

# CX330 Crawler Excavators

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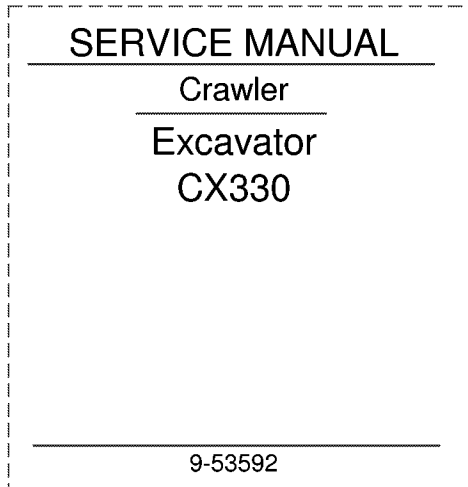
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\* Consult the Engine Service Manual

██████████ Sections to be distributed at a later date

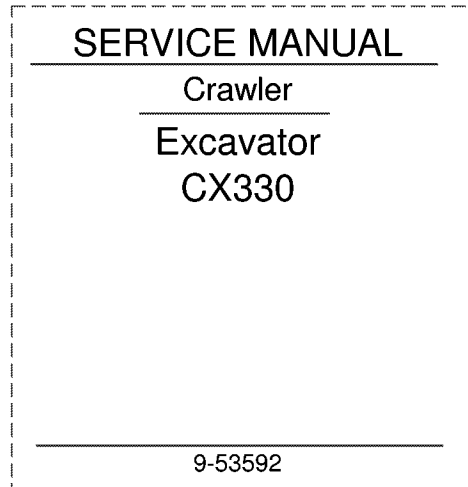
NOTE: CASE Company reserves the right to make changes in the specification and design of the machine without prior notice and without incurring any obligation to modify units previously sold.

The description of the models shown in this manual has been made in accordance with the technical specifications known as of the date of design of this document.



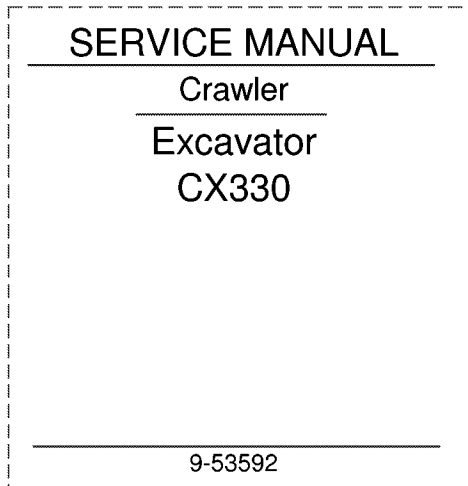
1. Trim along dashed line.
2. Slide into pocket on Binder Spine.

TYPE 1-4



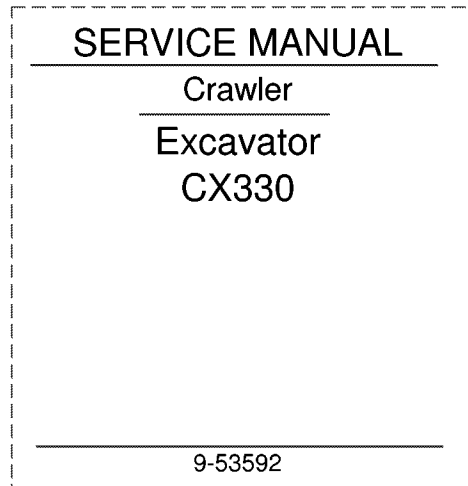
1. Trim along dashed line.
2. Slide into pocket on Binder Spine.

TYPE 1-4



1. Trim along dashed line.
2. Slide into pocket on Binder Spine.

TYPE 1-4



1. Trim along dashed line.
2. Slide into pocket on Binder Spine.

TYPE 1-4

# Section 1001

**SAFETY, GENERAL INFORMATION**

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## GENERAL INFORMATION

### Cleaning

Clean all metal parts except bearings, in a suitable cleaning solvent or by steam cleaning. Do not use caustic soda for steam cleaning. After cleaning, dry and put oil on all parts. Clean oil passages with compressed air. Clean bearings in a suitable cleaning solvent. Dry the bearings completely and put oil on the bearings.

### Inspection

Check all parts when the parts are disassembled. Replace all parts that have wear or damage. Small scoring or grooves can be removed with a hone or crocus cloth. Complete a visual inspection for indications of wear, pitting and the replacement of parts necessary to prevent early failures.

### Bearings

Check bearings for easy action. If bearings have a loose fit or rough action, replace the bearing. Wash bearings with a suitable cleaning solvent and permit to air dry. **DO NOT DRY BEARINGS WITH COMPRESSED AIR.**

### Needle Bearings

Before you press needle bearings in a bore always remove any metal protrusions in the bore or edge of the bore. Before you press bearings into position, put petroleum jelly on the inside and outside diameter of the bearings.

### Gears

Check all gears for wear and damage. Replace gears that have wear or damage.

### Oil Seals, O-rings and Gaskets

Always install new oil seals, O-rings and gaskets. Put petroleum jelly on seals and O-rings.

### Shafts

Check all shafts that have wear or damage. Check the bearing and oil seal surfaces of the shafts for damage.

### Service Parts

Always install genuine Case service parts. When ordering refer to the Parts Catalog for the correct part number of the genuine Case replacement items. Failures due to the use of other than genuine Case replacement parts are not covered by warranty.

### Lubrication

Only use the oils and lubricants specified in the Operator's or Service Manuals. Failures due to the use of non-specified oils and lubricants are not covered by warranty.

## 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.

Place a "Do not operate" tag on the starter switch key before carrying out any service or repair work on the machine.



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



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



**WARNING:** *This is a one man machine, no riders allowed.*



**WARNING:** *Before starting engine, study Operator's Manual safety messages. Read all safety signs on machine. Clear the area of other persons. Learn and practice safe use of controls before operating.*

*It is your responsibility to understand and follow manufacturers instructions on machine operation, service and to observe pertinent laws and regulations. Operator's and Service Manuals may be obtained from your Case dealer.*



**WARNING:** *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.*



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



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



**WARNING:** *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.*



**WARNING:** Use insulated gloves or mittens when working with hot parts.



**WARNING:** Lower all attachments to the ground or use stands to safely support the attachments before you do any maintenance or service.



**WARNING:** 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.



**WARNING:** 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.



**WARNING:** 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).



**WARNING:** 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.



**WARNING:** 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.



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



**WARNING:** 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.



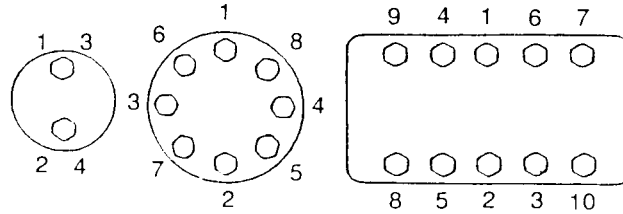
**WARNING:** When the battery electrolyte is frozen, the battery can explode if (1), you try to charge the battery, or (2), you try to jump start and run the engine. To prevent the battery electrolyte from freezing, try to keep the battery at full charge. If you do not follow these instructions, you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



## STANDARD TORQUE DATA FOR CAP SCREWS AND NUTS

### Tightening of Cap Screws and Nuts

Tighten alternately so that tightening torque can be applied evenly. The numbers in the figure below indicate the order of tightening.



JS00481B

Cap screws which have had Loctite used (white residue remains after removal) should be cleaned with light oil or suitable cleaning solvent and dried. Apply 2-3 drops of Loctite to the thread portion of the cap screw and then tighten.

## Torque Table

Tighten cap screws and nuts according to the table below if there are no other special instructions.

Cap Screw Name Size			M6	M8	M10	M12	M14	M16	M18	M20
Cap Screw	Wrench size	[in.]	0.39	0.51	0.67	0.75	0.87	0.95	1.06	1.18
		[mm]	10	13	17	19	22	24	27	30
	Tightening torque	[lb-ft]	5.1	14.5	29.0	43.4	72.5	116.0	144.6	202.4
		[Nm]	6.9	19.6	39.2	58.8	98.1	157.2	196.0	274.0
Socket Head Cap Screw	Wrench size	[in.]	0.20	0.24	0.32	0.39	0.47	0.55	0.55	0.67
		[mm]	5	6	8	10	12	14	14	17
	Tightening torque	[lb-ft]	6.5	15.9	31.1	57.8	86.8	130.1	180.8	253.1
		[Nm]	8.8	21.6	42.1	78.4	117.6	176.4	245.0	343.0

**NOTES**

Dotted lines for writing notes.

# Section 1002

1002

## SPECIFICATIONS AND SPECIAL TORQUE SETTINGS

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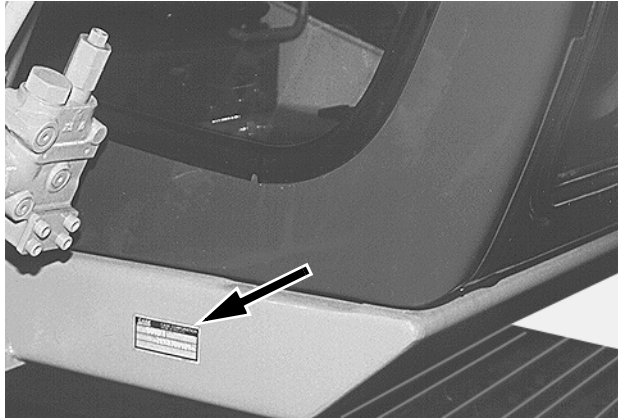
**WARNING:** *This symbol is used in this manual to indicate important safety messages. Whenever you see this symbol, carefully read the message which follows. Your safety depends on it.*

# TYPE, SERIAL NUMBER AND YEAR OF MANUFACTURE OF THE MACHINE

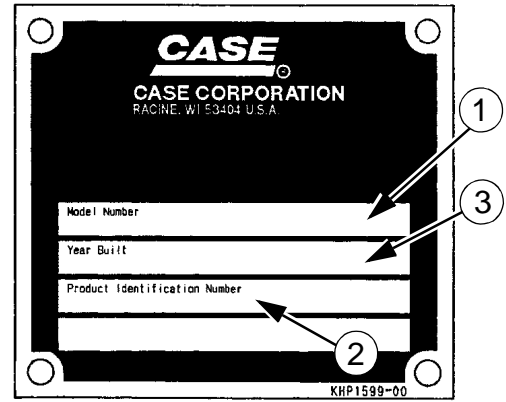
For all part orders, request for information or assistance, always specify the type and the serial number of the machine to your Case dealer.

Fill in the following lines with the required information: Type, serial number, year of manufacture of the machine and the serial numbers of the hydraulic and mechanical components.

## Machine



CP98N006



CS00M518

- (1) Type .....
- (2) Serial number .....
- (3) Year of manufacture .....

## Engine

Make and type .....

Serial number .....

## Serial numbers of the components

Hydraulic pump .....

Swing reduction gear .....

Travel reduction gears .....

Travel control valve .....

Attachment control valve .....

Swing control valve .....

## INGREDIENTS

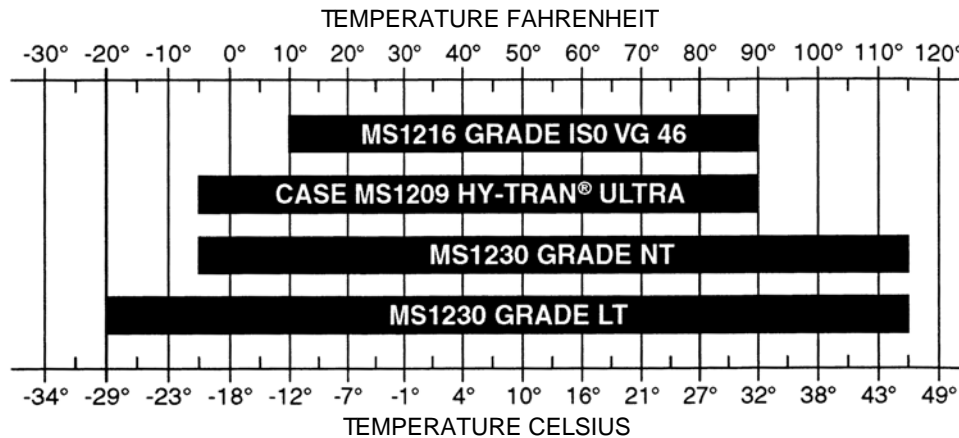
The ingredients must correspond to specific characteristics for every usage.



**WARNING:** You must respect the operating conditions for the different ingredients.

### Hydraulic fluid chart

**NOTE:** Use only hydraulic oils meeting Case specifications or equivalent AW (anti-wear) hydraulic oils.



CS02K507

**NOTE:** Case specification MS1209 Fluid is used in place of ISO VG 32 (-5° to + 65° F) and ISO VG 46 (+10° to + 90° F).

**NOTE:** Case specifications MS1230 Grade NT or Grade LT is used in place of ISO VG 32 (-5° to + 65°F), ISO VG 46 (+10° to + 90°F), ISO VG 100 (+30° to +115°F) and MS1210 TCH

### Transmission assembly oil

Extreme pressure oil used for transmission assemblies in housing.

Extreme pressure oil TYPE API GL5 GRADE 80W90 and ISO VG 150

### Greases

The type of grease to be used depends on the ambient temperature.

#### Hot and temperate climates

-4°F to + 140°F (-20°C to +60°C)

Extreme pressure EP NLGI grade 2 grease with molybdenum disulfide.

#### Cold climates

-40°F to +68°F (-40°C to +20°C)

Extreme pressure EP NLGI grade 0 grease.

## Engine Oil

THE CASE No. 1 engine oil is recommended for your engine. This oil ensures proper lubrication of your engine for all operating conditions.

If you are unable to procure the CASE No. 1 Multiperformance or Performance engine oil, use the corresponding oil from the API/CG/CF category.

**NOTE:** Do not put any Performance Additives or any other additives in the engine housing. The oil changing intervals are indicated in this manual based on tests carried out on CASE lubricants.

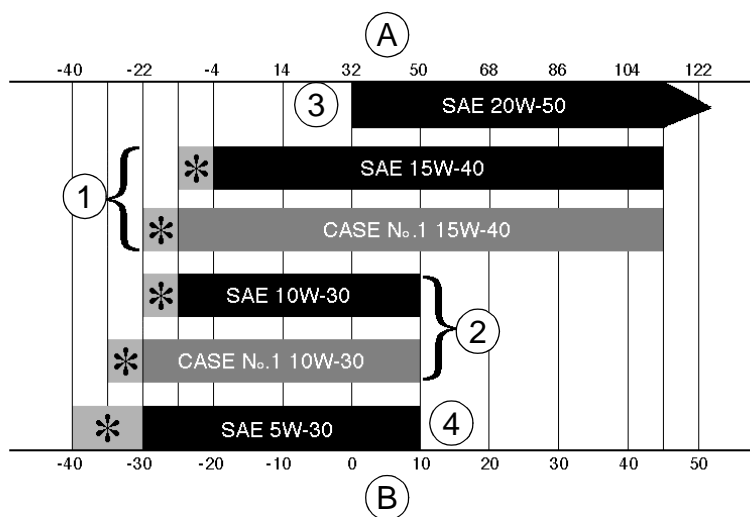


RD97F136



RD97F100

## Oil Viscosity / Oil Range



(A) FAHRENHEIT TEMPERATURE

(B) CELSIUS TEMPERATURE

(1) ALL-SEASONS

(2) WINTER

(3) TROPICAL

(4) ARCTIC

(\*) SHOWS THAT AN ENGINE OIL HEATER OR ENGINE COOLANT SOLUTION HEATER MUST BE USED.

CS98M561



## Fuel

The fuel to be used must comply with the D975 norm of the American Society for Testing and Materials (ASTM).

Use type No. 2 fuel, use of other fuels can cause a loss of engine power and excessive fuel consumption.

In cold weather, it is provisionally accepted that a mixture of No. 1 and No. 2 fuels be used. Contact your fuel supplier.

If the temperature drops below the freezing point of the fuel (point where paraffin appears), paraffin crystals in the fuel will cause loss of engine power or starting trouble.

**IMPORTANT:** *In cold weather, fill up the reservoir with fuel after each workday, in order to avoid the formation of condensation.*

## Storing fuel

Prolonged storage of fuel promotes the accumulation of foreign bodies or condensed moisture in the storage tank. Many engine failures are caused by the presence of water in fuel.

The storage tank must be placed outside and the fuel should be maintained at as low a temperature as possible. Drain the condensed moisture at regular intervals.

## Antifreeze/anticorrosive

Use the antifreeze in all seasons to protect the coolant system from corrosion and to avoid any risk of freezing.

In environments with a temperature greater than -33°F (-36°C), use a 50% mixture of antifreeze in an ethylene glycol base.

In environments with a temperature less than -33°F (-36°C), it is recommended that you use a 40% water and 60% antifreeze mixture.

## Environment

Before carrying out any maintenance operation on this machine and before throwing away the liquids or lubricants used, always think of the environment. Never throw oil or liquids on the ground and never put them in leaking containers.

Consult your local centre for ecological recycling for information on the appropriate method for disposing off these substances.

## Plastic and resin parts

When cleaning plastic parts, on the console, the instrument panel, the indicator and gauges etc., do not use petrol, paraffin, paint solvents, etc. Use only water, soap and a soft cloth.

The use of petrol, paraffin, paint solvents etc., causes discoloration, cracks or deformation of these parts.

## SPECIFICATIONS

### Engine

Make ..... CDC  
 Model ..... 6TAA - 8304

Type: Four stroke, water cooled with overhead valves, direct injection in-line cylinder (electronic control) with turbo-charger.

Number of cylinders ..... 6  
 Bore and stroke ..... 4.49 x 5.31 inches  
 Displacement ..... 505 cu in

#### Operating conditions

Idle ..... 900 rpm  
 Max speed ..... 2050 rpm  
 SAE net horse power ..... 259 HP  
 Max torque ..... 687 lb-ft at 1500 rpm

### Capacities

Engine oil capacity ..... 5.5 gallons  
 Engine cooling circuit ..... 11.6 gallons  
 Capacity of only the radiator ..... 5.5 gallons  
 Fuel reservoir ..... 153 gallons  
 Hydraulic fluid reservoir capacity ..... 46.2 gallons  
 Total hydraulic circuit capacity ..... 92.4 gallons  
 Capacity of only the oil-cooler ..... 4.3 gallons  
 Travel reduction gear housing capacity ..... 2.9 gallons  
 Swing drive housing capacity ..... 1.5 gallons  
 Idler pulley capacity ..... 8.25 oz  
 Upper roller capacity ..... 8.08 to 8.25 oz  
 Lower roller capacity ..... 9.24 oz

**NOTE:** *These capacities are given only for information purposes. To check the fluid levels, always use the oil gauge, visual gauges or the filler cap.*

### Electrical system

Type of system ..... 24 volts earth negative  
 Alternator amperage ..... 50 amperes

#### Battery

Number of batteries required ..... 2  
 Voltage of each battery ..... 12 volts  
 Capacity ..... 140 Ah  
 Reserve ..... 160 min  
 Cold startability at -1.4°F ..... 800 A  
 Load for load control ..... 400 A

#### Starter

Voltage ..... 24 volts  
 Power ..... 5 kW

Voltage regulator ..... built-in, without adjustment

## Hydraulic system

### Main hydraulic pump

Variable flow double pump, with axial pistons.

Maximum flow.....	2 x 75 gpm
Displacement.....	2 x 8.54 cu in

### Hydraulic pilot pump

Fixed flow pump

Max flow .....	8.05 gpm at 2030 rpm
Displacement.....	0.91 cu in

### Pressure setting

Pilot circuit relief .....	566 ± 14.5 psi
Main circuit relief (standard) .....	4975 ± 43 psi
Main circuit relief (Power-up).....	5410 ± 72 psi
Secondary relief (Boom raising, dipper and bucket).....	5685 ± 72 psi
Secondary relief (boom lower).....	3974 ± 72 psi
Secondary relief (swing).....	4264 ± 58 psi
Secondary relief (travel) .....	5511 ± 72 psi
Safety valve (boom and dipper).....	5685 ± 72 psi

## Cylinder

### Boom cylinder

Cylinder bore .....	6.7 in
Rod diameter .....	3.9 in
Stroke .....	58.8 in

### Dipper cylinder

Cylinder bore .....	8.1 in
Rod diameter .....	4.7 in
Stroke .....	68.8 in

### Bucket cylinder

Cylinder bore .....	7 in
Rod diameter .....	4.1 in
Stroke .....	47.6 in

### Cylinder leakage - attachment lowering (without load)

Boom cylinders (rods retraction).....	0.11 in/5 min
Dipper cylinder (rod extension).....	0.19 in/5 min
Dipper cylinder (rod extension).....	0.27 in/5 min
Total (at the end of the attachment).....	7.87 in/5 min

### Cylinder speed (in S mode)

Boom raised (bucket open and on the ground) .....	4.6 ± 0.5 seconds
Boom lowered (bucket open).....	3.7 ± 0.5 seconds
Dipper extended .....	3.7 ± 0.5 seconds
Dipper retracted.....	4.8 ± 0.5 seconds
Bucket open.....	3.0 ± 0.5 seconds
Bucket closed .....	5.4 ± 0.5 seconds

## Control valve

Five-element control valve for dipper, boom acceleration, swing, option and right travel.

Five-element control valve for dipper acceleration, bucket, boom, left travel and straight travel.

Load holding relief valve for boom and dipper.

## Swing

Fixed flow engine with axial pistons.

Automatic disk brakes.

Upperstructure frame swing speed.....	9.6 rpm
Displacement.....	10.98 cu in
Work flow.....	75 gpm
Reduction ratio.....	27.143
Brake torque.....	≥ 683.7 lb-ft
Minimum brake release pressure.....	421 psi
Permissible motor leak.....	4.2 gpm

## Travel

Two-speed motor with axial pistons.

Automatic disk brakes.

Low speed.....	1.9 mph
High speed.....	3.4 mph
Gradeability.....	70% (35°)
Tractive effort.....	61597 lbf
Displacement.....	17.73/10.38 cu in
Work flow.....	75 gpm
Reduction ratio.....	40.4675
Braking torque (reduction gear excluded).....	≥ 665 lb-ft
Number of sprocket turns (10 turns)	
Mode "S", low speed.....	27.8 ± 0.6 seconds
Mode "S", high speed.....	16.6 ± 0.6 seconds
Permissible deviation in travel over a distance of 65 ft 7 in	
Mode "H", full speed.....	39.36 in
Permissible motor leak.....	3.7 gpm

## Undercarriage

Monobloc frame with fabricated elements.

Lubricated rollers and idler wheels.

Grease track tension.

Ground pressure

with 27.5 in track pads.....	7.97 psi
with 31.4 in track pads.....	7.10 psi
Track tension.....	13.3 to 14.1 in

## Attachment

Digging force .....	55842 lbf
Break-out force	
8 ft 8 in dipper.....	-
10 ft 8 in dipper.....	-
13 ft 3 in dipper.....	34305 lbf

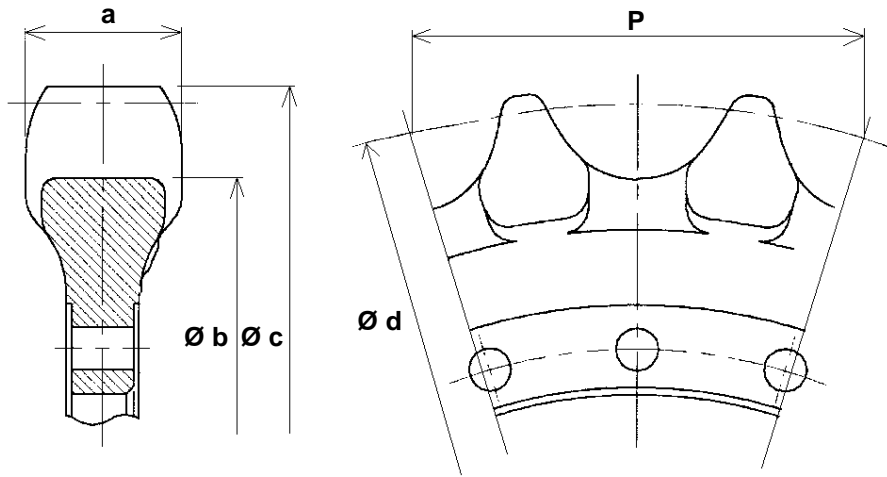
## Weight of components

Engine .....	1530 lbs
Hydraulic pump.....	287 lbs
Attachment control valve .....	423 lbs
Swing motor and reduction gear assembly .....	981 lbs
Travel motor and reduction gear assembly .....	1071 lbs
Boom cylinder.....	633 lbs
Dipper cylinder.....	1135 lbs
Bucket cylinder .....	617 lbs
Counterweight .....	16336 lbs
Cab .....	560 lbs
Turntable .....	1190 lbs
Complete upperstructure .....	34634 lbs
Hydraulic swivel.....	119 lbs
Complete chassis .....	28528 lbs
Machine without attachment.....	63383 lbs
Attachment .....	14881 lbs
Complete boom .....	8620 lbs
Complete dipper .....	3836 lbs
Radiator and oil-cooler assembly .....	406 lbs
Fuel reservoir.....	518 lbs
Hydraulic reservoir.....	430 lbs
Idler wheel .....	339 lbs
Upper roller.....	97 lbs
Lower roller.....	132 lbs
Tension damper.....	545 lbs
27.5 inch track .....	5328 lbs
31.4 inch track .....	5913 lbs

# DIMENSIONS AND WEAR LIMIT OF THE TRACK ASSEMBLY

## Sprocket

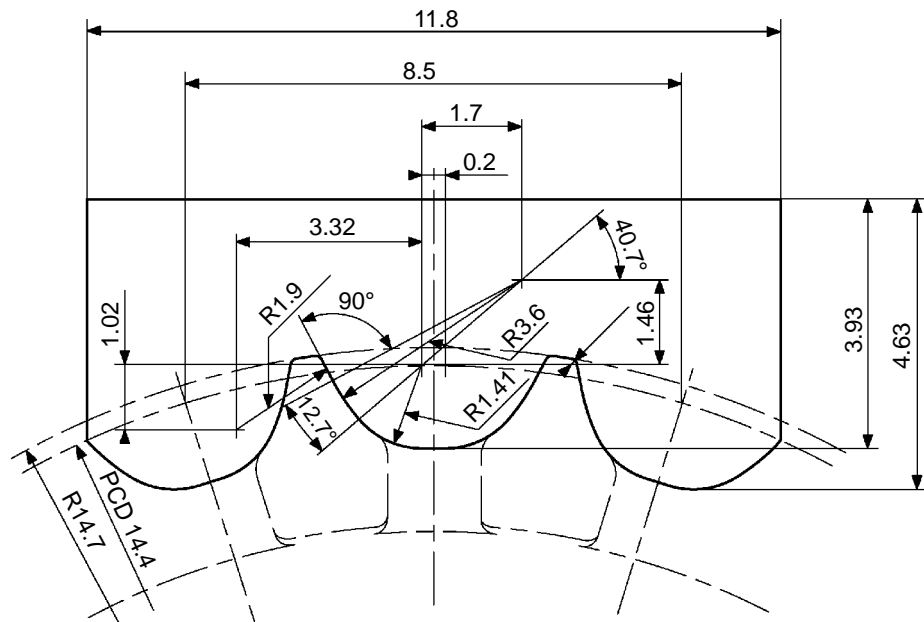
### Dimensions



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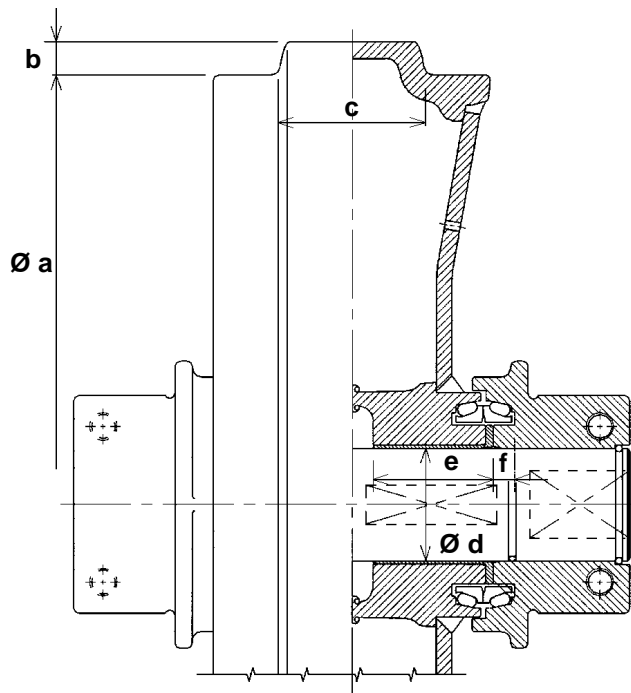
Mark		Dimension (in)
a	Standard	3.26
	Limit	2.87
Ø b	Standard	26
	Limit	25.5
Ø c	Standard	29.4
	Limit	29
Ø d	Standard	28.8
	Limit	---
P	Standard	8.5
	Limit	---

### Gauge



# Idler wheel

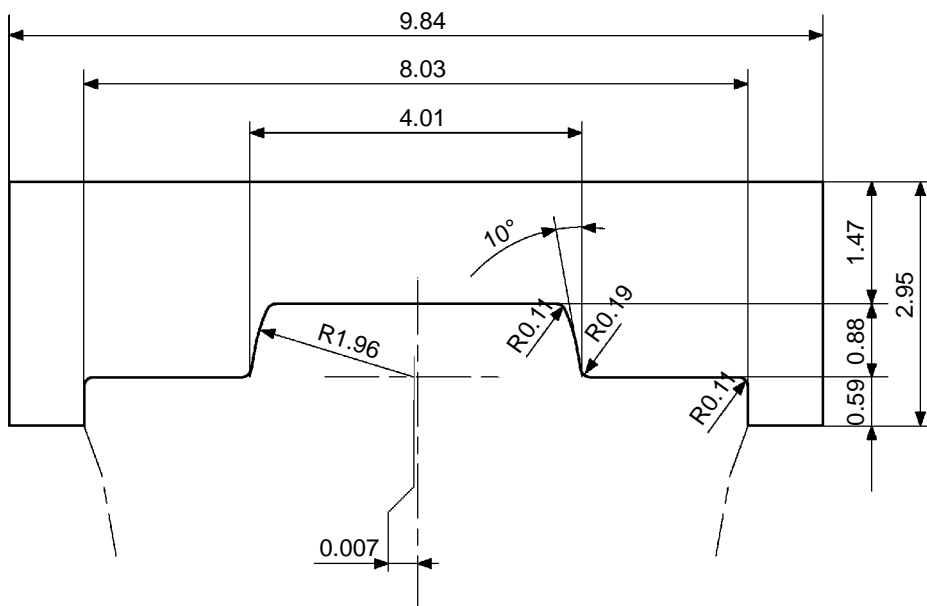
## Dimensions



Mark		Dimension (in)
$\varnothing a$	Standard	22.04
	Limit	21.6
$b$	Standard	0.88
	Limit	---
$c$	Standard	4.01
	Limit	3.62
$\varnothing d$ (shaft)	Standard	3.34
	Limit	3.30
$\varnothing d$ (bushing)	Standard	3.34
	Limit	3.38
$e$	Standard	3.22
	Limit	3.18
$f$	Standard	0.74
	Limit	0.73

CS01B514

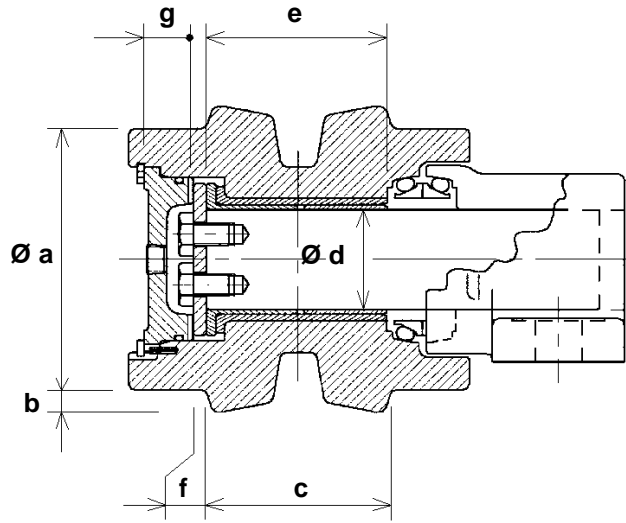
## Gauge



CI01N502

# Upper roller

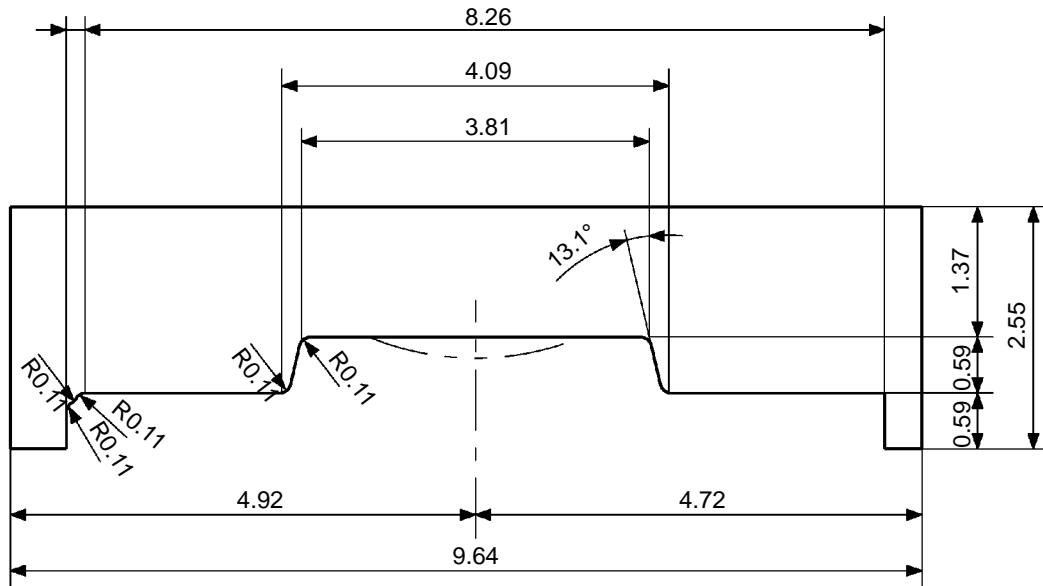
## Dimensions



CS01B516

Mark		Dimension (in)
Ø a	Standard	5.9
	Limit	5.5
b	Standard	0.59
	Limit	---
c	Standard	4.09
	Limit	---
Ø d (shaft)	Standard	2.55
	Limit	2.51
Ø d (bushing)	Standard	2.55
	Limit	2.59
e	Standard	2.71
	Limit	2.67
f	Standard	0.35
	Limit	0.33
g	Standard	1.18
	Limit	---

## Gauge

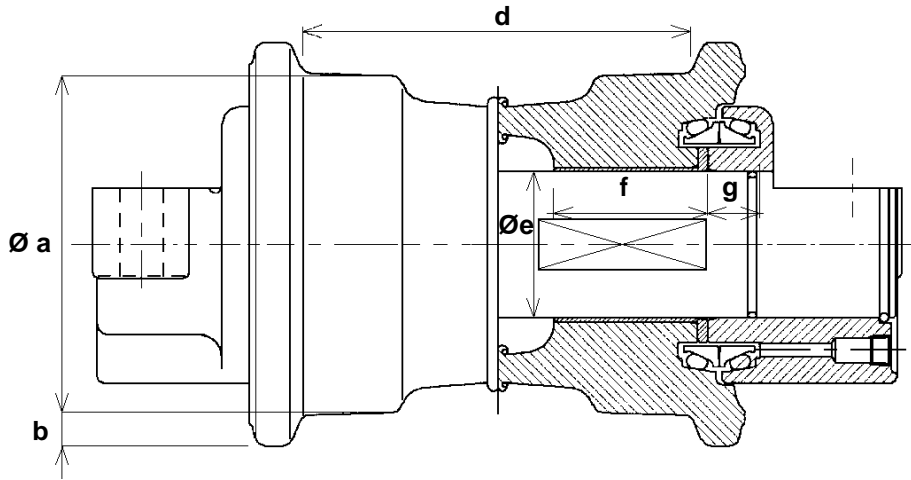


CI01N503



# Lower roller

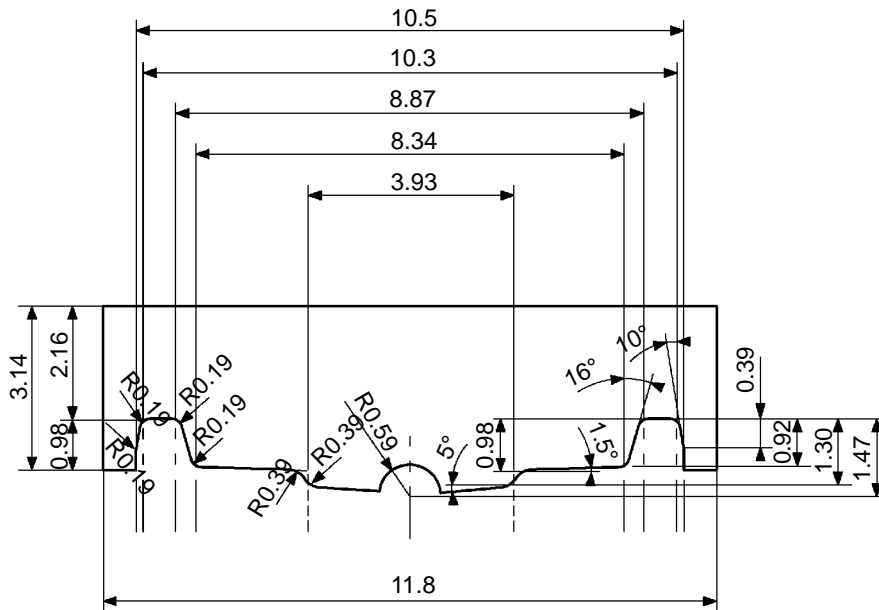
## Dimensions



CS01B518

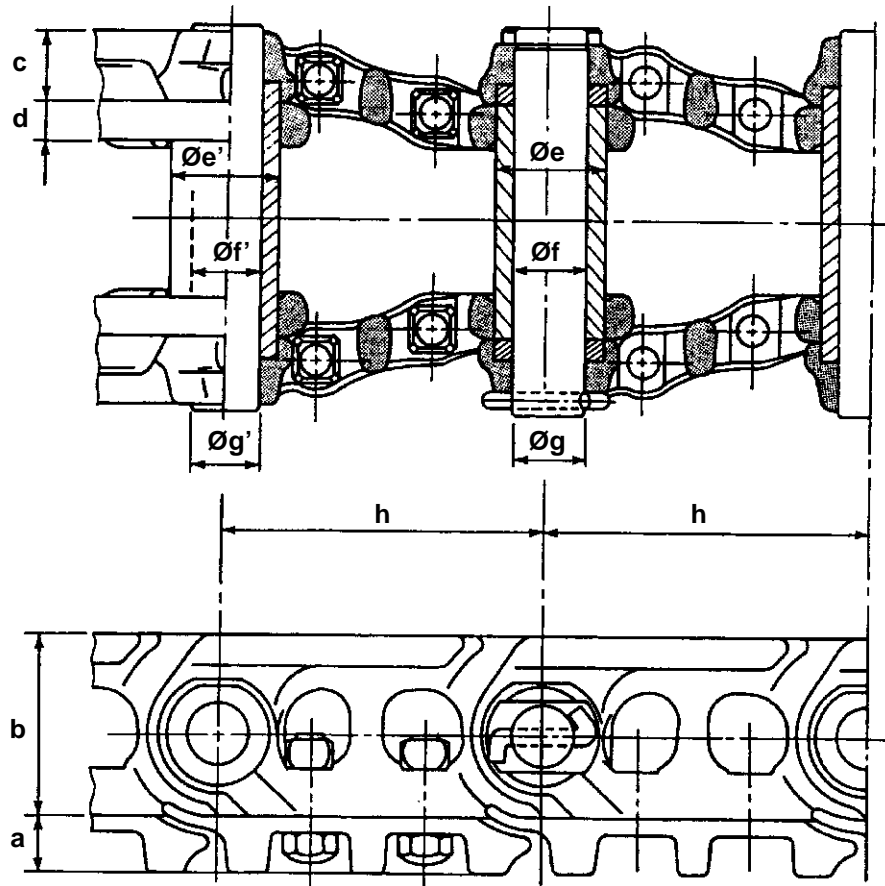
Mark		Dimension (in)	Mark		Dimension (in)
Ø a	Standard	7.08	Ø e (ring)	Standard	2.95
	Limit	6.69		Limit	2.99
b	Standard	0.98	f	Standard	3.22
	Limit	0.78		Limit	3.18
d	Standard	8.50	g	Standard	0.68
	Limit	8.81		Limit	0.66
Ø e (shaft)	Standard	2.95			
	Limit	2.91			

## Gauge



CI01N504

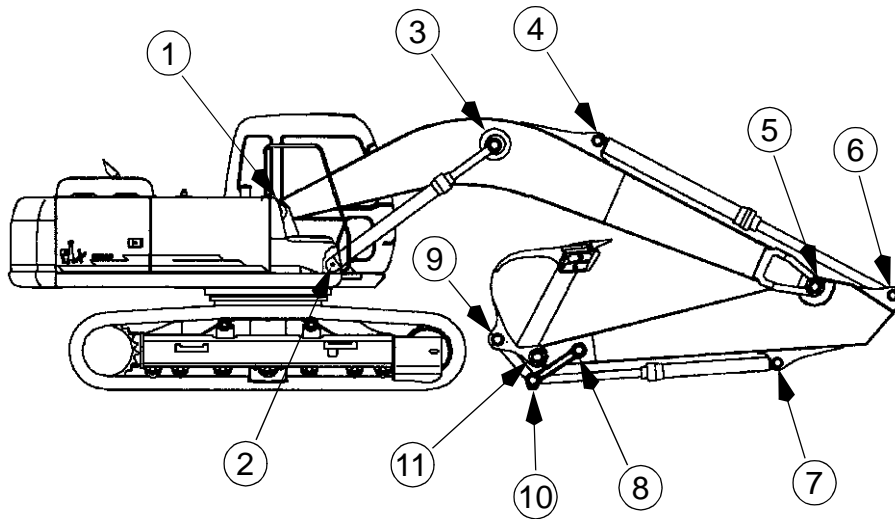
Track



CS01B520

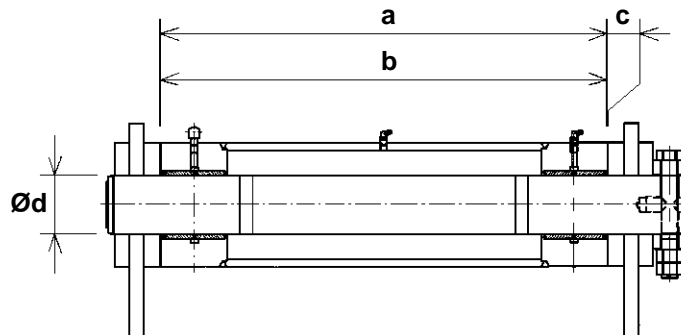
Mark		Dimension (in)	Mark		Dimension (in)
<b>a</b>	Standard	1.92	<b>Ø e (ring)</b>	Standard	2.80
	Limit	1.33		Limit	2.63
<b>b</b>	Standard	5.07	<b>Ø f (ring)</b>	Standard	1.88
	Limit	4.88		Limit	1.98
<b>c</b>	Standard	1.69	<b>Ø g (shaft)</b>	Standard	1.85
	Limit	1.61		Limit	1.77
<b>d</b>	Standard	1.11	<b>h</b>	Standard	8.49
	Limit	1.06		Limit	---
			<b>Ø e' (bushing)</b>	Standard	2.80
				Limit	2.63
			<b>Ø f' (bushing)</b>	Standard	1.90
				Limit	1.99
			<b>Ø g' (shaft)</b>	Standard	1.87
				Limit	1.77

# DIMENSIONS AND WEAR LIMITS OF ATTACHMENT LINKAGES



CS01B521

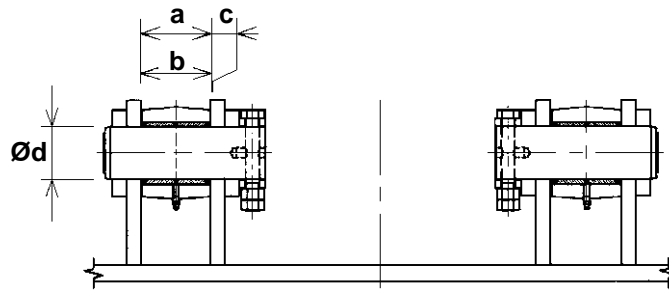
## 1. Boom foot/Frame



CS01B522

Mark		Dimension (in)
<b>a</b>	Standard	33.8
	Limit	34.1
<b>b</b>	Standard	33.8
	Limit	33.7
<b>c (a - b)</b>	Standard	0.05 to 0.15
	Limit	Shims
<b>Ø d (shaft)</b>	Standard	4.33
	Limit	4.29
<b>Ø d (bushing)</b>	Standard	4.33
	Limit	4.38

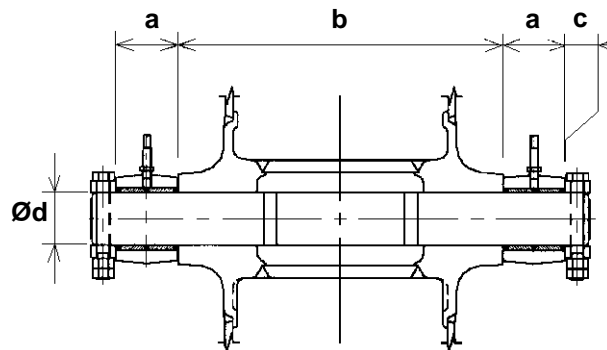
## 2. Boom cylinder foot/Frame



CS01B523

Mark		Dimension (in)
<b>a</b>	Standard	5.15
	Limit	5.39
<b>b</b>	Standard	5.11
	Limit	4.99
<b>c (play)</b>	Standard	0.039 to 0.13
	Limit	Shims
<b>Ø d (shaft)</b>	Standard	3.54
	Limit	3.50
<b>Ø d (bushing)</b>	Standard	3.54
	Limit	3.60

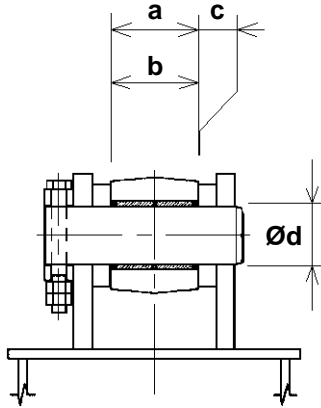
## 3. Boom cylinder head/Boom



CS01B524

Mark		Dimension (in)
<b>a</b>	Standard	4.84
	Limit	4.72
<b>b</b>	Standard	26.3
	Limit	26.1
<b>c (play)</b>	Standard	0.05 to 0.11
	Limit	Shims
<b>Ø d (shaft)</b>	Standard	4.33
	Limit	4.29
<b>Ø d (bushing)</b>	Standard	4.33
	Limit	4.38

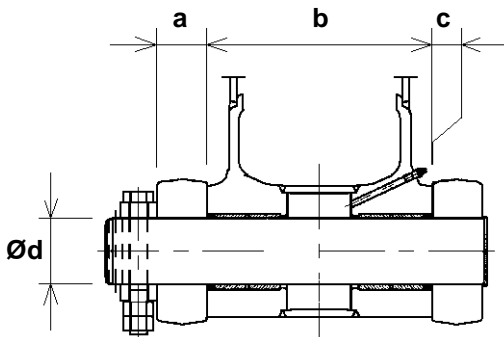
### 4. Dipper cylinder foot/Boom



CS01B525

Mark		Dimension (in)
<b>a</b>	Standard	5.74
	Limit	5.98
<b>b</b>	Standard	5.70
	Limit	5.62
<b>c (a - b)</b>	Standard	0.039 to 0.13
	Limit	Shims
<b>Ø d (shaft)</b>	Standard	3.93
	Limit	3.89
<b>Ø d (bushing)</b>	Standard	3.93
	Limit	3.99

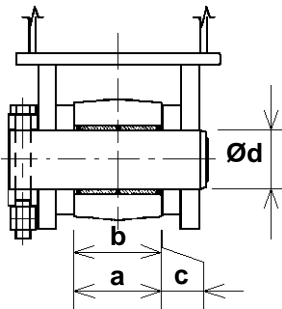
### 5. Boom/Dipper



CS01B526

Mark		Dimension (in)
<b>a</b>	Standard	3.50
	Limit	3.42
<b>b (boom)</b>	Standard	15.4
	Limit	15.5
<b>b (dipper)</b>	Standard	15.4
	Limit	15.3
<b>c (play)</b>	Standard	0.019 to 0.07
	Limit	Shims
<b>Ø d (shaft)</b>	Standard	4.52
	Limit	4.48
<b>Ø d (dipper)</b>	Standard	4.52
	Limit	4.58
<b>Ø d (boom)</b>	Standard	4.52
	Limit	4.58

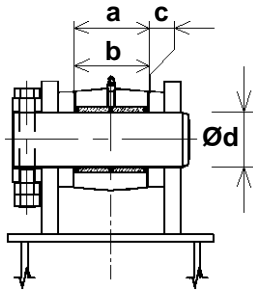
### 6. Dipper cylinder head/Dipper



CS01B527

Mark		Dimension (in)
<b>a</b>	Standard	5.74
	Limit	5.94
<b>b</b>	Standard	5.70
	Limit	5.62
<b>c (a - b)</b>	Standard	0.019 to 0.11
	Limit	Shims
<b>Ø d (shaft)</b>	Standard	3.93
	Limit	3.89
<b>Ø d (bushing)</b>	Standard	3.93
	Limit	3.99

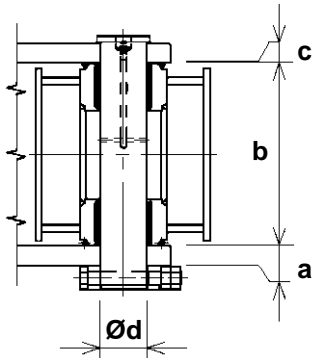
### 7. Bucket cylinder foot/Dipper



CS01B528

Mark		Dimension (in)
<b>a</b>	Standard	5.74
	Limit	5.98
<b>b</b>	Standard	5.70
	Limit	5.62
<b>c (a - b)</b>	Standard	0.039 to 0.13
	Limit	Shims
<b>Ø d (shaft)</b>	Standard	3.74
	Limit	3.70
<b>Ø d (bushing)</b>	Standard	3.74
	Limit	3.79

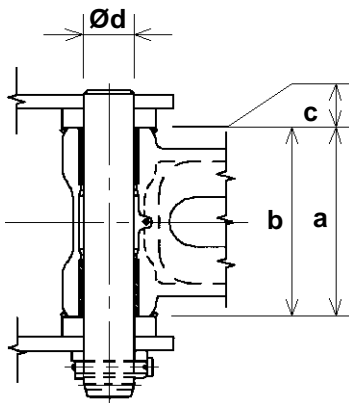
### 8. Connecting rod/Dipper



CS01B529

Mark		Dimension (in)
<b>a</b>	Standard	1.96
	Limit	1.85
<b>b</b>	Standard	14.7
	Limit	14.6
<b>c (play)</b>	Standard	0.039 to 0.078
	Limit	Shims
<b>Ø d (shaft)</b>	Standard	3.34
	Limit	3.30
<b>Ø d (bushing)</b>	Standard	3.34
	Limit	3.40

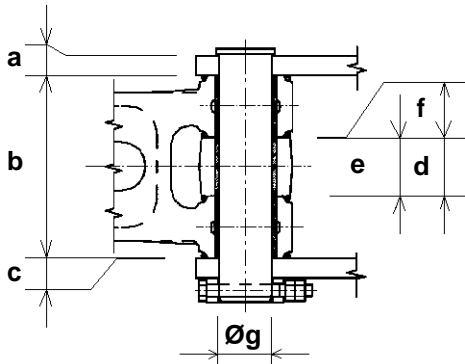
### 9. Compensator/Bucket



CS01B530

Mark		Dimension (in)
<b>a</b>	Standard	1.96
	Limit	1.85
<b>b</b>	Standard	14.7
	Limit	14.6
<b>c (play)</b>	Standard	0.039 to 0.078
	Limit	Shims
<b>Ø d (shaft)</b>	Standard	3.34
	Limit	3.30
<b>Ø d (bushing)</b>	Standard	3.34
	Limit	3.40

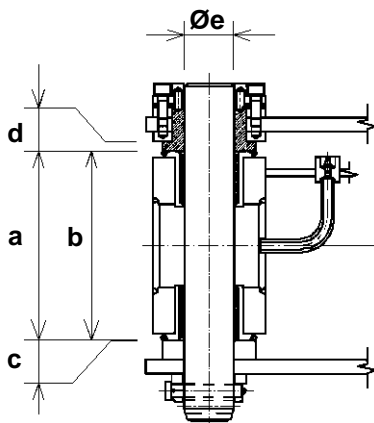
### 10. Connecting rod/Compensator/Bucket cylinder head



CS01B531

Mark		Dimension (in)
<b>a</b>	Standard	1.96
	Limit	1.88
<b>b</b>	Standard	14.8
	Limit	14.6
<b>c (play)</b>	Standard	0.05 to 0.09
	Limit	Shims
<b>d</b>	Standard	4.17
	Limit	4.29
<b>e</b>	Standard	4.13
	Limit	4.01
<b>f (d - e)</b>	Standard	0.05 to 0.09
	Limit	Shims
<b>Ø g (shaft)</b>	Standard	4.13
	Limit	4.09
<b>Ø g (compensator)</b>	Standard	4.13
	Limit	4.19
<b>Ø g (cylinder)</b>	Standard	4.13
	Limit	4.19

### 11. Dipper/Bucket



CS01B532

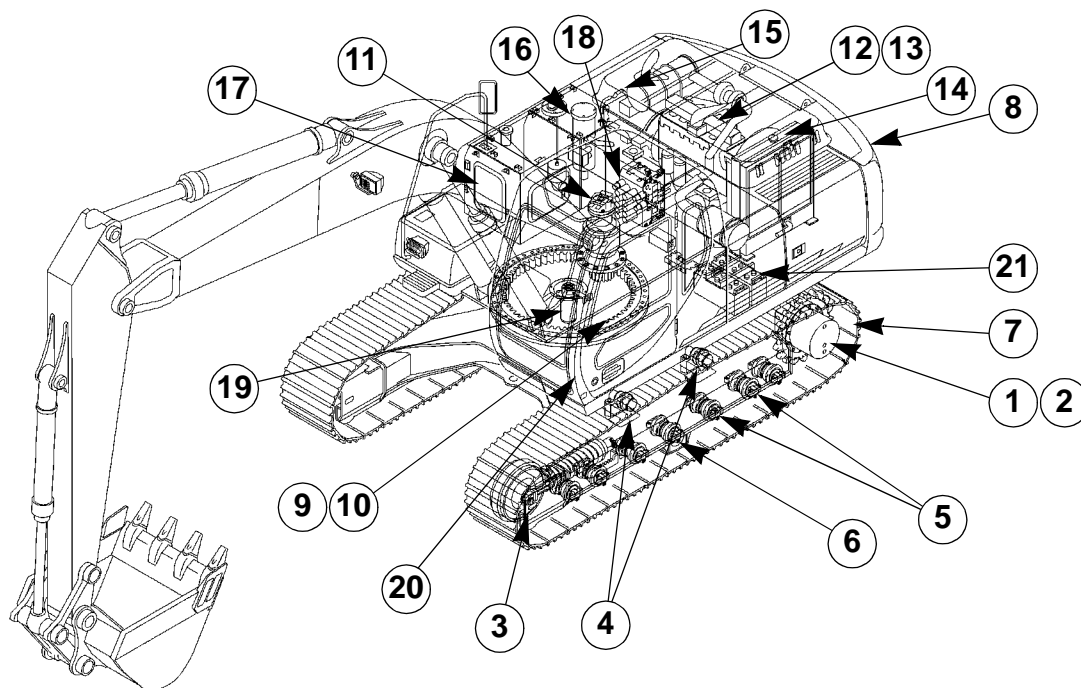
Mark		Dimension (in)
<b>a</b>	Standard	15.7
	Limit	15.9
<b>b</b>	Standard	15.7
	Limit	15.6
<b>c (a - b)</b>	Standard	0.039 to 0.15
	Limit	Shims
<b>d</b>	Standard	0.62
	Limit	0.39
<b>Ø e (shaft)</b>	Standard	3.54
	Limit	3.50
<b>Ø e (dipper)</b>	Standard	3.54
	Limit	3.60
<b>Ø e (bucket)</b>	Standard	3.54
	Limit	3.60

## SPECIAL TORQUE SETTINGS

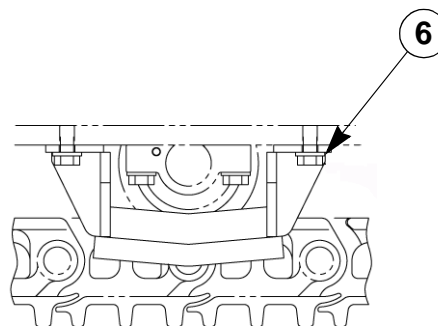
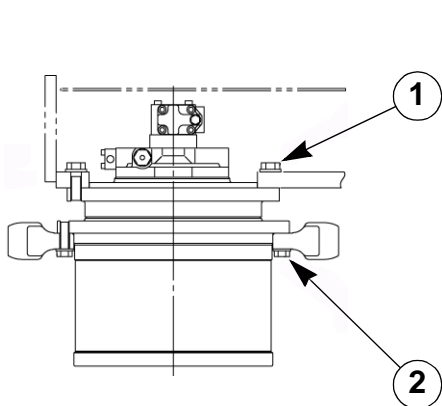
No.	Component	Screw (Ø)	Wrench (mm)	Torque setting (lb-ft)
1 *	Travel motor and reduction gear assembly	M24	36	664-774
2 *	Sprocket	M20	30	384-448
3 *	Idler wheel	M16	24	197-230
4 *	Upper roller	M20	30	384-448
5 *	Lower roller	M24	36	664-774
6	Chain guide	M24	36	664-774
7	Track pad	M24	36	912-1114
8	Counterweight	M33	50	1243-1446
9	Turntable (frame)	M24	36	664-774
10	Turntable (upperstructure)	M24	36	664-774
11 *	Swing motor and reduction gear assembly	M24	36	664-774
12 *	Engine	M20	30	213-248
13 *	Engine bracket	M12	19	80-94
14	Radiator	M16	24	108-130
15 *	Hydraulic pump	M10 M10 M10	17 Hex. Socket Hex. Socket	47-54 36 271-366
16 *	Hydraulic reservoir	M16	24	171-203
17 *	Fuel reservoir	M16	24	171-203
18 *	Control valve	M16	24	197-230
19 *	Hydraulic swivel	M16	24	197-230
20	Cab	M16	24	57-59
21	Battery	M10	17	15-21

**NOTE:** Use Loctite 262 or an equivalent on retaining screws of those components marked with an asterisk (\*).



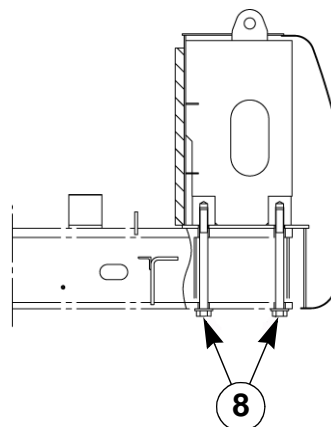
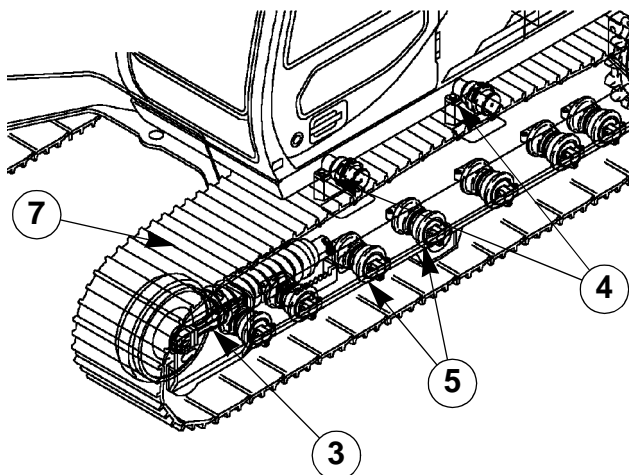


CS00E507



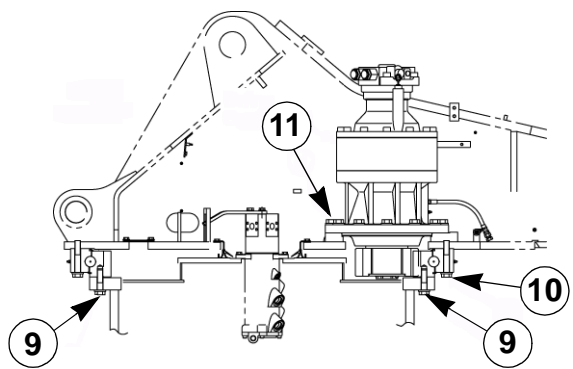
CS01N968

CS01N969

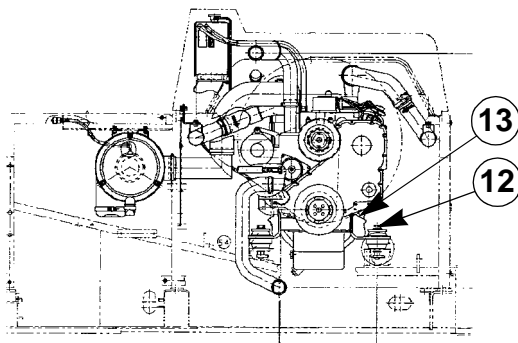


CS01N970

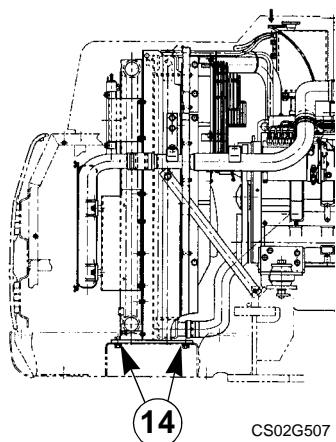
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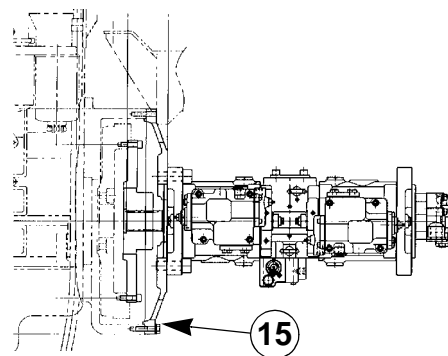
CS01N972



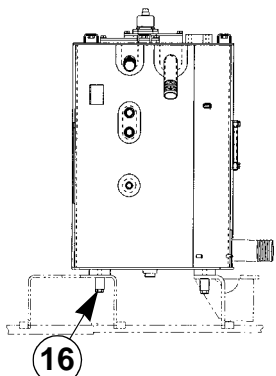
CS02G505



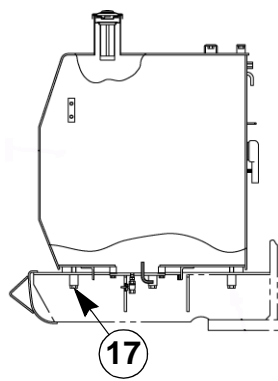
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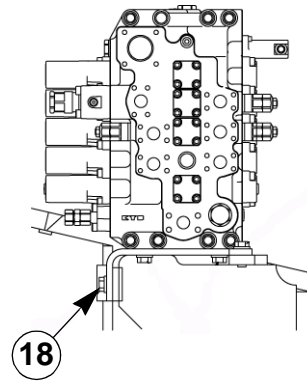
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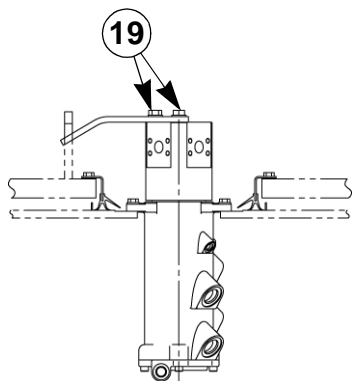
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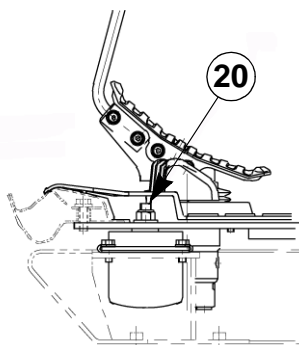
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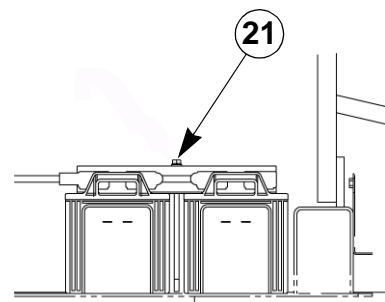
CS01N978



CS01N979

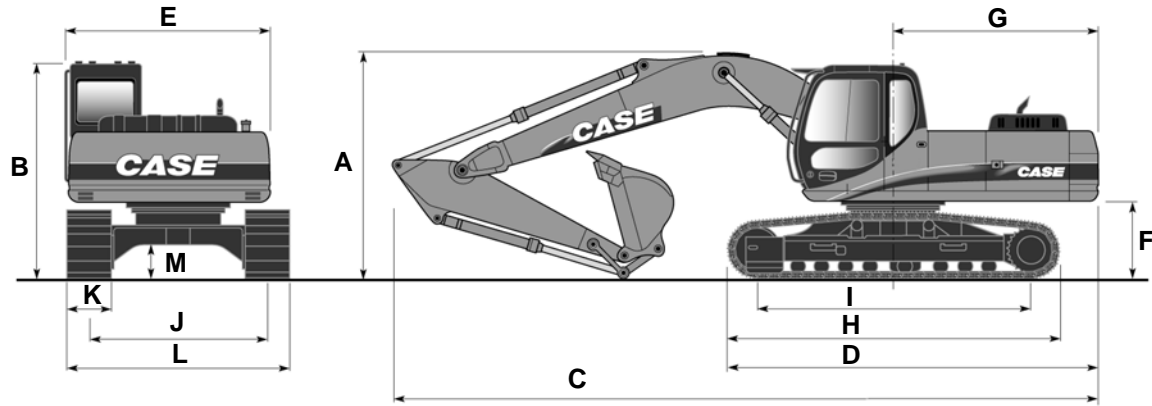


CS01N980



CS01N981

## MACHINE OVERALL DIMENSIONS



CS01B533A

	Dippers		
	8 ft 8 in	10 ft 8 in	13 ft 3 in
<b>A</b>	11 ft 5 in	15 ft 7 in	11 ft 6 in
<b>B (with vandal cover)</b>	11 ft 3 in	10 ft 3 in	10 ft 3 in
<b>C</b>	36 ft 5 in	36 ft 3 in	36 ft 5 in
<b>D</b>	19 ft 3 in	23 ft 7 in	23 ft 7 in
<b>E (with catwalks)</b>	11 ft 9 in	11 ft 9 in	11 ft 9 in
<b>F</b>	4 ft 0 in	4 ft 0 in	4 ft 0 in
<b>G</b>	11 ft 3 in	11 ft 3 in	11 ft 3 in
<b>H</b>	16 ft 3 in	16 ft 3 in	16 ft 3 in
<b>I</b>	13 ft 2 in	13 ft 2 in	13 ft 2 in
<b>J</b>	8 ft 6 in	8 ft 6 in	8 ft 6 in
<b>K (Standard shoe)</b>	31.5 in	31.5 in	31.5 in
<b>L (with 27.5 in track pads)</b>	10 ft 10 in	10 ft 10 in	10 ft 10 in
<b>L (with 31.4 in track pads)</b>	11 ft 2 in	11 ft 2 in	11 ft 2 in
<b>M</b>	1 ft 5 in	2 ft 9 in	2 ft 9 in

# Section

# 2000

## REMOVAL AND INSTALLATION OF THE ENGINE

## TABLE OF CONTENTS

SPECIFICATION .....	2
TORQUE SETTING .....	2
ENGINE .....	3
Removal and installation .....	3

### SPECIFICATION

Weight of engine.....	See Section 1002
-----------------------	------------------

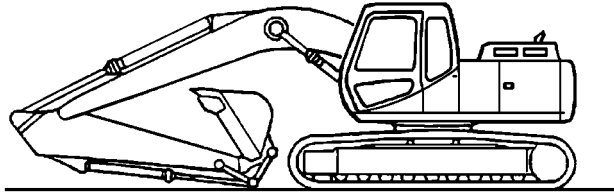
### TORQUE SETTING

Retaining screw of the engine .....	231 ± 18 lb-ft
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## ENGINE

### Removal and installation

#### STEP 1



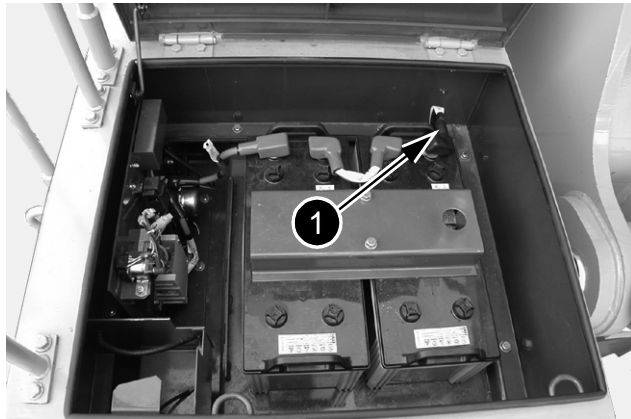
JS00163A

Park the machine on hard, flat ground. Lower the attachment to the ground.

#### STEP 2

Release pressure in the hydraulic system and in the hydraulic reservoir (see Section 8000).

#### STEP 3



CD01C162

Disconnect the battery ground (-) cable (1) from the battery.

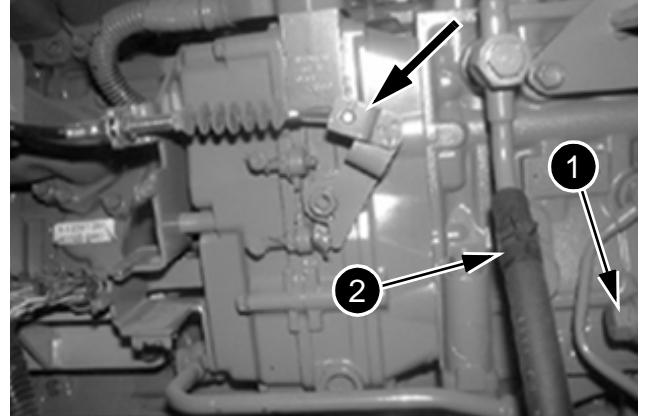
#### STEP 4

Refer to Section 8003 and remove the hydraulic pump.

#### STEP 5

Refer to Section 2001 and remove the radiator and oil-cooler assembly.

#### STEP 6

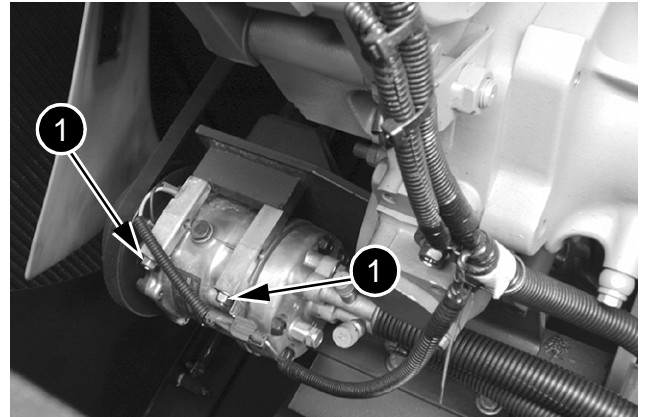


CD02C151

Remove the engine shutdown control (arrow).

Disconnect the fuel supply pipe (1) and the fuel return pipe (2) and plug them.

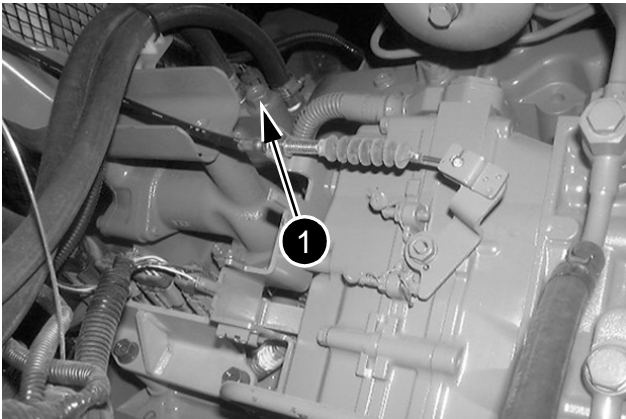
#### STEP 7



CD01D131

Remove the screws (1) from the compressor and put it away from the engine.

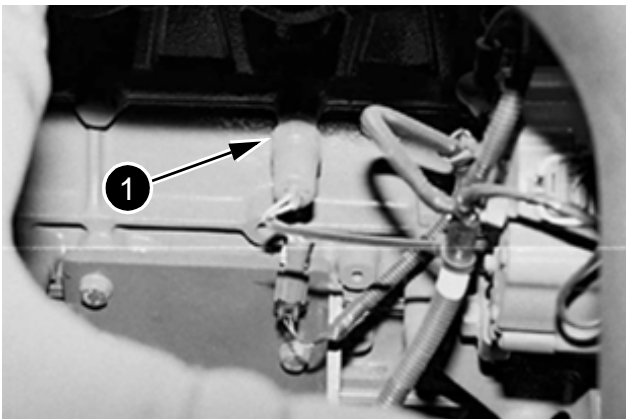
**STEP 8**



CD02C152

Label and disconnect the electrical connections from the water temperature sensor (1).

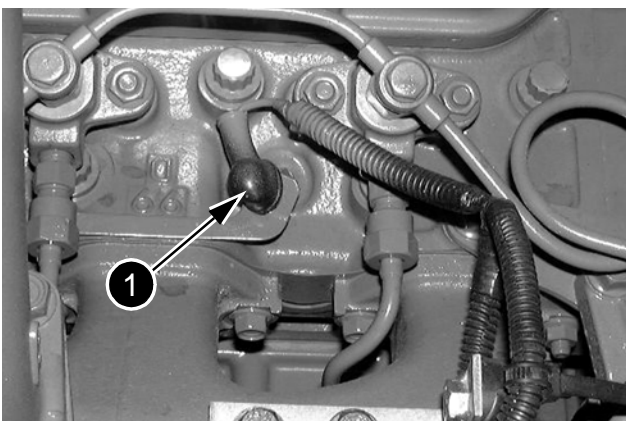
**STEP 9**



CD02C153

Label and disconnect the electrical connections from the oil pressure sensor (1).

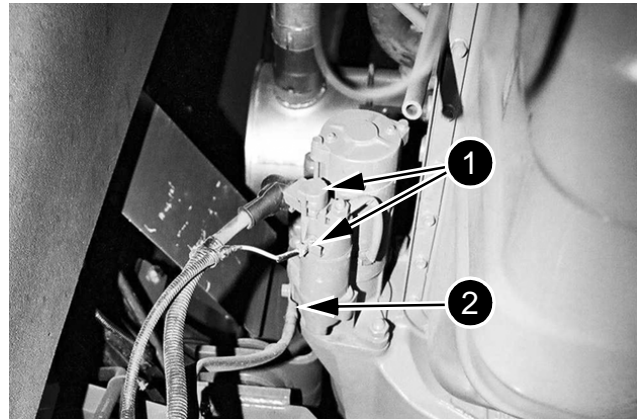
**STEP 10**



CD00J030

Label and disconnect the electrical supply (1) to the pre-heating plugs.

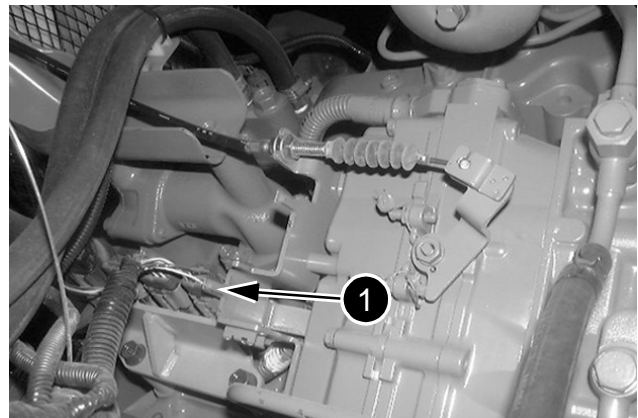
**STEP 11**



CD02C154

Label and disconnect the electrical connections to the starter motor (1). Remove the earth cable (2) at the engine end.

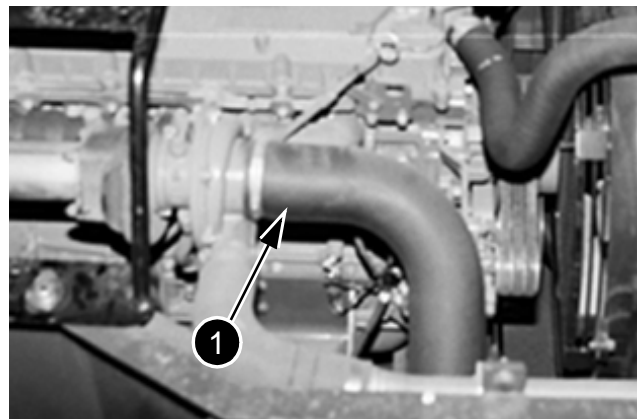
**STEP 12**



CD02C152

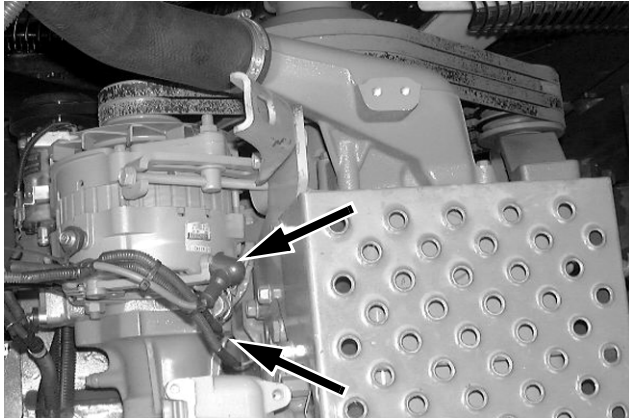
Label and disconnect the electrical connections of the electronic regulation (1) from the engine.

**STEP 13**



CD02C155

Remove the hose connecting the turbo-charger to the air filter (1).

**STEP 14**

Label and disconnect the electrical connections to the alternator (arrows).

**STEP 15**

Remove all the clips, etc, which fasten the electrical harnesses to the engine and move the harnesses out of the way.

**STEP 16**

Install a suitable lifting device on the engine lifting rings (for the weight of the engine, see Section 1002).

**STEP 17**

Remove the engine retaining hardware.

**NOTE:** *When installing, make a visual inspection of the condition of the rubber flexible mountings and change them if necessary. Respect the colours, light blue on the fan side, light green on the hand-wheel side. Tighten the engine retaining screws to a torque of  $231 \pm 18$  lb-ft.*

**STEP 18**

When there is nothing interfering with the removal of the engine, raise the engine carefully and install it on a suitable repair bench.

**NOTE:** *When installing the engine in the machine, proceed in the reverse order from removal.*

Before operating the machine, carry out the following operations:

- Bleed and prime the fuel system (see Operator's Manual).
- Fill and bleed the engine cooling system (see Operator's Manual).
- Check the hydraulic, fuel and cooling systems for leaks.
- Check the oil level in the hydraulic reservoir. Top up if necessary.



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