

# SERVICE MANUAL

**Dozer Crawlers DC150**  
**Includes LGP**



**NEW HOLLAND**  
**CONSTRUCTION**

## **PROPRIETARY NOTICE**

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## **COMPANY POLICY**

Company policy, which is one of continuous improvement, reserves the right to change prices and to make changes in design and specification at any time without notice and without obligation to modify units previously built.

All data given in this book is subject to production variations. Dimensions and weights are approximate only and the illustrations do not necessarily show machines in standard condition. For exact information about any particular machine please consult your New Holland Construction Dealer.

## **PARTS AND ACCESSORIES**

Genuine parts and accessories have been specifically designed for these machines. We would like to point out that “non-genuine” parts and accessories have NOT been examined and released by the Company. The installation and or use of such products could have negative effects upon the design characteristics of your machine and thereby affect its safety. The company is not liable for any damage caused by the use of “non-genuine” parts and accessories.

## **MODEL CODES**

The range of machines listed may not be available in all countries or markets therefore, for the latest information consult your local New Holland Construction Dealer.

<b>MODEL</b>	<b>ENGINE TYPE - H.P.</b>
DC150	CUMMINS 6BT 5.9 (150 H.P.)

# **OWNER ASSISTANCE**

We at New Holland and your New Holland dealer want you to be completely satisfied with your investment. Normally any problems with your equipment will be handled by your dealer's Service Department. Sometimes, however, misunderstandings can occur. If your problem has not been handled to your satisfaction, we suggest the following.

1. Contact the owner or General Manager of the dealership, explain the problem, and request assistance. When additional assistance is needed, your dealer has direct access to our office.

2. If you cannot obtain satisfaction by doing this, contact the New Holland Construction office and provide them with:

- Your name, address, and telephone number
- Machine model and serial number
- Dealership name and address
- Machine purchase date and amount of use
- Nature of problem

## **NEW HOLLAND CONSTRUCTION**

**245 E North Ave**

**Carol Stream, IL 60188**

**Ph # (630) 260-4000**

When contacting New Holland, be aware that your problem will likely be resolved in the dealership using the dealer's facilities, equipment, and personnel. So it is important that your initial contact be with the dealer.

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## **SPARE PARTS**

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To maintain operating efficiency, use NEW HOLLAND original spare parts. When ordering parts, give the following information:

- Machine model
- Machine and engine serial numbers
- Part number from the Parts Catalog

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## TO THE OWNER:

The warranty coverage that is extended to your machine is explained in the Warranty and Limitation of Liability form. Your dealer will provide you with a copy of the warranty and retain a copy which you have signed. After you read the warranty, ask your dealer to explain any points that you may not understand.

The machine was designed to power and propel itself. It is intended to move material in the normal and customary applications.

Do not modify or alter or permit anyone else to modify or alter this machine or any of its components mechanical function with first consulting an authorized New Holland Construction dealer. If you have any questions regarding machine modifications, contact New Holland Construction, 245 E. North Ave., Carol Stream, IL 60188.

Your safety and the safety of those around you depend upon the care and good judgment you use while operating this equipment. Read the safety precautions carefully.

After you have operated the machine for 50 hours, take your machine and this manual to your selling dealer. He will perform the factory recommended 50-hour service. You will be responsible for the cost of lubricants, fluids, filters and other items replaced as part of normal maintenance. Prior to taking the machine to your selling dealer for service, it is recommended that you contact them to determine any other charges for which you may be responsible.

All data given in this book is subject to product variations. Dimensions and weights are approximate only and the illustrations do not necessarily show machines in standard condition. For exact information about any particular machine, please consult your New Holland Construction dealer.



**CAUTION: THIS SYMBOL IS USED THROUGHOUT THIS BOOK WHENEVER PERSONAL SAFETY IS INVOLVED. TAKE TIME TO READ AND FOLLOW THE INSTRUCTIONS. BE CAREFUL!**

**CAUTION: PICTURES IN THIS MANUAL MAY SHOW PROTECTIVE SHIELDING OPEN OR REMOVED TO BETTER ILLUSTRATE A PARTICULAR FEATURE OR ADJUSTMENT.**

**BE CERTAIN, HOWEVER, TO CLOSE OR REPLACE ALL SHIELDING BEFORE OPERATING THE MACHINE.**

## IMPROVEMENTS

New Holland Construction is continually striving to improve its products. We reserve the right to make improvements or changes when it becomes practical and possible to do so, without incurring any obligation to make changes or additions to the equipment sold previously.

# PRECAUTIONARY STATEMENTS

## PERSONAL SAFETY

Throughout this manual and on machine decals, you will find precautionary statements (“CAUTION”, “WARNING”, and “DANGER”) followed by specific instructions. These precautions are intended for the personal safety of you and those working with you. Please take the time to read them.



**CAUTION: THE WORD “CAUTION” IS USED WHERE A SAFE BEHAVIORAL PRACTICE ACCORDING TO OPERATING AND MAINTENANCE INSTRUCTIONS AND COMMON SAFETY PRACTICES WILL PROTECT THE OPERATOR AND OTHERS FROM ACCIDENT INVOLVEMENT.**



**WARNING: THE WORD WARNING DENOTES A POTENTIAL OR HIDDEN HAZARD WHICH HAS A POTENTIAL FOR SERIOUS INJURY. IT IS USED TO WARN OPERATORS AND OTHERS TO EXERCISE EVERY APPROPRIATE MEANS TO AVOID A SURPRISE INVOLVEMENT WITH MACHINERY.**



**DANGER: THE WORD “DANGER” DENOTES A FORBIDDEN PRACTICE IN CONNECTION WITH A SERIOUS HAZARD.**

**FAILURE TO FOLLOW THE “CAUTION”, “WARNING”, “DANGER”, AND “STOP” INSTRUCTIONS MAY RESULT IN SERIOUS BODILY INJURY OR DEATH.**

## MACHINE SAFETY

Additional precautionary statements (“ATTENTION” and “IMPORTANT”) are followed by specific instructions. These statements are intended for machine safety.

*ATTENTION: The word “ATTENTION” is used to warn the operator of potential machine damage if a certain procedure is not followed.*

*IMPORTANT: The word “IMPORTANT” is used to inform the reader of something he needs to know to prevent minor machine damage if a certain procedure is not followed.*

## SAFETY RULES

This symbol is your safety alert sign. It means **ATTENTION! BECOME ALERT! YOUR SAFETY IS INVOLVED!**

Read and heed all safety instruction carrying the signal words **WARNING** and **DANGER**.

**STUDY THE OPERATION AND MAINTENANCE INSTRUCTION MANUAL THOROUGHLY BEFORE STARTING, OPERATING, MAINTAINING, FUELING OR SERVICING THIS MACHINE.**



MOST ACCIDENTS ARE CAUSED BY FAILURE OF SOME INDIVIDUAL TO FOLLOW SIMPLE AND FUNDAMENTAL SAFETY RULES OR PRECAUTION. FOR THIS REASON MOST ACCIDENTS CAN BE PREVENTED BY RECOGNIZING THE REAL CAUSE AND DOING SOMETHING ABOUT IT BEFORE ACCIDENT OCCURS. REGARDLESS OF THE CARE USED IN THE DESIGN AND CONSTRUCTION OF ANY TYPE OF EQUIPMENT THERE ARE MANY CONDITIONS THAT CAN'T BE COMPLETELY SAFEGUARDED AGAINST WITHOUT INTERFERING WITH REASONABLE ACCESSIBILITY AND EFFICIENT OPERATION.



**“live with it”**

**CALIFORNIA**

**PROPOSITION 65 WARNING**

Diesel engine exhaust and some of its constituents are known to the State of California to cause cancer, birth defects, and other reproductive harm.



## **SAFETY PRECAUTION INFORMATION**

**UNSAFE OPERATING PRACTICES AND IMPROPER USE OF THE MACHINE AND ITS ATTACHMENTS ON THE PART OF THE OPERATOR OR SERVICE TECHNICIAN CAN RESULT IN INJURIES. OBSERVE THE FOLLOWING SAFETY PRECAUTIONS AT ALL TIMES:**

- 1. FOR SERVICING, THE MACHINE SHOULD BE ON LEVEL TERRAIN, ENGINE STOPPED WITH THE WHEELS BLOCKED OR THE ENTIRE MACHINE SOLIDLY SUPPORTED WITH THE WHEELS OFF THE GROUND BEFORE SERVICING ANY COMPONENT OF THE DRIVETRAIN.**
- 2. FOR SERVICING UNDER THE MOVABLE EQUIPMENT, SUCH AS OPERATOR'S SEAT, ENGINE HOODS, ETC. MOVE THE EQUIPMENT ASSEMBLY TO THE LATCHED POSITION AND SECURELY LATCH.**
- 3. DO NOT OPERATE THE MACHINE UNLESS ALL MOVABLE EQUIPMENT IS LATCHED IN THE OPERATE POSITION.**
- 4. DO NOT SERVICE THE MACHINE WITH A RAISED HYDRAULIC EQUIPMENT UNLESS THE HYDRAULIC EQUIPMENT IS RESTING ON LOCK PINS OR CYLINDER LOCKING TOOLS OR FIXTURES.**
- 5. DO NOT SERVICE THE MACHINE WITH THE ENGINE RUNNING UNLESS THE MACHINE IS PROPERLY AND SECURELY SUPPORTED WITH ALL FOUR WHEELS OFF THE GROUND.**
- 6. USE CAUTION WHEN SERVICING THE UNIT AROUND MOVING PARTS.**
- 7. DO NOT TILT ANY MOVABLE EQUIPMENT WITHOUT PROPER INSTRUCTION.**
- 8. DO NOT TILT ANY MOVABLE EQUIPMENT WITHOUT USING THE PROPER TOOLS.**
- 9. REINSTALL ALL SHIELDS REMOVED FOR SERVICE.**
- 10. NEVER LOOSEN ANY HYDRAULIC CONNECTIONS BEFORE RELIEVING THE PRESSURE IN THE HYDRAULIC SYSTEM.**
- 11. WEAR EYE PROTECTION SUCH AS GOGGLES, ETC.**
- 12. WEAR EAR PROTECTION SUCH AS EARPLUGS, ETC. WHEN YOU FEEL THE NOISE LEVEL IS UNCOMFORTABLE.**
- 13. IF ANY SERVICING OR ADJUSTMENTS REQUIRE THE BATTERY TO BE DISCONNECTED, DISCONNECT THE (-) NEGATIVE GROUND CABLE.**
- 14. WHEN SERVICING ELECTRICAL COMPONENTS, DISCONNECT THE (-) NEGATIVE GROUND CABLE.**
- 15. IF AN ELECTRONIC EQUIPMENT REQUIRES REMOVAL FROM THE DASH AREA OR THE MACHINE, DISCONNECT THE (-) NEGATIVE GROUND BATTERY CABLE. THIS WILL SHUT OFF POWER TO THE ELECTRICAL SYSTEM AND PREVENT DAMAGE TO THE ELECTRICAL SYSTEM.**
- 16. IF WELDING IS REQUIRED ON THE MACHINE, DISCONNECT THE (-) NEGATIVE GROUND CABLE. FAILURE TO DISCONNECT THE BATTERY MAY RESULT IN DAMAGE TO THE ELECTRICAL SYSTEM, MONITORING SYSTEM AND/OR OTHER ELECTRICAL COMPONENTS.**
- 17. IF WELDING IS REQUIRED ON AN ATTACHMENT, REMOVE THE ATTACHMENT FROM THE MACHINE.**

18. GIVE COMPLETE AND UNDIVIDED ATTENTION TO THE JOB AT HAND SO THAT COMPLETE CONTROL OF THE MACHINE IS MAINTAINED AT ALL TIMES.
19. DRIVE SLOWLY OVER ROUGH GROUND AND ON SLOPES; KEEP ALERT FOR HOLES, DITCHES AND OTHER IRREGULARITIES THAT MAY CAUSE THE MACHINE TO OVERTURN.
20. AVOID STEEP HILLSIDE OPERATION WHICH COULD CAUSE THE MACHINE TO OVERTURN.
21. NEVER TRANSPORT A LOADED BUCKET AT FULL HEIGHT. OPERATE THE MACHINE WITH THE LOAD AS LOW AS POSSIBLE UNTIL IT BECOMES NECESSARY TO RAISE THE BOOM TO DISCHARGE THE LOAD INTO A TRUCK, CONTAINER, ETC.
22. REDUCE SPEED WHEN TURNING SO THERE IS NO DANGER OF OVERTURNING.
23. NEVER DRIVE UP OR BACK UP A HILL OR INCLINE WITH A RAISED BOOM OR THE MACHINE COULD OVERTURN.
24. ALWAYS LOOK BEHIND YOU BEFORE BACKING UP THE MACHINE.
25. MAINTAIN PROPER FLUID LEVELS TO PREVENT LOSS OF POWER, BRAKING OR OTHER FUNCTIONS.
26. DO NOT ALLOW PASSENGERS TO RIDE ON THE MACHINE AT ANY TIME.
27. DO NOT ALLOW CHILDREN TO OPERATE THE MACHINE OR RIDE ON THE MACHINE AT ANY TIME.
28. DO NOT ALLOW ANYONE TO OPERATE OR SERVICE THE MACHINE WITHOUT PROPER INSTRUCTION.
29. OSHA REQUIRES THAT ALL OPERATORS BE INSTRUCTED ON THE PROPER OPERATION OF THE MACHINE BEFORE THEY OPERATE THE UNIT.
30. DO NOT OPERATE THE LOADER IN ANY POSITION OTHER THAN WHILE IN THE OPERATOR'S SEAT WITH THE SEAT BELT SECURELY FASTENED.
31. BEFORE STARTING THE ENGINE, BE SURE THAT ALL OPERATING CONTROLS ARE IN NEUTRAL AND THE PARKING BRAKE IS ENGAGED.
32. NEVER OPERATE THE ENGINE IN A CLOSED BUILDING WITHOUT ADEQUATE VENTILATION.
33. REFUEL THE MACHINE OUTDOORS WITH THE ENGINE SHUT OFF. REPLACE THE FUEL CAP SECURELY. USE AN APPROVED FUEL CONTAINER. DO NOT SMOKE WHEN HANDLING FUEL. AVOID SPILLING FUEL.
34. AFTER OPERATING THE ENGINE, NEVER TOUCH THE MUFFLER, EXHAUST PIPE, ENGINE OR RADIATOR UNTIL THEY HAVE HAD TIME TO COOL.
35. DRESS APPROPRIATELY – WEAR RELATIVELY TIGHT-FITTING CLOTHING WHEN OPERATING OR SERVICING THE MACHINE. LOOSE OR TORN CLOTHING CAN CATCH IN MOVING PARTS OR CONTROLS.
36. BEFORE SERVICING THE MACHINE, OR ANY OF ITS ATTACHED EQUIPMENT, BE SURE THAT THE ATTACHMENTS ARE LOWERED TO THE GROUND OR ARE SUPPORTED.
37. DO NOT WORK UNDER OVERHANGS, ELECTRIC WIRES, OR WHERE THERE IS DANGER OF A SLIDE.

38. WEAR AN APPROVED SAFETY HAT WHEN OPERATING THE MACHINE AND WHILE IN ANY WORK AREA.
39. WHEN DRIVING THE MACHINE ON A ROAD OR HIGHWAY, USE WARNING LIGHTS OR WARNING DEVICES AS MAY BE REQUIRED BY LOCAL OR STATE GOVERNMENT REGULATIONS. HEADLIGHTS, WARNING LIGHTS AND SMV SIGNS ARE AVAILABLE THROUGH YOUR NEW HOLLAND DEALER.
40. KEEP THE MACHINE CLEAN. DO NOT ALLOW TRASH, DEBRIS OR OTHER ARTICLES TO ACCUMULATE IN THE CAB, FLOOR OR FOOT CONTROL PEDAL AREA THAT MAY HINDER SAFE MACHINE OPERATION.
41. NEVER OPERATE THE MACHINE WITH ANY OF THE SHIELDING REMOVED.
42. NEVER OPERATE THE MACHINE WITHOUT WINDOWS AND/OR SCREENS IN PLACE.
43. NEVER EXTEND ANY PART OF THE BODY OUTSIDE OF THE OPERATOR'S AREA.
44. ALWAYS PROPERLY TIE DOWN THE MACHINE TO A TRUCK OR TRAILER BEFORE TRANSPORT.
45. MAKE SURE ALL BYSTANDERS ARE AT A SAFE DISTANCE AWAY FROM THE MACHINE BEFORE STARTING THE ENGINE.
46. DO NOT ALLOW ANYONE NEAR THE MACHINE WHILE THE ENGINE IS RUNNING AND THE MACHINE IS OPERATIONAL.
47. WHEN USING THE MACHINE TO CRANE OBJECTS, DO NOT ALLOW ANYONE TO RIDE ON OBJECTS BEING CRANED.
48. DO NOT USE THE MACHINE AS A WORK PLATFORM FOR SUPPORTING MATERIALS.
49. DO NOT LIFT PERSONNEL OR ALLOW PERSONNEL TO WORK WHILE STANDING IN THE BUCKET OR ON OTHER ATTACHMENTS. THIS IS NOT A MAN-LIFT.

OSHA REQUIREMENTS NOW MAKE IT THE EMPLOYER'S RESPONSIBILITY TO FULLY INSTRUCT EACH OPERATOR IN THE PROPER AND SAFE OPERATION OF ALL OPERATIVE EQUIPMENT. BOTH EMPLOYER AND EMPLOYEE SHOULD THOROUGHLY FAMILIARIZE THEMSELVES WITH THE MACHINE OPERATION.



**CAUTION!**

SOME PICTURES IN THIS MANUAL SHOW SAFETY SHIELDS REMOVED OR OPEN TO SHOW PARTS BEING SERVICED OR FOR CLARITY. ALL SHIELDS SHOULD BE CLOSED OR REPLACED PRIOR TO OPERATING THE MACHINE.

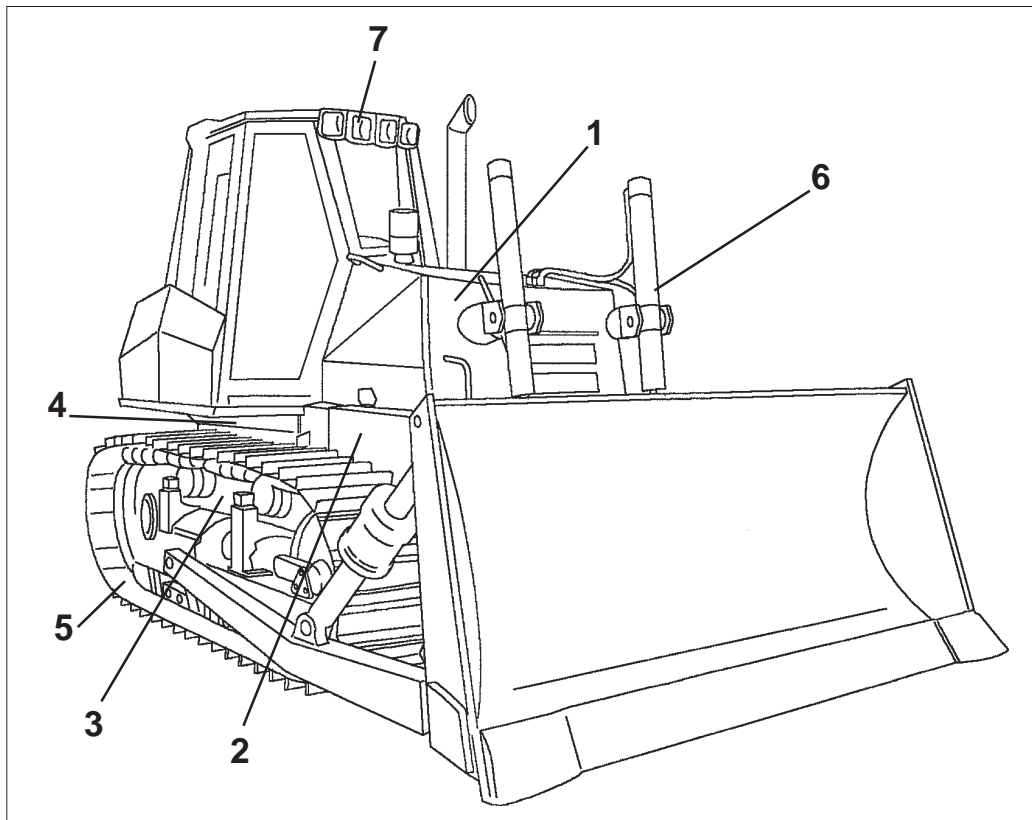
**DANGER!**

**FASTEN SEAT BELT**

**BEFORE STARTING ENGINE!**

# SUMMARY

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<b>TRANSMISSION</b>	<b>SECT. 2</b>
<b>FINAL DRIVES</b>	<b>SECT. 3</b>
<b>STEERING CLUTCHES - BRAKES</b>	<b>SECT. 4</b>
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**SECTION 0**  
**GENERALITIES**  
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## WARNING

**Study this Manual carefully before starting, operating, maintaining, fueling or servicing the machine.**

**Read and heed all safety rules before any intervention.**

### SAFETY RULES

- Do not allow unauthorized personnel to operate service or maintain this machine.
- Do not wear rings, wrist watches, jewelery, loose or hanging apparels, such as ties, torn clothing, scarves, unbuttoned or unzipped jackets that can catch on moving parts. Wear proper safety equipment as recommended for the job. Examples: hard hat, heavy gloves, ear protection, safety glasses or goggles, reflector vests, respirator. Consult your employer for specific safety equipment requirements.
- Keep operator's compartment, stepping points, grab-rails and handles clear of foreign objects, oil, grease, mud or snow accumulation to minimize the danger of slipping or stumbling. Clean mud or grease from shoes before attempting to mount or operate the machine.
- Do not jump on or off the machine. Keep two hands and one foot, or two feet and one hand in contact with step grab rails and handles at all times.
- Do not use controls or hoses as hand holds when climbing on or off machine. Hoses and controls are movable and do not provide a solid support. Also, controls may be inadvertently moved causing accidental machine or equipment movement.
- Never attempt to operate the machine or its tools from any position other than seated in the operator's seat.
- Keep head, body, limbs, hands and feet inside operator's compartment at all times, to reduce exposure to hazards outside the operator's compartment.
- Be careful of slippery conditions on stepping points, hand rails, and on the ground. Wear safety boots or shoes that have a high slip resistant sole material.
- Do not leave the machine until it is completely stopped.
- Check the seat safety belt at least twice a year. If there are signs of wear or fraying or other signs of weakness that could lead to failure, replace it.
- Be sure all protective guards or panels are in place, and all safety devices provided are in place and in good operating conditions.
- Be sure exposed personnel in the area of operation are clear of the machine before moving it or its attachments. **WALK COMPLETELY AROUND** the machine before mounting. Sound horn.
- Before starting machine, check, adjust and lock the operator's seat for maximum comfort and control of the machine.
- Fasten your seat belt (when provided).
- Obey all flag signals and signs.
- Due to the presence on the machine of flammable fluids, never check or fill fuel reservoirs or batteries near open flames, smoking materials or sparks.
- REMEMBER THAT STARTING FLUID IS FLAMMABLE. Follow strictly the recommendations printed on containers and in the Operation and Maintenance Manual.
- DO NOT PUNCTURE OR BURN CONTAINERS.
- Containers must be stored in fresh, well ventilated places, out of reach of unauthorized persons. Follow the instructions provided by the Manufacturer strictly.
- Never use these products near open flames, smoking materials or sparks.

### STARTING

- NEVER START OR OPERATE AN UNSAFE MACHINE. Before operating a machine, always ensure that any unsafe condition has been satisfactorily remedied.
- Check brakes, steering and attachment controls before moving. Advise the proper maintenance authority of any malfunctioning part or system.

### OPERATION

- Do not run the engine of this machine in closed areas without proper ventilation to remove deadly exhaust gases.
- Roll Over Protective Structures are required on loaders, dozers, graders, excavators. NEVER OPERATE machines without ROPS.
- Make sure the Operator's compartment is free of foreign objects, especially if not firmly secured. Never use the machine to transport objects, unless proper securing points are provided.
- Check monitoring instruments at start-up and frequently during operations. In case the brake pressure gauge shows a pressure lower than the minimum operating pressure, stop the machine immediately.
- DO NOT CARRY RIDERS ON MACHINE

## SAFETY RULES

- Study and familiarize with escape routes alternate to normal exit routes.
- Seat belts are required by current regulations to be provided with Roll Over Protection Structures or cabs. Keep safety belts fastened around you during operation.
- For your personal protection, do not climb on or off machine while machine is in motion.
- Make sure that exposed persons in the area of operation are clear of the machine, before starting the engine and operating the equipment. Sound horn. Obey all indications provided by flags and signals.
- NEVER COAST the machine down grades and slopes with the transmission in neutral or neutralized.

Choose and shift into the most appropriate gear to keep the speed required, thus preventing any loss of control.

- Do not operate machinery in a condition of extreme fatigue or illness. Be especially careful towards the end of working shift.
- Do not operate machine with brakes out of adjustment.
- Operate the machine at speeds slow enough to ensure complete control at all times.
- Travel slowly over rough terrain, on slopes or near drop-offs, in congested areas or on ice or slippery surfaces.
- When backing, always look to where the machine is to be moved. Be alert to the position of exposed personnel. DO NOT OPERATE if exposed personnel enter the immediate work area. STOP THE MACHINE.
- Maintain a safe distance from other machines. Provide sufficient clearance for ground and visibility conditions. Yield right-of-way to loaded machines.
- Maintain a clear vision of areas of travel or work. Keep cab windows clean and repaired.
- When machines are operating in tandem, the pusher (rear) must be equipped with the appropriate deflectors to protect the unit in front from the air stream coming from the radiator.
- When pulling or towing with a cable or chain, do not start suddenly at full throttle; take-up slack carefully.

Inspect carefully for flaws or troubles before using.

- Avoid kinking chains or cables. Do not pull using a kinked chain or cable due to the high stresses and possibility of failure of the kinked area. Always wear heavy gloves when handling chains or cables.
- Be sure chains and cables are anchored and the anchor points are strong enough to handle the expected load. Keep exposed personnel clear of anchor points and cables or chains.
- DO NOT PULL UNLESS OPERATOR'S COMPARTMENT OF MACHINES INVOLVED ARE PROPERLY

GUARDED AGAINST POTENTIAL CABLE OR CHAIN BACKLASH.

- Be alert to soft ground conditions close to newly constructed walls. The fill material and weight of the machine may cause the wall to collapse under the machine.
- In darkness, check area of operation carefully before moving in with machine. Use all lights provided. Do not move into area of restricted visibility.
- If engine has a tendency to stall for any reason under load or idle, report this for adjustment to proper maintenance authority immediately. Do not continue to operate machine, until condition has been corrected.
- On machines supplied with suction radiator fans, be sure to periodically check engine exhaust parts for leaks, as exhaust fumes are dangerous to the operator.
- In case of closed type cabs, always keep an opening with the outside, to ensure a constant air circulation.
- Operators must know the performances of the machine they are operating thoroughly. When working on slopes or near sudden level drops of the terrain, avoid areas where ground is loose or soft since rolling-over or loss of control of machine could result.
- Where noise exposure exceeds 90 dBA for 8 hours, wear approved ear protection.
- When counterweights are provided, do not work machine if they have been removed.
- Overtaking maneuvers must be performed only when absolutely necessary and unavoidable. Beware of possible uneven terrains, poor visibility conditions, the presence of other machinery or personnel out of sight.
- Operate the machine at a speed adequate to the working conditions in the site and slow enough to ensure complete control at all times.
- Never use the machine as a work platform or scaffolding, nor other inappropriate operations (i.e.: pushing railway cars, trucks or other machines).
- Be alert of people in the operating area of the machine.
- When operating a machine, know in advance what clearances will be encountered, overhead doors, cables, pipes, bearing load limitations of ground, bridges, floors or ramps.
- When roading, find-out what conditions are likely to be encountered, clearances, traffic congestion, type of road surfacing, etc. Beware of fog, smoke or dust elements that obscure visibility.
- When crossing gullies or ditches, move at an angle with

## SAFETY RULES

reduced speed after ensuring ground conditions will permit a safe traverse.

- Explore the working area to identify potential risks such as: slopes, overhangs, pits, demolition rubble, fires, ravines, ditches, soft terrain, heavy traffic, crowded parking areas, closed area. In such conditions, proceed with extreme care.
- Whenever possible, avoid going over obstacles such as rough terrain, rocks, logs highly irregular ground, steps, ditches, railroad tracks. When obstructions must be crossed, do so with extreme care at an angle, if possible. Reduce speed, shift-down. Ease up to the break over point, pass the balance point slowly on the obstruction and ease down on the other side.
- In steep down-hill operation, do not allow engine to over-speed. Select proper gear before starting down grade.
- Avoid side hill travel, whenever possible. Drive up and down the slope. Should the machine slipping sideways, turn it immediately downhill.
- The grade of slope you should attempt will be limited by factors such as condition of the ground, load being handled, type of machine, speed of machine and visibility.
- There is no substitute for good judgement when working on slopes.
- Avoid operating equipment too close to an overhang or high wall, either above or below the machine. Be on the look-out for caving edges, falling objects and slides. Beware of concealment by brush and undergrowth of these danger.
- When pushing over trees, the machine must be equipped with proper overhead guarding. Never allow a machine to climb up on the root structure particularly while the tree is being felled.
- When pushing trees with dead limbs, proceed with extreme care. Avoid brush piles, logs or rocks.
- NEVER DRIVE OVER THEM or other surface irregularities that brake traction with the ground, especially when on slopes or near drop-offs.
- Be alert to avoid changes in traction conditions that could cause loss of control. DO NOT DRIVE on ice or frozen ground when working the machine on steep slopes or near drop-offs.
- Working in virgin and rough terrains is characterized by the presence of all the perils and risks listed above. In these conditions, it is emphasized by the danger represented by large tree limbs (possibly falling on the machine), large roots (acting as a leverage under the machine when up-rooted causing the roll-over of the

unit) etc..

### STOPPING

- When the machine is stopped for whatever reason, follow the instructions of chapters "**Stopping the machine**" and "**Stopping the engine**" of the Operation and Maintenance Instruction Manual.
- Always remember to position the transmission drive control in neutral and engage the control lock to secure the machine.
- The parking brake is automatically set, when the transmission safety lever is lowered.
- NEVER LEAVE THE MACHINE UNATTENDED with the engine running.
- Before leaving the operator's seat and after making sure all personnel are clear of the machine, always slowly lower the attachments or tools flat to the ground in a positive ground support position.
- Return the controls to rest position. Place the gearshift lever in neutral. Disconnect the master switch and extract the key.
- Park in a non-operating and no-traffic area or as instructed. Park on firm level ground if possible. Where not possible, position machine at a right angle to the slope, making sure there is no danger of uncontrolled sliding movements.
- If parking in traffic lanes cannot be avoided, provide appropriate flags, barriers, flares and signals as required. Also provide advance warning signals in the traffic lane of approaching traffic.
- Keep head, body, limbs, feet, fingers or hands away from bucket, blade or ripper when in raised position.
- Always disconnect the master switch before any work (i.e. cleaning, repairing, maintaining, refuelling etc.). Do the same when parking for prolonged periods of time to avoid accidental or unauthorized starting.
- Never lower attachments or tools other than seated in operator's seat. Sound horn. Make sure area near the attachment is clear. Lower the attachment slowly. DO NOT USE FLOAT POSITION of hydraulic system.
- Place master switch in **OFF**, securely block the machine and lock it every time you leave it unattended. Return keys to authorized security. Heed all shut down operations of the Operation and Maintenance Instruction Manual are followed.

## SAFETY RULES

### MAINTENANCE

#### GENERALITIES

- Before operating or performing any work on the machine:
  - carefully read all the rules contained by this Manual;
  - read and obey all safety related plates and instructions located on the machine.
- Do not allow unauthorized personnel to perform any maintenance operation. Do not perform maintenance operation without prior authorisation. Follow all recommended maintenance and service procedures.
- Keep operator's compartment free of all loose objects that are not properly secured.
- Do not wear rings, wrist watches, jewelery, loose or hanging apparels, such as ties, torn clothing, scarves, unbuttoned or unzipped jackets that can catch on moving parts. Wear proper safety equipment as recommended for the job. Examples: hard hat, heavy gloves, ear protection, safety glasses or goggles, reflector vests, respirator. Consult your employer for specific safety equipment requirements.
- Do not use controls or hoses as hand holds when climbing on or off machine. Hoses and controls are movable and do not provide a solid support. Also, controls may be inadvertently moved causing accidental machine or equipment movement.
- Do not jump on or off the machine. Keep two hands and one foot, or two feet and one hand in contact with step grab rails and handles at all times.
- Do not perform any service operation on the machine with a person seated in the operator's compartment, unless he is an authorized operator co-operating in the operation to be performed.
- Keep operator's compartment, stepping points, grab-rails and handles clear of foreign objects, oil, grease, mud or snow accumulation to minimise the danger of slipping or stumbling.
- Keep shoes free of mud or grease before climbing or driving the machine.
- Never attempt to operate the machine or its tools from any position other than seated in the operator's seat.
- When maintenance operations require moving hydraulically operated attachments by means of machine's hydraulic system remember that all maneuvers must be made only when seated in the operator's seat. Before starting machine or moving attachment or tools, set brakes, sound horn and call for an all clear. Raise attachment slowly.
- Always block booms or parts of the machine which must be raised to perform work under them with external devices. Do not allow persons to move into the vicinities or standing under equipment not being blocked. Unless you are totally sure about your safety, avoid staying under raised equipment, even in case it is blocked.
- Do not place the body, limbs or fingers into sharp articulation, uncontrolled openings of the machine and without proper protections, unless they are blocked in a safe manner.
- Never perform work with engine running, except as called for in a Manual. Do not wear loose clothing or jewelery near moving parts.
- When servicing or maintenance require access to areas that cannot be reached from the ground, use a ladder or step platform that meet local and national regulations, to reach the service point. If such ladder or platform are not available, use the machine hand holds and steps as provided. Perform all service or maintenance carefully.
- Shop and/or field service platforms or ladders must be constructed and maintained in accordance with local and national regulations.
- Disconnect batteries and tag all controls according to current regulations to warn that work is in progress. Block machine and all attachments that must be raised according to current regulations.

Due to the presence of flammable fluids, never check or fill fuel tanks, batteries, nor use starting fluid near lighted smoking materials or open flames.
- BRAKES ARE INOPERATIVE when manually released for servicing. Provisions must be made to maintain control of the machine by blocking or other means.
- The fuel filling nozzle must be kept constantly inside the filling neck. Keep this contact from the beginning to the end of the fueling operation to avoid the possibility that sparks due to static electricity are generated.
- Use only designated towing or attaching points. Use care in making attachments. Make sure pins and/or locks are secure before pulling. Stay clear of drawbars, cables or chains under load.
- To move a disabled machine, use a trailer or a low-boy, if available. In case towing is needed, use all necessary signals required by local and national regulations, and follow the directions provided in this Manual.
- To load/unload a machine from transporter, choose a level surface ensuring firm support to the wheels of truck or trailer. Use strong access ramps, with adequate height and angle. Keep surface free of mud, oil or slippery materials.



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## SAFETY RULES

- Anchor the machine securely to the bed of truck or trailer and block wheels or tracks with appropriate wedges.
  - Never align holes with fingers or hands; always use appropriate aligning tools.
  - Eliminate all sharp edges and burrs from re-worked parts.
  - Use only approved grounded auxiliary power sources for heaters, chargers, pumps and similar equipment to reduce the hazards of electrical shocks.
  - Lift and handle heavy parts with a lifting device of proper capacity. Be sure parts are supported by proper slings and hooks. Use lifting eyes if provided. Watch-out for people in the vicinity.
  - Never pour gasoline or diesel fuel into open, wide and low containers. Never use gasoline, solvent or other flammable fluid to clean parts. Use exclusively qualified, non-flammable, non-toxic commercial solvents.
  - When using compressed air for cleaning parts, use safety glasses with side shields or goggles. Limit pressure to 2 bar (29.00 psi), in accordance with local and national regulations.
  - Do not run the engine in closed areas without proper ventilation to remove deadly exhaust fumes.
  - Do not smoke or permit any open flames or spark near when refueling or handling flammable materials.
  - Do not use an open flame as a light source to look for leaks or for inspection anywhere on the machine.
  - Make sure that all mechanic's tools are in good conditions. NEVER USE tools with mushroomed heads or frayed. Always wear eye protections.
  - Move with extreme care when working under the machine, its attachments and or on or near them. Always wear protective safety equipment as required, such as hard hat, goggles, safety shoes, ear plugs.
- When performing operations requiring running of the engine, have a qualified operator in the operator's seat at all times with the mechanic on sight. Place the transmission in neutral and set the brakes and safety lock.
- KEEP HANDS AND CLOTHING AWAY FROM MOVING PARTS.
  - For field service, move machine to level ground, if possible, and block it. If work on an incline is absolutely necessary, first block machine and its attachments securely, than move it to level ground as soon as possible.
  - Do not trust worn and /or kinked chains and cables: do not use them for lifting or pulling operations. To handle them, always use heavy gloves.
  - Be sure chains and cables are anchored and the anchor points are strong enough to handle the expected load. Keep exposed personnel clear of anchor points and cables or chains.
  - No personnels are allowed near the hooking points, chains or cables.
  - DO NOT TOW UNLESS OPERATOR'S COMPARTMENT OF MACHINES INVOLVED ARE PROPERLY GUARDED AGAINST POTENTIAL CABLE OR CHAIN BACKLASH.
  - Keep the area where maintenance operations are performed CLEAN and DRY. Eliminate immediately all water and oil spillages.
  - Do not pile oily or greasy rags; they represent a fire hazard. Store in closed metal container.
  - Before starting machine, check, adjust and lock the operator's seat for maximum comfort and control of the machine. Be sure exposed personnel in the area of operation are clear of the machine before moving it or its attachments. Sound horn.
  - Rust inhibitors are volatile and flammable Use only in well ventilated areas. Keep open flames away - DO NOT SMOKE - Store containers in a cool well ventilated place, secure against unauthorised personnel.
  - Do not carry loose objects in pockets that might fall unnoticed into open compartments.
  - Wear proper protective equipment such as safety goggles or safety glasses with side shields, hard hat, safety shoes, heavy gloves when metal or other particles are apt to fly or fall.
  - Wear welders protective equipment such as dark safety glasses, helmets, protective clothing, gloves and safety shoes, when welding or burning. Wear dark safety glasses near welding zones. DO NOT LOOK AT ARC WITHOUT PROPER EYE PROTECTION.
  - Know your jacking equipment and its capacity. Be sure the jacking point used on the machine is appropriate for the load to be applied. Be sure the support of the jack at the machine and under jack is appropriate and stable.
  - The load lifted by jacks is always dangerous: it is necessary to transfer loads to appropriate blocking as a safety measure, before proceeding with service or maintenance work, according to local or national regulations.
  - Steel cables are frayed after prolonged use; always wear appropriate protections (heavy gloves, goggles etc.).

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