

CX17B
Mini Excavator

Operator's Manual



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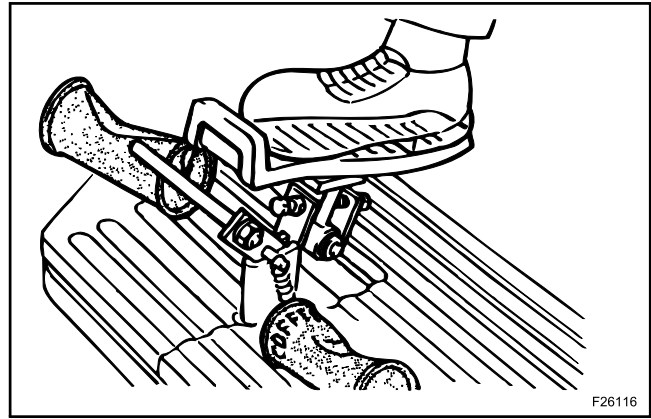
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1. SAFETY PRECAUTIONS

KEEP CLEAN CAB FLOOR AND OPERATOR'S SEAT

Do not place any parts and tools in the operator's cabin to prevent injury due to slipping and stumbling. Remove any debris from the cab floor, control levers, handrails, etc.

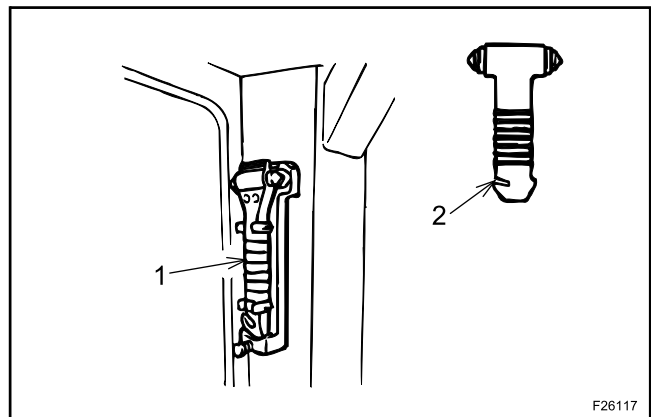
Make sure that all control levers are always clean.



KEEP CLEAN AROUND OPERATOR'S SEAT

HOW TO HANDLE LIFE HAMMER-CAB ONLY

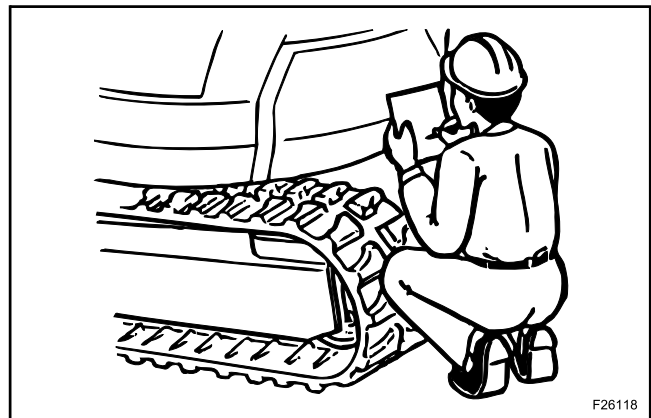
A life hammer is provided on the right side of cab. In case of emergency, take the life hammer (1), break the cab glass, and escape from the cab. In addition, the life hammer (1) is equipped with a cutter (2) on the lever side, to cut the seat belt, etc.



HOW TO HANDLE LIFE HAMMER-CAB ONLY

COMMISSIONING INSPECTION

Walk around the machine before commissioning it, perform a PRE-START inspection of the same and make note of any fault. If any problems are found, repair or replace defective components immediately. **DO NOT OPERATE THE MACHINE** until all problem areas are properly repaired. Always keep the windshield, working lamps, and mirrors clean for good visibility.

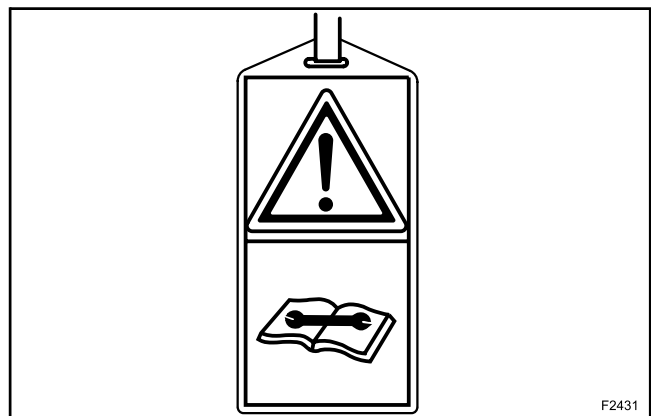


COMMISSIONING INSPECTION

APPLY NOTICE OF MAINTENANCE IN PROGRESS

Before performing any inspection or maintenance procedures to the machine, apply to the controls a "MAINTENANCE IN PROGRESS" tag, to warn persons not to start the machine.

Also inform the supervisor and all operators that the machine is under inspection or maintenance and they will be informed when the machine is ready for normal operation.

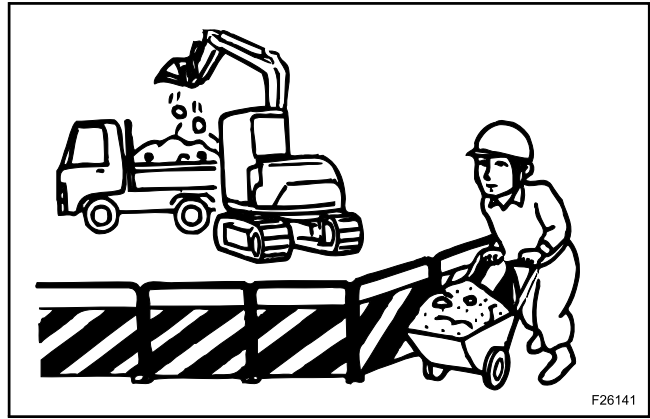


APPLY NOTICE OF MAINTENANCE IN PROGRESS

1. SAFETY PRECAUTIONS

SET LIMITS TO WORKING AREAS

Set limits around the working area to avoid collision or personal injury. Before starting to work, check for the presence of personnel or obstacles in the area around the machine. Use a flag man to guide the operator whenever necessary.



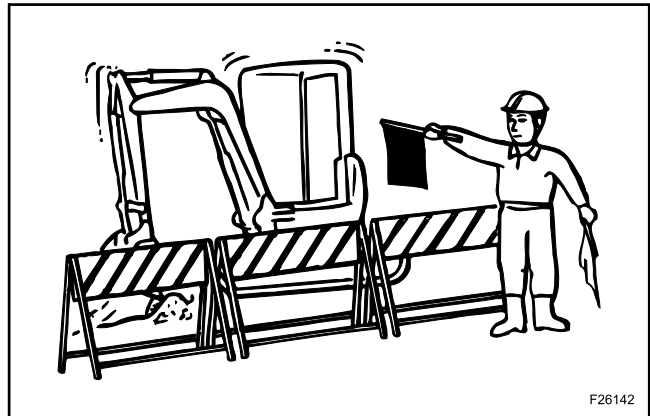
SET LIMITS TO WORKING AREAS

CAUTION FOR WORK IN URBAN AREAS

It is dangerous to allow other personnel to enter into the working area.

Make the working area off-limits to other people by providing caution signs.

Make sure to provide a flag man in working areas with heavy traffic to avoid accidents.

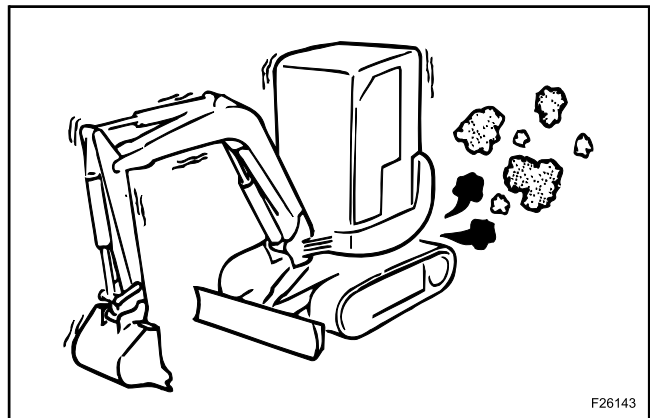


USE A FLAG MAN WHEN NECESSARY

DO NOT USE NON-SERVICED MACHINE

The use of non-serviced machine may cause an unexpected accident or breakdown.

Stop operation of a faulty machine. Make sure to repair any abnormalities before resuming operation.

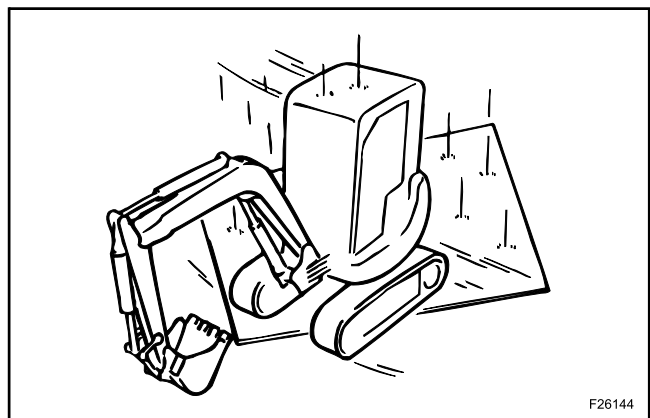


DO NOT USE NON-SERVICED MACHINE

SLIPPERY GROUND

Use caution when operating machine on boards or steel plates. Boards and steel plates become very slippery when wet.

Pay special attention when working on inclined areas. Provide a device to prevent skidding and proceed to work with extra care. Piled up tree leaves or branches also may cause skidding.



PAY ATTENTION TO SLIPPERY SLOPES

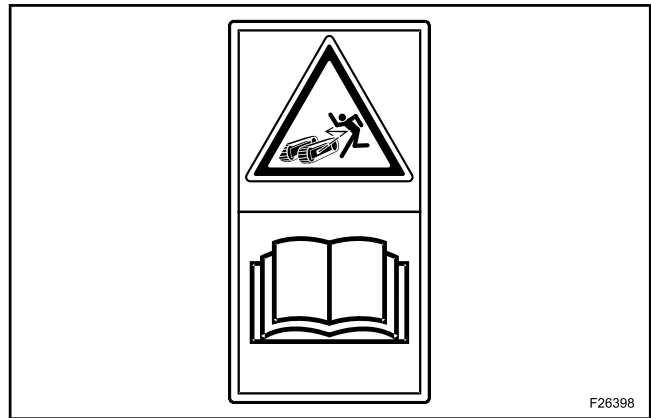
1. SAFETY PRECAUTIONS

ADJUSTING CRAWLER TENSION

The grease used to adjust the crawler tension is under extreme pressure in the cylinder. Use extreme caution when adjusting crawler tension.

KEEP FACE, HANDS AND LEGS AWAY FROM THE GREASE NIPPLE AREA.

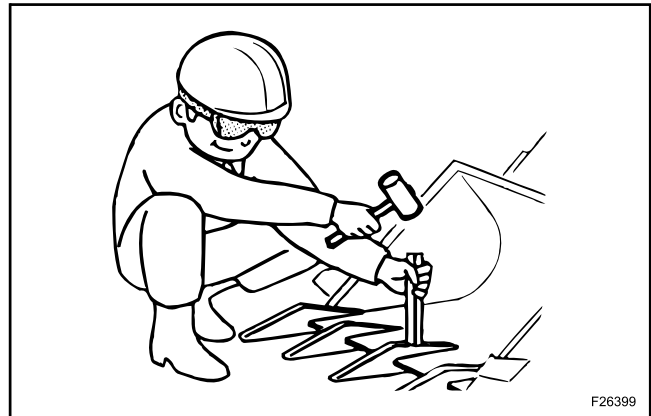
Carefully and slowly loosen the grease nipple when adjusting crawler tension. Never loosen grease nipple more than one complete turn. Refer to for the procedures to adjust the tension on the crawler **4-20**.



USE CAUTION WHEN ADJUSTING CRAWLERS

PAY ATTENTION TO BROKEN PIECES WHEN HAMMERING

Flying particles may cause injury when hammering hard metal parts, such as pin, edge, tooth, bearing, etc. Wear protective clothes such as protective glasses, safety hat, etc. during maintenance.



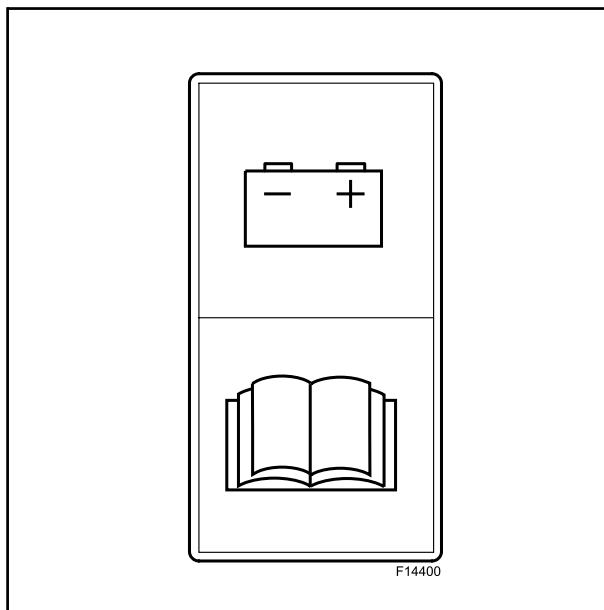
USE CAUTION WHEN HAMMERING

1. SAFETY PRECAUTIONS

13. BATTERY DECAL

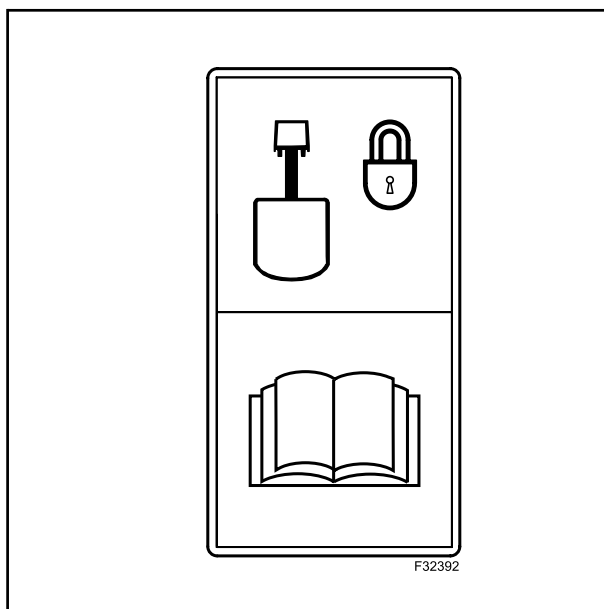
Located on battery box cover.

Hydrogen generates in the battery and it is easily flammable. Do not produce sparks and naked flames near a battery, to prevent this from catching fire and explode.



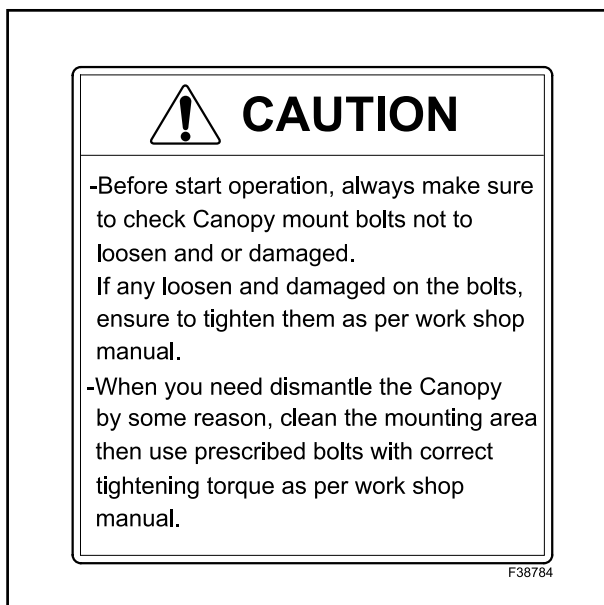
14. SLEWING LOCK

Located on the front lower side of the operator's seat.



15. CANOPY MOUNT BOLTS

Located on canopy support.

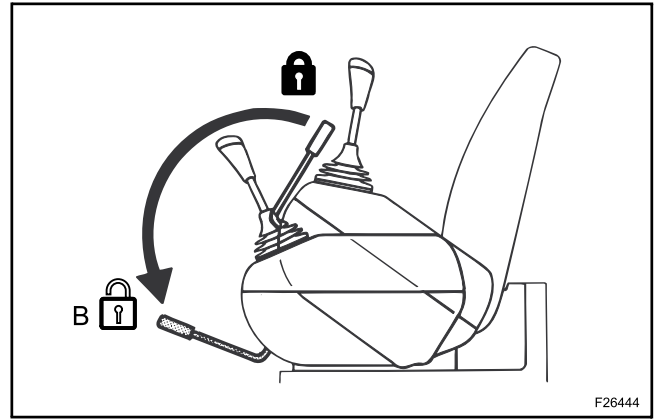


2. MACHINE FAMILIARIZATION



UNLOCKING HYDRAULIC SYSTEM "B"

When the safety lock lever is set in "UNLOCKED" position (down) all hydraulic functions are again released.



UNLOCKED POSITION (DOWN)

2. CONTROL LEVERS (ISO PATTERN)

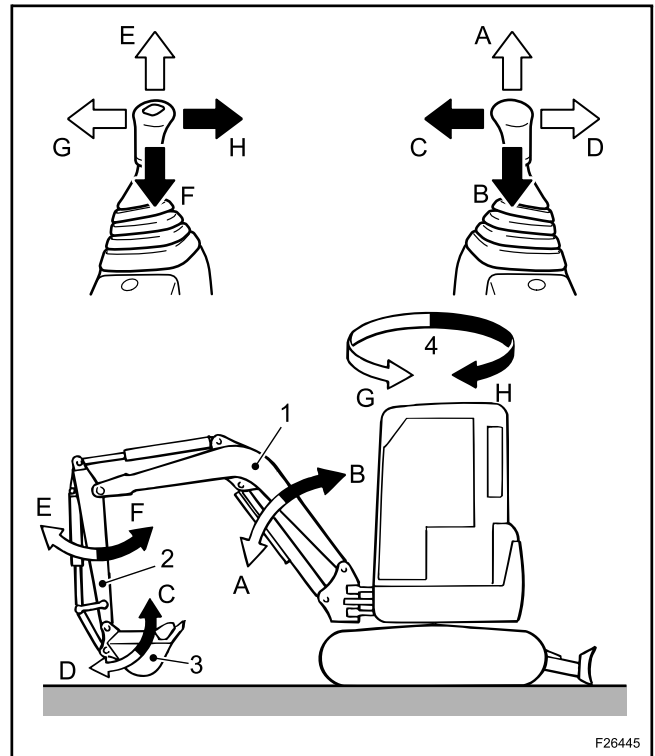
These two levers activate each function as illustrated on the right.

⚠ WARNING

- CONFIRM FOR SAFETY AROUND THE WORKING AREA. ALSO ENSURE THAT EACH LEVER OPERATION IS IN ACCORDANCE WITH THE OPERATING PATTERN INDICATED ON THE LABELS.
- IF LABELS DO NOT MATCH THE OPERATOR'S CONTROL PATTERN, REPLACE THEM IMMEDIATELY TO AVOID ACCIDENTS AND/OR INJURY.

NOTE: the operator's control levers return to neutral position when released, and the operation of attachment is stopped.

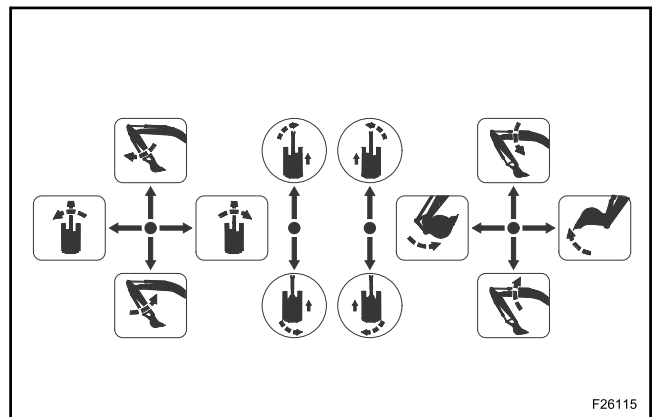
All functions can be activated simultaneously.



ISO OPERATING PATTERN

- ISO PATTERN

LEFT CONTROL LEVER	RIGHT CONTROL LEVER
2 E ARM OUT	1 A BOOM DOWN
F ARM IN	B BOOM UP
4 G SLEWING LEFT	3 C BUCKET IN
H SLEWING RIGHT	D BUCKET OUT



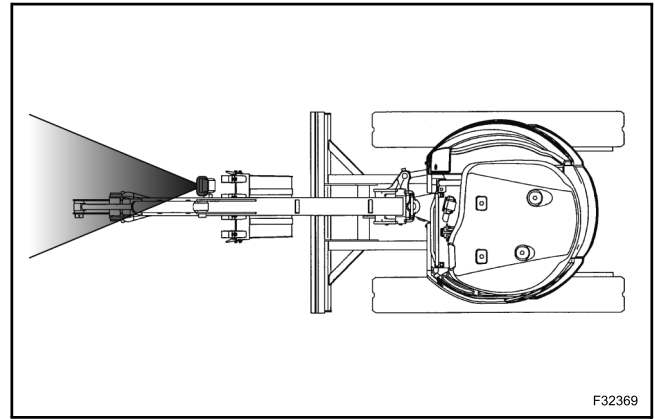
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2. MACHINE FAMILIARIZATION

2.4.7 ELECTRICAL EQUIPMENT

A. WORKING LIGHTS

A work lamp is provided on the boom for work at night, etc.



B. FUSE BOX (Main)

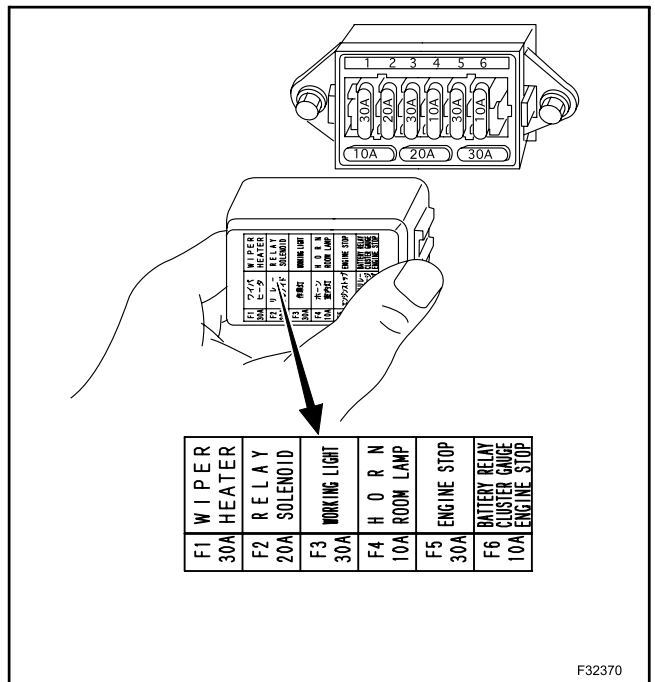
⚠ WARNING

MAKE SURE THE STARTER SWITCH IS IN THE “OFF” POSITION WHEN REPLACING FUSES.

The fuses protect the electrical system from excess current. If operation is not normal, a fuse may be blown. Replace blown or faulty fuses with the spare fuses as follows.

Replace any fuse generating white powder on it or in case that some looseness exists between the fuse and fuse holder.

- When replacing a fuse, replace it with one of the same capacity.
- The spare fuses are stored in the back side of fuse box cover.



No.	AMPS	FUNCTION
1	30A	WIPER, HEATER
2	20A	RELAY, SOLENOID
3	30A	WORKING LIGHT
4	10A	HORN, ROOM LAMP
5	30A	ENGINE STOP
6	10A	BATTERY RELAY, GAUGE CLUSTER, ENGINE STOP

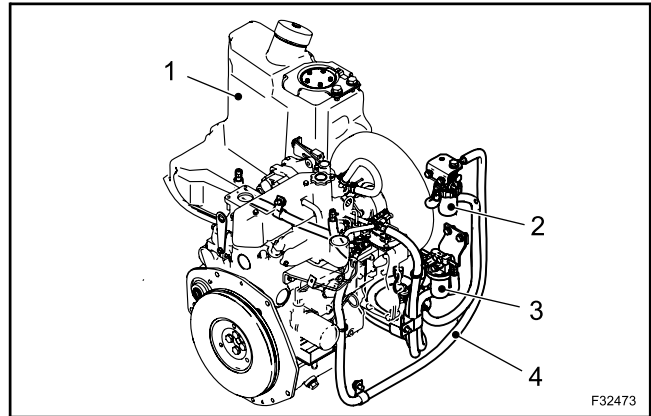
3. BASIC MACHINE OPERATION

F. CHECK FOR FUEL LEAKS

Check and repair any fuel leakage. Do not operate a machine leaking fuel. Fuel leaks can be caused by a faulty drain plug, by cracks in the hoses or by loose hose clamps.

Make sure to stop engine immediately after detection of a fuel leak. Repair fuel leak before resuming operation.

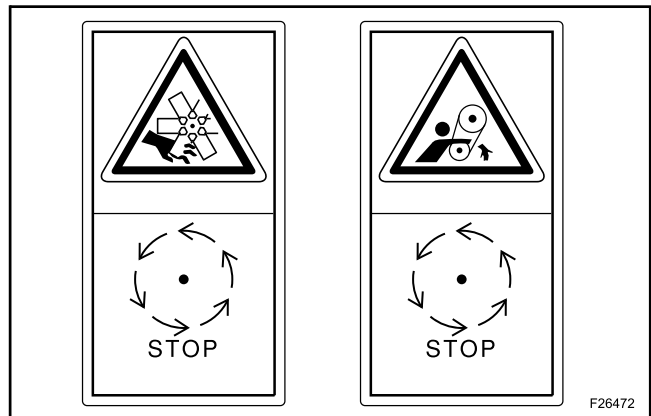
1. FUEL TANK
2. FUEL FILTER
3. WATER SEPARATOR
4. FUEL HOSE



G. INSPECT BELT CONDITION

▲ WARNING

ROTATING PARTS CAN CAUSE PERSONAL INJURY. KEEP AWAY FROM FAN AND BELT WHEN ENGINE IS RUNNING. MAKE SURE TO STOP ENGINE BEFORE SERVICING.

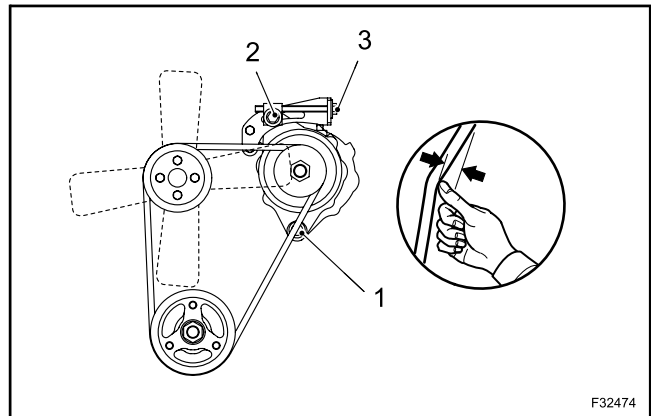


Check the fan belt for insufficient tension, wear, and damage. Insufficient belt tension may cause battery charge failure, engine overheating, or abnormal belt wear. Likewise, if too much tension is applied to the belt, the bearings or belt may be damaged prematurely. Apply a force of 98 N (22 lb) to the centre of belt between pulleys, and measure the belt deflection. The table below shows normal condition.

Belt deflection: 8 ~ 10 mm (0.31 ~ 0.39 in)

See the section **"250-HOUR (3-MONTH) INSPECTION AND MAINTENANCE"** for details on the inspection and adjustment procedure for the fan belt.

1. MOUNTING/PIVOT BOLT
2. ADJUSTING BOLT
3. ADJUSTING BOLT



3. BASIC MACHINE OPERATION

3.1.8 MACHINE OPERATION

The following instructions are aimed to provide the operator with the basic functions of each hydraulic control. To follow the instructions and to practice them, will allow the operator to become more skilful in the operation of this equipment. Read, understand and follow all safety precautions and operation procedures found in this manual before operating the machine or any attachment.

A. TRAVEL

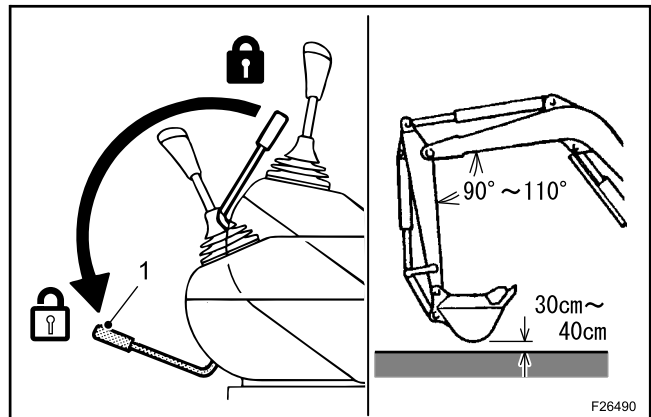
⚠ WARNING

MAKE SURE SWING AREA IS CLEAR OF PERSONS AND OBSTACLES BEFORE OPERATING THE ENGINE. ENSURE THE POSITION OF THE TRAVEL MOTORS, BEFORE STARTING TO TRAVEL AND SOUND THE HORN BEFORE BEGINNING THE WORK.

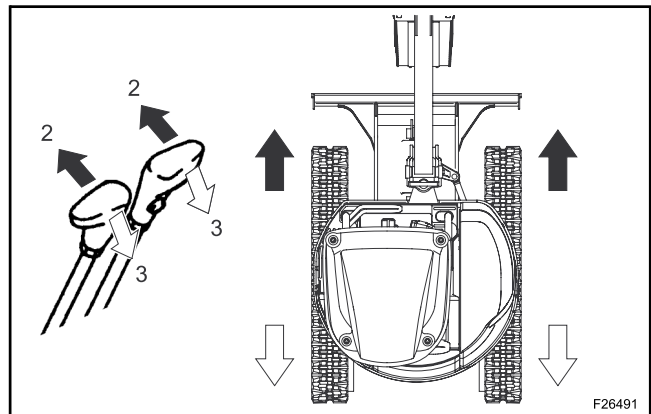
IF ANY ABNORMALITY IS FOUND DURING THE MACHINE OPERATION, IMMEDIATELY STOP WORKING. MAKE SURE TO REPAIR ANY FAULTY CONDITION BEFORE RESUMING OPERATION. NORMAL POSITIONING OF THE MACHINE, FOR THE PURPOSE OF DETERMINING FRONT, REAR, FORWARD AND REVERSE, IS WITH THE TRAVEL MOTORS LOCATED BEHIND THE OPERATOR'S CAB.

A.1 FORWARD/REVERSE TRAVEL

1. Make sure the safety lock lever (1) is in the "UNLOCKED" position (down). Operate the boom, arm, and bucket control levers to raise the attachments from the ground.
2. Operate the control lever to raise the dozer blade.

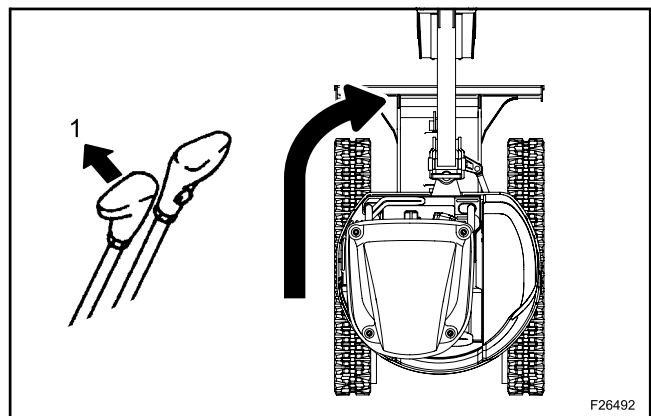


3. To move the machine forward, push both (right and left) travel levers forward simultaneously (2). To move the machine in reverse, pull back both travel levers simultaneously (3).
Travel speed changes depending on how far you push or pull the levers.



A.2 RIGHT TURN

- Push the left travel lever forward (1) to turn the machine RIGHT.
- Push the right travel lever forward (1) to turn machine LEFT.
- Pull the left travel lever back to turn machine LEFT in reverse.
- Pull the right travel lever back to turn machine RIGHT in reverse.



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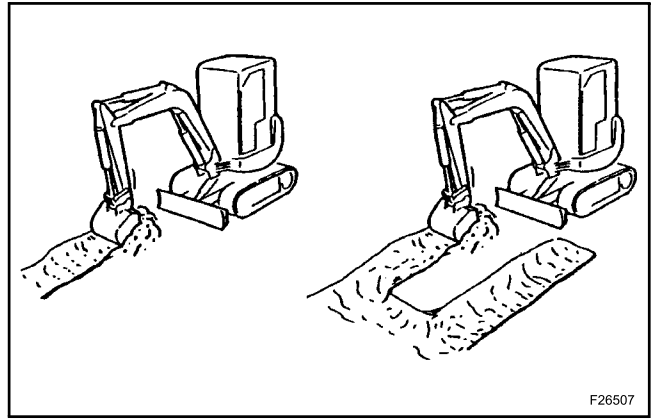
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3. BASIC MACHINE OPERATION

A.1 DITCH DIGGING

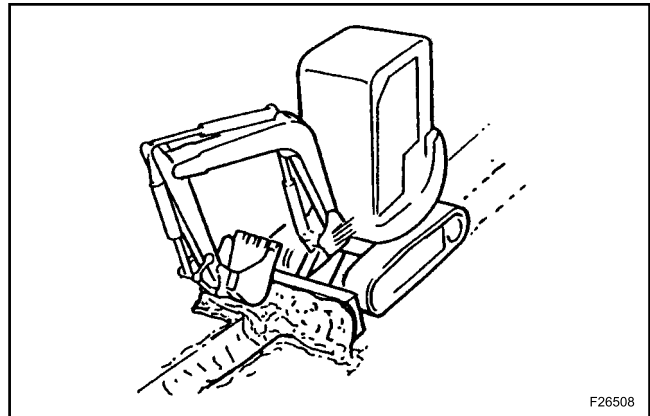
The working efficiency is much improved when the bucket is oriented correctly for digging ditches and parallel to a ditch.

For wide ditch digging, dig the two sides first, then dig the centre portion.



A.2 USING THE DOZER BLADE

1. The dozer blade is used to push the soil back into an excavated ditch, or for ground levelling.
2. Scrape the soil laid on the ground at its upper or side face with the dozer blade. Adjust the height of dozer with the dozer blade control lever to avoid overloading the engine.



A.3 OFFSET DIGGING

⚠ WARNING

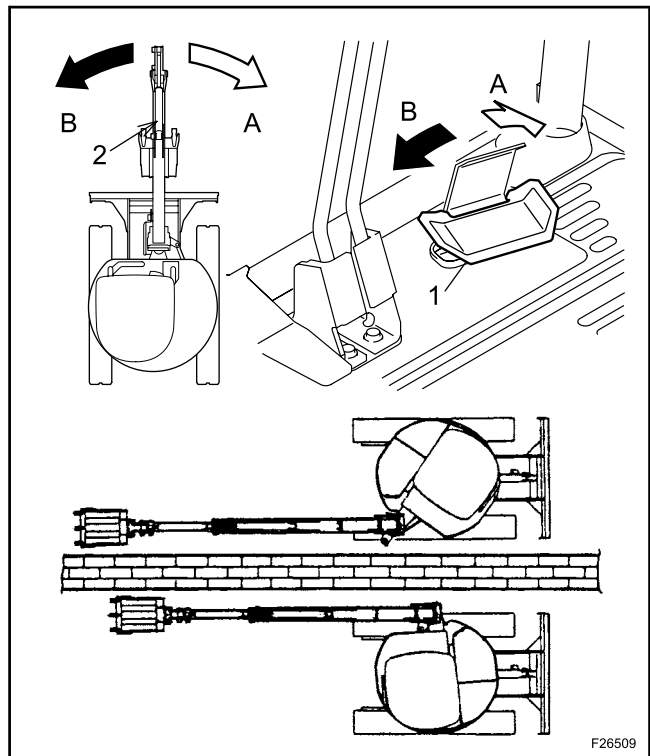
AS THE BOOM SWING OPERATING RANGE IS WIDER, OPERATE THE ATTACHMENT PAYING ATTENTION TO THE SURROUNDING CONDITIONS.

By depressing the left and right sides of the swing pedal (1) alternatively, the boom (2) swings in left and right directions, enabling offset digging in narrow spaces.

By depressing the left side of swing pedal, the boom swings leftward, and by pressing the right side the boom swings rightward.

The advantage of this function is that it enables offset digging work as shown in the figure.

- A. SLEWING RIGHT
- B. SLEWING LEFT



3. BASIC MACHINE OPERATION

B. OPERATION IN MARITIME OR SALTY CLIMATE

B.1 BEFORE OPERATION

- Check all mounting hardware for proper tightness. Torque to proper value to aid in preventing salt from entering the machine systems.
- Apply grease to the electrical equipment as required to prevent corrosion.

B.2 PRECAUTIONS AFTER OPERATION

Wash the machine thoroughly to remove salt. Apply oil or grease as necessary to prevent corrosion of mechanical pieces.

C. CARE FOR ELECTRICAL EQUIPMENT

The electrical equipment is especially sensitive to water. Be careful not to expose the electrical equipment to water when washing the machine or when it is raining. The electrical components (relays, fuses, etc.) are installed in the vicinity of the operator's seat.

Never expose the operator's seat to water.

D. OPERATION IN DUSTY AREAS

D.1 AIR CLEANER

Clean or replace the element at the corresponding interval. See "Maintenance" section for details.

D.2 RADIATOR

Clean the radiator regularly to prevent the radiator core from becoming clogged with dust.

D.3 FUEL

Be careful not to let contamination in the fuel when refuelling. Inspect the elements and filters at the corresponding interval.

D.4 ELECTRICAL EQUIPMENT

Clean the starter and generator especially, at the corresponding interval, to prevent dust from accumulating. See 4. "MAINTENANCE" section for details.

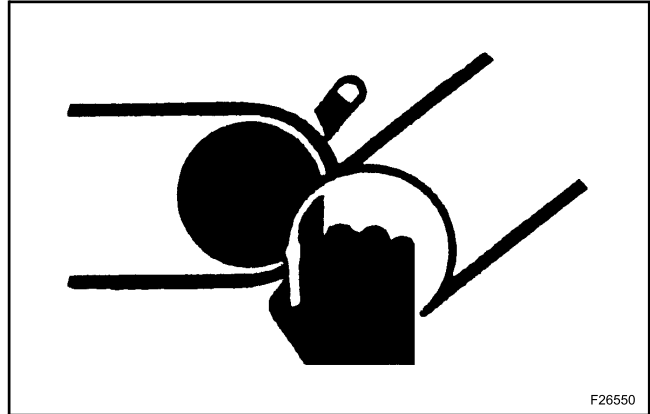
4. MAINTENANCE

P. CAUTION DURING BUCKET REPLACEMENT

Never insert your finger into the pin bores.

When aligning the pin bores, never insert your finger, hands or arms into them.

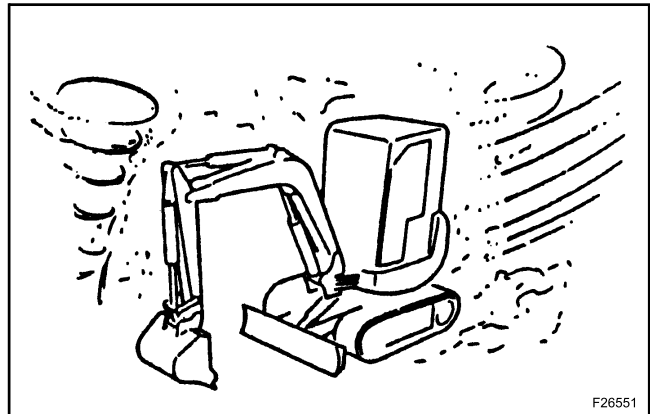
The alignment check must be carried out visually.



Q. DUSTY ENVIRONMENT

When the machine is operated in dusty environments, take the following precautions.

- Frequently check for the indicator for air cleaner restriction. Clean up the air cleaner element before the specified period.
- Clean up the radiator before the prescribed time interval to prevent its clogging.
- Clean up and replace the fuel filter element before the prescribed specific term.
- Clean up the electric components, especially the starter and generator, so as not to allow deposits of dust on them.



R. CLEANING PARTS

Use only approved cleaning solvents and proper equipment to clean parts.

▲ WARNING

NEVER USE GASOLINE, OR OTHER FLAMMABLE SOLVENTS TO CLEAN PARTS.

ALWAYS CLEAN PARTS IN A WELL VENTILATED AREA.

4. MAINTENANCE

4.9 RELEASING INTERNAL PRESSURE FROM THE HYDRAULIC SYSTEM

To avoid injury, release the internal pressure of the hydraulic system before carrying out any maintenance work. Read the instructions in the following section.

A. RELEASING HYDRAULIC SYSTEM AND OIL TANK PRESSURE

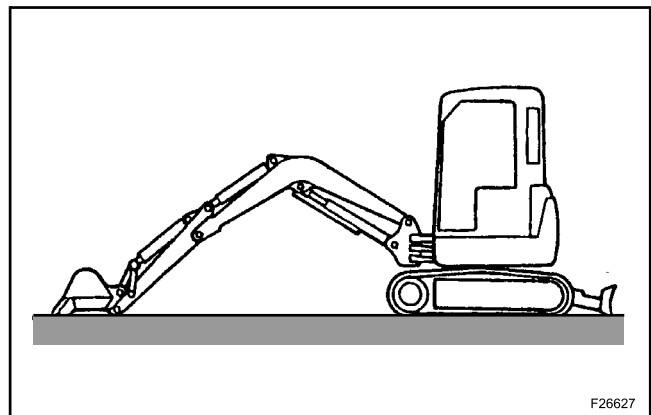
⚠ WARNING

- **NEVER CHANGE OILS OR FILTERS ON A MACHINE THAT HAS JUST FINISHED WORKING. ALLOW MACHINE TO COOL FIRST UNTIL OILS AND FLUIDS ARE WARM NOT HOT.**
- **RELEASE HYDRAULIC TANK PRESSURE, BEFORE WORKING WITH ANY HYDRAULIC COMPONENT, ACCORDING TO THE PROCEDURES PROVIDED BELOW.**
- **WHEN REPLACING ANY HOSE OR SEALS, MAKE SURE THE ATTACHMENTS ARE WELL SECURED TO AVOID SUDDEN MOVEMENT OF ATTACHMENT. SLOWLY REMOVE BOLTS TO RELEASE ANY HYDRAULIC PRESSURE DURING DISASSEMBLY.**

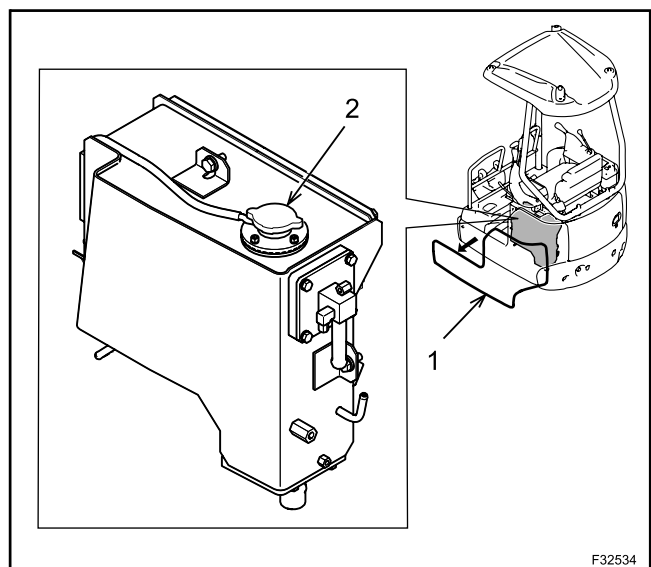
NOTE: the above procedure is the only way to release internal pressure.

1. Park the machine on a level surface as shown in the right figure. Fully retract the arm cylinder and bucket cylinder. Then lower the boom to place the bucket on the ground, and lower the dozer blade.
2. In case of pilot operating lines (boom, arm, bucket, swing) stop the engine, then operate the control levers to release pressure in each line.
3. Set the safety lock lever to "LOCKED" position.
4. Make sure that the hydraulic oil temperature is below 40 °C (104 °F).
5. Stop the engine, remove the starter key and wait until the machine is cold.
6. Remove the left side cover (1).
7. Slowly loosen the cap (2) about half turn to release the inside pressure.
8. This completes the bleeding of pressure remaining in the hydraulic tank.

To maintain the system, check it often.



HYDRAULIC OIL CHECK POSITION



4. MAINTENANCE

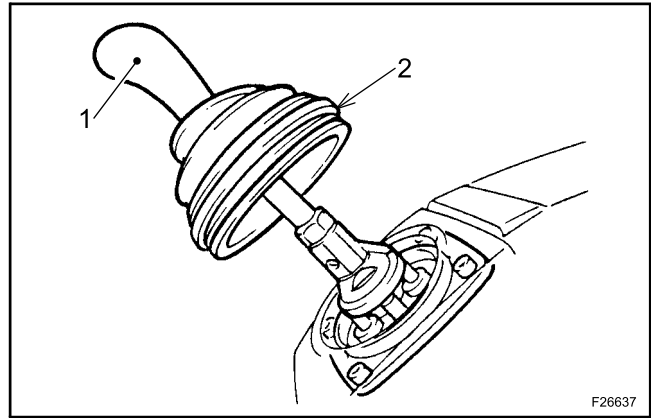
Components	Item	Interval	When re-quired	Pre-start 8H	Every week 50H	Every 3 months 250H	Every 6 months 500H	Every 12 months 1000H	2000H	5000H	Lubricant etc. (Replacing part)**	Reference page	
Electrical equipment	Checking damage of the electrical wirings		O									4-38	
	Battery												
	Checking the fluid level				O							Distilled water	4-45
	Measuring the specific gravity												
	Checking the function of warning lamps			O									3-9
Electrical equipment	Checking switches/levers			O									3-15
	Replacing work lamp (Lamp)		O								12V 55W (Halogen lamp)		4-31
	Checking abnormal deformation and damage of the machine exterior			O									4-39
Others	Checking looseness and missing of the bolts and nuts			O									4-39
	Control lever	Checking		O									3-15
		Lubrication	O									Grease	4-38

4. MAINTENANCE

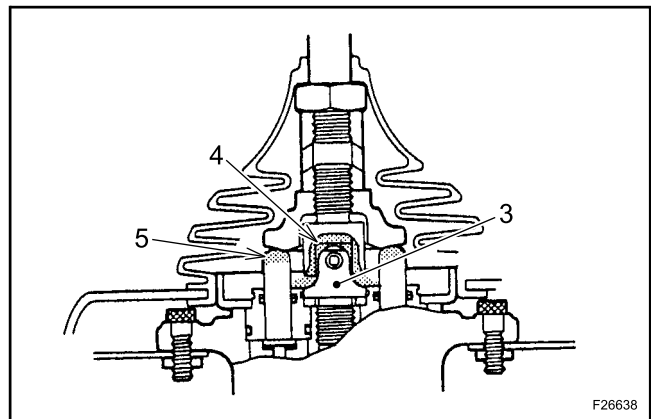
G. LUBRICATION OF CONTROL LEVERS

When a control lever becomes heavy to operate or does not move smoothly, apply grease to the sliding and rotating portion (4) and the top portion (5) of the universal joint (3).

1. Place the machine on a firm and level ground, and engage safety control lever on "LOCK" position. Stop the engine, pull out the starter key.
2. Carefully raise up the rubber boot (2) and the control lever (1) paying attention not to damage them.
3. Apply grease on the sliding parts and on the 4 places of rotating portion (4) and the top (5) of the universal joint (3).
4. Set back the rubber boot (2) to the original position.
5. Check for any loose assembly of pilot valve. If loose retighten the socket bolts.
6. Contact the dealer/distributor for additional service.



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H. CHECK ELECTRIC WIRING AND FUSES

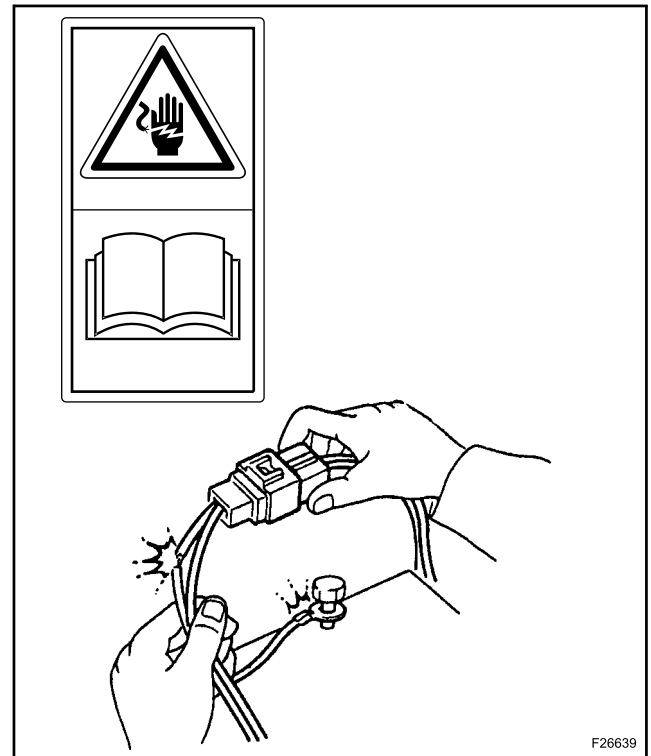
⚠ WARNING

- IF SHORT CIRCUIT TRACES ARE NOTICED ON THE ELECTRIC WIRING, ADDRESS TO AN AUTHORIZED DEALER.
- BEFORE CHECKING THE ELECTRICAL SYSTEM, DISCONNECT THE NEGATIVE (-) BATTERY CABLE.
- SHORT CIRCUITING MAY CAUSE FIRE.

NOTE: refer to 2-22 for the replacement of fuses.

⚠ WARNING

ALWAYS MAKE SURE TO INSTALL FUSES OF CORRECT AMPERAGE, TO AVOID OVERLOADING AND DAMAGING THE ELECTRIC SYSTEM.



F26639

4. MAINTENANCE

No.	GREASING POINTS	Q.ty	No.	GREASING POINTS	Q.ty	No.	GREASING POINTS	Q.ty
1	Dozer blade cylinder rod pin	1	2	Dozer blade cylinder foot pin	1	3	Dozer blade foot pins	1
4	Boom foot pin	1	5	Boom cylinder foot pin	3	6	Boom cylinder rod pin	1
7	Arm cylinder foot pin	1	8	Arm cylinder rod pin	1	9	Boom/arm connecting pin	2
10	Bucket cylinder foot pin	1	11	Bucket cylinder rod pin	1	12	Swing cylinder foot pin	1
13	Swing cylinder rod pin	1	14	Swing bracket/frame connecting pin				2

B. ENGINE OIL CHANGE

⚠ WARNING

DO NOT CHANGE OIL IMMEDIATELY AFTER STOPPING THE ENGINE. THE ENGINE AND OTHER PARTS ARE VERY HOT AFTER BEING STOPPED. TO AVOID BURNS, ALLOW THE ENGINE TO COOL BEFORE DOING OIL CHANGE.

NOTE: the first oil change must be done at 50 hours for a new machine engine.

Place a container to catch drain oil.

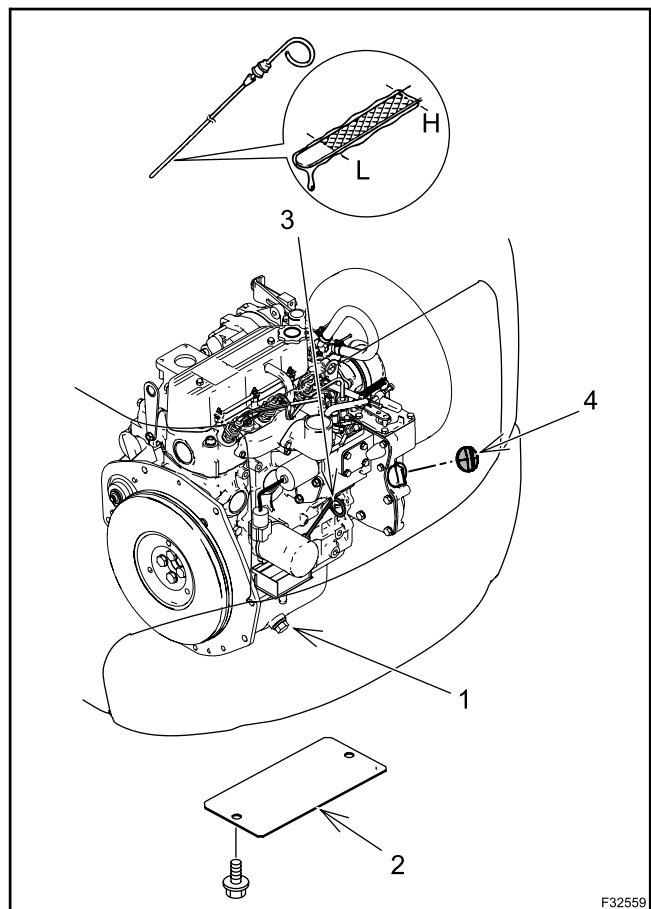
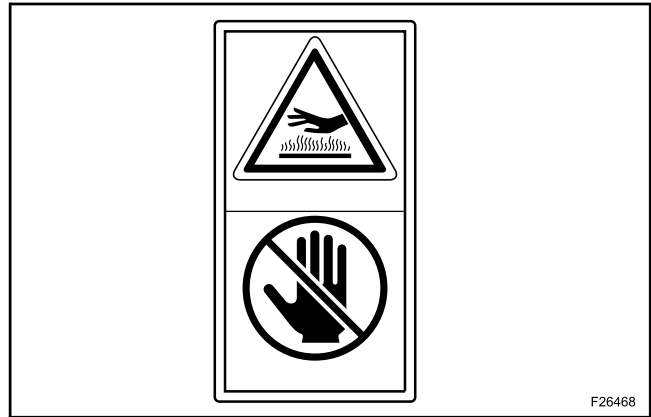
Container to receive drained oil:

4.0 L (1.06 gal) or more capacity

Oil volume to be refilled:

3.1 L (0.82 gal) (Upper limit of standard volume.)

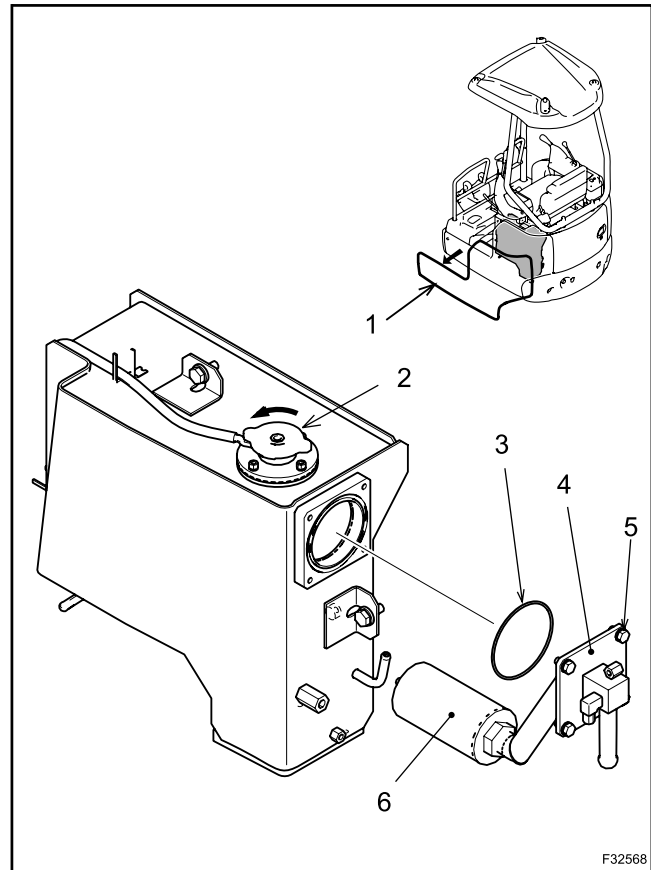
1. Move the machine to a firm, level ground and run engine for 5 minutes if engine has been off for 1 or more hours to warm the oil. Stop the engine.
2. Under the engine loosen the cover plate bolts and remove the cover (2).
3. Clean around yellow oil filler cap (4), remove the cap (4).
4. Slowly loosen drain cap (1) so that the oil does not splash over yourself.
Make sure to contain any oil spillage.
5. Inspect the drained oil for metal particles or foreign materials. If any are found, contact the distributor.
6. Securely tighten the drain plug (1).
7. Fill with the specified engine oil through oil filler port (4) slowly.
Refer to **4-10** for the proper oil and oil quantity to use.
8. Install oil filler cap (4).
9. Before starting the engine, check the engine oil level using the dipstick (3). The level should be between the "H" and "L" limits as shown in the figure. Start and run the engine for 5 minutes. Then stop the engine and check the oil level after 30 minutes. Add oil if necessary to obtain the correct level.
10. Install under cover (2) just below the engine to the regular position.



4. MAINTENANCE

4. Slowly loosen the cap (2) about half turn to release the inside pressure.
5. Remove bolt (5) and cover (4) from the side surface of the tank.
6. Take out element (6) out from the tank.
7. Replace O-ring (3) fitted on the face of cover (4).
8. Clean the parts taken out with light oil.
9. Install element by the reverse procedures of items (5) and (6) above-mentioned.
10. Install cover (4).
Tightening torque: $23.5 \pm 2 \text{ Nm}$ ($17 \pm 1.4 \text{ lbf}\cdot\text{ft}$)
11. Start and run the engine at idle. Moving the machine controls to remove air from the system. Then place the machine in position to check the oil level. Stop the engine and check the oil level adding oil if need.
12. Install the left side cover (1).

NOTE: machine equipped with a breaker attachment reduce the hydraulic oil life. A reduced service hours interval must be followed. Refer to the service interval specified on page 7-11.



4. MAINTENANCE

4.20 5000-HOUR INSPECTION AND MAINTENANCE

Thoroughly read and understand the chapter “**SAFETY PRECAUTIONS**” of this MANUAL before operating or servicing the machine. Perform together with 8 to 1000-hour inspection and maintenance.

A. HYDRAULIC OIL CHANGE

▲ WARNING

AVOID INJURY

Do not change oils or filters on a machine that has just finished working. Allow machine to cool first until oils and fluids are warm, not hot.

Release hydraulic tank pressure before working with any hydraulic component.

Container to receive drained fluid:

20 L (5.3 gal) or more capacity

Volume to be filled in:

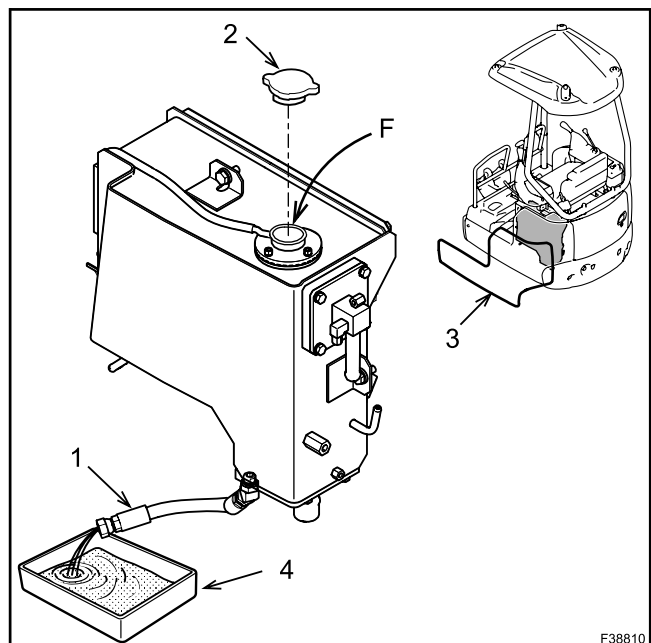
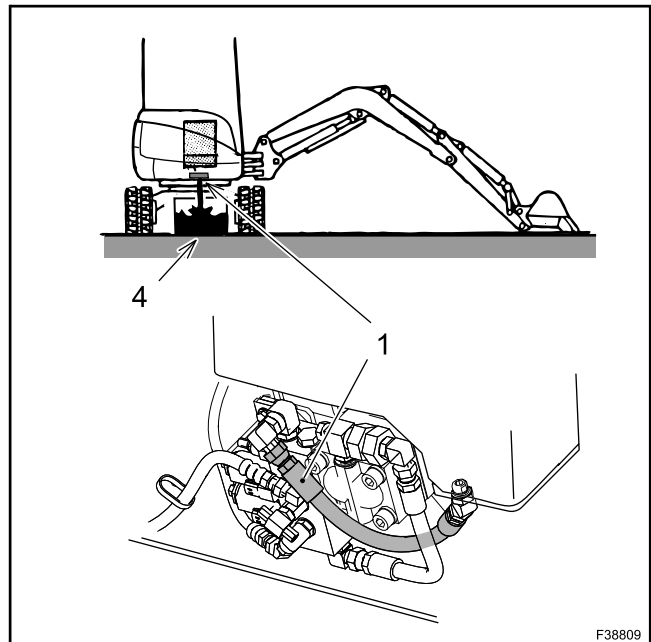
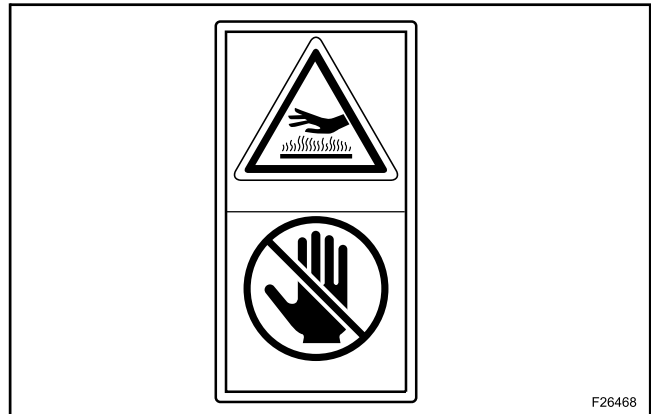
9 L (2.4 gal)

1. Slew the machine so that the hose (1) on the hydraulic oil tank comes to midway between the both crawlers.
2. Remove the left side guard.
3. Carry out the work in the same procedure referring to items [2] to [4] in **4-57, 4-55**.
4. Release the remaining pressure of the hydraulic tank, remove the cap (2).
5. Put a oil pan (4) under the hose (1). Loosen the union nut of the hose (1), and drain the remaining oil.
6. Tighten the union nut of the hose (1).
Tightening torque: $73.5 \pm 5 \text{ Nm}$ ($54.2 \pm 3.7 \text{ lbf}\cdot\text{ft}$)

IMPORTANT:

When loosening the hose (1), avoid contact with oil.
Do not drop tools or nuts / bolts, etc. into hydraulic tank.

IMPORTANT: dispose of all hazardous waste in accordance with government environmental regulations.



7. OPTIONAL EQUIPMENT

7. OPTIONAL EQUIPMENT

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