

en

Service Manual

Wheel loader

L506 - L510



LIEBHERR

Sub Group Index

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LIEBHERR

Datum / Edition / Date

04.91

Benennung / Description / Dénomination

General

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1.

INTRODUCTION

This manual has been issued to provide you with technical information on design, function, disassembly, assembly, adjustments and troubleshooting of components and assemblies on the LIEBHERR wheel loader.

The descriptions are brief but precise, with photographs, drawings, electric and hydraulic circuit schematics and graphic diagrams. This information is intended to simplify any necessary repair work on the LIEBHERR wheel loader.

We deliberately avoided full photographic details of each repair stage, since only skilled mechanics, already familiar with most repair work, should perform these repairs. This manual also contains information about adjustments and adjustment values.

Instructions on regular care and maintenance is excluded from this manual since they are covered in the individual Operations and Maintenance Manuals.

Observe all Accident Prevention Guidelines before any maintenance and repair on the wheel loader. To perform repairs listed in this manual, a complete set of standard tools as well as special tools and fixtures shown and listed in this manual are necessary. It is essential to keep all equipments, tools and working areas clean and tidy.

No special emphasis is put on replacing sealing components such as O-rings, gaskets etc., since it is taken for granted that all removed seals, O-rings and gaskets are replaced during the course of repair. Unless specific values are given, all threaded connections should be tightened according to the torque charts.

Working with a wheel loader can be dangerous, it could result in injury or death if proper precautions are not taken! **WE URGE YOU TO READ THIS MANUAL CAREFULLY!** The safety information is provided to operators and maintenance mechanics to ensure the safe operation and maintenance of the wheel loader. It is essential that you read and familiarize yourself with this information, which explains safety requirements and precautions and specific hazards of which you should be aware. Careful adherence to these safety guidelines will permit safe operation and maintenance and potentially prevent personal injury to yourself and others, and possible damage to the wheel loader.

Important safety notes such as **DANGER** and **WARNING** are used throughout this manual to emphasize important or critical instructions, they are defined as follows:



DANGER for persons: Denotes an extreme intrinsic hazard which could result in a high probability of death or serious injury if proper precautions are not taken.



WARNING for machine: Denotes a reminder of safety practices or directs attention to unsafe practices if proper precautions are not taken, also **IMPORTANT** operation and maintenance procedures which could result in damage or destruction of the machine or any of its components if not observed.

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Updates will only be sent to registered Liebherr Service Manual owners. Manuals, which are not registered, are not updated. Service Information Bulletins might also serve as updates. We hope that with this information contained in this manual and your cooperation we have taken another step towards improved service for LIEBHERR wheel loaders.

We reserve the right to change and modify the technical data as compared with the information and illustrations contained in this manual.

LIEBHERR-WERK BISCHOFSHOFEN GES.MBH

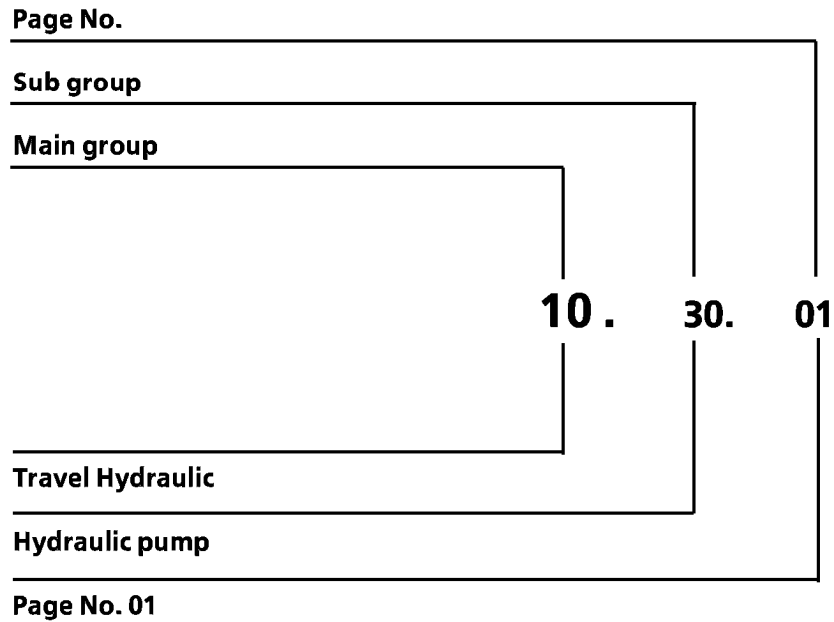
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EXPLANATION

In order to make it easier to find certain information or to add and/ or remove updates, we established the following page numbering system:



The index for the main groups can be found on page 1. of this manual.

Subgroups can be found on the sub group index page in front of every main group.

In case of minor changes, we will issue revised pages with a new date.

If an already existing sub group is updated completely, a new sub group number will be assigned.

The new group will list the machine serial number, for which this new information is valid.

SAFETY INFORMATION

For further information, see "TGB Safety Regulations for Wheel Loader Operation". In the United States or Canada, refer to the CIMA "Safety Manual" supplied with the machine.

THE SAFE OPERATION OF THE MACHINE DEPENDS ON COMPLIANCE WITH THE FOLLOWING SAFETY RULES.

GENERAL SAFETY INFORMATION

- **STUDY THE OPERATION AND MAINTENANCE MANUAL, AS WELL AS THE "CIMA" SAFETY MANUAL** before operating or working on the wheel loader.
- **ALLOW ONLY AUTHORIZED PERSONNEL TO OPERATE, SERVICE OR REPAIR THE WHEEL LOADER.**
- **WEAR PROPER WORK CLOTHING WHEN OPERATING OR WORKING ON THE WHEEL LOADER.** Rings, watches, bracelets and loose clothing such as ties, scarves, unbuttoned or unzipped shirts and jackets are dangerous and could cause injury.
- **WEAR PROPER SAFETY EQUIPMENT.** When appropriate, utilize safety equipment such as a hard hat, safety shoes, safety glasses, ear protection, reflector vest or respirator.
- **CONSULT YOUR EMPLOYER OR SUPERVISOR** for specific safety equipment requirements.
- **KEEP OPERATOR'S CAB, OPERATOR'S PLATFORM, STEPS, HANDRAILS AND HANDLES CLEAN AND FREE FROM OIL, GREASE, MUD, SNOW AND ICE.** These precautions will minimize the danger of slipping, stumbling or falling.
- **IF NEEDED, USE THE RIGHT OR REAR WINDOW AS AN ESCAPE ROUTE.**
- **NEVER JUMP OFF THE WHEEL LOADER.**
- **DO NOT CARRY TOOLS, PARTS OR OTHER SUPPLIES WHILE CLIMBING ON OR OFF THE WHEEL LOADER.**
- **NEVER USE THE STEERING WHEEL, CONTROL LEVERS, OR JOYSTICKS AS HANDHOLDS.** Climb on and off the wheel loader, using only the steps, rails and handles provided. When climbing on or off the wheel loader, use both hands for support and face machine.
- **PROPERLY SECURE ALL LOOSE ITEMS THAT ARE NOT PART OF THE WHEEL LOADER.**
- **EQUIP THE WHEEL LOADER WITH PROPER PROTECTION** when utilizing it in demolition, land clearing and logging applications.
- **BEFORE SERVICING THE WHEEL LOADER, ATTACH A "DO NOT OPERATE" TAG** to the starter switch.
- **PERFORM MAINTENANCE OR REPAIRS UTILIZING THE FOLLOWING PRECAUTIONS:**
 - Park wheel loader on firm and level ground.
 - Place all controls in neutral position.
 - Shut off engine.
 - Turn ignition key to "0" position.
 - Deactivate travel by engaging the parking brake. Deactivate the working hydraulic by pushing in the safety pin.
 - Turn the main battery switch to the "off" position.
- **NEVER ATTEMPT MAINTENANCE PROCEDURES OR REPAIRS YOU DO NOT UNDERSTAND.**
- **NEVER SERVICE THE WHEEL LOADER WITH THE ENGINE RUNNING UNLESS OTHERWISE SPECIFIED IN THE INSTRUCTION AND / OR OPERATION AND MAINTENANCE MANUAL.**

- **ALLOW ONLY TRAINED AND AUTHORIZED PERSONNEL TO MAINTAIN, SERVICE OR REPAIR THE WHEEL LOADER.**
 - **USE ONLY ORIGINAL LIEBHERR SPARE PARTS** such as hoses, tubing, electrical wires, filters, etc.
 - **NEVER JACK UP THE WHEEL LOADER WITH ITS ATTACHMENT TO PERFORM ANY MAINTENANCE OR REPAIR WORK.**
 - **BLOCK AND SUPPORT THE WHEEL LOADER PROPERLY.** Be aware that the center of gravity will shift if attachments or other major components are being removed.

CRUSHING AND BURN PREVENTION

- **NEVER WORK UNDERNEATH OR ON THE WHEEL LOADER UNLESS IT IS PROPERLY BLOCKED AND SUPPORTED.**
- **ALWAYS PROPERLY SUPPORT THE ATTACHMENT WHEN CHANGING ANY PART OF IT SUCH AS BUCKETS, TEETH, CUTTING EDGES, OR WEAR SHROUDS. NEVER USE METAL ON METAL SUPPORT.**
- **ALWAYS SECURE MACHINE WITH THE ARTICULATION SAFETY BAR. STAY CLEAR OF THE MACHINE UNTIL SECURED. NEVER WORK IN OR NEAR THE PIVOT AREA UNLESS THE MACHINE IS SECURED WITH THE ARTICULATION SAFETY BAR.**
- **NEVER USE DAMAGED OR INSUFFICIENT WIRE ROPES AND SLINGS.** Always wear gloves when handling wire ropes.
- **NEVER REACH INTO BORES DURING ATTACHMENT INSTALLATION OR REMOVAL.** Never align bores with your fingers or hands. Use proper alignment tools when installing, changing or servicing attachments.
- **KEEP OBJECTS AWAY FROM THE RADIATOR FAN.** Rotating fans will swirl and throw out objects, which can become very dangerous and cause severe injury to yourself and others.
- **AVOID CONTACT WITH COMPONENTS CONTAINING COOLANT.** At or near operating temperature, the engine coolant is hot and under pressure, and could cause severe burns.
- **CHECK COOLANT LEVEL ONLY AFTER RADIATOR CAP IS COOL ENOUGH TO TOUCH.** Remove radiator cap slowly to relieve pressure.
- **DO NOT ALLOW YOUR SKIN TO COME INTO CONTACT WITH HOT OIL OR COMPONENTS CONTAINING HOT OIL.** At or near operating temperature, engine and hydraulic oil is hot and can be under pressure.
- **DO NOT DISCONNECT LINES OR HOSES, OR REMOVE FITTINGS, CAPS OR COVERS WHILE THE HYDRAULIC SYSTEM OR ENGINE FUEL AND COOLING SYSTEM IS PRESSURIZED. ALWAYS LOWER ATTACHMENT, SHUT OFF ENGINE, AND RELEASE ALL PRESSURES.** After servicing, be certain that all lines, hoses and fittings are properly connected and all caps and covers properly closed.
- **ALWAYS WEAR SAFETY GLASSES AND PROTECTIVE GLOVES** when handling batteries. Keep sparks or open flames away.
- **NEVER PERMIT ANYONE TO HAND GUIDE** the bucket or other attachment into position.
- **DISCONNECT THE BATTERIES BEFORE WORKING ON THE ELECTRICAL SYSTEM OR BEFORE PERFORMING ANY ARC WELDING. ALWAYS DISCONNECT THE NEGATIVE TERMINAL FIRST, AND RECONNECT IT LAST.** If so equipped, turn the main battery switch to the "off" (aus) position.

FIRE AND EXPLOSION PREVENTION

- **NEVER SMOKE OR ALLOW AN OPEN FLAME** in refueling areas or where batteries are being charged, or where batteries or flammable materials are stored.
- **ALWAYS SHUT OFF ENGINE DURING REFUELING.**
- **NEVER STORE FLAMMABLE FLUIDS ON THE MACHINE EXCEPT IN THE STORAGE TANK INTENDED FOR THE WHEEL LOADER'S OPERATION.**
- **ALWAYS USE PROPER ENGINE START OR JUMP START PROCEDURES.** Consult the Instruction and / or Operation and Maintenance Manual.
- **FREQUENTLY CHECK THE ELECTRICAL SYSTEM AND CORRECT ALL WIRING DEFECTS.**
- **DO NOT USE FLAMMABLE FLUIDS TO CLEAN THE WHEEL LOADER.**
- **INSPECT ALL COMPONENTS, LINES, TUBES AND HOSES FOR OIL AND FUEL LEAKS OR DAMAGE. REPLACE OR REPAIR ANY DAMAGED COMPONENTS.**
- **NEVER CHECK FOR LEAKS WITH YOUR BARE HANDS.** Fluid escaping from a small hole can have enough force to penetrate the skin.
- **BE CERTAIN THAT ALL CLAMPS, GUARDS, AND HEAT SHIELDS ARE INSTALLED.** These components prevent vibration, rubbing and heat buildup. Install tie wraps to fasten hoses and wires as required.
- **USE ETHER ONLY IN VENTILATED AREAS AND AS DIRECTED.** Cold start ether is extremely flammable.
- **NEVER SMOKE WHILE HANDLING ETHER CANS OR CHANGING ETHER CYLINDERS.**
- **KNOW THE LOCATION OF THE WHEEL LOADER'S FIRE EXTINGUISHER, IF INSTALLED, AND BE FAMILIAR WITH ITS OPERATION.**
- **EXPLOSIVE SEPARATION OF TIRE AND/OR RIM COMPONENTS CAN CAUSE SERIOUS INJURY OR DEATH.** Always follow the manufacturer's recommendations or contact your tire supplier.
- **ALWAYS MAINTAIN THE CORRECT TIRE PRESSURE. DO NOT** operate the machine with over or under inflated tires.
- **INSPECT TIRES, WHEELS AND LUG NUTS DAILY. DO NOT** operate with cuts, bubbles, damaged rims or loose and missing lug nuts.
- **DO NOT INFLATE TIRES WITH FLAMMABLE GASES OR OXYGEN.**
- **ADJUST TIRE PRESSURE FROM A DISTANCE.** Use a long hose with self attaching air chuck. **ALWAYS** stand behind the tread when adjusting tire pressure.

MACHINE START-UP SAFETY

- **BEFORE WHEEL LOADER START-UP, PERFORM A THOROUGH WALK AROUND INSPECTION.**
- **VISUALLY INSPECT THE WHEEL LOADER.** Look for loose bolts, cracks, wear, tire condition, leaks and evidence of vandalism.
- **NEVER START OR OPERATE AN UNSAFE WHEEL LOADER.**

- **REPORT ALL DEFECTS TO YOUR FOREMAN OR SUPERVISOR AND MAKE SURE THEY ARE CORRECTED.**
- **FAMILIARIZE YOURSELF WITH JOB SITE RULES.** Be informed about traffic, hand signals and safety signs. Ask who is responsible for signaling.
- **TAKE SIGNALS FROM ONLY ONE PERSON.** In tight quarters, on job sites with limited visibility, or if necessary, have another person guide and signal you.
- **BE CERTAIN THAT THE AREA SURROUNDING THE WHEEL LOADER IS FREE OF OTHER PERSONNEL.**
- **BE CERTAIN NO ONE IS WORKING ON OR UNDER THE WHEEL LOADER.**
- **AFTER ENTERING THE WHEEL LOADER, ADJUST THE OPERATOR'S SEAT AND CONTROLS, ADJUST MIRRORS IF INSTALLED, FASTEN AND ADJUST SEAT BELT.** Be certain that all controls can be reached.
- **CLEAN ALL WINDOWS AND SECURE DOORS.**
- **ALERT NEARBY PERSONNEL THAT THE WHEEL LOADER IS BEING STARTED.**
- **BE CERTAIN TO REMOVE THE ARTICULATION SAFETY BAR. A LOCKED MACHINE CANNOT BE STEERED.**

ENGINE START-UP AND OPERATION SAFETY

- **PLACE ALL CONTROLS IN NEUTRAL POSITION BEFORE STARTING THE ENGINE.**
- **FOLLOW THE ENGINE STARTING INSTRUCTIONS.** These instructions are outlined in the Instruction and / or Operation and Maintenance Manual.
- **CHECK ALL LIGHTS, INDICATORS, INSTRUMENTS AND CONTROLS FOR THEIR PROPER FUNCTION.**
- **START ENGINE AND CHECK INDICATORS, GAUGES, WARNING DEVICES AND CONTROLS FOR THEIR PROPER INDICATION.**
- **START AND OPERATE ENGINE ONLY IN A WELL VENTILATED AREA.**
- **WARM UP ENGINE AND HYDRAULIC SYSTEM TO OPERATING TEMPERATURES.** Low engine and hydraulic oil temperatures cause the wheel loader to be unresponsive.
- **CHECK THAT ALL ATTACHMENT FUNCTIONS ARE PROPERLY OPERATING.**
- **MOVE THE WHEEL LOADER SLOWLY INTO AN OPEN AREA AND CHECK ALL TRAVEL FUNCTIONS FOR THEIR PROPER OPERATION.**

MACHINE OPERATING SAFETY

- **OPERATE WHEEL LOADER ONLY WHILE SEATED AND WITH THE SEAT BELT FASTENED.**
- **NEVER OPERATE THE MACHINE WITHOUT THE "ROPS" (ROLL-OVER PROTECTIVE STRUCTURE) CAB OR CANOPY.**
- **NEVER ALLOW OTHER PERSONNEL ON THE WHEEL LOADER.**
- **REPORT PROBLEMS OR NEEDED REPAIRS TO YOUR FOREMAN OR SUPERVISOR.**

- **BE CERTAIN THAT NO ONE IS BEING ENDANGERED BY MOVING THE WHEEL LOADER.**
- **CHECK THE BRAKE AND STEERING SYSTEM.** The proper operation of the brake and steering system is outlined in the Instruction and / or Operation and Maintenance Manual.
- **NEVER LEAVE THE WHEEL LOADER WHILE THE ENGINE IS RUNNING OR IF THE WHEEL LOADER IS IN MOTION.**
- **KEEP THE ATTACHMENT CLOSE TO THE GROUND.**
- **KEEP A SAFE DISTANCE FROM OVERHANGS, WALLS, DROP OFFS AND UNSTABLE GROUND.**
- **NEVER TRAVEL DOWNHILL AT MAXIMUM SPEED.**
- **ALWAYS ADAPT YOUR TRAVEL SPEED TO WORKING CONDITIONS.**
- **ALWAYS TRAVEL DOWNHILL IN EITHER LOW GEAR, OR WITH THE TRAVEL PEDAL DEFLECTED NO MORE THAN HALF WAY IN HIGH GEAR.**
- **NEVER TRAVEL ON SLOPES THAT EXCEED THE MAXIMUM PERMISSIBLE GRADEABILITY.**
- **IF THE WHEEL LOADER BEGINS TO TIP OR SLIP ON A GRADE, IMMEDIATELY LOWER ATTACHMENT AND LOAD TO THE GROUND AND TURN THE WHEEL LOADER DOWNHILL.**
- **KEEP SEAT BELT SECURELY FASTENED WHEN OPERATING.** Experience has shown that it is safer to stay in the (ROPS) cab, in the event of an overturn.
- **NEVER DIG, LIFT OR LOAD SIDWAYS ON SLOPES. ALWAYS OPERATE THE WHEEL LOADER WITH THE ATTACHMENT POSITIONED UPHILL OR DOWNHILL.**
- **ALWAYS TRAVEL SLOWLY ON ROUGH OR SLIPPERY GROUND AND ON SLOPES.**
- **BE ALERT TO CHANGING GROUND CONDITIONS, VISIBILITY AND WEATHER CONDITIONS.**
- **BE ALERT FOR UTILITY LINES.** Be aware of the location of underground cables, gas and water lines.
- **AVOID HIGH VOLTAGE ELECTRICAL LINES.**
 - Keep at least 10' from lines with a voltage up to 57,000 volts.
 - At least 17' from lines with a voltage above 57,000 volts.
- **ASK ABOUT FEDERAL, STATE AND LOCAL SAFETY REQUIREMENTS.**

MACHINE TOWING AND PULLING SAFETY

- Consult the Towing Section of the Instruction and / or Operation and Maintenance Manual.
- **BE SURE ALL TOWING AND PULLING DEVICES SUCH AS CABLES, HOOKS AND COUPLERS ARE SAFE AND ADEQUATE.**
- **CONNECT CABLES TO THE APPROPRIATE TOWING HOOKS OR COUPLERS ONLY.**
- **NEVER ALLOW ANYONE TO STAND NEAR THE CABLE WHILE PULLING OR TOWING. KEEP CABLE TIGHT AND FREE OF KINKS.**
- **ENGAGE TRAVEL SLOWLY AND DO NOT JERK.** With a slack cable , the sudden impact of the load being towed could snap the cable.

MACHINE PARKING SAFETY

- **PARK THE WHEEL LOADER ONLY ON FIRM AND LEVEL GROUND, AND ENGAGE THE PARKING BRAKE .** If it becomes necessary to park the machine on a grade, properly block and secure it.
- **NEVER LEAVE THE CAB OR THE WHEEL LOADER UNATTENDED WITH THE ENGINE RUNNING.**
- **ALWAYS LOWER THE ATTACHMENTS TO THE GROUND.**
- **RETURN ALL CONTROLS TO THE NEUTRAL POSITION AND ENGAGE THE PARKING BRAKE .**
- **WHEN STOPPING THE ENGINE, ALWAYS FOLLOW THE PROCEDURES AS OUTLINED IN THE INSTRUCTION AND / OR OPERATION AND MAINTENANCE MANUAL.**
- **BEFORE LEAVING THE CAB ALWAYS ENGAGE THE PARKING BRAKE TO DEACTIVATE TRAVEL. DEACTIVATE THE WORKING HYDRAULIC BY PUSHING IN THE SAFETY PIN.**
- **BE CERTAIN TO INSTALL THE ARTICULATION SAFETY BAR.**
- **TURN THE MAIN BATTERY SWITCH TO THE "OFF" POSITION.**
- **LOCK THE WHEEL LOADER, REMOVE ALL KEYS, AND SECURE THE WHEEL LOADER AGAINST VANDALISM AND UNAUTHORIZED USE.**

MACHINE TRANSPORTATION SAFETY

- **REMOVE ALL MUD, SNOW OR ICE FROM TRACK COMPONENTS.**
- **BE SURE THAT THE LOADING RAMP INCLINE IS LESS THAN 30 DEGREES AND COVERED WITH WOODEN PLANKS.**
- **REMOVE BUCKET OR ATTACHMENT FROM THE WHEEL LOADER ONLY IF NECESSARY.**
- **RETRACT THE ATTACHMENT AS FAR AS POSSIBLE.**
- **VERY CAUTIOUSLY DRIVE UP ON RAMP AND TRAILER.** Have another person guide and signal you.
- **RETRACT ATTACHMENT AS FAR AS POSSIBLE AND LOWER BUCKET OR ATTACHMENT ON THE TRAILER PLATFORM.**
- **BE CERTAIN TO INSTALL THE ARTICULATION SAFETY BAR.**
- **SECURELY BLOCK AND CHAIN THE WHEEL LOADER TO THE TRAILER.**
- **CAREFULLY CHECK OUT THE TRANSPORT ROUTE BEFOREHAND.** Check that there is enough clearance underneath all bridges and underpasses, utility lines, and in tunnels.
- **BE CERTAIN TO REMOVE THE ARTICULATION SAFETY BAR BEFORE UNLOADING THE MACHINE.**
- **UNLOAD THE WHEEL LOADER AS CAUTIOUSLY AS IT WAS LOADED.** Remove all chains and blocks. Start the engine as outlined in the Instruction and / or Operation and Maintenance Manual. Carefully drive off the trailer and down the ramp, holding the attachment as low as possible. Have another person guide and signal you .

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