

Shop Manual

WA320-6

WHEEL LOADER

SERIAL NUMBERS **WA320-6** **A35001** and UP
ENGINE **SAA6D107E-1**

This material is proprietary to Komatsu America Corp and is not to be reproduced, used, or disclosed except in accordance with written authorization from Komatsu America Corp.

It is our policy to improve our products whenever it is possible and practical to do so. We reserve the right to make changes or add improvements at any time without incurring any obligation to install such changes on products sold previously.

Due to this continuous program of research and development, periodic revisions may be made to this publication. It is recommended that customers contact their distributor for information on the latest revision.

CONTENTS


01	GENERAL	01-1
10	STRUCTURE, FUNCTION AND MAINTENANCE STANDARD	10-1
20	STANDARD VALUE TABLES	20-1
30	TESTING AND ADJUSTING	30-1
40	TROUBLESHOOTING.....	40-1
50	DISASSEMBLY AND ASSEMBLY.....	50-1
90	DIAGRAMS AND SCHEMATICS.....	90-1

SAFETY

Safety Notice

IMPORTANT SAFETY NOTICE

Proper service and repair is extremely important for the safe operation of your machine. The service and repair techniques recommended and described in this manual are both effective and safe methods of operation. Some of these operations require the use of tools specially designed for the purpose.

To prevent injury to workers, the symbol  is used to mark safety precautions in this manual. The cautions accompanying these symbols should always be followed carefully. If any dangerous situation arises or may possibly arise, first consider safety, and take the necessary actions to deal with the situation.

General Precautions

Mistakes in operation are extremely dangerous. Read the *Operation & Maintenance Manual* carefully BEFORE operating the machine. In addition, read this manual and understand its contents before starting the work.

1. Before carrying out any greasing or repairs, read all the precautions given on the labels which are fixed to the machine. For the locations of the safety labels and a detailed explanation of precautions, see the *Operation & Maintenance Manual*.
2. When carrying out any operation, always wear safety shoes and hard hat. Do not wear loose work clothes or clothes with buttons missing.
 - Always wear safety glasses when hitting parts with a hammer.
 - Always wear safety glasses when grinding parts with a grinder, etc.
3. If welding repairs are needed, always have a trained, experienced welder carry out the work. When carrying out welding work, always wear welding gloves, apron, shielding glasses, cap, and other clothes suited for welding work.



WARNING! Never modify, weld, cut, or drill on any part of a ROPS structure. Doing so may weaken the structure which could lead to possible failure in a rollover situation.

4. When carrying out any operation with two or more workers, always agree on the operating procedure before starting. Always inform your fellow workers before starting any step of the operation. Before starting work, hang UNDER REPAIR signs on the controls in the operator's compartment.

5. Keep all tools in good condition; learn the correct way to use them; and use the proper ones. Before starting work, thoroughly check the tools, machine, forklift, service car, etc.
6. Only qualified workers must carry out work and operations which require a license or qualification.
7. Establish a place in the repair workshop to keep tools and removed parts. Always keep the tools and parts in their correct places. Always keep the work area clean and make sure that there is no dirt or oil on the floor. Smoke only in the areas provided for smoking. Never smoke while working.
8. Avoid working for long hours and take rests at proper intervals to keep your body in good condition. Take rests in specified safe places.

Safety Points

1	Good arrangement
2	Correct work clothes
3	Following work standard
4	Making and checking signs
5	Prohibition of operation and handling by unlicensed workers
6	Safety check before starting work
7	Wearing protective glasses (for cleaning or grinding work)
8	Wearing shielding glasses and protectors (for welding work)
9	Good physical condition and preparation
10	Precautions against work which you are not used to or work with which you are too familiar

Preparations for Work

1. Before adding oil or making repairs, park the machine on hard, level ground and block the wheels to prevent the machine from moving.
2. Before starting work, lower blade, ripper, bucket, or any other work equipment to the ground. If this is not possible, insert the safety pin or use blocks to prevent the work equipment from falling. In addition, be sure to lock all the control levers and hang warning signs on them.
3. When disassembling or assembling, support the machine with blocks, jacks, or stands before starting work.
4. Remove all mud and oil from the steps or other places used to get on and off the machine. Always use the handrails, ladders, or steps when getting on or off the machine. Never jump on or off the machine. If it is impossible to use the handrails, ladders, or steps, use a stand to provide safe footing.
6. When removing components, be careful not to break or damage the wiring. Damaged wiring may cause electrical fires.
7. When removing piping, take steps to prevent the fuel or oil from spilling. If any fuel or oil drips on the floor, wipe it up immediately. Fuel or oil on the floor can cause you to slip and even start fires.
8. Gasoline or other fuels should never be used to clean parts. Clean parts with appropriate solvents.
9. Be sure to assemble all parts again in their original places. Replace any damaged parts or parts that must not be reused.
 - When installing hoses and wires, be sure that they cannot be damaged by contact with other parts when the machine is being operated.
10. When installing high pressure hoses, make sure that they are not twisted. Damaged tubes are dangerous. Be extremely careful when installing tubes for high-pressure circuits. Check that connecting parts are correctly installed.

Precautions During Work

1. When removing the oil filler cap, drain plug, or hydraulic pressure measuring plugs, loosen them slowly to prevent the oil from spraying out. Before disconnecting or removing components of the oil, water, or air circuits, first release the pressure completely from the circuit.
2. The engine components as well as the coolant and oil in the circuits are hot when the engine is stopped; be careful not to get burned. Wait for the oil and coolant to cool before carrying out any work on the oil or water circuits.
3. Before starting work, remove the leads from the battery. ALWAYS remove the lead from the negative (-) terminal first.
4. When raising heavy components (in excess of 25 kg (55 lb)), use a hoist or crane. Check that the wire rope, chains, and hooks are free from damage. Always use lifting equipment which has ample capacity. Install the lifting equipment at the correct places. Use a hoist or crane and operate slowly to prevent the component from hitting any other part. Do not work with any part still raised by the hoist or crane.
5. When removing a cover which is under internal pressure, or under pressure from a spring, always leave two bolts in position on opposite sides. Loosen the bolts gradually and alternately to release the pressure, and then remove the cover.
11. When assembling or installing parts, always use the specified tightening torques. When installing protective parts such as guards, or parts which vibrate violently or rotate at high speed, be particularly careful to check that they are installed correctly.
12. When aligning two holes, never insert your fingers or hand. Be careful not to get your fingers caught in a hole.
13. When measuring hydraulic pressure, check that the measuring tool is correctly assembled before taking any measurements.
14. Take care when removing or installing the tracks of track-type machines. When removing the track, the track separates suddenly; never let anyone stand at either end of the track.
15. When jump-starting the machine, only use a machine of similar size and voltage. Never use an arc welder or other electrical generating equipment to jump-start the machine. Carefully review the safety procedures for jump-starting the machine.
16. Stop the engine before starting repair or maintenance work. When working on or around a rotating part, stop the engine. When checking the machine without stopping the engine (measuring oil pressure, revolving speed, temperature, etc.), take the precautions so the machine does not move or roll over you. Do not get caught in rotating or moving parts.
17. If the engine is operated for a long time in a place which is not ventilated well, you may suffer from gas poisoning. Before starting the engine, open the windows and doors so that the area is well ventilated.

Seat Belt Inspection

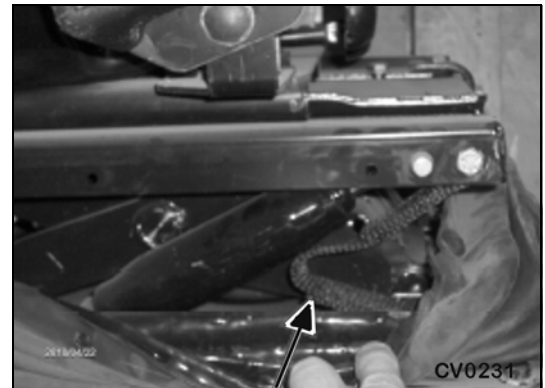
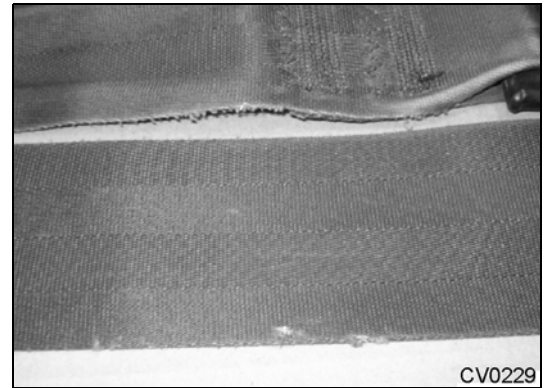


WARNING! Seat belts must be replaced immediately if there are any signs of wear or damage, regardless of how recently they were last replaced.

A thorough inspection of the entire seat belt system should occur before starting the engine.

- Inspect the full length and both sides of the seat belt webbing for wear, abrasion, dirt, oil, mildew, paint or other damage. Replace immediately if worn or damaged.
 - If the webbing is cut, fraying, snagging, kinking, or roping, the seat belt must be replaced. Any of these conditions may limit belt retraction.
- There may be internal and/or external tethers mounted on the suspension mechanism. Inspect these for fatigue as well as the integrity of the mounting hardware.
- Inspect the seat belt attachment and adjustment hardware for wear or damage.
 - Retractable and non-retractable buckle housings with damage from abrasions, rubbing, forceful impacts and age, must be replaced. These conditions may weaken the strength of the buckle.
 - Examine the seat belt buckle and retractor housing(s) for proper function.
 - Dirt, debris, lint, leaves, etc. may become encased inside of the retractor housing. With time, this condition may cause a seat belt malfunction.
- Check the mounting structure integrity. Verify that the mounting bolts are secure. Tighten to specified torque, if necessary.
- Check your records or the seat belt “Date of Installation” label (if equipped). Even if there are no signs of damage, the seat belt must be replaced either five years after the date of manufacture, or every three years after the start of usage, whichever comes first.
 - The manufactured date and “Install By” (if equipped) date may be found on the back of the buckle housing and/or on the seat belt webbing.
 - The location of the “Date of Installation” label (if equipped) may vary slightly, but most frequently it will be found on the plastic molding of the seat belt.

If your machine is equipped with a shoulder harness also, inspect the webbing, the shoulder loop web guide and the height adjuster for wear, damage and proper function capabilities



GENERAL

This shop manual has been prepared as an aid to improve the quality of repairs by giving the serviceman an accurate understanding of the product and by showing him the correct way to perform repairs and make judgments. Make sure you understand the contents of this manual and use it to full effect at every opportunity.

This shop manual contains the necessary technical information for operations performed in a service workshop. For ease of understanding, the manual is divided into the following sections. These sections are further divided into each main group of components.

General

This section lists the general machine dimensions, performance specifications, component weights, and fuel, coolant, and lubricant specification charts.

Structure, Function, and Maintenance Standard

This section explains the structure and function of each component. It serves not only to give an understanding of the structure, but also serves as reference material for troubleshooting. In addition, this section gives the judgment standards when inspecting disassembled parts.

Standard Value Table

This section explains the standard values for a new machine and the judgment criteria for testing, adjusting, and troubleshooting. This standard value table is used to check the standard values in testing and adjusting and to judge parts in troubleshooting.

Testing and Adjusting

This section explains checks to be made before and after performing repairs, as well as adjustments to be made at completion of the checks and repairs.

Troubleshooting

Troubleshooting charts correlating *Problems* to *Causes* are included in this section.

Disassembly and Assembly

This section explains the order to be followed when removing, installing, disassembling, or assembling each component, as well as precautions to be taken for these operations.

Diagrams and Schematics

This section has the foldout drawings for the machine.

NOTICE

The specifications contained in this shop manual are subject to change at any time and without any advance notice. Contact your distributor for the latest information.

HOW TO READ THE SHOP MANUAL

Volumes

Shop manuals are issued as a guide for carrying out repairs. They are divided as follows:

Chassis volume: Issued for every machine model

Engine volume: Issued for each engine series

Electrical volume: One issued to cover all models

Attachment volume: One issued to cover all models

These volumes are designed to avoid duplication of information. Therefore to deal with all repairs for any model, it is necessary that chassis, engine, electrical, and attachment manuals be available.

Distribution and Updating

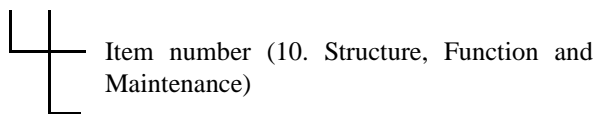
Any additions, amendments, or other changes will be sent to your distributor. Get the most up-to-date information before you start any work.

Filing Method

- See the page number on the bottom of the page. File the pages in correct order.
- Following examples show how to read the page number:

Example:

10 - 3



Consecutive page number for each item

- Additional pages: Additional pages are indicated by a hyphen (-) and numbered after the page number. File as in the example.

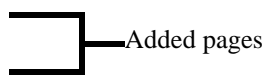
Example:

10-4

10-4-1

10-4-2

10-5



Revised Edition Mark

When a manual is revised, an edition mark (①②③...) is recorded on the bottom, outside corner of the pages.

Revisions

Revised pages are shown on the List of Revised Pages between the title page and SAFETY page.

Symbols

So that the shop manual can be of ample practical use, important places for safety and quality are marked with the following symbols.

Symbol	Item	Remarks
	Safety	Special safety precautions are necessary when performing the work.
	Caution	Special technical precautions or other precautions for preserving standards are necessary when performing the work.
	Weight	Weight of parts or systems. Caution necessary when selecting hoisting wire or when working posture is important, etc.
	Tightening torque	Places that require special attention for tightening torque during assembly.
	Coat	Places to be coated with adhesives and lubricants, etc.
	Oil, water	Places where oil, water, or fuel must be added, and the capacity.
	Drain	Places where oil or water must be drained, and quantity to be drained.

HOISTING INSTRUCTIONS

Hoisting

★ If a part cannot be smoothly removed from the machine by hoisting, the following checks should be made.

1. Check for removal of all bolts fastening the part to the relative parts.
2. Check for existence of another part causing interference with the part to be removed.

Making Signs/Hand Signals

1. Only one appointed worker must make signs. Coworkers must communicate with each other frequently.
2. The appointed signal maker must make specified signs clearly at a place where he is well seen from the operator's seat and where he can see the working condition easily.
3. The sign maker must always stand in front of the load and guide the operator safely.
 - Do not stand under the load.
 - Do not step on the load.

Precautions

Precautions for Sling Work

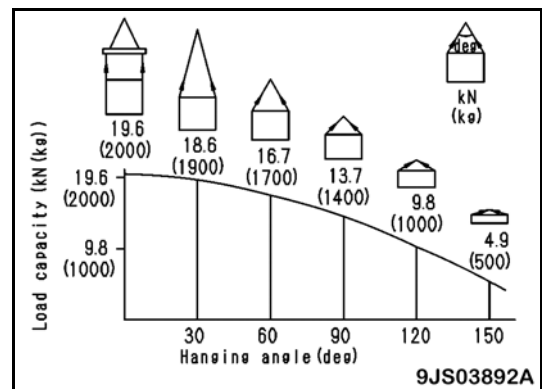
1. Check the slings before starting sling work.
2. Wear gloves during sling work. Use leather gloves, if available.
3. Measure the weight of the load visually and check its center of gravity.
4. Use a proper sling according to the weight of the load and method of slinging. If the wire ropes you use are too thick when slinging a light load, the load may slip and fall.

5. Do not sling a heavy load with one rope alone, but sling with two or more ropes symmetrically wound on to the load.



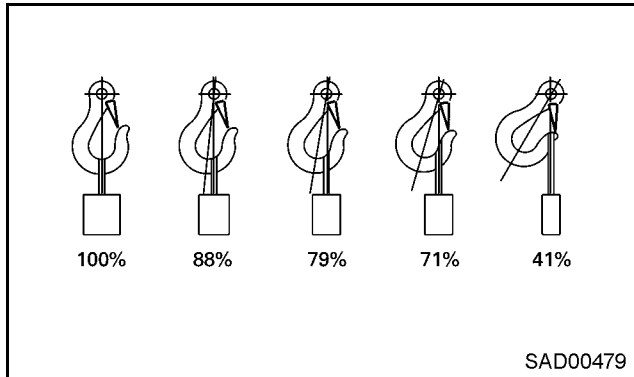
WARNING! Slings with one rope may cause the load to turn during hoisting, the rope to untwist, or the rope to slip from its original winding position on the load, which can result in a dangerous accident.

6. Limit the hanging angle to 60° , as a rule.
 - Do not sling a heavy load with ropes forming a wide hanging angle from the hook. When hoisting a load with two or more ropes, the force subjected to each rope will increase with the hanging angles.
 - The following table shows the variation of allowable load in kN (kg) when hoisting is made with two ropes, each of which is allowed to sling up to 9.8 kN (1,000 kg) vertically, at various hanging angles.
 - When two ropes sling a load vertically, up to 19.6 kN (2,000 kg) of total weight can be suspended. This weight is reduced to 9.8 kN (1,000 kg) when two ropes make a 120° hanging angle. On the other hand, two ropes are subject to an excessive force as large as 39.2 kN (4,000 kg) if they sling a 19.6 kN (2,000 kg) load at a lifting angle of 150° .



7. When installing wire ropes to an angular load, apply pads to protect the wire ropes. If the load is slippery, apply proper material to prevent the wire rope from slipping.
8. Use the specified eyebolts and fix wire ropes, chains, etc. to them with shackles, etc.

9. Apply wire ropes from the middle portion of the hook.
- Slings near the edge of the hook may cause the rope to slip off the hook during hoisting, and a serious accident can result. Hooks have maximum strength at the middle portion.



10. Do not use twisted or kinked wire ropes.
11. When lifting a load, observe the following.
- Wind in the crane slowly until wire ropes are stretched. When setting the wire ropes by hand, do not grasp them, but press them from above. If you grasp them, your fingers may get caught.
 - After the wire ropes are stretched, stop the crane and check the condition of the slung load, wire ropes, and pads.
 - If the load is unstable or the wire rope or chains are twisted, lower the load and lift it again.
 - Do not lift the load at a slanted angle.
12. When lowering a load, observe the following.
- When lowering a load, stop it temporarily at 30 cm (12 in) above the floor, and then lower it slowly.
 - Check that the load is stable, and then remove the sling.
 - Remove kinks and dirt from the wire ropes and chains used for the sling work, and put them in the specified place.

Precautions for Using Mobile Crane

- ★ Read the *Operation & Maintenance Manual* provided with the crane in advance and operate the crane safely.

Precautions for Using Overhead Hoist Crane



WARNING! Heavy parts (25 kg (55 lb) or more) must be lifted with a hoist, etc. In the *Disassembly and Assembly* section, every part weighing 25 kg or more is indicated clearly with this symbol.



- Before starting work, inspect the wire ropes, brake, clutch, controller, rails, overwind stop device, ground fault prevention breaker, crane collision prevention device, and power application warning lamp, and check safety.
- Observe the signs for sling work.
- Operate the hoist at a safe place.
- Check the direction indicator plates (east, west, south, and north) and the directions of the control buttons without fail.
- Do not sling a load at a slant. Do not move the crane while the slung load is swinging.
- Do not raise or lower a load while the crane is moving vertically or horizontally.
- Do not drag a sling.
- When lifting a load, stop it just after it leaves the ground and check safety, and then lift it up.
- Consider the travel route in advance and lift a load to a safe height.
- Place the control switch at a position where it will not be an obstacle to work and passage.
- After operating the hoist, do not swing the control switch.
- Remember the position of the main switch so that you can turn off the power immediately in an emergency.

- 13. If the hoist stops because of a power failure, turn the power switch OFF. When turning on a switch which was turned OFF by the ground fault prevention breaker, check that the devices related to that switch are not in operational state.
- 14. If there is an obstacle around the hoist, stop the operation.
- 15. After finishing the work, stop the hoist at the specified position and raise the hook to at least 2 m (6.6 ft) above the floor. Do not leave the sling installed to the hook.

Selecting Wire Ropes

- 1. Use adequate ropes depending on the weight of parts to be hoisted. Refer to the following table.

Wire ropes
(Standard "Z" twist ropes without galvanizing)
(JIS G3525, No. 6, Type 6X37-A)

Nominal Rope Diameter	Allowable load	
	kN	ton
mm		
10	8.8	0.9
12	12.7	1.3
14	17.3	1.7
16	22.6	2.3
18	28.6	2.9
20	35.3	3.6
25	55.3	5.6
30	79.6	8.1
40	141.6	14.4
50	221.6	22.6
60	318.3	32.4

- ★ The allowable load value is 1/6 of the breaking strength of the rope used.
- ★ Safety coefficient: 6

AIR CONDITIONER CIRCUITS

Precautions for Handling Hoses and Tubes

Observe these precautions when connecting and disconnecting hoses and tubes in the air conditioner circuit.



WARNING! The air conditioner of this machine uses a refrigerant (air conditioner gas: R134a) which has fewer factors to cause the depletion of the ozone layer. However, it does not mean that you may discharge the refrigerant into the atmosphere. Be sure to recover the refrigerant when disconnecting the refrigerant gas circuit and then reuse it.

Disconnecting Hoses and Tubes

- ★ Ask professional tradesmen to perform the collecting and filling operation of the refrigerant (R134a).
- ★ Never release the refrigerant (R134a) to the atmosphere.

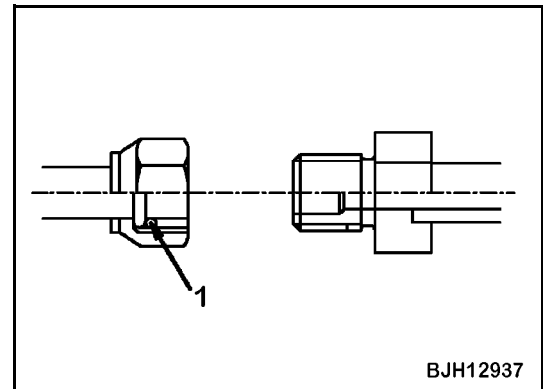


WARNING! If the refrigerant gas gets in your eyes, you may lose your sight. If the refrigerant gas contacts your skin, your skin may be frozen. Wear safety glasses, safety gloves, and safety clothes when recovering or adding the refrigerant. Refrigerant gas must be recovered and added by a qualified person.

Connecting Hoses and Tubes

1. When installing the air conditioner circuit hoses and tubes, be careful that dirt, dust, water, etc. does not get into them.
2. When connecting the air conditioner hoses and tubes, check that O-rings (1) are fitted to their joints.
3. Check that each O-ring is not damaged or deteriorated.
4. When connecting the refrigerant piping, apply compressor oil for refrigerant (R134a) (DENSO: ND-OIL8, VALEO THERMAL SYSTEMS: ZXL100PG (equivalent to PAG46)) to its O-rings.

- ★ See example of O-ring in the graphic. O-rings are fitted to every joint of the hoses and tubes.



- ★ For the tightening torque, see the precautions for installation in the appropriate *Disassembly and Assembly* sections.

MAINTENANCE STANDARD TERMS

The *Structure, Function and Maintenance* section explains the criteria for replacing or reusing products and parts in the machine maintenance work. The following terms are used to explain the criteria.

Standard Size and Tolerance

- To be accurate, the finishing size of parts is a little different from one to another.
- To specify a finishing size of a part, a temporary standard size is set and an allowable difference from that size is indicated.
- The temporary size set is called the *standard size* and the range of difference from the standard size is called the *tolerance*.
 - Tolerance with the symbols (+) or (-) is indicated on the right side of the standard size as shown in this table.

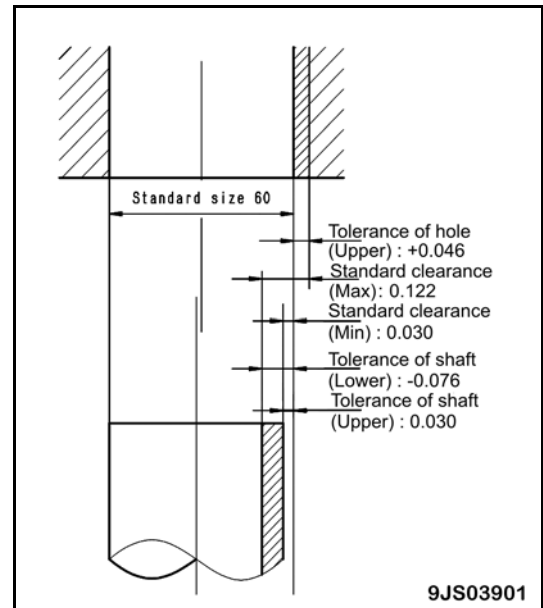
Standard Size	Tolerance
120	-0.022 -0.126

- ★ Tolerance may be indicated in the text and a table as [standard size (upper limit of tolerance/lower limit of tolerance)].

Example: 120 (-0.022/-0.126)

- Usually, the size of a hole and the size of the shaft to be fitted to that hole are indicated by the same standard size and different tolerances of the hole and shaft. The tightness of fit is decided by the tolerance.
- Indication of size of rotating shaft and hole and their relationship is shown in the graphic and this table.

Standard Size	Tolerance	
	Shaft	Hole
60	-0.030 -0.076	+0.046 0



Standard Clearance and Standard Value

- The clearance made when new parts are assembled is called the *standard clearance*, which is indicated by the range from the minimum clearance to the maximum clearance.
- When some parts are repaired, the clearance is generally adjusted to the standard clearance.
- A value of performance and function of new products or equivalent is called the *standard value*, which is indicated by a range or a target value.
- When some parts are repaired, the value of performance/function is set to the standard value.

Standard Interference

- When the diameter of a hole of a part shown in the given standard size and tolerance table is smaller than that of the mating shaft, the difference between those diameters is called the *interference*.
- The range (A – B) from the difference (A) between the minimum size of the shaft and the maximum size of the hole to the difference (B) between the maximum size of the shaft and the minimum size of the hole is the *standard interference*.
- After repairing or replacing some parts, measure the size of their hole and shaft and check that the interference is in the standard range.

Repair Limit and Allowable Value or Allowable Dimension

- The size of a part changes because of wear and deformation while it is used. The limit of changed size is called the *repair limit*.
- If a part is worn to the repair limit, it must be replaced or repaired.
- The performance and function of a product lowers while it is used. A value at which the product can be used without causing a problem is called the *allowable value* or *allowable dimension*.
- If a product is worn to the allowable value, it must be checked or repaired. Since the permissible value is estimated from various tests or experiences in most cases, it must be judged after considering the operating condition and customer's requirement.

Clearance Limit

- Parts can be used until the clearance between them is increased to a certain limit. The limit at which those parts cannot be used is called the *clearance limit*.
- If the clearance between the parts exceeds the clearance limit, they must be replaced or repaired.

Interference Limit

- The allowable maximum interference between the hole of a part and the shaft of another part to be assembled is called the *interference limit*.
- The interference limit shows the repair limit of the part of smaller tolerance.
- If the interference between the parts exceeds the interference limit, they must be replaced or repaired.

HANDLING ELECTRIC AND HYDRAULIC EQUIPMENT

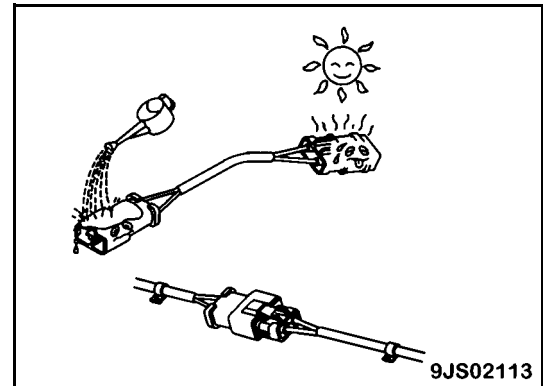
To maintain the performance of the machine over a long period and to prevent failures or other problems before they occur, correct operation, maintenance and inspection, troubleshooting, and repairs must be carried out. This section deals particularly with correct repair procedures for mechatronics and is aimed at improving the quality of repairs. For this purpose, it includes sections on handling electric equipment and handling hydraulic equipment (particularly gear oil and hydraulic oil).

Handling Electric Equipment

Handling Wiring Harnesses and Connectors

Wiring harnesses consist of wiring connecting one component to another component, connectors used for connecting and disconnecting one wire from another wire, and protectors or tubes used for protecting the wiring.

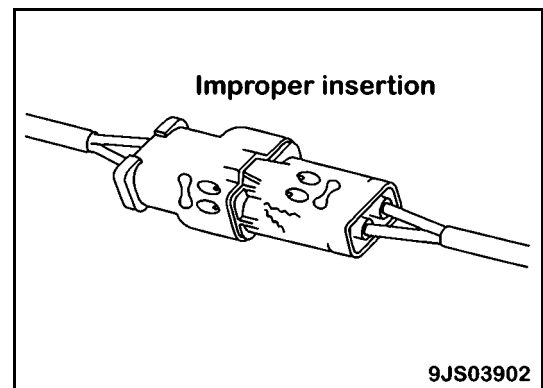
Compared with other electrical components fitted in boxes or cases, wiring harnesses are more likely to be affected by the direct effects of rain, water, heat, or vibration. Furthermore, during inspection and repair operations, they are frequently removed and installed again, so they are likely to suffer deformation or damage. For this reason, it is necessary to be extremely careful when handling wiring harnesses.



Main Failures Occurring in Wiring Harness

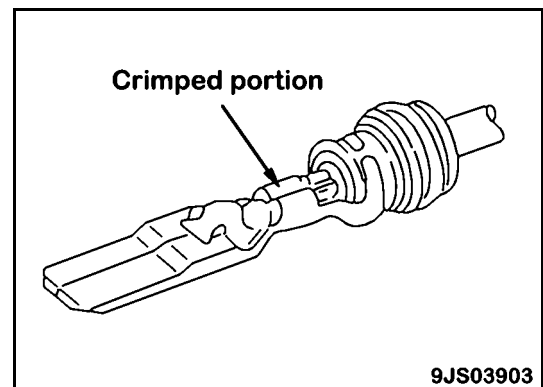
1. Defective contact of connectors (defective contact between male and female)

Problems with defective contact are likely to occur because the male connector is not properly inserted into the female connector, because one or both of the connectors is deformed or the position is not correctly aligned, or because there is corrosion or oxidization of the contact surfaces. The corroded or oxidized contact surfaces may become shiny again (and contact may become normal) by plugging and unplugging the connector about ten times.



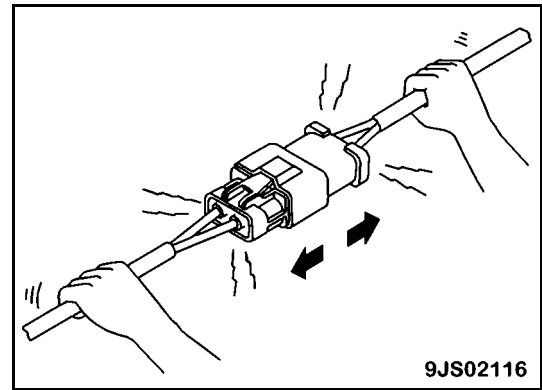
2. Defective crimping or soldering of connectors

The pins of the male and female connectors are in contact at the crimped terminal or soldered portion. If there is excessive force brought to bear on the wiring, the plating at the joint will peel and cause improper connection or breakage.



3. Disconnections in wiring

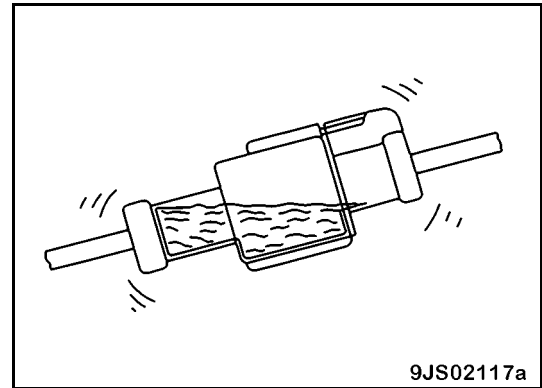
If the wiring is held and the connectors are pulled apart, components are lifted with a crane with the wiring still connected, or a heavy object hits the wiring, the crimping of the connector may separate, the soldering may be damaged, or the wiring may be broken.



9JS02116

4. High-pressure water entering connector

The connector is designed to make it difficult for water to enter (drip-proof structure). If high-pressure water is sprayed directly on the connector, water may enter the connector, depending on the direction of the water jet. Be careful not to splash water over the connector. The connector is designed to prevent water from entering but, at the same time, if water does enter, it is difficult for it to be drained. If water gets into the connector, the pins will be short-circuited by the water. If any water gets in, immediately dry the connector or take other appropriate action before passing electricity through it.

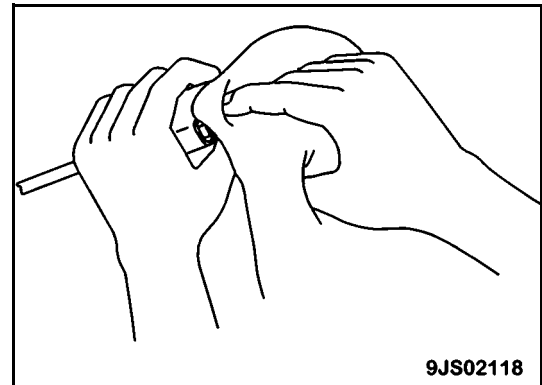


9JS02117a

5. Oil or dirt stuck to connector

If oil or grease are stuck to the connector and an oil film is formed on the mating surface between the male and female pins, the oil will not let the electricity pass; there will be a defective contact. If there is oil or grease stuck to the connector, wipe it off with a dry cloth or blow it dry with compressed air and spray it with a contact restorer.

- ★ When wiping the mating portion of the connector, be careful not to use excessive force or deform the pins.
- ★ If there is oil or water in the compressed air, the contacts will become even dirtier. Remove the oil and water from the compressed air completely before cleaning with compressed air.



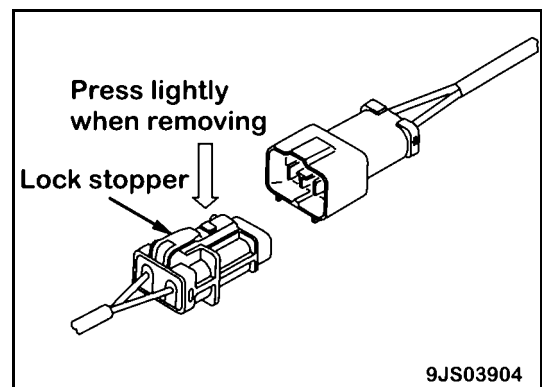
9JS02118

Removing, Installing, and Drying Connectors and Wiring Harnesses

1. Unplugging connectors

A. Hold the connectors when unplugging.

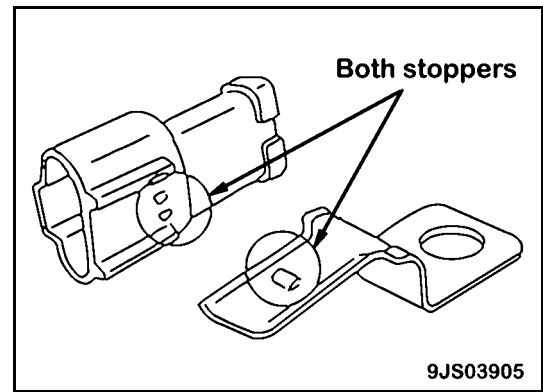
- For connectors held by a screw, loosen the screw fully, then hold the male and female connectors in each hand and pull apart.
- For connectors which have a lock stopper, press down the stopper with your thumb and pull the connectors apart.
- ★ Never pull with one hand.



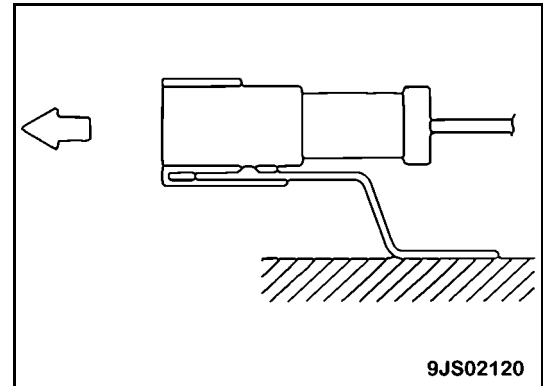
9JS03904

B. When removing from clips

- Both the connector and clip have stoppers, which are engaged with each other when the connector is installed.



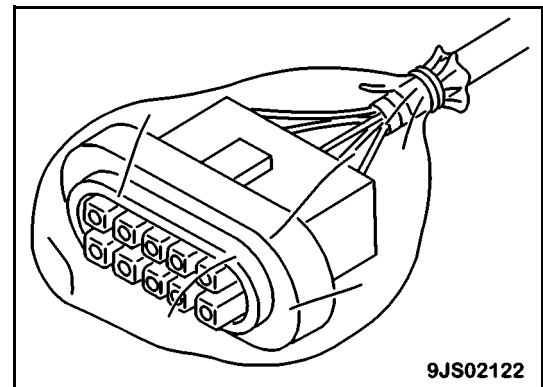
- When removing a connector from a clip, pull the connector in a parallel direction to the clip for removing the stoppers.
 - ★ If the connector is twisted up and down or to the left or right, the housing may break.



C. Action to take after removing connectors

After removing any connector, cover it with a vinyl bag to prevent any dust, dirt, oil, or water from getting in the connector portion.

- ★ If the machine is left disassembled for a long time, it is particularly easy for improper contact to occur. Always cover the connector.

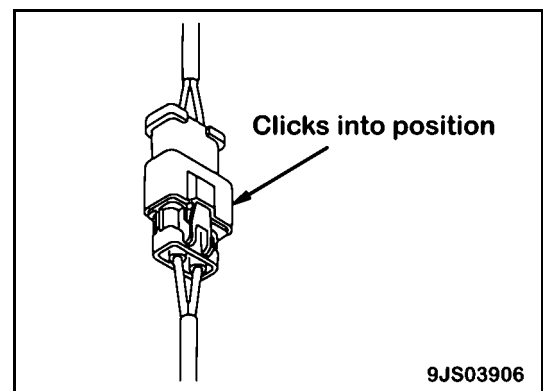


2. Plugging connectors

A. Check the connector visually.

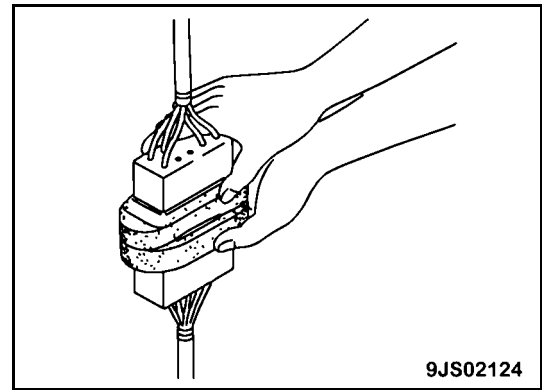
- Check that there is no oil, dirt, or water stuck to the connector pins (mating portion).
- Check that there is no deformation, defective contact, corrosion, or damage to the connector pins.
- Check that there is no damage or breakage to the outside of the connector.

- ★ If there is any oil, water, or dirt stuck to the connector, wipe it off with a dry cloth. If any water has got inside the connector, warm the inside of the wiring with a dryer, but be careful not to make it too hot as this will cause short circuits.
- ★ If there is any damage or breakage, replace the connector.



B. Fix the connector securely.

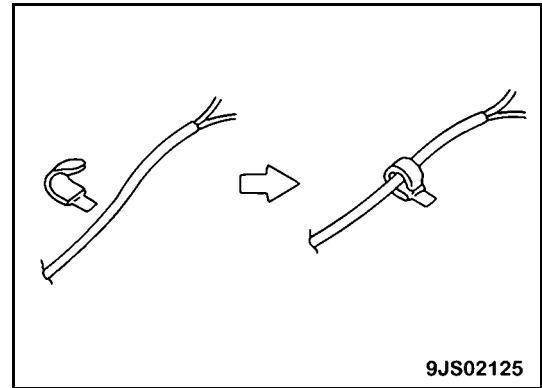
Align the position of the connector correctly, and then insert it securely. For connectors with the lock stopper, push in the connector until the stopper clicks into position.



C. Correct any protrusion of the boot and any misalignment of the wiring harness.

For connectors fitted with boots, correct any protrusion of the boot. If the wiring harness is misaligned or the clamp is out of position, adjust it to its correct position.

- ★ If the connector cannot be corrected easily, remove the clamp and adjust the position.
- ★ If the connector clamp has been removed, be sure to return it to its original position. Check also that there are no loose clamps.

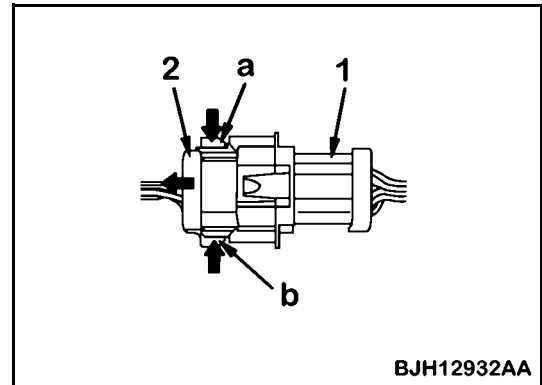


D. Heavy duty wire connector (DT 8-pole, 12-pole)

• Unplugging

While pressing both sides of locks (a) and (b), pull out female connector (2).

- (1): Male connector
- (2): Female connector
- (a), (b): Locks



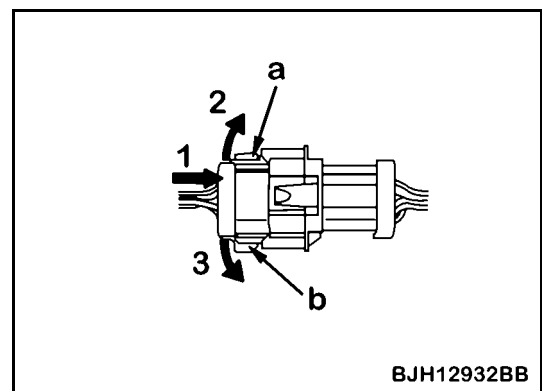
• Plugging

i. Push in female connector (2) horizontally until the lock clicks. (Arrow 1)

ii. Since locks (a) and (b) may not be set completely, push in female connector (2) while moving it up and down until the locks are set normally. (Arrows 1, 2, 3)

- ★ Lock (a) is pulled down (not set completely) and lock (b) is set completely.

- (1): Male connector
- (2): Female connector
- (a), (b): Locks



E. Drying wiring harness

If there is any oil or dirt on the wiring harness, wipe it off with a dry cloth. Avoid washing it in water or using steam. If the connector must be washed in water, do not use high-pressure water or steam directly on the wiring harness. If water gets directly on the connector, do the following steps.

- i. Unplug the connector and wipe off the water with a dry cloth.

- ★ If the connector is blown dry with compressed air, there is the risk that oil in the air may cause defective contact. Remove all oil and water from the compressed air before blowing with air.

- ii. Dry the inside of the connector with a dryer.

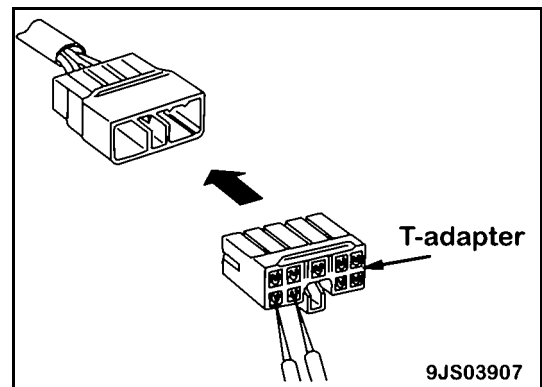
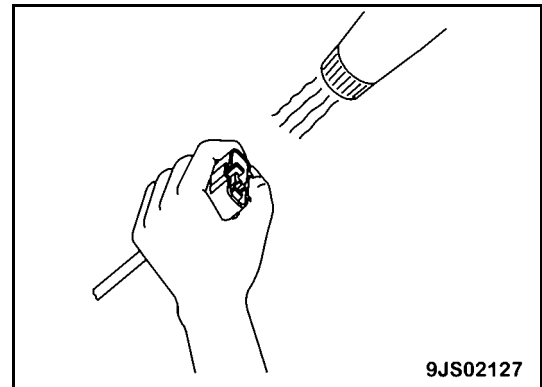
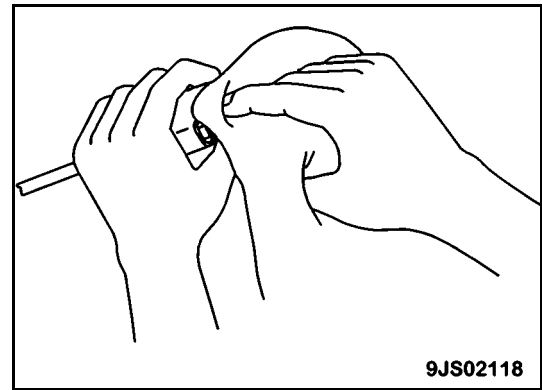
If water gets inside the connector, use a dryer to dry the connector.

- ★ Hot air from the dryer can be used, but regulate the time that the hot air is used in order that the connector or related parts do not get too hot; extreme heat will deform or damage the connector.

- iii. Carry out a continuity test on the connector.

After drying, leave the wiring harness disconnected and carry out a continuity test to check for any short circuits between pins caused by water.

- ★ After completely drying the connector, blow it with contact restorer and reassemble.

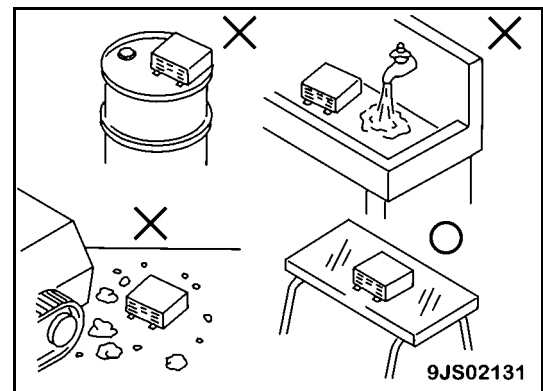
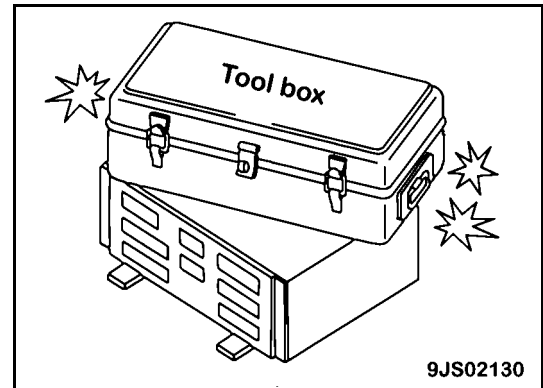


Handling Controller

The controller contains a microcomputer and electronic control circuits. These control all of the electronic circuits on the machine; be extremely careful when handling the controller.

- Do not place objects on top of the controller.
 - Cover the control connectors with tape or a vinyl bag. Never touch the connector contacts with your hand.
 - During rainy weather, do not leave the controller in a place where it is exposed to rain.
-
- Do not place the controller on oily or damp surfaces, or on soil. Do not place the controller in a hot place, even for a short time. Place it on a suitable dry stand.
 - Precautions when carrying out arc welding

When carrying out arc welding on the body, disconnect all wiring harness connectors connected to the controller. Fit an arc welding ground close to the welding point.



Troubleshooting Electric Circuits

1. Always turn the power OFF before unplugging or plugging connectors.
2. Before troubleshooting, check that all the related connectors are properly inserted.
 - ★ Disconnect and connect the related connectors several times to check.
3. Always plug any unplugged connectors before going to the next step.
 - ★ If the power is turned ON with the connectors still disconnected, unnecessary abnormal displays will be generated.
4. When troubleshooting circuits (measuring the voltage, resistance, continuity, or current), move the related wiring and connectors several times and check that there is no change in the tester reading.
 - ★ If there is any change, there is probably a defective contact in that circuit.

Handling Hydraulic Equipment

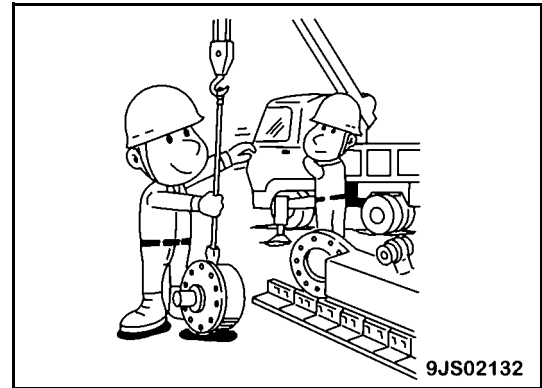
With the increase in pressure and precision of hydraulic equipment, the most common cause of failure is dirt (foreign material) in the hydraulic circuit. When adding hydraulic oil, or when disassembling or assembling hydraulic equipment, it is necessary to be particularly careful.

1. Be careful of the operating environment.

Avoid adding hydraulic oil, replacing filters, or repairing the machine in rain or high winds, or in places where there is a lot of dust.

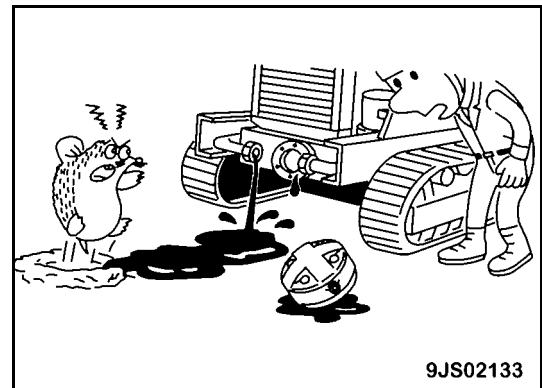
2. Disassembly and maintenance work in the field

If disassembly or maintenance work is carried out on hydraulic equipment in the field, there is danger of dust entering the equipment. It is also difficult to check the performance after repairs. It is preferable to use unit exchange. Disassembly and maintenance of hydraulic equipment should be carried out in a specially prepared dustproof workshop, and the performance should be checked with special test equipment.



3. Sealing openings

After any piping or equipment is removed, the openings should be sealed with caps, tapes, or vinyl bags to prevent any dirt or dust from entering. If the opening is left open or is blocked with a rag, there is danger of dirt entering or of the surrounding area being soiled by leaking oil. Do not use rags to block openings. Do not drain oil out onto the ground; collect it and ask the customer to dispose of it, or take it back with you for disposal.

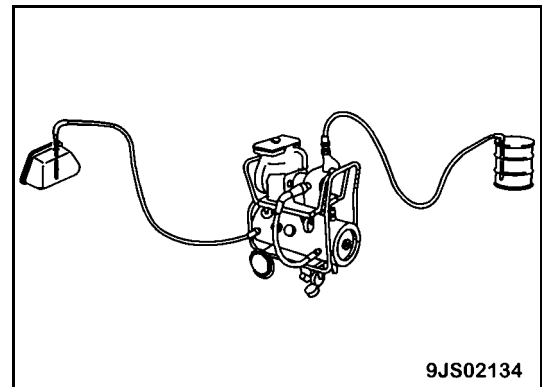


4. Do not let any dirt or dust get in during refilling operations.

Be careful not to let any dirt or dust get in when refilling with hydraulic oil. Always keep the oil filler and the area around it clean, and also use clean pumps and oil containers. If an oil cleaning device is used, it is possible to filter out the dirt that has collected during storage; this is an even more effective method.

5. Change hydraulic oil when the temperature is high.

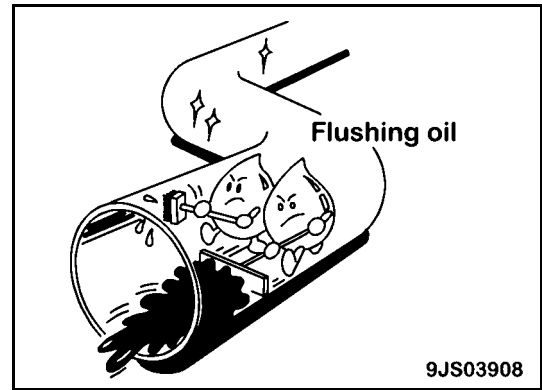
When hydraulic oil or other oil is warm, it flows easily. In addition, the sludge can also be drained out easily from the circuit together with the oil. It is preferable to change the oil when it is still warm. When changing the oil, as much as possible of the old hydraulic oil must be drained out. Drain the oil from the hydraulic tank; also drain the oil from the filter and from the drain plug in the circuit.



If any old oil is left, the contaminants and sludge in it will mix with the new oil and will shorten the life of the hydraulic oil.

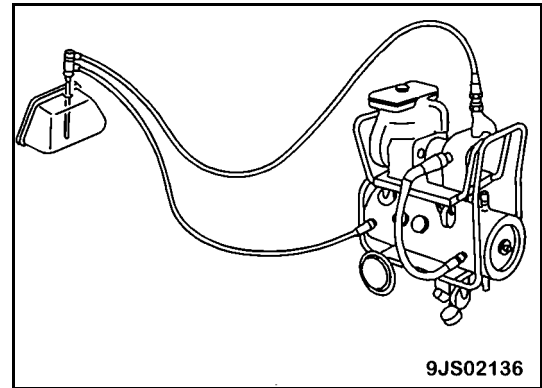
6. Flushing operations

After disassembling and assembling the equipment, or changing the oil, use flushing oil to remove the contaminants, sludge, and old oil from the hydraulic circuit. Normally, flushing is carried out twice: primary flushing is carried out with flushing oil, and secondary flushing is carried out with the specified hydraulic oil.



7. Cleaning operations

After repairing the hydraulic equipment (pump, control valve, etc.) or when running the machine, carry out oil cleaning to remove the sludge or contaminants in the hydraulic oil circuit. The oil cleaning equipment is used to remove the ultra fine (about 3 mm) particles that the filter, built in the hydraulic equipment, cannot remove; it is an extremely effective device.



Handling Connectors Used for Engines

The following engines use the connectors described in this section.

- 95E-5
- 107E-1
- 114E-3
- 125E-5
- 140E-5
- 170E-5
- 12V140E-3

★ Your machine has a 107E-1 diesel engine.

Slide Lock Type

FRAMATOME-3, FRAMATOME-2

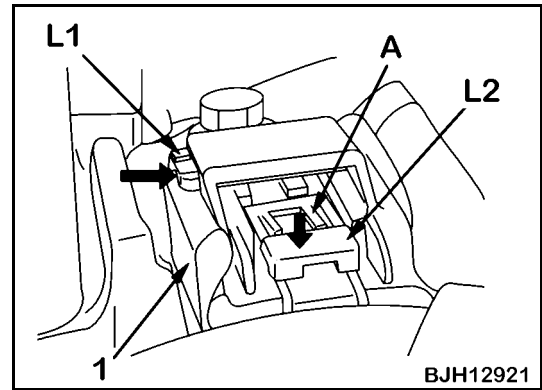
★ 95 – 170, 12V140 engines

- Pressure sensors and NE speed sensor

Engine	Sensor
125, 170, 12V140	Intake air pressure sensor in intake manifold: PIM
125, 170, 12V140	Oil pressure sensor: POIL
95, 107, 114	Oil pressure switch
95 – 170, 12V140	Ne speed sensor of flywheel housing: NE
125, 170, 12V140	Ambient pressure sensor: PAMB

Unplug connector (1) according to the following procedure.

1. Slide lock (L1) to the right.
2. While pressing lock (L2), pull out connector (1) toward you.
3. Even if lock (L2) is pressed, connector (1) cannot be pulled toward you if part A does not float. In this case, float part A with a small screwdriver while pressing lock (L2), and then pull out connector (1) toward you.



BJH12921

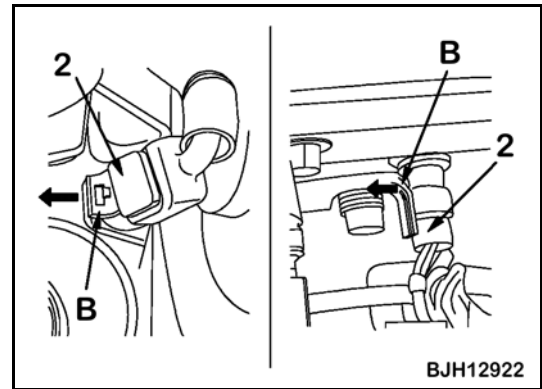
Pull Lock Type

PACKARD-2

- ★ 95 – 170, 12V140 engines
- Temperature sensors

Engine	Sensor
95 – 170, 12V140	Intake air temperature sensor in intake manifold: TIM
	Fuel temperature sensor: TFUEL
	Oil temperature sensor: TOIL
	Coolant temperature sensor: TWTR, etc.

- Unplug the connector by pulling lock (B) (on the wiring harness side) of connector (2) outward.



BJH12922

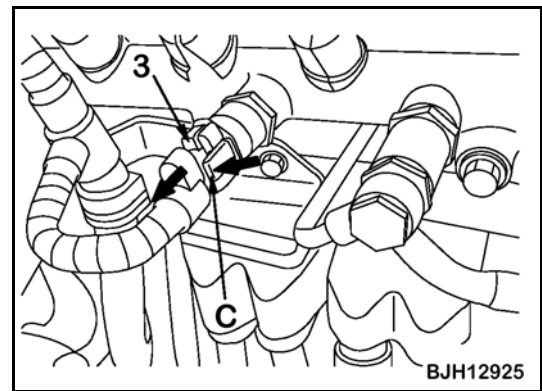
Push Lock Type

- ★ 95, 107, 114 engines

Connector	Sensor
BOSCH0-03	Fuel pressure sensor in common rail

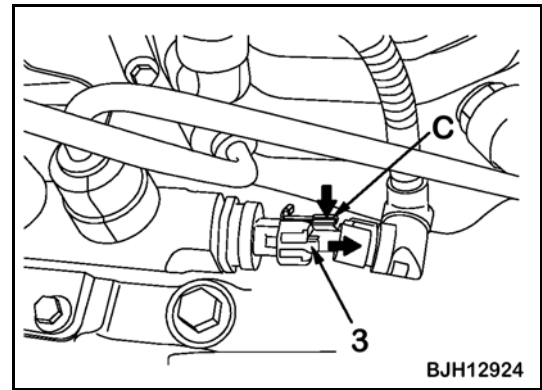
Unplug connector (3) according to the following procedure.

1. While pressing lock (C), pull out connector (3) in the direction of the arrow.
- ★ 114 engine (see graphic)

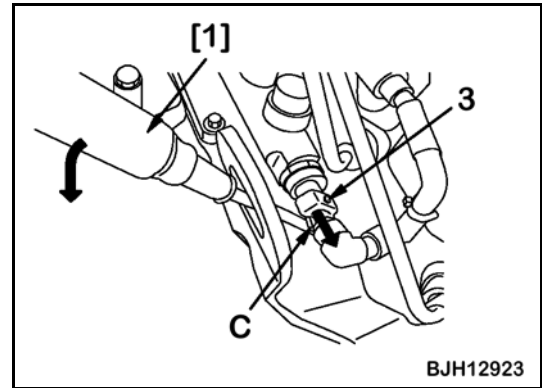


BJH12925

- ★ 107 engine (see graphic)
- ★ If the lock is on the underside, use flat-head screwdriver [1] since you cannot insert your fingers.



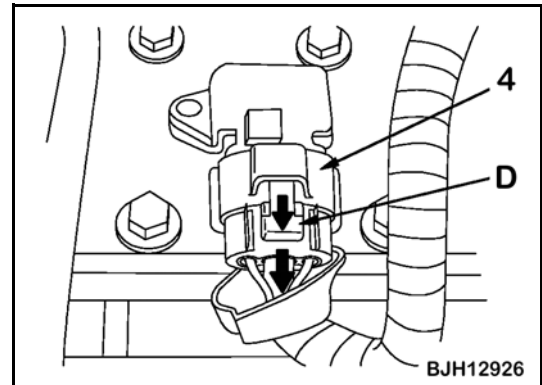
2. While pressing up lock (C) of the connector with flat-head screwdriver [1], pull out connector (3) in the direction of the arrow.



- ★ 107, 114 engines

Connector	Sensor
SUMITOMO-04	Intake air pressure/temperature sensor in intake manifold

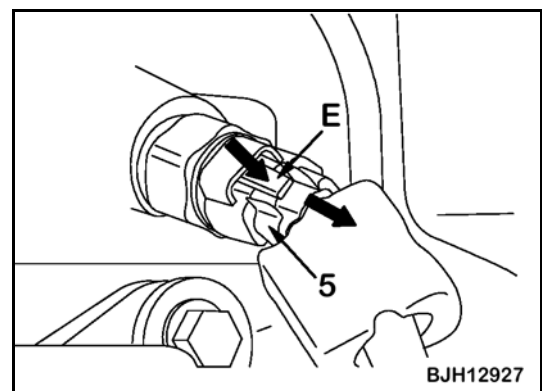
3. While pressing lock (D), pull out connector (4) in the direction of the arrow.



- ★ 95, 125 – 170, 12V140 engines

4. While pressing lock (E) of the connector, pull out connector (5) in the direction of the arrow.

Connector	Sensor
AMP-3	Fuel pressure sensor in common rail: PFUEL, etc.





Download the full PDF manual instantly.

Our customer service e-mail:

aservicemanualpdf@yahoo.com