EN

AL275

S/N ADBH 11001 & above

AL350

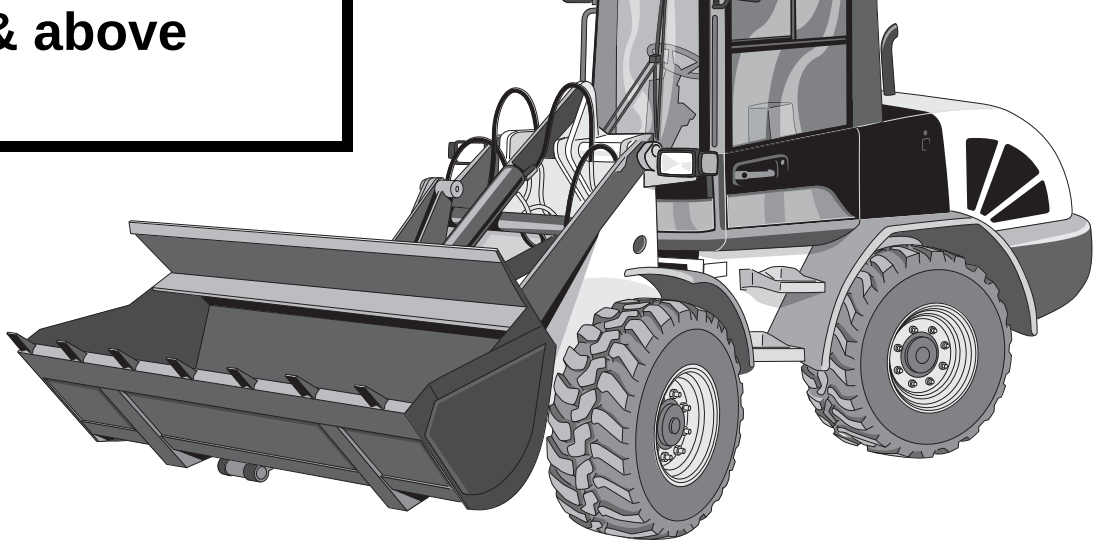
S/N ADBJ 11001 & above

AL440

S/N ADBK 11001 & above

Bobcat®

Service Manual



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Bobcat

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ALPHABETICAL INDEX

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FOREWORD

SAFETY INSTRUCTIONS

Introductory remarks

Please read the operating instructions carefully before putting an earth-moving machine into operation and strictly follow the remarks for a safe operation.

National safety regulations - e.g. the Accident Prevention Regulations, „Earth-Moving Machinery“ (VBG 40) and „Vehicles“ (VBG 12), in the Federal Republic of Germany - must also be complied with.

In addition to the operating instructions, legal regulations governing road traffic and road safety measures must also be observed. Such requirements could also apply in respect of handling hazardous goods or the wearing of personal safety equipment, for example.

Furthermore, safety laws governing work in particular locations (tunnels, adits, quarries, pontoons, contaminated areas, etc.) must likewise be observed.

Correct use

The earth-moving machine with normal shovel equipment is only to be used for work which is suitable for the machine's functions and its attachment.

Such work includes the digging, loading, displacing and dumping out the earth, stones or other materials and the loading of these materials and the loading of these materials onto lorries, conveyor belts or other means of transportation. The transport of the loading material, however, is mainly carried out by moving the earth-moving machine.

If special attachments, such as Unishovel, side dump shovel, sweeper, forklift attachment etc. are mounted, special jobs can be done with the attachment.

Another or additional application, e.g. for transportation of passengers or using the lifting device as working platform etc. is not considered as correct use. The supplier is not liable for subsequent damage. The end-user himself bears the full risk.

It is part of the correct use to follow the operating and maintenance instructions and to carry out the maintenance as well as to follow the maintenance intervals.

General safety notes

It is important to refrain from any working methods which impair safety.

The earth-moving machine may only be used when it is in a safe, operational condition.

The manufacturer's operating instructions must be complied with for operation, maintenance, repair, assembly and transportation.

The plant operator must provide additional special safety instructions, wherever necessary, for specific local conditions.

The operating instructions and any information pertaining to the safety must be carefully kept in the driver's cab.

The operating instructions and safety notes must be complete and fully readable.

Safety devices on earth-moving machines must not be deactivated or removed.

Protective work clothing must be worn during operation. Rings, scarves and unbuttoned jackets are to be avoided. Protective goggles, protective boots, helmets, gloves, reflecting jackets, earmuffs, etc. may be required.

Before commencing work, information must be obtained on first aid and possible means of rescue (ambulance, fire brigade, helicopters).

A check must be carried out to ensure that the first aid box is at hand and that its contents comply with regulations.

Personnel must be aware of the location and method of operation of the fire extinguishers on the earth-moving machine as well as on-site fire-warning and fire-fighting equipment.

Loose parts such as tools or other accessories must be secured to the earth-moving machine.

Open doors, windows, covers, flaps, etc. must be secured so that they cannot slam shut.

Operation

Earth-moving machines may only be independently operated and serviced by people who

- Are physically and mentally fit
- Have been instructed in the operation or maintenance of he earth-moving machine and have demonstrated this ability to the plant operator
- Can be expected to perform their allocated duties reliably

Operation (Cont'd)

All these people must be of the legal minimum age.

They must be designated by the plant operator to operate or service the earth-moving machine.

Operating equipment (controls) may only be activated from the driver's seat.

The earth-moving machine may only be ascended and entered using the entrances and surfaces intended for this purpose.

The operator has to ensure that the cab, steps and other walked-on surfaces of the earth-moving machine are free of dirt, grease, oil, ice and snow.

Danger zone

- No one may enter the danger zone of earth-moving machines.
- The danger zone encompasses the area around the earth-moving machine in which people may be injured by movements of the earth-moving machine in which people may be injured by movements of the earth-moving machine during operation, its working equipments and attachments, or by swinging out or falling loads, or by falling working equipment.
- The machine operator may only work with the earth-moving machine when the danger zone is free of personnel.
- The machine operator must give a warning signal to persons who may be in danger.
- The machine operator has to stop work with the earth-moving machine if anyone remains in the danger zone despite the warning.
- To ensure no danger of crushing, a sufficient safety distance (min. 500 mm) must be kept from solid objects, e.g. buildings, excavation slopes, scaffolding, other machines, etc.

If the above safety distance cannot be maintained, the area between solid objects and the working zone of the earth-moving machine must be blocked off.

- If conditions are such that the machine operator's view of the driving and working zone is restricted, he must be guided or the driving and working zone must be marked by a solid barricade.

The windows must be clean and free of ice.

Driving tracks must be designed so as to ensure smooth, safe operation, i.e. they must be sufficiently wide, on ground which has sufficient carrying capacity and as few slopes as possible.

Downhill tracks must be set out in such a way that loading machines can be braked safely.

Transport of passengers

Passengers must not be transported on the machine.

Stability

Earth-moving machines must be used, driven and operated in such a manner that their stability against overturning is ensured at all times.

The machine operator must drive at speeds which are suitable for local conditions.

The permitted payload of the earth-moving machine must not be exceeded.

Earth-moving machines must remain at a sufficient distance from the edges of quarries, pits, mounds and slopes to ensure there is no risk of falling.

Earth-moving machines must be secured so that they cannot roll or slip when in the vicinity of excavations, shafts ditches, pits and slopes.

Travel operation

Before putting the earth-moving machine into operation, the driver's seat, mirrors and controls must be so adjusted as to ensure safe working.

The carrying capacity of bridges, cellar roofs, vaults, etc. must be verified before the earth-moving machine can drive over them.

The internal dimensions of constructions must be noted before entering underground passages, tunnels, etc.

On steep drops and uphill gradients, the load must be carried on the uphill side, if possible, in order to increase stability.

Before driving downhill, the appropriate gear for the terrain must be selected and the gear lever must not be moved during downhill travel (normal or crawler gear).

Earth-moving machines may only be driven on the open road when both the machine and the driver have the appropriate license as required by the country in question.

Outside areas covered by general traffic regulations, e.g. on construction sites, traffic regulations should be applied in the proper manner. This should also apply with regard to drivers' licenses.

Operation

The operator has to check the correct fastening of the attachments and / or lock of the quick exchange device daily before start of operation and after every attachment change. Move the attachment carefully at low height. Please ensure that nobody is in the danger zone during these checks.

The machine operator may only swing the working equipment over occupied drivers' seats, operator consoles and workplaces of other machines if these are protected by overhead guards (FOPS).

If a cab does not have the required protection, the driver of this vehicle must leave the driver's seat when the working equipment has to be slewed overhead.

The vehicles must be loaded in such a manner as to ensure that there is no overloading and no material can be loaded from the lowest possible height.

At dumping points, earth-moving machines may only be operated when suitable measures have been taken to prevent rolling or falling.

Guides

Guides must be easily recognizable, e.g. by means of reflective clothing. They must remain within the machine operator's field of sight.

While guiding the machine, guides must not be given other jobs which may distract them from their task.

Danger of falling objects

Earth-moving machines may only be used where there is a danger of falling objects if the driver's seat and operator consoles have an overhead guard (FOPS). A front guard must be employed if there is a risk of materials breaking into the cab.

In front of walls e.g. of stacked materials, earth-moving machines must be positioned and operated in such a way that the driver's seat and entry to the driver's seat are not situated on the side facing the wall.

Demolition work may only be performed with earth-moving machines where there is no danger to personnel.

Working in the vicinity of underground power lines

Before commencing excavating work using earth-moving machines, it must be determined whether any underground power lines are present in the intended working zone which may present a danger to personnel.

If underground power lines are present, their exact position and course must be determined in consultation with the proprietor or operator of the lines, and the necessary safety precautions decided and implemented.

The course of power lines in the work area must be clearly marked, under supervision, before commencing any excavation work. If the position of lines cannot be determined, search ditches must be dug - manually, if needed.

If underground power lines are encountered unexpectedly or they or their protective covers are damaged, the machine operator must discontinue work immediately and notify the supervisor.

Working in the vicinity of overhead power lines

When the earth-moving machine is being used in the vicinity of overhead power lines and trolley wires, a safety distance which varies depending upon the nominal voltage of the overhead line must be maintained between the lines and the earth-moving machine and its working equipment, in order to prevent current overspill. This also applies to the distance between these lines and attached implements or loads.

The safety distances specified below must be complied with:

NOMINAL VOLTAGE	SAFETY DISTANCE IN METERS
1000 V	1,0 m
over 1kV - 110kV	3,0 m
over 110kV - 220kV	4,0 m
over 220kV - 380kV	5,0 m
Nom. Voltage unknown	5,0 m

In the observation of safety distances, all working movements of the earth-moving machine, e.g. positions of the boom, swinging ropes and the dimensions of attached loads must be taken into consideration. Uneven ground which would cause the earth moving machine to be inclined and thus nearer to overhead lines must also be taken into account.

During work in windy conditions, both overhead lines and working equipment may swing out, thus reducing the safety distance.

If it is impossible to maintain sufficient distance from overhead power lines and trolley wires, the plant operator must consult with the proprietor or operator of the overhead lines to find other safety precautions to prevent current overspill. Such measures could be, e.g.

- Switching off the current
- Re-routing the overhead line
- Cabling, or
- Limiting the work zone of earth-moving machines

Operation in closed rooms

If earth-moving machines are used in closed rooms, these areas must be sufficiently ventilated and special regulations observed.

Work stoppages

Before rest periods and at the end of the working day, the driver of the earth-moving machine must park the machine on ground with sufficient load capabilities and is as even as possible, and must secure it against movement.

Before rest periods and at the end of the working day, the driver must lower the working equipment onto the ground or secure it so that it cannot move about.

The driver must not leave the earth-moving machine if the working equipment has not been lowered to the ground or secured.

Earth-moving machines may only be parked in places where they do not present an obstacle, e.g. on the construction site or to plant traffic. Warning devices, e.g. triangles, warning cordons, flashing or hazard lights are to be used if necessary.

Before leaving the control console, the driver must bring all working equipment into home position and apply the brakes.

If the driver is leaving the earth-moving machine unattended, he must first turn off the drive motors and ensure that they cannot be started up by unauthorized persons (remove ignition key for example).

Crane operations

Crane operations are the hoisting, transporting and lowering of loads with the aid of a fixing device (rope, chain, etc.), whereby the assistance of personnel is required to attach and release the load.

Such work covers, for example, the lifting and lowering of pipes, heavy machine parts or containers with earth moving machines.

Earth-moving machines may only be used for crane operations if the prescribed safety devices are present and in full working order. For earth-moving machines, these are:

- Safe fastening points for lifting device
- Table of carrying capacity
- Overload warning device*
- Hose rupture safety valve for boom cylinder*

* only in case of an admissible carrying capacity of more than 1000 kg

Loads must be attached in such a way that they cannot slip or fall out.

Personnel guiding the machine and attaching loads must always remain in the machine operator's field of sight.

The machine operator must carry loads as close to the ground as possible and prevent them from swinging.

Earth-moving machines may only travel with an attached load if the path of travel is fairly level.

When earth-moving machines are used for crane operations, personnel attaching loads may only approach the boom from the side and with the machine operator's permission. The machine operator may only give his permission if the earth-moving machine is standing still and the working equipment is not in motion.

Do not use fixing devices (ropes, chains) which are damaged or of inadequate dimensions. Protective gloves must always be worn when working with fixing devices.

Assembly, maintenance, repair

Earth-moving machines may only be assembled, converted or disassembled under the guidance of a suitable person designated by the plant operator and following the manufacturer's operating constructions.

After every change of attachment, the operator has to ensure the correct fastening and / or lock of the quick exchange device.

Work on braking, steering, hydraulic and electric systems of the earth-moving machine may only be carried out by expert personnel specially trained in these areas.

Stability must be ensured at all times during work on earth-moving machines.

The working equipment must be secured against movement by lowering them to the ground or equivalent measures, e.g. stays, trestles. When the engine is running, the unsecured articulation area of loaders with articulated steering must not be entered.

When jacking up earth-moving machines, jacking devices must be positioned sot that they cannot slip. Jacks must be positioned and applied absolutely straight, without tilting.

Assembly, maintenance, repair (Cont'd)

Raised earth-moving machines must be supported by suitable structures such as crosswise stacks of planks, square timbers or steel trusses.

Earth-moving machines which are raised with working equipment must be stabilized by a supporting structure immediately after lifting. Do not work under earth-moving machines which are only supported by the hydraulics.

The engine/motor must be turned off prior to all maintenance and repair work. These requirements may only be ignored in the case of maintenance or repair work which cannot be performed without the engine/motor running.

Depressurize the hydraulic system when carrying out maintenance and repair jobs. To do this, lower the working equipment to the ground with the engine turned off and operate all hydraulic system is depressurized.

Before working on the electrics or when performing arc welding on the machine, the connection to the battery must be interrupted.

When disconnecting the battery, first the negative pole then the positive pole must be disconnected. The battery must be reconnected in reverse order.

During repair work around the battery, the battery must be covered with insulating material; tools should never be placed on or near the battery.

Protective devices of moving machine parts may only be opened or removed when the drive has been switched off and cannot be switched on again by unauthorized persons. Protective devices are e.g. engine/motor covers, doors, protective grating, and trim.

Upon completion of assembly, maintenance or repair work, all protective devices must once more be attached in the proper manner.

Load-bearing parts of earth-moving machines may only be welded following consultation with the manufacturer and in accordance with recognized welding principles.

Overhead guards (FOPS) must not be welded or drilled in any way which could impair their sturdiness.

Alterations, such as welding of the hydraulic system, may only be undertaken with the manufacturer's permission.

Before commencing work on the hydraulic system, the pilot pressure, back pressure and pressure inside the tank must be let off.

Lubricants cannot be taken internally and repeated skin contact should be avoided. There is no special danger to health if lubricants are used correctly. Please follow the safety recommendations issued by the mineral oil companies.

Only the hoses specified by the manufacturer may be used.

Hydraulic hoses must be routed and assembled by expert personnel.

Never smoke or handle open flames near or around the fuel tank and batteries.

Towing, loading, transportation

The towing of earth-moving machines may only be done with towing devices sufficiently dimensioned.

The fixing devices specified by the manufacturer must be employed.

For loading and transportation earth-moving machines and all necessary auxiliary equipment must be secured against unwanted movement.

The traveling gear and track-laying gear of earth-moving machines must be sufficiently cleaned of mud, snow and ice to ensure tat ramps can be driven up without risk of slipping.

When the earth-moving machine is transported on lorries, flatbed trailers or by rail, it has to be carefully secured with wheel chocks and tie-downs at the fastening points.

Before setting off, the route to be taken must be examined to determine whether the roads are wide enough, entrances and passages under bridges are large enough and that roads and bridges have sufficient carrying capacity

Monitoring and inspections

The machine must be thoroughly inspected by an authorized and trained person according to the safety regulations valid in your country:

- Prior to the first commissioning and prior to re-commissioning after major changes
- At least once a year
- Periodically according to the operating conditions and the conditions in the operator's company

The inspection report is to be put in writing and kept for future reference.

Furthermore, prior to each work shift, the machine operator must check the earth-moving machine according to the inspections chart.

Hydraulic hoses must be replaced as soon as the following damages are recognized:

- Damages to the outer layer which reach the intermediate layer
- Embrittled patches on the outer layer
- Deformations when under pressure or without pressure which differ from the original shape of the installed hose
- Leakages
- Damages to hose fittings or to the connection between the fitting and the hose

The coolant level must only be checked when it has cooled down; the cap must be turned carefully in order to bleed off excess pressure.

Prior to operations, the machine operator must check the function of the safety devices.

The machine operator must advise the supervisor immediately - and the person relieving him, should there be a change of operators - with regard to any shortcomings.

In the event of shortcomings which jeopardize the operating safety of the earth-moving machine, it must not be used until these have been eliminated.

Fire protection

A fire extinguisher has to be stored in the operator's cab. A fire extinguisher symbol has to be applied.

Emergency exit

The windscreen acts as an emergency exit. If a front guard is fitted or this exit can no longer be used for any other reason, an emergency hammer must be affixed at an easily accessible place inside the driver's cab.

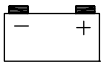
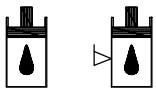
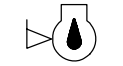
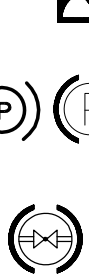
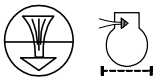
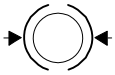
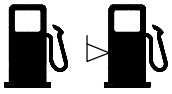
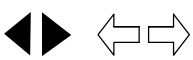
Other dangers

Failure of the hydraulics

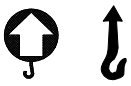
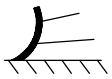
If the hydraulic system fails due to a standstill of the diesel engine, a defectiveness of the hydraulic oil leakage, only the **emergency** functions „**lower working equipment**“ are possible.

Pictogram

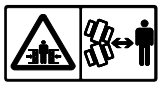
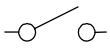
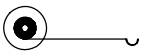
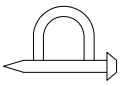
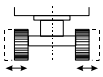
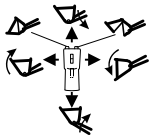
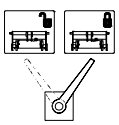
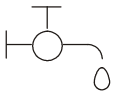
001 - 099	:	General control
100 - 119	:	Loader
120 - 139	:	Excavator
140 - 149	:	Backhoe excavator
150 - 159	:	Universal-mounted excavator / loader
160 - 179	:	Walking excavator
180 - 199	:	Tunneling and mining machines / Rail-road excavator
200 -	:	Maintenance, safety, etc. in general

	SYMBOL	DESCRIPTION		SYMBOL	DESCRIPTION
001		Battery charge indicator	**012**		Hydraulic oil, hydraulic oil level
002		Pre-heat	**013**		Hydraulic oil temperature
003		Engine oil pressure	**014**		Hydraulic oil filter clogging indicator
004		Engine oil temperature	**015**		Horn
005		Engine oil level	**016**		Operational status, operating hours
006		Coolant temperature	**017**		Parking brake
007		Coolant level	**018**		Brake accumulator pressure
008		Air filter	**019**		Excavator brake
009		Fuel, fuel level	**020**		Service brake
010		Fan, Heater / ventilation	**021**		Hazard warning system
011		Windscreen wash/ wipe system	**022**		Direction indicator, left/right

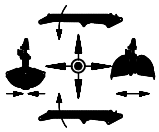
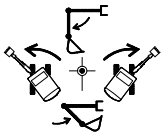
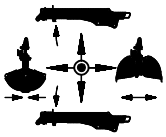
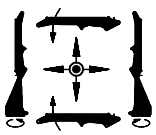
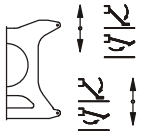
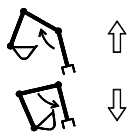
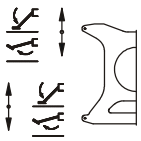
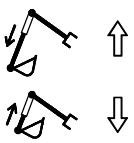
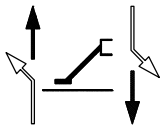
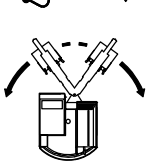
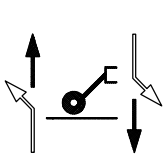
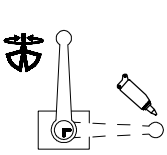
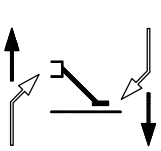
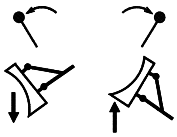
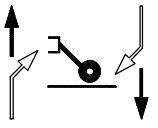
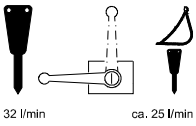
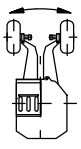
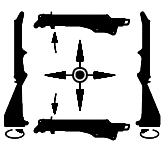
Pictogram (Cont'd)

	SYMBOL	DESCRIPTION		SYMBOL	DESCRIPTION
023		Working floodlights	**039**		Speed control
024		Upper beam indicator	**040**		Oscillating axle lock
025		Direction of travel forward/reverse	**041**		Steering inversion
026		Rotating beacon	**042**		All-wheel steering crab / round steer
027		Light, lower beam	**043**		Rocker pedal for travel
028		Central grease system	**044**		Only shift when machine is at standstill
029		Lashing points	**045**		High gear
030		Overload warning device / Overload warning indicator	**046**		Cabin lift / lower
031		Suspension point for loading by crane	**047**		Steering control display
032		Travel speed, fast	**048**		First aid kit
033		Travel speed, slow	**049**		Fire extinguisher
034		Working hydraulics cut-off, excavator; loader / crane	**050**		Switch-over monitor for operating hours and time
035		Unlocked	**051**		Swing limitation, engine stop override
036		Locked	**052**		Switch for all-wheel steering
037		Float position	**053**		Interior lighting
038		Dozer blade	**054**		Reset hydraulic pulley block (crane)

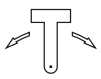
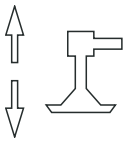
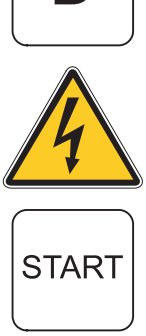
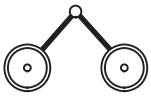
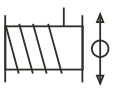
Pictogram (Cont'd)

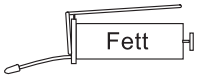
	SYMBOL	DESCRIPTION		SYMBOL	DESCRIPTION
055		Quick movement hoisting winch	071		Danger of crushing
056		Cable uncoil limit switch	072		Danger of injury
057		Auxiliary winch	073		Observe notes in operating instructions
058		Magnet system	074		
059		Hydraulic rock breaker	075		Linde - no load automatics
060		Electric boom height limitation	076		Remote control
061		Undercarriage-adjustment	077		Warning - general
062		Switch-over swing speed, engine speed adjustment	078		Temperature - general
063		Free fall mode	079		
064		Grab rotation	080		
065		Bucket return positioning, lifting frame height limitation	100		Control by joystick
066		Ride control system	101		
067		Bucket return positioning	102		Quick mount-hitch lock
068		Hydraulic oil level	103		
070		Safety distance, see item 202	104		Water pump for sweeper

Pictogram (Cont'd)

	SYMBOL	DESCRIPTION		SYMBOL	DESCRIPTION
105		Warning lamp gearbox	**151**		Universal-mounted excavator/loader (AL) controls
120		Control	**152**		ISO control system right
121		ISO control system-let control system-right	**153**		Universal-mounted excavator / loader (AL) controls
122		Control	**154**		control system right
123		ISO control system right	**155**		Universal-mounted excavator / loader (AL) controls
124		Control control system left	**160**		control system right
125		Control	**161**		Universal-mounted excavator / loader (AL) controls
126		Intermediate boom (articulated boom type)	**162**		Outrigger right
127		Control	**163**		Universal-mounted excavator / loader (AL) controls
128		Telescopic stick in / out	**164**		Outrigger left
140		Control	**165**		Control
150		Articulation „Knickmatik	**166**		Outrigger leg left

Pictogram (Cont'd)

	SYMBOL	DESCRIPTION
167		Outriggers spread
168		Outriggers lift / lower
169		Steering mode switch HS 41 MM
170		Outrigger left
171		Outrigger right
180		Switch-over diesel drive
181		Switch-over electric drive
182		Diesel engine ignition lock
183		Pony Truck IN
184		Pony Truck OUT
185		Electric motor START
186		Electric motor emergency OFF
187		Cable drum (cable winch)

	SYMBOL	DESCRIPTION
200		Grease gun
201		Danger
202		On the machine: caution, safety distance
203		In the operating manual: warning
204	**R**	Note
205		Scoot filter

SAFETY AND MAINTENANCE

GENERAL NOTES

The good operating condition and life expectancy of machines is largely influenced by care and maintenance.

For this reason, it is in every machine owner’s interest to perform the specified maintenance work and comply with the service intervals. In detail, this Chapter deals with periodic maintenance, inspection and lubricating tasks.

The type-specific maintenance and inspection plan lists all work to be performed on the machine at regular intervals. Maintenance and inspection plans for this purpose are contained in every instruction book.

It is essential that the recommendations in "SAFETY INSTRUCTIONS" on page II are observed.

INTERVALS

First inspection	Once before first putting into operation	See “Initial inspection (delivery / handing-over inspection)” on page 10-70-1.
Daily jobs	Every 10 operating hours or every work shift 1)	See “Daily and weekly tasks” on page 10-70-2 .
Weekly jobs	Weekly or after 50 operating hours 1)	
AL275		See “Inspection plan” on page 10-90-1
Every 10 operating hours	Every 10 operating hours or every work shift 1)	
Every 100 operating hours	Once after first putting into operation 2)	
Every 200 operating hours	After every 200 operating hours	
Every 400 operating hours	After every 400 operating hours or 12 months 1)	
Every 800 operating hours	After every 800 operating hours or 12 months 1)	
Every 1,500 operating hours	After every 1,500 operating hours or 12 months 1)	
Every 3,000 operating hours	After every 3,000 operating hours or 12 months 1)	
AL350 / AL440		
Every 10 operating hours	Every 10 operating hours or every work shift 1)	
Every 250 operating hours	After every 250 operating hours or 12 months 1)	
Every 400 operating hours	After every 400 operating hours or 6 months 1)	
Every 500 operating hours	After every 500 operating hours or 12 months 1)	
Every 800 operating hours	After every 800 operating hours or 12 months 1)	
Every 1,000 operating hours	After every 1,000 operating hours or 12 months 1)	
Every 3,000 operating hours	After every 3,000 operating hours or 12 months 1)	

1) Whichever comes first.
2) Also applicable when new or overhauled diesel engines are put into operation.