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Section

1001

SAFETY INSTRUCTIONS, GENERAL INFORMATION AND TORQUE SPECIFICATIONS

J I Case

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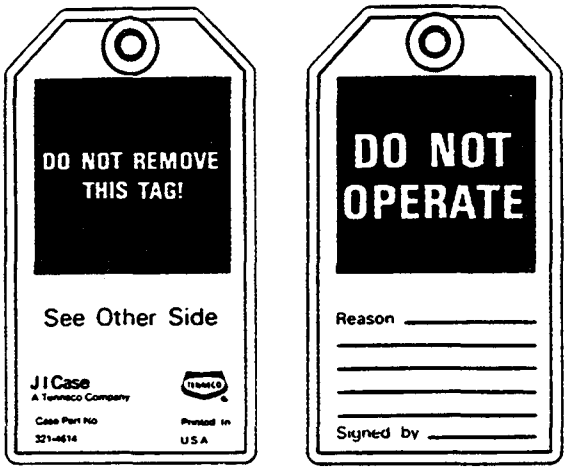
SAFETY

This symbol means ATTENTION ! BECOME ALERT ! YOUR SAFETY IS INVOLVED. The message that follows the symbol contains important information about safety. Carefully read the message, Make sure you fully understand the causes of possible injury or death.

To prevent injury always follow the Warning, Caution and Danger notes in this section and throughout the manual.
Put the warning tag shown below on the key for the keyswitch when servicing or repairing the machine. One warning tag is supplied with each machine. Additional tags Part Number 331-4614 are available from your service parts supplier.



B004

Read the operator's manual to familiarize yourself with the correct control functions.

Operate the machine and equipment controls from the seat position only. Any other method could result in serious injury.

This is a one man machine, no riders allowed.

Before starting engine, study Operator's Manual safety messages. Read all safety signs on machine. Clear the area of other persons. Learn and practise safe use of controls before operating.
It is your responsibility to understand and follow manufacturers instrucitons on machine operation, service, and to observe pertinent laws and regulations. Operator's and Service Manuals may be obtained from your J.I. CASE dealer.

If you wear clothing that is too loose or do not use the correct safety equipment for your job, you can be injured. Always wear clothing that will not catch on objects. Extra safety equipment that can be required includes hard hat, safety shoes, ear protection, eye or face protection, heavy gloves and reflector clothing.

When working in the area of the fan belt with the engine running, avoid loose clothing if possible, and use extreme caution.

When doing checks and tests on the equipment hydraulics, follow the procedures as they are written. DO NOT change the procedure.

When putting the hydraulic cylinders on this machine through the necessary cycles to check operation or to remove air from a circuit, make sure all people are out of the way.

Use insulated gloves or mittens when working with hot parts.

Lower all attachments to the ground or use stands to safety support the attachments before you do any maintenance or service.

Pin sized and smaller streams of hydraulic oil under pressure can penetrate the skin and result in serious infection. If hydraulic oil under pressure does penetrate the skin, seek medical treatment immediately. Maintain all hoses and tubes in good condition. Make sure all connections are tight. Make a replacement of any tube or hose that is damaged or thought to be damaged. DO NOT use your hand to check for leaks, use a piece of cardboard or wood.

When removing hardened pins such as a pivot pin, or a hardened shaft, use a soft head (brass or bronze) hammer or use a driver made from brass or bronze and a steel head hammer.

When using a hammer to remove and install pivot pins or separate parts using compressed air or using a grinder, wear eye protection that completely encloses the eyes (approved goggles or other approved eye protectors).

Use suitable floor (service) jacks or chain hoist to raise wheels or tracks off the floor. Always block machine in place with suitable safety stands.

When servicing or repairing the machine. Keep the shop floor and operator's compartment and steps free of oil, water, grease, tools, etc. Use an oil absorbing material and or shop cloths as required. Use safe practices at all times.

Some components of this machine are very heavy. Use suitable lifting equipment or additional help as instructed in this Service Manual.

Engine exhaust fumes can cause death. If it is necessary to start the engine in a closed place, remove the exhaust fumes from the area with an exhaust pipe extension. Open the doors and get outside air into the area.

When the battery electroyte is frozen, the battery can explode if (1), you try to charge the battery, or (2), you try to jump start and run the engine. To prevent the battery electrolyte from freezing, try to keep the battery at full charge. If you do not follow these instructions, you or others in the area can be injured.

Batteries contain acid and explosive gas. Explosions can result from sparks, flames or wrong cable connections. To connect the jumper cables correctly to the battery of this machine see the Operator's Manual. Failure to follow these instructions can cause serious injury or death.

GENERAL INFORMATION

CLEANING

Clean all metal components, except bearings, with steam or white spirit. Do not use caustic soda when steam-cleaning. After cleaning, dry and oil the components. Clean oil lines with compressed air. Clean bearings in kerosene, dry them completely and oil them.

INSPECTIONS

Carefully examine all disassembled components. Replace all parts showing signs of wear or damage. Light scores and scratches can be removed by honing or with a buffing compound. Fast, abnormal wear of components can be avoided by careful examination and early detection of wear and pitting.

BEARINGS

Check that bearings run freely. Replace bearings that show signs of too much play or seizing. Clean bearings in a good solvent or kerosene and allow them to dry naturally. DO NOT DRY BEARINGS WITH COMPRESSED AIR.

NEEDLE BEARINGS

Before installing needle bearings in their housing, remove any metal edges inside or around the housing. When installing bearings with a hydraulic press, grease the inside and the outside of the bearing with petroleum jelly.

GEARS

Check all gears for signs of damage or wear. Replace damaged or worn gears.

SEAL RINGS, O RINGS AND FLAT SEALS

Always install new seal rings, O-rings and flat seals, if removed. Lubricate seal rings and O-rings with petroleum jelly.

SHAFTS

Check all shafts showing signs of damage or wear. Check particularly to make sure that any surface of the shaft in contact with bearings or seal rings is not damaged.

SERVICE PARTS

Always use genuine CASE service parts. To order service parts, see the Spare Parts Catalog and remember to give the correct reference of the necessary CASE part. No warranty claims will be considered for failures involving parts which are not of CASE origin.

LUBRICATION

Never use oil or grease which is different from that specified in the Operator's Manual or the Service Manual. No warranty claims will be considered for failures due to the use of wrong oil or grease.

STANDARD FASTENER TORQUE SPECIFICATIONS

Unless otherwise specified, use the following torque specifications. Lubricate the threads with engine oil or ordinary grease.

SCREWS / STANDARD SIZE	4	7	9
M6	7.8 to 9.3 Nm (5.75 to 6.86 lb ft)	9.8 to 11.3 Nm (7.23 to 8.33 lb ft)	12.3 to 14.2 Nm (9.07 to 10.47 lb ft)
M8	17.7 to 20.6 Nm (13.0 to 15.2 lb ft)	23.5 to 27.5 Nm (17.34 to 20.29 lb ft)	29.4 to 34.3 Nm (21.6 to 25.31 lb ft)
M10	39.2 to 45.1 Nm (28.9 to 33.28 lb ft)	48,0 to 55.9 Nm (35.42 to 41.25 lb ft)	60.8 to 70.6 Nm (44.8 to 52.10 lb ft)
M12	62.8 to 72.6 Nm (46.3 to 53.5 lb ft)	77.5 to 90.2 Nm (57.19 to 66.56 lb ft)	103.0 to 117.7 Nm (76.0 to 86.86 lb ft)
M14	107.9 to 125.5 Nm (79.6 to 92.6 lb ft)	123.6 to 147.1 Nm (91.2 to 108.5 lb ft)	166.7 to 196.1 Nm (123.0 to 144.7 lb ft)
M16	166.7 to 191.2 Nm (123.0 to 141.0 lb ft)	196.1 to 225.6 Nm (144.7 to 166.49 lb ft)	259.9 to 304.0 Nm (191.8 to 224.3 lb ft)
M18	245.2 to 284.4 Nm (180.9 to 209.88 lb ft)	274.6 to 318.7 Nm (202.6 to 235.2 lb ft)	343.2 to 402.1 Nm (253.2 to 296.74 lb ft)
M20	333.4 to 392.2 Nm (246.0 to 289.44 lb ft)	367.7 to 431.5 Nm (271.36 to 318.44 lb ft)	490.3 to 568.8 Nm (361.8 to 419.77 lb ft)

HYDRAULIC CONNECTION TORQUE SPECIFICATIONS

HOSE FITTINGS

THREAD SIZE	NUTS	FLARED FITTINGS	WRENCH SIZE
1/8″	7.80 to 11.80 Nm (5.75 to 8.7 lb ft)	14.71 to 19.61 Nm (10.85 to 14.47 lb ft)	17 mm
1/4″	24.50 to 29.40 Nm (18.8 to 21.6 lb ft)	36.30 to 44.10 Nm (26.7 to 32.5 lb ft)	19 mm
3/8″	49.00 to 53.90 Nm (36.0 to 39.7 lb ft)	39.20 to 49.00 Nm (28.9 to 36 lb ft)	22 mm
1/2″	58.80 to 63.70 Nm (43.4 to 47.0 lb ft)	49.00 to 68.60 Nm (36.0 to 50.6 lb ft)	27 mm
3/4″	117.70 to 127.50 Nm (86.8 to 94.0 lb ft)	127.50 to 147.10 Nm (94.0 to 108.5 lb ft)	36 mm
1″	137.30 to 147.10 Nm (101.3 to 108.5 lb ft)	147.10 to 166.10 Nm (108.5 to 122.5 lb ft)	41 mm

CONNECTORS

THREAD SIZE	TAPERED THREAD	STRAIGHT THREAD	WRENCH SIZE
1/8″	19.60 to 29.40 Nm (14.46 to 21.7 lb ft)	———	17 mm
1/4″	36.30 to 46.10 Nm (26.8 to 34.0 lb ft)	58.80 to 78.50 Nm (43.4 to 57.0 lb ft)	19 mm
3/8″	39.20 to 49.00 Nm (28.9 to 36.2 lb ft)	78.50 to 98.10 Nm (58.0 to 72.4 lb ft)	23 mm
1/2″	49.00 to 68.60 Nm (36.2 to 50.6 lb ft)	117.70 to 137.30 Nm (86.8 to 101.3 lb ft)	26 mm

LINE NUTS

TUBE SIZE (OUTER DIAMETER)	NUTS	WRENCH SIZE
8 mm	29.40 to 39.20 Nm (21.7 to 29.0 lb ft)	17 mm
10 mm	39.20 to 44.10 Nm (29.0 to 32.5 lb ft)	19 mm
12 mm	53.99 to 63.70 Nm (39.9 to 47.0 lb ft)	21 mm
16 mm	88.30 to 98.10 Nm (65.16 to 72.4 lb ft)	29 mm
18 mm	127.50 to 137.30 Nm (94.0 to 101.3 lb ft)	32 mm
27.20 mm	235.40 to 254.97 Nm (173.7 to 188.2 lb ft)	41 mm

Section

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GENERAL SPECIFICATIONS

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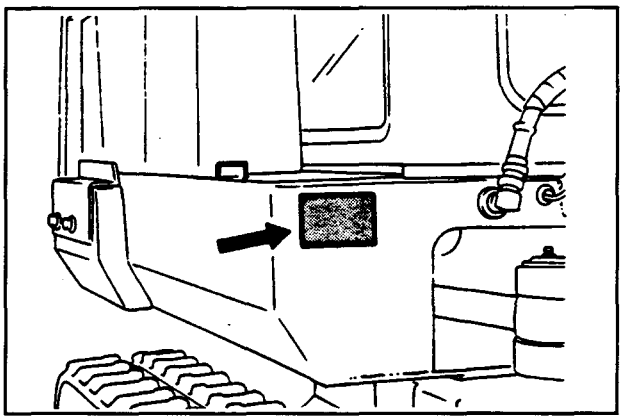
PRODUCT IDENTIFICATION AND SERIAL NUMBERS

When ordering parts or when requesting information or assistance always give the model and serial numbers of your machine.
Write the model and serial numbers of your machine on the lines below.



Model _____
Product Identification Number (PIN)_____

GENERAL SPECIFICATIONS

Capacities - CK25

Engine Oil (without filter change)	4 litres
Radiator	4 litres
Fuel Tank	30 litres
Hydraulic Oil Reservoir	25 litres
Hydraulic Circuit	36 litres
Bottom Track Roller	0.05 litres
Track Idler Wheel	0.04 litres
Travel Motor Reduction	0.5 litres

Capacities - CK28

Engine Oil (without filter change)	5.3 litres
Radiator	4 litres
Fuel Tank	57 litres
Hydraulic Oil Reservoir	43 litres
Hydraulic Circuit	65 litres
Bottom Track Roller	0.05 litres
Top Track Roller	0.025 litres
Track Idler Wheel	0.04 litres
Travel Motor Reduction	0.5 litres

Travel Speed - CK25

1st Speed	2.1 Km/h
2nd Speed	3.9 Km/h

Travel Speed - CK28

1st Speed	2.1 Km/h
2nd Speed	4.1 Km/h

HYDRAULIC SPECIFICATIONS - CK25

General

Engine Speed, no load ..... 3200 rpm
Test Temperature of Hydraulic Oil ..... 45 to 50°C

	Value on Machine	Value on Pressure Setting Pump
Relief Valve, A1	147 to 156 bar (2133 to 2275 psi)	145 to 150 bar (2105 to 2176 psi)
Relief Valve, A2	161 to 171 bar (2346 to 2488 psi)	160 to 164 bar (2318 to 2389 psi)
Relief Valve, A3	156 to 166 bar (2275 to 2417 psi)	145 to 150 bar (2105 to 2176 psi)
Secondary Relief Valves:		
Boom: Raising b2, Lowering b1	240 to 260 bar (3484 to 3768 psi)	237 to 243 bar (3441 to 3527 psi)
Dipper: Extend b3, Retract b4	240 to 260 bar (3484 to 3768 psi)	237 to 243 bar (3441 to 3527 psi)
Levelling Blade: Lowering b5	240 to 260 bar (3484 to 3768 psi)	237 to 243 bar (3441 to 3527 psi)
Bucket: Closing b6	240 to 260 bar (3484 to 3768 psi)	237 to 243 bar (3441 to 3527 psi)
Swing Motor Brake Valve, c1	147 to 166 bar (2133 to 2417 psi)	129 to 135 bar (1877 to 1963 psi)
High Pressure Relief Valve, c2	274 to 294 bar (3982 to 4266 psi)	240 to 260 bar (3484 to 3768 psi)

Operating Speeds (in seconds)

		Reference Value	Authorised Limit	Note
Boom Cylinder (Cab)	Raising	1.7 to 2.3	2.8	1
	Lowering	3.2 to 3.8	4.6	1
Boom Cylinder (Canopy)	Raising	2.0 to 2.6	3.1	1
	Lowering	3.7 to 4.3	5.2	1
Dipper Cylinder	Retracting	4.7 to 5.3	6.4	2
	Extending	3.2 to 3.8	4.6	2
Bucket Cylinder	Closing	2.9 to 3.5	4.2	2
	Opening	2.1 to 2.7	3.2	2
Levelling Blade Cylinder	Lowering	3.2 to 3.8	4.6	2
	Raising	2.5 to 3.1	3.7	2
Swivel Speed	Left	18.2 to 22.2	26.6	3
	Right	18.2 to 22.2	26.6	3
Swing Cylinder	Left	7.7 to 8.3	10.0	4
	Right	6.0 to 6.3	7.6	4
Swing Start	Left/Right	1.7 to 2.3	2.8	0 to 90°

NOTE:
1. *Cylinder to maximum height without end of stroke cushioning*
2. *Complete cylinder stroke*
3. *Three complete revolutions*
4. *Not counting end of stroke cushioning*

Hydraulic Pumps

	P1, P2	P3	P4
Pump Rotation Speed (rpm)	3000	3000	1500
Test Pressure	Main Relief Valve Pressure		———
Theoretical Displacement	9.4 cm^3 (0.57 in^3)	5.7 cm^3 (0.35 in^3)	1.53 cm^3 (0.09 in^3)
Theoretical Output	28.2 l/min (6.2 gal/min)	17.1 l/min (3.76 gal/min)	2.2 l/min (0.48 gal/min)
Maximum Authorised Output for 85% use	24 l/min (5.28 gal/min)	14.5 l/min (3.19 gal/min)	1.87 l/min (0.41 gal/min)
Maximum Authorised Output for 80% use	22.6 l/min (4.97 gal/min)	13.7 l/min (3.01 gal/min)	1.76 l/min (0.38 gal/min)

P1 - First body, main pump
P2 - Second body, main pump
P3 - Swing pump
P4 - Pilot controlled pump

HYDRAULIC SPECIFICATIONS - CK28

General

Engine Speed, no load ..... 2800 rpm
Test Temperature of Hydraulic Oil ..... 45 to 50°C

	Value on Machine	Value on Pressure Setting Pump
Relief Valve, A1	181 to 188 bar (2631 to 2733 psi)	170 to 174 bar (2461 to 2532 psi)
Relief Valve, A2	196 to 206 bar (2844 to 2986 psi)	194 to 199 bar (2816 to 2887 psi)
Relief Valve, A3	166 to 176 bar (2418 to 2560 psi)	155 to 160 bar (2247 to 2318 psi)
Secondary Relief Valves:		
Boom: Raising b2, Lowering b1	240 to 260 bar (3484 to 3768 psi)	237 to 243 bar (3441 to 3527 psi)
Dipper: Extend b3, Retract b4	240 to 260 bar (3484 to 3768 psi)	237 to 243 bar (3441 to 3527 psi)
Levelling Blade: Lowering b5	240 to 260 bar (3484 to 3768 psi)	237 to 243 bar (3441 to 3527 psi)
Bucket: Closing b6	240 to 260 bar (3484 to 3768 psi)	237 to 243 bar (3441 to 3527 psi)
Swing Motor Brake Valve, c1	156 to 176 bar (2275 to 2559 psi)	144 to 150 bar (2090 to 2176 psi)
High Pressure Relief Valve, c2	274 to 294 bar (3982 to 4266 psi)	240 to 260 bar (3484 to 3768 psi)

Operating Speeds (in seconds)

		Reference Value	Authorised Limit	Note
Boom Cylinder (Cab)	Raising	1.6 to 2.2	2.6	1
	Lowering	3.2 to 3.8	4.6	1
Boom Cylinder (Canopy)	Raising	1.8 to 2.4	2.9	1
	Lowering	3.7 to 4.3	5.2	1
Dipper Cylinder	Retracting	4.4 to 5.0	6.0	2
	Extending	3.0 to 3.6	4.3	2
Bucket Cylinder	Closing	3.3 to 3.9	4.7	2
	Opening	2.1 to 2.7	3.2	2
Levelling Blade Cylinder	Lowering	2.9 to 3.5	4.2	2
	Raising	2.2 to 2.8	3.4	2
Swivel Speed	Left	18.7 to 23.1	27.7	3
	Right	18.7 to 23.1	27.7	3
Swing Cylinder	Left	7.2 to 7.8	9.4	4
	Right	5.7 to 6.3	7.6	4
Swing Start	Left/Right	1.7 to 2.3	2.8	0 to 90°

NOTE:
1. *Cylinder to maximum height without end of stroke cushioning*
2. *Complete cylinder stroke*
3. *Three complete revolutions*
4. *Not counting end of stroke cushioning*

Hydraulic Pumps

	P1, P2	P3	P4
Pump Rotation Speed (rpm)	2600	2600	1500
Test Pressure	Main Relief Valve Pressure		———
Theoretical Displacement	11.2 cm^3 (0.68 in^3)	7.0 cm^3 (0.43 in^3)	1.53 cm^3 (0.09 in^3)
Theoretical Output	29.1 l/min (6.4 gal/min)	18.2 l/min (4.0 gal/min)	2.2 l/min (0.48 gal/min)
Maximum Authorised Output for 85% use	24.7 l/min (5.43 gal/min)	15.5 l/min (3.41 gal/min)	1.87 l/min (0.41 gal/min)
Maximum Authorised Output for 80% use	23.3 l/min (5.12 gal/min)	14.6 l/min (3.21 gal/min)	1.76 l/min (0.38 gal/min)

P1 - First body, main pump
P2 - Second body, main pump
P3 - Swing pump
P4 - Pilot controlled pump

Electrical Specifications

BATTERY
- Capacity - CK25 ..... 12V 52AH
- Capacity - CK28 ..... 12V 64AH

ALTERNATOR
- Nominal Voltage ..... 12 Volts
- Maximum Output ..... 480 watts
- Direction of Rotation ..... Clockwise viewed from Pulley Side
- Polarity ..... Negative Ground

STARTER MOTOR
- Nominal Voltage ..... 12 Volts
- Nominal Output ..... 1.4 Kw
- Direction of Rotation ..... Clockwise viewed from Pulley Side
- Time Rating ..... 30 Seconds

GLOW PLUG
- Current Value after 6 Seconds at 10.5 Volts ..... Approximately 9 Amps

Lubricants and Fluids

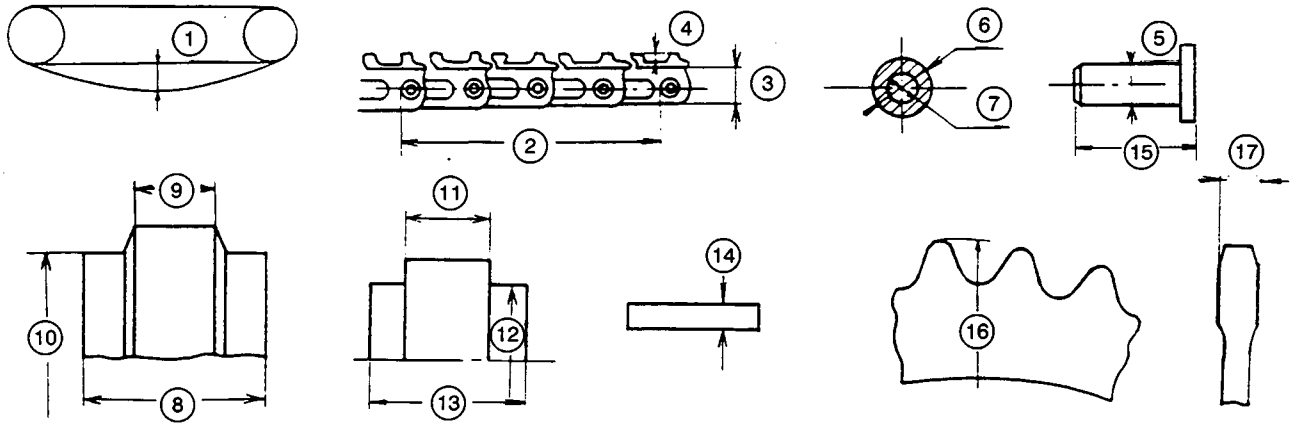
Battery ..... Drinking or Distilled Water
Coolant Solution ..... Refer to Page 10
Engine Lubrication ..... Refer to Page 10
Hydraulic Fluid ..... Hydraulic Fluid
Travel Reduction Gear Lubricant ..... CASE GEAR LUBE (85W-140)
Swing Reduction Gear Lubricant (CK28 only) ..... CASE GEAR LUBE (85W-140)
Lower Roller and Idler Wheel Lubricant ..... SAE 80
Turntable Bearing Lubricant ..... CASE IH Molybisulphide grease

Machine Weights

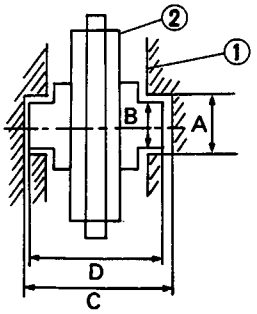
CK25 with Cab (Steel Tracks) ..... 2350 Kg
CK25 with Cab (Rubber Tracks) ..... 2275 Kg
CK25 with Canopy (Steel Tracks) ..... 2210 Kg
CK25 with Canopy (Rubber Tracks) ..... 2135 Kg

CK28 with Cab (Steel Tracks) ..... 2780 Kg
CK28 with Cab (Rubber Tracks) ..... 2705 Kg
CK28 with Canopy (Steel Tracks) ..... 2640 Kg
CK28 with Canopy (Rubber Tracks) ..... 2565 Kg

Tracks, Rollers and Idlers



1.	Track Tension		
	CK25 and CK28 (Rubber)		10 to 15 mm
	CK25 (Steel)		30 to 35 mm
	CK28 (Steel)		40 to 45 mm
2.	4 Chain Stretch (Length)	406 mm	416 mm maximum
3.	Link Wear (Height)	68 mm	63 mm maximum
4.	Pad Wear (Height)	16 mm	8 mm maximum
5.	Link Pin Wear (O.D.)	17 mm	15 mm maximum
6.	Link Bushing Wear (O.D.)	28 mm	26 mm maximum
7.	Link Bushing Wear (I.D.)	17 mm	15 mm maximum
8.	Idler Wheel Outer Surface Wear (Width)	72 mm	64 mm maximum
9.	Idler Wheel Outer Surface Wear (Guide Width)	22 mm	15 mm maximum
10.	Idler Wheel Outer Surface Wear (O.D.)	305 mm	297 mm maximum
11.	Lower Roller Outer Surface Wear (Guide Width)	26 mm	20 mm maximum
12.	Lower Roller Outer Surface Wear (O.D.)	96 mm	91 mm maximum
13.	Lower Roller Outer Surface Wear (Width)		61 mm
14.	Sliding Plate Wear - CK25 only	6 mm	3mm maximum
15.	Master Pin Length		93.5 mm
16.	Drive Sprocket Wear (O.D.)	393 mm	385 mm maximum
17.	Drive Sprocket Wear (Width)	30 mm	26 mm maximum
18.	Top Roller Wear (O.D.) - CK28 only	85 mm	80 mm maximum



1. TRACK FRAME
2. IDLER WHEEL

Idler Wheel to Track Frame Clearance (A-B)	6 mm
Idler Wheel to Track Frame Clearance (C-D)	6 mm
Steel Track Height (Link and Pad) - CK25	90 mm
Steel Track Height (Link and Pad) - CK28	90.5 mm
Steel Track Pitch (CK25 and CK28)	101.6 mm
Rubber Track Height (Link and Pad) - CK25	83.5 mm
Rubber Track Height (Link and Pad) - CK28	85.5 mm
Rubber Track Pitch (CK25 and CK28)	101.15 ± 1 mm
Steel Track Weight - CK25	124.26 Kg
Steel Track Weight - CK28	152 Kg
Rubber Track Weight - CK25	89 Kg
Rubber Track Weight - CK28	116.4 Kg

ENGINE SPECIFICATIONS

Run-In Instructions

For an increase in working life, greater performance and more economical operation, pay particular attention to the engine during the first 20 operating hours.

During this period, follow the recommendations listed below:

1. Warm up the engine before you use it under load.
2. Do not idle the engine for long periods.
3. Keep a close watch on the indicator lamps.
4. Frequently check the engine oil and coolant levels.

The following operation must be carried out in addition to those given in the Servicing Chart:

After the first 35 hours ..... Change the engine oil

Engine Cooling System

Coolant Solution ..... Ethylene-glycol

WARNING: *When using ethylene-glycol coolant solutions, always have a minimum of 50% ethylene-glycol in the cooling system. Do not put more than 50% ethylene-glycol in the cooling system unless the ambient air temperature is below -36°C (-37°F). More than 50% ethylene-glycol decreases heat transfer, with the result that the engine surface temperature is higher than normal.*

Engine Lubrication

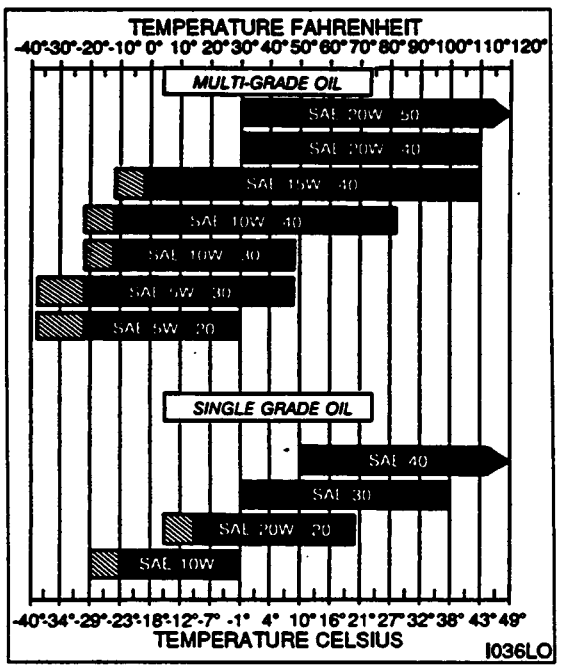
CASE IH N°1 engine oil is recommended for your engine. This oil ensures correct lubrication of your engine in all working conditions. If you cannot obtain CASE IH N°1 single grade oil, only use API grade CD engine oil.

See the chart below for recommended viscosity in different temperatures.

NOTE: *DO NOT put performance additives or other oil additive products into the engine crankcase.*

Engine Oil Viscosity

AMBIENT AIR TEMPERATURE RANGES



ENGINE SPECIFICATION DETAILS

General - CK25

Make and Model		KUBOTA D1105-BHG
Type		3 Cylinder, 4 Stroke Cycle
Horsepower: SAE	27.7 HP	20.4 KW
Horsepower: DIN	25 HP	18.3 KW
Firing Order		1-2-3
Piston Displacement		1123 cm^3
Rated Engine Speed		3200 rpm
Engine Idle Speed		1000 to 1200 rpm
Engine Oil Capacity (without filter change)		4 litres

General - CK28

Make and Model		KUBOTA V1505-BH
Type		4 Cylinder, 4 Stroke Cycle
Horsepower: SAE	32.2 HP	23.7 KW
Horsepower: DIN	29 HP	21.3 KW
Firing Order		1-3-4-2
Piston Displacement		1495 cm^3
Rated Engine Speed		2800 rpm
Engine Idle Speed		1000 to 1200 rpm
Engine Oil Capacity (without filter change)		5.3 litres

NOTE: *The following Specifications are common to CK25 and CK28 Excavators.*

General

Bore x Stroke	78 x 78.4 mm
Compression Ratio	22:1
Valve Clearance (Cold)	0.145 to 0.185 mm
Direction of Rotation	Counterclockwise, viewed from flywheel side

Pistons

Rings per Piston	3
Number of Compression Rings	2
Number of Oil Rings (two piece)	1

Main Bearings

Number of Bearings - 3 Cylinder Engine	4
Number of Bearings - 4 Cylinder Engine	5
Type of Bearings	Replaceable

Lubrication System

Type		Forced Lubrication by Pump
Oil Pressure	2.5 to 4.5 bar	35.6 to 64 psi
Oil Pump		Rotor Type
Oil Filter		Cartridge Type

Fuel System

Fuel Injection Pump		BOSCH MINI MD
Fuel Injection Pump Timing		17° to 19° before TDC
Fuel Injectors		BOSCH MINI NOZZLE DN0PD
Fuel Injector Opening Pressure	137 to 147 bar	1991 to 2133 psi

Cylinder Head

Warpage		0.05 mm maximum
Top Clearance		0.55 to 0.70 mm
Compression Pressure	28.4 to 32.4 bar	412 to 469 psi
Minimum	22.6 bar	327 psi

Valves (Inlet and Exhaust)

Valve Clearance (cold)		0.145 to 0.185 mm
Valve Recess below Cylinder Head	-0.05 to 0.15 mm	0.4 mm maximum
Valve Seat Width		2.12 mm
Valve Face Angle		
Inlet		60°
Exhaust		45°
Valve Stem Diameter		6.960 to 6.975 mm
Valve Guide I.D.		7.010 to 7.025 mm
Clearance between Valve Stem and Valve Guide	0.035 to 0.065 mm	0.10 mm maximum
Valve Timing		
Inlet Valve -Open		14° before TDC
Inlet Valve - Closed		30° after BDC
Exhaust Valve - Open		55° before BDC
Exhaust Valve - Closed		14° after TDC

Valve Springs

Free Length	37.0 to 37.5 mm	36.5 mm minimum
Setting Load/Setting Length		117.4N/31.0 mm
Valve Spring Tilt		1.0 mm maximum

Rocker Arm Assembly

Clearance between Rocker Shaft and Rocker Arm	0.016 to 0.045 mm	0.1 mm maximum
Rocker Arm Shaft O.D.		11.973 to 11.980 mm
Rocker Arm I.D.		12.000 to 12.018 mm

Camshaft

Camshaft Side Clearance	0.07 to 0.22 mm	0.3 mm maximum
Camshaft Lobe Height		
Inlet	28.80 mm	28.75 mm minimum
Exhaust	29.00 mm	28.95 mm minimum
Clearance between Camshaft Journal and Camshaft Bearing	0.05 to 0.091 mm	0.12 mm maximum
Camshaft Journal O.D.		35.934 to 35.950 mm
Camshaft Bearing I.D.		36.000 to 36.025 mm

Gear Train

Backlash		
Crankshaft Gear to Idler Gear 1	0.032 to 0.115 mm	0.15 mm maximum
Idler Gear 1 to Camshaft Gear	0.036 to 0.114mm	0.15 mm maximum
Idler Gear 1 to Injection Pump Gear	0.034 to 0.116 mm	0.15 mm maximum
Idler Gear 1 to Idler Gear 2	0.033 to 0.117 mm	0.15 mm maximum
Idler Gear 2 to Governor Gear	0.030 to 0.117 mm	0.15 mm maximum
Clearance between Idler Gear Shaft and Idler Gear Bushing		
Idler Gear 1	0.020 to 0.054 mm	0.10 mm maximum
Bushing I.D.	26.000 to 26.021 mm	0.10 mm maximum
Shaft O.D.	25.967 to 25.980 mm	
Idler Gear 2	0.020 to 0.054 mm	0.10 mm maximum
Bushing I.D.		26.000 to 26.021 mm
Shaft O.D.		25.967 to 25.980 mm
Idler Gear Side Clearance		
Idler Gear 1	0.20 to 0.51 mm	0.8 mm maximum
Idler Gear 2	0.20 to 0.51 mm	0.8 mm maximum

Pistons and Piston Rings

Piston Pin Bore	22.000 to 22.013 mm	22.03 mm maximum
Clearance between Compression Ring 2 and Ring Groove	0.095 to 0.122 mm	0.20 mm maximum
Clearance between Oil Ring and Ring Groove	0.020 to 0.055 mm	0.15 mm maximum
Ring Gap		
Compression Ring 1	0.30 to 0.45 mm	1.25 mm maximum
Compression Ring 2	0.30 to 0.45 mm	1.25 mm maximum
Oil Ring	0.25 to 0.40 mm	1.25 mm maximum

Connecting Rods

Connecting Rod Alignment		0.05 mm
Clearance between Piston Pin and Small End Bushing	0.014 to 0.038 mm	0.15 mm maximum
Piston Pin O.D.		22.002 to 22.011 mm
Small End Bushing I.D.		22.025 to 22.040 mm

Crankshaft

Crankshaft Alignment	0.02 mm	0.08 mm maximum
Clearance between Crankshaft and		
Crankshaft Bearings 1 and 2	0.034 to 0.095 mm	0.2 mm maximum
Crankshaft O.D.		47.934 to 47.950 mm
Bearings 1 and 2 I.D.		47.984 to 48.048 mm
Clearance between Crankshaft and Crankshaft Bearing 3	0.034 to 0. 098 mm	0.2 mm maximum
Crankshaft O.D.		51.921 to 51.940 mm
Bearing 3 I.D.		51.974 to 52.019 mm
Clearance between Crank Pin and Crank Pin Bearing	0.029 to 0.091 mm	0.2 mm maximum
Crank Pin O.D.		39.959 to 39.975 mm
Bearing I.D.		40.004 to 40.050 mm
Crankshaft Side Clearance	0.15 to 0.31 mm	0.5 mm maximum

Cylinder Liner

Cylinder Liner I.D.	78.000 to 78.019 mm	+0.15 mm
Oversized Cylinder Liner I.D.		+0.5 mm

Engine Lubricating System

Engine Oil Pressure		
At Idle Speed	0.5 bar	7 psi
At Rated Speed	2.0 to 4.5 bar	29 to 65 psi
Oil Pump		
Clearance between Outer Rotor and Pump Body	0.10 to 0.18 mm	0.54 mm maximum
Clearance between Inner and Outer Rotor	0.06 to 0.18 mm	0.3 mm maximum
End Clearance between Inner Rotor and Cover	0.025 to 0.075 mm	0.225 mm maximum

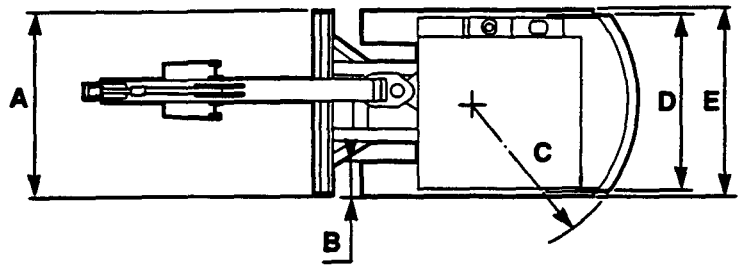
Cooling System

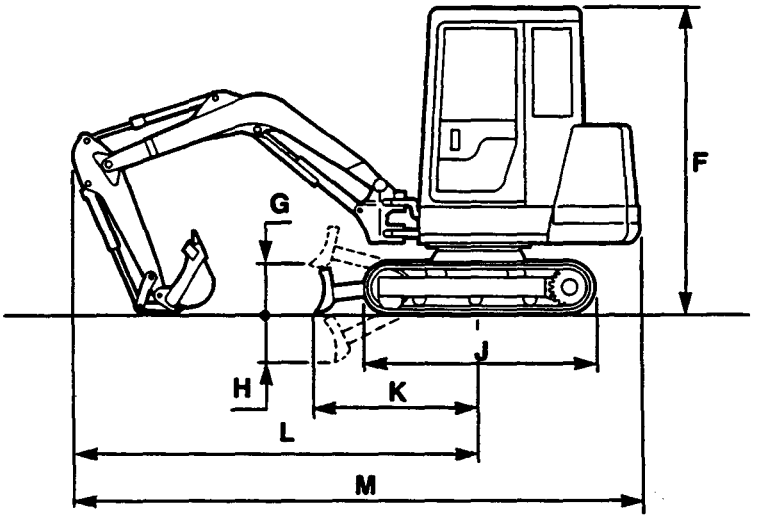
Thermostat	
Opening Temperature	69.5 to 72.5°C
Completely Open	85°C
Radiator Cap	1.4 bar / 20 psi
Fan Belt Tension	7 to 9 mm at 10 Kgf

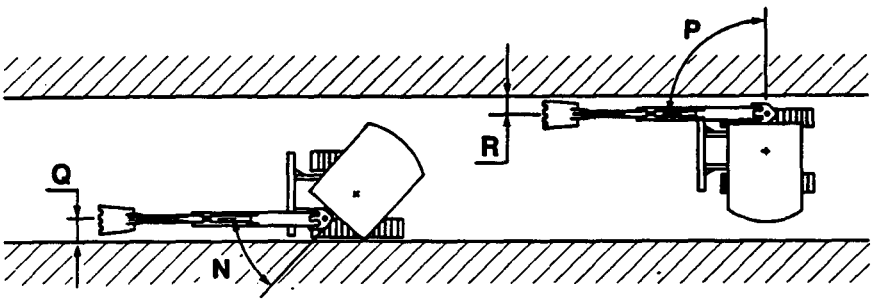
SPECIAL TORQUES

Rocker Cover Retaining Nuts	6.9 to 8.8 Nm	5.1 to 6.5 lb ft
Cylinder Head Bolts	63.7 to 68.6 Nm	47 to 50.6 lb ft
Bearing Case Bolts 1 (M8)	29.4 to 34.3 Nm	21.7 to 25.3 lb ft
Bearing Case Bolts 2 (M9)	49 to 53.9 Nm	36.2 to 39.8 lb ft
Flywheel Retaining Bolts	53.9 to 58.8 Nm	39.8 to 43.4 lb ft
Rocker Arm Retaining Nuts	21.6 to 26.5 Nm	15.9 to 19.5 lb ft
Idler Gear Shaft Bolts	9.8 to 11.3 Nm	7.2 to 8.3 lb ft
Glow Plugs	19.6 to 24.5 Nm	14.5 to 18.1 lb ft
Nozzle Holder Assembly	49 to 68.6 Nm	36.2 to 50.6 lb ft
Engine Oil Pressure Switch	14.7 to 19.6 Nm	10.8 to 14.5 lb ft
Injection Pipe Retaining Nuts	24.5 to 34.3 Nm	18.1 to 25.3 lb ft

MACHINE DIMENSIONS







	CK25	CK28
A	1.40m	1.45m
B	0.25m	0.30m
C (Radius)	1.25m	1.35m
D	1.35m	1.45m
E	1.40m	1.56m
F (With Canopy)	2.32m	2.33m
F (With Cab)	2.34m	2.34m
G	0.33m	0.36m
H	0.38m	0.46m
J	1.77m	1.77m
K	1.24m	1.34m
L	3.00m	3.18m
M	4.25m	4.53m
N	48°	48°
P	90°	90°
Q	0.35m	0.37m
R	0 m	0.18m

Section

2002

ENGINE REMOVAL AND INSTALLATION

J I Case

Don 7-37940

Printed in England
May 1992

TABLE OF CONTENTS

SPECIFICATIONS

Fan to Radiator Clearance	30 mm or more
Fan to Fan Shroud Clearance, Top and Sides	15 mm or more
Fan to Fan Shroud Clearance, Bottom	20 mm or more
Engine Oil Capacity - CK25	4 Litres
Engine Oil Capacity - CK28	5.3 Litres
Hydraulic Oil Reservoir Capacity - CK25	25 Litres
Hydraulic Oil Reservoir Capacity - CK28	43 Litres
Cooling System Capacity	4 Litres

SPECIAL TORQUES

Protector Mounting Bolts	
M12	77 to 90 Nm
M16	166 to 197 Nm
Hood Sheet Mounting Bolts	
M10	48 to 56 Nm
M12	77 to 90 Nm
Engine Mounting Bolts	
M10	48 to 56 Nm
M12	77 to 90 Nm
M14	124 to 147 Nm

SHOP EQUIPMENT TOOLS

1. TORQUE WRENCH
OEM 6475

2. LOCTITE 271

Removal and Installation

STEP 1

Park the machine on hard level ground. Lower the attachment to the ground. Release pressure in the hydraulic circuits and stop the engine.

STEP 2

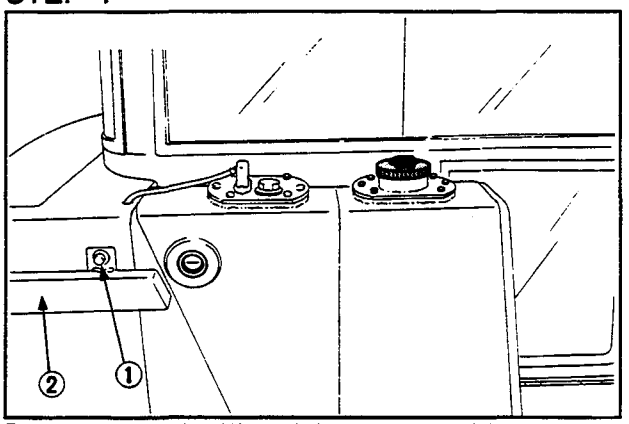
Disconnect the battery, positive (+) terminal first.

NOTE: *For Installation, install and tighten the negative (−) terminal first.*

STEP 3

Remove the Cab or Canopy, refer to Section 9004.

STEP 4



Remove the bolts (1) and the protector (2).

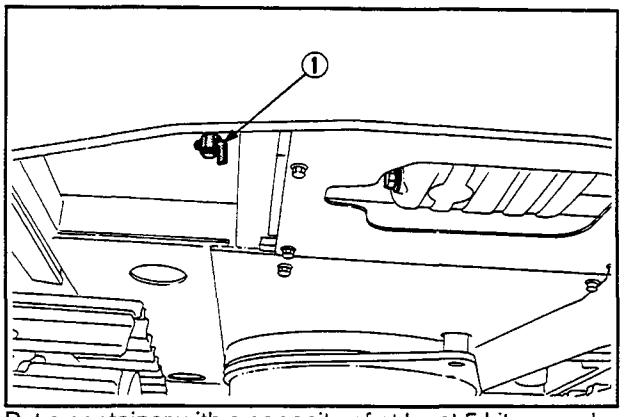
NOTE: *For Installation, apply Loctite 271 to the bolts and tighten to a torque of:*

M12 - 77 to 90 Nm
M16 - 166 to 197 Nm

STEP 5

Remove the Hydraulic Oil Reservoir, refer to Section 8010.

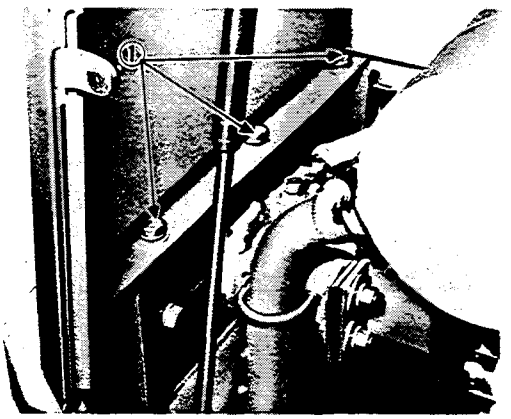
STEP 6



Put a container with a capacity of at least 5 Litres under the radiator drain valve and drain the coolant.

NOTE: *For Installation, install coolant to the correct level.*

STEP 7

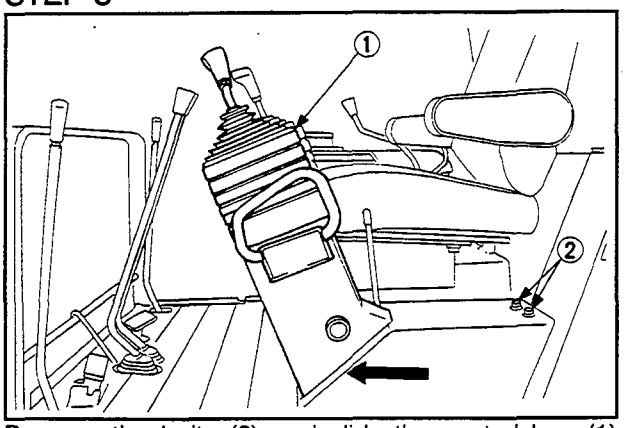


Remove the hood mounting bolts (1) from the inside of the engine compartment.

NOTE: *For Installation, apply Loctite 271 to the bolts (1) and tighten to a torque of:*

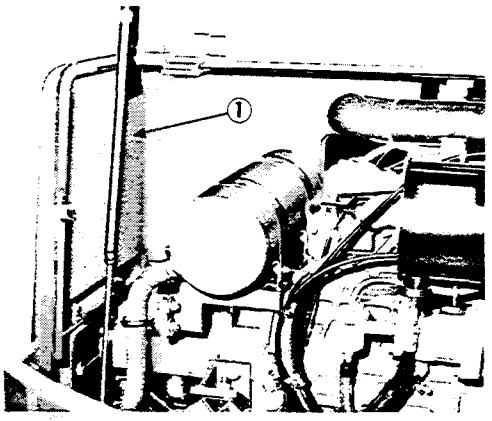
M10 - 48 to 56 Nm
M12 - 77 to 90 Nm

STEP 8

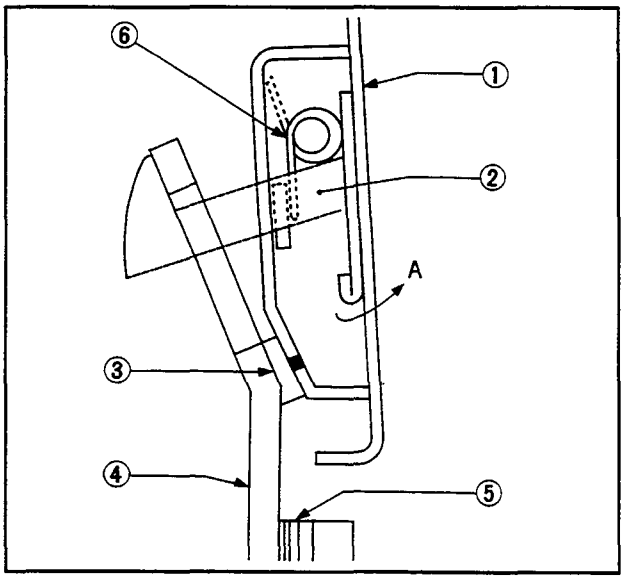


Remove the bolts (2) and slide the control box (1) forwards.

STEP 9



Disconnect and remove the gas strut (1) on the hood. Support the hood on suitable lifting equipment. Remove the hood.

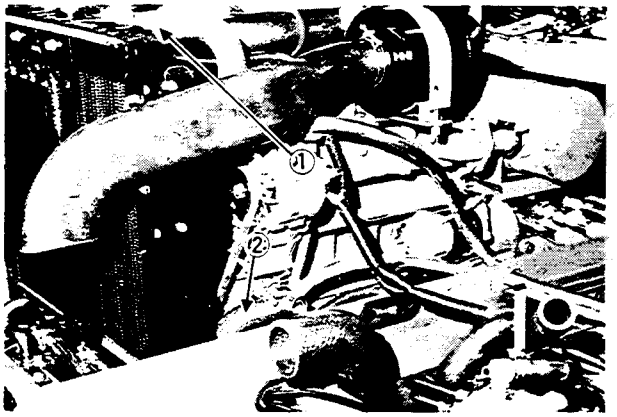


NOTE: *When the hood (1) is closed make sure the catch (2) comes in close contact with the bracket (4). When opening the hood (1) make sure the catch (2) easily comes off the bracket (4), if necessary adjust with shims (5).*

STEP 10

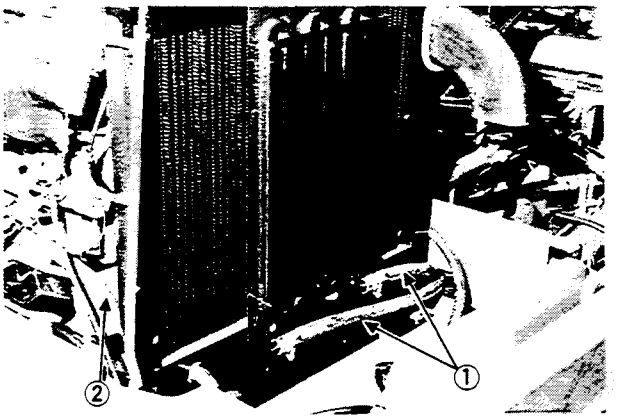
Remove the battery and the fluid level sensor.

STEP 11



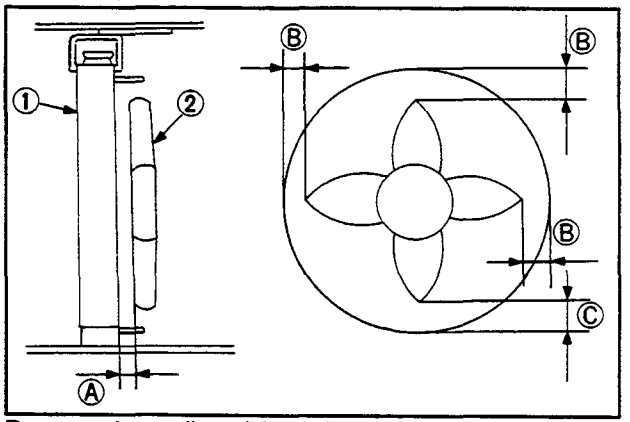
Disconnect and cap the radiator hoses (1) and (2).

STEP 12



Disconnect and cap the oil cooler hoses (1) and radiator return hose (2).

STEP 13



Remove the radiator/oil cooler assembly.

NOTE: *For Installation, make sure the radiator (1) and fan (2) have the following clearances:*

A = 30 mm or more
B = 15 mm or more
C = 20 mm or more