

**SERVICE
MANUAL**

**E150BSR
Blade Runner**

Print No. 87493625A



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SAFETY INSTRUCTIONS

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GENERAL SAFETY INFORMATION

⚠ WARNING

Do not perform any maintenance operation on this machine until you have carefully read and understood all instructions contained in this manual.

An improper operation or maintenance of this machine may lead to accidents or serious injury, even death.

If parts are missing or damaged, contact your Dealer to have them replaced.

If you have any questions, please consult your Dealer.

Most accidents occurring during operation are due to negligence of precautionary measures and safety instructions. Sufficient care should be taken to prevent these accidents. Incorrect operation, lubrication or maintenance are very dangerous and may cause injury or death of the personnel. Therefore all precautionary measures, NOTES, DANGERS, WARNINGS and CAUTIONS contained in this manual and on the machine should be read and understood by all personnel before starting any work with or on the machine.

Operation, inspection and maintenance should be carefully carried out, and safety must be given the first priority. Safety messages are indicated with marks. The safety information contained in this manual is intended only as an integration of safety codes, insurance requirements, local laws, rules and regulations.

Safety messages appear in this manual and on the machine. All safety messages are identified by the words "DANGER", "WARNING" and "CAUTION".

⚠ DANGER

Indicates an imminently hazardous situation which, if not prevented, will result in death or serious injury.

⚠ WARNING

Indicates a potentially hazardous situation which, if not prevented, will result in death or serious injury.

⚠ CAUTION

Indicates a potentially hazardous situation that, if not prevented, will result in minor or moderate injury. It may also be used to alert against possible damage to the machine and its components.

It is very difficult to forecast every danger that may occur during operation. However, safety can be guaranteed by fully understanding the operating procedures for this machine according to the methods recommended by the Manufacturer.

While operating the machine, be sure to perform work with great care, so as not to damage the machine, or allow accidents to occur.

Continue studying this manual until all safety, operating and maintenance procedures are completely understood by all persons working with the machine.

SAFETY INSTRUCTIONS

▲ WARNING

Lubrication and maintenance appropriate for this machine, recommended by the Manufacturer, are indicated in this Service Manual.

An improper performance of lubrication or maintenance procedures is dangerous and could result in injury or death. Read and understand this manual before carrying out any lubrication or maintenance operation.

The operator or serviceman may be unfamiliar with many of the systems in this machine. This makes a careful use of the systems very important when performing maintenance operations. Getting familiar with the system or its components is very important before removing or disassembling any of them.

Because of the size of some of the machine's components, the operator or serviceman should check the weights noted in this manual. Use proper lifting procedures when removing any components.

The following is a list of basic precautions that must always be observed.

Read and understand all warning labels and safety decals before operating, servicing or repairing this machine.

Always wear protective glasses and protective shoes when working around machines.

In particular, wear safety goggles when using hammers, punches or drifts on any part or attachment of the machine. Use gloves, safety goggles, aprons and protective clothing appropriate for welding jobs. Do not wear loose accessories or torn clothes. Remove all rings from fingers, loose jewellery, confine long hair and loose clothing before working on this machine.

Disconnect the battery and hang a "Maintenance in progress" tag in the operator's compartment. Remove the starter switch key.

If possible, make all repairs with the machine parked on a level and firm surface. Block the machine so it does not roll while working on or under the machine. Hang a "Maintenance in progress" tag in the operator's compartment.

Do not work on any machine that is supported only by lift, jacks or a hoist. Always use blocks or stops for the jack before carrying out any disassembly operation.

▲ WARNING

Do not operate this machine until you have read and understood the instructions contained in this manual. Improper machine operation is dangerous and could result in injury or death.

Relieve all pressure in air, oil or fuel systems before any lines, fittings or related devices are disconnected or removed. Always make sure that all raised components are blocked correctly and pay attention to possible pressures when disconnecting any device from a system under pressure.

Lower the bucket, dozer or other attachments to the ground before performing any operation on the machine. If this cannot be done, make sure the bucket, dozer or other attachment is blocked correctly to prevent it from dropping unexpectedly.

Use the steps and the grab handles when mounting or dismounting the machine. Remove any debris or mud from steps, walkways or work platforms before using them.

Always face the machine when using steps, ladders and walkways. When it is not possible to use the designed access system, provide ladders, scaffolds, or work, platforms to perform safe repair operations.

To prevent back injury, use a hoist when lifting components which weigh 20 kg (45 lbs) or more. Make sure all chains, hooks, slings, etc., are in good condition and have the correct capacity. Be sure hooks are positioned correctly. Lifting eyes are not to be side loaded during a lifting operation.

In order to prevent burns, be careful not to touch hot machine parts and hot liquids in systems.

Be careful when removing cover plates. Gradually back off the last two screws or nuts located at opposite ends of the cover or device and carefully pry the cover loose to relieve any spring or other pressure before removing the last two screws or nuts completely.

Be careful when removing filler caps, breathers and plugs on the machine. Hold a rag over the cap or plug to prevent being sprayed or splashed by liquids under pressure. Danger is even greater if the machine has just been stopped, as liquids might be boiling hot.

Always use proper tools that are in good condition and that are suited for the job at hand. Be sure you understand how to use them before performing any service work.

Replace all clamps with original spare parts. Do not use clamps of a lesser quality.

Repairs which require welding should be performed only with the benefit of the appropriate reference information and by personnel adequately trained and skilled in welding procedures. Determine the type of metal being welded and select the correct welding procedure and electrodes, rods or wires to provide a metal weld strength at least equivalent to that of the parent metal. Make sure to disconnect the battery before any welding operation is performed.

Do not damage the cables during removal operations. Reinstall the cables so that they are not damaged during machine operation, by contacting the machine's sharp corners or by rubbing against objects or hot surfaces. Do not connect the cables to a system containing liquids.

Make sure all protective devices including the operator's protective devices are properly installed and functioning correctly before starting a repair operation. If a guard or shield must be removed to perform the repair work, use extra caution and replace the guard or shield after repair is complete.

Performing maintenance and repair operations while the bucket is lifted is dangerous, because there is the possibility of a device falling. Do not fail to lower such device and place the bucket to the ground before starting the operation.

Loose or dirty fuel, lubrication and hydraulic systems, pipes and hoses may cause fires. Do not bend or strike high-pressure lines, nor install bent or damaged lines. Inspect lines, tubes and hoses carefully. Do not check for leaks with your hands. Very small leaks from holes can result in a high-velocity oil jets that will be invisible close to the hose. This oil can penetrate the skin and cause personal injury. Use cardboard or paper to locate hole leaks.

Tighten the connections to the prescribed torques. Make sure that all protections against burns, the clamps and the operator's protective devices are correctly installed in order to prevent excessive heat, vibrations or rubbing against other parts during operation. The protections against oil leaks from hot hoses or damaged seals must be correctly installed.

Do not operate a machine if any rotating part is damaged or contacts any other part during operation. Any high speed rotating component that has been damaged or altered should be checked for balance before reusing.

Be careful when servicing or separating the crawlers. Chips can fly when removing or installing a crawler pin. Wear safety glasses and long sleeve protective clothing. Crawlers can unroll very quickly when separated. Keep away from front and rear of machine. The machine can move unexpectedly when both crawlers are disengaged from the sprockets. Block the machine to prevent it from moving.

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NOTE:

This Manual is prepared as a technical material in which the information necessary for the maintenance and repairing services of our hydraulic excavators are collected, and is categorized into 7 Chapters, Specification, Maintenance, System, Disassembly, Troubleshooting, Engine, and Installation Procedures for Optional Attachment.

- The Chapter "Specification" describes the specifications for entire machine and material, which are instructive for replacement and repairing of attachments.
- The Chapter "Maintenance" describes the material, which is helpful for maintenance service and adjustments for entire machine.
- The Chapter "System" describes the operating system like hydraulic system, electric system, components, and so on.
- The Chapter "Disassembly" describes the removal and installing of assembly mounted on the upper structure and undercarriage, and the assembling and disassembling of the associated hydraulic equipment.
- The Chapter "Troubleshooting" describes how to find the fault equipment.
- The Chapter "Engine" describes the engines making use of the "Maintenance Manual" provided by the suppliers.
- The Chapter "Installation Procedures for Optional Attachment" describes the supplements added on request as required.

This Manual may be properly revised due to the improvement of products, modification of specifications, etc. And there are cases where the system on actual machine and a part of the contents of this manual may differ due to the variations of specification by countries. For the section in which the description is hardly understood, contact our distributor.

All parts mentioned in this Manual can be supplied as spare parts, refer to spare part catalogue. Therefore, the order must be placed with respective formal number with due confirmation on the Parts Manual for applicable machine.

1. DESCRIPTION

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1. DESCRIPTION

1. GENERAL PRECAUTIONS FOR INSTALLATION

1.1 PREPARATION BEFORE DISASSEMBLY



Understand the operating procedure

Carefully read the Service Manual to understand the operating procedure.

Machine cleaning

Remove earth, mud and dust from the machine before bringing it to the repair workshop, to prevent any loss of working efficiency, damaging parts and the difficulty of preventing rust and dust during reassembly.

Machine inspection

Identify the parts to be disassembled before beginning the job, determine the disassembly procedure by taking the working environment etc. into consideration, and ask for the retrieval of the necessary tools in advance.

Recording

Record the following details in order to take them into consideration later to prevent recurring malfunctions.

- Date and place of the inspection
- Model name, machine serial number and hourmeter reading
- Failure condition, position and cause.
- Visible oil leak, water leak and damage
- Filter obstruction, oil level, oil quality, oil contamination and loss of connections
- Result of the inspection, if some problem occurs against the monthly operating average, calculated on the hourmeter since the latest inspection date.

Repair and cleaning in the service workshop

Tools necessary for the repair operation.

Prepare the space to position the disassembled parts.

Prepare the containers for the oil to be drained.

1.2 SAFETY DURING DISASSEMBLY AND ASSEMBLY



Wear appropriate clothes with long sleeves, safety shoes, a protective hard hat and safety goggles.

Apply a "Maintenance in progress" tag to the handle of the door or on the control lever, and organize a preliminary meeting before beginning the job.

Stop the engine before beginning inspection and maintenance operations in order to prevent the operator from getting entangled in the machine.

Identify the location of the first aid kit and of the fire extinguisher and inform yourself about whom to contact in case of emergency.

Choose a hard, flat and safe surface and position the attachment steadily on the ground.

Use a lifting device, e.g. a crane, to remove heavy parts [23 kg (51 lb) or more] from the machine.

Use original spare parts to replace or repair defective parts.

Support the machine and the attachment with blocks, if the job is carried out with the machine lifted.

1.3 DISASSEMBLY AND ASSEMBLY OF THE HYDRAULIC ATTACHMENT



Attachment removal

Before disconnecting the lines, release the hydraulic pressure from the system or open the cover of the oil return filter and extract the filter.

Carefully drain the oil from the removed lines into the containers without spreading it on the ground.

Install pins or plugs at the ends of the lines to prevent oil leaks and dust and dirt from entering the lines.

Clean the external surface of the attachment before disassembling it, and drain the oil from the hydraulic system before positioning the attachment on the workbench.

1. DESCRIPTION

Attachment disassembly

Do not disassemble, reassemble or modify the attachment without prior permission of the Manufacturer, who is not responsible for performance and operation after the modification.

If it is inevitable to disassemble and reassemble the attachment, please contact qualified personnel having specific knowledge or having been technically trained for this specific operation.

Make reference coupling marks to facilitate reassembly.

Before beginning the job, read the manual containing the disassembly procedure, if available, and determine whether you are able to carry out the job yourself.

Use special attachments and tools, if indicated.

If it is difficult to extract a part by following the procedure, do not force the extraction, but check for the cause of this difficulty.

Position the parts removed in a sequence and apply labels to facilitate their reassembly.

Note down the position and the quantity of the parts commonly used in different locations.

Inspection of parts

Make sure that the parts removed are not seized, do not present any interference or irregular contacts.

Measure and record the wear conditions of the parts and their clearance.

If the problem concerns one part, repair or replace it with a new one.

Attachment reassembly

Activate the fan or open the windows to maintain a good ventilation before beginning cleaning the machine parts.

Carry out a complete cleaning before assembly.

Remove the cleaning oil with compressed air and apply clean hydraulic oil or gear oil for assembly.

Always replace the removed O-rings, back-up rings and seal rings with new ones and apply some grease.

Remove the dirt and any moisture and degrease the surface which the liquid seal is applied to.

Remove the rust inhibitor from the new parts before using them.

Assemble the bearings, the bushings and the seal rings by using the special tools.

Assemble the parts by taking the reference coupling marks into consideration.

Make sure that all parts are completely assembled at the end of the job.

Installation of the hydraulic attachment

Make sure that the hydraulic oil and the lubricant are correctly supplied.

Bleed the system when:

- hydraulic oil is changed;
- parts of the lines on the suction side are replaced;
- the hydraulic pump is installed;
- the slew motor is installed;
- the travel motor is installed;
- the hydraulic cylinder is installed.

⚠ WARNING

If hydraulic oil and lubricant are not topped up or air is not bled from the system, the hydraulic attachment can be severely damaged.

Bleed air from the hydraulic pump and the rotation motor after loosening the upper drain plug, start the engine and let it run at a low rpm.

Bleed air when oil infiltrations are detected and screw in the plug tightly.

Bleed air from the travel motor and the hydraulic cylinders by letting the engine run for more than 5 minutes at a low rpm with no load.

⚠ WARNING

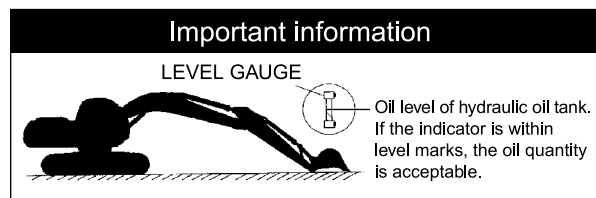
Do not take the hydraulic cylinder to stroke end immediately after having performed maintenance operations.

Bleed air from the pilot circuit by carrying out some digging, rotation and travel operations.

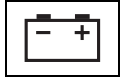
Check the hydraulic oil level after positioning the attachment in the oil check position and top up oil, if necessary.

Refill oil if the oil level is lower than the specified level.

Check oil level of hydraulic oil tank.



1.4 ELECTRICAL EQUIPMENT



Do not disassemble electrical equipment.

Take care not to drop it nor expose it to shocks.

Turn the starter switch key to OFF before beginning the operation.

Disconnect the connector by pressing and holding it and by pressing the block. Do not pull the cable in order not to force the caulked part.

Connect the connector and make sure that it is completely locked.

Turn the starter switch key to OFF before touching the terminal of the starter motor or of the battery.

Remove the ground terminal of the battery when handling tools near the battery or its relays.

Do not pour water on the electrical components and on the connectors while washing the machine.

Check if liquid has entered the waterproof connector after extracting it, because it is very difficult to remove moisture from the connector.

If moisture is detected, completely dry it before connecting it.

▲ WARNING

The battery electrolyte is dangerous.

The battery electrolyte is diluted sulphuric acid. Skin or eye contact with this liquid can cause burns or loss of eyesight.

If this occurs, take the following measures and get prompt specialised medical attention.

When skin contact occurs:
thoroughly wash with water and soap.

When eye contact occurs:
immediately wash with running water from the mains for more than 10 minutes.

If a big quantity of liquid escapes:
neutralize with sodium bicarbonate or wash with water from the mains.

If ingested:
drink a big quantity of milk or water.

When contact with clothes occurs:
immediately put them off and wash yourself.

1.5 HYDRAULIC PARTS



O-ring

Make sure the O-rings are elastic and not damaged before using them.

Use appropriate O-rings. O-rings are of different kinds and made of different materials, and they have a different hardness to be applied to a variety of parts, such as moving or fixed parts, subject to high pressure and exposed to corrosive fluids, even if their size is same.

Fit the O-rings without twisting or bending them.

Always handle the seal rings in couples.

Hoses

Use appropriate parts. Different parts are used depending on the working pressure even the size of fitting and the total length of the hose is same.

Tighten the fittings at the specified torque. Ensure no kink, tension, interference nor oil leakage is recognized.

1.6 WELDING REPAIR

Welding repairs must be carried out by qualified personnel according to the appropriate procedures.

Disconnect the ground cable of the battery before starting the repair.

Failure to do so will cause damage to the electrical equipment.

Move away in advance the elements which may cause fires if exposed to sparks.

Before starting the repair of the attachment, do not fail to cover the plated surfaces of the piston rod with a flameproof sheet to prevent it from being exposed to sparks.

1. DESCRIPTION

1.7 ENVIRONMENTAL PRECAUTIONS

Start the engine in a sufficiently ventilated place.

Industrial waste disposal

Dispose of the following parts according to the relevant regulations:

Waste oil and waste container.

Battery

Precautions for handling hydraulic oil

Exposure of eyes to hydraulic oil will cause inflammation. Wear protective glasses before handling to avoid an accident.

When an eye is exposed: immediately wash with a sufficient quantity of water from the mains until pain symptoms stop.

If oil is swallowed: do not induce vomit and get prompt medical assistance.

When skin contact occurs: thoroughly wash with water and soap.

Use spare parts and lubricants approved by the Manufacturer as, for example, original spare parts.

2. TECHNICAL SPECIFICATIONS

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2. TECHNICAL SPECIFICATIONS



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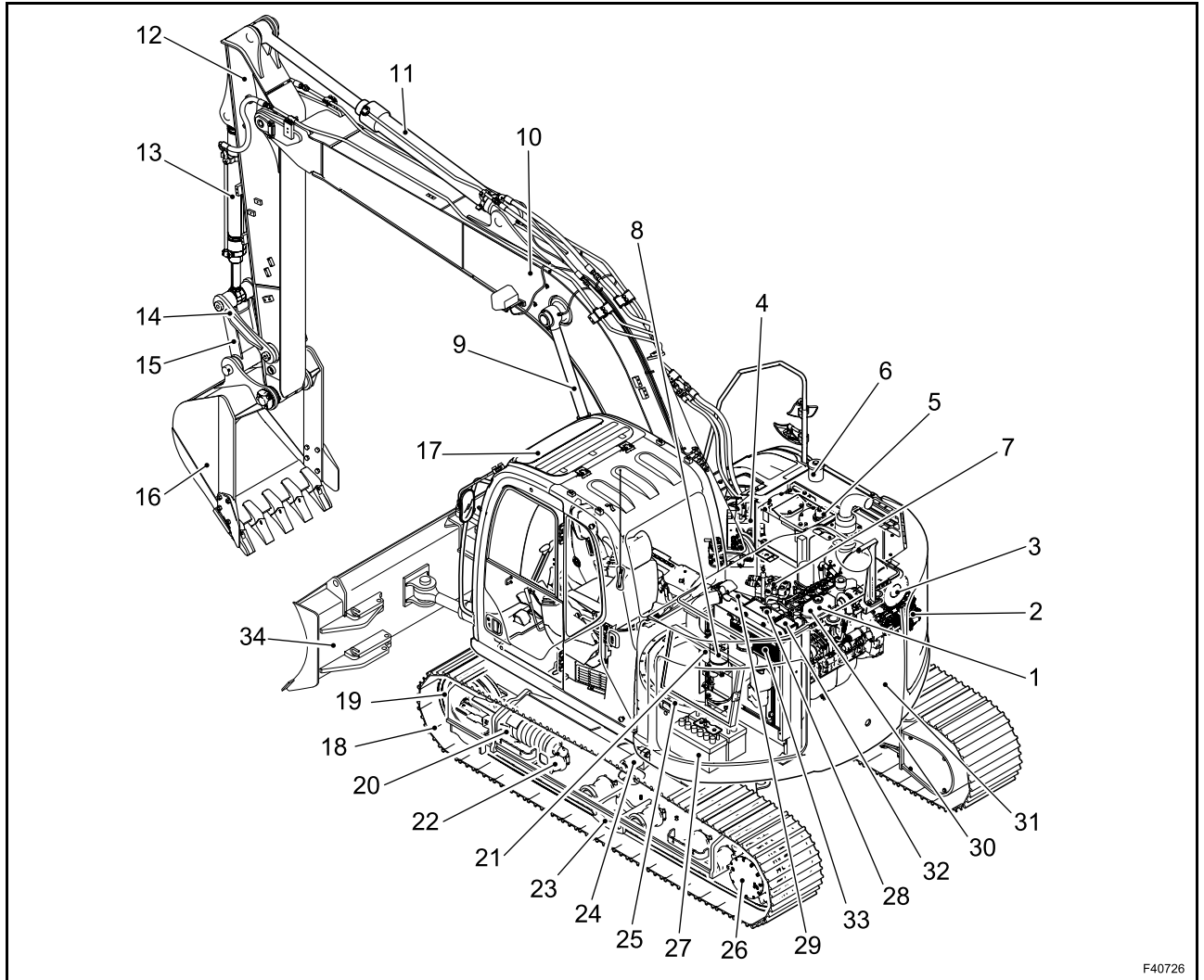
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1. MAIN COMPONENTS



F40726

- | | |
|-----------------------|----------------------|
| 1. Engine | 18. Crawler assembly |
| 2. Hydraulic pump | 19. Crawler idler |
| 3. Muffler | 20. Crawler spring |
| 4. Main control valve | 21. Air cleaner |
| 5. Hydraulic oil tank | 22. Lower roller |
| 6. Fuel tank | 23. Crawler guide |
| 7. Swing motor | 24. Upper roller |
| 8. Swivel joint | 25. Slewing ring |
| 9. Boom cylinder | 26. Travel motor |
| 10. Boom | 27. Battery |
| 11. Arm cylinder | 28. Engine radiator |
| 12. Arm | 29. Oil cooler |
| 13. Bucket cylinder | 30. Engine hood |
| 14. Idler link | 31. Counterweight |
| 15. Bucket link | 32. Inter cooler |
| 16. Bucket | 33. Fuel cooler |
| 17. Operator cab | 34. Dozer |

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