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4.1 GENERAL INFORMATION

WARNING

READ, UNDERSTAND AND FOLLOW ALL SAFETY PRECAUTIONS CONTAINED IN THIS MANUAL BEFORE PERFORMING ANY INSPECTION OR MAINTENANCE PROCEDURES ON THIS MACHINE, ITS SYSTEMS OR COMPONENTS.

A. It is recommended by KOBELCO AMERICA INC., that an inspection and maintenance schedule be developed and maintained on a regular basis for this machine. Developing and maintaining such a schedule, helps to keep the machine in optimum operating condition. See Figure 4.3A.

B. The information contained in this section gives the proper procedures for performing inspection and maintenance functions for this machine. Use these procedures when performing inspection and maintenance as they will guide the technician step by step for each procedure. Also, refer to the Inspection and maintenance charts for general service interval recommendations.

NOTE

The inspection and maintenance charts provided in this section give only general time intervals. It may be necessary to develope a custom schedule to perform machine maintenance at more frequent intervals based on the work conditions.

C. Use only KOBELCO oils, fluids, lubricants, filters and replacement parts to keep machine in optimum operating condition. See Figure 4.3B.

4.2 GENERAL SAFETY

A. Disposal of Hazardous Waste– FIGURE 4.3C

Dispose of waste oils, fluids, lubricants, filters and other hazardous waste properly.

CAUTION

Dispose of all hazardous waste in accordance with government environmental regulations, laws and codes.

B. Keep Machine Clean– FIGURE 4.3D

Thoroughly clean machine before performing Inspection and maintenance procedures. It is easier and safer to locate problems, perform maintenance and also reduce the risk of hydraulic system contamination when machine is clean.

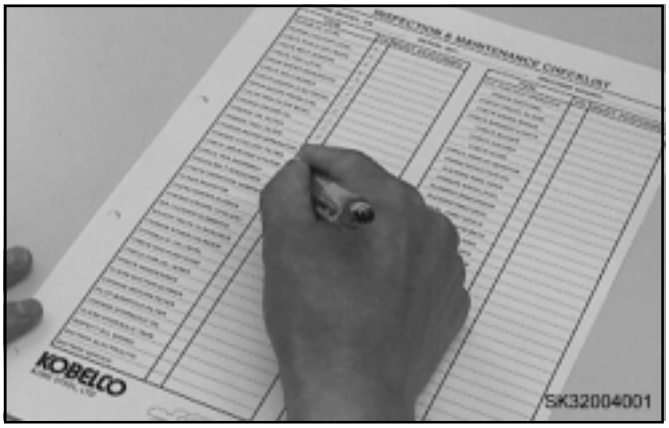


FIGURE 4.3A

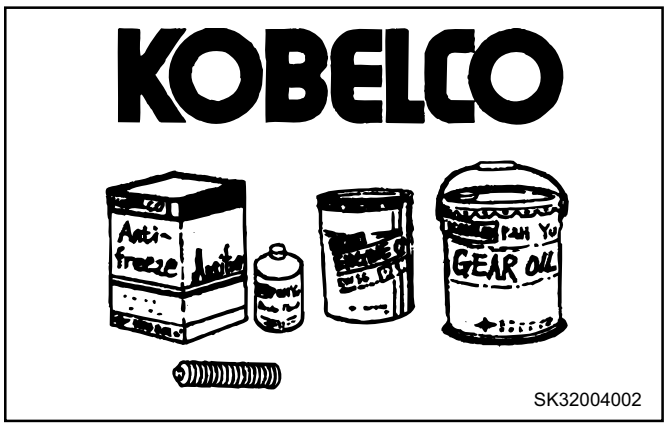


FIGURE 4.3B

FIGURE 4.3C

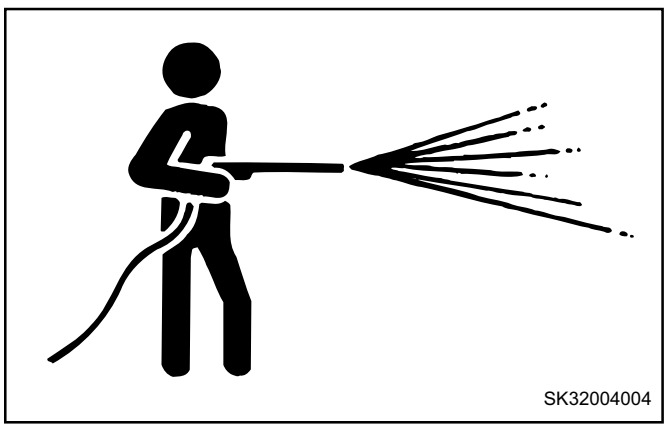


FIGURE 4.3D

C. Hot Surfaces & Fluids– FIGURE 4.4A

Use caution and wear the proper safety equipment when working around hot areas. Never change oils, engine coolant or filters immediately after a machine has been stopped. Allow machine to cool down before performing maintenance procedures.

D. Warm Engine Oil

Engine oil should have a temperature should be between 20°C ~ 40°C (68°F ~ 104°F) before the oil is changed. If necessary run engine until the oil is warm within the recommended oil change temperature.

E. "Tag-Out" Machine– FIGURE 4.4B

Before beginning any inspection or maintenance procedures, secure a "DO NOT OPERATE" tag to the operators console to inform the operator that the machine will be inoperable for inspection and maintenance. This tag will help prevent accidental starting of the machine. Order tag P/N: YN20T01320P1

F. Inspect Waste Oils and Filters– FIGURE 4.4C

Before disposal, inspect all waste oils, fluids and filters for debris and foreign material. It is recommended to cut open the oil filters to determine any abnormal wear.

G. Prevent Contamination– FIGURE 4.4D

Always cap or plug lines when hydraulic components are removed to help prevent hydraulic system contamination that can be caused by dirt, dust and debris entering a line or port.

CAUTION

Never allow a hydraulic line or component to become contaminated. This could cause severe system damage. Contact an authorized KOBELCO dealer to obtain the proper caps and plugs to be used on this machine. Refer to Specification's Section, page 6-41, for proper part numbers.

H. Seals & "O"-Rings

Always replace seals and "O"-Rings with new parts. Never reuse a seal or "O"-Ring during reassembly of components. Make sure to lubricate all new seals with the appropiate oil before installation.

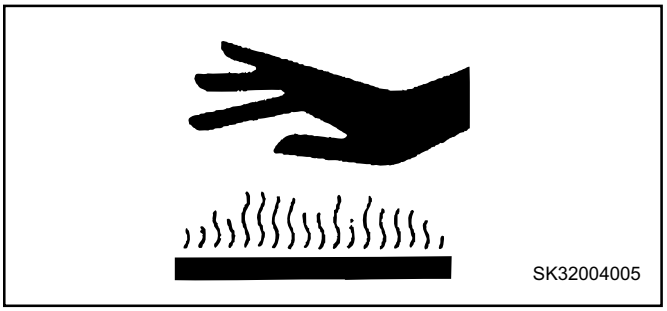


FIGURE 4.4A

FIGURE 4.4B

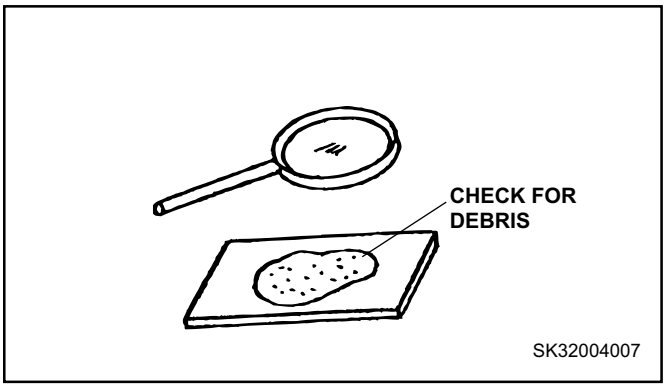


FIGURE 4.4C

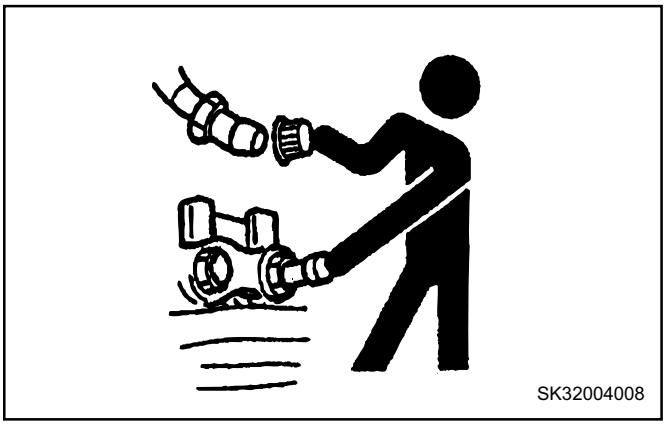


FIGURE 4.4D

I. Stop Engine

Never attempt any MAINTENANCE with engine running. Always stop the engine and allow machine to cool .

J. Wear Safety Equipment– FIGURE 4.5A

Wear hard hat, safety goggles or face shield, work gloves, safety shoes and well fitting work clothes when performing inspection and maintenance procedures on this machine.

K. Cleaning Parts

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

WARNING

NEVER USE GASOLINE, DIESEL FUEL OR OTHER FLAMMABLE SOLVENTS TO CLEAN PARTS. ALWAYS CLEAN PARTS IN A WELL VENTILATED AREA.

L. Hydraulic Tank Pressure

Always release the internal pressure of the hydraulic tank before performing inspection or maintenance procedures.

1. Remove cap and depress valve to release air pressure from the reservoir. See Figure 4.5B.

CAUTION

Gasses from hydraulic tank may be hot. Wear safety equipment.

M. Welding Safety

1. Turn key switch to “OFF” position. Wait 4 seconds for electrical power to disconnect. See Figure 4.5C.

2. Remove negative (-) cable from battery terminal. See Figure 4.5D.

3. Attach the welder ground cable within 1 M (3’-3”) away from component being welded.

4. Make certain that the welder ground is not located at a seal or bearing.

5. Make certain that no bearings nor seals separates the welder ground and the weld area.

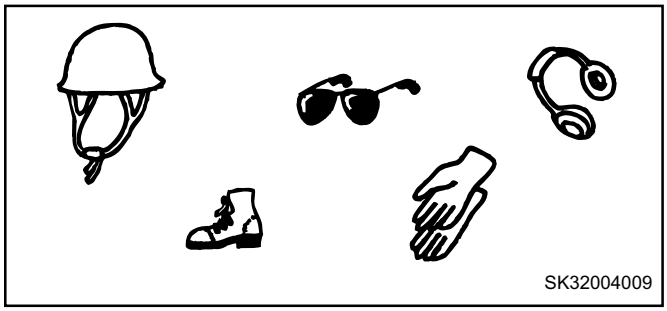


FIGURE 4.5A

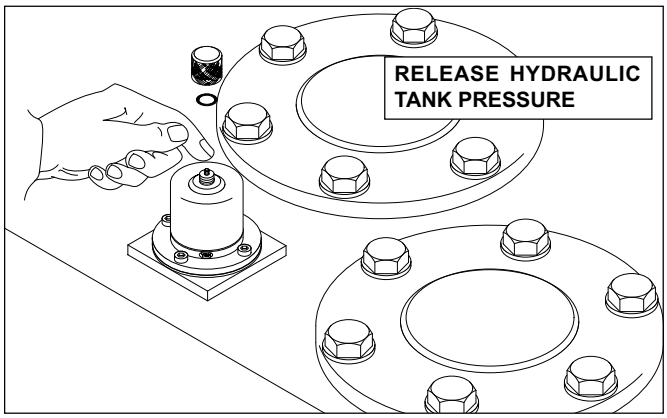


FIGURE 4.5B

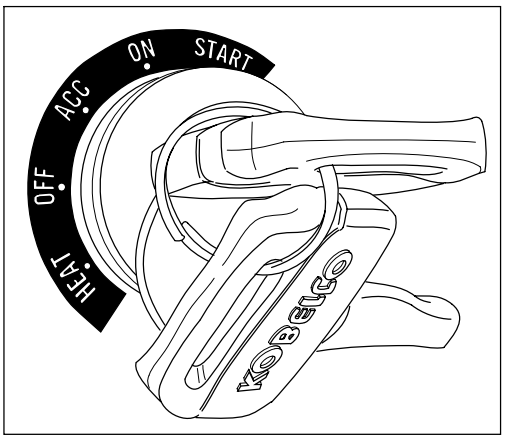


FIGURE 4.5C

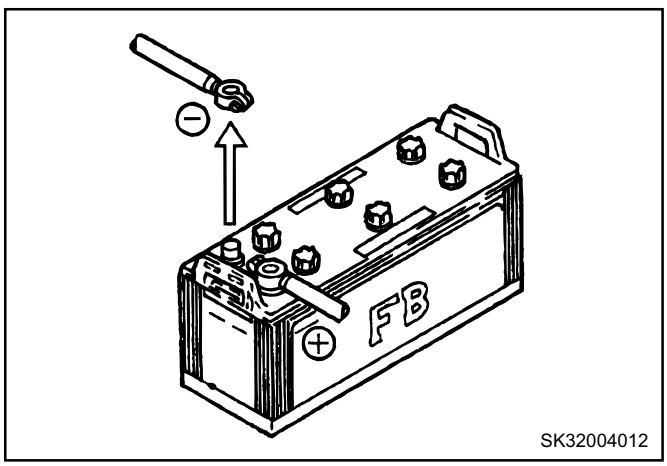


FIGURE 4.5D

N. Releasing Hydraulic System and 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.

1. Move the machine to firm level ground and place the attachments on the ground in the oil check position as shown in Figure 4.6A.

2. Stop the engine.

3. Make sure to place the ignition key in “ON” postion and the safety lever is in the unlocked (down) position.

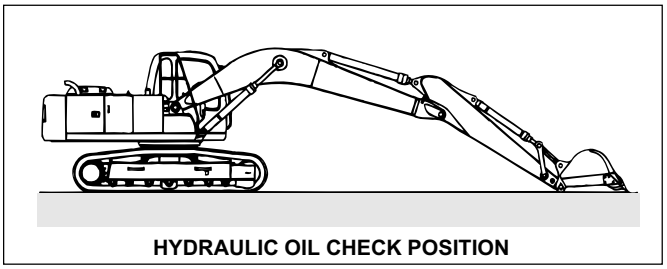
4. Shift the right and left travel control levers shift forward and backward, operate the right and left control levers in full stroke several times.

5. Remove cap and depress hydraulic relief valve located on the upper surface of hydraulic tank to release the pressure in the hydraulic tank. See Figure 4.6B.

6. Carry out the inspection and/or maintenance of hydraulic system.

WARNING

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.



HYDRAULIC OIL CHECK POSITION

FIGURE 4.6A

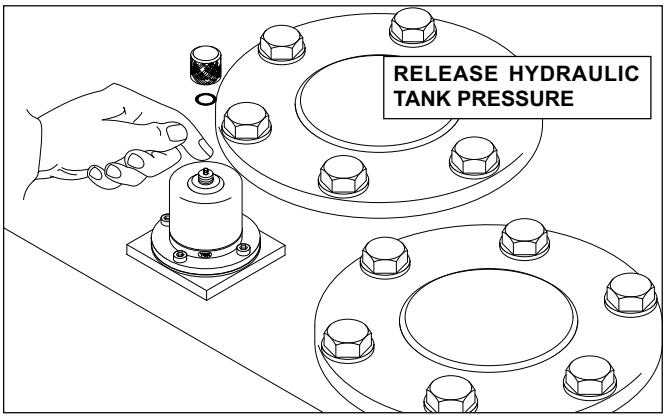


FIGURE 4.6B

NOTE

THE HYDRAULIC RELIEF VALVE ON SOME EARLIER SK210(LC)/SK250(LC)-VI DYNAMIC ACERA MACHINES DO NOT HAVE A HARD CAP; INSTEAD THESE VALVES HAVE A RUBBER CAP. ON THESE VALVES, DEPRESS THE RUBBER CAP TO RELEASE HYDRAULIC TANK PRESSURE.

4.3 INSPECTION & MAINTENANCE CHART

Follow the chart below for recommended intervals of regular inspection and maintenance procedures.

WARNING

READ, UNDERSTAND AND FOLLOW ALL SAFETY PRECAUTIONS FOUND IN THIS MANUAL BEFORE PERFORMING INSPECTION & MAINTENANCE.

SYSTEM	MAINTENANCE TO PERFORM	LOCATION	INTERVAL (Working Hours)							
			8	50	120	250	500	1000	2000	Page
ENGINE	Check oil level	Eng. left side	X							4-12
	Check coolant level	Rear left compartment	X							4-12
	Check for fluid leaks	Complete engine	X							4-13
	Check belt tension	Front of engine	X							4-33, 4-38
	Check air cleaner	Air cleaner compartment	X							4-13
	Check engine electrical	Complete engine	X							4-14
	Change engine oil	Oil pan		O			X			4-24
	Change oil filter	Bottom RH side of engine		O			X			4-24
	Change fuel filter & clean priming pump gauze filter	Engine LH side		O			X			4-28
	Check air intake system	Hoses and clamps		O			X			4-26
	Check fan assembly	Front of engine		O				X		
	Check radiator cap and hoses	Radiator				X				4-40
	Check belt tensioner & adjust belts	Front of engine		O		X				4-38
	Clean debris screen	Front of radiator or front of oil cooler		OX						4-27
	Clean radiator core and compartment	Radiator and LH compartment		OX						4-27
	Check foam seals	Engine & radiator compartments		OX						4-27, 4-61
	Change engine coolant	Radiator and engine							X	4-45
	Change air cleaner elements	Air cleaner compartment						X		4-13
	Adjust valve clearence	Engine top						OX		4-44
	Check engine compression	Engine						X		4-44
	Lubricate water pump bearing	Engine		O			X			4-25
	Check injection timing	Engine						X		4-44
	Check injection pressure	Engine					X			4-44
	Check injection nozzle atomization	Engine					X			4-44
	Check starter and alternator	Engine						X		4-44
FUEL SYSTEM	Check fuel level	Gauge cluster	X							4-15
	Drain water and deposits from fuel tank	Fuel tank bottom		X						4-26
	Drain water separator	Hyd. pump compartment		OX						4-26
	Check and clean fuel tank cap & strainer	Fuel tank					X			4-42

O - Break in (After first 50 Hrs) Inspection & Maintenance Required.
X - Regular Inspection & Maintenance Required.

SYSTEM	MAINTENANCE TO PERFORM	LOCATION	INTERVAL (Working Hours)							
			8	50	120	250	500	1000	2000	Page
HYDRAULIC SYSTEM	Hydraulic oil level	RH side of hyd. tank	X							4-16
	Check hydraulic functions	Operator's controls	X							4-17
	Check for oil leaks	Hoses and components	X							4-17
	Check hoses and lines	Complete machine	X							4-60
	Clean suction screen	Hydraulic tank							X	4-48~4-50
	Change return filters	Hydraulic tank		O			X			4-30
	Clean pilot system filter	Pilot valve on side of hydraulic tank		O			X			4-31
	Hydraulic oil change	Hydraulic tank							X	4-48~4-50
	Clean hydraulic oil tank	Hydraulic tank							X	4-48~4-50
	Change hydraulic tank breather	Hydraulic tank							X	4-51
UPPER FRAME	Check swing reduction unit oil level	Swing reduction unit		O	X					4-35, 4-36
	Change swing reduction oil	Swing motor red. unit					O		X	4-42
	Lubricate swing bearing	Swing bearing housing		O			X			4-34
	Check swing bearing seal	Swing bearing seal		O			X			4-35
	Check torque on slewing ring bolts	Slewing ring		O			X			4-35
	Check slewing ring pinion, gear, and grease bath	Inspection plate next to boom foot area		O			X			4-34
	Drain water from slewing ring grease bath	Lower frame cavity - drain port		O			X			4-34
	Change grease in slewing ring bath	Remove upper body							X	4-58
	Check swivel joint seal	Swivel valve in front of swing motor		O			X			4-34
	Check counterweight bolts	Counterweight		O		X				4-35
	Inspect and clean steps and handrails		X							4-18
	Check bolts/torque	Upper structure		O		X				
OPERATOR'S CONTROLS	Check hydraulic functions and switches	Operator's control & control panels	X							4-17
	Check travel alarm	Operator's control panel	X							Sect. 2
	Check lights	Boom, front & back	X							Sect. 2
	Check monitor alarm (buzzer)	Operator's control panel	X							Sect. 2
	Check gauge cluster and indicators	Cluster gauge	X							Sect. 2
	Check horn	LH side control	X							Sect. 2
	Lubricate control lever joints	Control levers			X					4-36

O - Break in (After first 50 Hrs) Inspection & Maintenance Required.
X - Regular Inspection & Maintenance Required.

SYSTEM	MAINTENANCE TO PERFORM	LOCATION	INTERVAL (Working Hours)							
			8	50	120	250	500	1000	2000	Page
ELECTRICAL	Inspect all wiring	Complete machine	X							4-14, 4-17
	Battery electrolyte	Batteries		O	X					4-32
	Battery maintenance	Batteries		O		X				4-32
LOWER FRAME	Check for oil leaks	Complete system	X							
	Check hoses and lines	Frame cavity	X							
	Check step rails	Frame rails	X							4-18
	Check frame structure and welds	Entire frame	X							4-18
	Check tracks and links	Undercarriage	X							4-19
	Check sprockets	Undercarriage	X							4-19
	Check idlers	Undercarriage	X							4-19
	Check rollers	Undercarriage	X							4-19
	Check track tension and adjust	Undercarriage		OX						4-20
	Check travel red. unit oil level	Travel motor red. unit		O	X					4-35, 4-37
	Change travel reduction unit oil	Travel motor red. unit					O		X	4-41
	Check bolts/hardware	Entire lower structure		O	X					
ATTACHMENTS	Check structure	Boom, arm, and bucket	X							4-21
	Check bucket teeth and side cutters	Bucket	X							4-57
	[1]Lubricate boom foot pin and boom cylinder connections	Boom	O	O	X					4-23
	[1]Lubricate arm pin and arm cylinder connections	Arm	O	OX						4-23
	[1]Lubricate bucket pins and bucket cylinder connections	Arm and bucket links	O	OX						4-23
	Check bolts/torque	Hoses and lines supports, bucket		X						
ACCESSORIES	Check A/C refrigerant	Climatizer-A/C					X			4-23~4-44
	Check A/C compressor belt & adjust	Engine				X				4-33, 4-38
	Check A/C condenser and clean	Radiator compartment	X							4-43~4-44
	Check A/C fresh air filter	Cab				X				4-39
	Check A/C recirculate air filter	Cab					X			4-39
	Check wiper washer fluid level	Air cleaner compartment	X							4-58
	Check bolts/torque	Climatizer-A/C system		X						

[1] - The lubrication interval outlined in this table is for a standard excavator (See section 6 for definition of a standard machine) working in an average duty cycle (Most typical digging application, road construction in natural bed clay, digging 50~60% of the daily work schedule). During the break in period, a new pin and bushing connection has to be lubricated every eight (8) hours for the first one hundred (100) hours of operation for a standard machine working in an average duty cycle; all other machines should be lubricated every four (4) hours for the first twenty (20) hours and every eight (8) hours for the next eighty (80) hours of operation. Refer to page 4-22 for more details in regards to the guidelines for reduced lubrication intervals.

O - Break in (After first 50 Hrs) Inspection & Maintenance Required.

X - Regular Inspection & Maintenance Required.

4.4 FLUIDS & FILTERS

The following charts list all the necessary lubricants, oils, greases, fuels, coolants and filters required for the KOBELCO SK210 (LC) -VI and SK250LC-VI, SK250NLC-VI Hydraulic Excavator. Also a chart is provided giving specific information for the proper lubricants, oils, greases, fuels and coolants to be used in certain climates. Contact an authorized KOBELCO dealer to order the required filters, fluids and lubricants.

A. Required Fluids & Capacities

TYPE OF FLUID	COMPONENT (LOCATION)	CAPACITIES	
		SK210-VI SK210LC-VI	SK250-VI SK250LC-VI
HYDRAULIC	Hydraulic Tank	156 Liters (41 Gal)	
	Hydraulic System	246 Liters (65.0 Gal)	260 Liters (69.0 Gal)
ENGINE OIL	Engine Oil Pan (H Level)	18 Liters (4.8 Gal)	
	Engine Oil Pan (L Level)	15.5 Liters (4.1 Gal)	
	Upper Rollers	50 cc (1.69 Fluid oz) X 4	
	Lower Rollers	160 cc (5.41 Fluid oz) X 14 160 cc (5.41 Fluid oz) X 16 - LC	
	Idler	200 cc (6.76 Fluid oz) X 2	
Gear Oil	Swing Reduction Unit	7.5 Liters (2.0 Gal)	15.3 Liters (4.0 Gal)
	Travel Reduction Unit	5.5 Liters X 2 (1.5 Gal X 2)	4.7 Liters X 2 (1.2 Gal X 2)
EP GREASE	Operating Lever Joint	As required in each joint	
	Attachment Pins	16 Places	
	Swing Bearing	1 Place (90º X 4)	
	Track Tension Adjustment	2 Places as required	
N.L.G.I. Nº 2 (Lithium soap)	Water Pump Brg.	6.1 cc (Aprox. one grease gun shot)	
LITHIUM BASE GREASE WITH MOS_2	Slewing Ring Gear Bath	8.3 Kg (18.3 lbs)	11.3 Kg (24.9 lbs)
ENGINE COOLANT	Radiator	9.5 Liters (2.5 Gal)	
	Cooling System Total Volume	19 Liters (5 Gal)	22 Liters (5.8 Gal)
DIESEL FUEL	Fuel Tank	340 Liters (90 Gal)	

B. Required Filters

SYSTEM	DESCRIPTION	PART NUMBER (SK210-VI ~ SK250LC-VI)
HYDRAULIC	Return Filter	**Element:** YN50V00001P1 **Kit:** YN50V00004F3
	Return Filter Element (Breaker only)	**Element:** YN50V00009P1 **Kit:** YN30T00007F2
	Tank Suction Strainer	YN50V00001P1 (Includes o-ring P/N: 45Z91D6)
	Tank Breather Filter Element	YN57V00002S010
	Pilot Line Filter	YN50V01001S005
ENGINE	Engine Oil Filter	*VAME088532
	Air Cleaner Inner Element	2446R255S6
	Air Cleaner Outer Element	2446R255S5
FUEL	Engine Fuel Filter	*VAME015254
	Priming Pump Gauze Filter	*VAME717659
OPERATOR CAB	A/C Fresh Air filter	YN50V01006P1
	A/C Recirculate Air filter	YT20M00004S050

***Available from a KOBELCO dealer only.**

C. Kobelco Fluids and Lubricants

PART NUMBER	DESCRIPTION
KSP1000-1001	Engine oil - SAE 15W/40 (1 Gal)
KSP1000-1005	Engine oil - SAE 15W/40 (5 Gal)
KSP1000-1055	Engine oil - SAE 15W/40 (55 Gal)
KSP1000-2005	Hydraulic oil - AW 46 (5 Gal)
KSP1000-2055	Hydraulic oil - AW 46 (55 Gal)
KSP1000-4014	Grease EP/2 - 14 Ounce
KSP1000-4035	Grease EP/2 - 35 Pounds
KSP1000-120	Grease EP/2 - 120 Pounds
KSP1000-3035	Gear oil 80W90 - 5 Gal

D. Lubricant Specifications

The following information is designed to allow usage of the proper oils, greases, fuels and coolants in various climates and certain working conditions.

LUBRICANT	CLIMATE ZONE				
HYDRAULIC OIL (ANTI-WEAR, ANTIOXIDANT AND NON-FOAMING) (SHELL TELLUS)	FRIGID -30°C ~ 15°C (-22°F ~ 59°F) ISOVG22	FRIGID -20°C ~ 30°C (-4°F ~ 86°F) ISOVG32	FRIGID~WARM -25°C ~ 40°C (-13°F ~ 104°F) ISOVG32S	WARM -5°C ~ 40°C (23°F ~ 104°F) ISOVG46*	VERY HOT 5°C ~ 55°C (41°F ~ 131°F) ISOVG68

*Note: Machines are shipped from factory with SHELL TELLUS 46 hydraulic oil

LUBRICANT	CLIMATE ZONE		
ENGINE OIL* A.P.I. CLASSIFICATION FOR "SERVICE CD" * ALL ENGINES SHIPPED FROM FACTORY WITH SAE15W40 OIL	FRIGID -30°C ~ 30°C (-22°F ~ 86°F) SAE10W30	WARM -5°C ~ 40°C (23°F ~ 104°F) SAE15W40	VERY HOT 30°C and Above (86°F and Above) SAE15W50

LUBRICANT	CLIMATE ZONE		
FUEL	FRIGID -15°C ~ -25°C (5°F ~ -13°F) WINTERIZED ASTM D975 No.1	WARM -5°C ~ -15°C (23°F ~ 5°F) ASTM D975 No.2	VERY HOT -5°C and Above (23°F and Above) ASTM D975 No.2

LUBRICANT	
ENGINE OIL (FOR GENERAL PURPOSE LUBRICATION)	FOR ROLLERS AND IDLERS ON ALL MODELS. A.P.I. Classification for "Service CD" – SAE30

LUBRICANT	
ENGINE OIL	FOR SWING MOTOR REDUCTION UNIT AND TRAVEL MOTOR REDUCTION UNITS ON THE FOLLOWING MODELS : SK210 (LC) -VI, SK250LC-VI, SK250NLC-VI A.P.I. Classification for "Service CD" – SAE30

LUBRICANT	GENERAL LUBRICATION	SWING GEAR SUMP (BATH)
GREASE (FOR GENERAL PURPOSE LUBRICATION)	EXTREME PRESSURE MULTIPURPOSE GREASE No.2 EP TYPE GREASE	N.L.G.I. No.2 LITHIUM BASE WITH MoS 2 GREASE

FLUID	
ENGINE COOLANT (50% MIXTURE)	ANTIFREEZE (LLC) -34°C (-29.2°F) Mixture ratio should protect to 5°C (9°F) lower than the coldest temperature the machine will experience. Take into consideration Wind Chill Factors.

NOTE: USE OF BIO-DEGRADABLE OILS

When you use Bio-degradable Oil (BIO OIL), refer to the following information.

1. **There are two types of BIO OIL available; vegetable-based and synthetic-based. You are recommended to use the synthetic-based type, because the vegetable-based oil has a maximum usage temperature of 80°C (176°F). Because of this, the degradation of vegetable-based oil occurs more rapidly, and causes reduced service life.**
2. **Do not mix either type of BIO OIL with the original factory-filled mineral oil. In the case that you do use BIO OIL. It is required to flush the hydraulic system that was filled with mineral oil two times.**
3. **If you use BIO OIL, swing and propel parking brake performance will be reduced, because of the lower friction factor of BIO OIL compared to that of mineral oil.**
4. **For further information about recommended Bio-degradable oil, please contact local dealer.**

4.5 PRE-START (EVERY 8 HRS) INSPECTION & MAINTENANCE

The following procedures are to be performed every 8 hours or daily, before starting the machine.

WARNING

BE CAUTIOUS OF HOT FLUIDS AND SURFACES. WEAR GOGGLES, SAFETY SHOES, HARD HAT, WORK CLOTHES, AND WORK GLOVES TO PERFORM INSPECTION AND MAINTENANCE ON THIS MACHINE.

A. ENGINE OIL LEVEL

1. Stop engine and raise the engine cover.

2. Locate and pull engine dipstick, clean it with a clean, dry, lint free cloth. Reinsert into engine. Pull out again to visually inspect the engine oil level on dipstick. See Figure 4.12A.

3. If necessary to add oil, remove oil filler cap and fill engine oil to proper level. See Figure 4.12A and refer to page 4-11 for oil specifications.

NOTE

After adding oil, check oil level again, replace oil filler cap and dipstick and close engine cover.

B. ENGINE COOLANT LEVEL

1. Open left rear compartment cover and inspect coolant level in engine coolant reservoir. See Figure 4.12B.

2. Proper coolant level is between “FULL” and “LOW” marks. See Figure 4.12B.

3. If necessary to add coolant, remove reservoir cap and fill to proper level with fresh coolant mixture. See Figure 4.12B and refer to page 4-11 for proper coolant specifications.

4. If no coolant is shown in reservoir, check coolant level in radiator. Fill radiator with proper coolant mixture and replace cap. See Figure 4.12C. Then refill reservoir to proper level.

WARNING

NEVER REMOVE RADIATOR CAP WHEN ENGINE IS HOT. ALLOW ENGINE TO COOL DOWN BEFORE REMOVING RADIATOR CAP.

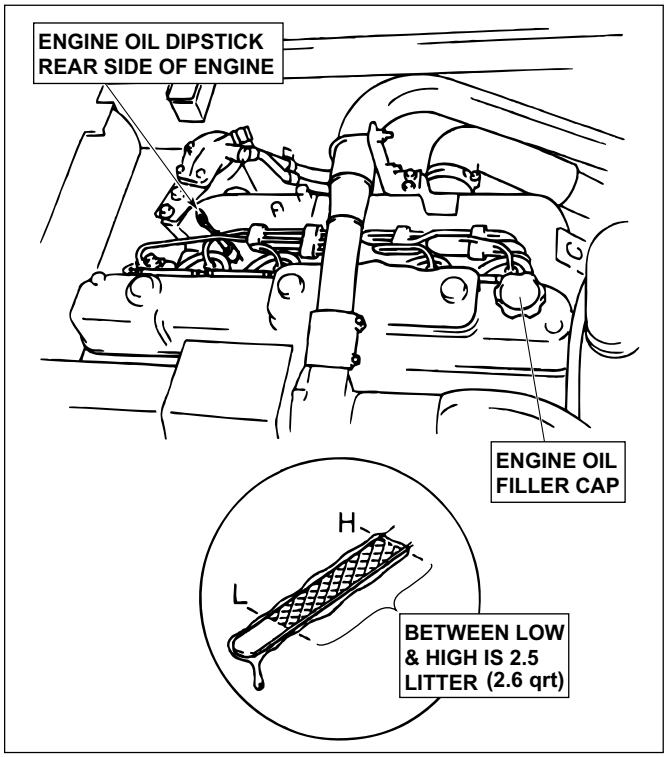


FIGURE 4.12A

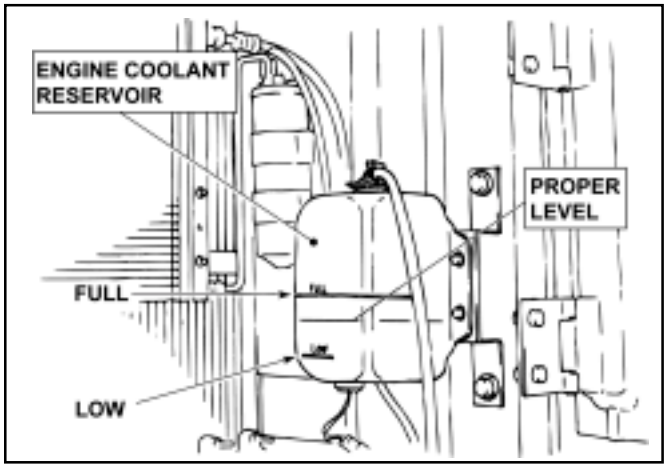


FIGURE 4.12B

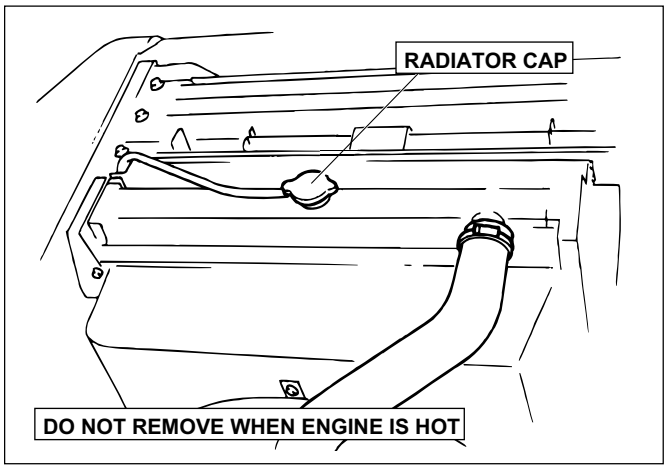


FIGURE 4.12C

C. ENGINE FLUID LEAKS

1. Inspect complete engine for signs of fluid leaks.
2. When inspecting around pressure lines and hoses use a stiff piece of cardboard. See Figure 4.13A.

CAUTION

Never use hands to check for leaks. High pressure fluid leaks will penetrate the skin and cause severe injury.

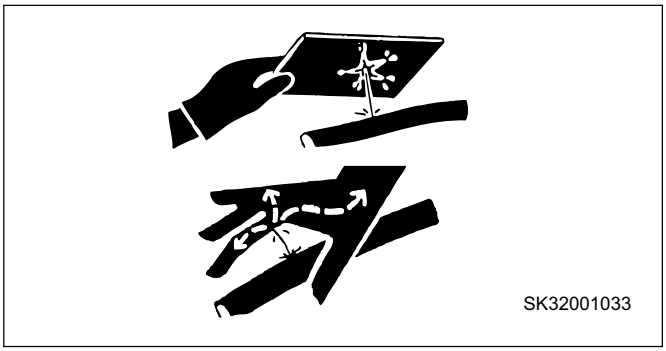


FIGURE 4.13A

D. AIR CLEANER

CAUTION

Wear protective glasses or goggles when using compressed air.

NOTE

The air restriction indicator will not signal if the element is torn or if the air cleaner compartment is not sealed properly. If “REST’D AIR CLEANER” icon is displayed, as indicated in Figure 4.13B, inspect, clean, and/or replace the air cleaner elements.

1. Open engine air cleaner access door and lock open. Use ignition key if door is locked to unlock it. See Figure 4.13C.
2. Release clamp from the air cleaner cover. See Figure 4.13D.
3. Remove the air cleaner outer element from the housing. See Figure 4.13E.

NOTE

Replace the Air Filter elements every 1000 hours or when the restricted icon appears on the cluster gauge, which ever comes first.

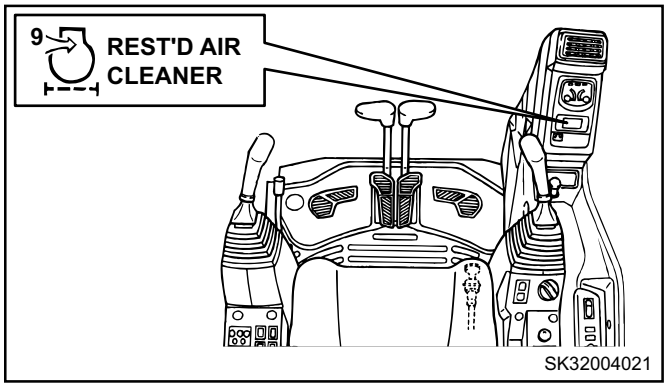


FIGURE 4.13B

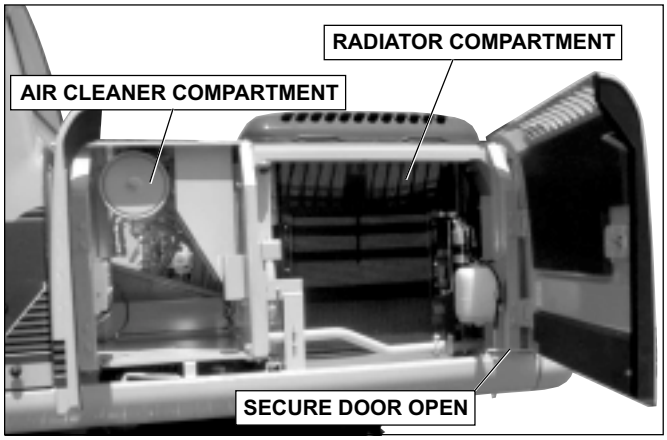


FIGURE 4.13C

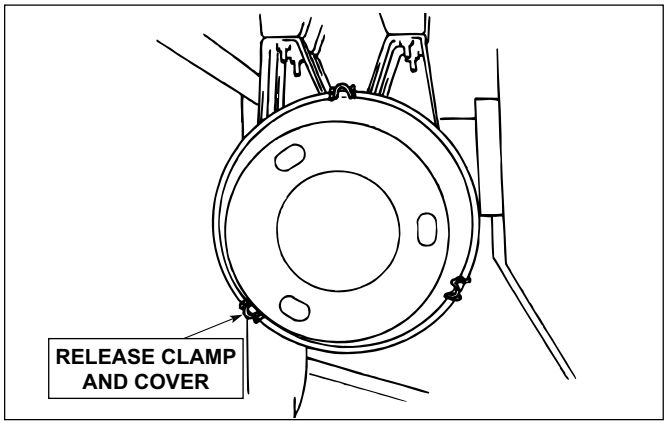


FIGURE 4.13D

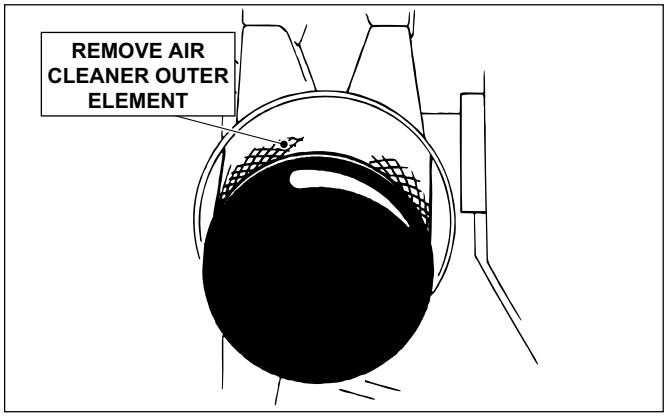


FIGURE 4.13E

4. Remove the wing nut and air cleaner inner element from the housing. See Figure 4.14A.

5. To clean the outer element, blow compressed air {less than 2.8 bar (40 psi)} up and down along the folds of the filter element interior to remove clogged dust or other contaminants. See Figure 4.14B.

6. After cleaning, use a light to check the inside of the element for tearing, pinholes, or packing damage. Replace with a new element if necessasry.

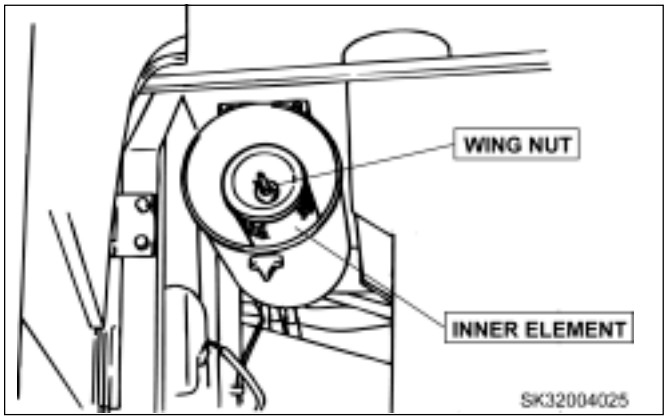


FIGURE 4.14A

CAUTION

Make sure to properly place the O-ring seal on the wing nut sleeve for the outer filter element. Failure to do so could cause engine failure.

7. Assemble elements in the reverse order of disassembling.

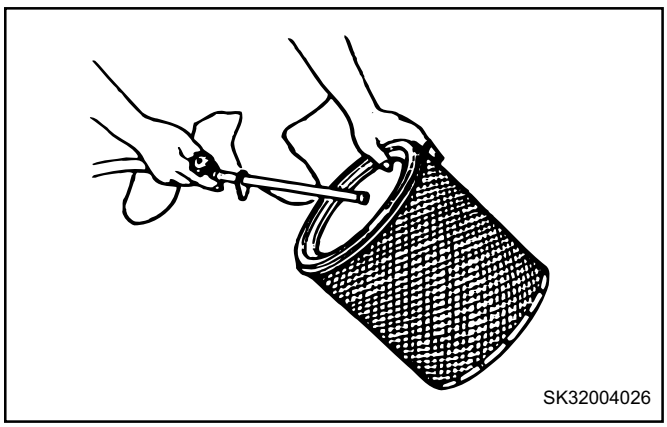


FIGURE 4.14B

E. ENGINE ELECTRICAL

1. Visually and manually inspect all engine electrical wiring, connectors and components for signs of damage and malfunction. See Figure 4.14C.

2. Repair or replace all damaged or malfunctioning wiring, connectors and components before resuming operation of the machine.

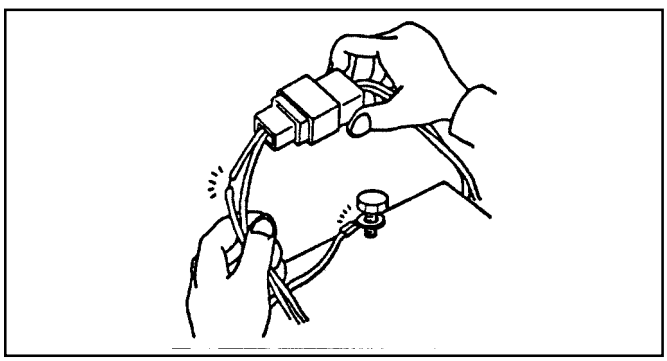


FIGURE 4.14C

WARNING

OPERATING THE MACHINE WITH DAMAGED OR MALFUNCTIONING ELECTRICAL COMPONENTS CAN CAUSE SERIOUS DAMAGE TO THE MACHINE AND SERIOUS INJURY TO PERSONNEL. REPAIR OR REPLACE FAULTY COMPONENTS IMMEDIATELY.

F. FUEL LEVEL

1. Turn “ON” the ignition key and the fuel level gauge in the cluster gauge will indicate the fuel tank level. See Figure 4.15A.

2. To refuel the machine, use the ignition key to remove the fuel tank cap. Do not remove the fuel screen for fueling. Refill fuel tank to full mark to reduce air volume (condensation). Failure to do so could create problems such as rusting and fuel freezing, as well as other associated problems.

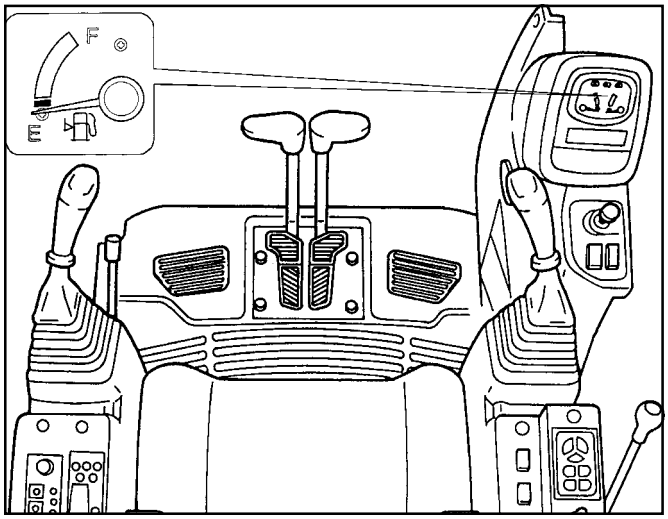


FIGURE 4.15A

NOTE

If refilling is done by means of the optional auxiliary fuel pump (standard for european machines only), proceed as follows:

a. Use the ignition key to remove the fuel tank cap.

b. Open battery access cover, remove the filter end of the fuel pump suction hose from its storage housing and insert the fuel suction hose into fuel supply reservoir. See Figure 4.15B.

c. Locate the auxilliary fuel pump switch inside the storage box access door. Place the switch in the “ON” position. See Figure 4.15C. Place pump switch in the “OFF” position when fuel tank is full.

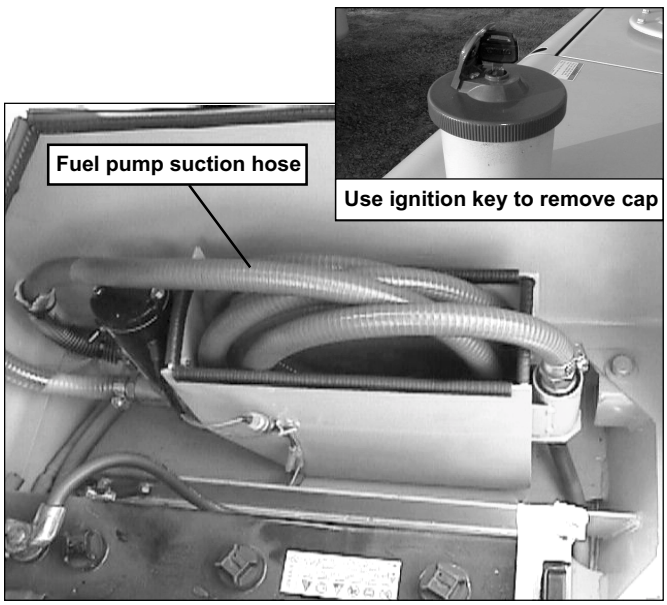


FIGURE 4.15B

NOTE

Delivery rate of the auxilliary fuel pump is 30 liters per minute (7.9 U.S. Gal per minute).

d. After removing fuel suction hose from fuel supply reservoir, coil hose and place filter into its storage housing. Replace fuel strainer and fuel filler cap.

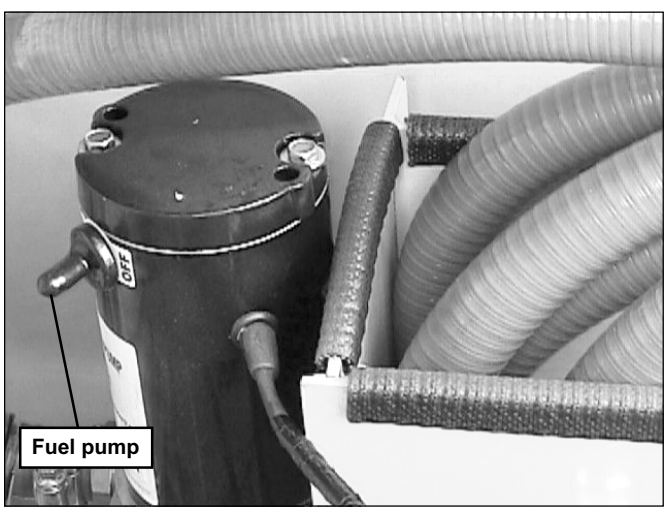


FIGURE 4.15C

G. HYDRAULIC OIL LEVEL

1. Place the machine in the oil check position on a firm level surface as shown in Figure 4.16A.
2. Check the sight glass through the openning of the hydraulic tank side cover, as shown in Figure 4.16B.

WARNING

FOR SAFE OPERATION ON INCLINES, THE HYDRAULIC OIL LEVEL MUST BE MAINTAINED BETWEEN "PROPER LEVEL" AND "UPPER LIMIT" MARK. DO NOT OPERATE MACHINES ON INCLINED SURFACES WITH A SLOPE GREATER THAN 35º.

3. To add hydraulic oil, proceed as follows:
   a. Release hydraulic tank pressure. See Figure 4.16C.

CAUTION

Gasses from hydraulic tank may be hot. Wear safety equipment.

   b. Slowly remove the six mounting bolts from the hydraulic return filter cover plate. Cover is under pressure by the spring. See Figure 4.16D.
   c. Add hydraulic oil through the return filter, filling hydraulic tank to the proper level. See Figure 4.16B.
   d. Before replacing filter cover, replace "O"Ring. Order KOBELCO Part Number ZD11G20000. See Figure 4.16D.
   e. Lubricate the new "O"-Ring and place it properly in seat. Place cover over opening and install mounting bolts with lockwashers.
   f. Torque mounting bolts to proper value. Refer to Torque Specifications Table.

WARNING

CLEAN UP ALL SPILLED OIL TO PREVENT FIRES. DISPOSE OF HAZARDOUS WASTE ACCORDING TO ENVIRONMENTAL LAWS AND REGULATIONS.

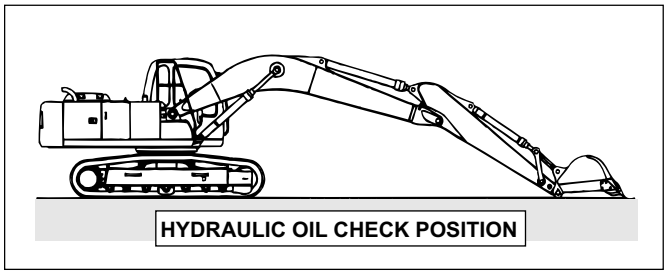


FIGURE 4.16A

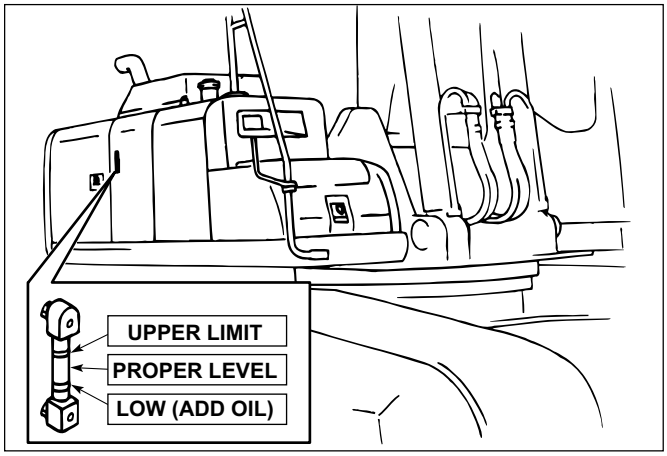


FIGURE 4.16B

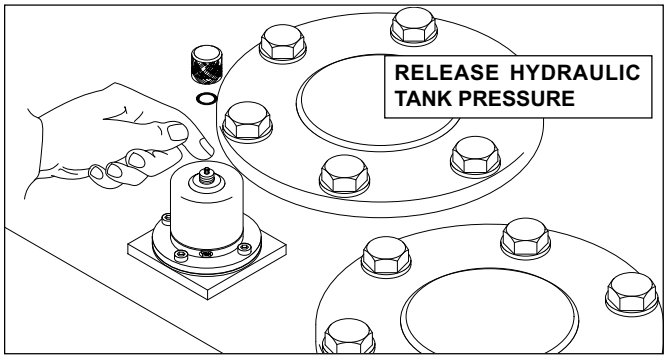


FIGURE 4.16C

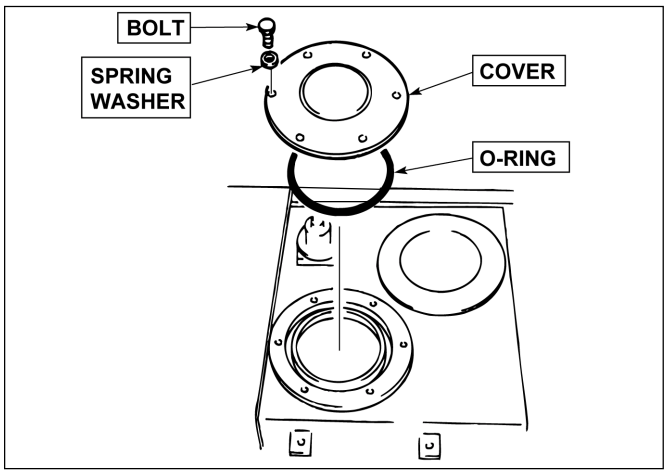


FIGURE 4.16D

NOTE

Machine is shipped from factory with **SHELL TELLUS 46** Hydraulic oil.

H. HYDRAULIC FUNCTIONS

1. Check all hydraulic controls for proper functionality before operating the machine. See Figure 4.17A.

WARNING

NEVER OPERATE THE MACHINE WITH A FAULTY CONTROL OR FUNCTION. MAKE ALL NECESSARY REPAIRS BEFORE ALLOWING ANY OPERATION.

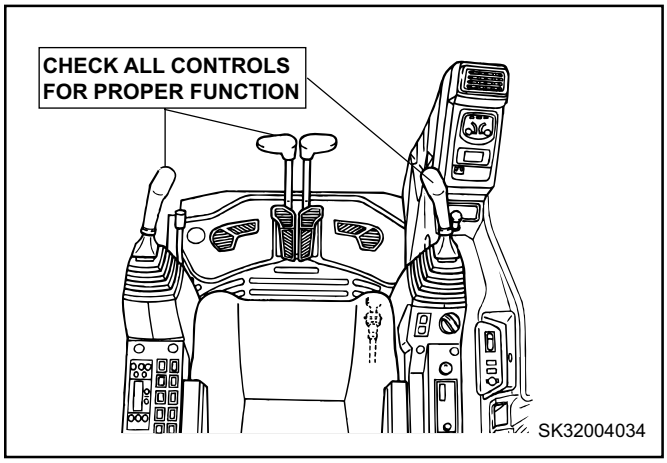


FIGURE 4.17A

I. HYDRAULIC OIL LEAKS

1. Check complete hydraulic system for leaks. Use a small piece of cardboard when checking areas with high pressure. See Figure 4.17B.

CAUTION

Never use hands to check for leaks. High pressure fluid leaks will penetrate the skin and cause severe injury.

2. Check all hoses and lines for signs of damage.
3. Repair or replace damaged hoses and lines before allowing any operation.

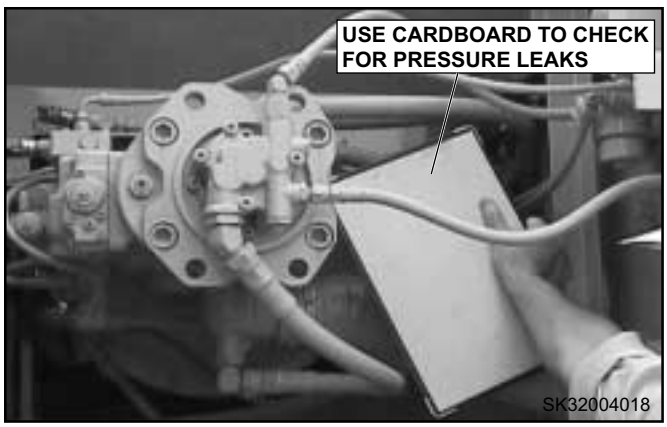


FIGURE 4.17B

WARNING

CLEAN UP ALL SPILLED OIL TO PREVENT FIRES. DISPOSE OF HAZARDOUS WASTE ACCORDING TO ENVIRONMENTAL LAWS AND REGULATIONS.

J. MACHINE ELECTRICAL

1. Check all switches for proper operation.
2. Visually check all wiring and connectors for signs of damage, corrosion etc..
3. Repair or replace all damaged or faulty electrical components before allowing any operation of the machine.
4. Check all gauges and L.C.D. Display on the gauge cluster display for proper operation. See Figure 4.17C.

DANGER

DAMAGED OR FAULTY ELECTRICAL COMPONENTS CAN CAUSE SEVERE DAMAGE TO THE MACHINE AND CAUSE SERIOUS PERSONAL INJURY OR DEATH.

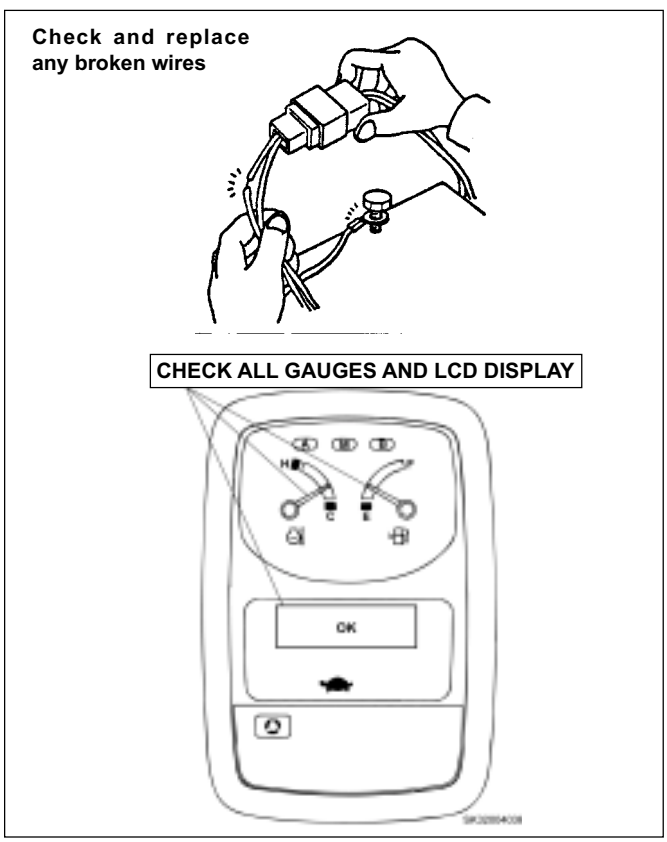


FIGURE 4.17C

K. STEPS AND HANDRAILS

1. Inspect daily all mounting steps and handrails on the machine to make sure they are clean and in safe working condition. See Figure 4.18A.

2. Repair or replace all areas before allowing any operation of the machine.

CAUTION

Use steps, and handrails when mounting and dismounting the machine. Keep steps, handrails and step rails clean and in safe working condition.

L. FRAME STRUCTURE

1. Carefully inspect the entire frame structure for signs of damage, broken welds etc..

NOTE

Remove any excessive grease form the attachment pin connecting areas to inspect welding. See Figure 4.18C.

2. Repair or replace all frame components found to be damaged before allowing any operation of the machine.

3. In cases where welding repair is required, consult an authorized KOBELCO Service Dealer for proper procedures concerning weld repairs. Use only certified welding personnel familiar with structural welding methods to perform repairs requiring welding.

WARNING

DISCONNECT BATTERIES BEFORE WELDING ON THIS MACHINE. SEE FIGURE 4.18B. CONNECT WELDER GROUND CABLE WITHIN 1M (3'-3") AWAY FROM AREA TO BE WELDED

M. TRACKS & COMPONENTS

1. **Track Shoes**
   - **a.** Visually inspect track shoes for signs of excessive wear or damage. See Figure 4.46.
   - **b.** Have all repair or replacement work done by an authorized KOBELCO Service Dealer.
   - **c.** Check tightness of shoe mounting bolts and nuts. If loose, remove bolt, clean thread, apply engine oil and torque to 853 ±27 N•m (628±36 ft•lbs). See Figure 4.18D.

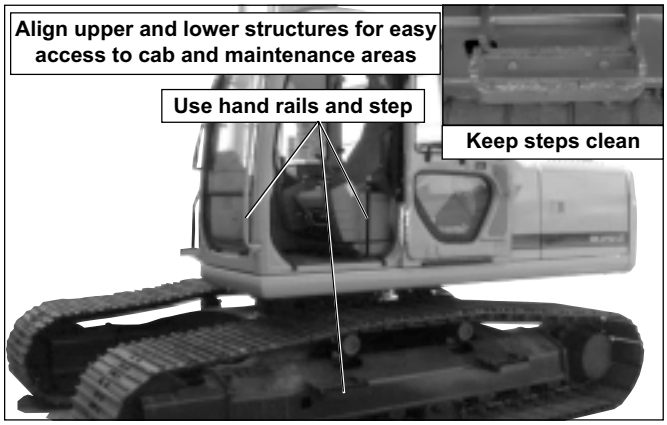


FIGURE 4.18A

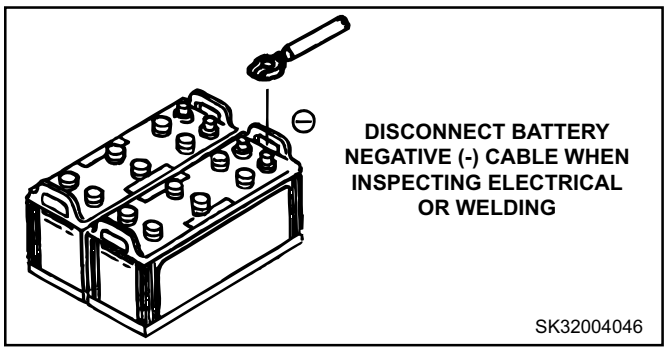


FIGURE 4.18B

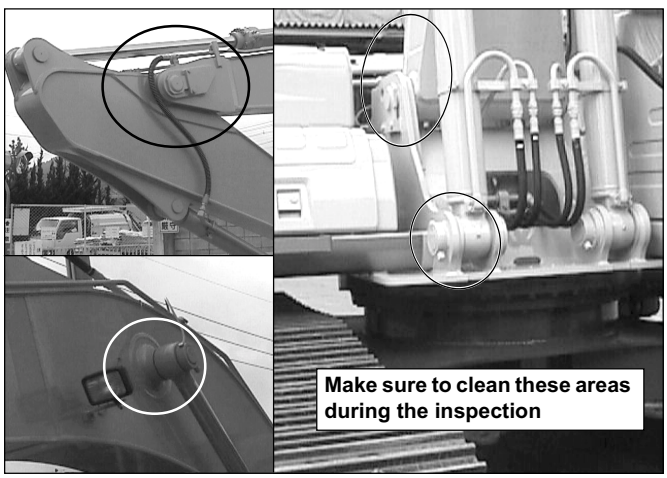


FIGURE 4.18C

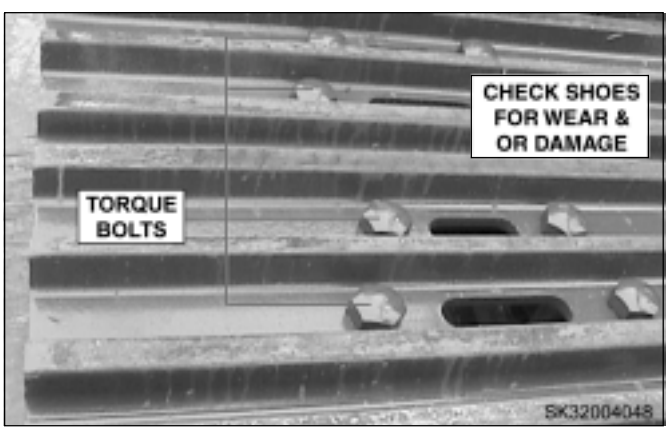


FIGURE 4.18D

2. **Track Links**
   - **a.** Inspect links for signs of excessive wear or damage. See Figure 4.19A.
   - **b.** Have all repair or replacement work done by an authorized KOBELCO Service Dealer.

FIGURE 4.19A

3. **Sprockets**
   - **a.** Inspect sprockets for excessive wear and damage. See Figure 4.19B.
   - **b.** Should the sprockets require service, contact an authorized KOBELCO Service Dealer for assistance.
   - **c.** Check and make sure all sprocket bolts are properly torqued.

NOTE

If any sprocket bolt is loose, preceed as follows:
c.1- Remove bolt and clean threads.
c.2- Apply locktite # 262 to the bolt.
c.3- Torque to 397 N-m (40.5 Kgf-m) {293 lbs-ft}

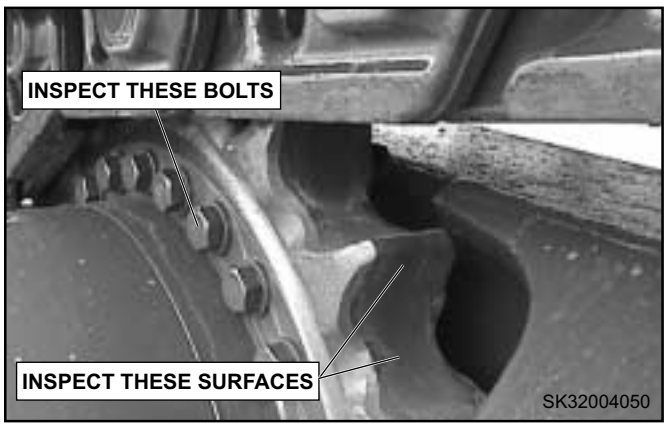


FIGURE 4.19B

4. **Idlers**
   - **a.** Inspect Idlers for excessive wear and damage. See Figure 4.19C.
   - **b.** Should the Idlers require service, contact an authorized KOBELCO Service Dealer for assistance.

NOTE

Every 8 hours of operation, make sure to check idlers and rollers for leakage and repair as needed. Contact your Kobelco dealer's Service Department for any assistance.

Change oil in idlers and rollers every 2000 hours of operation. See 2000 hour maintenance in this section for specific details.

FIGURE 4.19C

5. **Rollers**
   - **a.** Inspect rollers for excessive wear and damage. See Figure 4.19D.
   - **b.** Should the rollers require service, contact an authorized KOBELCO Service Dealer for assistance.

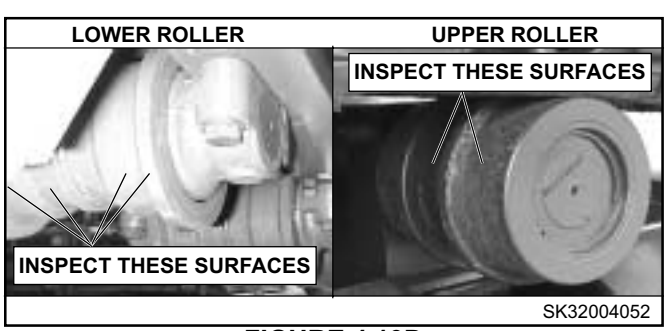


FIGURE 4.19D

N. TRACK TENSION

1. Operate swing, arm, bucket and boom controls until machine is set up as shown in Figure 4.20A.

WARNING

SUPPORT LOWER FRAME WITH SUITABLE BLOCKS.

2. Measure the sag in the center of the track, between the bottom of the track frame and the track shoe surface. See Figure 4.20B.
3. To increase track tension, set machine as shown in Figure 4.20A and with grease gun inject extreme pressure No. 2 grease into idler adjustment grease fitting until proper tension is reached. See Figure 4.20C. Perform this procedure on both tracks.
4. To decrease track tension, carefully loosen grease fitting to allow grease to scape.
5. Tighten grease fitting as shown in Figure 4.20C.

WARNING

GREASE IN TRACK TENSIONING MECHANISM IS UNDER EXTREME PRESSURE AND CAN PENETRATE SKIN CAUSING SEVERE INJURY. KEEP FACE AND BODY AWAY FROM GREASE FITTING AREA. NEVER LOOSEN GREASE FITTING MORE THAN ONE (1) COMPLETE TURN. IF GREASE DOES NOT RELEASE AFTER ONE TURN OF THE FITTING, CALL AN AUTHORIZED KOBELCO SERVICE DEALER FOR ASSISTANCE.

6. Start engine and operate the travel motor for the track being adjusted, back and forth. Recheck track tension and adjust if needed.
7. Perform steps 1 through 6 on the opposite track if needed.

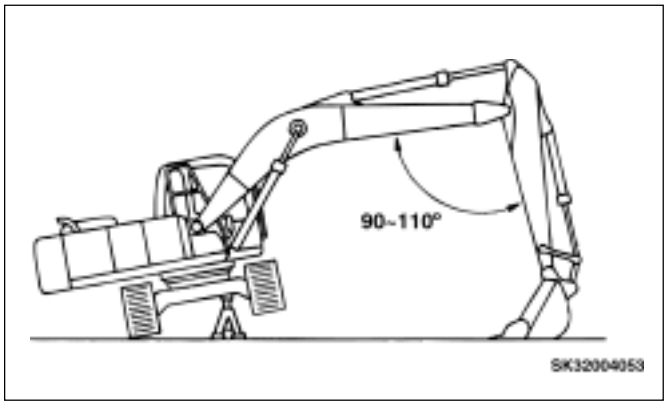


FIGURE 4.20A

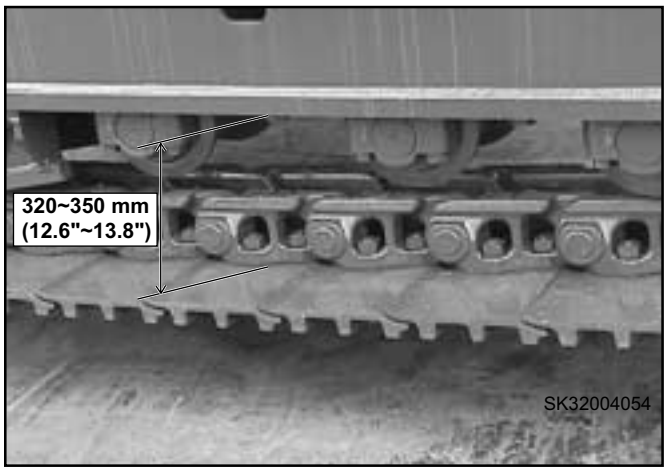


FIGURE 4.20B

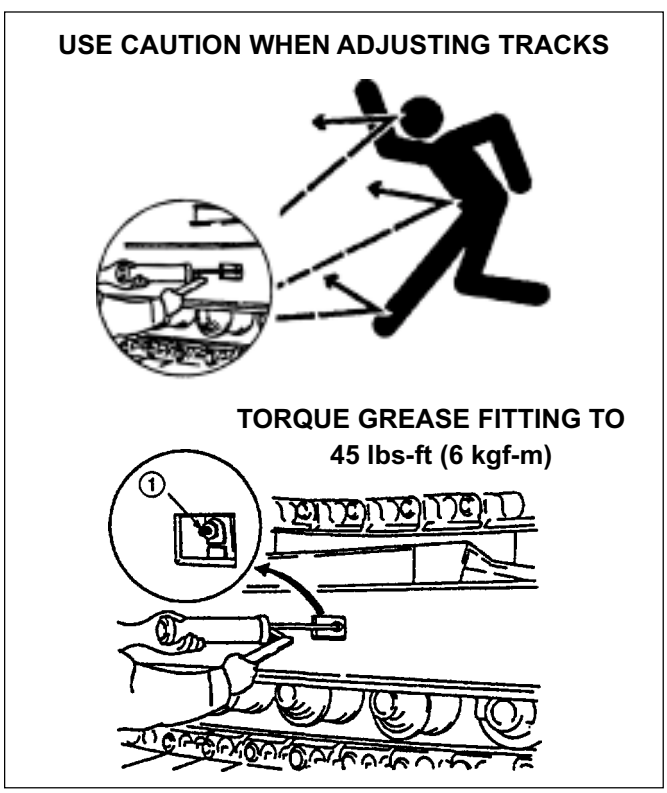


FIGURE 4.20C

O. BOOM & ARM

1. Inspect Boom and Arm structures for signs of excessive wear and damage. See Figure 4.21A.

2. Should repair or replacement be necessary, contact an authorized KOBELCO Service Dealer for assistance.

NOTE

Remove any excessive grease form the attachment pin connecting areas to inspect welding. See Figure 4.21A.

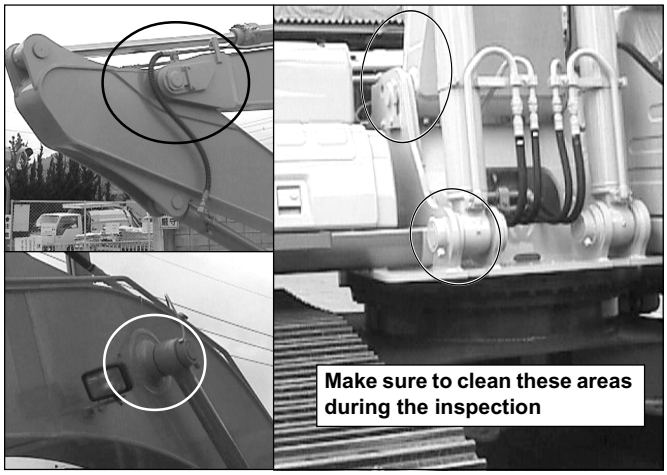


FIGURE 4.21A

WARNING

DISCONNECT BATTERIES BEFORE WELDING ON THIS MACHINE. SEE FIGURE 4.21B. CONNECT WELDER GROUND CABLE WITHIN 1M (3'-3") AWAY FROM AREA TO BE WELDED.

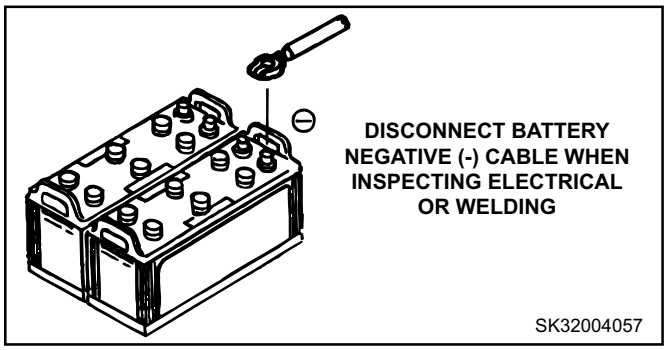


FIGURE 4.21B

P. CUTTING EDGE, BUCKET TEETH & SIDE CUTTERS

1. Inspect bucket teeth and side cutters for signs of excessive wear and damage. See Figure 4.21C.

2. Should repair or replacement be required, follow bucket manufactures recommendations.

CAUTION

Wear goggles, safety shoes, hard hat, work clothes and work gloves to perform inspection and maintenance on this machine.

3. Inspect cutting edge for signs of excessive wear and damage. See Figure 4.21C.
4. Should repair or replacement be required, contact your KOBELCO Dealer Service Department for proper advice.

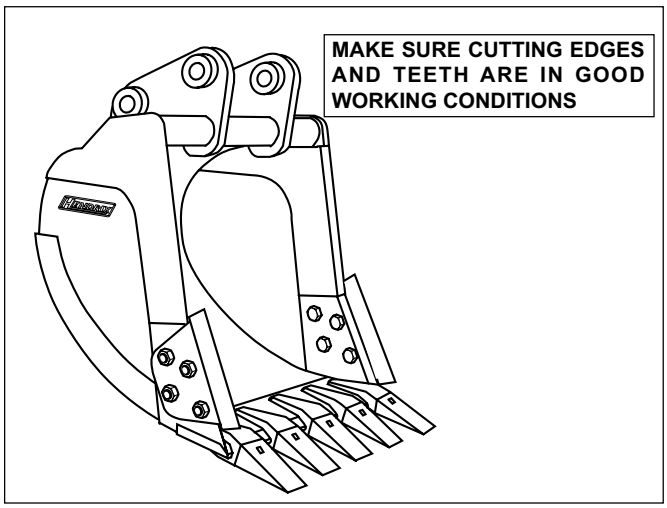


FIGURE 4.21C

NOTE

Make sure that bolts on cutting edges are properly tighten. If bolts are loose, remove bolts, clean threads on bolts and nuts, apply locktite #262 and torque them to specs. Refer to the Specifications Section in this book.

Q. ATTACHMENT LUBRICATION

Lubricate attachment pins according to the intervals indicated in page 4-9. Use extreme pressure multi-purpose grease No.2 EP Type. Lubricate all points until grease purges. The lubrication intervals are based on a standard excavator, see Section 6 of this manual for Kobelco definition of a standard excavator, working in an ***average duty cycle***. Average duty cycle is defined as "Most typical digging application, road construction in natural bed clay, digging 50 ~ 60 % of the daily work schedule".

New pins and bushings, including new machines and repairs require special break-in procedures. While both pin and bushing have a special ground finish, they still have to be mated to each other to eliminate the machining high points, see Fig. 4.22A.

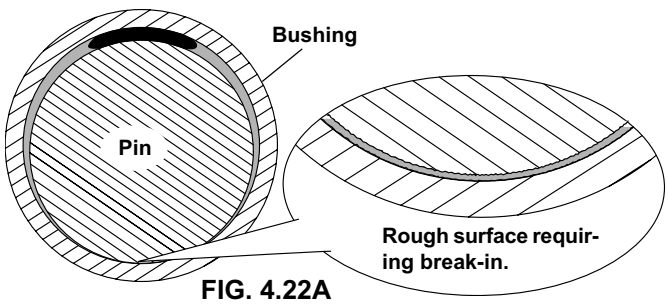


FIG. 4.22A

Because of these high spots, it is recommended that the front attachment or the repaired area be lubricated a minimum of once every eight (8) hours for the first one hundred (100) hours for a standard machine working in an average duty cycle. All other machines should be lubricated every 4 hours for the first twenty (20) hours and every eight (8) hours for the next eighty (80) hours of operation. This lubrication procedure will reduce the possibility of a premature pin or bushing failure during the break-in process.

SPECIAL CONSIDERATIONS FOR HAND LUBRICATION: While grease grooves in the bushings allow grease to move around the bushing, it does not insure that grease gets on all of the bushing surfaces. Any load on the joint will prevent the grease from getting to the wear surface in the loaded area. Due to the fact that a hand greaser does not provide the volume of grease that a power system does, there is a greater possibility of bushing galling, unless the standard lubrication procedure is modified. Fig. 4.22B illustrates the pin load

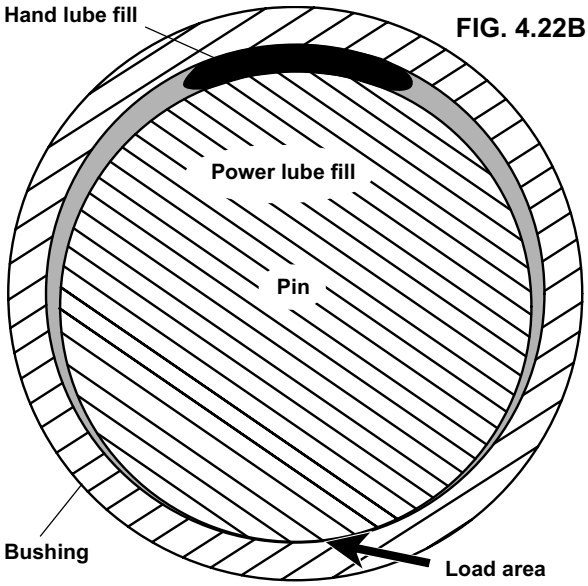


FIG. 4.22B

and grease cavity discussed above. No matter how much grease is pumped into the pin bushing cavity with a hand grease gun, the grease will tend to escape to the outside before filling the grease cavity. Therefore, to avoid this situation, the front attachment has to be repositioned during the lubrication process, to move the load area and allow the grease to cover the entire grease cavity between the pin and bushing.

RECOMMENDED GUIDELINES FOR REDUCED LUBRICATION INTERVALS:

- **a.** When the excavator does not meet the Kobelco standard definition, see Section 6 for standard specifications.
- **b.** When the application duty cycle exceeds the above guideline.
- **c.** When the machine is equipped with a special attachment; any attachment other than the standard bucket, such as a large bucket, long arm, grapple, hammer, mower, shear, thumb, etc.
- **d.** Machines working with abrasive materials, chemicals mining, forestry, scrap, severe digging (rock, hardpan), and digging in wet conditions.
- **e.** Any other special attachment or application.

Any of the above circumstances will require shortening the standard lubrication interval. The machine configuration and application determine the special interval.

1. Boom cylinder head pins. See Figure 4.23A.

WARNING

MOVING THE ATTACHMENT OR MACHINE WHILE GREASING IS NOT RECOMMENDED. PESONAL INJURY MAY RESULT. MOVE THE ATTACHMENT TO A DIFFERENT POSITION, STOP THE ENGINE AND LUBRICATE THE ATTACHMENT AGAIN. REPEAT THIS PROCEDURE UNTIL THE FRONT ATTACHMENT IS COMPLETELY LUBRICATED.

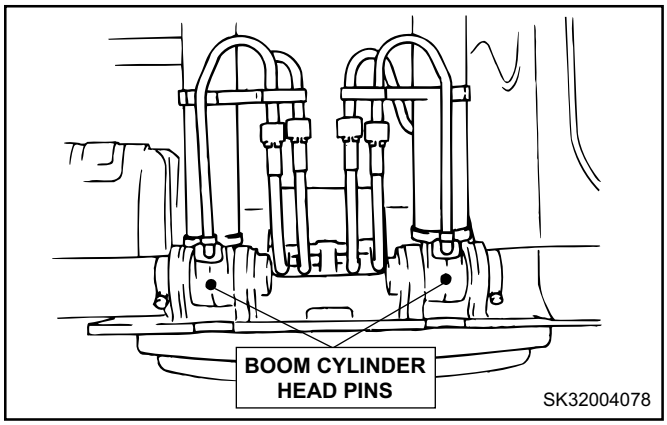


FIGURE 4.23A

2. Boom foot pin. See Figure 4.23B.
3. Boom cylinder rod pins. See Figure 4.23B.
4. Arm cylinder head pin. See Figure 4.23B.

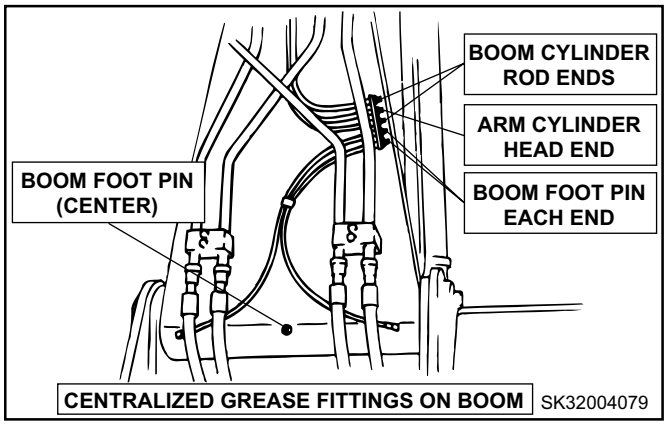


FIGURE 4.23B

5. Arm cylinder rod pin. See Figure 4.23C.
6. Arm to boom pin. See Figure 4.23C.
7. Bucket cylinder head pin. See Figure 4.23C.

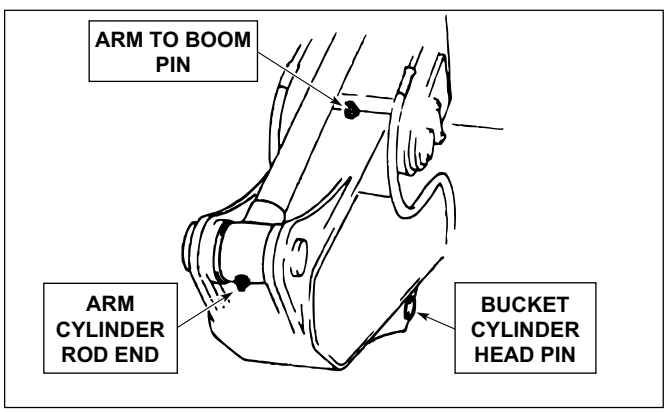


FIGURE 4.23C

8. Bucket link pins. See Figure 4.23D.
9. Idler pink to arm pin and arm to bucket pin. See Figure 4.23D.
10. Bucket cylinder rod pin. See Figure 4.23D.

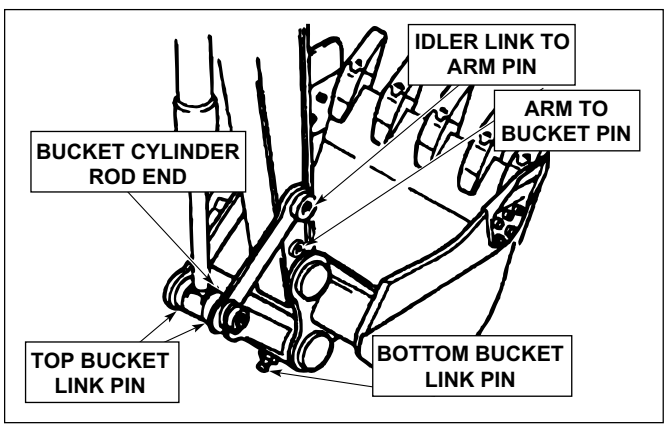


FIGURE 4.23D

4.6 50 HOUR (WEEKLY) & NEW MACHINE BREAK–IN INSPECTION & MAINTENANCE PROCEDURES.

Change the engine oil and filter on a new machine after the first 50 hours of operation. Then change the engine oil at every 500 hours of operation.

NOTE

One new oil filter is shipped with the machine in the support kit. This is to be used at the 50 hour oil & filter change.

A. ENGINE OIL AND FILTER ELEMENT

1. Move the machine to a firm, level surface and run engine for 5 minutes to warm the oil.

WARNING

DO NOT CHANGE OIL ON A MACHINE THAT HAS JUST STOPPED WORKING. THE OIL WILL BE EXTREMELY HOT. ALLOW THE ENGINE TO COOL UNTIL OIL IS JUST WARM BEFORE CHANGING.

NOTE

- Check the waste oil. If there are metal chips or powder mixed in the oil, contact your KOBELCO distributor.
- Do not reuse the oil filter.

2. Raise the engine cover, lock it open, and remove the oil cap. See Figure 4.24A.

3. Remove bolts and engine lower covers. See Figure 4.24A.

4. Locate the engine oil filter on its right side and place an empty oil container {20 L (5 Gal) capacity} under the filter.

5. Remove the oil filter by turning counterclockwise. See Figure 4.24B.

6. To install the oil filter, apply a thin coat of engine oil to the gasket of the new oil filter, fill filter with engine oil and then secure the filter by tightening 3/4 ~ 1 complete turn (by hand) after the gasket comes in contact with the oil filter head. See Figure 4.24C. {The amount of oil to be added into the filter is approx. 1.1 Lit (0.29 GAL)}

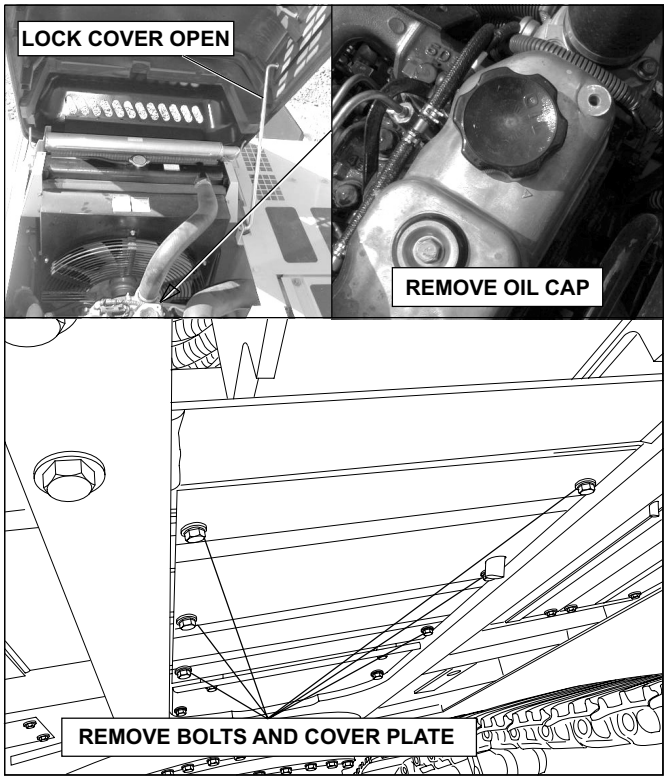


FIGURE 4.24A

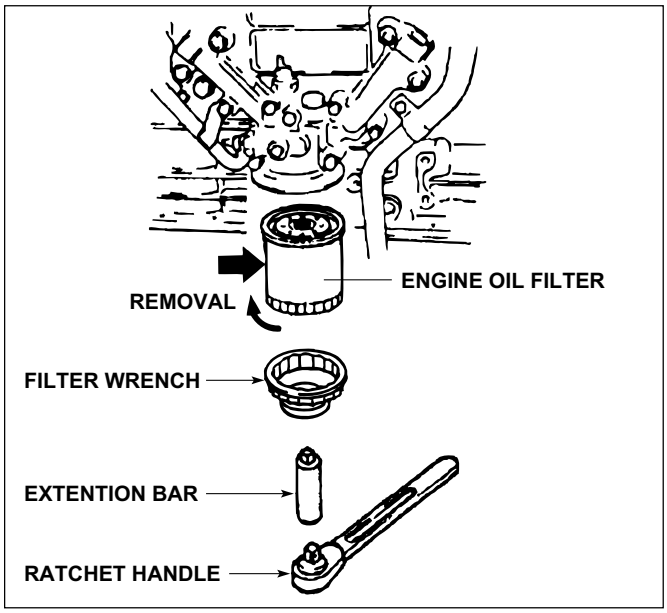


FIGURE 4.24B

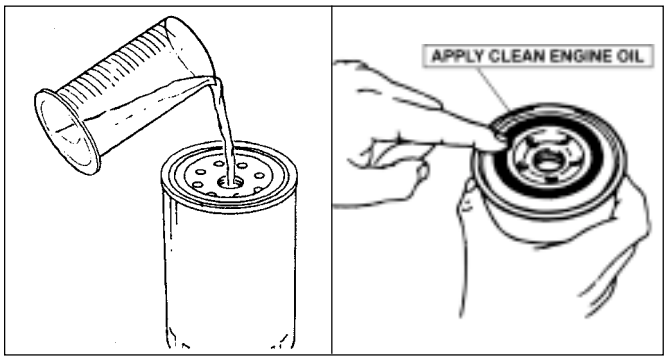


FIGURE 4.24C

⚠ WARNING ⚠

DO NOT CHANGE OIL ON A MACHINE THAT HAS JUST STOPPED WORKING. THE OIL WILL BE EXTREMELY HOT. ALLOW THE ENGINE TO COOL UNTIL OIL IS JUST WARM BEFORE CHANGING.

7. Remove engine oil drain plug and let the engine oil drain out completely. See Figure 4.25A.
8. Clean oil drain plug an install it. Tighten securely.
9. Refer to page 4-11 for the proper oil to use and fill engine oil to proper level.
   - Total oil volume to be replaced SK210 (LC) -VI, SK250LC-VI & SK250NLC-VI : 18 Liters (4.8Gal)
10. Install oil filler cap. Clean up all spilled oil.
11. Start engine, run for 5 minutes. While running, check for oil leaks.
12. Should any oil leaks be found, stop engine, check for the soruce of leakage, and repair immediately and refill with proper oil.
13. Check Oil Level and close engine cover.
14. Reinstall engine lower covers and tighten bolts securely. See Figure 4.25C.

⚠ CAUTION ⚠

Dispose of all hazadous waste in accordance with government environmental regulations.

B. WATER PUMP BEARING LUBRICATION

Lubricate the water pump bearing on a new machine after the first 50 hours of engine operation. Then check and lubricate every 500 hours.

1. Open the engine cover, lock it open, and locate grease fitting for the water pump bearing, in front of the engine. See Figure 4.25D.
2. Wipe all dust and mud off the grease nipple.
3. Use N.L.G.I. Nº 2 (Lithium soap) wheel bearing grease to lubricate the bearing.
4. Close engine cover.

NOTE

Do not over grease the water pump bearing. It only requires about one shot of a manual grease gun, which is equivalent to aprox. 6.1 cc. NEVER USE A PNEUMATIC GREASE GUN.

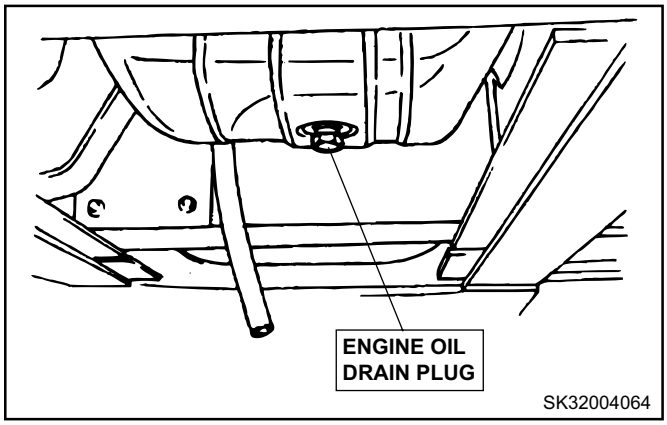


FIGURE 4.25A

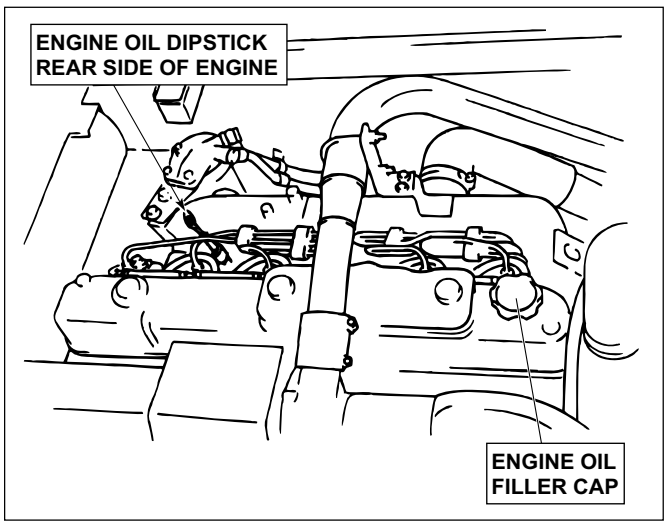


FIGURE 4.25B

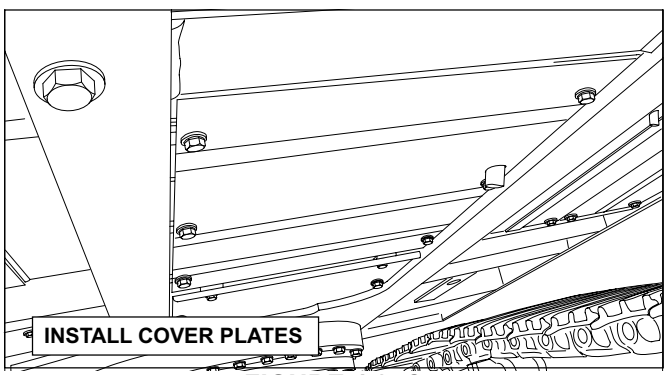


FIGURE 4.25C

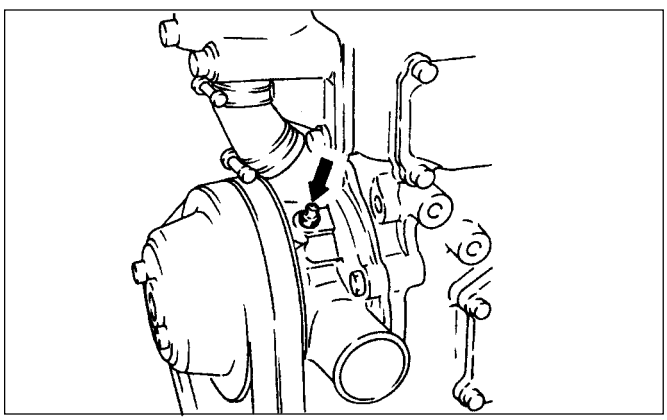


FIGURE 4.25D

C. FUEL TANK DRAIN

Drain the fuel tank every 50 hours or weekly. See Figure 4.26A.

1. Place an empty container below the fuel tank drain valve.
2. Locate and open fuel tank drain valve on bottom of fuel tank. See Figure 4.26A.
3. Allow all water and sediment to drain from fuel tank into a waste container, then close the drain valve.

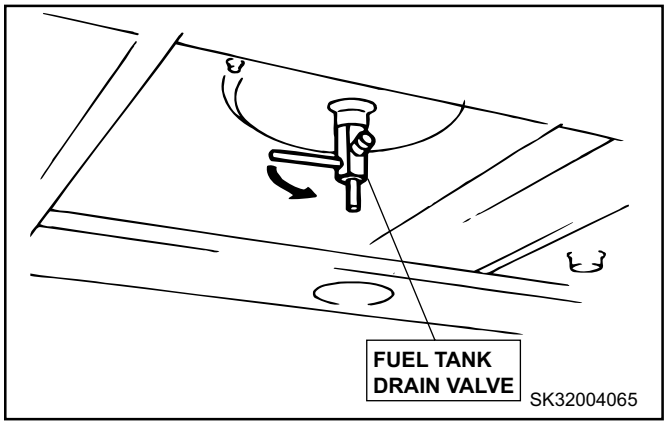


FIGURE 4.26A

D. WATER SEPARATOR

The water separator isolates water that mixes in with the fuel. The water separator assembly is equipped with a float. When water accumulates, the float rises. Drain the water separator every 50 hours or weekly. See Figure 4.26B.

1. Open the pump compartment door, lock it open, locate the water separator, place an empty container below its drain hose, and loosen the drain plug to drain the water.
2. Close the drain plug when the float comes down to the bottom.
3. Check and make sure fuel is not leaking.

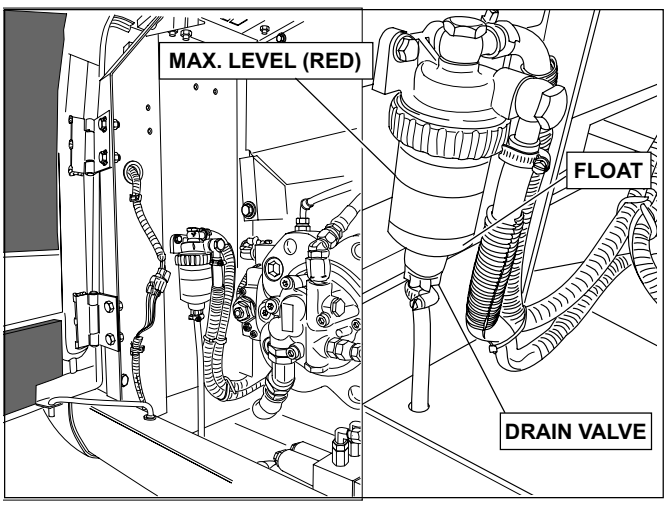


FIGURE 4.26B

NOTE

Drain water whenever the float rises to the level line, regardless of inspection time.

If air contaminates the fuel system, proceed with instructions for bleeding as described in page 4-29.

CAUTION

Clean up all spilled fuel to avoid a fire. Dispose of all hazardous waste in accordance with government environmental regulations.

E. AIR INTAKE SYSTEM

Inspect all hoses and clamps of the air intake system on a new machine after the first 50 hours of operation. Then at every 500 hours of engine operation.

1. Open the engine cover, lock it open, and inspect all hoses for damage. Tighten all hose clamps. See Figure 4.26C.
2. Replace any damaged hose before allowing any operation of the machine.

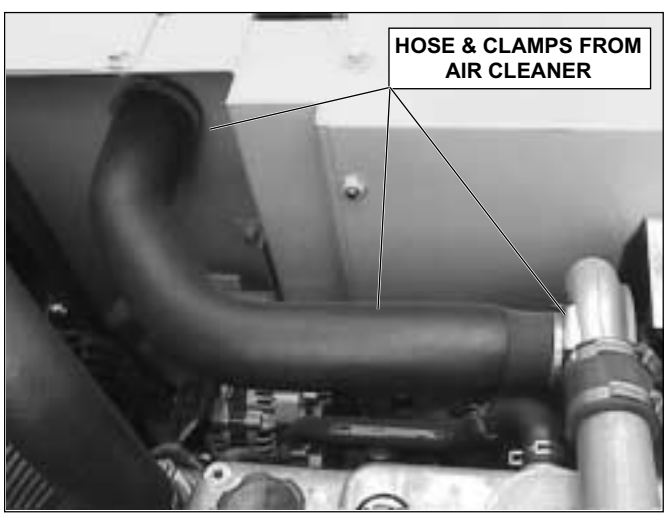


FIGURE 4.26C

F. RADIATOR, OIL COOLER & DEBRIS SCREEN

Clean radiator after every 50 hours of operation using pressurized water.

1. Open radiator compartment door and engine cover to clean the radiator and oil cooler. See Figure 4.27A. Make sure to lock doors open.

NOTE

When working in extremely dusting environments, it is recommended to check the radiator, oil cooler, and A/C condenser at the end of the working shift and clean regardless of working hours.

2. Remove the wing nuts retaining the debris screen. See Figure 4.27B. Carefully remove debris screen and clean with pressurized water.

NOTE

- Debris screen on SK210-VI is in front of the oil cooler. In addition, SK210-VI has a cover over the opening between the oil cooler and the radiator.
- Debris screen on SK250-VI is in front of the radiator.

3. Remove radiator lower access cover from bottom of machine. See Figure 4.27C.

4. Rinse all dirt and debris from engine compartment. Reinstall debris screen and radiator lower access cover.

CAUTION

Be careful not to bend or damage cooling fins of the radiator, A/C condenser, or oil cooler. Replace debris screen if damage is found. Repair damaged cooling fins of radiator, oil cooler, and A/C condenser.

5. Check and make sure all foam seals around radiator and engine compartment are in good condition and in place. Repair or replace as needed.

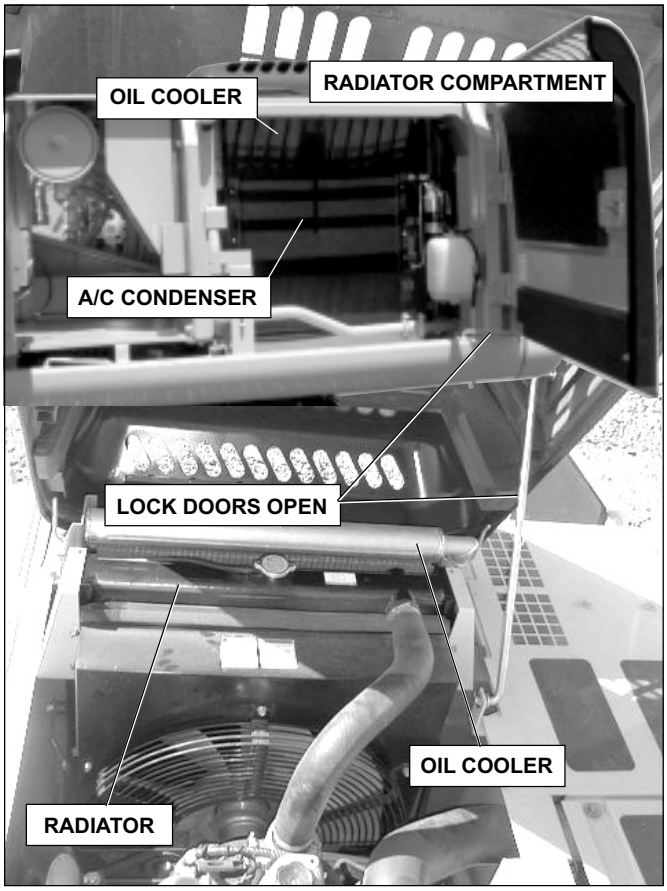


FIGURE 4.27A

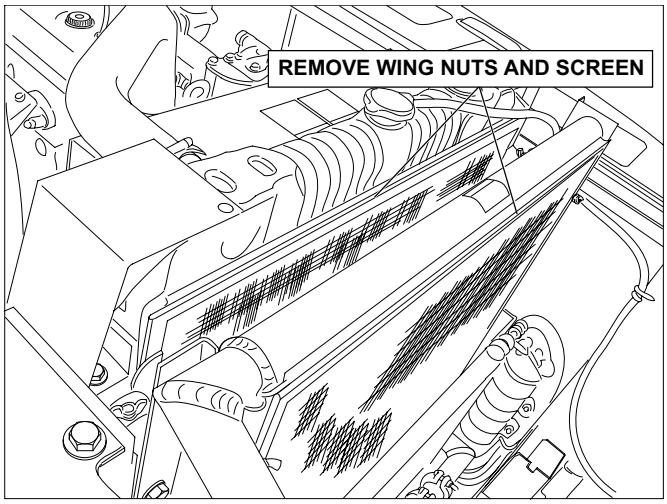


FIGURE 4.27B

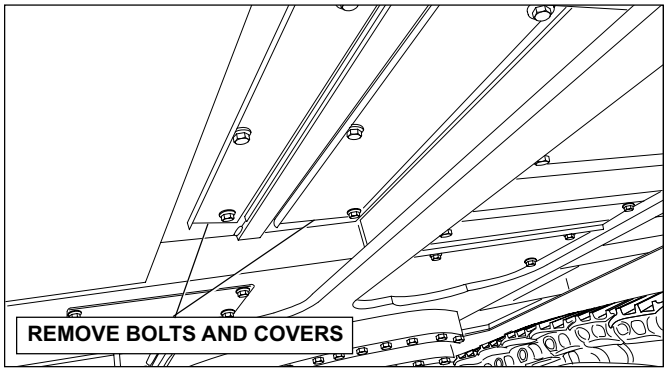


FIGURE 4.27C

G. FUEL FILTERS

Change the fuel filter and clean the priming pump filter on a new machine after the first 50 hours of operation. Then change the fuel filter and clean the priming pump filter every 500 hours of operation.

NOTE

One new fuel filter is shipped with the machine in the support kit. This is to be used at the 50 hour maintenance.

WARNING

DO NOT PERFORM MAINTENANCE ON A MACHINE THAT HAS JUST STOPPED WORKING. ALLOW SUFFICIENT TIME FOR THE ENGINE TO COOL BEFORE WORKING ON IT.

1. Replacing Fuel Filter

a. Open engine cover and make sure to lock it open.

b. Locate the fuel filter on engine right side. See Figure 4.28A.

C. Place an empty container below fuel filter.

d. Use a filter wrench and turn counter clockwise to remove the fuel filter. See Figure 4.28B.

e. Make sure to remove O-ring seal from the filter suport mount.

f. With a clean, dry cloth, clean the filter support mount surface.

g. Fill fuel filter with proper diesel fuel, see Figure 4.28B.

h. Lubricate the O-ring seal with diesel fuel and install filter by hand (Do not use wrench), and tighten 3/4 to 1 turn after the O-ring seal has made contact with support mount surface.

2. Cleaning Priming Pump Strainer

a. Remove the eyebolt, which contains gauze filter (strainer) 4. See Fig. 4.28C.

b. Remove the gauze filter and clean it. Replace the gauze filter if damaged. Refer to page 4-10 for part number if needed.

c. Install gauze filter and eybolt in reverse order and torque the eybolt accordingly.

TORQUE FOR EYEBOLT SK210/SK250-VI

•Zexel pump: tightening torque 1.75 Kgf-m (12.7 lbs-ft)

WARNING

CLEAN UP ALL SPILLED FUEL TO PREVENT FIRES. DISPOSE OF HAZARDOUS WASTE ACCORDING TO ENVIRONMENTAL LAWS AND REGULATIONS.

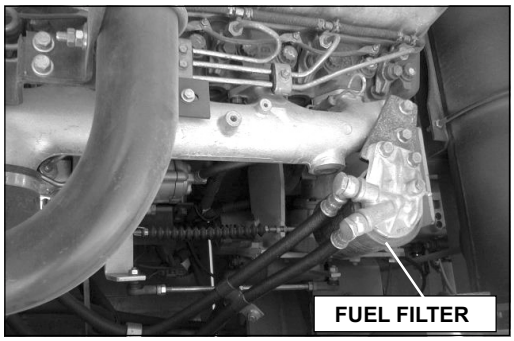


FIGURE 4.28A

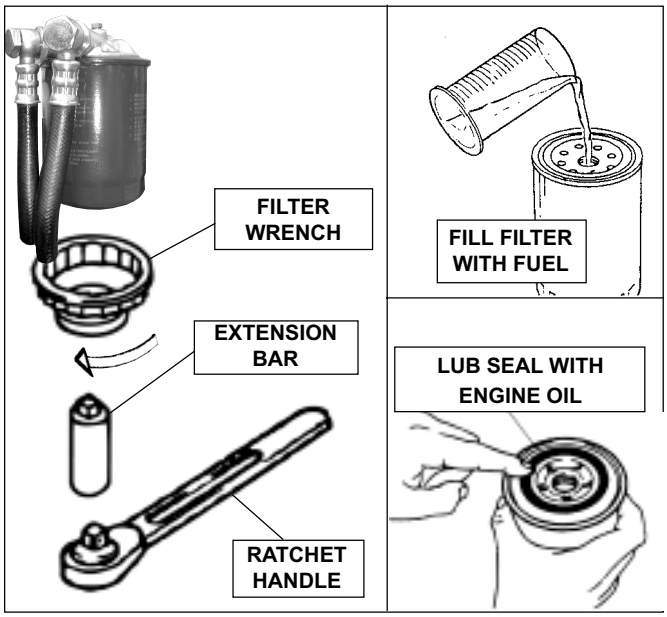


FIGURE 4.28B

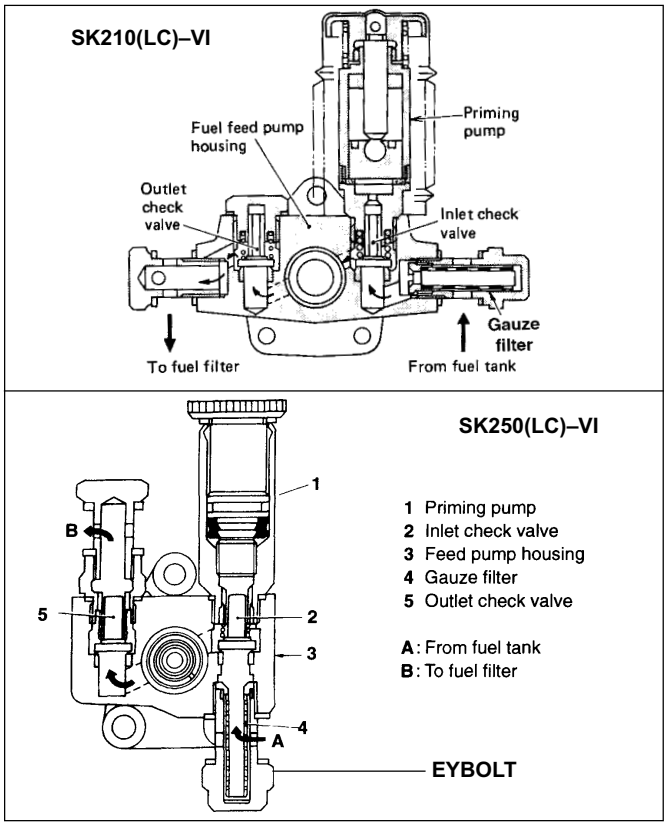


FIGURE 4.28C

3. Bleeding Air From Fuel System

WARNING

CLEAN UP ALL SPILLED FUEL TO PREVENT FIRES. DISPOSE OF HAZARDOUS WASTE ACCORDING TO ENVIRONMENTAL LAWS AND REGULATIONS.

If air contaminates the fuel system, the engine may become hard to start or it malfunction. Bleed the air whenever the fuel tank is empty, the water separator is drained, or the fuel filter element is replaced. See Figure 4.29.

a. Loosen the priming pump knob.

b. Loosen the air plug located on top of the fuel filter support mount.

c. Pump by hand to supply fuel until air bubbles stop coming out of the air plug.

NOTE

Use paper towels or rags to contain any fuel spills.

d. Tighten the air plug when no more air bubbles are present.

e. Continue pumping, even after tightening the air plug. Stop pumping with the handle in the lower position and tighten the knob completely.

NOTE

The air in the injection pump will automatically be forced out when the engine starts.

f. Run engine at low idle for 5 minutes to check and make sure there isn't any fuel leakage. Repair if needed.

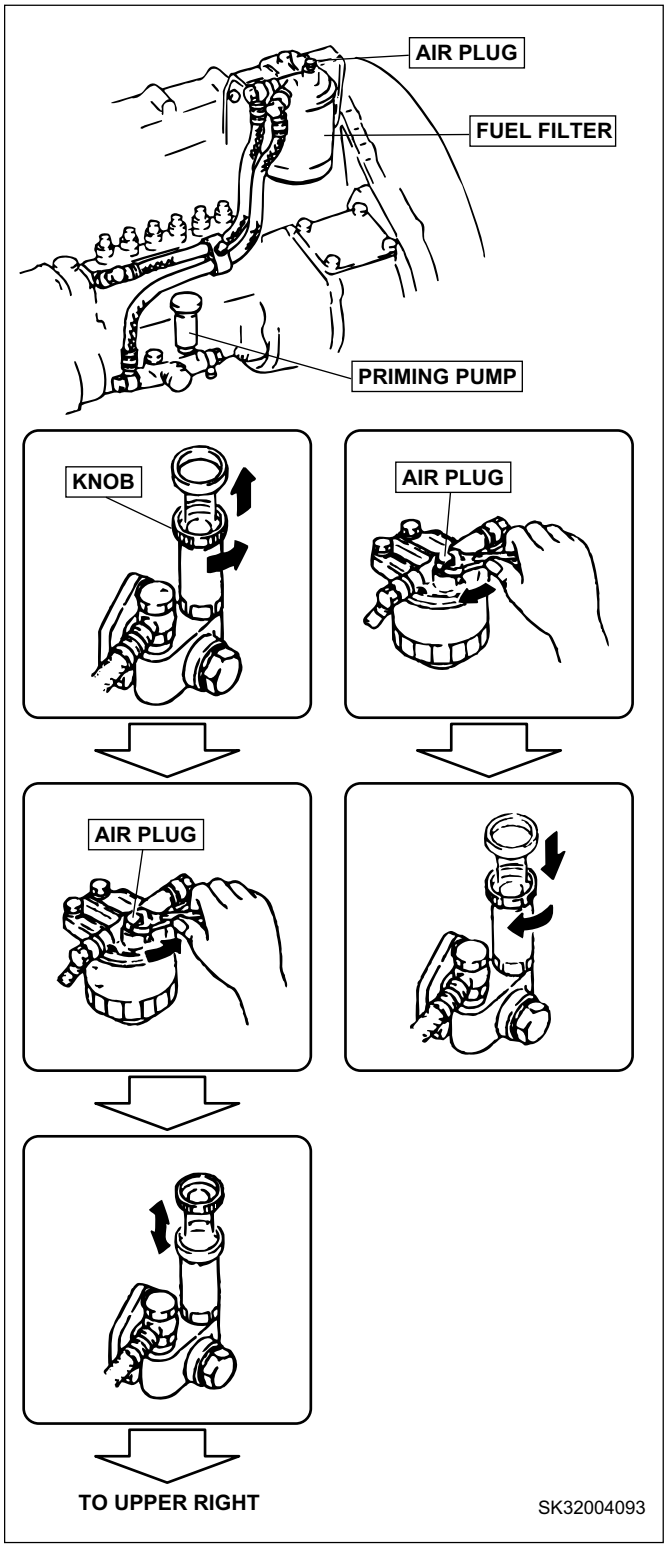


FIGURE 4.29

4

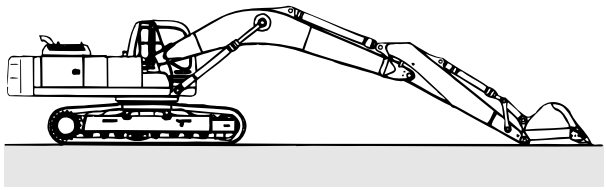
H. HYDRAULIC RETURN FILTER

Change the hydraulic tank return filter on a new machine after the first 50 hours of engine operation then change every 500 hours.

NOTE

One new hydraulic return filter is shipped with the machine in the support kit. This is to be used at the 50 hours filter change.

Move machine to firm level ground and place attachment in hydraulic oil check position.



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4

1. Release hydraulic tank pressure. See Figure 4.30A.

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.

2. Remove the six mounting bolts from the hydraulic return cover plate. See Figure 4.30B.

CAUTION

Slowly remove the mounting bolts. The filter cover plate is under spring tension.

3. Remove “O”-Rings, filter springs and bypass valves. See Figure 4.30C.
4. Remove the filter from the housing. See Figure 4.30C.
5. Install new filter, bypass valve and spring into housing.
6. Install New “O”-Ring, KOBELCO Part Number ZD11G20000.
   Lubricate “O”-Ring before installing.
7. Install cover plates and torque mounting bolts to proper value. Refer to Specifications Section for torque value.

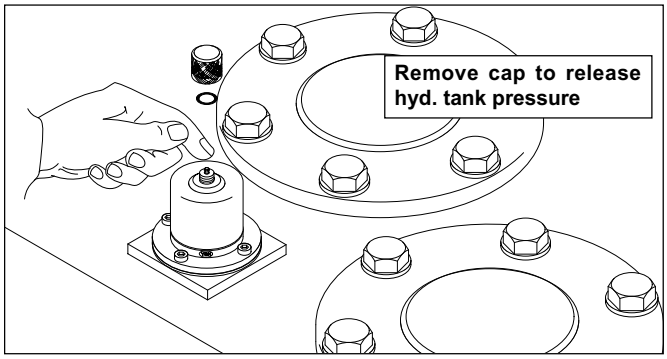


FIGURE 4.30A

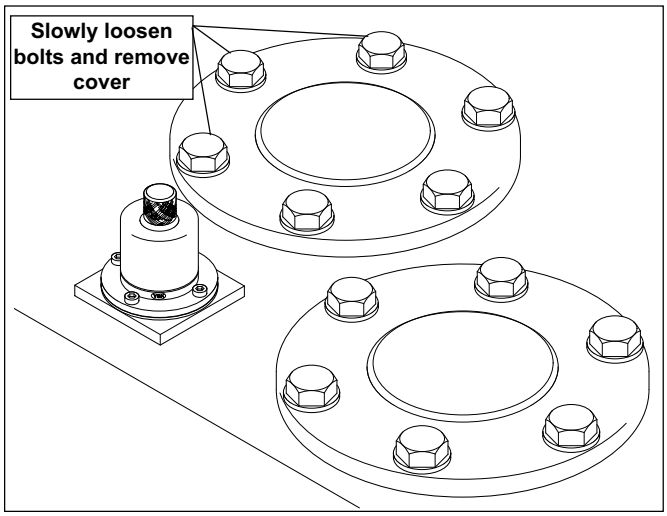


FIGURE 4.30B

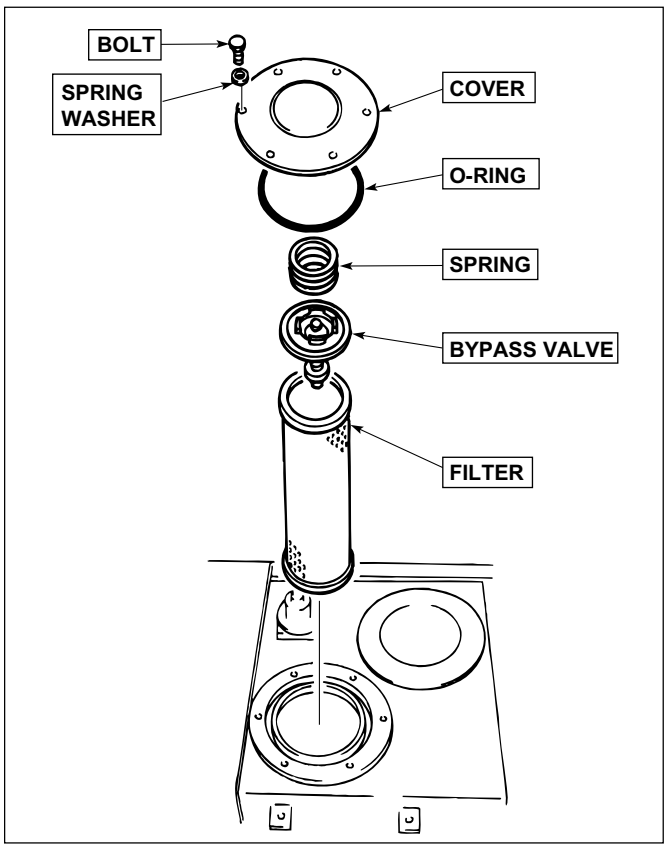


FIGURE 4.30C

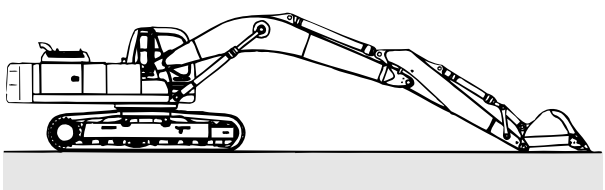
I. PILOT LINE FILTER

Clean the pilot system filter/screen on a new machine after the first 50 hours of engine operation, then clean it every 500 hours.

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.

1. Move the machine to a firm level surface, place the attachment on the ground in the hydrauilic oil check position, and release the tank pressure.



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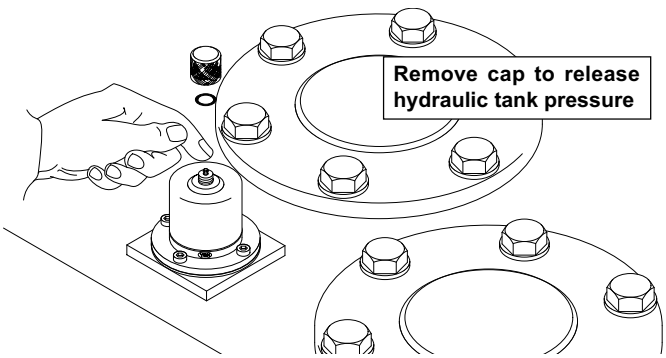


2. Open the main pump access door, lock it open, and locate the pilot manifold mounted to the side of the hydraulic tank. See Figure 4.31A.

3. Loosen the manifold block case with spanner 24mm(0.94"). See Figure 4.31B.

4. Clean the removed parts and fit new element and O-ring in the case.

5. After the case is installed on the filter base, tighten it with spanner 24mm(0.94").
   Tightening torque: 2.5 to 3.5kgf.m(18 to 25ft.lbs)

6. Close & lock the main pump access door.

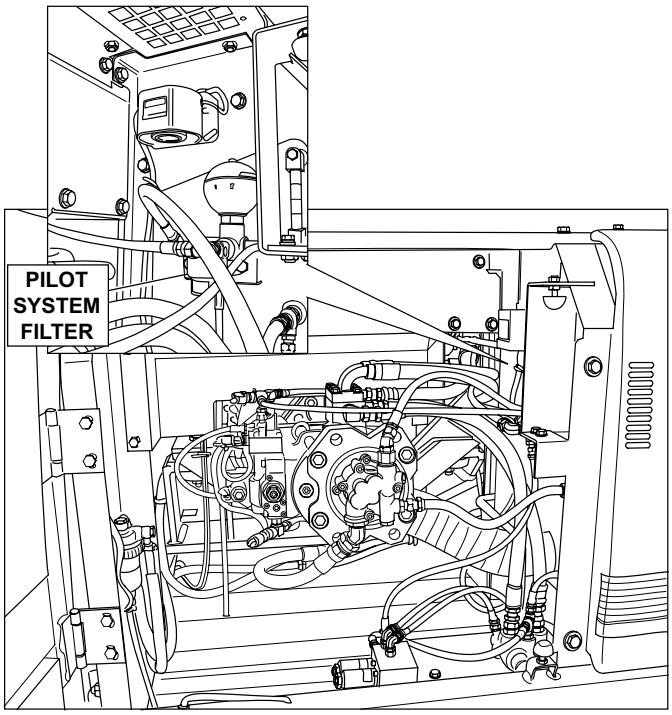


FIGURE 4.31A

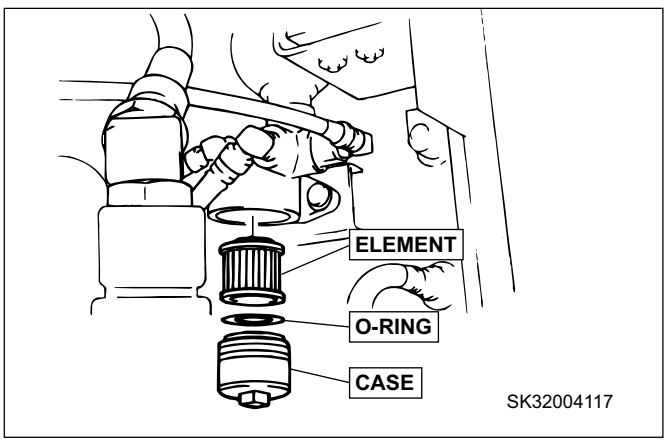


FIGURE 4.31B

4

J. BATTERIES

Perform complete battery service on a new machine after the first 50 hours of engine operation. Then, check electrolyte (acid) every 50 hours and perform maintenance every 250 hours.

WARNING

1. **WEAR SAFETY CLOTHES, GOGGLES OR FACE SHIELD, GLOVES AND SAFETY SHOES WHEN WORKING WITH BATTERIES.**
2. **WORK IN A WELL VENTILATED AREA.**
3. **BATTERY ELECTROLYTE (ACID) IS CORROSIVE. IF IT COMES IN CONTACT WITH SKIN, EYES OR CLOTHING, FLUSH WITH LARGE AMOUNTS OF WATER AND SEEK IMMEDIATE MEDICAL ATTENTION. SEE FIGURE 4.32A.**
4. **BATTERY ELECTROLYTE (ACID) PRODUCES HYDROGEN GAS THAT IS HIGHLY EXPLOSIVE. DO NOT ALLOW NEAR SPARKS, FIRE OR FLAMES AND DO NOT SMOKE WHEN WORKING WITH BATTERIES. SEE FIGURE 4.32A.**

FIGURE 4.32A

1. Open the battery access door. See Figure 4.32B.
2. Remove battery cell caps and visually inspect electrolyte (acid) level. Proper level is 10~15 mm (0.4” ~ 0.6”) above cell plates. See Figure 4.32C.
3. If necessary, fill each cell to proper level with **DISTILLED WATER ONLY.**
4. Remove cables from terminals and clean with hot water. Coat each terminal with a thin layer of petroleum jelly. Clean cables in the same manner and reinstall onto battery.
5. If cables are found to be in poor condition, replace with new parts immediately.

FIGURE 4.32B

WARNING

PREVENT BATTERY EXPLOSION

- **Batteries give off hydrogen gasses that can explode and cause personal injury.**
- **Keep sparks, open flames and cigarettes away from batteries.**
- **Keep metallic articles away from batteries.**
- **Keep all ventilation caps tightly secured.**
- **Never check charge by placing metal articles across battery terminals.**
- **Leave battery box open to improve ventilation when charging.**

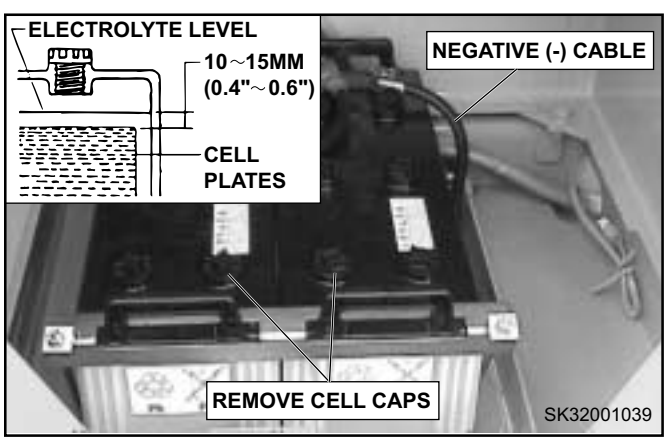


FIGURE 4.32C

6. Use a hydrometer to check the specific gravity of each cell. Compare readings to the chart below.

NOTE

Use hydrometer according to its manufacturer's instructions.

CHARGE %	ATMOSPHERIC TEMPERATURE		
	20°C (68°F)	0°C (32°F)	–10°C (14°F)
100%	**1.26**	**1.27**	**1.28**
90%	**1.24**	**1.25**	**1.26**
80%	**1.22**	**1.23**	**1.24**
75%	**1.21**	**1.22**	**1.23**

7. When disconnecting batteries, remove the negative(–) cable first. When connecting batteries, connect the negative(–) cable last. See Figure 4.33A.
8. When the battery requires charging;
   - **a.** Disconnect battery cables from terminals.
   - **b.** Remove all cell caps.
   - **c.** Check for proper electrolyte (acid) level.
   - **d.** Connect charger leads to the proper battery terminals.

CAUTION

Make certain not to cross Positive and Negative terminals when connecting charger.

   - **e.** Stop charge if battery overheats.
   - **f.** Periodically check the specific gravity of the batteries with a hydrometer. Stop charging batteries when 100% charged.

NOTE

Battery life can be shortened by overcharging and over discharging of the battery. Replace any battery that will not hold charge or is difficult to charge.

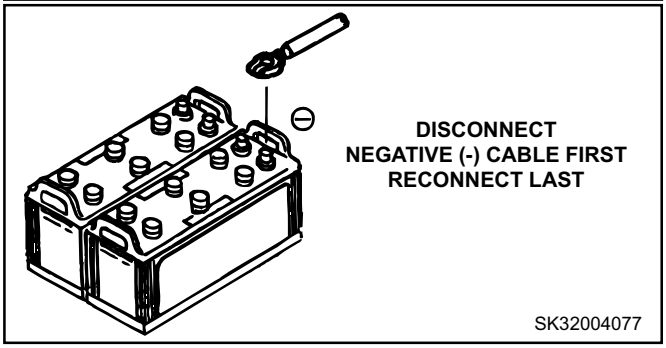


FIGURE 4.33A

K. FAN AND A/C BELT WEAR & TENSION

Inspect belt wear and tension on a new machine after the first 50 hours of operation. Then at every 250 hours of engine operation.

Measure belt tension on longest span of belt. Apply a 10 kgf (22 lbf) on the belts as indicated in Figure 4.33B, and measure the belt deflection. Compare to the following table:

BELT	DEFLECTION
FAN BELT	**10 mm ~ 15 mm (0.4"~ 0.6")**
AIR CONDITIONER	**7 mm ~ 10 mm (0.3"~ 0.4")**

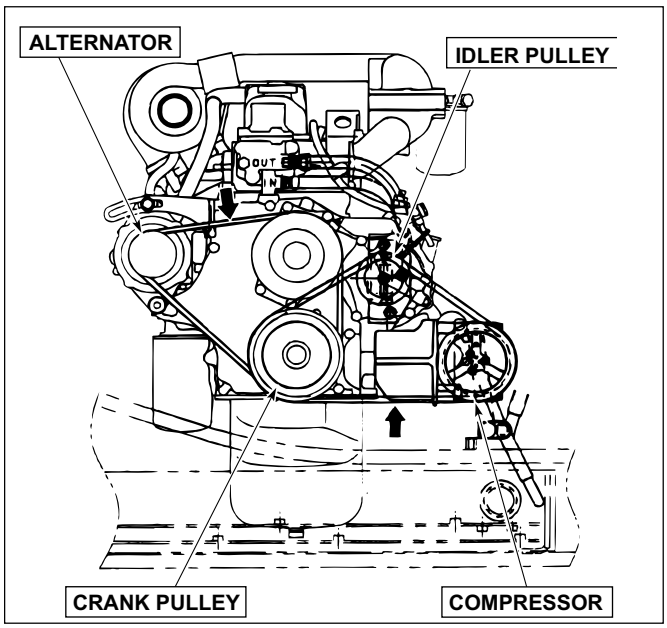


FIGURE 4.33B

Should the fan and/or AC compressor belts need adjustment, please refer to detailed instructions in 250 hour maintenance, item A, in this section.

NOTE

Be very careful when moving the alternator. Do not damage the stator coil section located beween the alternator's front and rear housing.

L. SLEWING RING AND SWING BEARING LUBRICATION.

1. Slewing Ring

Check the grease level and condition of the slewing ring gear grease bath on a new machine after the first 50 hours of engine operation. Then check every 120 hours. Replace the grease in the slewing ring gear bath every 2,000 hours (See 2,000 hour maintenance in this section for details)

a. Locate the slewing ring grease case inspection cover between the battery compartment and the boom support frame. See Figure 4.34A.

b. Remove bolts and inspection cover plate. If water is present, remove the lower plate (drain plate). See Figure 4.34B.

c. Start the engine and slowly rotate the upper structure to inspect the slewing gear.

d. Should any grease be needed, add N.L.G.I. Nº 2 Lithium base with MOS_2 grease only.

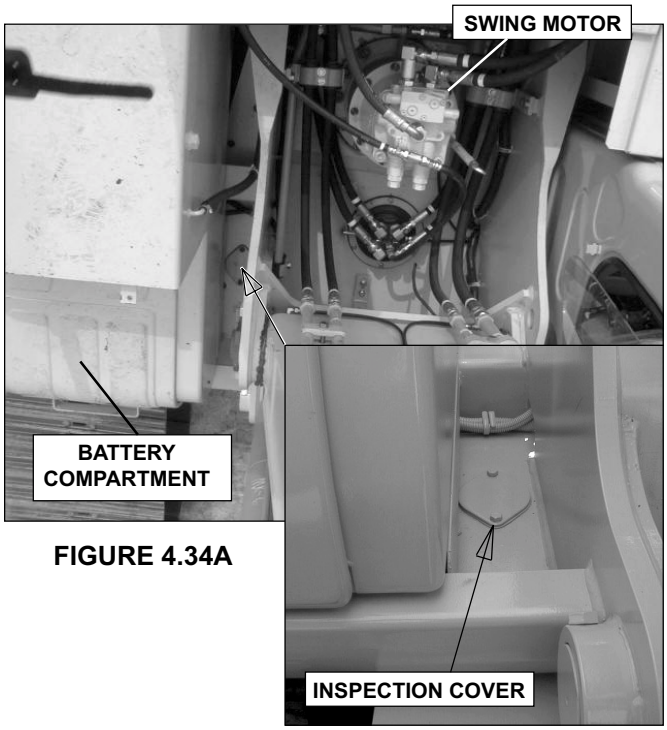


FIGURE 4.34A

CAUTION

DO NOT OVERFILL SUMP BATH. IF OVERFILLED, SUMP BATH GREASE COULD BE PUMPED INTO SWING MOTOR REDUCTION UNIT AND CAUSE SEVERE DAMAGE. USE ONLY N.L.G.I. LITHIUM BASE WITH MOS2 GREASE IN SLEWING RING GEAR SUMP BATH.
IF THE SLEWING RING EVER BECOMES SUBMERGED IN WATER, IT IS MANDATORY THAT THE SUMP BATH GREASE BE CHANGED. REFER TO 2,000 HOUR MAINTENANCE FOR SPECIFIC INSTRUCTIONS.

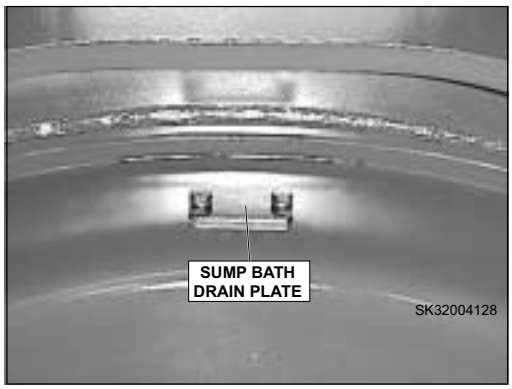


FIGURE 4.34B

2. Swing Bearing Lubrication

Lubricate the swing bearing on a new machine after the first 50 hours of engine operation. Then lubricate every 500 hours, or as conditions dictate.

a. Locate the grease fitting at the front of the swing bearing. See Figure 4.34C.

b. Using a grease gun filled with general purpose EP Grease (Refer to page 4-8), lubricate swing bearing with several shots from grease gun.

c. Swing machine 90° right, and repeat step 2. See label on frame.

d. Continue to swing machine at 90° increments and lubricating swing bearing until ring has been completely greased.

NOTE

Make sure to inspect the Upper and Lower Side of Swivel Valve for leakage. Repair any leakage as needed.

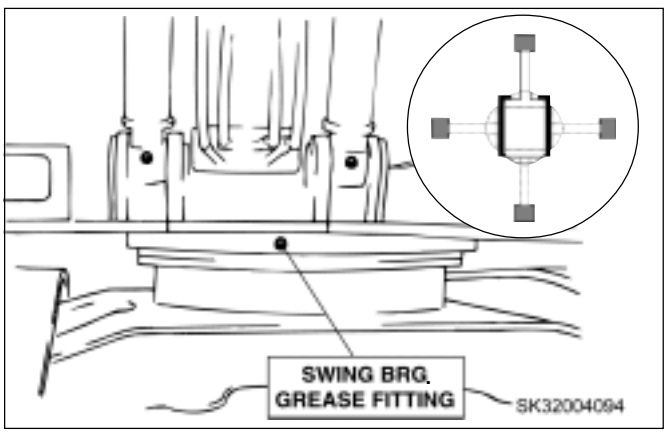


FIGURE 4.34C

e. Check and make sure the swing bearing seal is in good condition. It is normal to see the excessive grease come out of the seal. See Figure 4.35A.

M. CHECKING SLEWING RING ATTACHING BOLTS FOR PROPER TORQUE

Check the slewing ring bolts torque on a new machine after the first 50 hours of engine operation. Then check every 500 hours.

Check the slewing ring bolts for proper torque across each other and in sequence, see Figure 4.35B. If bolts are loose, remove one bolt at the time, clean it and apply locktite #262 and torque accordingly. See the following table for torque reference.

Unit : Kgf•m (ft•lbs)

MODEL	LOCATION	TORQUE SPECIFICATION
SK210-VI SK210LC-VI	Inner Race	57.5 ± 5.8 (415 ± 42)
	Outer Race	40.0 ± 4.0 (289 ± 29)
SK250LC-VI SK250NLC-VI	Inner Race	57.5 ± 5.8 (415 ± 42)
	Outer Race	50.0 ± 5.0 (361 ± 36)

N. OIL LEVEL IN SWING AND TRAVEL REDUCTION UNITS

Check the oil level on swing motor reduction unit and travel reduction units on a new machine after the first 50 hours of engine operation. Then check every 120 hours. See detailed instructions in 120 hour maintenance in this section (items B, C, and D).

O. INSPECTING COUNTERWEIGHT ATTACHING BOLTS FOR PROPER TORQUE

Check bolts and nuts for proper torque. See Figure 4.35C.

CAUTION

Striking counterweight against obstruction may cause loosening of bolts. Check bolts for loosening after 50 hours the first time, and every 250 hours after that.

Unit : Kgf•m (ft•lbs)

MODEL	TORQUE SPECIFICATION (Apply Loctite # 242)
SK210(LC)–VI	130 ±13 (939 ±94)
SK250(LC)–VI SK250NLC–VI	170 ±15 (1228 ±36)

FIGURE 4.35A

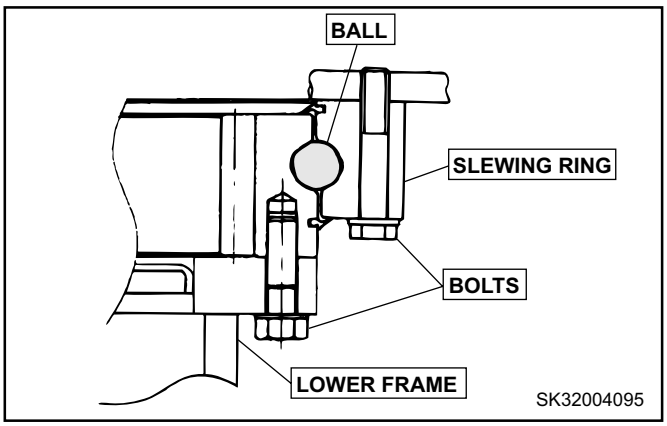


FIGURE 4.35B

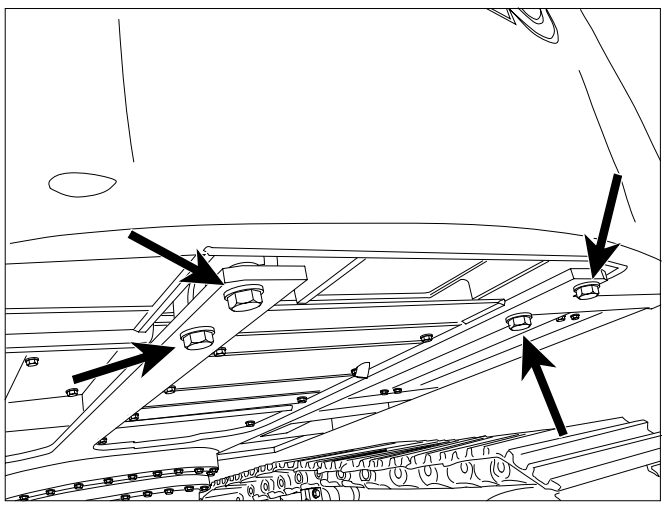


FIGURE 4.35C

NOTE

If a counterweight bolt is found loose, remove it, clean threads, apply loctite # 242 before installing it.

WARNING

WEAR GOGGLES, SAFETY SHOES, HARD HAT, WORK CLOTHES AND WORK GLOVES TO PERFORM INSPECTION AND MAINTENANCE ON THIS MACHINE.

4.7 120 HOUR INSPECTION & MAINTENANCE PROCEDURES.

A. CONTROL LEVER JOINT LUBRICATION

Remove the rubber boots from control levers and lubricate the universal joint (1) and the top of the sliding area (2) every 120 hours. See Figure 4.35A.

B. SWING MOTOR REDUCTION OIL

Check the oil level of the swing motor reduction unit on a new machine after the first 50 hours of engine operation. Then check every 120 hours.

1. Locate the dipstick on the side of the swing motor. See Figure 4.36B. Pull dipstick, wipe clean and reinsert all the way in.
2. Pull dipstick and read oil level.
3. If necessary to add oil, remove plug from oil fill port and fill to full level with proper oil. See Figure 4.36B and refer to page 4-11 for oil specifications.
4. Check and make sure the vent hole on dipstick is clean. See Figure 4.36C.

CAUTION

Reduction unit may be under pressure.
Remove plug slowly.

5. To drain any excess oil from swing motor reduction Unit:
   - **a.** Locate drain port under the center opening of the lower frame. See Figure 4.36D.
   - **b.** Place a an empty container under drain port and remove plug allowing excess oil to drain into container.

Total oil volume

MODEL	Volume
SK210 (LC) -VI	7.5 Liter (2.0 Gal)
SK250LC-VI	15.3 Liter (4.0 Gal)

   - **c.** Replace plug and tighten securely after all oil is drained.
   - **d.** Fill through fill port using proper oil. See Figure 4.36B and Refer to page 4-11 for oil specifications.
   - **e.** Recheck oil level and make sure it is within specifications.

WARNING

NEVER PERFORM MAINTENANCE ON A MACHINE THAT HAS JUST FINISHED WORKING. ALLOW SUFFICIENT TIME FOR MACHINE TO COOL DOWN.

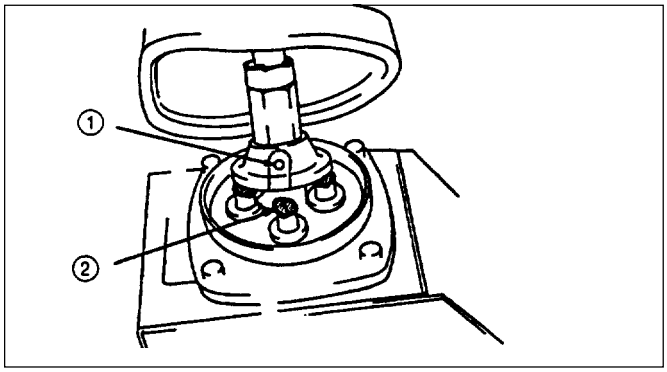


FIGURE 4.36A

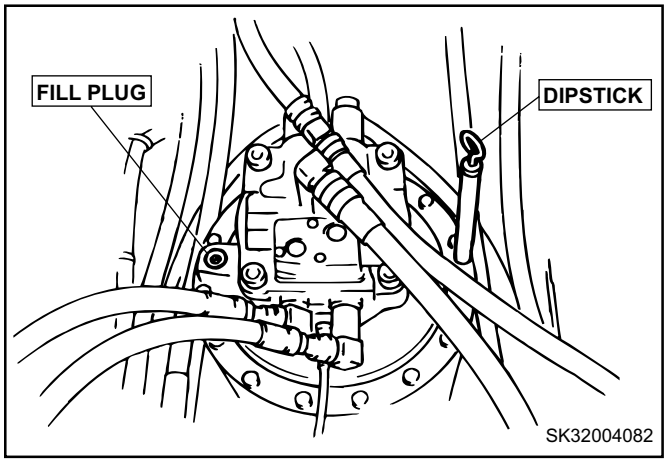


FIGURE 4.36B

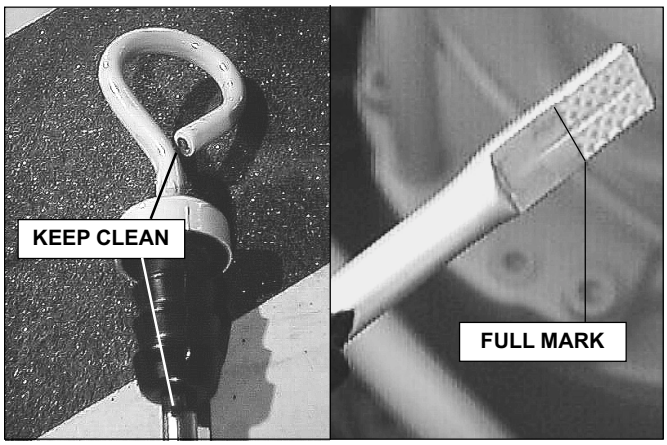


FIGURE 4.36C

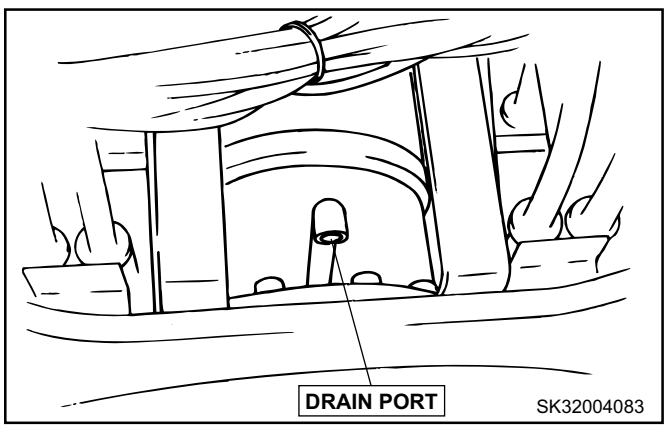


FIGURE 4.36D

C. TRAVEL MOTORS REDUCTION OIL (FOR SK210 (LC) -VI)

Inspect oil level of travel motor reduction unit on a new machine after the first 50 hours of engine operation. Then check every 120 hours.

1. Move machine to a firm, level surface. Operate travel until “DRAIN” plug is positioned at 6:00 o’clock. “FILL/LEVEL” plug should be on the top left side at about 10:00 o’clock. See Figure 4.37A.
2. Stop engine and remove the travel motor reduction unit oil level plug. See Figure 4.37A. If oil just seeps from the port, oil level is correct.

CAUTION

Reduction unit may be under pressure. Remove plug slowly.

3. To add oil, remove the oil FILL plug and add Extreme Pressure Gear Oil #90 Grade GL-4 until oil just begins to flow out from the orifice.
4. Use teflon tape on the plug for better sealing. Install plug and tighten securely.

NOTE

Capacity of each travel motor reduction unit is 5.5 liters (1.5 Gallons).

D. TRAVEL MOTORS REDUCTION OIL (FOR SK250LC-VI & SK250NLC-VI)

Inspect oil level of travel motor reduction unit on a new machine after the first 50 hours of engine operation. Then check every 120 hours.

1. Move machine to a firm, level surface. Operate travel until “FILL” plug is positioned at 12:00 o’clock, “LEVEL” plug at 3:00 o’clock, and drain plug at 6:00 o’clock on travel motors. See Figure 4.37B.
2. Stop engine and remove the travel motor reduction unit oil level plug. See Figure 4.37B. If oil just seeps from level port, oil level is correct.

CAUTION

Reduction unit may be under pressure. Remove plug slowly.

3. To add oil, remove the oil fill plug and the level plug. Add extreme pressure gear oil #90 grade GL-4 through the fill orifice until oil just begins to flow out from the level orifice.
4. Use teflon tape on plugs for better sealing. Install plugs and tighten securely.

NOTE

Capacity of each travel motor reduction unit is 4.7 liters (1.2 Gallons).

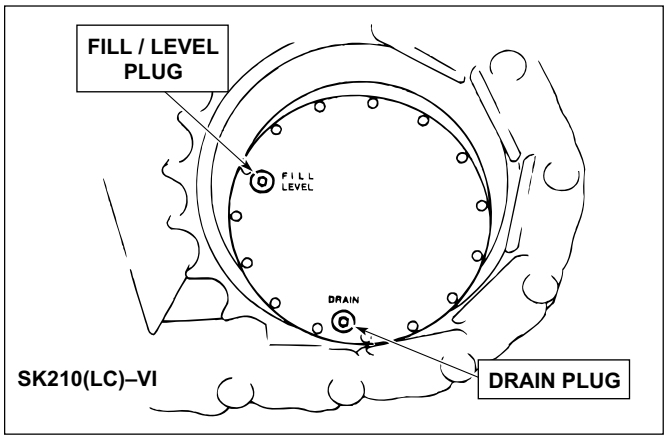


FIGURE 4.37A

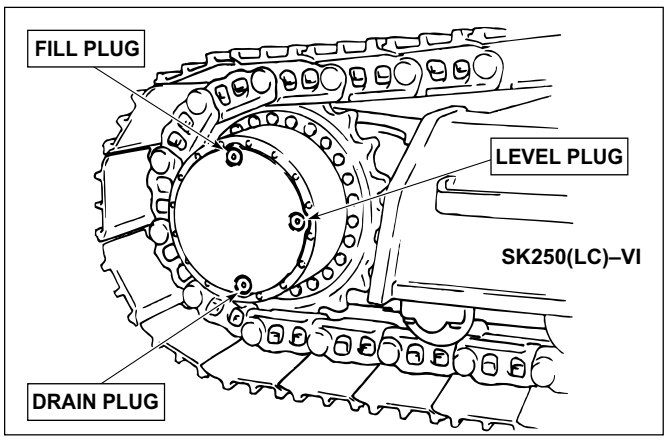


FIGURE 4.37B

CAUTION

Clean up all spilled oil. Dispose of all hazardous waste in accordance with government environmental regulations.

NOTE

To replace oil in travel motors, please refer to 500 hour maintenance in this section.

4.8 250 HOUR (3-MONTH) INSPECTION & MAINTENANCE PROCEDURES.

NOTE

Perform all pre-start (every 8-Hour and 50-Hour) inspection & maintenance procedures along with the 120 Hour inspection and maintenance procedures.

A. FAN AND A/C BELT WEAR AND TENSION

Inspect belts and tensioner assembly on a new machine after the first 50 hours of operation. Then at every 250 hours of engine operation.

Measure belt tension on longest span of belt. Apply a 10 kgf (22 lbf) on the belts as indicated in Figure 4.38A and measure the belt deflection. Compare to the following table:

BELT	DEFLECTION
FAN BELT	10 mm ~ 15 mm (0.4"~ 0.6")
AIR CONDITIONER	7 mm ~ 10 mm (0.3"~ 0.4")

1. Fan Belts

Check fan belts for excessive wear and cracks and replace them if needed. ***When replacing a twin type V-belt, replace them both.*** If only one belt is replaced, it may fail due to the excessive loading. To adjust the fan belts, proceed as follows:

a. Loosen mounting cap screw and adjusting nut on the alternator. See Figure 4.38B.

b. Loosen or tighten adjusting bolt to adjust fan belt to the specified tension, and tighten mounting nut and adjusting nut properly. See Figure 4.38B.

TIGHTENING TORQUES

Mounting cap screw: 8.4 ±1.0 Kgf-m (61 ±7 lbs-ft)

Adjusting nut: 7.7 ±1.5 Kgf-m (56 ±11 lbs-ft)

c. After adjustment, start engine and run it at low idle for about 5 minutes. Then recheck belt tension.

2. Air Conditioning Compressor Belt

Check belt for excessive wear and cracks and replace if needed. To adjust the AC compressor belt, proceed as follows:

a. Loosen the idler pulley nut. See Figure 4.38C.

b. Loosen or tighten adjusting bolt.

c. Tighten idler pulley nut to 4.0 ~ 5.5 Kgf-m (29 ~ 40 lb-ft)

d. After adjustment, start engine and run it at low idle for about 5 minutes with AC turned on. Then recheck belt tension.

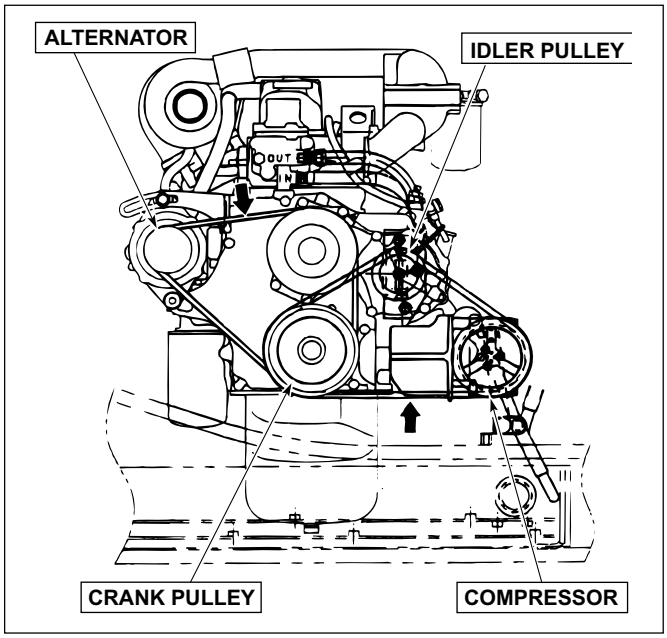


FIGURE 4.38A

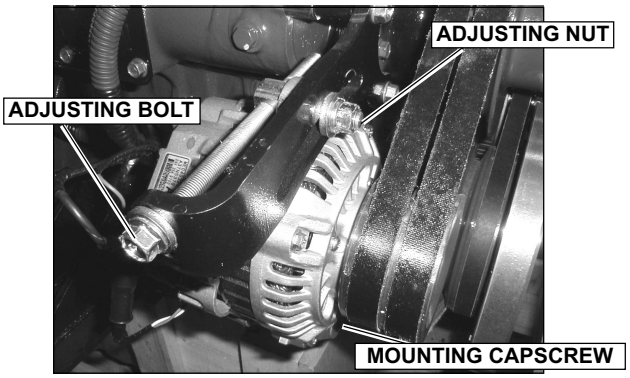


FIGURE 4.38B

NOTE

Be very careful when moving the alternator. Do not damage the stator coil section located beween the alternator's front and rear housing.

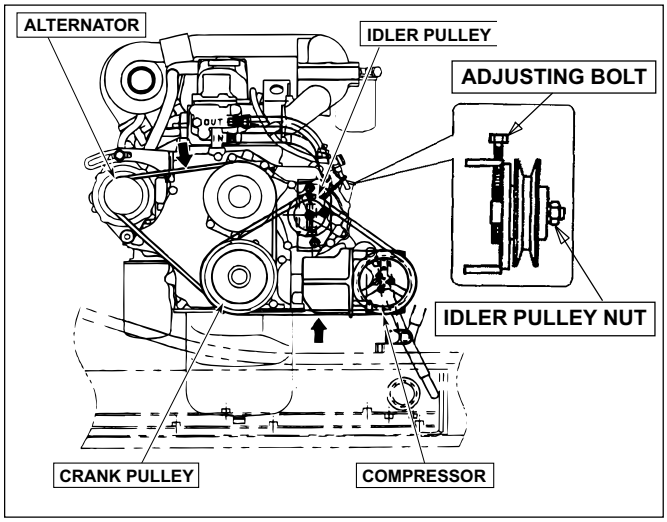


FIGURE 4.38C

B. CLIMATIZER-AC UNIT FILTER INSPECTION

Inspect the fresh air filter every 250 hours of engine operation and the recirculate air filter every 500 hours of engine operation.

NOTES

• If the working environment is extremely dusty, it is recommended to reduce the inspection schedule to at least half of the above specified working hours.

• The fresh air filter is a paper filter. DO NOT WASH. Clean with air only. Do not clean more than 10 times, or replace it every 2 years.

• Clean the recirculate air filter with compressed air or by washing and rinsing.

• Do not wash recirculate air filter with any organic solvent, such as: gasoline, trichlene, thinner, etc.

Removing the climitizer-AC unit filters:

1. Fresh Air Filter

a. Move the seat back forward for easy access to the rear panel.

b. Release the 4 top screws from the rear panel top cover (behind the operator's seat), see Figure 4.39A, and press the lower locks to release cover and remove it. Tilt the cover towards the seat to obtain access to the fresh filter. See Figure 4.39B.

NOTE

To release the 4 top screws, turn them counter clockwise 1/4 of a turn (90º).

c. Remove the fresh air filter for inspection and cleaning, or replacement. See Figure 4.39B.

d. After cleaning or replacement, use this procedure in reverse for assembling.

2. Recirculate Air Filter

a. Repeat above steps a, and b.

b. Pull out the speaker wires and carefully remove the top cover from the cab.

c. Press the locks on the lower cover to release it and remove it to obtain access to the recirculate air filter. See Figure 4.39A.

d. Raise recirculate air filter slightly and pull it out for inspection and cleaning, or replacement. See Figure 4.39C.

e. After cleaning or replacement, use this procedure in reverse for assembling.

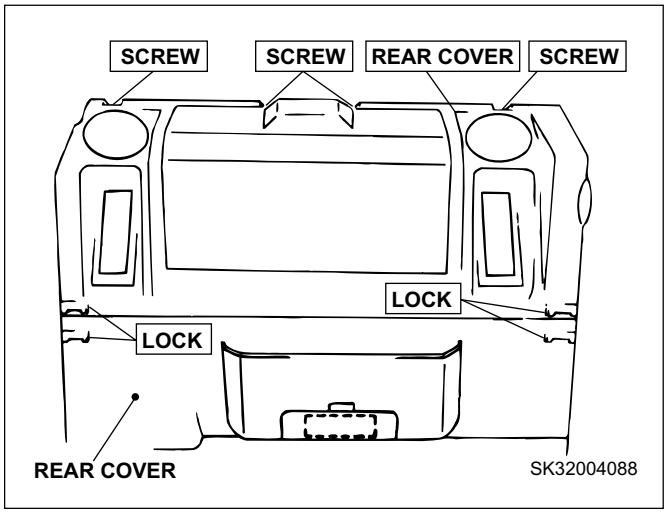


FIGURE 4.39A

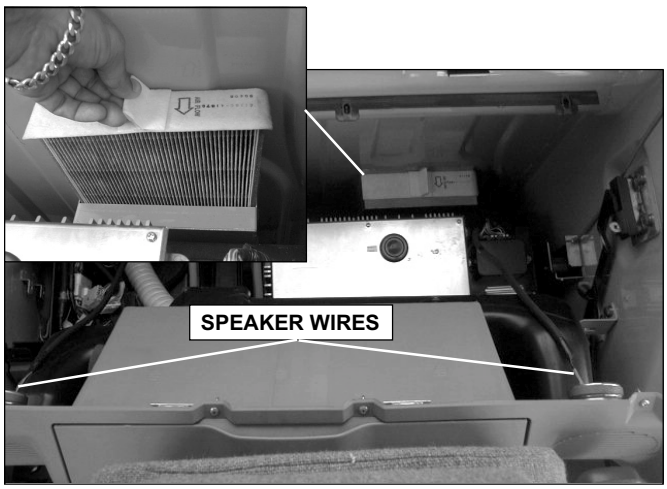


FIGURE 4.39B

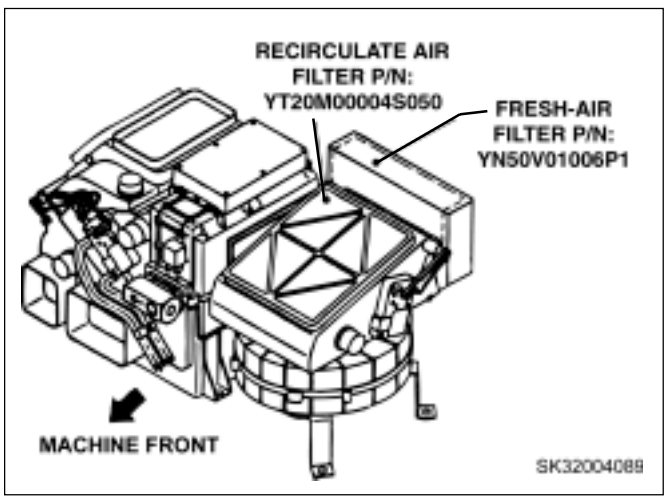


FIGURE 4.39C

C. CHECKING THE RADIATOR CAP & HOSES

Inspect the radiator cap and hoses every 250 hours of engine operation.

1. Raise the engine cover and make sure to lock it open. See Figure 4.40A.

2. Check the hoses for coolant leakage due to loose clamps, or cracked and worn hoses.

3. Tighten any loose clamps.

4. Should you need to replace any cracked or worn hoses, proceed as follows:

WARNING

USE EXTREME CAUTION WHEN REMOVING THE RADIATOR CAP. THE COOLANT IS UNDER HIGH PRESSURE WHEN HOT. NEVER REMOVE THE RADIATOR CAP WHEN THE SYSTEM IS HOT. ALLOW SUFFICIENT TIME FOR MACHINE TO COOL DOWN.

4

a. Place a rag or paper towel on the radiator cap and slowly remove it to release the pressure. See Figure 4.40A.

b. Locate the radiator lower cover, remove bolts and cover to obtain access to the radiator drain hose and lower hose. See Figure 4.40B

c. Place an empty clean container under the radiator drain hose. Do not contaminate coolant mixture drained, since it can be reused.

NOTE

Refer to page 4-11 in regards to proper engine coolant capacity.

d. Turn drain valve counter clockwise to drain coolant. See Figure 4.40B.

e. Loosen the hose clamp and remove radiator hose.

f. Make sure to clean the areas where the new hose will be connected.

g. Remove the clamps from the old hose and install them on the new hose.

h. Coat the inside ends of the new radiator hose with grease and install it. Tighten clamps properly.

i. Fill radiator with the coolant drained in step c.

j. Install radiator cap, start engine, and bring engine temperature to about 90 ºC (194 ºF).

k. Run engine at low idle, check for leakages and repair as needed.

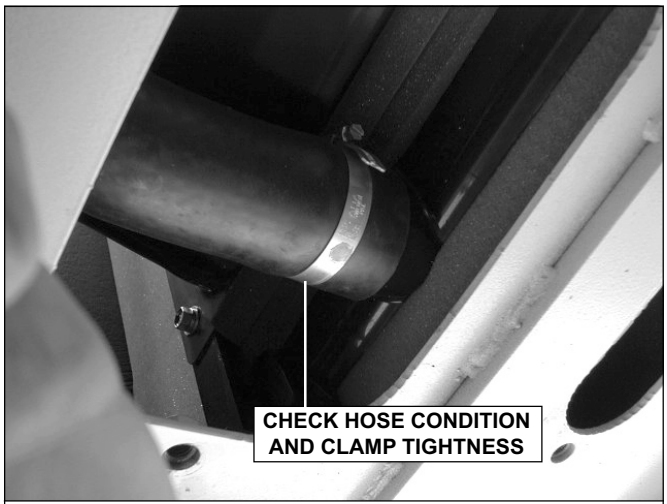
l. Install radiator lower cover and close engine cover.

5. Inspect radiator cap for proper operation and replace if needed.

WARNING

WEAR GOGGLES, SAFETY SHOES, HARD HAT, WORK CLOTHS AND WORK GLOVES TO PERFORM INSPECTION AND MAINTENANCE ON THIS MACHINE.

FIGURE 4.40A



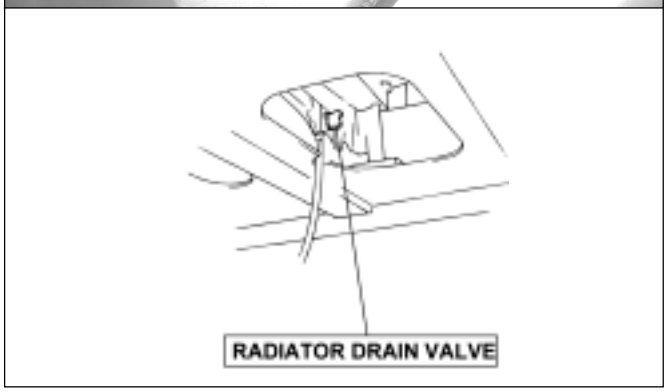


FIGURE 4.40B

4.9 500 HOUR (6-MONTH) INSPECTION & MAINTENANCE PROCEDURES.

A. CHANGE OIL IN TRAVEL MOTOR REDUCTION UNITS (SK210(LC)-VI, SK250(LC)-VI & SK250NLC-VI)

Change the travel reduction units oil on a new machine after the first 500 hours of engine operation then change every 2000 hours.

WARNING

NEVER CHANGE OILS OR FILTERS ON A MACHINE THAT HAS JUST FINISHED WORKING. ALLOW SUFFICIENT TIME FOR THE MACHINE TO COOL DOWN BEFORE PERFORMING ANY MAINTENANCE.

1. SK210(LC)-VI

a. Move machine to a firm, level surface and place the attachments on the ground. Operate travel until “DRAIN” plug is positioned at 6:00 o’clock. “FILL/LEVEL” plug should be on the top left side at about 10:00 o’clock. See Figure 4.41A.

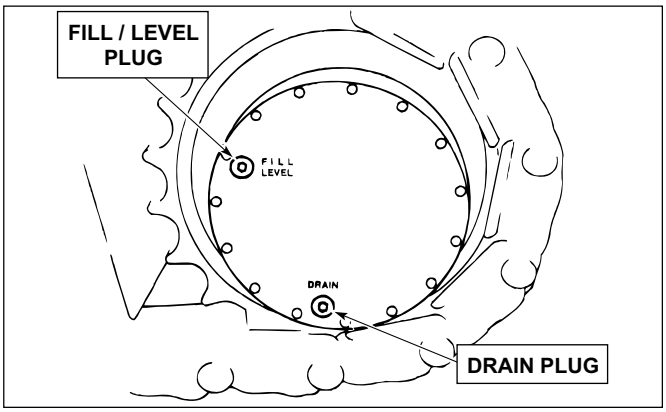


FIGURE 4.41A

b. Stop engine and place an empty container under the drain plug.

NOTE

Capacity of each travel motor reduction unit is 5.5 liters (1.5 Gallons).

c. Remove “FILL/LEVEL” and drain plugs to drain oil into the container.

d. After oil has been drained out completely, clean drain plug. Use teflon tape on drain plug for additional sealing and install plug. Tighten securely.

e. Add gear oil #90 grade GL-4 through the FILL/LEVEL opening until oil starts flowing out.

f. Clean FILL/LEVEL plug. Use teflon tape on plug for additional sealing and install it. Tighten securely.

WARNING

WEAR GOGGLES, SAFETY SHOES, HARD HAT, WORK CLOTHES AND WORK GLOVES TO PERFORM INSPECTION AND MAINTENANCE ON THIS MACHINE.

2. SK250(LC)-VI and SK250NLC-VI

a. Move machine to a firm, level surface. Operate travel until “FILL” plug is positioned at 12:00 o’clock, “LEVEL” plug at 3:00 o’clock, and “DRAIN” plug at 6:00 o’clock. See Figure 4.41B.

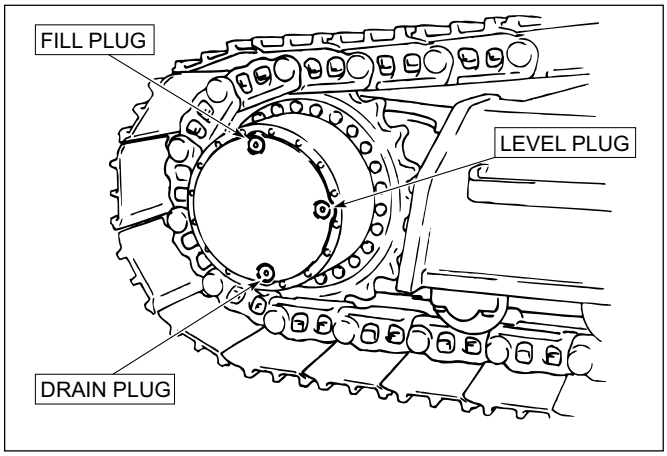


FIGURE 4.41B

b. Stop engine and place an empty container under the drain plug.

NOTE

Capacity of each travel motor reduction unit is 4.7 liters (1.2 Gallons).

c. Remove “FILL”, “LEVEL”, and “DRAIN” plugs to drain oil into the container.

d. After oil has been drained out completely, clean drain plug. Use teflon tape on drain plug for additional sealing and install it. Tighten securely.

e. Add gear oil #90 grade GL-4 through the fill opening until oil starts flowing out of the level opening.

f. Clean fill and level plugs. Use teflon tape on plugs for additional sealing and install them. Tighten both plugs securely.

CAUTION

Clean up all spilled oil. Dispose of all hazardous waste in accordance with government environmental regulations.

B. CHANGE OIL IN SWING REDUCTION UNIT

Change the swing reduction unit oil on a new machine after the first 500 hours of engine operation then change every 2000 hours.

WARNING

NEVER CHANGE OILS OR FILTERS ON A MACHINE THAT HAS JUST FINISHED WORKING. ALLOW SUFFICIENT TIME FOR THE MACHINE TO COOL DOWN BEFORE PERFORMING ANY MAINTENANCE.

1. Move machine to a firm, level surface and place the attachments on the ground.

2. Locate drain port under the center opening of the lower frame. Place a an empty container under drain port and remove plug allowing oil to drain into container. See Figure 4.42B.

NOTE

Capacity of each swing reduction unit.
SK210(LC)-VI ---------- 7.5 Liters (2 Gallons)
SK250(LC)-VI, SK250NLC-VI -- 15.3 Liters (4 Gallons)

3. Clean the drain plug and seal it with teflon tape. Install plug and tighten securely.

4. Remove the oil filler plug and fill with extreme pressure gear oil #90 grade GL-4.

5. Using the dipstick, confirm that the oil level is within the designated range. See Figure 4.42A.

6. Clean the fill plug. Use teflon tape on plug and install. Tighten securely.

C. CHECKING AND CLEANING FUEL TANK AND STRAINER

1. Use the ignition key and remove the fuel tank cap. See Figure 4.42C.

2. Check the cap seal and replace it if needed.

3. Remove the fuel tank strainer and clean it. See Figure 4.42C. Replace the strainer if it is damaged.

4. Install fuel tank strainer and use the ignition key to install the cap.

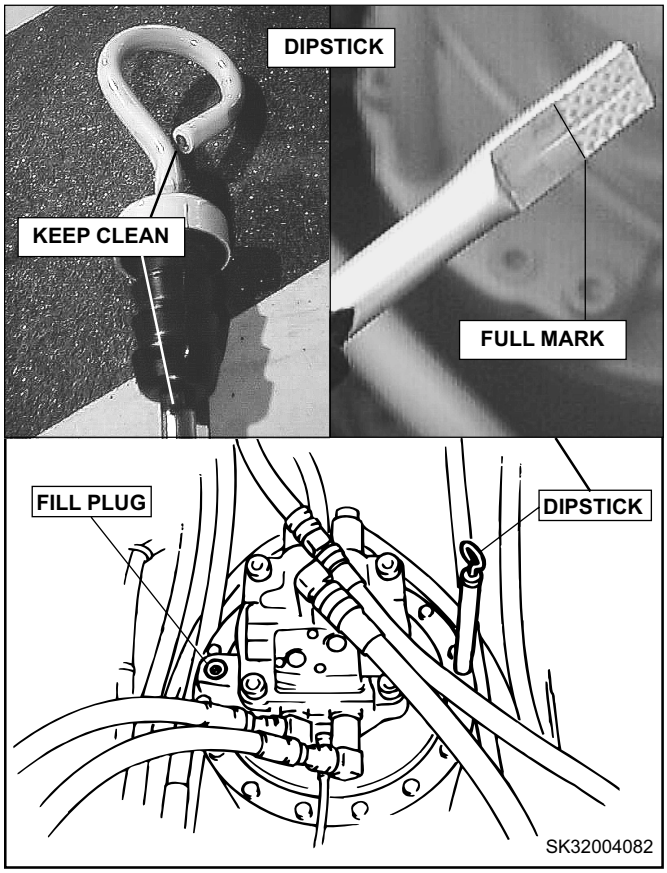


FIGURE 4.42A

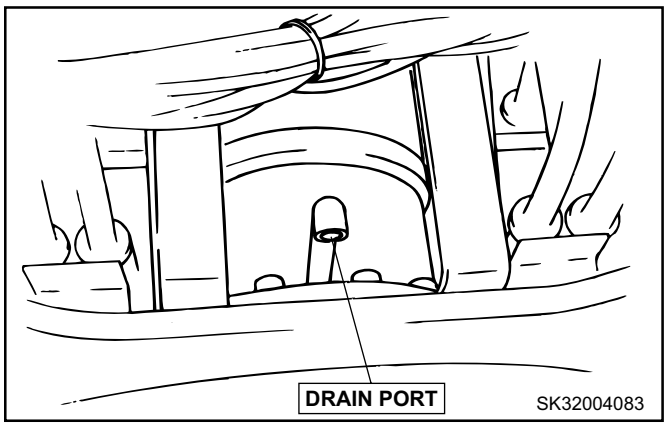


FIGURE 4.42B

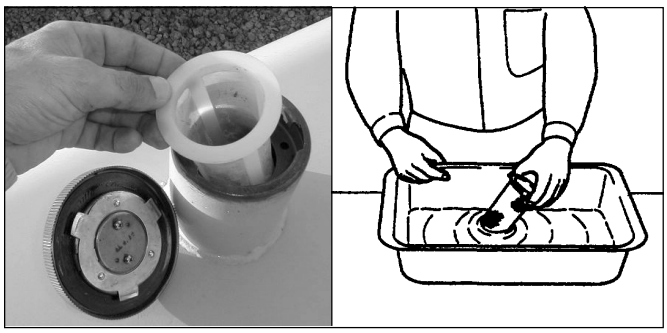


FIGURE 4.42C

D. CHECKING THE AIR CONDITIONER REFRIGERANT

1. Locate the one pin connector for the auto-acceleration function behind the operator's right hand console and change the position of the connector as indicated in Figure 4.43A.

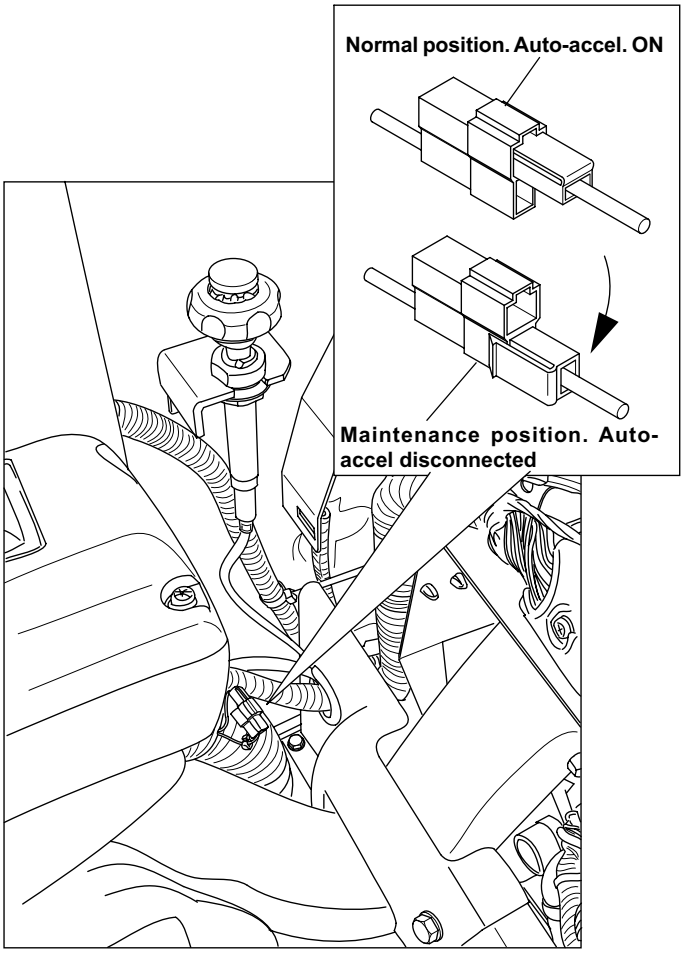


FIGURE 4.43A

2. Start the engine. Set the engine speed to the middle speed position. See Figure 4.43C

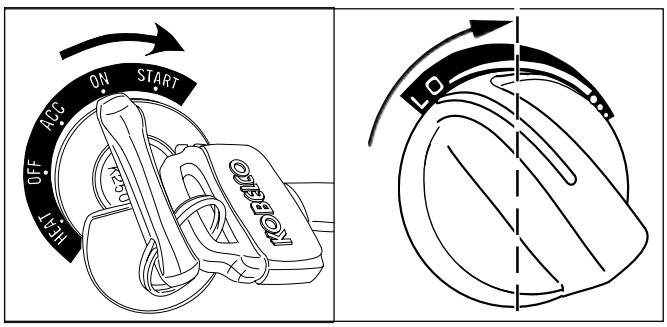


FIGURE 4.43B

3. Set the machine to the conditions shown below when checking the refrigerant. See Figure 4.43D.

- Air conditioner switch :ON
- Fan switch :Hl position (Maximum/ ▲)
- Temp. adjustment switch :Lower temp position (▼)
- Door / Window :Close
- Compressor switch :ON (The ❂ lamp lit up)

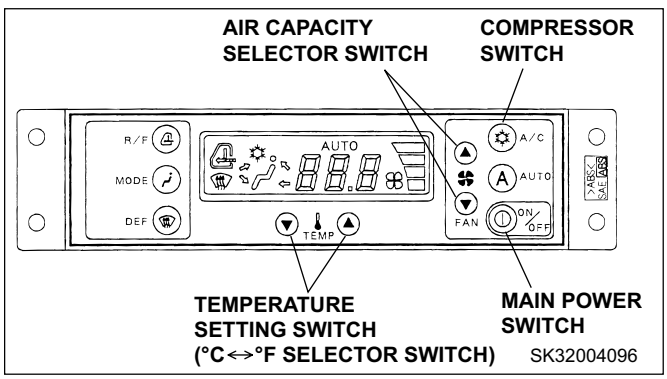
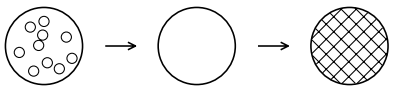
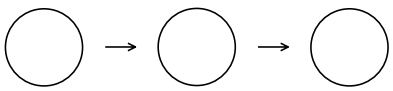
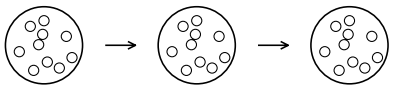


FIGURE 4.43D

4. Follow the procedure below and check the refrigerant volume by looking thorough the sight glass (inspection window) on the upper part of the receiver dryer. See table below for better reference.
   a. Figure Ⓐ shows that the refrigerant volume is proper.
   b. Figure Ⓑ shows that the refrigerant is over charged. This will make both high and low pressure extreme and exert a bad influence on the pressure switch operation and the air conditioning system.
   c. Figure Ⓒ shows that the refrigerant is insufficient. Have the refrigerant recharged at your KOBELCO distributor.

Refrigerant volume	Description
Ⓐ Proper 	 After the air conditioner is turned ON, little bubbles appear. The refrigerant becomes transparent, then turns a light milky white.
Ⓑ Overcharged 	 After the air conditioner is turned ON, no bubbles appear.
Ⓒ Insufficient 	 After the air conditioner is turned ON, bubbles appear continuously.

NOTE

- New refrigerant (HFC-134a), whose characteristics are different from conventional CFC-12, is used in this machine. Do not mix HFC-134a with CFC-12.
- Operate the air conditioner at least once every week for several minutes to rotate the compressor regardless of the season. This will prevent the refrigerant gas from leaking from the compressor sealing.

Bubbles: Refrigerant gas is mixed with refrigerant fluid.

No Bubbles: Whole refrigerant becomes fluid and transparent.

Cloudy: Refrigerant is separated from oil. The fluid becomes a light milky white.

5. Make sure to change the position of the auto accel connector to activate the auto accel function for normal machine operation. See Figure 4.43A (previous page) for better reference.

E. FUEL SYSTEM INJECTION PRESSURE AND NOZZLE CONDITION (Atomization)

Perform this inspection and adjustment every 500 hours of engine operation. Contact your Kobelco dealer's Service Department for assistance.

Initial injection pressure: 220 kgf/cm² (3129 psi)

4.10 1000 HOUR (12-MONTH) INSPECTION & MAINTENANCE PROCEDURES.

A. ENGINE VALVE CLEARANCE

Check and adjust the engine valve clearance every 1000 hours of engine operation. Contact your Kobelco dealer's Service Department for assistance.

Adjust exhaust and intake valves at 0.4 mm (0.016") (With cold engine)

B. ENGINE COMPRESSION PRESSURE SK210(LC)/SK250(LC)–VI

Check Engine Compression every 1000 hours of engine operation. Contact your Kobelco dealer's Service Department for assistance.

Compression pressure: 26 Kgf/cm² (370 psi) @ 200 rpm at engine temperature between 75~85 ºC (167~185 ºF)

C. INSPECTION OF STARTER AND ALTERNATOR

Check Starter and Alternator every 1000 hours of engine operation. Contact your Kobelco dealer's Service Department for assistance. It is necessary to disassemble these components for proper cleaning and inspection.

D. ENGINE FUEL INJECTION TIMING

Check Engine Fuel Injection timing every 1000 hours of engine operation. Contact your Kobelco dealer's Service Departement for assistance.

Injection timing:	**SK210(LC)–VI**	**15º BTDC**
	SK250(LC)–VI	**17º BTDC**

4.11 2000 HOUR INSPECTION & MAINTENANCE PROCEDURES

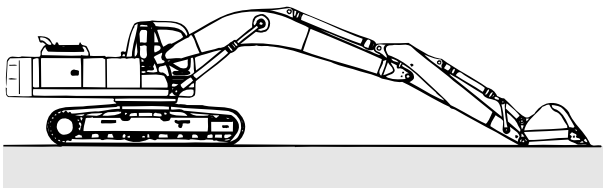
Perform all other Inspection & Maintenance Procedures as previously described in this section.

A. ENGINE COOLANT CHANGE

WARNING

BE CAUTIOUS OF HOT FLUIDS AND SURFACES. WEAR GOGGLES, SAFETY SHOES, HARD HAT, WORK CLOTHES AND WORK GLOVES TO PERFORM INSPECTION AND MAINTENANCE ON THIS MACHINE. ALLOW SUFFICIENT TIME FOR THE ENGINE TO COOL BEFORE CHANGING FLUIDS.

1. Move the machine to a firm level area, place the attachement on the ground and shut off the engine, see Fig. 4.45A.



SK32001028

FIGURE 4.45A

2. Locate the one pin connector for the auto-acceleration function behind the operator's right hand console and change the position of the connector as indicated in Figure 4.45B.

3. Raise the engine cover, secure it open, and place a rag or paper towel on the radiator cap. Slowly remove the cap. The system could be under pressure. See Figure 4.45C

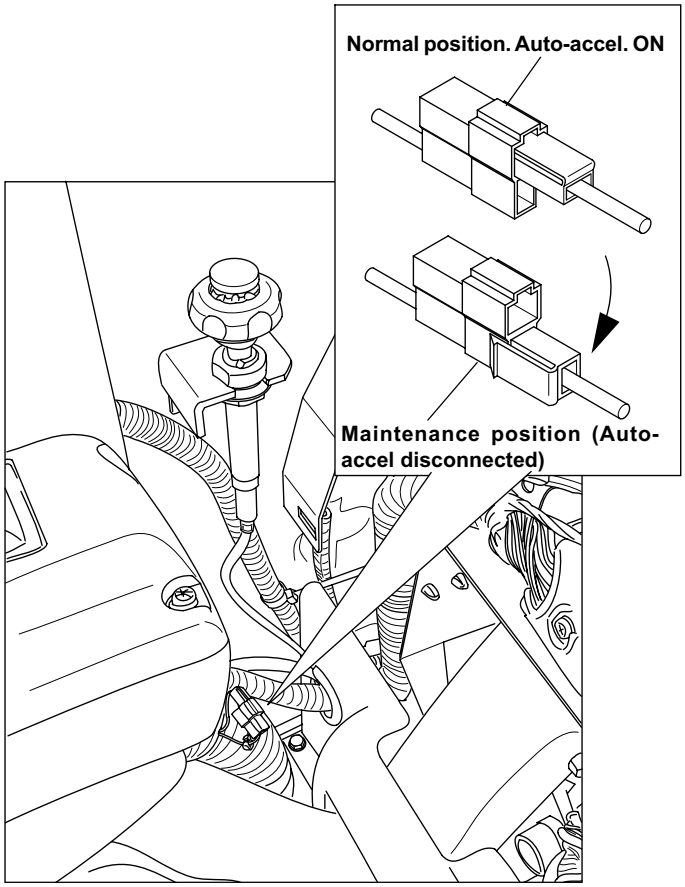


FIGURE 4.45B

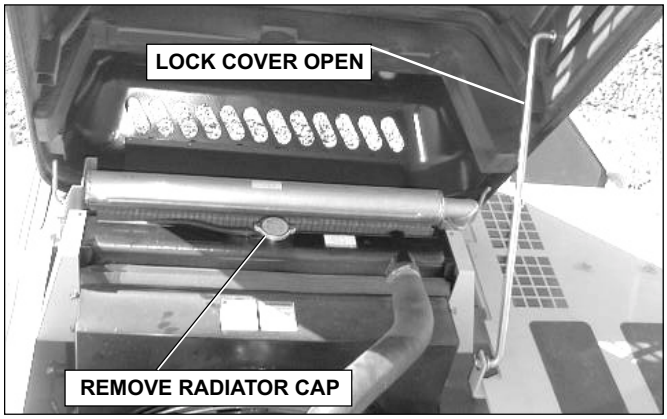


FIGURE 4.45C

4. Locate the lower cover beneath the radiator. See Figure 4.45D. Remove bolts and cover to obtain access to the radiator drain hose. Place an empty container, with sufficient capacity for engine system coolant, below the radiator drain hose. Refer to page 4-10 for proper system capacity. Turn valve counter clock wise to open drain.

CAUTION

Clean up all spilled coolant. Dispose of all hazardous waste in accordance with government environmental regulations.

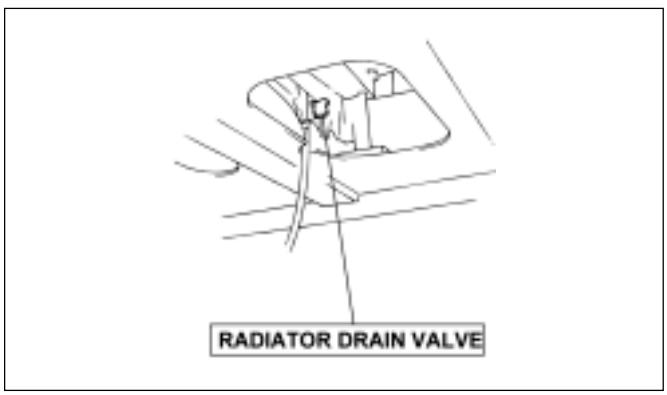


FIGURE 4.45D

5. Remove the engine lower cover. See Figure 4.46A. Use a funnel with hose attached to direct the drained coolant toward the container.

6. Locate the engine coolant drain plug on the left side of the engine block. Remove it to drain coolant. See Figure 4.46B.

7. After draining, close the drain valve and install the drain plug. Fill cooling system with with fresh water, preferable with hot water.

8. Start engine and bring engine cooling temperature to about 90 ºC (194 ºF). Then run engine at low idle. Remove engine drain plug, open radiator drain valve, and simultaneously feed fresh water into radiator until draining water comes out clear (About 10 min. flushing should be sufficient).

9. When flushing is completed, stop engine and also stop water feeding. Drain engine cooling system completely. Close drain valve and install plug.

10. Prepare a mixture of radiator detergent according to the detergent manufacturing specs and pour the solution into the radiator.

11. Repeat step 8, but run the engine at low idle for 30 minutes before draining and flushing.

12. After flushing is completed, use teflon tape on the engine drain plug for additional sealing. Install plug and tighten securely.

13. Close the radiator drain valve.

14. Add a mixture of engine coolant according to the specifications indicated in the table below. See page 4-10 for total engine cooling capacity.

NOTE

Expected minimum temperature	Long life coolant
-14.5°C (5.9°F)	30% mixed
- 34°C (-29.2°F)	50% mixed

Change contaminated and foamy coolant with new coolant mixture as soon as possible.
Cooling water other than long life coolant should be changed two times a year, in autumn and spring.

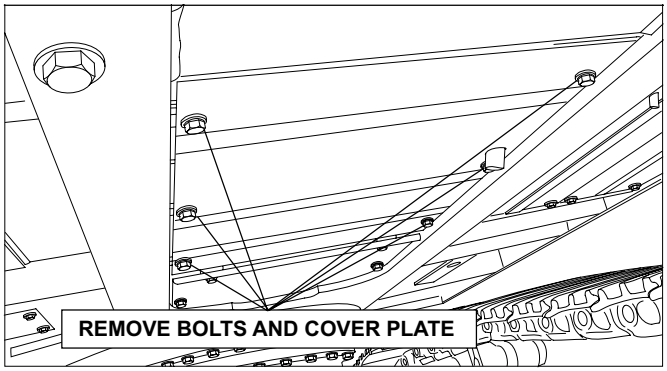


FIGURE 4.46A

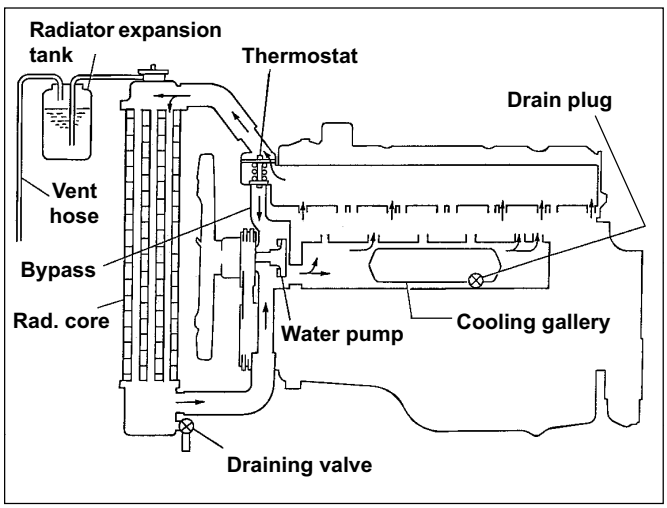


FIGURE 4.46B

15. Install radiator cap. Start engine and run it at low idle for 5 minutes. Check and make sure there isn't any leakage.

16. Install engine and radiator lower covers. See Specifications section for proper torque values.

17. Run engine at high idle for 5 minutes to bleed out any air from the cooling system.

18. Return throttle to low idle and stop engine. Wait about 3 minutes and check engine coolant reservoir for proper level. See Fig. 4.46C.

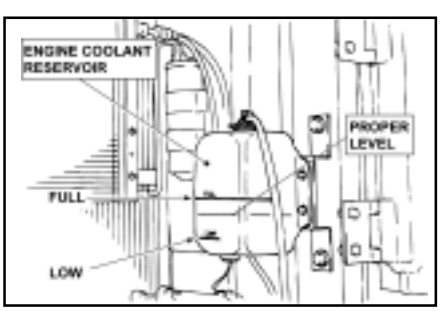


FIGURE 4.46C

19. Make sure to change the position of the auto accel connector to activate the auto accel function for normal machine operation. See Figure 4.45B for better reference.

B. REMOVAL AND INSTALLATION OF RADIATOR

WARNING

BE CAUTIOUS OF HOT FLUIDS AND SURFACES. WEAR GOGGLES, SAFETY SHOES, HARD HAT, WORK CLOTHES AND WORK GLOVES TO PERFORM INSPECTION AND MAINTENANCE ON THIS MACHINE. ALLOW SUFFICIENT TIME FOR THE ENGINE TO COOL BEFORE CHANGING FLUIDS.

1. Move the machine to a firm level area, place the attachments on the ground, and shut off the engine.
2. Raise the engine hood and make sure to lock it open. See Figure 4.47A. Place a rag or paper towel on the radiator cap and slowly open it to release any pressure.
3. On the SK210(LC) -VI, remove the two wing nuts ① and the radiator top cover (between the radiator and the oil cooler, see Fig. 4.47B). On the SK250(LC)-VI, remove the two wing nuts that hold the debris screen in front of the radiator and remove the screen.
4. Locate the lower cover beneath the radiator. See Figure 4.47A. Remove bolts and cover to obtain access to the radiator drain hose. Place an empty container, with sufficient capacity for engine system coolant, below the radiator drain hose. Refer to page 4-10 for proper system capacity. Turn valve counter clock wise to open drain.
5. Loosen four M8 cap screws ② and remove side pads ③ from the R.H. and L.H. sides of the radiator shoulders. See Fig. 4.47C.
6. Remove four M10 capscrews ④ from the top of radiator, two from each side.
7. Remove two M8 capscrews ⑤ from the lower side of radiator. See Fig. 4.47C.
8. After making sure that the cooling mixture is completely drained out, loosen the radiator hose clamps ⑥, and remove hoses from the radiator side only. See Fig. 4.47C.
9. Move the radiator toward the oil cooler side, and remove it paying attention not to damage the insulation. See Fig. 4.47C.
   The radiator weights 29 kg (64 lbs)
10. After cleaning the radiator, install it by following the reverse procedure described above.

NOTE

Refer to pages 4-10 and 4-11 for radiator capacity and proper coolant mixture.

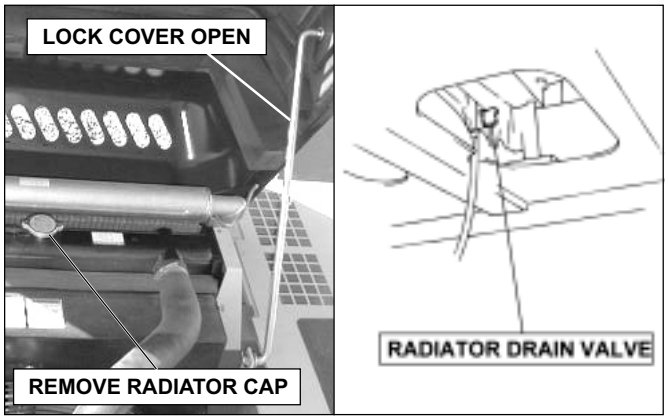


FIGURE 4.47A

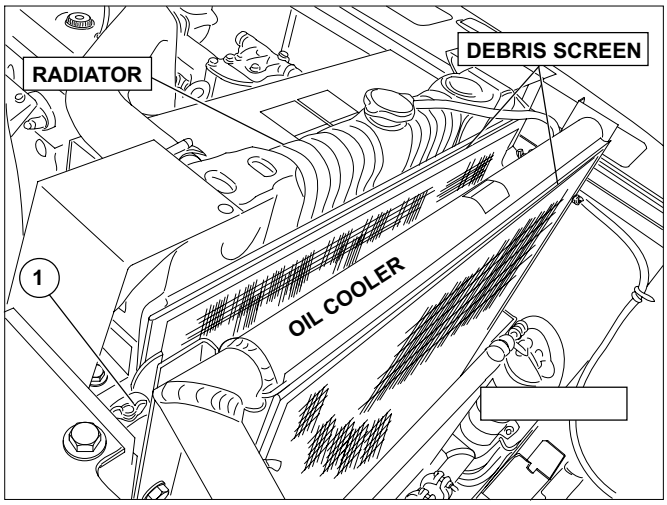


FIGURE 4.47B

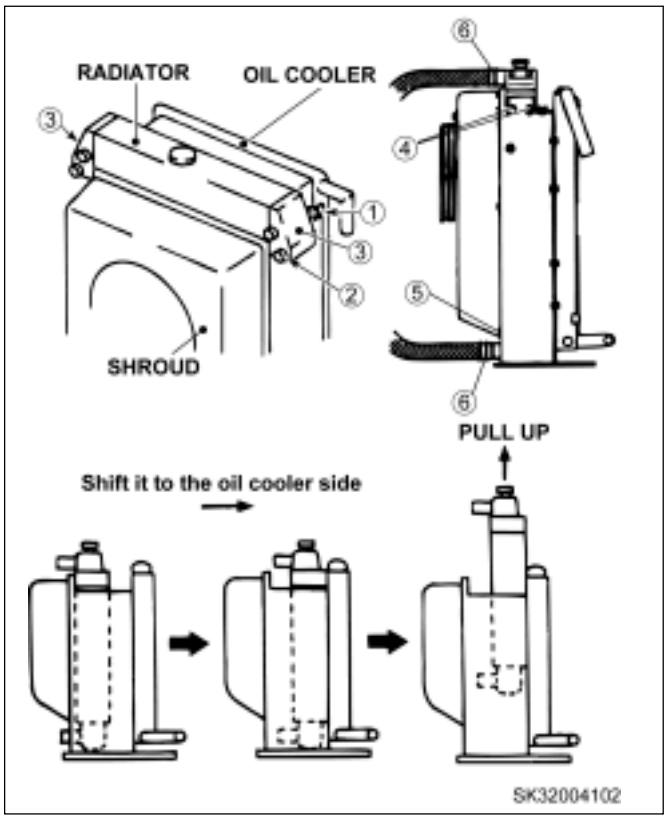


FIGURE 4.47C

C. CHANGE HYDRAULIC OIL

NOTE

The following procedures are to be used for a normal oil change of the hydraulic tank oil only.

If it is necessary to change the hydraulic oil viscosity, change hydraulic oil due to hydraulic component failure or change main pump, contact an authorized KOBELCO Dealer Service Department for assistance.

WARNING

BE CAUTIOUS OF HOT FLUIDS AND SURFACES. WEAR GOGGLES, SAFETY SHOES, HARD HAT, WORK CLOTHES AND WORK GLOVES TO PERFORM INSPECTION AND MAINTENANCE ON THIS MACHINE. ALLOW HYDRAULIC OIL TO COOL BEFORE CHANGING.

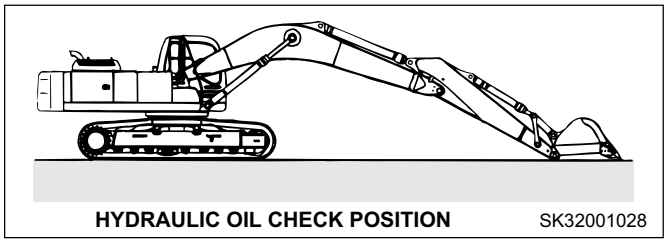
4

1. Move the machine to a firm, level surface with the attachment in the hydraulic oil check position. See Figure 4.48A. Make sure the attachments are resting on the ground.

NOTE

If the machine is cold, warm the hydraulic oil. See Section 3 (Basic Machine Operation) for specific instructions.

2. Shut off the engine.
3. Turn the ignition key to the “ON” position - DO NOT START THE ENGINE.
4. Make sure the safety lever is in the unlocked (down) position.
5. Move the attachment control levers, several times in all directions.
6. Release hydraulic tank pressure. See Fig. 4.48B.
7. Slowly remove the six retaining bolts from the suction strainer cover plate. See Fig. 4.48C.
8. Remove cover, “O”-ring, and strainer from hydraulic tank. See Figure 4.48D.
9. Remove the “O”-ring from the bottom of the strainer. See Figure 4.48D.



HYDRAULIC OIL CHECK POSITION SK32001028

FIGURE 4.48A

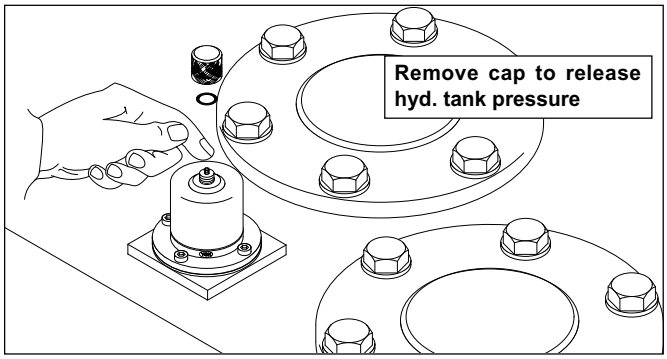


FIGURE 4.48B

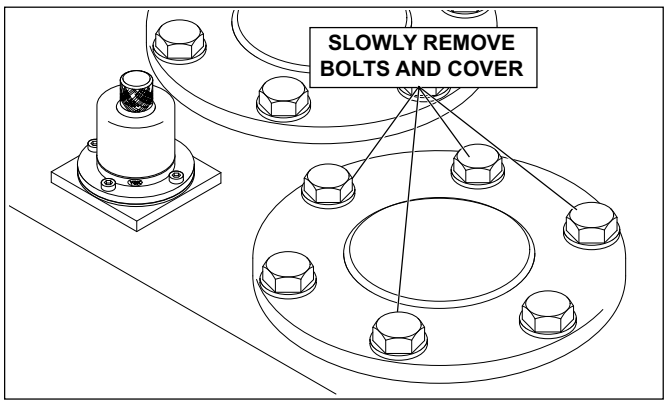


FIGURE 4.48C

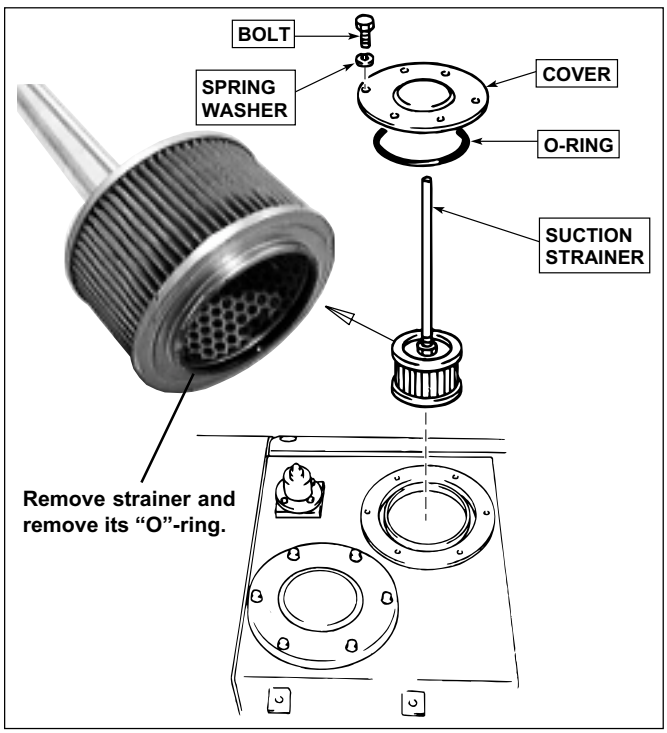


FIGURE 4.48D

10. Install special suction stopper Part Number 24100P978F2 over suction tube inside hydraulic tank. See Figure 4.49A.

11. Slowly remove the six retaining bolts from the hydraulic return filter cover plate. See Figure 4.49B.

12. Remove “O”-Ring, bypass valve, and filter element from hydraulic tank. See Figure 4.48B

13. Place a 156 liter (41 Gal) capacity container under drain plug. Remove plug and allow all oil from hydraulic tank to drain into container. See Figure 4.49C.

14. After all oil has drained, carefully and thoroughly clean inside of hydraulic tank.

15. Replace hydraulic tank drain plug and tighten securely.

16. Inspect return filter and oil for signs of abnormal wear.

17. Clean hydraulic tank covers, spring, and bypass valve.

18. Install a new return filter element Part Number YN50V00001P1, along with the Bypass Valve and spring, as shown in Figure 4.49B.

NOTE

Order element kit P/N YN50V00004F3, which consists of one filter P/N YN50V00001P1, and “O” - ring seal P/N ZD11G20000. For machines equipped with Breaker, order return filter P/N YN50V00009P1.

19. Remove special suction stopper from suction tube.

CAUTION

Clean up all spilled oil. Dispose of all hazardous waste in accordance with government environmental regulations.

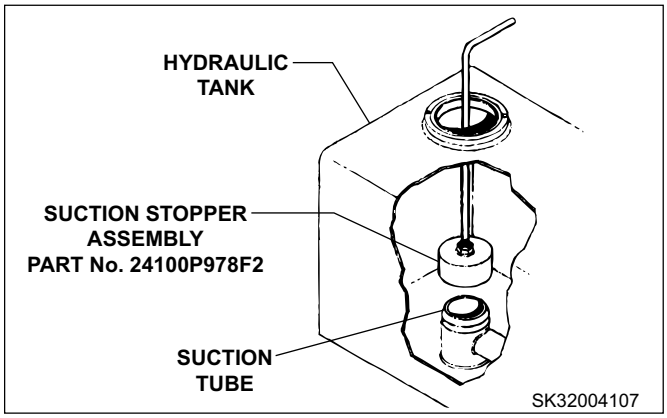


FIGURE 4.49A

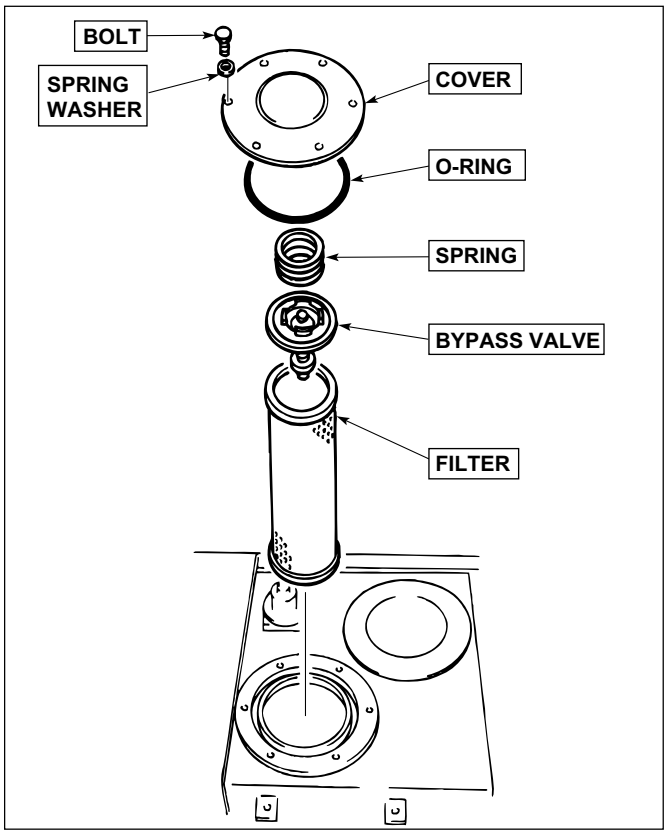


FIGURE 4.49B

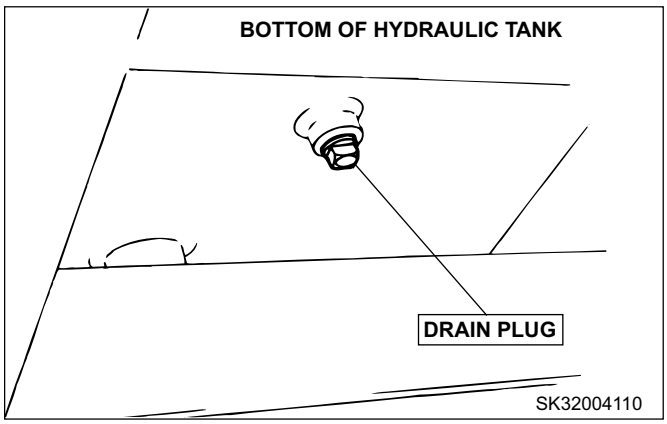


FIGURE 4.49C

4

20. Clean and inspect suction strainer for damage. See Figure 4.50A. Replace strainer, if needed, with P/N: YN50V00002S001.

21. Make sure to install a new "O"-Ring seal P/N 45Z91D6 on the strainer. Lubricate seal with hydraulic oil and install strainer assembly onto suction tube. See Figure 4.50B.

22. Make sure to install spring on strainer guide. See Figure 4.50B.

23. Install a new "O"-ring P/N ZD11G20000 on cover plate mount surface groove, lubricate seal with hydraulic oil.

24. Install suction strainer cover. Make sure to properly tighten the bolts. Refer to Specifications Section in this manual for proper torque values.

25. Fill hydraulic tank to proper level with fresh clean hydraulic oil through return filter. See Figure 4.50C.

26. Install new "O"-ring seal P/N ZD11G20000, lubricate it with hydraulic oil and install cover for hydraulic tank return filter element. Make sure to properly tighten the bolts. Refer to Specifications Section in this manual for proper torque values.

CAUTION

Make sure to use the same viscosity oil in the hydraulic tank as it was drained. Refer to page 4-11 for oil specifications.

NOTE

This machine was shipped from the factory with **SHELL TELLUS 46** hydraulic oil in the hydraulic system.

CAUTION

Clean up all spilled oil. Dispose of all hazardous waste in accordance with government environmental regulations.

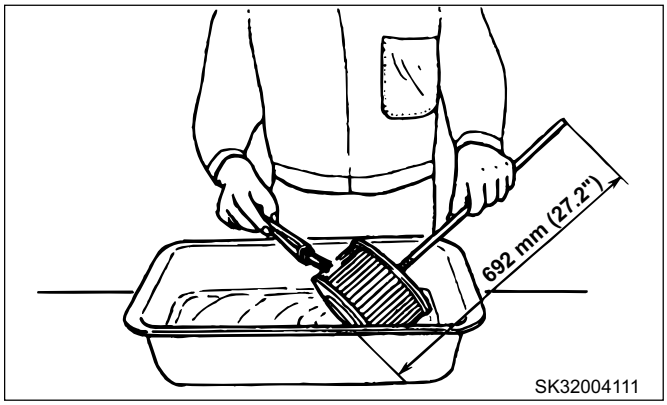


FIGURE 4.50A

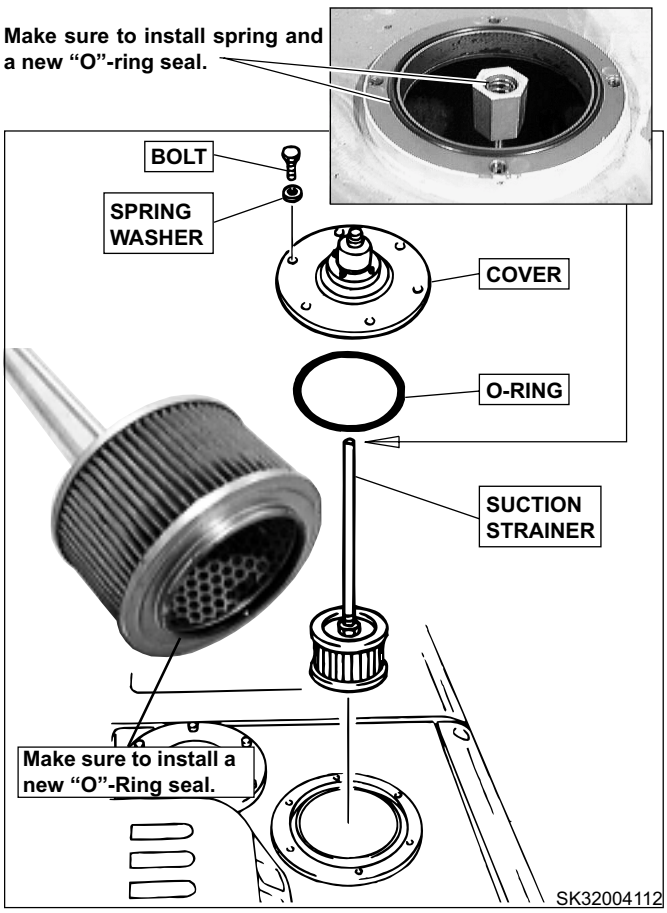


FIGURE 4.50B

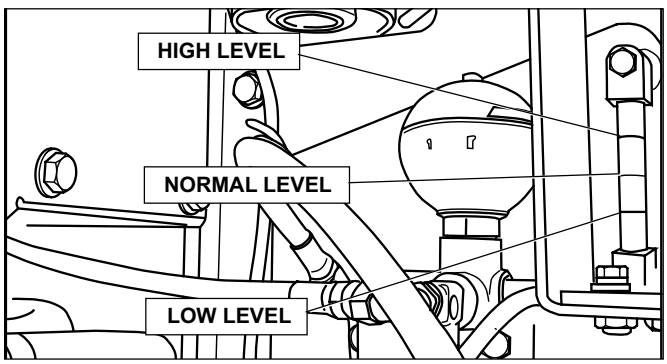


FIGURE 4.50C

D. HYDRAULIC TANK BREATHER

1.Release hydraulic tank pressure. See Figure 4.51A.

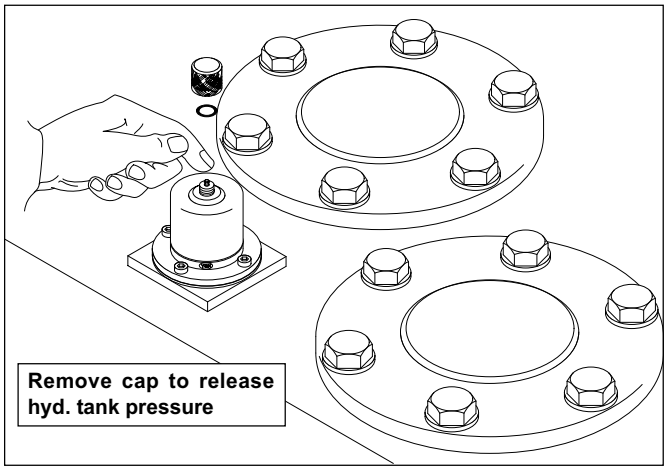


FIGURE 4.51A

2.Remove cap. See Figure 4.51B

3.Remove breather filter cover. See Figure 4.51B.

4.Remove old filter, clean mounting surfaces and install new filter. See Figure 4.51B. Order Part Number YN57V00002S010.

5.Install breather filter cover.

6.Install cap and tighten securely

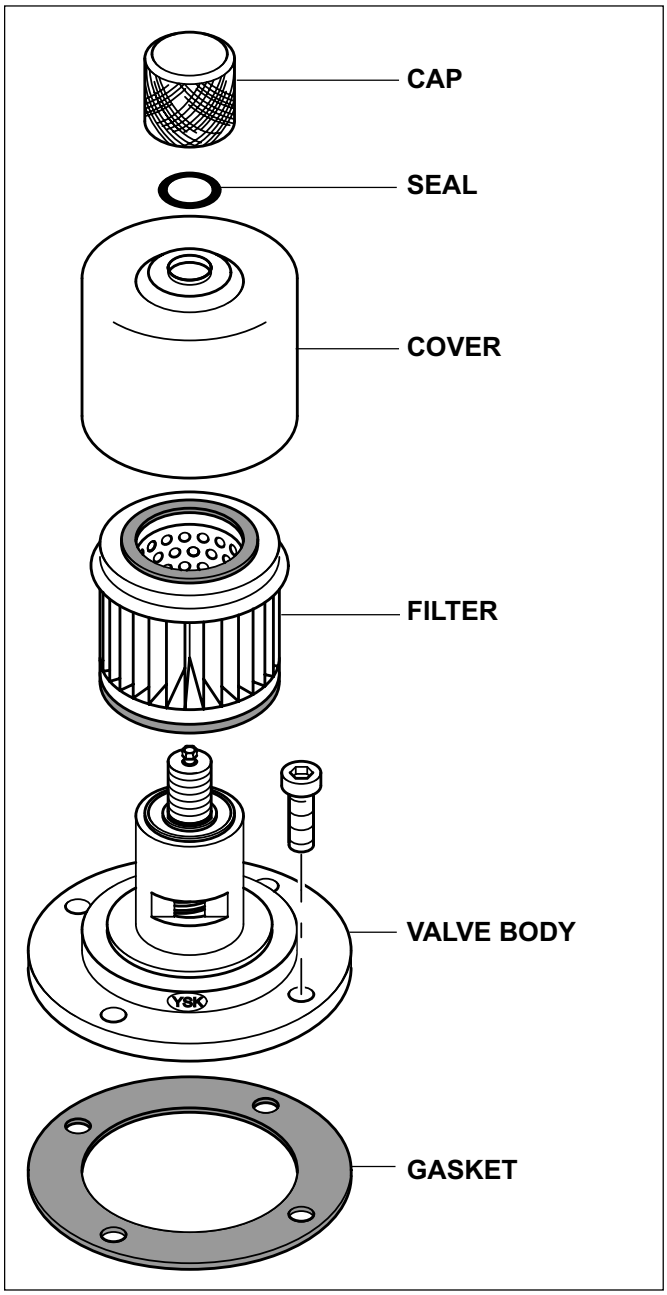


FIGURE 4.51B

4

WARNING

WEAR GOGGLES, SAFETY SHOES, HARD HAT, WORK CLOTHES AND WORK GLOVES TO PERFORM INSPECTION AND MAINTENANCE ON THIS MACHINE.

E. MAINTENANCE ON ROLLERS AND IDLERS

Change the oil in rollers and idlers every 2000 hours of machine operation.

NOTE

Refer to the machine's service manual for specific instructions in regards to removing and installing the undercarriage rollers and idlers. Contact your Kobelco dealer's Service Department for assistance if necessary.

1. Remove rollers and idlers as indicated in the Service Manual.

2. Remove side plugs from upper rollers cover plate and drain the oil out into an empty container. See Figure 4.52A.

3. Remove plugs from track rollers center flanges and drain the oil out into an empty container. See Figure 4.52B.

4. Remove side plugs from idler bearing housing and drain the oil out into an empty container. See Figure 4.52C.

5. Remove side plugs from idler bearing housing and drain the oil out into an empty container.

NOTE

Use engine oil as indicated in page 4-11 and refer to page 4-10 for proper capacities to refill oil in Rollers and Idlers.

6. Install rollers and Idlers and torque properly. Refer to Specification Section for proper torque values.

CAUTION

Clean up all spilled oil. Dispose of all hazardous waste in accordance with government environmental regulations.

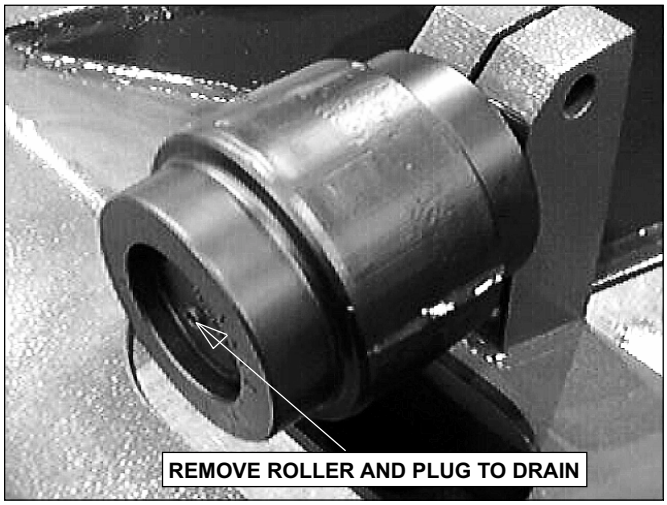


FIGURE 4.52A

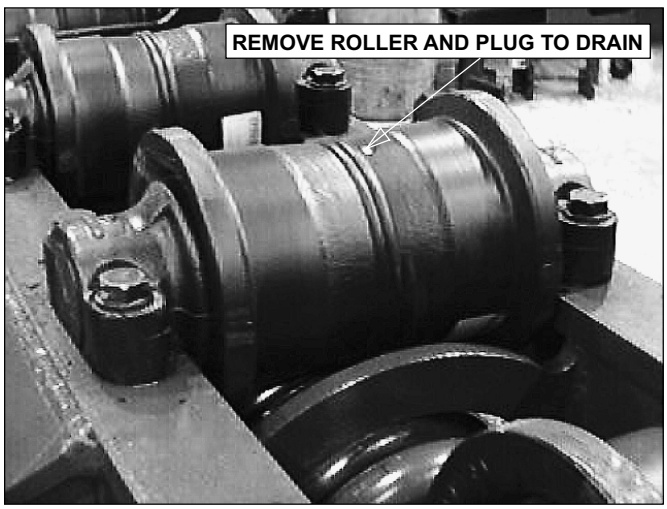


FIGURE 4.52B

FIGURE 4.52C

4.12 PERIODICAL INSPECTION ITEMS

A. DUST SEALS

Inspect dust seals in all pin connections frequently. The attachment incorporates several dust seals that should be periodically checked for damage and excessive wear. See Figure 4.53A. If excessive wear is found, refer to the machine's Shop Manual for specific instructions in regards to disassembly and assembly. Contact your Kobelco dealer's Service Department for assistance if necessary. Refer to table below for the proper part numbers for the replacement seals:

NOTE

Order the following part numbers for replacement seals:

NO	COMPONENT LOCATION	SK210(LC)-VI	SK250(LC)-VI SK250NLC-VI
1	BOOM FOOT	2445R220D6 (2 Req'd)	2445R220D9 (2 Req'd)
2	ARM TO BOOM	2445R220D6 (2 Req'd)	2445R220D6 (2 Req'd)
3	ARM TO IDLER LINK	2445R220D3 (2 Req'd)	2445R220D3 (2 Req'd)
4	BKT CYLINDER TO BUCKET LINK	2445R220D4 (4 Req'd)	2445R220D4 (4 Req'd)
5	ARM TO BUCKET	2445R220D4 (2 Req'd)	2445R220D6 (2 Req'd)
6	BOOM CYLINDER HEAD	2445R138D8 (2 Req'd)	2438U999S26 (2 Req'd)
7	BOOM CYLINDER ROD	2438U941S3 (2 Req'd)	2438U999S26 (2 Req'd)
8	ARM CYLINDER HEAD AND ROD	2438U1106S6 (4 Req'd)	2438U1381S24 (4 Req'd)
9	BKT LINK (AT BUCKET)	2438U1109S28 (4 Req'd)	2438U959S23 (4 Req'd)

Use Figure 4.53B as reference to install the seals. Make certain that pin surface and tapered end are smooth and free from burrs or imperfections that could cause damage to the new seals.

WARNING

WEAR GOGGLES, SAFETY SHOES, HARD HAT, WORK CLOTHES AND WORK GLOVES TO PERFORM INSPECTION AND MAINTENANCE ON THIS MACHINE.

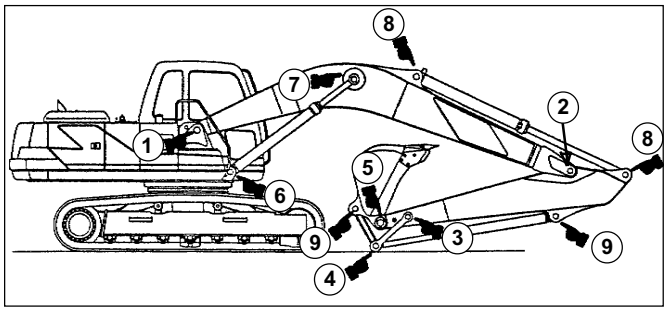


FIGURE 4.53A

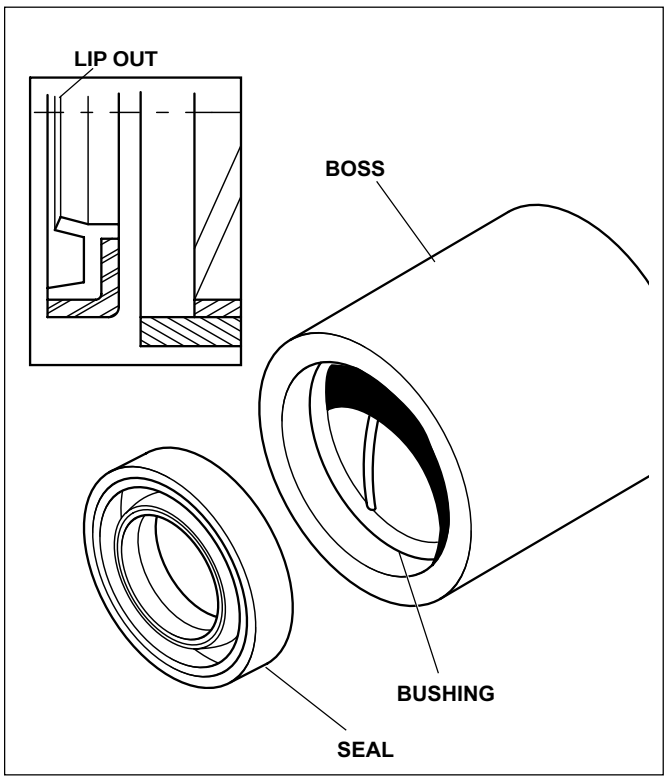


FIGURE 4.53B

4

B. ATTACHMENT

WARNING

WEAR GOGGLES, SAFETY SHOES, HARD HAT, WORK CLOTHES AND WORK GLOVES TO PERFORM INSPECTION AND MAINTENANCE ON THIS MACHINE.

1. Bucket/Arm & Link Clearance

Frequently, check clearance between bucket and bucket link and/or between arm and bucket to make sure it is within specifications. If clearance is greater than 1.2 mm (0.05") adjust clearance. Proceed as follows to correct excessive play:

a. Move the machine to a firm level surface and place the bucket on the ground, making certain that the bucket is stable. See Figure 4.54A.

b. Roll "O"-Rings onto the bucket bosses. See Figure 4.54B.

c. Remove jam nuts, nuts, and retaining bolt. See Figure 4.54B.

d. Carefully slide out, partially, main pins mounting arm and bucket link to bucket. You may have to start the engine and slightly operate the boom and arm to remove load from pins. See Figure 4.54C.

e. Insert shims as needed to correct any excessive play.

f. Align the shims with pin holes and insert pins into position. Be careful not to damage seals.

g. Install retaining bolt with nut and jam nut. See Figure 4.54B.

h. Roll "O"-Rings onto the grooves between bucket/arm, and bucket/bucket link. See Figure 4.54D.

NOTE

Inspect "O"-Rings for damage or excessive wear. If worn or damaged replace with new parts to protect seals, pins and surfaces from dirt and debris which can cause premature failure.

(FOR SK210(LC)-VI)
"O"-Ring Part Number (4 Required) 2445Z1136
(FOR SK250(LC)-VI, SK250NLC-VI)
"O"-Ring Part Number (4 Required)
LQ61B01004P1

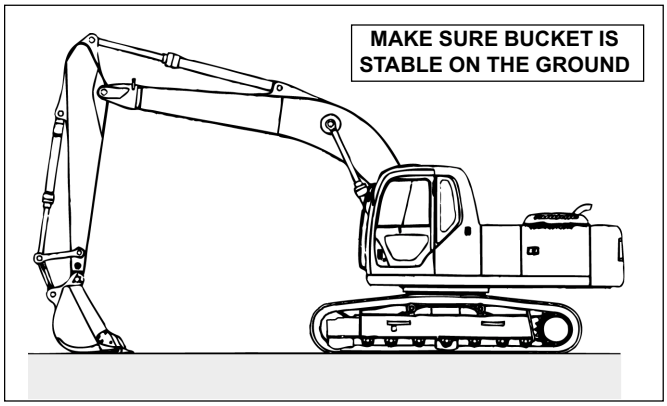


FIGURE 4.54A

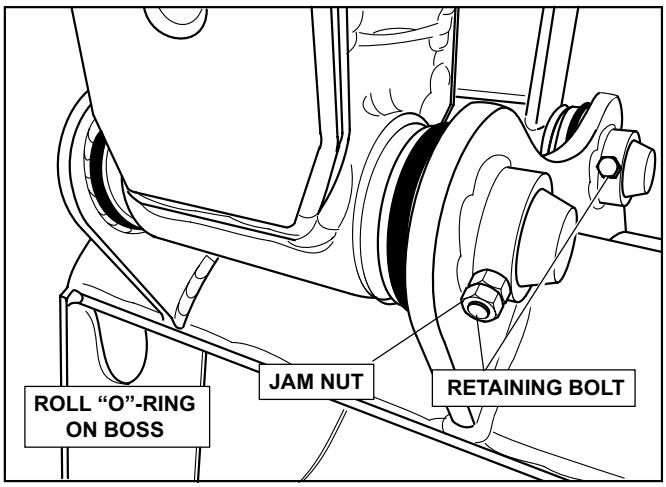


FIGURE 4.54B

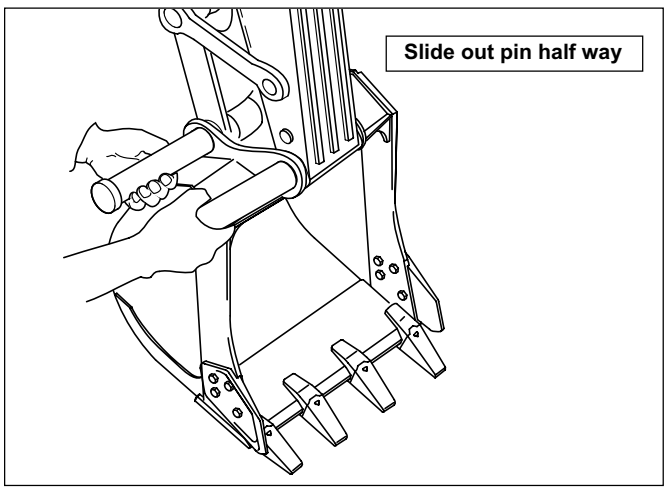


FIGURE 4.54C

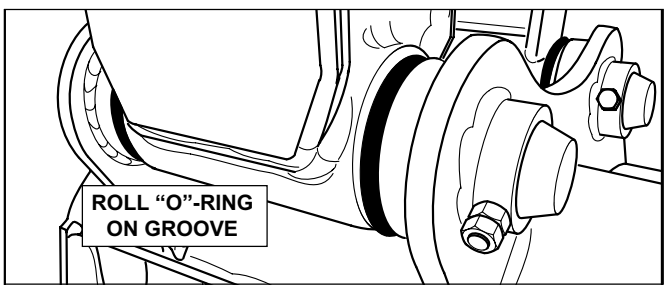


FIGURE 4.54D

2. Reversing Bucket

a. Move the machine to a firm level surface and place the bucket on the ground, making certain that the bucket is stable. See Figure 4.55A.

b. Roll "O"-Rings onto the bucket bosses. See Figure 4.55B.

c. Remove jam nuts, nuts, and retaining bolts from both pins. See Figure 4.55B.

d. Carefully slide out main pins mounting arm and bucket link to bucket.

NOTE

You may have to start the engine and slightly operate the boom and arm to remove load from pins.

e. Clean pins and pin holes, and apply grease on pin and holes surfaces.

f. Rotate bucket 180º or move machine. Install arm and bucket link in their respective positions. See Figure 4.55C.

g. Move the bucket cylinder to match the bucket pin holes with the bucket link hole. Insert pin. Becareful not to damage seals.

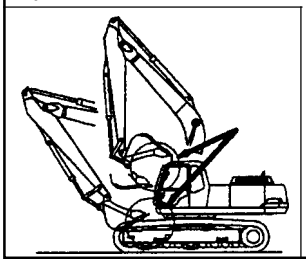
h. Operate the boom and arm to match the bucket pin holes with the arm hole connection. Insert pin carefully to avoid damaging the seals.

i. Install retaining bolts with nuts and jam nuts on both pins. See Figure 4.55B.

j. Roll "O"-Rings onto the grooves between bucket/arm, and bucket/bucket link. See Figure 4.55B.

CAUTION

Slowly cycle bucket, check for interference with arm, particularly if a lifting eye is welded on bucket bottom. Be careful not to confuse the bucket shoveling operation with that of the backhoe.



Check clearance between bucket and cab before operation. Exercise care when operating the bucket near the cab.

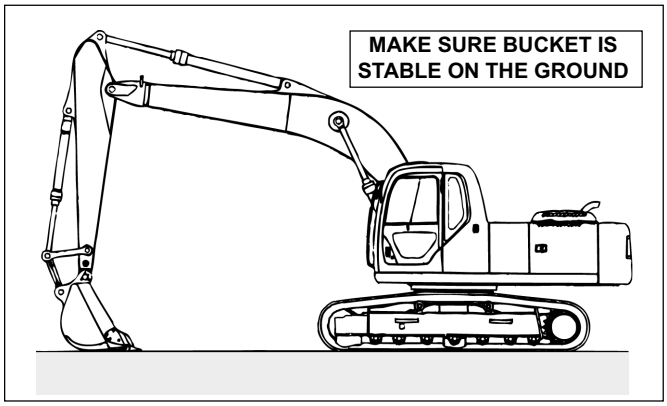


FIGURE 4.55A

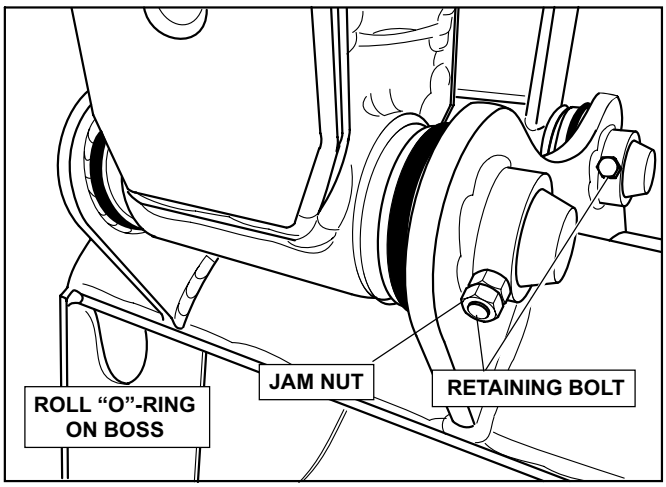


FIGURE 4.55B

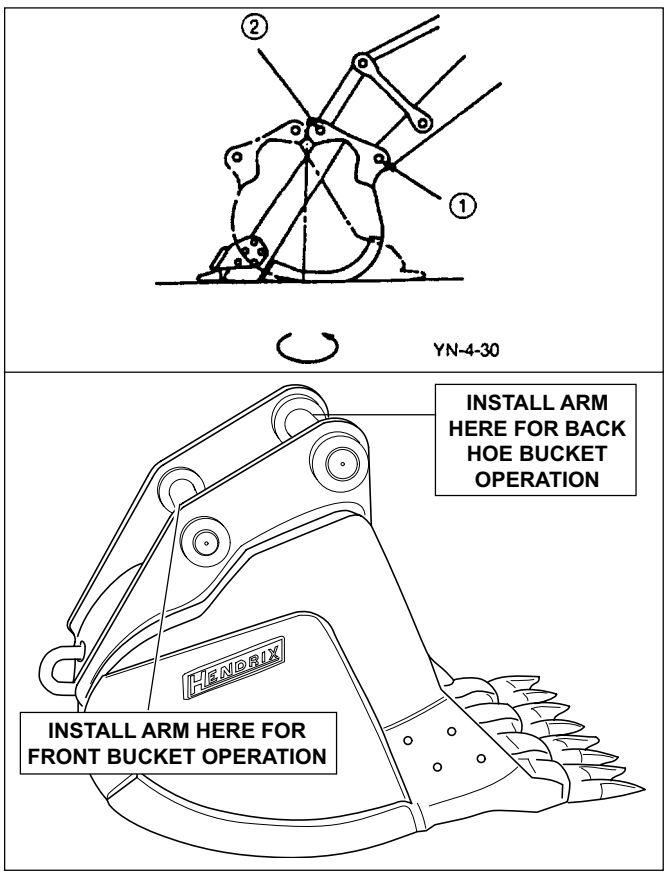


FIGURE 4.55C

3. Removing the Bucket

a. Move the machine to a firm level surface and place the bucket on the ground, making certain that the bucket is stable. See Figure 4.56A.

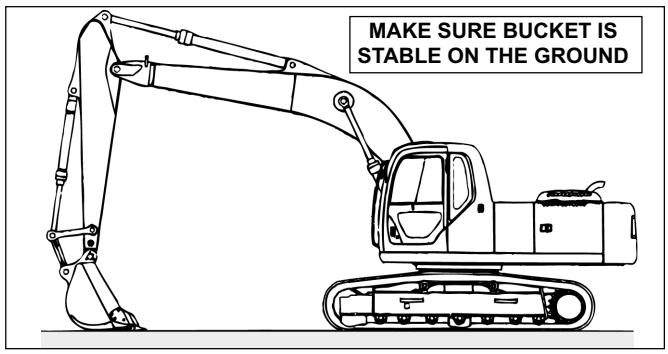


FIGURE 4.56A

b. Roll "O"-Rings onto the bucket bosses. See Figure 4.56B.

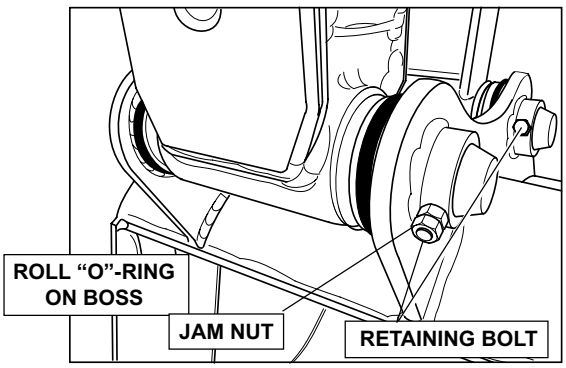


FIGURE 4.56B

c. Remove jam nuts, nuts, and retaining bolt. See Figure 4.56B.

d. Carefully remove main pins mounting arm and bucket link to bucket. You may have to start the engine and slightly operate the boom and arm to remove load from pins. See Figure 4.56C. Be careful not to damage dust seals.

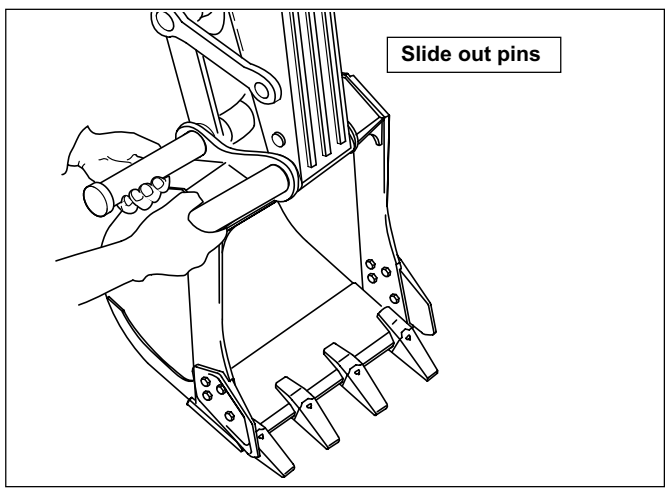


FIGURE 4.56C

4. Installing the Bucket

a. Make certain that the bucket is stable on firm level ground.

b. Install "O"-Rings onto the bucket bosses.

c. Clean pins and pin holes, and apply grease on pin and holes surfaces.

d. Move the bucket cylinder to match the bucket pin holes with the bucket link hole. Insert pin. Be careful not to damage seals. See Figure 4.56D

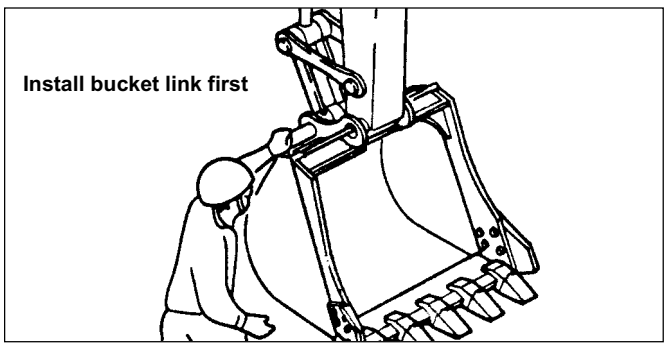


FIGURE 4.56D

e. Operate the boom and arm (7) to match the bucket (6) pin holes with the arm hole connection. Insert pin (5) carefully to avoid damaging the seals. See Figure 4.56E

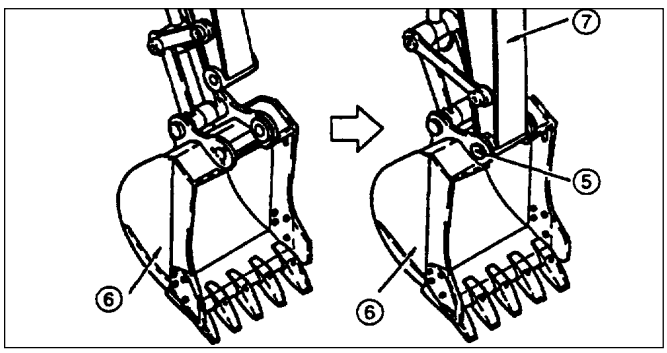


FIGURE 4.56E

f. Install retaining bolts with nuts and jam nuts on both pins. See Figure 4.56F.

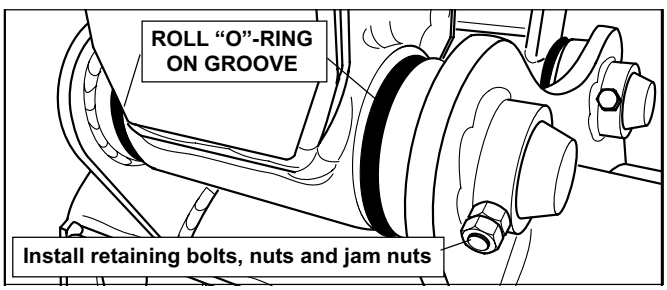


FIGURE 4.56F

g. Roll "O"-Rings onto the grooves between bucket/arm, and bucket/bucket link. See Figure 4.56F.

h. Apply sufficient grease to the bucket pin connections.

5. Bucket Teeth and Side Cutters

Frequently, check bucket tooth points and side cutters for wear and looseness. The life of the bucket teeth and side cutters can not be determined by working hours, but rather by application and operating conditions.

a. Parts description, see Figure 4.57A:
(1) adapter nose, (2) tooth point, (3) rubber lock pin, (4) locking pin, (5) side cutter, (6) cap screw, (7) Nut.

NOTE

Contact your Kobelco dealer for assistance in regards to parts for the specific bucket installed on your machine.

b. Replace the bucket teeth when their cutting edge and/or when hole for retaining pin on tooth are excessively worn.

b.1- Place a wood block under the bucket teeth support lip, as indicated in Figure 4.56B, and remove all sand and soil adhered to the teeth pin connection areas.

b.2- Use a hammer and a punching tool to hammer out the locking pin. Be careful not to damage the rubber lock.

b.3- Inspect the lock pin (4) and rubber lock (3). Replace them if the lock pin (4) is too short or the rubber lock (3) is in poor condition.

b.4- Clean the surface of the adapter nose (1) with putt knife.

b.5- Fit the tooth point (2) onto the adapter nose (1).

b.6- Push the rubber lock pin (3) into the hole of the adapter nose (1).

b.7- Hammer the locking pin (4) until it is aligned with the point surface.

c. Replacing the side cutters

c.1- Remove all sand and soil adhered around the side cutters capscrews.

c.2- Use a torch and cut off the cap screws, then remove the side cutters. See Figure 4.57C.

c.3- Clean the mounting surface and install a new side cutter with new cap screws and nuts. See Figure 4.57D.

c.4- Torque the cap screw with nuts to 100 ± 5 Kgf-m (722 ± 36 lbs-ft).

C.5- Spot weld the nuts.

WARNING

WEAR GOGGLES, SAFETY SHOES, HARD HAT, WORK CLOTHES AND WORK GLOVES TO PERFORM INSPECTION AND MAINTENANCE ON THIS MACHINE.

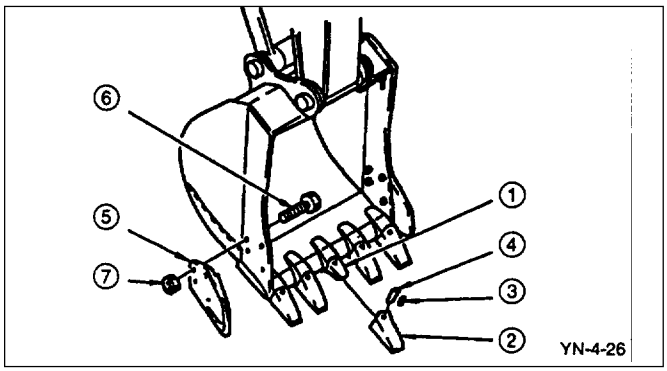


FIGURE 4.57A

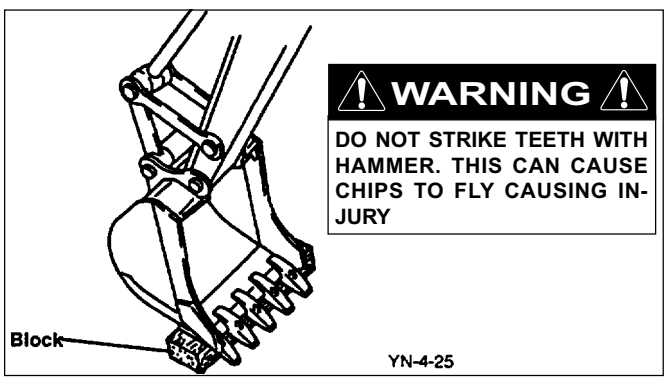


FIGURE 4.57B

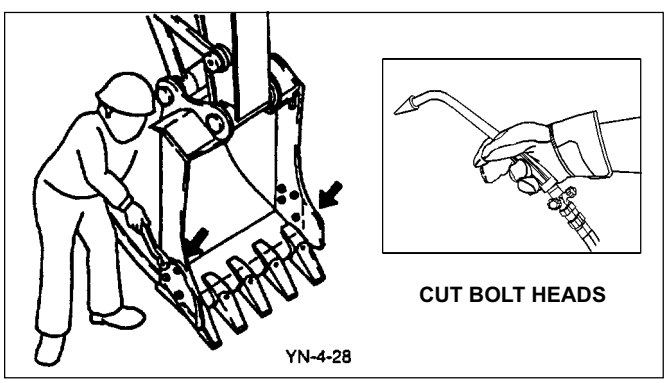


FIGURE 4.57C

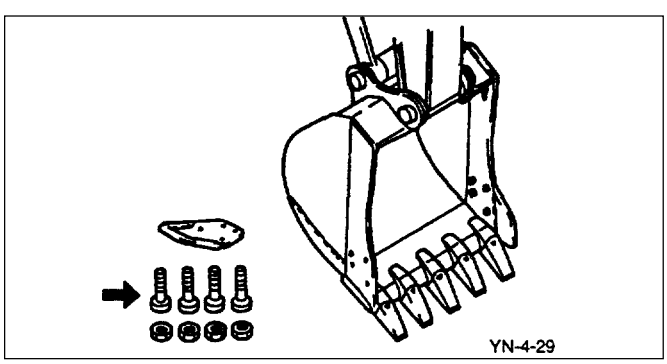


FIGURE 4.57D

C. CHANGE SLEWING RING GREASE BATH

Change the slewing ring grease bath every 2000 hours of machine operation. To properly replace the grease, it is necessary to remove the upper frame. Refer to the machine's shop manual and/or contact your Kobelco dealer's Service Department for assistance. Proper tools have to be used and specific instructions must be followed to undeck the machine upper structure from the ist lower structure. See Figure 4.58A.

CAUTION

If the slewing ring ever becomes submerged in water, it is mandatory that the sump bath grease be changed.

SUMP BATH GREASE QUANTITIES CHART

GREASE TYPE	SK210(LC)-VI	SK250(LC)-VI, SK250NLC-VI
N.L.G.I. No. 2 LITHIUM BASE W/MoS2	8.3 kg (18.3 lbs)	11.3 kg (24.9 lbs)

If the machine is in the field and can't be brought to a shop to replace the slewing ring grease bath, proceed to remove the swing motor assembly. Use eye bolts P/N ZS91C01200 on top cover of the swing motor and a proper lifting device to remove the swing motor assembly. Refer to the end of Section 6 to obtain the proper caps and plugs for lines and hoses that need to be removed during this process, see Fig. 4.58B.

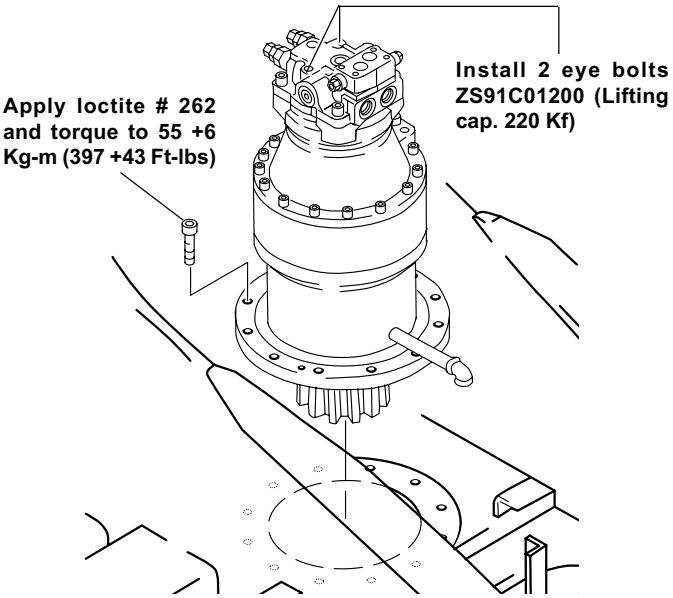


FIGURE 4.58B

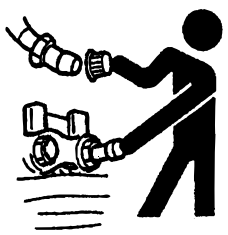
WARNING

MAKE SURE TO BLOCK THE ATTACHMENTS PROPERLY BEFORE PROCEEDING TO REMOVE SWING REDUCTION UNIT.

FIGURE 4.58A

CAUTION

INSTALL PROPER CAPS AND PLUGS ON HOSES TO HELP PREVENT CONTAMINATION FROM ENTERING THE HYDRAULIC SYSTEM.



D. WINDSHIELD WASHER RESERVOIR

Fill the windshield washer fluid reservoir as required using approved windshield washing fluid.

1. Open engine air cleaner access door to locate washer fluid reservoir. See Figure 4.58C.
2. Pull cap off and fill with proper windshield washing fluid.
3. Replace cap and reposition engine air cleaner access door.

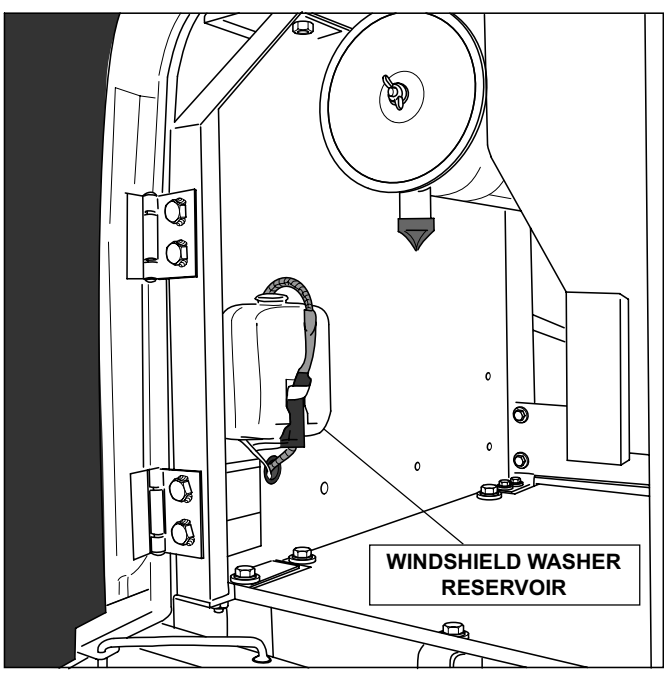


FIGURE 4.58C

E. FUSES

Follow the procedures below to replace “blown” or faulty fuses.

1.Move seat and seat base completely forward.

2.Open the fuse compartment and remove fuse box cover from fuse box. See Figure 4.59A.

3.Locate and remove faulty fuses. Replace any fuse needed with same amperage fuse as removed.

WARNING

NEVER REPLACE A FAULTY FUSE WITH A HIGHER AMPERAGE FUSE. NEVER USE A “JUMPER” IN PLACE OF A FUSE. NEVER SPLICE ACCESSORIES DIRECTLY INTO FUSE TERMINALS.

4. Refer to fuse box cover or Figure 4.59B for Fuse amperage and their functions.

NOTE

When ordering replacement fuses, order the following part numbers:

5 AMP– Part Number 2479R655S10
10 AMP– Part Number 2479R655S8
15 AMP– Part Number 2479R655S3
20 AMP– Part Number 2479R655S9

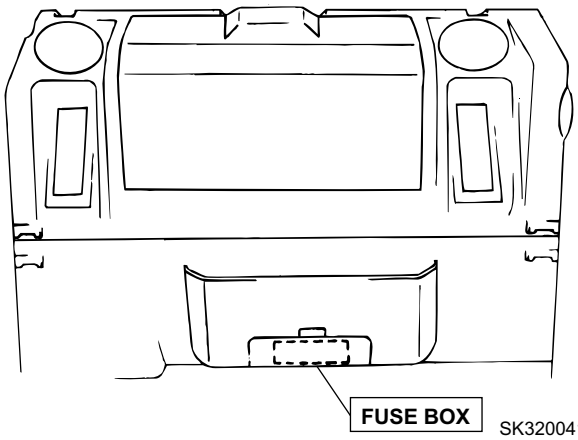
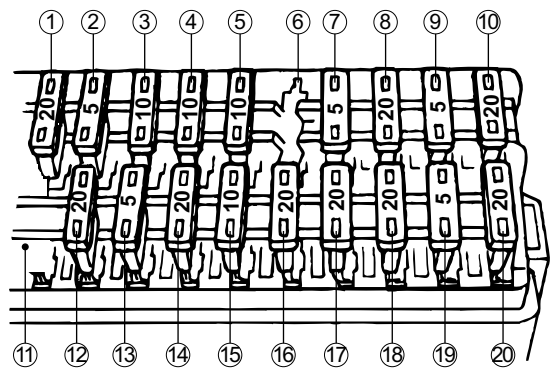


FIGURE 4.59A



No.	AMPS	FUNCTION
1	20A	Mechatro Controller (CPU)
2	5A	Wiper, Washer Relay
3	10A	Cigarette Lighter 24V
4	10A	DC-DC Converter
5	10A	Horn
6	NONE	None
7	5A	Mechatro Controller (Back up)
8	20A	Fuel Supply Pump **(Optional)**
9	5A	Dome Lamp, DC-DC Converter (Back up)
10	20A	Starter Switch
11	5A	Tuner
12	20A	Swing Flasher
13	5A	Gauge Cluster
14	20A	Wiper, Washer
15	10A	Solenoid Valve (Lever lock)
16	20A	Working Light (FRONT)
17	20A	Working Light (CAB)
18	20A	Air Conditioner
19	5A	Controller (A/C)
20	20A	Spare 24V

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FIGURE 4.59B

F. HYDRAULIC LINES, TUBES AND HOSES

Since there is no definite time table for the replacement of hydraulic lines, tubes and hoses, inspect the following periodically for tightness and signs of damage. Replace all damaged lines, tubes and hoses with new parts. Refer to the parts manual for correct part numbers when ordering.

WARNING

DO NOT BEND, STRIKE OR DAMAGE HIGH PRESSURE LINES. DO NOT INSTALL BENT OR DAMAGED LINES, TUBES OR HOSES.
REPLACE ALL DAMAGED LINES, TUBES AND HOSES IMMEDIATELY.
TIGHTEN ALL LOOSE FITTINGS AND CONNECTIONS TO THE PROPER TORQUE VALUE.
CLEAN UP ALL FUEL AND OIL SPILLS IMMEDIATELY TO HELP PREVENT FIRES.
NEVER USE HANDS TO CHECK FOR LEAKS
CAREFULLY INSPECT ALL LINES, TUBES AND HOSES FOR:
1. **FITTINGS & CONNECTIONS DAMAGED OR LEAKING.**
2. **OUTER COVERING OF HOSES WORN, CUT OR DAMAGED EXPOSING WIRE REINFORCEMENT.**
3. **HOSE SWELLING OR "BALLOONING".**
4. **EVIDENCE OF HOSE BEING KINKED OR COLLAPSED.**
5. **STEEL PROTECTIVE COVERING WORN OR DAMAGED.**
6. **LOOSE FITTINGS AND CONNECTIONS.**

MAKE CERTAIN ALL CLAMPS, GUARDS AND HEAT SHIELDS ARE IN PLACE AND SECURE. THIS WILL HELP PREVENT VIBRATION, EXCESSIVE WEAR OF COMPONENTS AND EXCESSIVE HEAT DURING OPERATION.

4

1. **Heater Hoses**
   Inspect the heater hoses between heater and engine for signs of damage and wear. See Figure 4.60A.

2. **Boom Cylinder Hoses & Tubes**
   Inspect boom head and rod hoses and tubes for damage, wear and loose connections. See Figure 4.60B.

3. **Arm Cylinder Hoses & Tubes**
   Inspect arm head and rod hoses and tubes for damage, wear and loose connections. See Figure 4.60C.

4. **Bucket Cylinder and Nibbler/Breaker Hoses & Tubes**
   Inspect bucket head and rod hoses and tubes for damage, wear and loose connections. See Figure 4.60D.

5. **Fuel Lines and Hoses**
   Inspect fuel lines and hoses for damage, wear and loose connections. Repair or replace fuel lines and hoses before operating the machine.

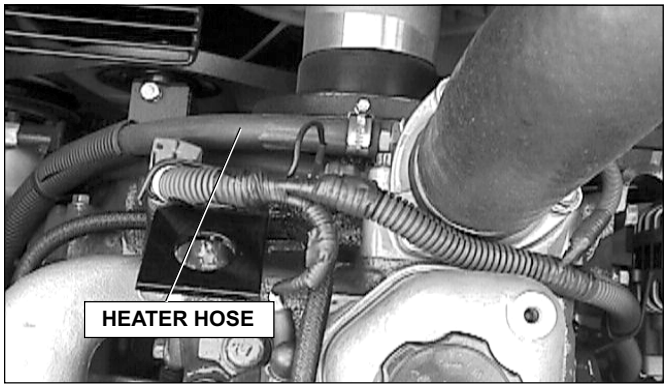

FIGURE 4.60A

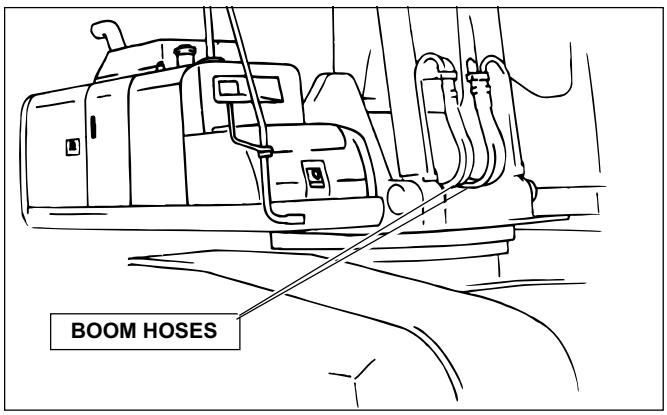

FIGURE 4.60B

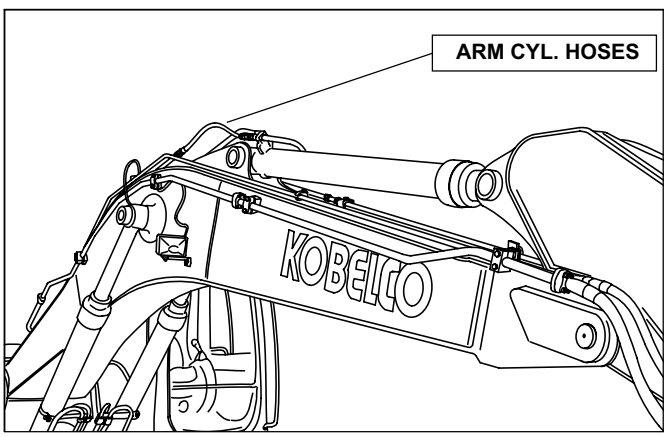

FIGURE 4.60C

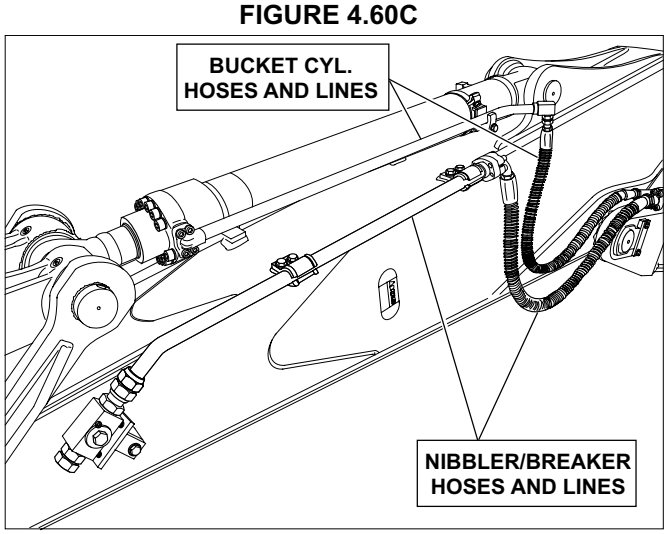

FIGURE 4.60D

6. Hydraulic Suction Tubes & Hoses

Inspect all hydraulic tubes and hoses for damage, wear and loose connections. See Figure 4.61A.

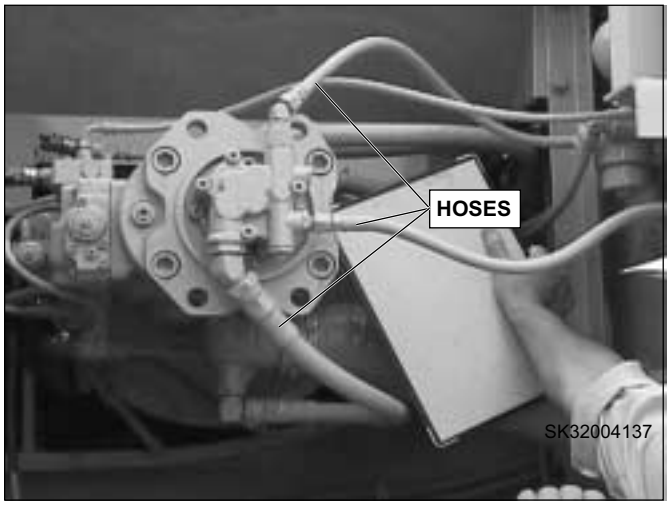

FIGURE 4.61A

G. FOAM SEALS

Inspect the foam seals around the radiator, oil cooler, and on the engine cover. Make certain they are in place and secure to prevent overheating of the engine. See Figure 4.61B

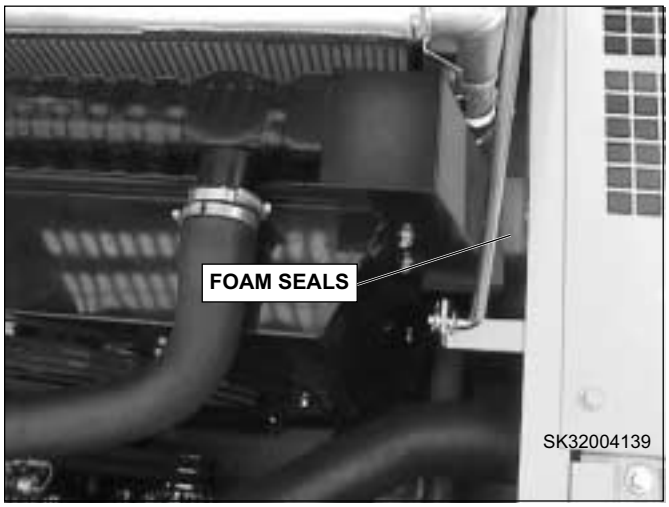

FIGURE 4.61B

4.13 MACHINE STORAGE

A. Prepare Machine

Perform the following procedure to prepare the machine for long term storage.

1. Perform all inspection and maintenance procedures as previously described in this section.
2. Thoroughly clean the machine, inspect for damaged or worn parts and components and replace or repair all damaged or worn parts.

CAUTION

Protect CPU and all electrical components from water and steam when cleaning the machine.

3. Completely fill fuel tank with fresh, clean fuel to aid in preventing condensation of moisture inside the fuel tank. Make sure to use an anti-algae additive in the fuel tank.
4. Move machine to an indoor location for storage.
5. Operate bucket and arm completely "IN" extending cylinders. Then lower boom until attachment is resting on the floor. See Figure 4.62.
6. Coat cylinder rods with a heavy coat of grease to prevent corrosion during storage.
7. Remove batteries and store in a well ventilated, warm area.

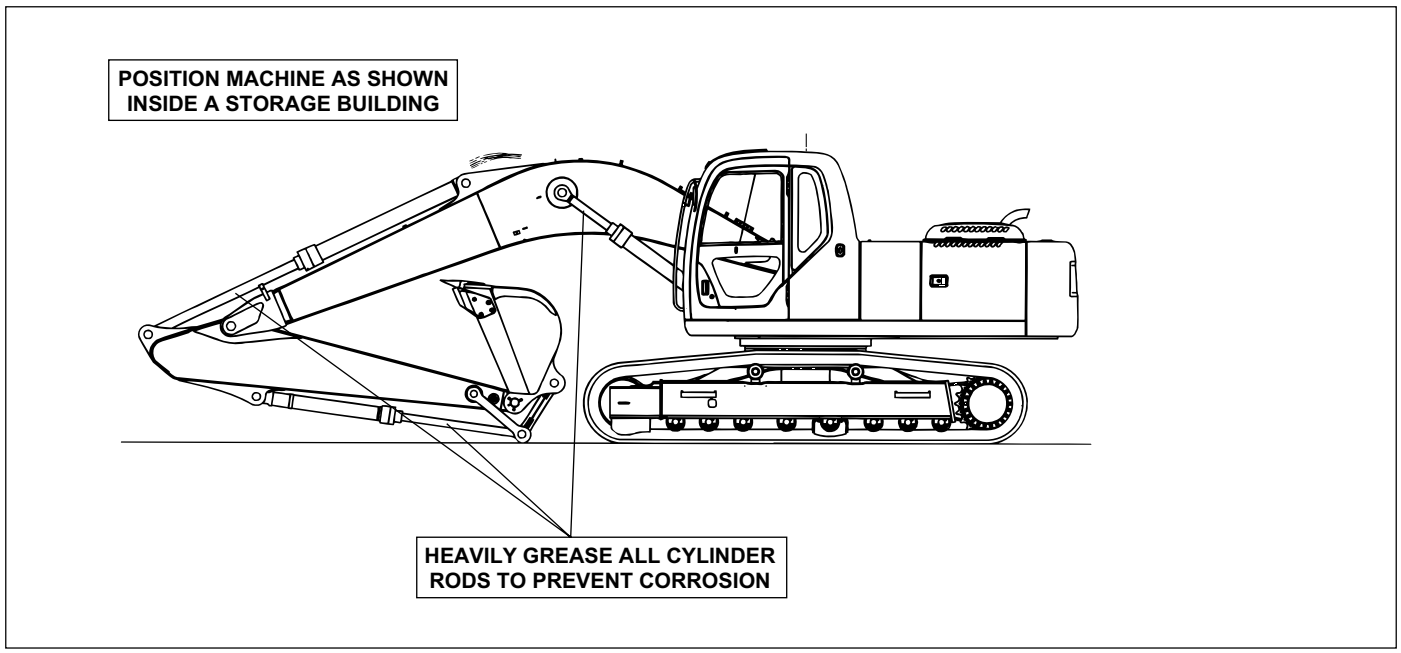

FIGURE 4.62

B. Care During Storage

1. Every 30 days during storage, it will be necessary to start and run the machine to circulate the fluids through the systems. Before starting clean cylinder rods and after running re-grease cylinder rods.

NOTE

Run and operate machine for approximately 1 hour to allow all fluids to circulate well and reach normal operating temperatures.

C. Removing Machine From Storage

1. Perform all inspection and maintenance procedures as described in this section before bringing machine out of storage for normal operation.
2. Remove drain plugs from travel motor and swing gear reduction units to drain off any moisture which may have accumulated during storage.
3. Carefully and closely inspect all hydraulic hoses after long periods of storage for signs of deterioration. Replace all hoses showing these signs.

MACHINE MODEL: SK_____ SERIAL NO.: _____ MACHINE HOURS:_____

ITEM	OK	MAINT. PERFORMED
ENGINE OIL LEVEL		
ENGINE COOLANT LEVEL		
CHECK FOR FLUID LEAKS		
CHECK BELT TENSION		
CHECK FUEL LEVEL		
DRAIN WATER SEPARATOR		
CHECK AIR CLEANER		
CHECK ENGINE ELECTRICAL		
DRAIN WATER FROM FUEL		
CLEAN PRE-FILTER BOWL		
CHANGE ENGINE OIL		
CHANGE OIL FILTER		
CHANGE FUEL FILTER		
CHANGE WATER SEPARATOR		
CHANGE COOLANT FILTER		
CHECK AIR INTAKE SYSTEM		
CHECK FAN ASSEMBLY		
CHECK BELT TENSIONER		
CHECK VIBRATION DAMPER		
CLEAN RADIATOR		
CLEAN DEBRIS SCREEN		
CHANGE ENGINE COOLANT		
AIR CLEANER ELEMENTS		
ADJUST VALVE CLEARANCE		
CHANGE ETHER CYLINDER		
HYDRAULIC OIL LEVEL		
CHECK HYD FUNCTIONS		
CHECK FOR OIL LEAKS		
CHECK HOSES/LINES		
CLEAN SUCTION SCREEN		
CHANGE RETURN FILTER		
PILOT MANIFOLD FILTER		
CHANGE HYDRAULIC OIL		
CLEAN HYDRAULIC TANK		
INSPECT ALL WIRING		
BATTERY ELECTROLYTE		
BATTERY SERVICE		

ITEM	OK	MAINT. PERFORMED
HYD. FUNCTION OPERATION		
CHECK SWITCHES		
CHECK TRAVEL ALARM		
CHECK SWING BRAKE		
CHECK WARNING LIGHTS		
CHECK BUZZER		
CHECK GAUGES		
CHECK HORN		
CHECK DISPLAY MONITOR		
SWING REDUCTION OIL		
SLEWING RING GEAR		
GREASE BATH LEVEL		
SLEWING RING PINION		
SLEWING RING SEAL		
SWIVEL JOINT SEALS		
DRAIN WATER FROM BATH		
GREASE SLEWING RING		
CHANGE GREASE BATH		
CHECK BOLTS/HARDWARE		
CHECK FOR OIL LEAKS		
CHECK LINES FOR DAMAGE		
CHECK STEPS		
CHECK FRAME STRUCTURE		
CHECK TRACKS & LINKS		
CHECK SPROCKET WEAR		
CHECK IDLER WEAR		
CHECK ROLLER WEAR		
CHECK TRACK TENSION		
ADJUST TRACK TENSION		
TRAVEL REDUCTION OIL		
CHECK BOOM & ARM		
BUCKET TEETH		
SIDE CUTTERS		
GREASE BOOM PINS		
GREASE ARM PINS		
GREASE BUCKET PINS		
CHECK COOLANT ADDITIVE		

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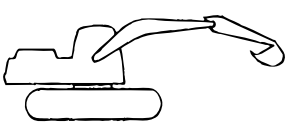

These item include non-equipped parts by the machine specification.

MECHANIC:

SIGNATURE: DATE: