
HYDRAULICS EXCAVATORS

788 & 988

Update 06-2000



**CRAWLER AND WHEELED EXCAVATORS
788, 788 PLUS, 988, 988 PLUS
SCHEMATIC SET**

TABLE OF CONTENTS

SECTION	SECTION No.	REFERENCE No.
Safety, general information and torque specifications.....	1001	7-56942GB
Specifications		
<i>Crawler excavators</i>	1002	7-80071GB
<i>Wheeled excavators</i>	1002	7-80062GB
Electrical schematics		
<i>Crawler excavators - before November 99</i>	4001	7-80040GB
<i>Crawler excavators - after November 99</i>	4001	7-26570GB
<i>Wheeled excavators - before November 99</i>	4001	7-80021GB
<i>Wheeled excavators - after November 99</i>	4001	7-26540GB
Electronic and troubleshooting system		
<i>Crawler excavators</i>	4002	7-80031GB
<i>Wheeled excavators</i>	4002	7-80051GB
Tests, adjustments and hydraulic schematics		
<i>Crawler excavators</i>	8001	7-24590GB
<i>Wheeled excavators</i>	8001	7-24580GB
Large size hydraulic and electrical schematics		
<i>Crawler excavators 788</i>	Pocket	7-80190GB
<i>Crawler excavators 788 Plus</i>	Pocket	7-26730GB
<i>Wheeled excavators 788</i>	Pocket	7-80200GB
<i>Wheeled excavators 788 Plus</i>	Pocket	7-26760GB
<i>Crawler excavators 988, 988 Plus - before November 99</i>	Pocket	7-58960GB
<i>Crawler excavators 988 Plus - after November 99</i>	Pocket	7-26770GB
<i>Wheeled excavators 988, 988 Plus - before November 99</i>	Pocket	7-58970GB
<i>Wheeled excavators 988 Plus - after November 99</i>	Pocket	7-26780GB

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.

1001

Section

1001


**SAFETY, GENERAL INFORMATION
AND TORQUE SPECIFICATIONS**

1001-2

TABLE OF CONTENTS

SAFETY.....	3
TWIN WHEELS	5
Safety rules	5
Safety instructions.....	5
GENERAL INFORMATION	6
CORRECT USE OF TORQUE WRENCHES	7
HARDWARE TIGHTENING ORDER	8
STANDARD SCREW A TORQUE SPECIFICATIONS.....	9
Correct screw identification	9
METAL CAP REFERENCES.....	10
PLASTIC PLUG AND CAP REFERENCE CHART	11

SAFETY


 **WARNING:** This symbol means **WARNING ! BE VIGILANT ! YOUR SAFETY IS AT RISK**. The message that follows the symbol contains important safety information. Read it carefully. Be sure you understand the possible risks of injury or even death.


To avoid all risks, always follow the safety notes contained in this section and throughout this 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 321-4614, are available from your service parts supplier.





PDG0328


 **WARNING:** Read the Operator's Manual carefully and make sure you understand how to operate the controls correctly.


 **WARNING:** Never operate the machine and attachment controls unless you are seated in the operator's seat. If you are not in the operator's seat, you run the risk of serious injury.

 **WARNING:** The machine is built to carry the operator only. Do not allow passengers to ride on the machine.

 **WARNING :** Prior to starting up the engine read the safety messages contained in the operator's manual carefully. Read all safety stickers on the machine. Have people move back from the machine. Learn how to use the controls before starting up the machine. It is your responsibility to follow the manufacturer's instructions on how to operate and maintain the machine. It is your responsibility to follow applicable rules and regulations. Service and Operator's Manuals are available from your J.I. Case Dealer.

 **WARNING:** If you wear loose clothing or if you omit to use safety equipment for your work, you risk injury. Always wear clothes that do not risk getting caught in the machine. Other safety equipment may be necessary, in particular : helmets, safety shoes, ear plugs, safety glasses, protection mask, thick gloves and reflecting clothes.

 **WARNING:** When working close to the fan with the engine running, avoid wearing loose clothing and operate with extreme caution.

 **WARNING:** When checking the hydraulic circuits, follow procedures to the letter. **DO NOT CHANGE** procedures.



WARNING: Prior to operating the hydraulic cylinders of this machine for setting or to bleed the circuit, have all people standing around the machine move away.



WARNING: Wear gloves or insulated mittens when working on hot parts.



WARNING: Lower all attachments to the ground or rest them on stands before carrying out maintenance jobs.



WARNING: Fine sprays of hydraulic oil under pressure can penetrate the skin and cause serious infection. If hydraulic oil under pressure penetrates the skin, see a doctor immediately. Maintain all hoses and pipes in good condition. Make sure that all connections are properly tightened. Change all hoses or pipes that have been damaged or that are suspect. **DO NOT CHECK** for leaks with bare hands. Use a piece of cardboard or wood.



WARNING: To remove a hardened pin such as a pivot pin, or a hardened shaft, use a soft head hammer (brass or bronze) or a brass or bronze strip and a steel head hammer.



WARNING: When using a hammer to remove or reassemble pivot pins, or when using compressed air, or when using a grinder make sure to wear safety glasses that protect the eyes from all sides.



WARNING: Use proper lifting/hoisting equipment to lift wheels or tracks and always work on safe ground. Prevent the machine from moving using correct safety chocks.



WARNING: When performing maintenance or repair operations on the machine, make sure that the work shop floor, the cab and the steps of the excavator are free from oil, water, grease, tools etc. Use oil absorbing material or rags as necessary. Always think safety.



WARNING: Certain components of this machine are very heavy. Use hoisting tools or additional assistance as recommended in this manual.



WARNING: Exhaust fumes can cause death. If it is necessary to start up the engine in a closed building, evacuate exhaust fumes using an exhaust pipe extension. Open the doors and let fresh air into the building.



WARNING: When battery liquid is frozen, the battery can explode if : (1) you try to charge the battery or (2) you try to start the engine by connecting an auxiliary power source. To prevent battery electrolyte from freezing keep the battery fully charged. If you do not follow these instructions, you or others nearby may be injured.



WARNING: Batteries contain acid and explosive gases. A spark, a flame or an improper cable connection may cause an explosion. For proper connection of cables to the battery of this machine see the Operator's Manual. If you do not follow these instructions, you risk severe injury.

TWIN WHEELS

Safety rules



WARNING: *In all cases, before removing twin wheels, always deflate both tyres completely.*



WARNING: *If a tyre bursts it can cause serious injury. Check tyres regularly to see that they are in good condition and always be sure to inflate them to the correct pressure.*



WARNING: *Never face a tyre when checking pressure or adding air. Always stand in front of the tread. Use an inflation cage if the wheel has been removed from the machine. Make sure all people standing in the area move well away.*



WARNING: *Never weld near a tyre. If this can not be avoided, it is mandatory to remove the tyre before performing any welding operations.*



WARNING: *Make sure that all decals on the machine are perfectly legible, clean them regularly and replace any decals which are damaged, missing or painted over, with new ones.*

Safety instructions

- Use appropriate, good quality tools to disassemble the various wheel components. Never use a hammer. Use a rubber, plastic or copper-faced mallet.

IMPORTANT: *Never remove the inner tyre valve extension, as this will be necessary afterwards for inflating and deflating the tyre.*

IMPORTANT: *If the valve or the valve extension are no longer accessible, take the necessary precautions and then, imperatively, puncture the tyre.*

- Use suitable grease to facilitate the installation and removal of the tyre.
- Never re-inflate a tyre on the machine which has been used at a pressure lower than 5.6 bar.
- Check the various components: tyre, rim, shoulder, retaining ring and replace any defective items.
- Never reuse a retaining ring which is distorted or rusty.

1001-6

GENERAL INFORMATION

CLEANING

Clean all metal parts except bearings with white spirit or steam. Do not use caustic soda when steam cleaning. After cleaning, dry and lubricate all parts. Clean hydraulic lines with compressed air. Clean bearings with kerosene, then dry them and lubricate them.

INSPECTION

Check all parts when disassembled. Change all parts showing wear or damage. Scratches that are not too deep can be removed by honing or with a rag dipped into buffing compound. A full visual inspection to detect wear and pitting and subsequent changing of parts will prevent premature failure.

BEARINGS

Check that bearings rotate freely. If their adjustment is too loose or if they do not run regularly, change them. Wash bearings with a good solvent or kerosene and let them dry. **DO NOT DRY BEARINGS WITH COMPRESSED AIR.**

NEEDLE BEARINGS

Before inserting needle bearings into a bore, remove all metal particles from the edge of the bore. Prior to mounting bearings with a press, coat the inside and the outside of the bearing with vaseline.

GEARS

Check all the gears for wear or damage. Change worn or damaged gears.

SEAL RINGS, O-RINGS, GASKETS

Always use new seal rings. O-rings and gaskets. Coat sealing rings and O-rings with vaseline.

SHAFTS

Check all shafts showing signs of wear or damage. Check that the surface of a shaft running in a bearing is not damaged.

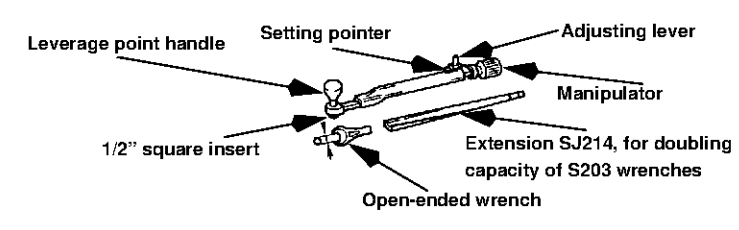
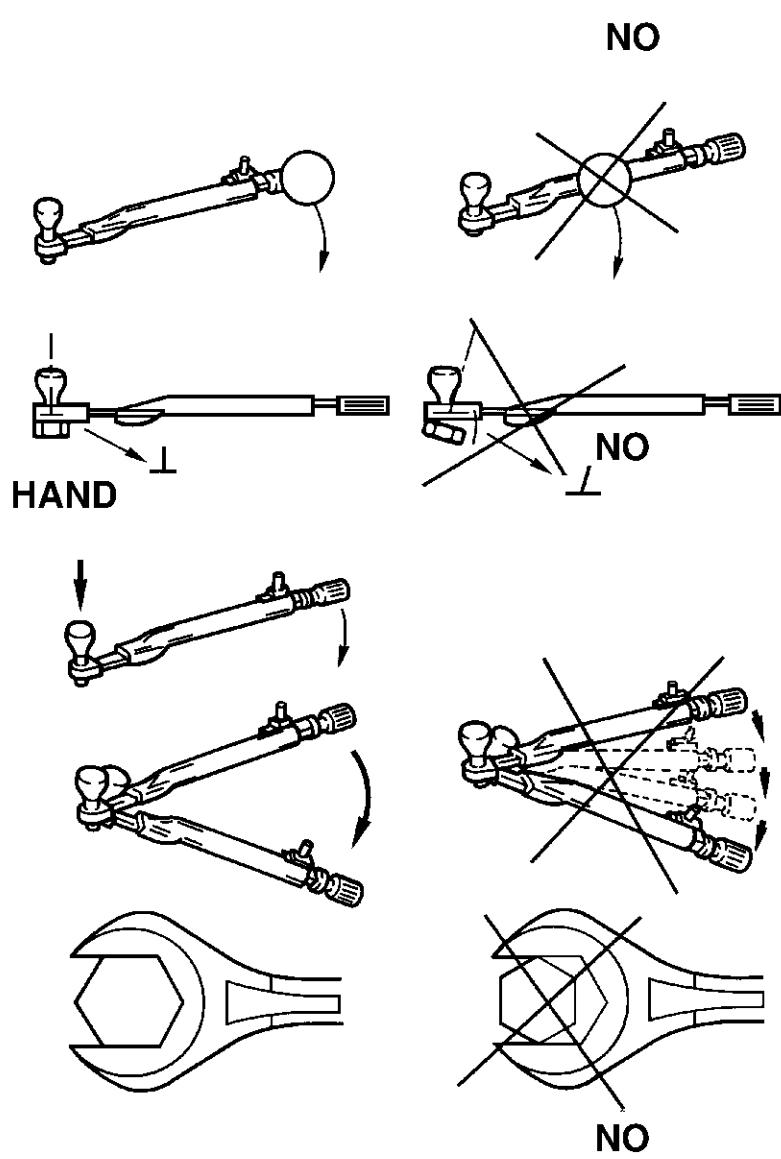
SPARE PARTS

Always use original CASE spare parts. To order spare parts, see the Spare Parts Catalogue to indicate the proper reference of original CASE spare parts. Failures caused by the use of parts that are not original CASE spare parts are not covered by the warranty.


LUBRICATION

Use only oils and lubricants specified in the Operator's and Service Manuals. Failures due to the use of oils and lubricants not specified are not covered by the warranty.

CORRECT USE OF TORQUE WRENCHES

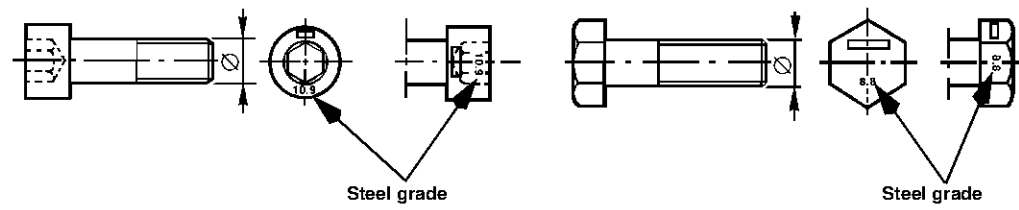
<p>TORQUE WRENCHES</p>	 <p style="text-align: right;">PDG0315</p>
<p>CORRECT USE</p> <p>a - Hold the wrench by the handle provided.</p> <p>b - When tightening, always keep the wrench perpendicular to the screw.</p> <p>c - Keep one hand on the leverage point handle on the wrench.</p> <p>d - Tighten progressively in one movement.</p> <p>e - Position a correctly dimensioned socket or open-ended wrench on the flats of the screw head.</p>	 <p style="text-align: right;">PDG0316</p>

HARDWARE TIGHTENING ORDER






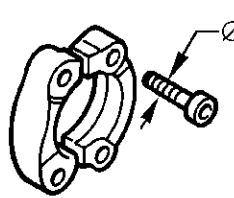
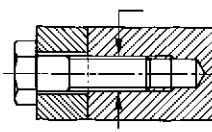
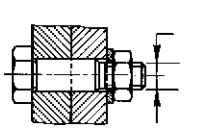
<p>TORQUE WRENCHES</p>	 <p style="text-align: right;">PDG0317</p>
<p>INITIAL TORQUE</p> <p>a - Torque wrench.</p> <p>- Follow the correct order of procedure when tightening.</p> <p>- Cross or diagonal pattern tightening.</p>	<p style="text-align: right;">PDG0318</p>
<p>FINAL TORQUE</p> <p>Always tighten in clockwise order.</p>	<p style="text-align: right;">PDG0319</p>



STANDARD SCREW A TORQUE SPECIFICATIONS

Correct screw identification



PDG0320

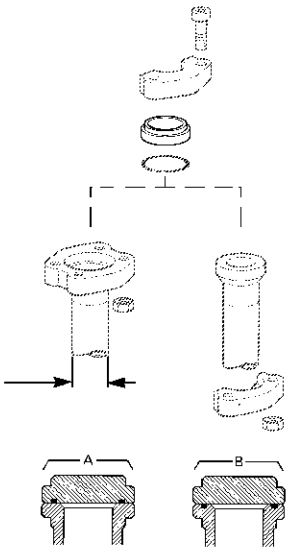
	Diameter x thread size Grade 8.8	Key 		Torque			
				Nm		lb.ft	
							
Two-part hydraulic connector (to SAE J518 specifications) 	M5 x 0.8 M6 x 1 M8 x 1.5 M10 x 1.5 M12 x 1.75 M14 x 2 M16 x 2 M18 x 2.5 M20 x 2.5 M22 x 2.5 M24 x 3 M27 x 3 M30 x 3.5	4 5 6 8 10 12 14 14 17 17 - - -	8 10 13 17 19 22 24 27 30 32 36 41 46	5.5 9 22.5 45 70 100 170 250 350 500 600 900 1200	5.5 9 22.5 45 80 120 200 300 400 600 700 1000 1400	4.1 6.7 16.6 33.2 51.6 73.8 125.5 184.5 258.3 369 442.8 664.2 885.6	4.1 6.7 16.6 33.2 59 88.6 147.6 221.4 295.2 442.8 516.6 738 1033.2
Components assembled by screws and bolts SCREW   BOLT	Grade 10.9 M5 x 0.8 M6 x 1 M8 x 1.5 M10 x 1.5 M12 x 1.75 M14 x 2 M16 x 2 M18 x 2.5 M20 x 2.5 M22 x 2.5 M24 x 3 M27 x 3 M30 x 3.5	4 5 6 8 10 12 14 14 17 17 - - -	8 10 13 17 19 22 24 27 30 32 36 41 46	75 12.5 35 60 100 170 250 350 500 700 900 1200 1700	75 12.5 35 70 120 200 300 400 600 800 1000 1400 1900	5.6 9.3 25.8 44.3 73.8 125.5 184.5 258.3 369 516.6 664.2 885.6 1254.6	5.6 9.3 25.8 51.6 88.6 147.6 221.4 295.2 442.8 442.8 738 1033.6 1402.2

 Zinc bichromate
 Phosphate

1001-10

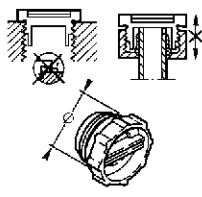
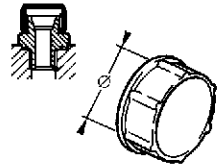
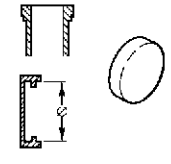
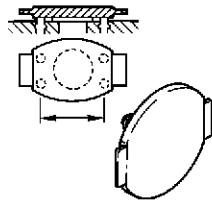
METAL CAP REFERENCES

To SAE J518 specifications

	NP 250 bar Ø ND	NP 400 bar Ø ND	Part number		
			A	B	
 <p>PDG0323</p>	13 mm	-	D5327838	E5327839	
	19 mm	-	F5327840	G5327841	
	25 mm	-	H5327842	J5327843	
	32 mm	-	K5327844	L5327845	
	38 mm	-	M5327846	N5327847	
	-	13 mm	U5327830	V5327831	
	-	19 mm	W5327832	X5327833	
	-	25 mm	Z5327834	A5327835	
	-	32 mm	B5327836	C5327837	

NP = Nominal pressure
 NP = Nominal diameter

PLASTIC PLUG AND CAP REFERENCE CHART

	Dia. x pas	Part number	Dia. x pas	Part number
Tapped orifices and connectors with tightening nuts = screw-type plugs  PDG0324	M10 x 1.5 M12 x 1.5 M14 x 1.5 M16 x 1.5 M18 x 1.5	F3237416 G3237417 H3237418 J3237419 K3237420	M20 x 1.5 M22 x 1.5 M24 x 1.5 M27 x 2	L3237421 M3237422 N3237423 Q3237448
Unions = Screw-type plugs  PDG0325	M12 x 1.5 M14 x 1.5 M16 x 1.5 M18 x 1.5	X3237409 Z3237410 A3237411 B3237412	M20 x 1.5 M22 x 1.5 M30 x 1.5	C3237413 D3237414 E3237415
S.A.E tube or hose collars = external plugs  PDG0326	NP 250 bar 30.2 38.1 44.5 50.8 60.4	J2537460 K2537461 L2537462 M2537463 N2537464	NP 400 bar 31.8 41.3 47.6 54 63.6	P2537465 Q2537466 R2537467 S2537468 T2537469
S.A.E orifices = caps for installation into tapped fitting orifices  PDG0327	NP 250 bar L = 38.1 47.65 52.35 58.07 69.85	A2340480 B2340481 C2340482 D2340483 E2340484	NP 400 bar L = 40.5 50.8 57.15 66.7 79.4	K1640415 R1640421 S1640422 T1640423 Z1640479

NP = Nominal pressure
 ND = Nominal diameter

1001-12

Section 1002

1002

SPECIFICATIONS
Crawler excavators

TABLE OF CONTENTS

FLUIDS AND LUBRICANTS	3
Hydraulic fluid.....	3
Transmission component oil	3
Grease	3
Engine oil	4
Oil viscosity/Oil range	4
Fuel	5
Anti-freeze/Anti-corrosion.....	5
Environment.....	5
Components made from plastic or resin	5
GENERAL MACHINE SPECIFICATIONS.....	6
Engine	6
Hydraulic system.....	8
Electrical system	9
Upperstructure	9
Cab	9
Operation	9
Undercarriage (depending on version)	10
Safety devices	10
Indicators	10
Warning and indicator lamps	10
Attachments	10
Noise level	10
Vibration level in operator's compartment	10
Ground pressure	11
Travel	11
WEIGHTS.....	12
Machine	12
Attachments	15
Counterweight	15
Cab	15
788 AND 788 "PLUS" BUCKETS	16
988 AND 988 "PLUS" BUCKETS	17
788 AND 788 "PLUS" CLAMSHELLS	18
988 AND 988 "PLUS" CLAMSHELLS	19
MACHINE OVERALL DIMENSIONS.....	20
TRANSPORTATION OVERALL DIMENSIONS.....	22



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.*

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 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
Fluid type ISO VG 46
CASE reference: POHYDR

Hot climates

0°C to +60°C
Fluid type ISO VG 100
CASE reference: POHYDC

Cold climates

-40°C to +20°C
Fluid type ISO VG 22
CASE reference: POHYPF

These various grades of fluid must be in conformity with CASE France specification P9903201Z.

Temperate climate biodegradable fluid:

This yellow fluid is compatible with standard fluid. If adopted, it is advisable to drain the circuit completely.

Fluid type ISO VG 46
CASE reference: CASYNTH46

This grade of fluid must be in conformity with CASE France specification P9903203B

Transmission component oil

Extreme pressure oil used for transmission components inside sealed housings.

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

Grease

The type of grease to use depends on ambient temperature.

Temperate and hot climates

-20°C to +60°C
Extreme pressure grease EP NLGI grade 2 with molybdenum disulphide.

Cold climates

-40°C to +20°C
Extreme pressure grease EP NLGI grade 0.

1002-4

Engine oil

CASE engine oil N°1 is recommended for your engine. This oil ensures correct lubrication of your engine in all working conditions.

If CASE N°1 Multiperformance or Performance engine oil is not available, use oil corresponding to category API/CG/CF.

NOTE: Do not put any Performance Additive or other additive in the sump. Oil change intervals shown in this manual are based on tests carried out on CASE lubricants.

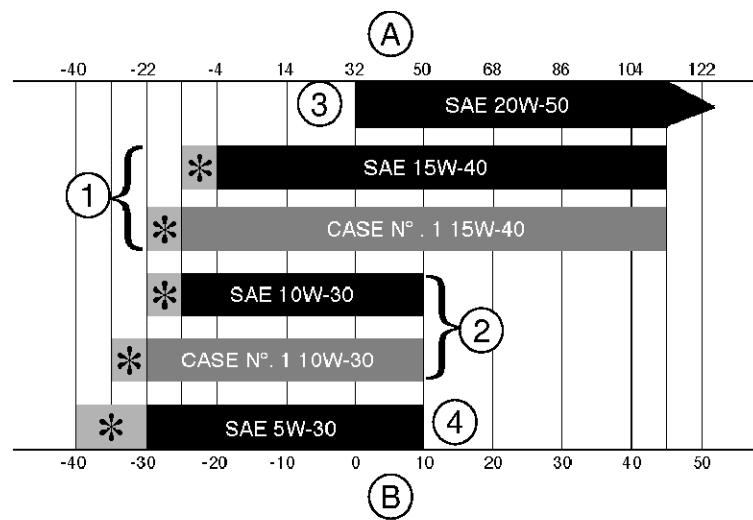


RF97F136



RB97F100

Oil viscosity/Oil range



(A) FAHRENHEIT TEMPERATURE

(B) CELSIUS TEMPERATURE

(1) ALL-SEASONS

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

(2) WINTER

(3) TROPICAL

(4) ARCTIC

CS98M561

Fuel

Use fuel that is to ASTM (American Society for Testing and Materials) D975 standard.

Use Grade No N°2 fuel. The use of other types of fuel can result in a loss of power and may cause high fuel consumption.

In cold weather, the use of a mixture of fuels N°1 and N°2 is temporarily permitted. Consult your fuel supplier.

If the temperature falls below the fuel cloud point (point at which wax begins to form) the wax crystals will cause power loss or will prevent the engine from starting.

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

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.

In environments with a temperature higher than -36°C, use a mixture of 50% ethylene-glycol based anti-freeze.

For areas where the temperature is below -36°C, it is advisable to use a blend of 40% water and 60% anti-freeze.

Environment

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

Consult your local ecological recycling centre to obtain information on the appropriate means of disposing of these substances.

Components made from plastic or resin

When cleaning polycarbonate windows, the console, the instrument panel, the gauges, etc., do not use petrol (gasoline), paraffin (kerosene), paint solvents, etc. Use only water, soap and a soft cloth.

The use of petrol (gasoline), paraffin (kerosene), paint solvents, etc, will cause discoloration, cracking or deformation of these components.

1002-6

GENERAL MACHINE SPECIFICATIONS

Engine

(788 and 788 "Plus")

	788	788 "Plus"
Make and type.....	CASE 4T 390.....	CASE 4TA 390
4 stroke, 4 cylinder	turbo-charged diesel	
Capacity.....	3920 cm ³	
Bore.....	102 mm	
Stroke.....	120 mm	
Cooling	water-cooled	
Starting: 2 x 12 volt batteries, 24 V.....	120 A/h	

Working specifications

Engine speed.....2000 rpm

Horsepower: SAE J1995.....68.6 kW (93 hp).....81 kW (110 hp)
DIN 70020 - DIN 6271 65 kW (88 hp)..... 76 kW (103 hp)
EEC 80/1269 - ISO 9249..... 65 kW (88 hp)..... 76 kW (103 hp)

Specifications maintained up to an altitude of
3000 m at a temperature of 25°C.

Capacities: Engine oil sump.....10 L
Fuel tank.....249 L

Electric fuel filler pump optional equipment

Average consumption per hour 10 L/h..... 14.5 L/h

Engine and pump assembly mounted on rubber blocks.
Heavy-duty dust filtration.

