

Product: EXCAVATOR
Model: 212B EXCAVATOR 3PJ
Configuration: 212B EXCAVATOR WHEEL TYPE 3PJ00001-UP (MACHINE)

Operation and Maintenance Manual 206B AND 212B WHEEL-TYPE EXCAVATORS

Media Number -SEBU6326-00

Publication Date -01/06/1990

Date Updated -11/10/2001

Foreword

SMCS - 7606

This manual should be stored in the operator's compartment in the literature holder.

This manual contains safety, operation, transportation, lubrication and maintenance information.

Some photographs or illustrations in this publication show details or attachments that may be different from your machine. Guards and covers may have been removed for illustrative purposes.

Continuing improvement and advancement of product design may have caused changes to your machine which are not included in this publication. Read-study-and keep this manual with the machine.

Whenever a question arises regarding your machine, or this publication, please consult your Caterpillar dealer for the latest available information.

Safety

The safety section lists basic safety precautions. In addition, this section identifies the text and locations of warning labels used on the machine.

Read and understand the basic precautions listed in the safety section before operating or performing lubrication, maintenance and repair on this product.

Operation

The operation section is a reference for the new operator and a refresher for the experienced one. This section includes a discussion of gauges, switches, machine controls, implement controls, transportation and towing information.

Photographs and illustrations guide the operator through correct procedures of checking, starting, operating and stopping the machine.

Operating techniques outlined in this publication are basic. Skill and techniques develop as the operator gains knowledge of the machine and its capabilities.

Maintenance

The maintenance section is a guide to equipment care. The illustrated, step-by-step instructions are grouped by servicing intervals. Items without specific intervals are listed under "When Required" topics. Items in the "Maintenance Intervals" chart are referenced to detailed instructions that follow.

Maintenance Intervals

Use the service hour meter to determine servicing intervals. Calendar intervals shown (daily, weekly, monthly, etc.) may be used instead of service hour meter intervals if they provide more convenient servicing schedules and approximate the indicated service hour meter reading. Recommended service should always be performed at the interval that occurs first.

Under extremely severe, dusty or wet operating conditions, more frequent lubrication than is specified in the "Maintenance Intervals" chart may be necessary.

Perform service on items at multiples of the original requirement. For example, at "Every 500 Service Hours or 3 Months," also service those items listed under "Every 250 Service Hours or Monthly" and "Every 10 Service Hours or Daily."

Machine Description



This machine is equipped with a 3114 diesel engine.

This machine is designed primarily for excavating material.

Machine Storage

For complete machine storage information refer to Special Instruction SEHS9031, "Storage Procedure for Caterpillar Products."

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Safety

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Warning Signs and Labels

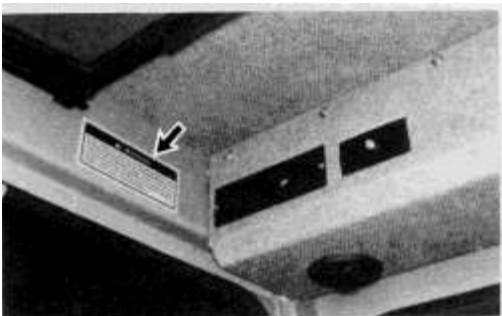
There are several specific safety signs on your machine. Their exact location and description of the hazard are reviewed in this section. Please take the time to familiarize yourself with these safety signs.

Make sure that you can read all safety signs. Clean or replace these if you cannot read the words or see the pictures. When cleaning the labels use a cloth, water and soap. Do not use solvent, gasoline, etc.

You must replace a label if it is damaged, missing or cannot be read. If a label is on a part that is replaced, make sure a new label is installed on the replaced part. See your Caterpillar dealer for new labels.



Do not operate or work on this machine unless you have read and understand the instructions and warnings in the Operation and Maintenance Manual. Failure to follow the instructions or heed the warnings could result in injury or death. Contact any Caterpillar dealer for replacement manuals. Proper care is your responsibility.



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Located in the cab.

 **WARNING**

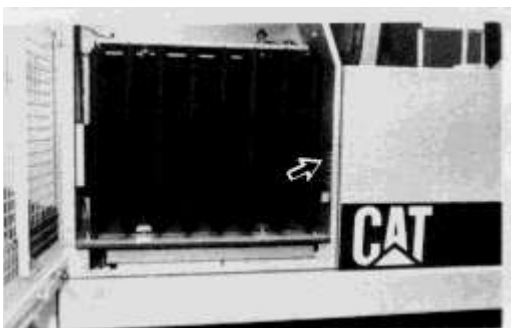
Structural damage, an overturn, modification, alteration, or improper repair can impair this structure's protection capability thereby voiding this certification. Consult a Caterpillar dealer to determine this structure's limitations without voiding its certification.



Located on the Falling Object Guard.

 **WARNING**

Improper jumper cable connections can cause an explosion resulting in personal injury. Batteries in series may be located in separate compartments. When using jumper cables always connect positive (+) cable to positive (+) terminal of battery connected to starter solenoid and negative (-) cable from external source to starter negative (-) terminal. (If not equipped with starter negative terminal, connect to engine block.)



Located by the battery compartment.



WARNING

Know the maximum height and reach of your machine. Serious injury or death by electrocution can occur if machine or attachments are not kept a safe distance from electrical power lines. Keep distance at least 3 m (10 feet) plus additional 10 mm (0.4 inch) for each 1,000 volts over 50,000 volts.

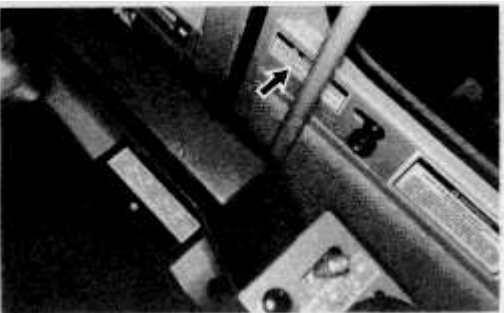


Located on the cab door.



WARNING

Functions of steering and transmission direction controls are reversed when boom is over rear axle. Failure to properly control machine can result in personal injury.



Located in the cab.



WARNING

Swing lock must be engaged before shipping machine. If lock is not engaged, upper structure can swing, resulting in possible personal injury.

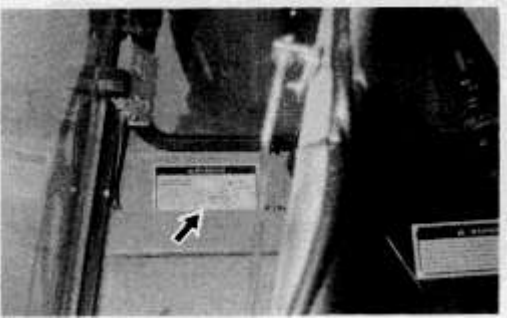


Located in the cab.



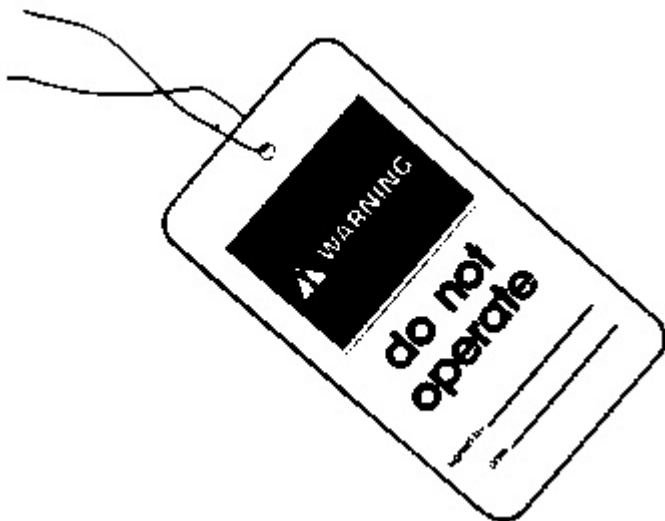
WARNING

Clamshell or grapple swing. Personal injury may result if clamshell or grapple swings into the cab or a person in the work area. Clamshell or grapple can swing in all directions.



Located in the cab.

General Hazard Information



Attach a "DO NOT OPERATE" or similar warning tag to start switch or controls before servicing or repairing the machine. These tags, Form SEHS7332, are available from your Caterpillar dealer.

Know the width of your attachments so proper clearance can be maintained when operating near fences, boundary obstacles, etc.

Wear a hard hat, protective glasses and other protective equipment as required by job conditions.

Do not wear loose clothing or jewelry that can catch on controls or other parts of the machine.

Make certain all protective guards and covers are secured in place on the machine.

Keep the machine, especially the deck, walkways and steps, free of foreign material, such as debris, oil, tools and other items which are not part of the machine.

Secure all loose items such as lunch boxes, tools and other items which are not part of the machine.

Know the appropriate work-site hand signals and who gives them. Accept signals from one person only.

Never put maintenance fluids into glass containers.

Use all cleaning solutions with care.

Report all needed repairs.

Do not allow unauthorized personnel on the machine.

- * The attachments lowered to the ground.
- * The hydraulic armrest control pulled up to the disengaged position.
- * The parking brake engaged.
- * The engine stopped.
- * The key start switch off and the key removed.
- * The disconnect switch off and the key removed. (Located in the engine compartment.)

Pressure Air

Pressure air can cause personal injury. When using pressure air for cleaning, wear a protective face shield, protective clothing and protective shoes.

The maximum air pressure must be below 205 kPa (30 psi) for cleaning purposes.

Fluid Penetration

Always use a board or cardboard when checking for a leak. Escaping fluid under pressure, even a pin-hole size leak, can penetrate body tissue, causing serious injury, and possible death. If fluid is injected into your skin, it must be treated by a doctor familiar with this type of injury immediately.

Crushing or Cutting Prevention

Support equipment and attachments properly when working beneath them. Do not depend on hydraulic cylinders to hold it up. Any attachment can fall if a control is moved, or if a hydraulic line breaks.

Never attempt adjustments while the machine is moving or the engine is running unless otherwise specified.

Where there are attachment linkages, the clearance in the linkage area will increase or decrease with movement of the attachment.

Stay clear of all rotating and moving parts.

Keep objects away from moving fan blades. They will throw or cut any object or tool that falls or is pushed into them.

Do not use a kinked or frayed wire rope cable. Wear gloves when handling the wire rope cable.

Retainer pins, when struck with force, can fly out and injure nearby persons. Make sure the area is clear of people when driving retainer pins.

Wear protective glasses when striking a retainer pin to avoid injury to your eyes.

Chips or other debris can fly off objects when struck. Make sure no one can be injured by flying debris before striking any object.

Falling Objects Guard

This is an attached guard located above the operator's compartment and secured to the machine.

To avoid possible weakening of the Falling Objects Guard, consult a Caterpillar dealer before altering the Falling Objects Guard in any way. The protection offered by this Falling Objects Guard will be impaired if it has been subjected to structural damage. Structural damage can be caused by an overturn accident, by falling objects, etc.

Do not attempt to lift the machine with the lift eyes on the cab or counterweight.

Burn Prevention

Coolant



At operating temperature, the engine coolant is hot and under pressure. The radiator and all lines to heaters or the engine contain hot water or steam. Any contact can cause severe burns.

Steam can cause personal injury.

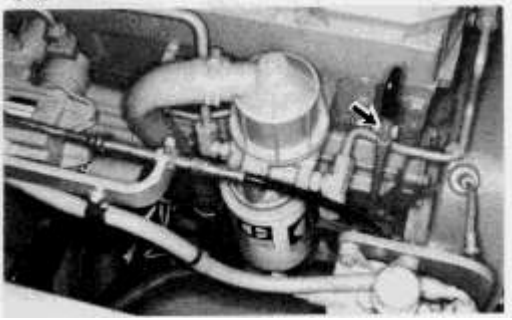
Check the coolant level only after the engine has been stopped and the filler cap is cool enough to remove with your bare hand.

Remove the cooling system filler cap slowly to relieve pressure.

Cooling system additive contains alkali that can cause personal injury. Avoid contact with the skin and eyes and do not drink.

Allow cooling system components to cool before draining.

Oils



Hot oil and components can cause personal injury. Do not allow hot oil or components to contact the skin.

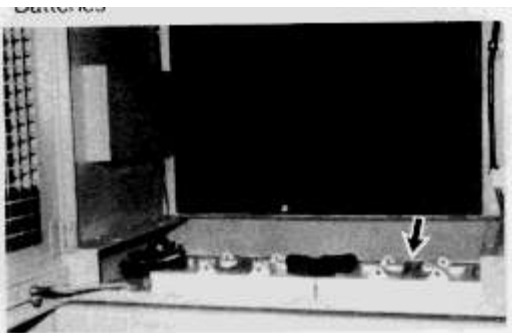
At operating temperature, the hydraulic tank is hot and can be under pressure.

Remove the hydraulic tank filler cap only after the engine has been stopped and the filler cap is cool enough to remove with your bare hand.

Remove the hydraulic tank filler cap slowly to relieve pressure.

Relieve all pressure in air, oil, fuel or cooling systems before any lines, fittings or related items are disconnected or removed.

Batteries



Batteries give off flammable fumes which can explode.

Do not smoke when observing the battery electrolyte levels.

Electrolyte is an acid and can cause personal injury if it contacts skin or eyes.

Always wear protective glasses when working with batteries.

Fire or Explosion Prevention

All fuels, most lubricants and some coolant mixtures are flammable.

Fuel leaked or spilled onto hot surfaces or electrical components can cause a fire.

Do not smoke while refueling or in a refueling area.

Do not smoke in areas where batteries are charged, or where flammable materials are stored.

Batteries in series may be located in separate compartments. When using jumper cables always connect positive (+) cable to positive (+) terminal of battery connected to starter solenoid and negative (-) cable from external source to starter negative (-) terminal. (If not equipped with starter negative terminal, connect to engine block.)

See the "Operation Section" of this manual for specific starting instructions.

Clean and tighten all electrical connections. Check daily for loose or frayed electrical wires. Have all loose or frayed electrical wires tightened, repaired or replaced before operating the machine.

Keep all fuels and lubricants stored in properly marked containers and away from all unauthorized persons.

Store all oily rags or other flammable material in a protective container, in a safe place.

Do not weld or flame cut on pipes or tubes that contain flammable fluids. Clean them thoroughly with nonflammable solvent before welding or flame cutting on them.

Remove all flammable materials such as fuel, oil and other debris before they accumulate on the machine.

Do not expose the machine to flames, burning brush, etc., if at all possible.

Shields, which protect hot exhaust components from oil or fuel spray in the event of a line, tube or seal failure, must be installed correctly.

Have a fire extinguisher available and know how to use it. Inspect and have it serviced as recommended on its instruction plate.

Ether

Ether is poisonous and flammable.

Breathing ether vapors or repeated contact of ether with skin can cause personal injury.

Use ether only in well ventilated areas.

Do not smoke while changing ether cylinders.

Use ether with care to avoid fires.

Do not store replacement ether cylinders in living areas or in the operator's compartment.

Do not store ether cylinders in direct sunlight or at temperatures above 39°C (102°F).

Discard cylinders in a safe place. Do not puncture or burn cylinders.

Keep ether cylinders out of the reach of unauthorized personnel.

Lines, Tubes and Hoses

Do not bend or strike high pressure lines. Do not install bent or damaged lines, tubes or hoses.

Repair any loose or damaged fuel and oil lines, tubes and hoses. Leaks can cause fires. Contact your Caterpillar dealer for repair or replacement.

Check lines, tubes and hoses carefully. Do not use your bare hand to check for leaks. Use a board or cardboard to check for leaks. See "Fluid Penetration" in the "Safety" section for more details. Tighten all connections to the recommended torque. Replace if any of the following conditions are found.

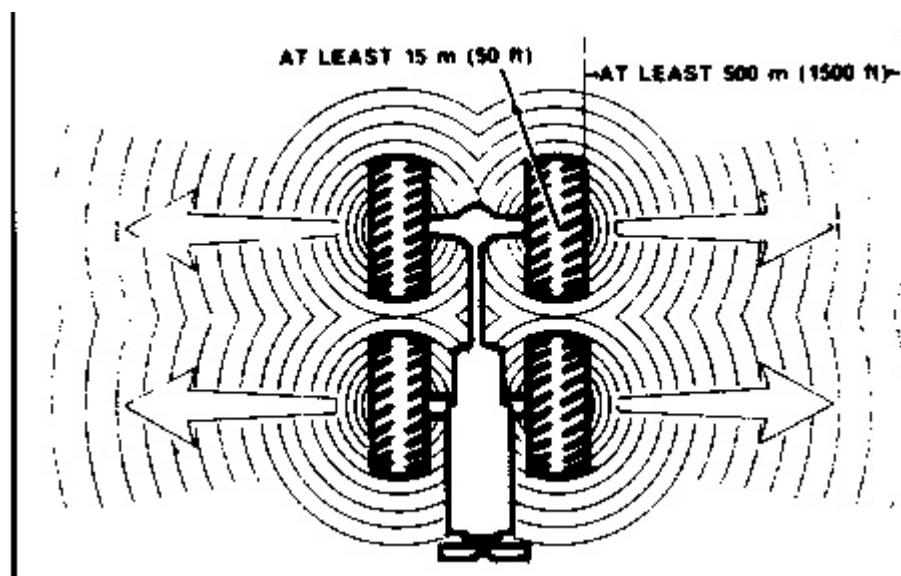
- * End fittings damaged or leaking.
- * Outer covering chafed or cut and wire reinforcing exposed.
- * Outer covering ballooning locally.
- * Evidence of kinking or crushing of the flexible part of hose.
- * Armouring embedded in the outer cover.
- * End fittings displaced.

Make sure that all clamps, guards and heat shields are installed correctly to prevent vibration, rubbing against other parts, and excessive heat during operation.

Tire Information

Explosions of air-inflated tires have resulted from heat-induced gas combustion inside the tires. The heat, generated by welding or heating rim components, external fire, or excessive use of brakes can cause gaseous combustion.

A tire explosion is much more violent than a blowout. The explosion can propel the tire, rim and axle components as far as 500 m (1500 ft) or more from the machine. Both the force of the explosion and the flying debris can cause personal injury or death, and property damage.



Do not approach a warm tire closer than the outside of the area represented by the shaded area in the above drawing.

Dry nitrogen (N₂) gas is recommended for inflation of tires. If the tires were originally inflated with air, nitrogen is still preferred for adjusting the pressure. Nitrogen mixes properly with air.

Nitrogen inflated tires reduce the potential of a tire explosion, because nitrogen does not support combustion. Also, nitrogen helps prevent oxidation and the resulting deterioration of rubber and corrosion of rim components.

Proper nitrogen inflation equipment and training in its use are necessary to avoid overinflation. A tire blowout or rim failure can result from improper or misused equipment.

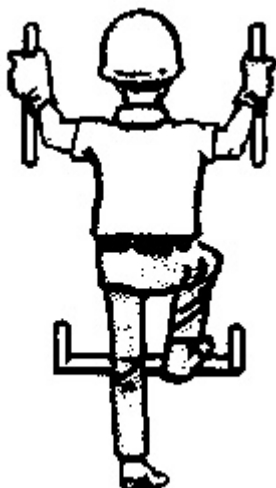
Stand behind the tread and use a self-attaching chuck when inflating a tire.

Servicing and changing tires and rims can be dangerous and should be done only by trained personnel using proper tools and procedures. If correct procedures are not followed while servicing tires and rims, the assemblies could burst with explosive force and cause serious personal injury or death. Follow carefully the specific information provided by your tire or rim servicing personnel or dealer.

Mounting and Dismounting



- * Mount and dismount the machine only where steps and/or handholds are provided.
- * Inspect, and when necessary, clean and have repairs made to steps and handholds before mounting and dismounting.



- * Face the machine when mounting and dismounting.

- * Maintain a three point contact (two feet and one hand or one foot and two hands contact) with the steps and handholds.
- * Never get on or off a moving machine.
- * Never jump off the machine.
- * Do not try to climb on or off the machine when carrying tools or supplies. Use a hand line to pull equipment up onto the platform.
- * Do not use any controls as handholds when entering or leaving the operator's station.

Secondary Exit

Machines equipped with cabs are equipped with secondary exits. For additional secondary exit information, refer to topics "Front Windshield" and "Cab Rear Window" in the "Monitoring Systems and Cab Features" section of this manual.

Before Starting the Engine

Start the engine only from the operator's station. Never short across the starter terminals or across the batteries, as this could bypass the engine neutral-start system as well as damage the electrical system.

Inspect the condition of the seat belt and mounting hardware. Replace any damaged or worn parts. Replace the seat belt regardless of appearance, after three years of use.

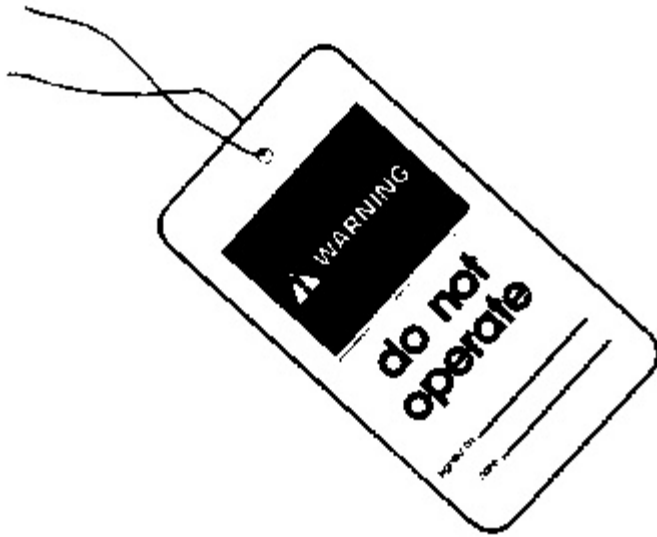
Adjust the seat so that full pedal travel can be obtained with the operator's back against the seat back.

Make sure the machine is equipped with a lighting system as required by conditions.

Make sure all lights are working properly.

Make sure no one is working on, underneath or close to the machine before starting the engine or beginning to move the machine. Make sure the area is free of personnel.

Engine Starting



Do not start the engine or move any of the controls if there is a "DO NOT OPERATE" or similar warning tag attached to the start switch or controls.

Move all hydraulic controls to the HOLD position before starting the engine.

Raise the armrest up to disengage the hydraulic controls.

Engage the parking brake.

Diesel engine exhaust contains products of combustion which may be harmful to your health. Always start and operate the engine in a well-ventilated area and, if in an enclosed area, vent the exhaust to the outside.

Before Operating the Machine

Clear all personnel from the machine and the area.

Clear all obstacles from the path of the machine. Beware of hazards such as wires, ditches, etc.

Be sure all windows are clean. Secure the doors and windows in either the open or shut position.

Adjust the rear view mirrors (if equipped) for best vision, especially close to the machine.

Make sure the machine horn, the travel alarm and all other warning devices are working properly.

Fasten the seat belt securely.

Machine Operation

Operate the machine only while seated and with the seat belt fastened.

Operate the controls only with the engine running.

Check for proper operation of all controls and protective devices while moving slowly in an open area.

The operator must be satisfied that no one will be endangered before moving the machine.

Do not allow riders on the machine unless additional seat, seat belt and Falling Objects Guard are provided.

Report any needed repairs noted during operation.

Carry attachments close to the ground, approximately 40 cm (15 in) above ground level.

Stay a safe distance from the edge of cliffs, overhangs and slide areas.

If the machine begins to sideslip on a grade, immediately dispose of the load and turn the machine downhill.

Be careful to avoid the condition which could lead to tipping when working on hills, banks or slopes, and when crossing ditches, ridges or other obstructions.

Work up and down slopes, rather than sideways, whenever possible.

Keep the machine under control and do not work it over its capacity.

Be sure hitch points and the towing device are adequate.

Connect trailing equipment to a drawbar or hitch only.

Never straddle a wire rope cable or similar device, nor allow others to do so.

No personnel should be between the machine and trailing equipment when maneuvering to connect them. Block the tongue or hitch of trailing equipment to align it with the drawbar or hitch.

Know the maximum height and reach of your machine.

For safety, local or state codes or jobsite operating directives may require a greater distance.

Always keep the Falling Objects Guard (if equipped) installed when operating the machine.

Do not operate the machine with the counterweight removed. Machine can tip when boom is over the side.

Personal injury may result if the clamshell swings into the cab or into a person in the work area. The clamshell can swing in all directions.

The boom and stick linkage can allow the bucket to make contact with the undercarriage and the cab.

Machine Parking



Park on a level surface. If necessary to park on a grade, block the machine.

Apply the service brake to stop the machine.

Engage the parking brake control.

Lower all attachments to the ground.

Move the governor control lever to LOW IDLE.

Stop the engine.

Turn the start switch key to OFF and remove.

Turn the disconnect switch key to OFF and remove.

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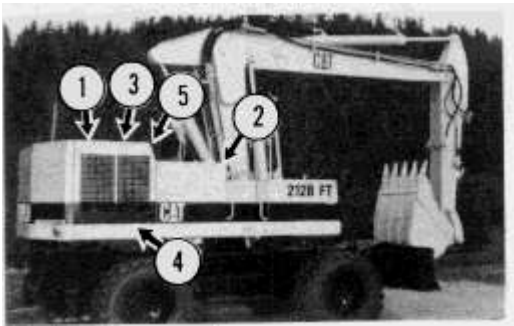
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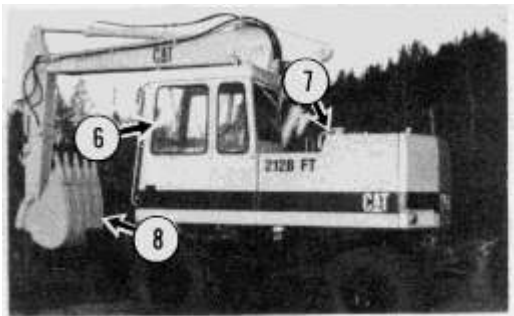
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Specifications and Model Views

SMCS - 7606



Engine (1), fuel tank (2), radiator (3), battery (4) and key disconnect switch (5).



Operator's compartment (6), hydraulic tank (7) and bucket (8).

Basic standard machine shipping specifications for 206B are listed below.

206B Wheel-Type Excavators	
Weight (approximate)	11 670 kg (25,674 lb)
Length (maximum)	7430 mm (24 ft 5 in)
Width (across tires)	2499 mm (8 ft 2 in)
Height (cab)	3101 mm (10 ft 2 in)

Basic standard machine shipping specifications for 212B are listed below.

212B Wheel-Type Excavators

Weight (approximate)	14 510 kg (31,922 lb)
Length (maximum)	7980 mm (26 ft 2 in)
Width (across tires)	2499 mm (8 ft 2 in)
Height (cab)	3148 mm (10 ft 4 in)

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Product Identification and Serial Number Location

SMCS - 7606

The Product Identification Number (PIN) will be used to identify a powered machine that is designed for an operator to ride.

Caterpillar products such as earthmoving equipment not designed for an operator to ride (engines, transmissions, etc.) are identified by Serial Numbers. Also, most major Caterpillar attachments are identified by Serial Numbers.

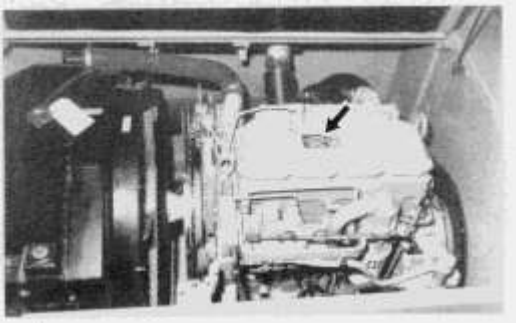
For quick reference, record the identification numbers in the spaces provided below the illustration photographs.



Machine PIN _____



Service Information Number Plate (SIN)



Engine Serial Number _____



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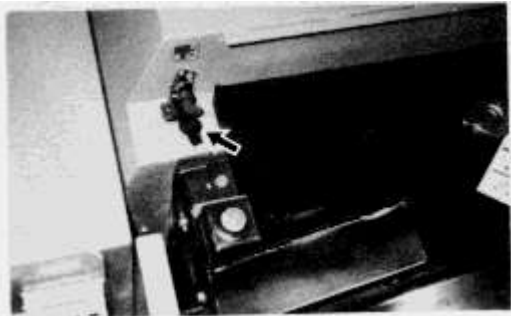
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Monitoring Systems and Cab Features

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Battery Disconnect Switch



The battery disconnect switch is located in the engine compartment.

Disconnect Switch ON - Insert the key, and turn it to the right, to turn on the electrical system. The switch must be on before starting the engine.

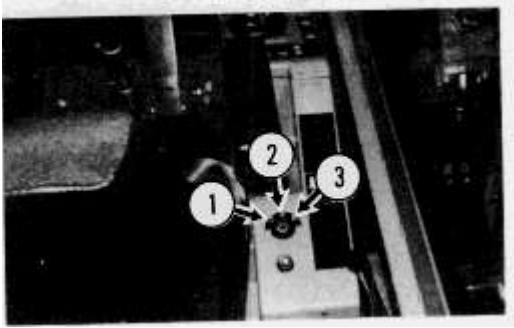
Disconnect Switch OFF - Turn the key to the left to turn off the electrical system.

Remove the key when leaving the machine. Also, remove the key when servicing the electrical system.

NOTICE

Never turn the disconnect key off with the engine running. Engine damage could result.

Engine Start Switch



OFF (1) - No power to most electrical circuits in the cab. The cab lights, panel lights, tail lights and the fuel gauge light are operational even with the switch in the OFF position.

Turn the key switch to OFF to stop the engine.

ON (2) - Turn the switch clockwise and all circuits in the cab are operational.

START (3) - Starts the engine, key returns to the (2) position when released.

Starting Aid



Starting Aid - Push the switch to release a premeasured amount of ether into the air intake.

NOTICE

Inject ether ONLY while cranking the engine. Use the ether sparingly. Excessive ether can cause piston and ring damage. Use when temperatures are below 0°C (+32°F) for cold weather starting purposes. Refer to "Engine Starting" for further information.

Indicator lights

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