

CRAWLER EXCAVATOR CX160B-CX180B SERVICE MANUAL

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* *Consult the Engine Service Manual*

NOTE: CNH 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.

Section 1001

**SAFETY, GENERAL INFORMATION
AND TORQUE SPECIFICATIONS**

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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 that follows, as there is a risk of serious injury.*

GENERAL INFORMATION

Cleanning

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.

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



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.

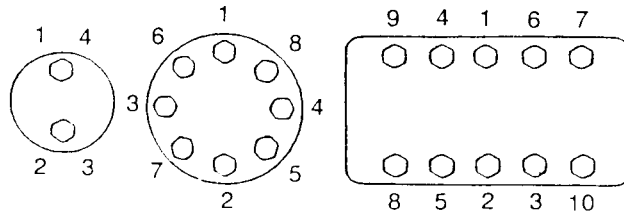


WARNING: When the battery electrolyte is frozen, the battery can explode if (1), you try to charge the battery, or (2), you try to jump start and run the engine. To prevent the battery electrolyte from freezing, try to keep the battery at full charge. If you do not follow these instructions, you or others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

STANDARD TORQUE DATA FOR CAP SCREWS AND NUTS

Tightening of cap screws, nuts

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



JS00481A

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 (Size)			M6	M8	M10	M12	M14	M16	M18	M20
Cap Screw	Spanner	[mm]	10	13	17	19	22	24	27	30
		[in.]	0.39	0.51	0.67	0.75	0.87	0.95	1.06	1.18
	Tightening torque	[Nm]	6.9	19.6	39.2	58.8	98.1	156.9	196.1	294.2
		[lb-ft]	5.1	14.5	28.9	43.4	72.3	115.7	144.6	217
Socket Head Cap Screw	Spanner	[mm]	5	6	8	10	12	14	14	17
		[in.]	0.20	0.24	0.32	0.39	0.47	0.55	0.55	0.67
	Tightening torque	[Nm]	8.8	21.6	42.1	78.5	117.7	176.5	245.2	343.2
		[lb-ft]	6.5	15.9	31.1	57.9	86.9	130.2	181	253.2

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.*

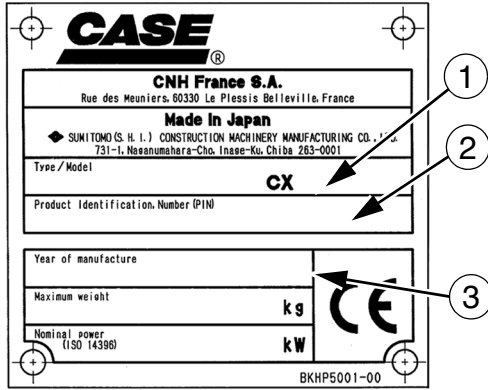
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TYPE, SERIAL NUMBER AND YEAR OF MANUFACTURE OF THE MACHINE

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



CT04A171A

(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

Control valve

FLUIDS AND LUBRICANTS

Lubricants must have the correct properties for each application.

 **WARNING:** The conditions of use for individual fluids and lubricants must be respected.

Hydraulic fluid

CASE/AKCELA hydraulic fluid is specially designed for high pressure applications and for the CASE hydraulic system. The type of fluid to be used depends on the ambient temperature.

Temperate climates: -20°C to +40°C (-4° to 104° F)

CASE/AKCELA: HYDRAULIC EXCAVATOR FLUID (MS 1230. ISO VG 46. DIN 51524 PART 2 HV)

Hot climates: 0°C to +50°C (32° to 122° F)

CASE/AKCELA: AW HYDRAULIC FLUID 68 HV (MS 1216. ISO VG 68. DIN 51524 PART 3 CATEGORY HVLP)

Cold climates: -25°C to +20°C (-13° to 68° F)

CASE/AKCELA: AW HYDRAULIC FLUID 32 (MS 1216. ISO VG 32. DIN 51524 PART 2)

Biodegradable fluid: -30°C to +40°C (-22° to 104° F)

This yellow-colored fluid is miscible with standard fluid. If used to change standard fluid, it is advised to drain the circuit completely before refilling with this fluid.

CASE/AKCELA: HYDRAULIC EXCAVATOR FLUID BIO (MS 1230. ISO VG 46. DIN 51524 PART 2 HV)

Transmission component oil

Extreme pressure oil used for enclosed transmission components.

CASE/AKCELA: GEAR 135H EP (SAE 80W-90. API GL 5. MIL-L-2105 D. MS 1316. ZF TE-ML 05A)

Grease

CASE/AKCELA: MOLY GREASE 251H EP-M (251H EP-M. NLGI 2)

"Extreme Pressure" multipurpose grease with lithium soap and molybdenum disulphide.

CASE/AKCELA: MULTIPURPOSE GREASE 251H EP (251H EP. NLGI 2)

"Extreme Pressure" multipurpose grease with lithium soap and calcium.

CASE/AKCELA: PREMIUM GREASE EP2 (NLGI 2)

"Extreme Pressure" multipurpose grease with lithium soap.

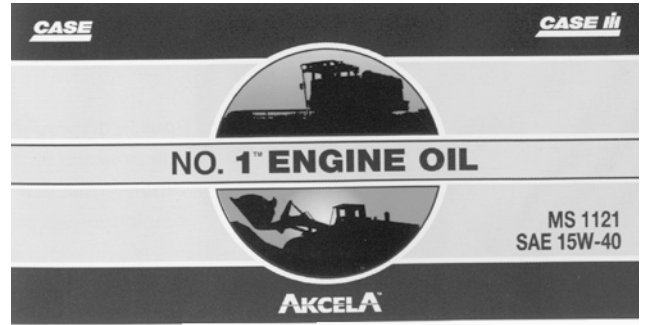
Hydraulic breakers

CASE/AKCELA: MULTIPURPOSE GREASE 251H EP (NLGI 2).

Engine Oil

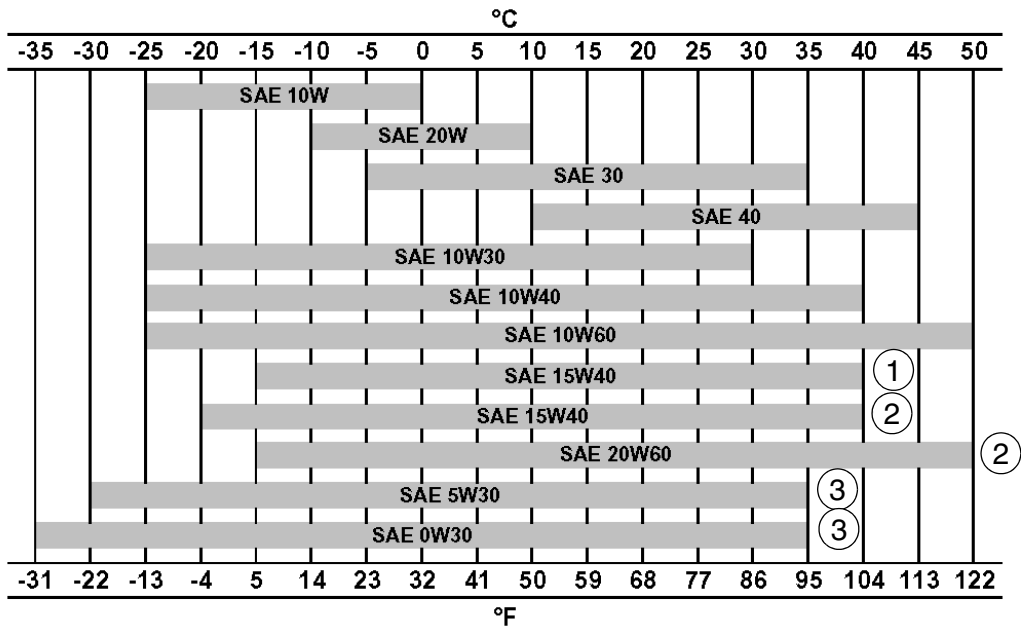
THE CASE/AKCELA No. 1 engine oil is recommended for your engine. This oil ensures proper lubrication of your engine for all operating conditions.

If the CASE/AKCELA Multigrade "No. 1 ENGINE OIL" cannot be obtained, use the oil corresponding to one of the following categories: ACEA E7. API CI-4.



CP02N001

Oil viscosity / Oil range



CT02M001

- 1) With mineral base
- 2) With semi-synthetic base
- 3) With synthetic base

Engine fuel, maintenance of fuel filters and fuel storage

In order to meet the emission control regulation of 3rd-stage, the engine components have been made precisely and they are to be used under high-pressure conditions.

Therefore, the specified fuel must be used for the engine.

As a matter of course, not only the guarantee will not be given for the use of a fuel other than the specified but also it may invite a serious breakdown.

In addition, since suitable specifications for the fuel filter elements have been established for this engine, use of the genuine filter is essential.

The following describes the specifications and the requirements of the fuel to be applied, and maintenance of the fuel and the fuel elements.

Fuel to be applied

Selection of fuel

Following conditions must be met for the diesel engines, that is the one;

- 1 In which no dust even fine one is mixed,
- 2 With proper viscosity,
- 3 With high cetane rating,
- 4 With good flow properties in lower temperature,
- 5 With not much sulfur content, and
- 6 With less content of carbon residue

Applicable standards for diesel fuel

Applicable Standard	Recommendation
JIS (Japanese Industrial Standard)	NO.2
DIN (Deutsche Industrie Normen)	DIN 51601
SAE (Society of Automotive Engineers)	
Based on SAE-J-313C	NO. 2-D
BS (British Standard) Based on BS/2869-197	Class A-1
EN590	

If a standard applied to the fuel for the diesel engine is stipulated in your country, check the standard for details.

Requirements for diesel fuel

Although conditions required for the diesel fuel are illustrated above, there are other requirements exerting a big influence on its service durability and service life.

Be sure to observe the following requirements for selecting fuel.

Sulfur content.....	2500 ppm or less
HFRR*.....	460 mm or less
Water content.....	0.05 wt% or less

* HFRR (High-Frequency Reciprocating Rig.): An index showing lubricating properties of the fuel.

Sulfur content reacts to moisture to change into sulfuric acid after combustion.

Use of a fuel containing much sulfur content allows it to accelerate internal corrosion and wear.

In addition, much sulfur content quickens deterioration of engine oil allowing its cleaning dispersive property to be worse which results in acceleration of wear of sliding portions.

HFRR is an index that indicates lubricating property of a fuel.

Large value of the index means poor lubrication so that seizure of the machine components may result if such a fuel is used.

Since a fuel with high HFRR value also has lower viscosity, it can easily be leaked out.

If the fuel is mixed with the engine oil, the oil is diluted to deteriorate its lubricating property resulting in acceleration of wear.

Water content allows inside of the fuel tank to rust which in turn blocking the fuel line and the fuel filter.

IMPORTANT : *In cold weather, fill the fuel tank at the end of the day's work, in order to prevent the formation of condensation.*

This may also cause wear and seizure of the machine components.

If atmospheric temperature goes below the freezing point, moisture content in the fuel forms fine particle of ice allowing the fuel line to be clogged.

IMPORTANT : *Obtain table of analysis for the fuel you are using from the fuel supplier to confirm that it meets the criteria described above.*

IMPORTANT : *If a fuel which does not meet the specifications and the requirements for the diesel engine, function and performance of the engine will not be delivered. In addition, never use such a fuel because a breakdown of the engine or an accident may be invited.*

Guarantee will not be given to a breakdown caused by the use of a improper fuel.

Some fuels are used with engine oil or additives mixed together with diesel engine fuel.

In this case, do not use these fuels because damage to the engine may result as the fuel has been contaminated.

It is natural that the emission control regulation of 3rd-stage will not be cleared in case where a fuel that does not meet the specifications and the requirements is used.

Use the specified fuel for compliance of the exhaust gas control.

IMPORTANT : *If you use diesel fuel which contains much sulfur content more than 2500 ppm, be sure to follow the items below for the engine oil selection and maintenance of engine parts. Guarantee will not be given to breakdowns caused by not to follow these items.*

1 Selection of engine oil

Use API grade CF-4 or JASO grade DH-1.

2 Exchange the engine oil and engine oil filter element by the periodical interval reported on the Operator's Manual.

3 Inspect and exchange the EGR (*)parts and fuel injector parts of engine every 3000 hour of use.

* EGR: Exhaust Gas Recirculation

Maintenance of fuel filters

Be sure to use the genuine fuel filters.

The fuel injection system is precisely constructed and the genuine filter employs finer mesh than conventional filters to improve protection of machine equipment.

If a filter with coarse mesh is used, foreign object passing through the filter enters into the engine so that machine equipment can wear out in a short period of time.

IMPORTANT : *If a fuel filter other than the genuine filter is used, guaranty will not be applied to a fault caused by the use of a wrong filter.*

Two kinds of fuel filter, the pre-filter and the main filter, are mounted on the machine.

Be sure to use the genuine fuel filters and replace them at the periodic intervals reported on the operator's Manual.

IMPORTANT : *Since the pre-filter also has a function of water separation, discharge water and sediment when the float reaches lower part of the filter elements. CHECK EVERY DAY before to start the engine.*

Time to replace filters may be advanced according to properties of the fuel being supplied.

- Therefore, take measures to prevent dust or water from being entered in the fuel tank when supplying fuel.
- When supplying fuel directly from a fuel drum can, leave the drum as it stands for a long period of time to supply clean fuel standing above a precipitate.
- If it is hard to leave the drum for a long period of time, install a fuel strainer and a water separator before the fuel tank of the machine to supply clean fuel.

Water drain cock is provided on the bottom side of the fuel tank.

- Drain water before starting the engine every morning.
- In addition, remove the cover under the tank once a year to clean up inside of the tank.

Fuel storage

Long storage can lead to the accumulation of impurities and condensation in the fuel. Engine trouble can often be traced to the presence of water in the fuel.

The storage tank must be placed outside and the temperature of the fuel should be kept as low as possible. Drain off water and impurities regularly.

Anti-freeze/Anti-corrosion

Use anti-freeze in all seasons to protect the cooling system from corrosion and all risk of freezing.

CASE/AKCELA: PREMIUM ANTI-FREEZE (MS 1710)

For areas where the temperature goes down to -38°C (-36.4°F), mix 50/50 with water.

IMPORTANT : *Do not mix products of a different origin or brand. The same product must be used when topping up the system.*

Environment

Before carrying out any maintenance operation on this machine and before disposing of used fluids or lubricants, always think of the environment. Never throw oil or fluid on the ground and never place it in leaking receptacles.

Contact your local ecological recycling centre or your CASE Dealer to obtain information on the correct method of disposing of these lubricants.

Plastic and resin parts

When cleaning plastic parts, the console, the instrument panel, the indicators etc... avoid using petrol, kerosene, paint solvents etc... Use only water, soap and a soft cloth.

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

SPECIFICATIONS

Main data

Model name CX160B or CX180B Hydraulic Excavator
 Operating weight
 CX160B 17000 kg (37479 lbs)
 CX180B 17900 kg (39463 lbs)
 Engine output 89.2 kW / 2200 rpm

Performance

Swing speed 11.5 Tr/min.
 Travel speed
 CX160B Low Speed 2.8 km/h (1.74 mph)
 CX180B Low Speed 2.3 km/h (1.43 mph)
 CX160B High Speed 5.4 km/h (3.35 mph)
 CX180B High Speed 4.0 km/h (2.48 mph)
 Maximum drawbar pull
 CX160B 161 kN (36194.24 lbf)
 CX180B 190 kN (42713.7 lbf)
 Grade ability 70% (35°)
 Ground pressure
 CX160B 47 kPa (500 mm (19.68 in) grouser shoe)
 CX160B/CX180B 40 kPa (600 mm (23.62 in) grouser shoe)
 CX160B/CX180B 35 kPa (700 mm (27.56 in) grouser shoe)
 CX180B 31 kPa (800 mm (31.50 in) grouser shoe)

Complete machine dimensions

CX160B (Standard boom)	Arm (dipper)		
	2620 mm (103.15 in)	2220 mm (87.40 in)	3050 mm (120.08 in)
Lenght (without attachment)	4410 mm (173.62 in)	4410 mm (173.62 in)	4410 mm (173.62 in)
Lenght (with attachment)	8440 mm (332.22 in)	8490 mm (334.25 in)	8520 mm (335.43 in)
Height (with attachment)	2960 mm (116.53 in)	3000 mm (118.11 in)	3130 mm (123.23 in)

CX160B (Articulated boom)	Arm (dipper)		
	2620 mm (103.15 in)	2220 mm (87.40 in)	3050 mm (120.08 in)
Lenght (without attachment)	4410 mm (173.62 in)	4410 mm (173.62 in)	4410 mm (173.62 in)
Lenght (with attachment)	8330 mm (327.95 in)	8365 mm (329.33 in)	8365 mm (329.33 in)
Height (with attachment)	2950 mm (116.14 in)	2950 mm (116.14 in)	3025 mm (119.09 in)

CX180B	Arm (dipper)		
	2620 mm (103.15 in)	2220 mm (87.40 in)	3050 mm (120.08 in)
Lenght (without attachment)	4500 mm (177.17 in)	4500 mm (177.17 in)	4500 mm (177.17 in)
Lenght (with attachment)	8440 mm (332.22 in)	8490 mm (334.25 in)	8520 mm (335.43 in)
Height (with attachment)	2960 mm (116.53 in)	3000 mm (118.11 in)	3120 mm (122.83 in)

Main body dimensions

Main body width	See machine overall dimensions
Upper side swing body width.....	2540 mm (100 in)
Cab width	1000 mm (39.37 in)
Main body height	
CX160B.....	2950 mm (116.14 in)
CX180B.....	2960 mm (116.53 in)
Tail swing radius	2450 mm (96.46 in)
Swing body tail distance.....	2410 mm (94.88 in)
Swing body rear section bottom height	
CX160B.....	1020 mm (40.16 in)
CX180B.....	1040 mm (40.94 in)
Distance between tumblers	
CX160B.....	3190 mm (125.59 in)
CX180B.....	3370 mm (132.68 in)
Overall track length	
CX160B.....	3990 mm (157.09 in)
CX180B.....	4170 mm (164.17 in)
Width of track shoe	
CX160B.....	600 mm (23.62 in) (Optional: 500 mm (19.68 in), 700 mm (27.56 in)
CX180B.....	600 mm (23.62 in) (Optional: 700 mm (27.56 in), 800 mm (31.50 in)
Minimum ground clearance (To bottom of lower frame)	
CX160B.....	440 mm (17.32 in)
CX180B.....	490 mm (19.29 in)

Engine

Name.....	ISUZU, 4JJ1X
Type:	4-cycle, water-cooled, overhead camshaft, vertical in-line, direct injection type (electronic control), with turbocharger.
No. of cylinders - bore x stroke.....	4 - Ø95.4 mm x 104.9 mm (3.76 x 4.13 in)
Displacement.....	2.999 L (0.792 gal)
Compression ratio	17.5
Rated output.....	89.2 kW / 2200 min ⁻¹
Maximum torque.....	391 N.m (288.39 lb-ft) / 1800 min ⁻¹
Engine dimensions (LxWxH)	926.4x763x891.8 mm (36.47 x30.04x35.11 in)
Oil pan	All direction 0.61 rad, inclinable
Oil pan capacity.....	Maximum: 15 L (3.92 gal) Minimum: 11 L (2.91 gal) (excluding oil filter)
Direction of rotation	Right (as seen from fan)
Starter, reduction type.....	.24 V, 4 kW
Alternator, AC type	24 V, 50 A
Battery	2 x 12V, 92 Ah/5 Hr

Cooling system

Fan type.....	Ø 550 mm (21.65 in), suction type - 8 blades, plastic with belt mouth-type fan guide
Pulley ratio.....	0.95 (reduction)
Radiator	
Fin type	wavy
Fin pitch	2.0 mm (0.078 in)
Oil cooler	
Fin type	wavy
Fin pitch	1.75 mm (0.069 in)
Inter-cooler	
Fin type	triangular straight
Fin pitch	2.0 mm (0.078 in)
Fuel cooler	
Fin type	wavy
Fin pitch	2.0 mm (0.078 in)
Coolant capacity.....	6 L (1.58 gal) (engine only)

Capacity of coolant and lubricants

Coolant.....	14.6 L (3.86 gal)
Fuel	300 L (79.5 gal)
Lubricant for engine	17 L (4.49 gal)
Lubricant for travel reduction gear (per side)	
CX160B	5.8 L (1.53 gal)
CX180B	5 L (1.32 gal)
Lubricant for swing reduction gear (per side).....	5 L (1.32 gal)
Hydraulic oil.....	165 L (43.59 gal)
Capacity of hydraulic oil tank	90 L (23.77 gal)

Hydraulic oil filter

Suction filter (inside tank).....	150 mesh
Return filter (inside tank).....	6 µm
Pilot line filter (inside housing)	8 µm

Fuel filter

Main filter.....	4 µm
Pre-filter.....	10 µm

Operating devices

Operator's seat

Location: left side

Structure: Adjustable forward and back and up and down, reclining mechanism, with seat suspension.

Cab

Sealed steel type, all reinforced glass.

Levers and pedals

For travel use: Lever and pedal type (hydraulic pilot type) (x2)

For operating machine use: Lever type (hydraulic pilot type) (x2)

Instruments and switches

Work mode select switch: 3 modes (SP / super power, H / heavy duty, A / automatic)

Travel mode select switch: Low-speed / high-speed switch type

One-touch idle: Knob switch type

Engine emergency stop: Switch type

Monitor device

Machine status display (full-dot liquid crystal)

Work mode selection status: SP / H / A

Instruments (full-dot liquid crystal, except for hour meter)

Fuel gauge: bar graph indicator

Engine coolant temperature gauge: bar graph indicator

Hydraulic oil temperature gauge: bar graph indicator

Hour meter: digital type

Machine Status and Warning Alarms (full-dot liquid crystal and warning tone) *Items have a warning alarm

Over heat*	Battery charge*	Faulty electrical system*
Refill fuel*	Engine oil pressure*	Refill coolant*
Engine preheat	Auto warm-up	Air cleaner clogged
Anti-theft device triggered	Faulty engine system	Engine emergency stop

Lighting

Working light	Tank:	24V, 70W (x1)
	Boom:	24V, 70W (x1)
	Cab:	24V, 70W (x2)
Interior light		24V, 10W (x1)

Horn: electric horn (x2)

Other

Wiper with intermittent function, Window washer, Air conditioner, Rear view mirrors (left and right), DC converter,

Clock

Hydraulic system

Hydraulic pump drive system, directly coupled to the engine (no transmission)

Main pump

Manufacturer	Kawasaki
Pump type	double variable displacement piston pump
Displacement volume	65.2 cm ³ (3.98 cu in) x 2 /rev
Rated operating pressure	34.3 MPa (4975 psi)
Maximum operating pressure	36.3 MPa (5265 psi)
Input revolution speed	2200 min ⁻¹
Maximum discharge flow	142.5 L/min (37.64 gpm) x 2 at 2200 min ⁻¹

Pilot pump

Pump type	Gear pump
Displacement volume	10 cm ³ (0.61 cu in)/rev
Operating pressure	3.92 MPa (568 psi)
Maximum flow	22 L/min (5.81 gpm) (at 2200 min ⁻¹)

Control method

- Hydraulic simultaneous constant output control.
- Maximum flow adjustment control through external commands (negative control).
- Setting horsepower adjustment control through external command current.

Control Valve

Model; 4-spool section: integrated (1) or 5-spool section: integrated (1)	
Operation method: hydraulic pilot method: travel, swing and operating machine	
Maximum flow	143 L / min (37.78 gpm) (at 2200 min ⁻¹)
Main relief set pressure	standard; 34.3 MPa (4975 psi), power boost 36.3 MPa (5265 psi)
Overload set pressure	when boom down; 32.3 MPa (4685 psi)
.....	other: 38.2 MPa (5540 psi)
Foot relief set pressure	2.55 MPa (369.85 psi)

Functions

- Straight travel circuit
- Boom up / arm 2 pumps internal flow
- Boom and arm load holding circuit
- Boom-down regenerative circuit
- Bucket-close regenerative circuit
- Arm-in forced regenerative circuit
- Swing priority variable orifice (for arm operation)
- 2 pumps flow
- Variable foot relief

Hydraulic Cylinders

Boom cylinder (x2)

Cylinder bore	Ø115 mm (Ø4.53 in)
Rod diameter	Ø80 mm (Ø3.15 in)
Maximum retracted length	1698 mm (66.85 in)
Stroke	1179 mm (46.42 in)

Articulated boom cylinder

Cylinder bore	Ø140 mm (Ø5.51 in)
Rod diameter	Ø90 mm (Ø3.54 in)
Maximum retracted length	1385 mm (54.53 in)
Stroke	840 mm (33.07 in)

Arm (dipper) cylinder

Cylinder bore	Ø125 mm (Ø4.92 in)
Rod diameter	Ø90 mm (Ø3.54 in)
Maximum retracted length	1830 mm (72.05 in)
Stroke	1280 mm (50.39 in)

Bucket cylinder

Cylinder bore	Ø105 mm (Ø4.13 in)
Rod diameter	Ø75 mm (Ø2.95 in)
Maximum retracted length	1507 mm (59.33 in)
Stroke	985 mm (38.78 in)