

**CX75SR
CX75SR-LR
CX80
CXI35SR
Tier 3
Crawler excavators**

Operator's Manual



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THIS SAFETY ALERT SYMBOL INDICATES IMPORTANT SAFETY MESSAGES IN THIS MANUAL. WHEN YOU SEE THIS SYMBOL, CAREFULLY READ THE MESSAGE THAT FOLLOWS AND BE ALERT TO THE POSSIBILITY OF PERSONAL INJURY OR DEATH.

The words **Danger**, **Warning** or **Caution** used on the safety decals have the following significance:

- **DANGER:** Indicates an immediate hazardous situation that, if not avoided, could result in serious injury or even death. The colour associated with Danger is RED.
- **WARNING:** Indicates a potentially hazardous situation that, if not avoided, could result in serious injury. The colour associated with Warning is ORANGE.
- **CAUTION:** Indicates a potentially hazardous situation that, if not avoided, may result in minor injury. It may also be used to alert against unsafe practices. The colour associated with Caution is YELLOW.

Certain decals, in conformity with the ISO standard are in several parts. They must be interpreted as follows:

- The upper panel indicates the nature of the danger.
- The lower panel indicates appropriate avoidance of the danger.
- Background colour is YELLOW.
- Prohibition symbols such as   if used, are RED.



WARNING

IMPROPER OPERATION OF THIS MACHINE CAN CAUSE INJURY OR DEATH. BEFORE USING THIS MACHINE, MAKE CERTAIN THAT EVERY OPERATOR:

- Is instructed in safe and proper use of the machine.
- Reads and understands the Manual(s) pertaining to the machine.
- Reads and understands ALL Safety Decals on the machine.
- Clears the area of other persons.
- Learns and practises safe use of machine controls in a safe, clear area before operating this machine on a job site.

It is your responsibility to observe pertinent laws and regulations and follow CASE instructions on machine operation and maintenance.

CNH France S.A. 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.

All data given in this manual is subject to production variations. Dimensions and weights are provided with approximate values and the machine fitting shown in the illustrations may not correspond with standard models. For precise information on specific machine models and versions, please consult your CASE Dealer.

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OPERATOR'S MANUAL

CX75SR
CX75SR-LR
CX80
CX135SR
Tier 3



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Hello dear friend!

Thank you very much for reading.

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QUICK REFERENCE SECTION GUIDE

Shown are the Sections contained within this book.

1 - To the owner

2 - Identification numbers/Machine components

3 - Safety/Decals/Hand signals

4 - Controls/Instruments/Accessories

5 - Operating instructions

6 - Servicing intervals

7 - Lubrication/Filters/Fluids

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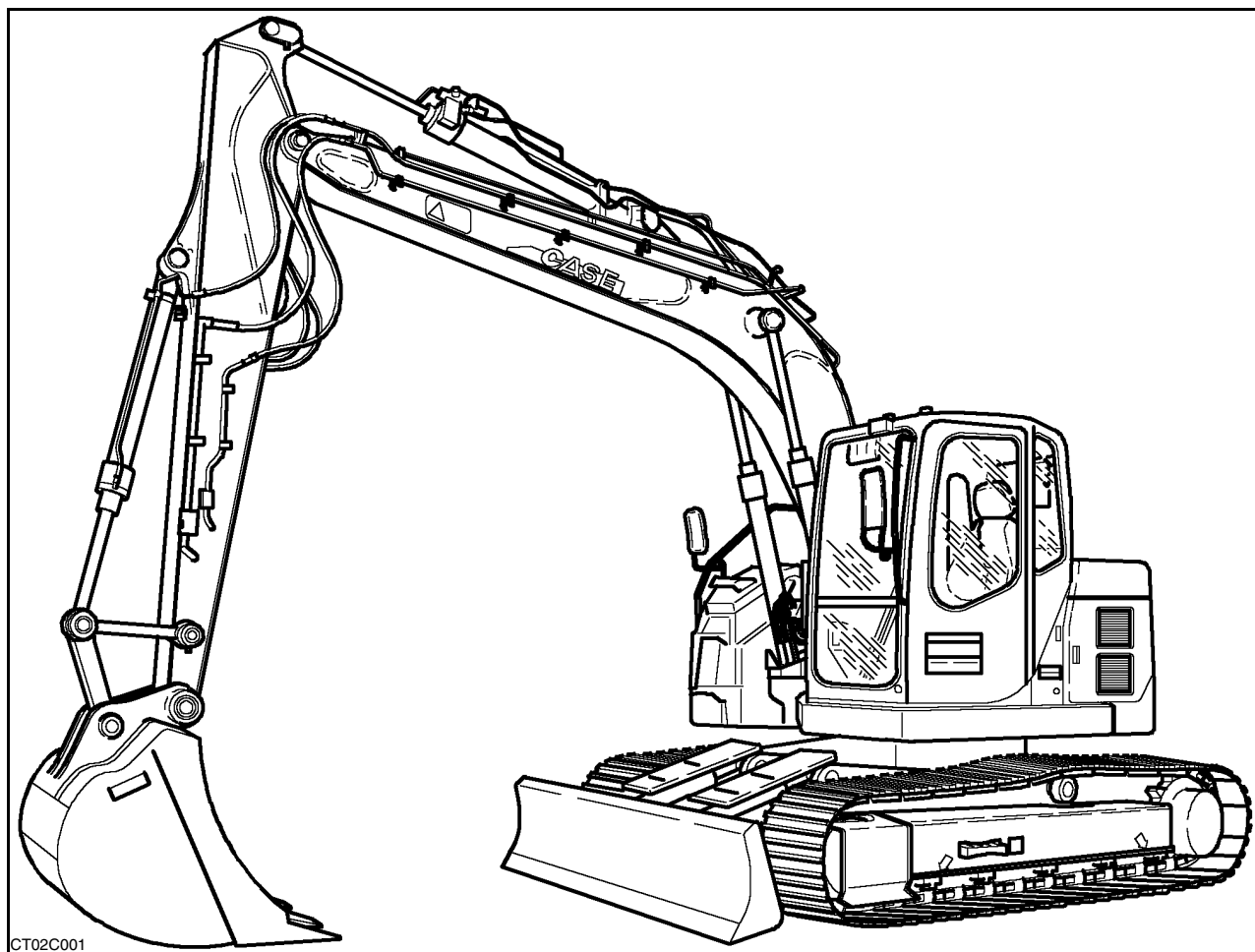
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SECTION 1

TO THE OWNER

HYDRAULIC CRAWLER EXCAVATORS
CX75SR, CX75SR-LR, CX80 and CX135SR



Type presented: **CX135SR**

Dealer's Stamp

CNH France S.A.
16-18 rue des Rochettes
91150 MORIGNY - CHAMPIGNY
FRANCE

SECTION 1 - TO THE OWNER

Your machine has been designed and built to the highest standards of quality. It conforms to all current safety regulations. See "Official documents". However, the risk of accidents can never be completely excluded. That is why it is essential to observe elementary safety rules and precautions.

Read this manual carefully, paying particular attention to the instructions concerning safety, operation and maintenance so as to avoid the risk of injury while operating or servicing the machine.

The standard attachments and tools of this machine are designed to carry out all kinds of earthmoving and rehandling operations. If you want to use this machine to handle a load (pipes, culverts, formwork, etc.), make sure that it is designed to carry out this kind of work. For this type of application, the machine must be equipped with safety valves, an overload indicator, a load handling chart corresponding to the type of machine and its attachment and a load fixing point. All legal requirements must also be strictly observed.

Do not use this machine for any application or purpose other than those described in this manual. If the machine is to be used for work involving the use of special attachments, accessories or equipment, consult your CASE Dealer in order to make sure that any adaptations or modifications made are in keeping with the machine's technical specifications and with prevailing safety requirements.

Any modification or adaptation which is not approved by the manufacturer may invalidate the machine's initial conformity with safety requirements.

The machine must undergo regular inspections, the frequency of which varies according to the type of use. Consult your CASE Dealer.

The engine and fuel system on your machine is designed and built to government emissions standards. Tampering by dealers, customers, operators and users is **strictly prohibited by law**. Failure to comply could result in government fines, rework charges, invalid warranty, legal action and possible confiscation of the machine until rework to original condition is completed. Engine service and/or repairs must be done by a certified technician only!

Before permitting a new operator on this machine, make sure:

1. That the operator is qualified to operate the machine correctly and safely.
2. That the operator has read and understood the instructions given in this manual.

Always keep this manual in the operator's compartment (in the seat back, behind the operator's seat). Make sure it is always complete and in good condition. If you wish to obtain extra copies, or copies in languages other than that of the country of use, consult your CASE Dealer.

Your CASE Dealer is at your disposal for any further information. He will also provide any after-sales service you may require, and genuine CASE spare parts, your guarantee of quality and match.

OFFICIAL DOCUMENTS

A certificate defining the weight shown on the manufacturer's plate:

- Indication that the weight shown on the manufacturer's plate is a value using the heaviest configuration and that it does not always correspond to the transport configuration.

A "EC" declaration of conformity:

- For a new construction equipment machine, series produced to a type approved design, designed and manufactured in accordance with the requirements of European directive 98/37/EC, concerning machine safety and mainly:

1 - The following directives:

- 89/336/EC: Electromagnetic compatibility
- 2000/14/EC: Noise level (outside the cab)
- 2006/42/EC: Noise level (inside the cab)

2 - The following European standards:

- EN 474-1: Safety - General requirements
- EN 474-5: Safety - Hydraulic excavators including load handling

IMPORTANT: An original of this "EC" declaration is supplied with each machine and must be kept carefully by the owner.

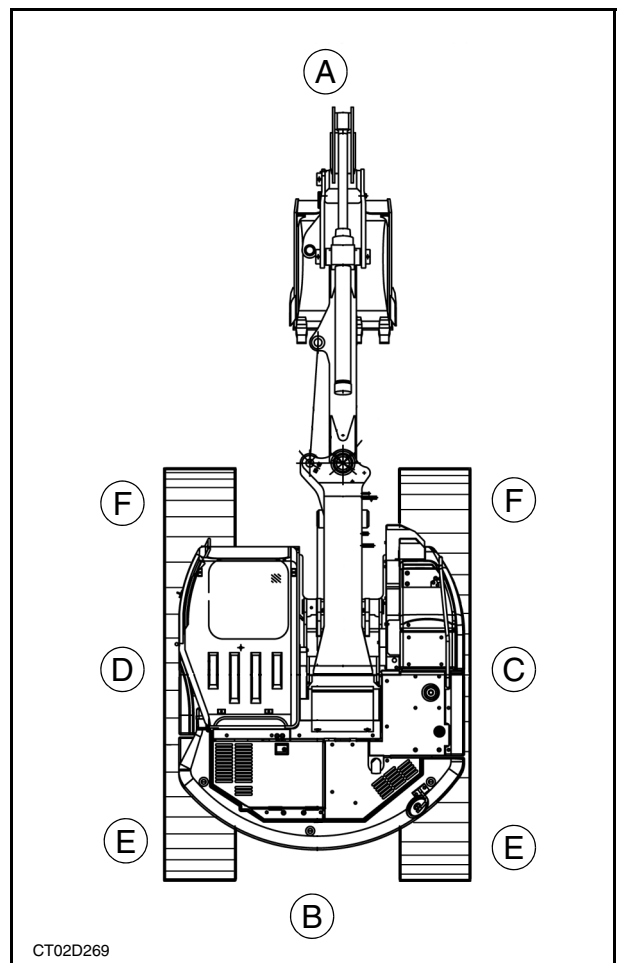
IMPORTANT: The official documents supplied with the machine must be kept by the owner so as to be able to present them to any inspecting authority which may request them.

RIGHT, LEFT, FRONT AND REAR OF THE MACHINE

The terms "Right", "Left", "Front" and "Rear" are used in this manual to indicate the sides as they are seen from the operator's seat when the cab is over the idler wheels.

The illustration opposite shows the machine in normal TRAVEL position. In normal TRAVEL position, the cab is over the idler wheels. The travel reduction gears are at the rear of the upperstructure.

- A. FRONT
- B. REAR
- C. RH SIDE
- D. LH SIDE
- E. TRAVEL MOTORS
- F. IDLER WHEELS



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SECTION 2

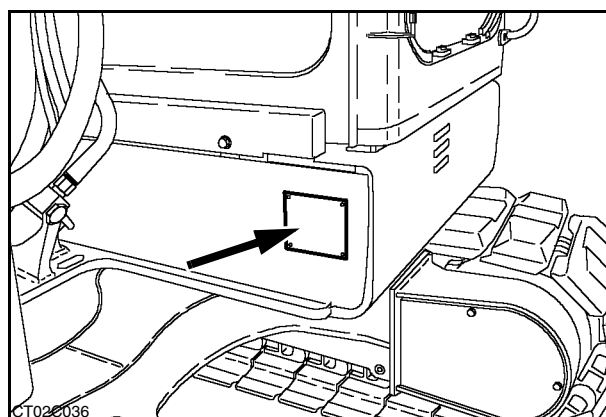
IDENTIFICATION NUMBERS/MACHINE COMPONENTS

TYPE, SERIAL NUMBER AND YEAR OF MANUFACTURE OF THE MACHINE

When ordering parts, obtaining information or assistance, always supply your CASE Dealer with the type and serial number of your machine or accessories.

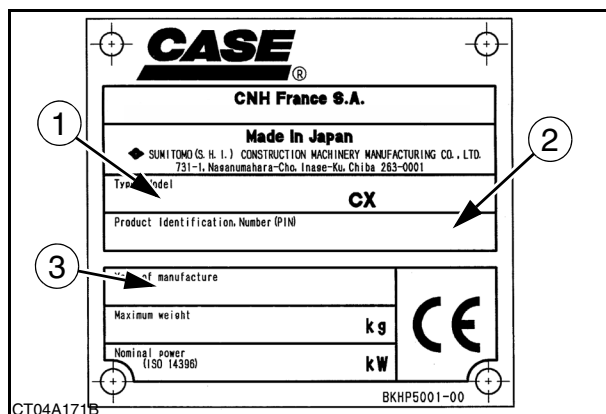
Write the following in the spaces below: the type, serial number and year of manufacture of your machine, accessories and the serial numbers of the various hydraulic and mechanical components.

MACHINE



1

- (1) Type
- (2) Serial number
- (3) Year of build



2

SECTION 2 - IDENTIFICATION NUMBERS/MACHINE COMPONENTS

ENGINE

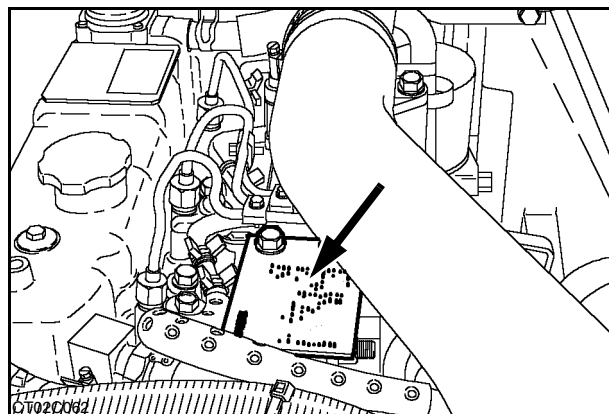
(CX75SR, CX75SR-LR, CX80)

Make and type **ISUZU AU-4LE2X**

.....

Serial number.....

.....



3

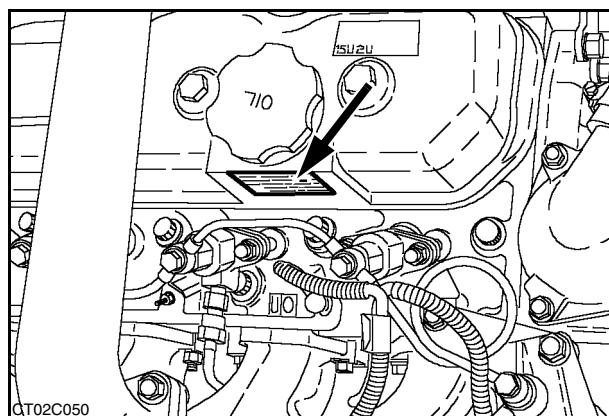
(CX135SR)

Make and type **ISUZU AJ-4JJ1X**

.....

Serial number.....

.....



4

SECTION 2 - IDENTIFICATION NUMBERS/MACHINE COMPONENTS

COMPONENT SERIAL NUMBERS

Hydraulic pump.....

.....

Swing reduction gear.....

.....

Travel reduction gears

.....

Travel control valve

.....

Attachment control valve

.....

Swing control valve.....

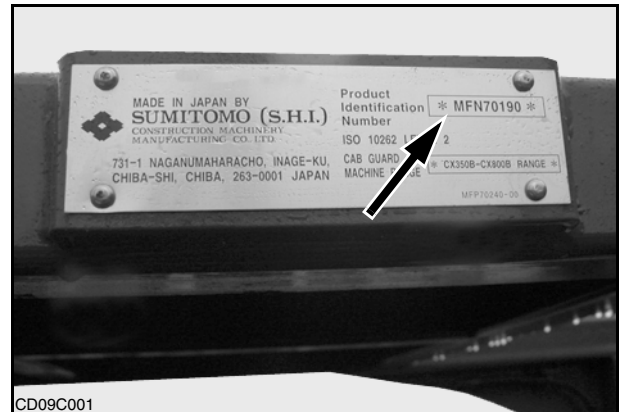
.....

CAB PROTECTION (F.O.P.S.) (optional)

Complies with ISO 10262 level 2 standard.

Identification number

.....



5

QUICK COUPLER (except CX75SR-LR) (optional)

(1) Serial number

(2) Weight.....

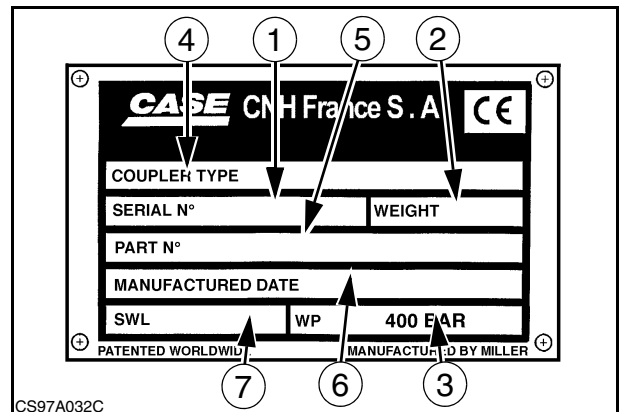
(3) Operating pressure

(4) Type

(5) Part number.....

(6) Date of manufacture.....

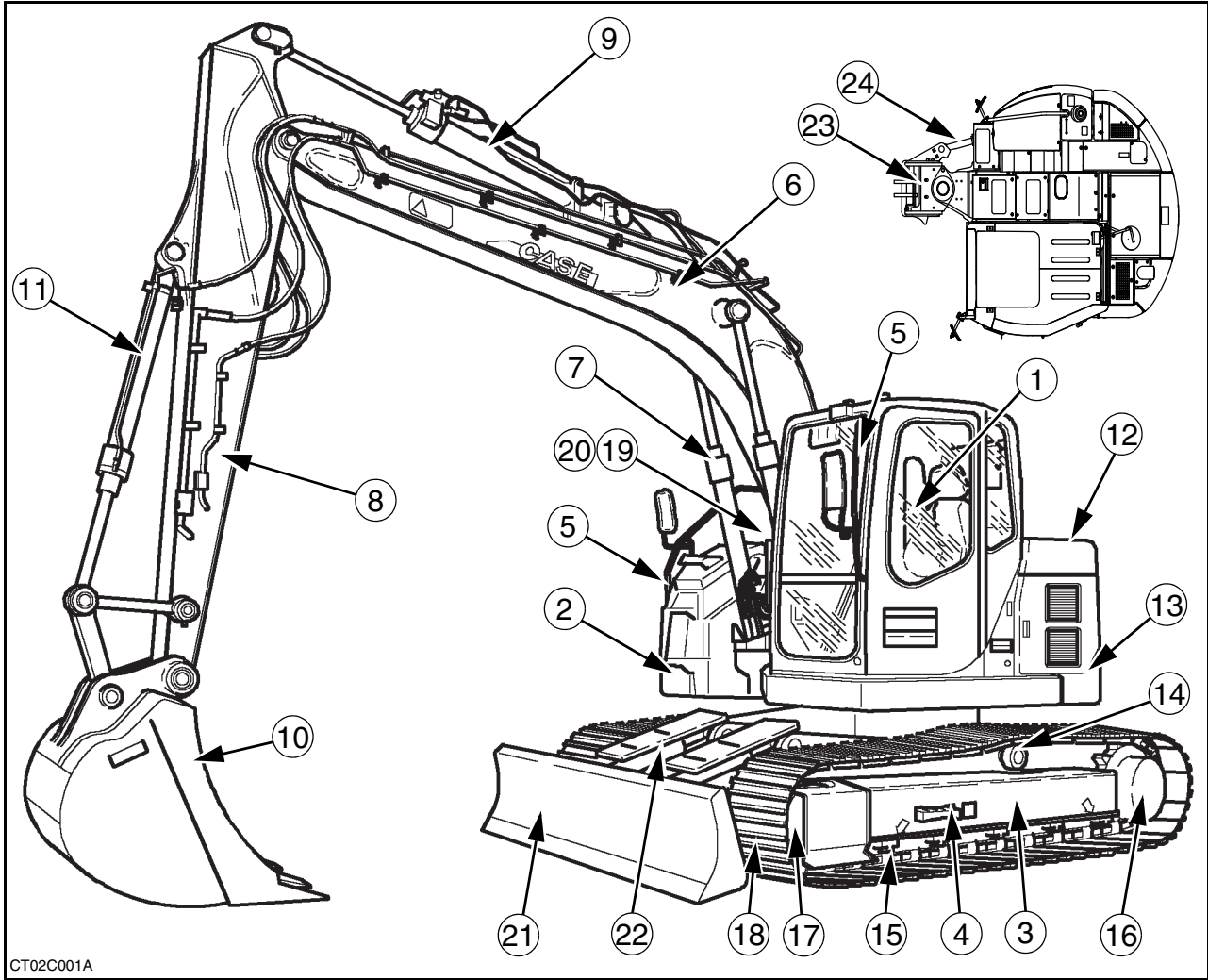
(7) Safe working load.....



6

DESCRIPTION OF THE MAIN COMPONENTS

The **CX75SR**, **CX75SR-LR**, **CX80** and **CX135SR** are fully hydraulic excavators. They consist of an undercarriage fitted with tracks and a turntable bearing which supports the upperstructure frame. The upperstructure frame supports the attachment, at the front end of the machine, plus the engine, hydraulics and cab. When the operator works the controls, the engine-driven pump delivers hydraulic fluid to the control valves. The control valves distribute the hydraulic fluid to the various cylinders and motors concerned. A cooling system maintains the hydraulic fluid at normal operating temperature.



1. Cab/Operator's compartment
2. Upperstructure
3. Undercarriage
4. Steps
5. Access handles
6. Boom
7. Boom cylinders
8. Dipper
9. Dipper cylinder
10. Backhoe bucket
11. Backhoe bucket cylinder
12. Engine compartment
13. Counterweight
14. Upper rollers
15. Lower rollers
16. Travel reduction gears
17. Idler wheels
18. Tracks
19. Hydraulic reservoir
20. Fuel tank
21. Dozer blade (if equipped)
22. Dozer blade cylinders (if equipped)
23. Attachment positioning pivot **(CX80)**
24. Pivot cylinder **(CX80)**

SECTION 3

SAFETY/DECALS/HAND SIGNALS

SAFETY INSTRUCTIONS

Your safety and that of people around you depends on you. It is essential that you understand this manual for the correct operation, inspection, lubrication and maintenance of this machine.

Read this manual carefully and check that:

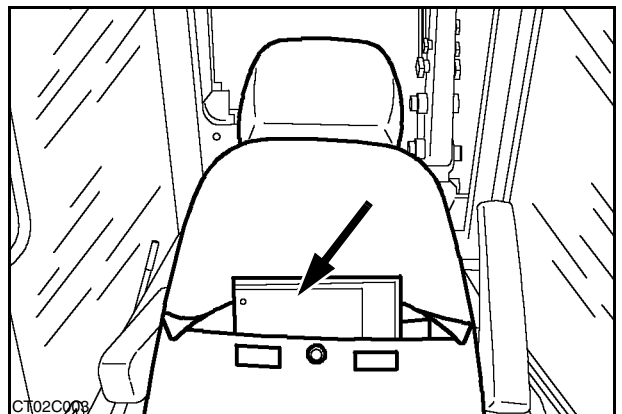
- You understand fully the symbols on the controls and the safety signs used in this manual and on the machine.
- You understand fully the speed, stability, braking and steering characteristics of the machine. If you are in any doubt, consult your CASE Dealer.

The safety messages in this manual concern situations which may arise during normal machine operation and servicing. These safety messages also indicate the different ways of coping with these situations. Other safety messages are used throughout the manual to indicate specific dangers.

Whatever type of work is being done (earthmoving, handling, etc.), the safety measures for private or public work-sites are those which conform to current regulations in the country concerned, or the type of operation concerned (example: mining, quarrying, underground work).

The safety instructions given in this manual are a summary of the basic rules to be respected at all times and do not exempt you from insurance requirements or from abiding by the highway code.

Always keep this manual in the location provided for that purpose (behind the operator's seat). Make sure it is always complete and in good condition. If you wish to obtain extra copies, or copies in languages other than that of the country of use, consult your CASE Dealer.



BEFORE USING THE MACHINE

1. Avoid loose fitting clothing, loose or uncovered long hair, jewellery or any other items which could get caught up in machinery.
2. Different types of job will require different types of protective equipment. Items such as hard hats, safety shoes, heavy gloves, reflector type jackets, respirators, ear protection and eye protection may be required. Before starting a job, determine what protective equipment will be necessary. Use this equipment at all times.
3. Do not attempt to operate this machine unless you have first read and perfectly understood the safety messages and instructions appearing in this manual.
4. Operating the machine requires full attention and care on the part of the operator can avoid accidents. Get to know the machine's possibilities and limitations and the working space required. There are areas of poor visibility in the working range of the machine. Have someone guide you for all areas where visibility is not perfect.
5. Grease, oil, mud or (in winter) ice on the steps and access handles can cause accidents. Make sure they are kept clean at all times.
6. Every day, inspect the machine to detect any signs of hydraulic fluid leakage. Tighten the connections or replace any defective components as necessary.
7. Remove any obstructions which hinder visibility. Keep the windshield, rear view mirror and windows clean at all times.
8. Make sure the windshield wiper works correctly.
9. Make sure you are perfectly familiar with hand signals in daily use on the worksite so as to be able to obtain help with tight manoeuvres or when carrying out operations where visibility is poor.
10. Before undertaking any travel or working operations during hours of darkness, make sure the lighting and signalling equipment is fully operative.
11. Before any travel operation, make sure that the doors and hoods are properly latched.
12. Check that no tools or other items have been left on the machine (be it on the undercarriage or the upperstructure) or in the operator's compartment.
13. The operator must be alone on the machine at all times. Do not allow anyone to stand on or around the machine.
14. To get in or out of the cab, it is imperative that the upperstructure frame is in line with the undercarriage.
15. When alighting from or getting into the operator's compartment, always face the machine and use the steps and access handles.
16. Be sure you know the position and function of each control. Incorrect operation of the controls can cause serious injuries.
17. Check all controls and safety devices in a safe, open area before starting work.
18. Keep away from dangerous areas such as ditches, overhangs, rocky areas, etc. Make a survey of the work-site and determine the possible dangers before using the machine.
19. Before parking the machine, make sure that the ground is stable. Plan the worksite so that the ground is flat, hard and level.
20. Before moving the machine to work in a new area, walk around to determine all possible causes of accidents there. Holes, obstacles, debris and other danger risks in the working area can cause serious injury.
21. Be ready to meet emergencies. Always carry a first aid kit and if possible, fire extinguisher (not supplied) within easy reach on board. Make sure the fire extinguisher is regularly serviced in conformance with the manufacturer's instructions.
22. Check the fastening of the main components: counterweight, turntable bearing and operator's compartment. In the event of problems, consult your CASE Dealer.
23. Make sure you understand the symbols used on the machine safety decals. Keep the decals clean so that they are perfectly legible at all times.

24. Work out a means of convenient escape from the machine (emergency exit via the windshield or the rear window glass) in the event of the machine turning over or tipping over or the cab door being jammed.
25. Make sure you are perfectly familiar with traffic regulations and special safety equipment requirements before transporting this machine on a public highway.
26. When loading trucks, never swing the load over the truck cab.
27. Before undertaking any travel on the job site, make sure the itinerary to be followed is completely safe. If bridges are to be crossed, make sure they are perfectly capable of supporting the weight of the machine.
28. Always steer round large obstacles such as boulders, big trees, etc.
5. Before starting the engine, check the direction of travel (in forward drive, the reduction gears should be to the rear of the machine).
6. Do not work near overhead high-voltage electric lines without checking beforehand that all necessary measures have been taken to respect the minimum distances:
Less than 57 000 volts: 3 metres.
More than 57 000 volts: 5 metres.
7. Study the position of any existing pipelines or conduits before starting work. Electrical cables, gas and water pipes and other underground installations can cause serious injury.
8. Always make allowance for working conditions (sloping or rough ground), the site and weather conditions when driving the machine.
9. Do not allow anyone to stand in the machine working area. Accidental operation of the upper-structure swing control or of an attachment control could cause an accident. Stop all operations until everyone has moved away.

QUICK COUPLER (except CX75SR-LR) (optional)

1. It is mandatory for the switch to be in the locked position when operating the machine.
2. Every day, check that the locking bar functions correctly and that it is not fouled by foreign matter. Clean the locking system if necessary.
3. If you are obliged to use the quick coupler with buckets not manufactured by CASE, make sure the diameter of the pins and the width between the bucket lugs meet the dimensions needed to fit the quick coupler (pins, washers, bushings, etc.). Consult your CASE Dealer.
10. Before operating the dozer blade (if equipped) or pivoting the backhoe-offset boom (if equipped), make sure that there is no one in the working area of the latter.
11. Operate all controls gradually to ensure smooth machine operation.
12. Whenever load handling operations are to be carried out, it is imperative to adhere strictly to the instructions given in this manual and local legislation.

OPERATING THE MACHINE

1. When working on a public highway, use standard traffic signs and take into consideration the working range of the upperstructure and its attachments. Local or national regulations stipulate the number, type and location of reflector strips.
2. Avoid running the engine in a confined space. If there is no alternative, proper ventilation must be provided at all times.
3. Do not allow anyone else on the machine. The passenger could fall or cause an accident.
4. Never operate the working or travel controls unless you are properly seated in the operator's seat with the seat belt correctly fastened.
13. It is forbidden to use the machine to carry out tasks other than those for which it is intended. Never use the equipment for sweeping the ground to level out rubble or push objects (transversal stress on the attachment).
14. Stop the engine and remove the starter switch key when the machine is not in use, even for short periods of time.
15. In some configurations, the working range of the attachment allows the tool to interfere with the machine. Always maintain a safe minimum distance between the tool and the machine (swaying of the tool or incorrect operation).

16. To access or exit the operator's compartment, the LH control arm must be in the raised position. Never forget this basic requirement.
17. Never leave the operator's compartment while the engine is running.
18. To get in or out of the cab, it is imperative that the upperstructure frame is in line with the undercarriage.
19. Dust, smoke or mist can reduce visibility and cause an accident. Reduce speed or come to a complete halt until visibility has improved.
20. Never jump down from the machine. When alighting from the machine or the upperstructure, always face the machine and use the steps and access handles.
21. In the event of an operating problem or failure, move the machine to a safe place, lower the attachment to the ground, shut down the engine and remove the starter switch key. Locate the problem, report it if necessary and take the necessary steps to warn others not to attempt to operate the machine.
22. Before tilting the operator's seat back forward, raise the armrests to prevent them from fouling with the control levers.
23. **(CX135SR)** If the machine is equipped with the 2.10 or 2.85 m dipper, for any work with the machine, the hooking point on the head of the dipper cylinder must be in the work position.
24. **(CX135SR)** If the machine is equipped with the 2.10 m or 2.85 m dipper, the dipper cylinder top attachment point must be in the transport position before transporting the machine.

PREVENTING RISKS CAUSED BY VIBRATIONS

The machine's vibration affects the comfort and in some cases the health and safety of the operator. To reduce vibration risks to a minimum:

1. Make sure that the machine, the equipment and the tool are suitable for the work to be carried out.
2. Make sure that the machine is in good condition and that servicing intervals are complied with.
3. Check the track tension adjustment and the play in equipment linkages.
4. Make sure that the operator's seat and its adjustment controls are in good condition and then adjust the seat to suit the operator's size and weight. The operator's seat complies with the ISO 7096, 2000 standard, EM 6 class.

During work:

1. Operate all controls gradually to ensure smooth machine operation.
2. Modify the machine's operation to suit the working conditions.
3. During travel, adjust the machine's speed, reducing it if necessary.
4. Make sure that the machine's operating radius is in good condition, and free of obstacles and holes.

CAB PROTECTION (F.O.P.S.) (optional)

1. Never try to weld or straighten up the protective structure (F.O.P.S.).
2. Do not modify the protective structure (F.O.P.S.) in any way. Any modification, such as welding, drilling, cutting, addition of accessories, as well as damage suffered following an impact reduces the protection that it provides. Replace the protective structure (F.O.P.S.) if it has suffered an impact and do not attempt to repair it.
3. Incorrect inspection or service work of the protective structure (F.O.P.S.) may lead to serious injury. Carry out inspection operations of the protective structure (F.O.P.S.) given in this manual. If the protective structure (F.O.P.S.) or its components need to be replaced, use only those parts that are listed in the spare parts catalogue corresponding to your machine.

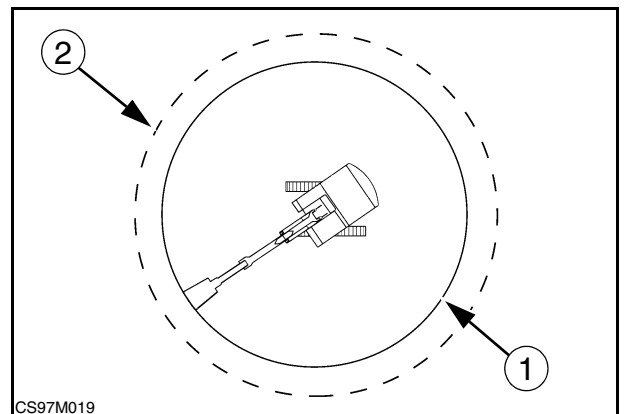
QUICK COUPLER (except CX75SR-LR) (optional)

1. Never place the control switch in the unlocked position when the machine is working.
2. Each time a bucket is installed on the quick coupler, close the bucket and raise the attachment so as to be able to make a visual check that the bucket pin is correctly engaged in the latching hook.
3. The quick coupler modifies the working range of the machine. In certain attachment positions the tool may foul the machine. Always leave a safety distance.
4. Never carry out load handling using the front or rear anchoring points used to install the tool on the quick coupler.
5. Never put your hands inside the quick coupler and never attempt to adjust or repair the quick coupler if the engine is running.

SAFETY AREA

The safety area is the space necessary for the machine to operate at the maximum range of the tool and at full swing (360°) plus 2 metres.

1. Working area.
2. Safety area.



2

USING AN IMPLEMENT OTHER THAN A BUCKET (except CX75SR-LR) (optional)

When using a special implement (hydraulic breaker, cutter crusher etc.), refer to the operator's manual provided with the implement.

IMPLEMENT OPERATION AND MAINTENANCE (except CX75SR-LR)

For the implement operation and maintenance, refer to the operator's manual provided with the implement.

PARKING THE MACHINE

When parking the machine, proceed as follows:

1. Position the machine on flat, level ground, away from soft ground, excavations or poorly shored cavities.
2. Place the upperstructure and the attachment in line with the undercarriage, retract the attachment and dig the bucket into the ground.
3. Lower the dozer blade (if equipped) until it rests on the ground.
4. Stop the engine and remove the starter switch key.
5. It is imperative to lift the LH control arm before leaving the operator's compartment.
6. Lock the cab door.
7. Make sure that the hoods and doors are properly latched.
8. Check that no part of the machine is encroaching on the highway. If this cannot be avoided, install the necessary regulation signalling equipment.

MAINTENANCE AND ADJUSTMENTS

1. Do not try to service this machine unless you have first read and perfectly understood the safety messages and instructions featuring in this manual.
2. When carrying out service work always wear suitable dress. Avoid loose-fitting clothing.
3. Release pressure completely in the hydraulic system before disconnecting the hydraulic piping. Hydraulic oil escaping under pressure can cause serious injury.
4. Before commencing any work on the machine, place a "Do not operate" tag on the right-hand control arm.
5. Always wear eye protection when using a tool that might project metal particles. Use a hammer with a soft face, such as copper, for installing pins.
6. Badly carried out maintenance or adjustments can cause serious injuries. If you do not understand a servicing or adjustment procedure, consult your CASE Dealer.
7. If the attachment is raised or if the machine moves without an operator, serious injury can result. Before carrying out maintenance on this machine, proceed as follows:
 1. Park the machine on flat, level ground.
 2. Lower the attachment until it is resting on the ground.
 3. Lower the dozer blade (if equipped) until it rests on the ground.
 4. Stop the engine and remove the starter switch key.
 5. Lock the tracks to prevent any machine movement.
8. Any unauthorized modifications made to this machine can cause serious injury. Do not undertake any modifications without first consulting your CASE Dealer. Any modifications made must be in conformity with the technical specifications of the machine and any current safety legislation requirements.
9. Certain components of the machine are subject to type approval. When replacing such components, it is mandatory to make sure that they conform to regulations. For safety's sake, use genuine CASE parts.
10. Pressurized hydraulic fluid or grease which penetrates the skin can cause serious injury. Take the necessary safety precautions (safety clothing and protection for face and hands) to avoid such risks. Also, before using these products, read the manufacturer's instructions concerning their use. If hydraulic fluid penetrates the skin, call a doctor immediately.
11. Coolant solution is toxic.
Avoid contact with skin, eyes and clothing.
Antidote:
EXTERNAL: rinse thoroughly with water and remove soiled clothes.
INTERNAL: do not induce vomiting. Rinse the mouth out with water. Seek medical advice.
EYES: rinse thoroughly with water and seek medical advice.

12. The pressure in the track tension cylinders is high. Follow the procedure described in this manual carefully for increasing or reducing track tension.
13. When carrying out a welding operation on the undercarriage or upperstructure carriage as authorized by the manufacturer and in accordance with his instructions, disconnect the batteries, disconnect the alternator B+ and D+ terminal wires and connect the welding apparatus earth cable to the component on which the welding operation is to be performed. Never connect the welding apparatus to the undercarriage when welding on the upperstructure (or vice-versa). Never connect the welding apparatus earth to a component of the hydraulic system.
14. When using compressed air, take the necessary precautions to protect your face.
15. Clean the machine regularly. Accumulations of grease, dirt and debris can cause injuries or damage the machine.
16. Periodically inspect the fastening of the main components, as part of the machine maintenance programme: counterweight, turntable bearing and operator's compartment. In the event of problems, consult your CASE Dealer.
17. If the accumulator is not functioning correctly, see your CASE Dealer. Never try to carry out any servicing operation on the accumulator. If this instruction is not followed serious injury can result.
18. The accumulator is charged with nitrogen under high pressure. Do not weld or allow flames to come near to the accumulator.
19. There is high pressure fuel in the feed pipe when the engine is running and immediately after it has been shut down. Wait for 2 minutes after engine shut down before you do any maintenance or inspections to allow the pressure to drop in the pipe.
20. High-voltage is charged to the controller and/or to the injector while the engine is running and immediately after it has been shut down. Do not touch the controller or the injector. If it is necessary to touch them for maintenance purposes, consult your CASE Dealer.

QUICK COUPLER (except CX75SR-LR) (optional)

1. Every day, check that the locking bar functions correctly and that it is not fouled by foreign matter. Clean the locking system if necessary.

PREVENTING FIRES OR EXPLOSIONS

1. Engine fuel can cause an explosion or a fire.
 - Never refuel when the engine is running.
 - Never smoke while refuelling.
 - Take all necessary safety measures when welding, grinding or working near a naked flame.
2. Always use a non-inflammable solvent for cleaning parts.
3. A spark or a naked light can cause the hydrogen in a battery to explode. To avoid all risk of explosion, be sure to follow the instructions below:
 - When disconnecting battery cables, always disconnect the negative cable (-) first.
 - When connecting battery cables, always connect the negative cable (-) last.
 - Never short-circuit the battery terminals with metal objects.
 - Do not weld, grind or smoke near the batteries.
4. Always store batteries in a safe place, out of the reach of children.
5. Sparks can fly from the electrical system or the engine exhaust. Before running the machine in an area where there may be inflammable gasses, make sure there is adequate ventilation.
6. If possible, make sure there is a fire extinguisher (not supplied) within easy reach on board the machine. Make sure the fire extinguisher is regularly serviced in conformity with the manufacturer's instructions.
7. Clean the machine regularly, removing all debris and inflammable material.
8. Make sure there are no leaks and replace any damaged hoses, lines or connectors. After any repair work, clean the machine before operating.



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PREVENTION OF BURNS

1. The electrolyte in the batteries can cause serious burns. Batteries contain sulphuric acid. Avoid contact with skin, eyes and clothing.
Antidote:
EXTERNAL: rinse thoroughly with water and remove soiled clothes.
INTERNAL: do not induce vomiting. Rinse the mouth out with water. Seek medical advice.
EYES: rinse thoroughly with water for 15 minutes and seek medical advice.
2. When the batteries electrolyte freezes, they can explode if you try to charge them or start up the engine with booster batteries. To prevent the electrolyte from freezing, always keep the batteries fully charged.
3. Batteries give off explosive gases. Keep all naked flames, sparks and cigarettes away. Ensure adequate ventilation when charging batteries or when using in a confined place. Always protect your eyes when working near the batteries.
4. Boiling coolant solution can spray out if the radiator cap is removed while the system is still hot. Before removing the cap, let the system cool down and then turn the cap to its first notch, waiting until all pressure is released. Then remove the cap.
5. Never touch battery terminals with the hands as electrolysis can take place within the human body and damage vital organs.

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