Product: EXCAVATOR
Model: 213 EXCAVATOR 3ZC
Configuration: 6.3544 DIESEL ENGINE FOR 213 EXCAVATOR 3ZC00001-UP (MACHINE)

Operation and Maintenance Manual
213 TRACK-TYPE EXCAVATOR

Media Number -HEBU6003-01 **Publication Date -01/05/1985** **Date Updated -10/10/2001**

Foreword

SMCS - 7606

This guide contains operation instructions and lubrication and maintenance information.

The operation section is a reference for the new operator and a refresher for the experienced one. Read - study - and keep it handy.

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.

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." Items in the "Lubrication and Maintenance Chart" are referenced to detailed instructions that follow.

Use the service meter to determine servicing intervals. Calendar intervals shown (daily, weekly, monthly, etc.) may be used instead of service meter intervals if they provide more convenient servicing schedules and approximate the indicated service 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 "Lubrication and Maintenance 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, Every 50 Service Hours or Weekly and Every 10 Service Hours or Daily.

Some photographs in this publication show details or attachments that may be different from your machine. Also, 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.

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

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Safety

SMCS - 7606

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.

HIGH PRESSURE CYLINDER - Do not remove any parts until all pressure has been relieved to avoid possible personal injury. Relieve pressure by opening relief valve 3 turns maximum. See Maintenance Guide for track adjustment procedure.

Located on the roller frame.

Do not operate this machine unless you have read and understand the instructions in the "Operation" Guide. Improper machine operation is dangerous and could result in injury or death. The "Operation" Guide is in holder located in operator's compartment. Contact any Caterpillar dealer for a replacement guide. Proper operation is your responsibility.

Located in the cab.

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.

WARNING

Lubrication, maintenance or repair of this machine can be dangerous unless performed properly. Each person must satisfy himself that he has the necessary skill and information, proper tools and equipment, and that his work method is safe and correct. Caterpillar dealers are available to provide service and information.

Located on the cab door.

WARNING

To prevent possible injury refer to the "Operation" Guide before attempting to boost start this machine.

Located in the battery compartment.

POISON/DANGER

CAUSES SEVERE BURNS

Contains sulfuric acid. Avoid contact with skin, eyes or clothing. Antidote: EXTERNAL - Flush with water. INTERNAL - Drink large quantities water or milk. Follow with milk of magnesia, beaten egg or vegetable oil. Call physician immediately. Eyes: Flush with water for 15 minutes and get prompt medical attention. Batteries produce explosive gases. Keep sparks, flame, cigarettes away. Ventilate when charging or using in enclosed space. Always shield eyes when working near batteries.

KEEP OUT OF REACH OF CHILDREN.

Do not open door while engine is running. Personal injury could result from contact with moving parts.

Located on engine access door.

General

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.

Perform all maintenance unless otherwise specified as follows:

The parking brake engaged.

The engine stopped.

The key switch off and the key removed.

Follow the lift capacity sign in the cab for lifting.

To avoid possible weakening of this FOPS, consult a Caterpillar dealer before altering a FOPS in any way. The protection offered by this FOPS, if equipped, will be impaired if it has been subjected to structural damage or has been involved in an overturn incident.

The upper structure can swing and cause personal injury during shipping or roading, if the swing lock pin is not engaged.

Lower the clamshell (if equipped) in the open position.

Use the front windshield or rear window as an emergency exit if the door is blocked.

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 hand signals and who gives them. Accept signals from one person only.

Never put maintenance fluids into glass containers.

Report all needed repairs.

Do not allow unauthorized personnel on the machine.

When using pressure air for cleaning, wear a protective face shield and protective clothing.

Maximum air pressure from the nozzle must be less than 205 kPa (3Q psi) for cleaning purposes.

Crushing or Cutting Prevention

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

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

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

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.

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.

Burn Prevention

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.

Battery electrolyte contains acid that can cause injury. Avoid contact with the skin and eyes.

Fire or Explosion Prevention

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

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.

When starting from an external source, always connect the positive (+) boost cable to the positive (+) terminal of the battery of the engine to be started.

Attach the negative (-) boost ground cable last, away from the battery. See "Starting the Engine" in the this guide for specific 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.

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.

Inspect all lines, tubes and hoses carefully. Do not use your bare hand to check for leaks. Tighten all connections to the recommended torque.

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

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.

Do not use ether in this engine. It is equipped with a cold weather inlet manifold preheater.

Fire Extinguisher

Always have a fire extinguisher on the machine and know how to use it. Inspect and have it serviced as recommended on its instruction plate.

Mounting and Dismounting

Mount and dismount the machine only where steps and/or handholds are provided.

Use both hands and face the machine, when mounting and dismounting.

Turn the machine 90° to align the upper with the lower structure steps for maintenance purposes. Remove all personnel from machine before turning.

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.

Preparing to Start the Engine

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 brake 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.

Starting the Engine

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 implement controls to the HOLD position before starting the engine.

Engage the parking brake. Move the transmission control lever to neutral.

Start and operate the engine in a well ventilated area only. In an enclosed area, vent the exhaust to the outside.

Preparing to Operate 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.

For best vision, especially close to the machine, adjust the rear view mirrors.

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

Fasten the seat belt securely.

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

Operating the Machine

Operate the machine only while seated.

Operate the controls only with the engine running.

Watch boom clearances when moving the machine. Uneven ground can cause the boom to move from side to side or up and down.

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 Object Protective Structure (FOPS), if equipped, installed when operating the machine.

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.

Use caution when working around shear blades and grapples. Personal injury can result if shear blades or grapple are accidentally closed.

Do not allow riders on the machine unless additional seat, seat belt and falling object protection are provided.

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

Report any needed repairs noted during operation.

Carry implements close to the ground, approximately 40 cm (15 inch) above ground level.

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

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.

Parking the Machine

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

Engage the parking brake.

Engage the hydraulic and undercarriage lock lever.

Lower all implements to the ground and apply slight down pressure.

Stop the engine.

Turn the key switch to the OFF position and remove the key.

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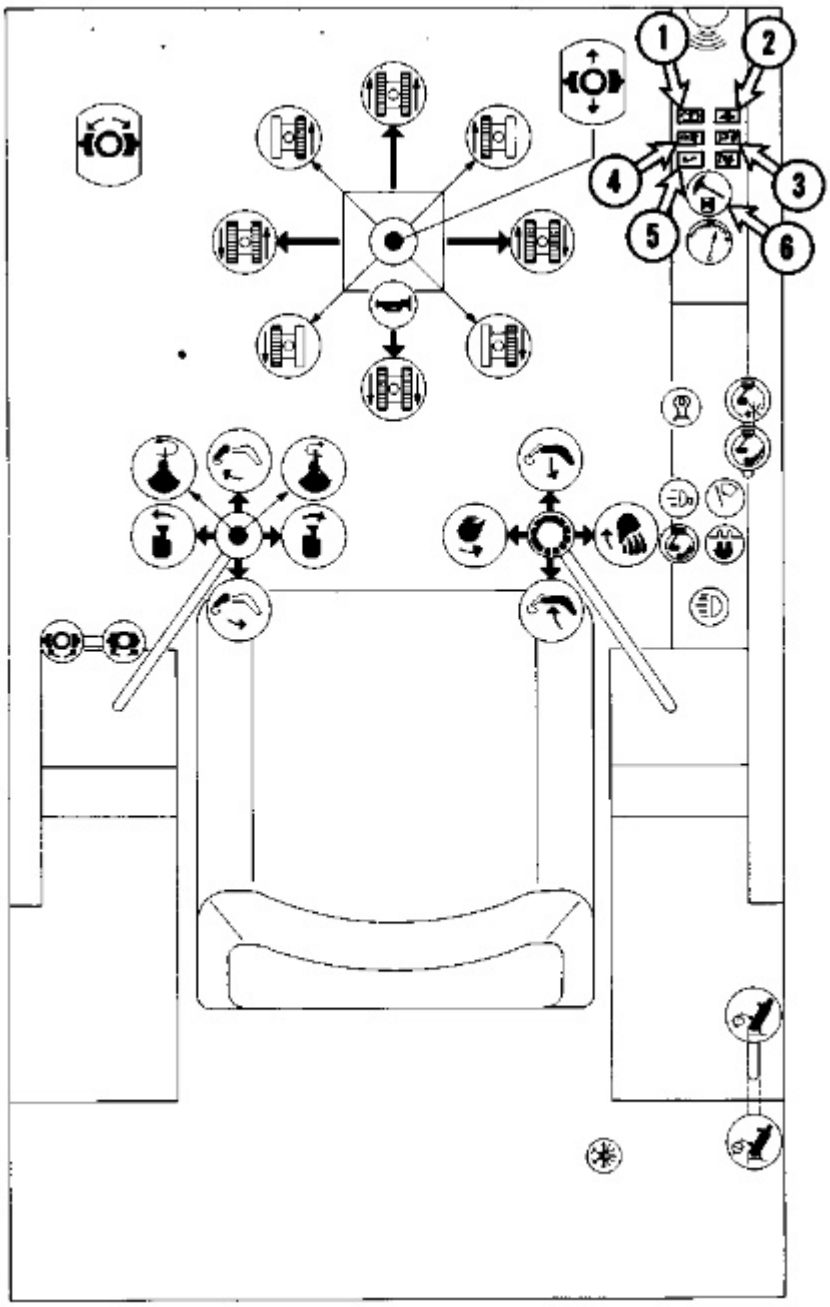
Media Number -HEBU6003-01 **Publication Date -01/05/1985** **Date Updated -10/10/2001**

Controls, Gauges and Indicators

SMCS - 7606



1. Alternator Fault Light - This light monitors the charging current. It should come on if the ignition key is turned to the ON position. It goes out if the alternator is charging. If it does not go out with the engine running, the batteries are not being charged. Determine the cause and correct the problem.

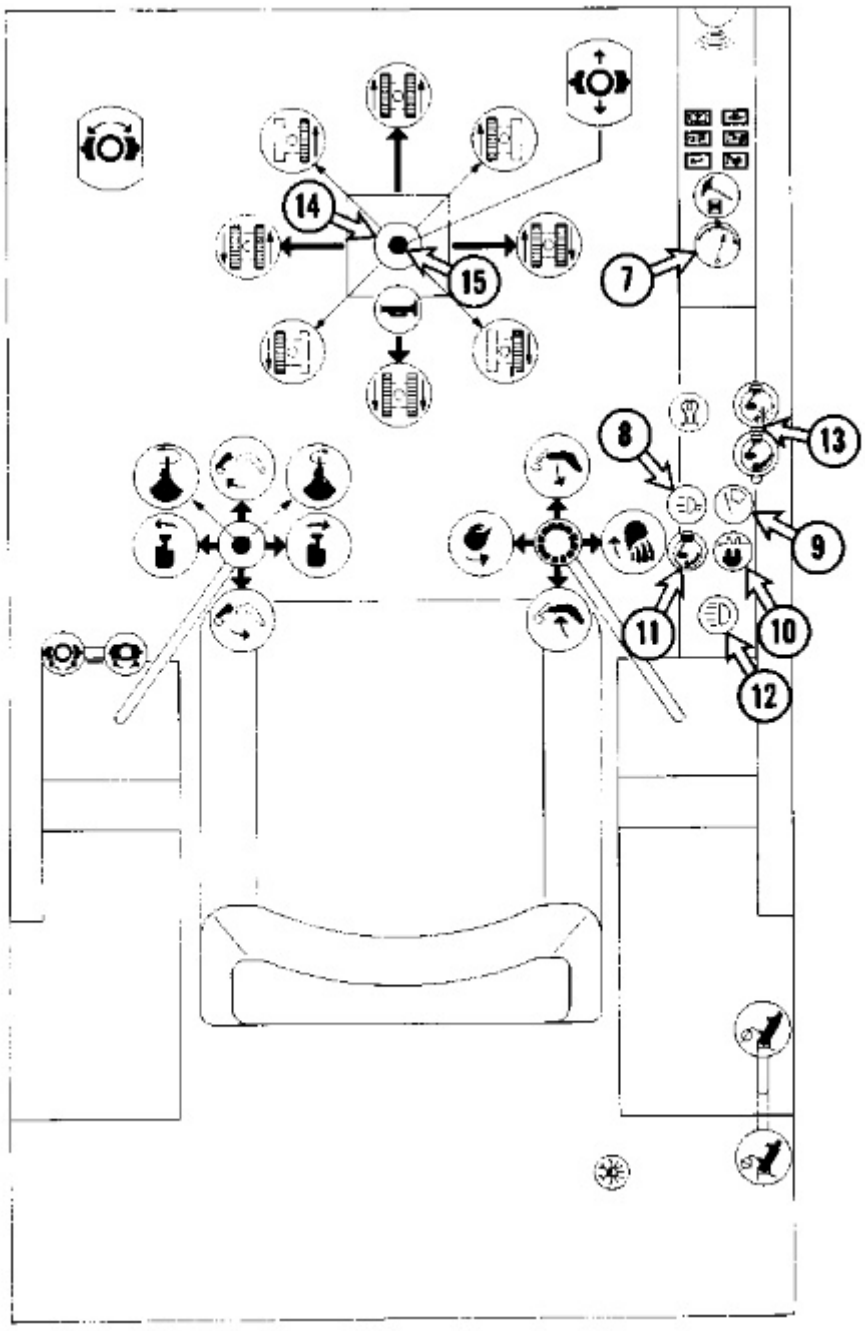
2. Engine Oil Pressure Fault Light - This light monitors the engine oil pressure. After starting the engine and building up sufficient oil pressure, the light goes out. If the light comes on with the engine running, the lubrication system may have developed a fault. Stop the engine immediately. Correct the problem before starting again.

3. Engine Temperature Fault Light - A red light shows that the engine is overheating. Stop engine immediately. When the light comes on, the horn sounds at the same time. Check for loose or broken fan belts.

4. Main Headlight Beam Indicator Light

5. Parking Brake Light - This lights when the track brakes are released. The light extinguishes when the brakes are applied.

6. Service Hour Meter - Use this to determine the service intervals.



7. Fuel Gauge - The fuel gauge monitors the fuel tank contents.

8. Working Beam Switch

9. Windshield Wiper Switch

10. Power Socket - This socket may be used for hand lamps, cigarette lighters or similar devices. Check voltage.

11. Push Button Starter - Push the button to start the engine.

12. Key Switch - Four Positions:

0 - Ignition Off
1 - No Function
2 - Heat-Start Activation
3 - Ignition On

NOTE: Directional control must be in NEUTRAL to start engine.

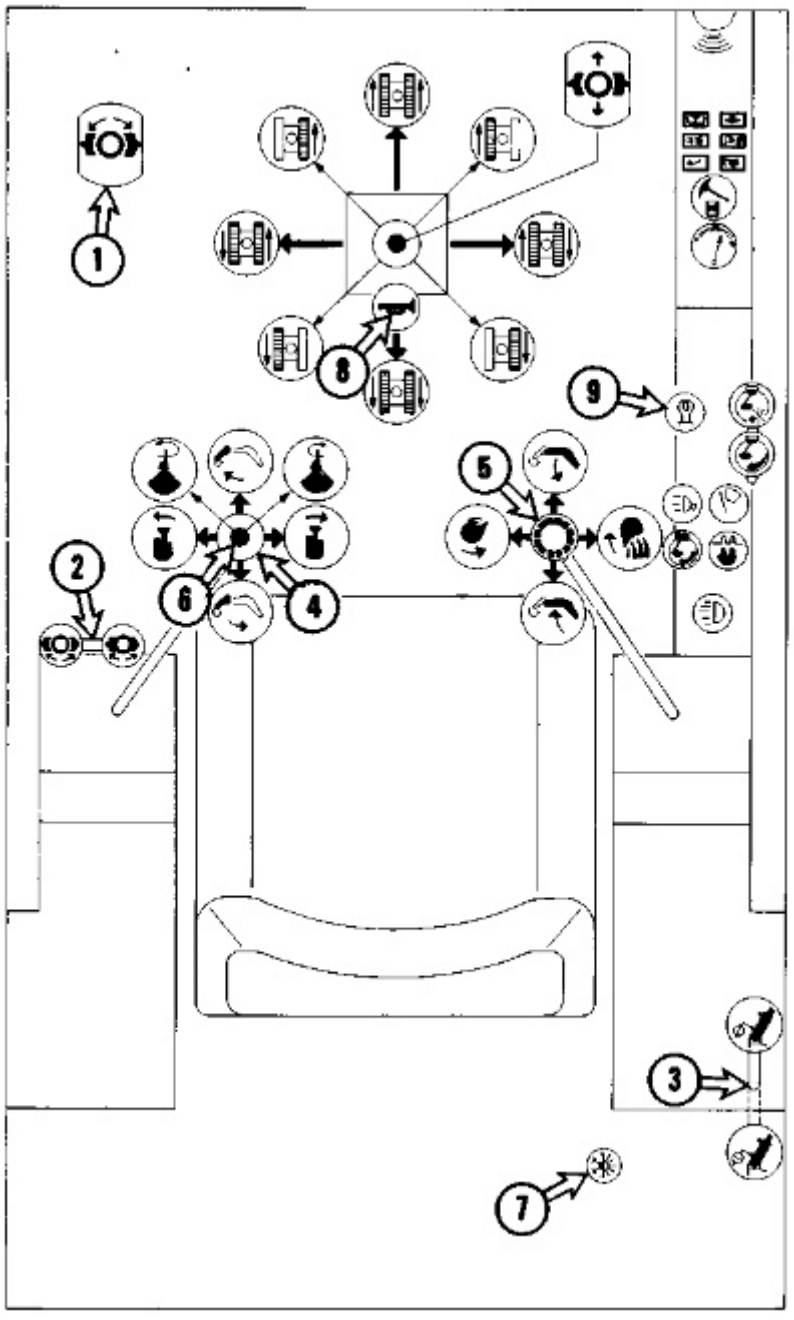
13. Governor Control Lever - Pull back to increase the engine speed. Push lever fully forward to stop the engine.

14. Drive Control - The drive control lever controls the track motors either simultaneously or individually.

Straight forward - travel forward
Straight back - travel back
Straight left - spot turn left
Straight right - spot turn right
Diagonal front left - travel forward left
Diagonal front right - travel forward right
Diagonal back left - travel drive back right
Diagonal back right - travel drive back left

15. Parking Brake Push Button - The neutral position of drive control, locks the track motors hydraulically. In addition to each track motor a multi-plate brake is provided. These brakes are service brakes and must be applied during machine service.

Depress the button for applying brakes, and press again to release brakes. See also "Parking Brake Light."



1. Swing Gear Brake Pedal - The swing brake pedal is used to slow down the rotating upper carriage. Do not brake and use the swing control at the same time.

2. Hydraulic and Undercarriage Lock Lever - This lever is located at the left lower side of the operator's seat. With the lever in the vertical position the undercarriage is locked, and all hydraulic functions are blocked, the operator can enter or leave the cab.

With the lever down, all hydraulic functions are operable.

3. Lift Cylinder Shutoff Valve - While excavating, the shutoff valve is forward (open). While traveling or while waiting with loaded boom, the shutoff valve may be closed (move backward). This prevents the lift cylinder from lowering (due to valve block leakage).

4. Main Boom Cylinder and Swing Control Lever -

Forward - Extend main boom.

Backward - Retract main boom.
Left - Swing to left.
Right - Swing to right.

5. Control Lever for Lift Cylinders and Bucket Cylinder -

Forward - Lower bucket.
Backward - Raise bucket.
Left - Fill bucket.
Right - Empty bucket.

6. Optional Hydraulic Attachment Push Button - While this push button is depressed, the swing control lever does not swing the machine to the right or the left. The lever then operates a hydraulic attachment (if equipped) move the lever clockwise or counterclockwise with the same rotation of attachment.

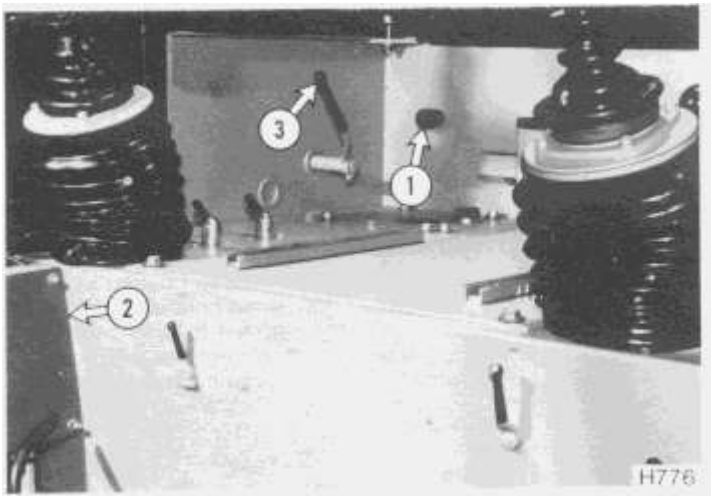
7. Independent Heater Switch -

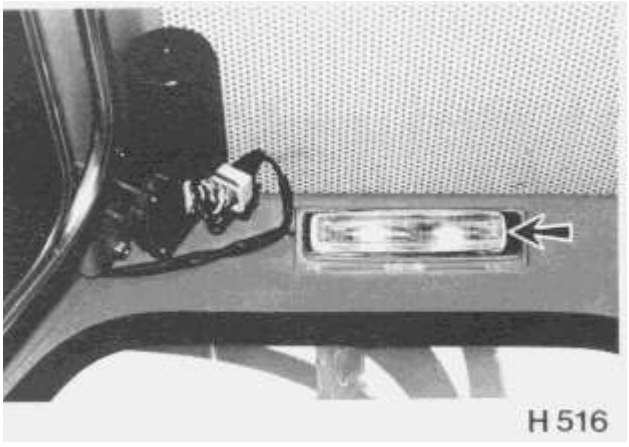
Turn left - ventilation on.
Turn right - heater on (indicator light on).
Neutral position - heater and ventilator off.

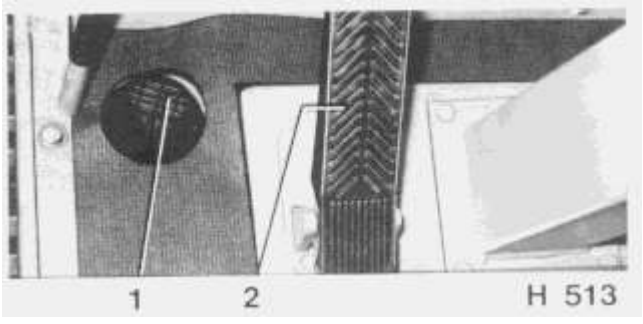
8. Horn Push Button

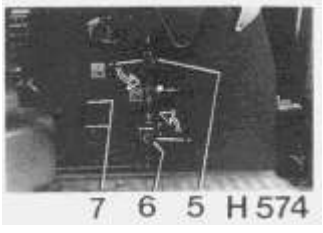
9. Heat-Start Indicator Light - Turn key to Heat-Start, when light comes on, start the engine.

Swing Brake Shutoff Valve - The shutoff valve can be used to establish a non-positive connection (temporary) between the upper carriage and the undercarriage. Lever located under left side of operator's seat.









Air Cleaner Indicator (1, Fig. 776) - Progressive choking of the air cleaner filter enlarges the red field in the inspection glass of the indicator and warns that replacement of the filter is necessary. This visual check is possible even with the engine stopped, if the indicator locks in the red position after maximum negative pressure has been reached. After replacing the filter, press the release button. A neutral area will once more appear in place of the red field.

Defroster (1, Fig. 513) - Direct the air flow as required by turning the nozzle.

Fuse Box (2, Fig. 776) - The fuse box is mounted behind the plastic trim panel and is easily accessible after opening the snap fasteners.

Locking the Upper Carriage - Locking bolt for the upper carriage (3, Fig. 776) for transport and long traveling distances.

Locking Latch for the Cab Door in Open Position (Fig. 515) - Press the door against the cab wall for locking. Release by pulling the latch forward.

Cab Light (Fig. 516) - Use switch in the lamp to switch lamp on or off.

Emergency Release of the Lift Cylinders (6, Fig. 574) - If a defect arises in the hydraulic pilot system or a failure of the oil pump or the diesel engine occurs, the attachment can be lowered to the ground by turning the shutoff valve through 90°.

Make sure that nobody is under the boom before operating the emergency release. A baffle installed in the pipe system reduces the lowering speed. Close the shutoff valve again after placing the attachment on the ground (machine service).

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Starting the Engine

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Put the drive control in NEUTRAL and the control levers for lift and bucket cylinders as well as those for the swing and main boom cylinders into the HOLD position.

Insert the key into the ignition. The alternator and engine oil pressure warning light should now come on.

Move the governor to low idle and turn the key to ON. Push the starter button. Release after the engine starts. Both warning lights should now extinguish.

NOTE: The machine is equipped with a heat-start engine heating system, do not turn the key switch to ON, but turn the key switch clockwise to position 2 in order to activate the heat-start system in cold weather. Hold key in this position until the heat-start control light comes on.

Start the engine. All indicator lights must go out.

Do not operate starter for more than ten seconds. Allow the batteries to recover for a while before operating the starter again.

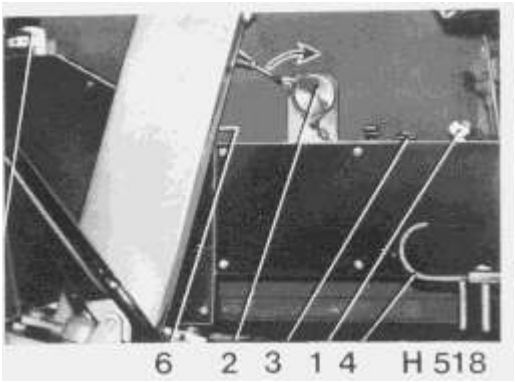
Bleed the fuel system, if necessary. See the engine manufacturer's operation guide for fuel bleed information.

Stopping the engine

Push the governor control lever all the way forward. Remove the key.

Traveling

Before the drive control is engaged release the parking brake by means of the push button (1, Fig. 519), raise the attachment and lock the upper carriage if necessary (4, Fig. 518).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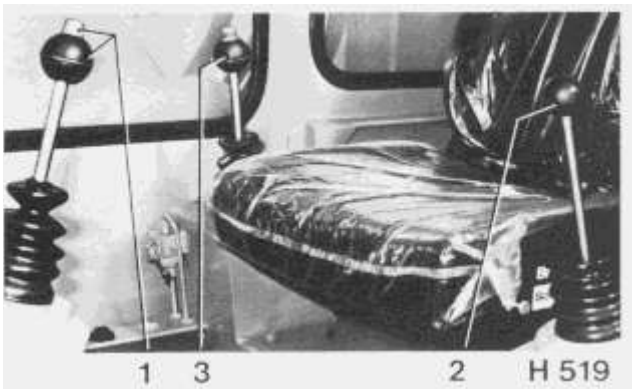
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Operator Adjustments

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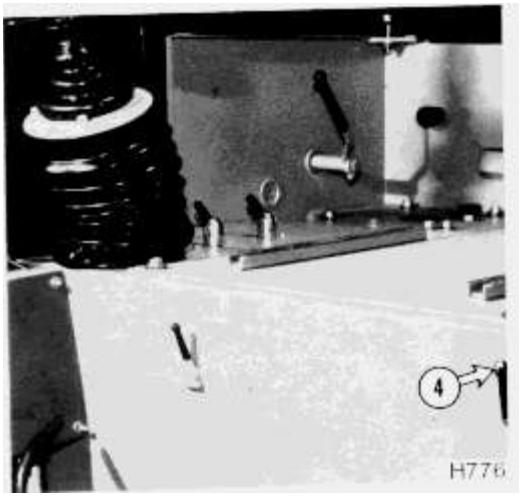
Locking the Swing Brake

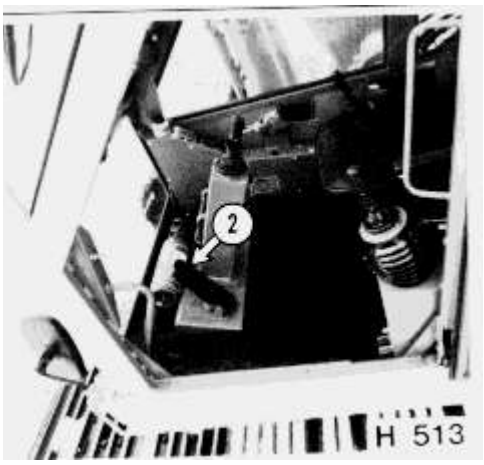
In addition to the positive locking of the upper carriage by means of a bolt, which connects the swing upper carriage with the undercarriage in or opposite to the direction of travel (for transport and long traveling distances), the upper carriage can be non-positively locked against the undercarriage in any position.

Depress pedal (2, Fig. 513) and simultaneously turn the shutoff valve (4, Fig. 776) through 90°. The hydraulic pressure maintained between the wheel cylinder of the swing brake and the shutoff valve immobilizes the upper carriage. However, locking depends on the amount of leakage of the shutoff valve. Repeat locking procedure if necessary.



NOTICE

Do not counteract machine movement with the swing control lever while simultaneously operating the swing brake pedal (2, Fig. 513).



Throttle Relief Valve for Lift and Main Boom Cylinders

Lift Cylinders (1, Fig. 520)

The throttle relief valve controls the lowering speed. Turning as indicated by the arrow reduces the lowering speed. Turning against the arrow increases the lowering speed.

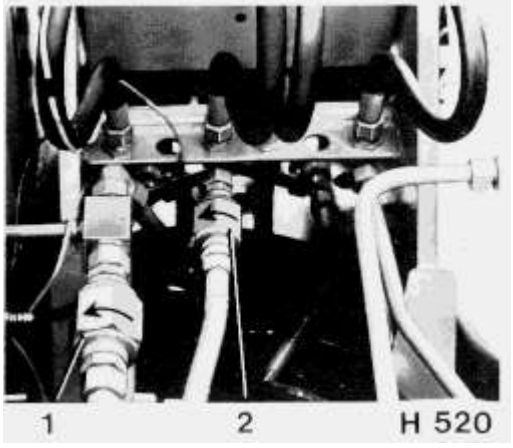
Main Boom Cylinder (2, Fig. 520)

The function is the same as for the lift cylinder valve, although this valve is used to adjust the speed for the extension of the cylinder (with the lift cylinders, retraction speed).

The speed is reduced by turning in the direction of the arrow. Speed is increased by turning against the arrow.

NOTICE

Do not close the throttle relief valves too far, otherwise the hydraulic fluid may overheat.



Electrical Fuel Lift Pump (If Equipped)

The fuel lift pump shown in Fig. 522 is used for filling of the diesel fuel tank.

After connecting an appropriate filling hose to the socket (2, Fig. 522), insert the hose into a fuel barrel or other container.

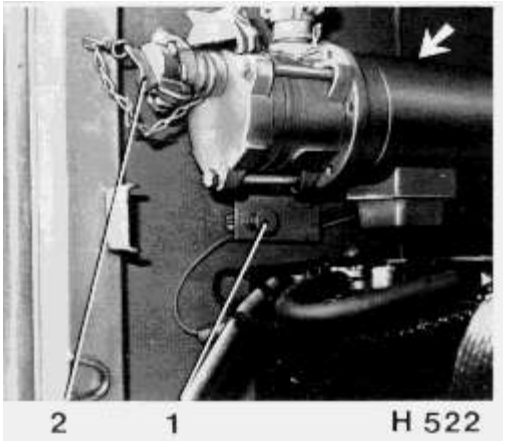
Pull the switch (1, Fig. 522) and start the electric pump.

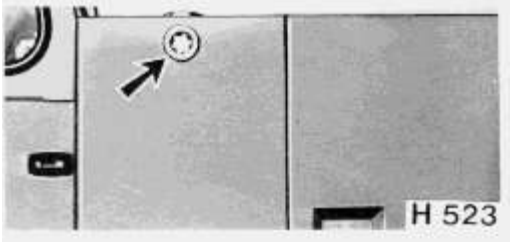
Check the level in the fuel tank by means of the inspection glass fitted in the fuel tank wall (Fig. 523) or in the fuel gauge in the operator's cab.

The switch (1, Fig. 522) must be pushed in to stop the filling procedure.

NOTICE

The pump is only suitable for diesel fuel.





Optional Hydraulic Attachment Function (If Equipped)

The optional hydraulic attachment function is required if another actuator must be manipulated, e.g., for hydraulic clamshell rotation.

To use the additional actuator (for rotation) first turn the shutoff valves (1, Figs. 524 and 777) through 90° as shown by arrow (the valves are now closed). This cancels the rapid traverse function for the main boom (retract main boom).

The free valve is now used to move the additional actuator by way of the swing control. Depression of the push button and simultaneous operation of the swing control to left or right, actuates rotate left or rotate right.

NOTE: If the push button is released while the swing control continues to be held left or right, the additional actuator does not function and the swing gear mechanism (left or right) is actuated.

1. Moving the swing control to left or right in conjunction with the depressed push button controls the optional actuator function (and not the swing gear mechanism).

2. Moving the control to left or right without simultaneously depressing the push button controls the swing gear mechanism (and not the optional attachment actuator).

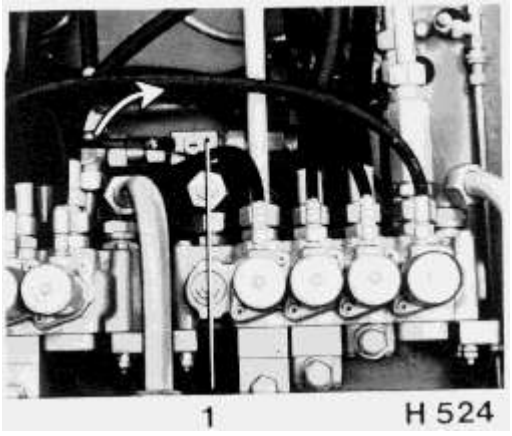
3. Close the shutoff valves (1, Figs. 524 and 777) for the operation of the optional attachment function (turn through 90° as shown by arrow).

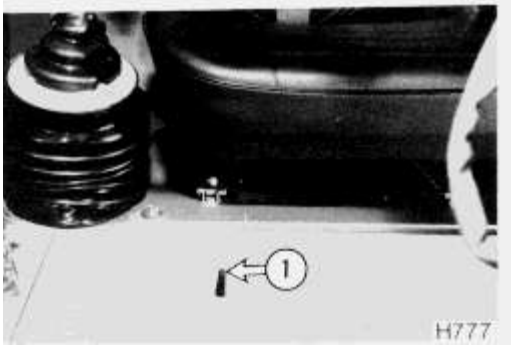
4. Open the shutoff valves (1, Figs. 524 and 777) for backhoe bucket service.

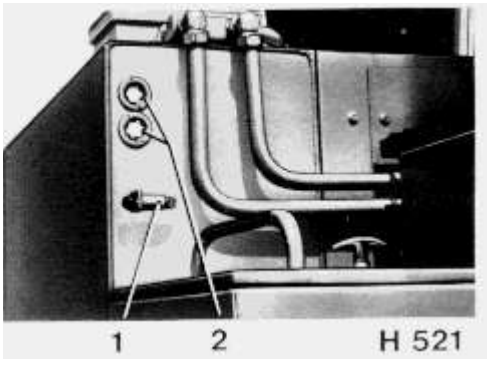
Latching the Open Tool Box Cover

When the cover of the toolbox is opened, the pin (1, Fig. 521) catches the handle automatically.

Pull the spring-loaded pin outward to close the cover.







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