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Service Manual

CLG816C Wheel Loader

Applicable type and model: CLG816C

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Torque Selection

Bolts involved in this machine shall be fastened in accordance with the torque requirements specified in the following table, unless special declaration.

Standard thread torque in metric system

Thread size	Standard Torque lb·ft (N·m)	
	Grade 8.8 strength	Grade 10.9 strength
M6	7.7±1.1(10.5±1.5)	---
M8	19±2.9(26±4)	---
M10	38±5(52±7)	53±4(72±6)
M12	66±9(90±12)	89±7(120±10)
M14	107±15(145±20)	144±11(195±15)
M16	166±26(225±35)	225±18(305±25)
M18	229±33(310±45)	306±26(415±35)
M20	302±37(410±50)	443±37(600±50)
M22	443±59(600±80)	590±52(800±70)
M24	561±74(760±100)	752±74(1020±100)
M27	811±111(1100±150)	1106±74(1500±100)
M30	1106±148(1500±200)	1364±11(1850±150)
M33	1512±221(2050±300)	2139±295(2900±400)
M36	1955±258(2650±350)	2286±184(3100±250)

Standard thread torque in British system

Thread size	Standard Torque lb·ft (N·m)
1/4	9±3 (12±4)
5/16	18±5 (25±7)
3/8	33±5 (45±7)
7/16	52±11 (70±15)
1/2	74±11 (100±15)
9/16	110±15 (150±20)
5/8	148±18 (200±25)
3/4	266±37 (360±50)
7/8	420±59 (570±80)
1	645±74 (875±100)

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Oil

Engine oil selection

LiuGong machine use engine oil SAE15W/40 API CF-4, it is applicable to all working conditions.

⚠ Instruction: do not add performance additive or other oil additive product to engine crankcase. The oil drain intervals specified in the operation manual is measured under test method of LiuGong lubrication.

CF - 4 diesel engine oil

Item	Quality index					
	30	40	10W/30	15w/30	15w/40	10W/40
Kinematic viscosity (100℃), mm^2/s	9.3 ∽< 112.5	12.5 ∽< 16.3	9.3 ∽< 112.5	9.3 ∽< 12.5	12.5 ∽< 16.3	12.5 ∽< 116.3
Flashing point (opening) ℃ ,Not lower than	220	230	205	215	215	205
Viscosity index is no less than	75	80	---	---	---	---
Pour point℃ Not higher than	-15	-10	-30	-23	-23	-30
CCS viscosity in low temperature, mPa·s is not more than	---	---	3500 (-20 ℃)	3500 (-15 ℃)	3500 (-15 ℃)	3500 (-20 ℃)
MRV critical temperature of pumping, ℃ not more than	---	---	-25	-20	-20	-25
Foam resistance ml/ml 24 ℃ , not more than 93 ℃ , not more than Rear 24 ℃ , not more than	 25/0 150/0 25/0	 25/0 150/0 25/0	 25/0 150/0 25/0	 25/0 150/0 25/0	 25/0 150/0 25/0	 25/0 150/0 25/0

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Diesel fuel system

The machine uses 0# diesel fuel under standard condition, and engine power may be decreased or specific fuel consumption increased due to applying other fluids.

⚠ Instruction:

- Please consult your local diesel fuel dealer for the requirements of diesel operation in winter. If diesel temperature lower than the critical point, the fuel will crystallized, and even deactivate the fuel filter, then cause the engine power loss or failed to start.
- Diesel using on machine must conform to performance parameters of “0# diesel fuel”(p. 1-5)

Diesel fuel storage

If diesel fuel needed to be stored for a certain period, you can put some water or irrelevant substances into the diesel storage box.

Keep the diesel storage box opened widely, and make sure the cooling status of diesel fueldiesel fuel. Drain the water from the diesel storage box according to the required time cycle.

After daily work is over, diesel tank shall be refilled with diesel fuel to prevent diesel in its tank from drying or condensing.

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Typical data for oil

0# diesel fuel

No.	Item		Specified norms	Typical data
1	Oxidative stability, total undissolved substance, mg/100ml		Not more than 2.5	---
2	Sulfur content, %(m/m)		Not more than 0.035	0.0198
3	Carbon residue on residuum 10%, %(m/m)		Not more than 0.3	---
4	Ash content, %(m/m)		Not more than 0.01	---
5	Copper corrosion (50 ℃ , 3h), level		Not more than 1	1
6	Water content, %(v/v)		Trace	None
7	Mechanical admixture		None	None
8	oiliness polishing scratch diameter (60 ℃)/um		Not more than 460	---
9	Palycyclic aromatic content d (mass fraction)/%		Not more than 11	---
10	Kinematic viscosity (20 ℃), mm^2 / s		3.0-8.0	---
11	Condensation point, ℃		---	---
12	Cold filter plugging point, ℃		≤4	-1
13	Flashing point (close), ℃		Not lower than 55	4
14	Cetane number		Not less than 46	51
15	Distillation range	50% recovery temperature. ℃	Not higher than 300	286.0
		90% recovery temperature. ℃	Not higher than 355	341.0
		95% recovery temperature. ℃	Not higher than 365	352.0
16	Density (20 ℃), kg/m^3		810.0-850.0	8450.0
17	Fatty acid methyl ester (volume fraction)/%		Not more than 0.5	---

⚠ Note: typical values will change within the criteria at different periods.

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HM Anti-wear hydraulic oil

Item	Quality index			
	32	46	68	100
Kinematic viscosity (40 ℃)/(mm^2/s),±10%	32	46	68	100
Viscosity index not less than	95	95	95	90
Flashing point (opening) ℃ Not lower than	160	180	180	180
Pour point ℃ Not higher than	-15	-9	-9	-9
Demulsibility [54 ℃ ,(40-37-3)ml],min, no more than	30(54 ℃)		40(54 ℃)	30(82 ℃)
Air release value (50 ℃), min Not more than	6	10	12	Report
Foam resistance (foam tendency/ foam stability) 24 ℃ , ml/ml, no more than 93 ℃ , ml/ml, no more than Rear 24 ℃ , ml/ml, no more than	150/10, 150/10, 150/10			
Sealing applicable performance index is no more than	12	10	8	Report
Test vane pump (100 hours, total weight loss) mg no more than	100			
Oxidation stability (acid value up to 2.0mgKOH/g), h, no more than	1000			

HV low-temperature anti-wear hydraulic oil

Item	Quality index			
	32	46	68	100
Kinematic viscosity (40 ℃)/(mm^2/s),±10%	32	46	68	100
Viscosity index not less than	130	130	130	130
Flashing point (opening) ℃ Not lower than	160	160	160	160
Pour point ℃ Not higher than	-33	-33	-30	-21
Demulsibility [54 ℃ ,(40-37-3)ml],min, no more than	30(54 ℃)		40(54 ℃)	30(82 ℃)
Air release value (50 ℃), min Not more than	8	10	12	Report
Foam resistance (foam tendency/ foam stability) 24 ℃ , ml/ml, no more than 93 ℃ , ml/ml, no more than Rear 24 ℃ , ml/ml, no more than	150/10, 150/10, 150/10			
Sealing applicable performance index is no more than	13	11	10	Report

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Test vane pump (100 hours, total weight loss) mg no more than	100
Oxidation stability (acid value up to 2.0mgKOH/g), h, no more than	1000

Hydraulic transmission oil

Item	6#	8#
Kinematic viscosity (100 ℃)/(mm^2/s), no more than	5-7	7-9
Flashing point (opening) ℃ Not lower than	170	180
Pour point ℃ Not higher than	-25	-20
Viscosity index is no less than	100	90
copper corrosion (100 ℃ , 3h) level Not more than	1	1
Corrosion test (distilled water) no more than	No rust	No rust
Foam resistance (foam tendency/ foam stability) 93 ℃ , ml/ml, no more than	50/0	50/0
Four-ball test, $P_{B,}$N, no less than	588	588

Heavy-duty vehicles gear oil

Item	Quality index				
	90	140	80W/90	85W/90	85W/140
Kinematic viscosity (100 ℃), mm^2/s	13.5 ≤ < 124	24 ≤ < 41	13.5 ≤ < 124	13.5 ≤ < 124	24 ≤ < 41
Flashing point (opening) ℃ Not lower than	180	200	165	165	180
Viscosity index is no less than	75	75	---	---	---
Pour point ℃ Not higher than	-10	-5	-28	-18	-18
Ditch Point ℃ Not higher than	---	---	-35	-20	-20
Copper corrosion, level, Not more than	3	3	3	3	3
Temperature of apparent viscosity is 150Pa.S, ℃ , no more than	---	---	-26	-12	-12
Foam resistance ml/ml 24 ℃ Not more than 93 ℃ Not more than Back 24 ℃ Not more than	20/0 50/0 20/0				

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Anti-freeze

Item	Standard range	Typical data
Color	Bold color	Blue
Odor	Odorless	Odorless
Density (20 ℃), kg/m^3	1107-1142	1126
Freezing point, 50%(V/V) distilled water, not higher than,	-37 ℃	-37.2 ℃
Boiling point, 50%(V/V) distilled water, not higher than,	107.8 ℃	110.5 ℃
Ash content,% (m/m), no more than	5.0	4.2
PH value, 50%(V/V) distilled water	7.5-11	8.2
Moisture content,% (m/m), no more than	5.0	2.1
Corrosion test (Test piece variable value), mg/piece		
Red copper	±10	4.7
Brass	±10	6.6
Carbon steel	±10	1.3
Cast iron	±10	3.4
Solder	±30	17.7
Cast aluminum	±30	5.4

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Unit conversion table

Unit conversion table

Name	Unit	Conversion unit	Conversion ratio
Length	Inch (in)	Millimeter (mm)	25.4
	Millimeter (mm)	Inch (in)	0.03937
	Foot (ft)	Meter (m)	0.3048
	Meter (m)	Foot (ft)	3.28084
Area	Square Inch (in^2)	Square centimeter (cm2)	6.4516
	Square centimeter (cm2)	Square Inch (in^2)	0.1550
Volume	UK gallons (gal)	Liter (L)	4.54609
	Liter (L)	UK gallons (gal)	0.219969
	US gallons (gal)	Liter (L)	3.78541
	Liter (L)	US gallons (gal)	0.264172
	Liter (L)	cubic decimeter	1
Mass	Pound (lb)	Kilogram (kg)	0.453592
	Kilogram (kg)	Pound (lb)	2.204622
Torque	Pound force• inch lbf• in	Newton· meter (N· m)	0.112985
	Newton· meter (N· m)	Pound force• inch lbf• in	8.85075
Pressure	Pounds per square inch (psi)	Bar (bar)	0.06895
	Bar (bar)	Pounds per square inch (psi)	14.5038
	Pounds per square inch (psi)	MPa	0.006895
	MPa	Pounds per square inch (psi)	145.038
	MPa	Bar (bar)	10
	Bar (bar)	MPa	0.1
	Pascals (Pa)	Bar (bar)	10^{-5}
	Bar (bar)	Pascals (Pa)	10^{5}
Speed	Foot per second (ft/s)	Meter per second (m/s)	0.3048
	Meter per second (m/s)	Foot per second (ft/s)	3.28084
Flow	UK gallons per minute (gal/min)	Liter per minute (l/min)	4.54609
	Liter per minute (l/min)	UK gallons per minute (gal/min)	0.219969
	US gallons per minute (gal/min)	Liter per minute (l/min)	3.78541
	Liter per minute (l/min)	US gallons per minute (gal/min)	0.264172
Temperature	Fahrenheit degree ºF	Celsius degree ℃	5/9*(Fahrenheit degree ℉ -32)
	Celsius degree ℃	Fahrenheit degree ºF	Celsius degree ºC*9/5+32

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Safety Description

Safety warning decals

⚠ Safety warning sign/mark will appear on the machine, safety sign, manual or any other important safety informations. If the symbol appeared, you should obey the instruction in the safety information, and guard for the possibility of personal injury or death.

Words on safety sign

Words on safety sign such as “Danger”, “Warning” or “Caution” appeared on the machine shall have the following definitions:

⚠ Danger Danger: this word means danger will occurred immediately, and if no avoidance, it may cause death or serious personal injury.
⚠ Warning Warning: this word means existing potential danger, and if no avoidance, it may cause death or serious personal injury.
⚠ Caution Caution: this word means existing potential danger, and if no avoidance, it may cause slight or medium personal injury.

“Caution” is also used for reminding the safety attentions of unsafe operation possibly causing personal injury.

“Danger” represents the worst dangerous condition.

Safety sign of “Danger” or “Warning” is set near the specified dangerous location.

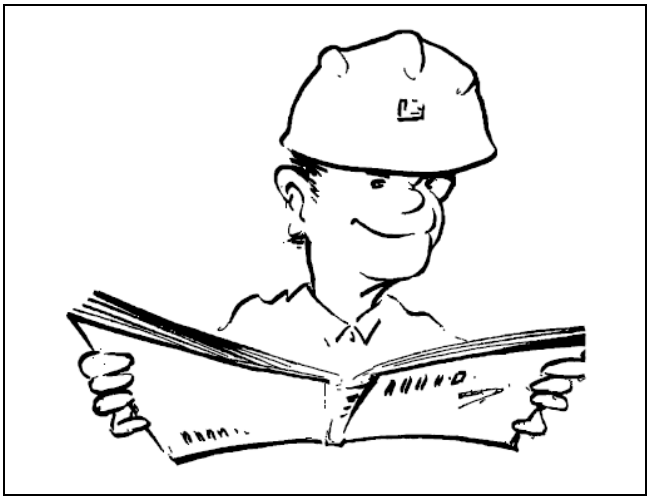
General notices is listed on the safety sign “Caution”.

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General notices for safety

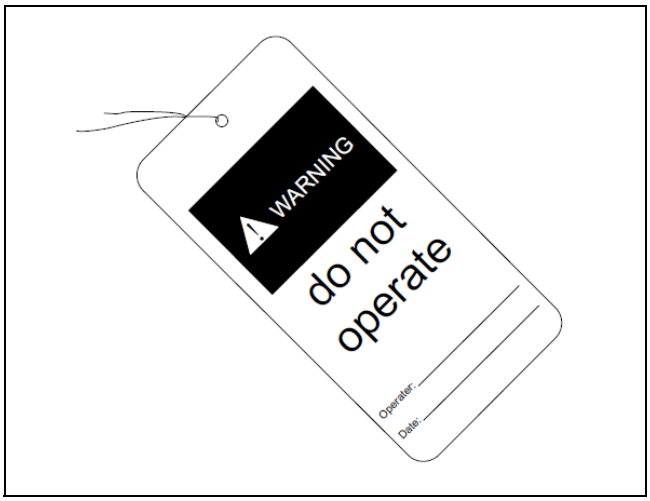
Please read and be familiar with all safety rules to avoid the occurrence of severe damage or even death.

Only trained and qualified persons are permitted to operate and maintain the machine.

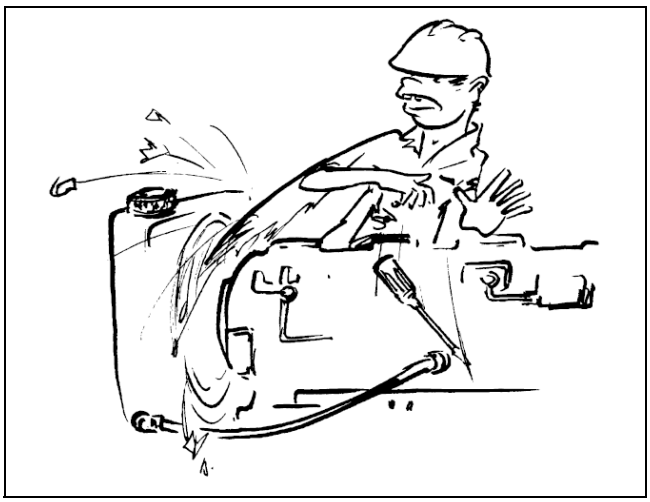


If you feel uncomfortable, feel sleepy after taking medicine or have drunk, do not operate the machine. In the case, it may cause your mis-judgment and possibility of accidents.

Before maintaining and repairing the machine, please hang the labels of “Do not operate” or similar warnings on the starting switch or the operation lever.

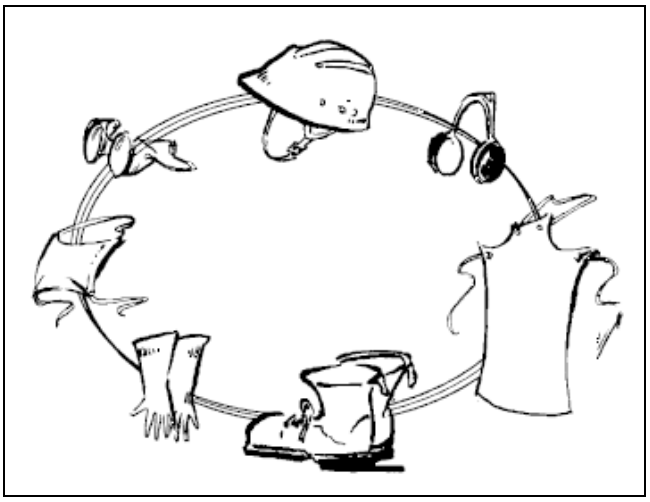


Do not wear loose clothes, jewelries or long hair. Because they may be drawn into the control system or the mobile parts and lead to severe damage or even death.



During the operation and maintaining the machine, please wear the cap, ear cover and safety glasses of hard material as well as safety shoes, mask and gloves.

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Goggles, safety glasses or mask can protect your eyes from the hazards of high-pressure fluid during the service of the accumulator and the hazards of flying debris generated during the work of the engine and the operation of tools. Please wear the protection mask when to dismantle and remove spring, elastic parts or add acid to the battery. Please wear the safety cap and goggles when to conduct welding operations or use the welding gun for cutting.



If you work under loud noise, please wear appropriate hearing protection devices, such as earmuff or earplug, to avoid damage to hearing due to loud noise.

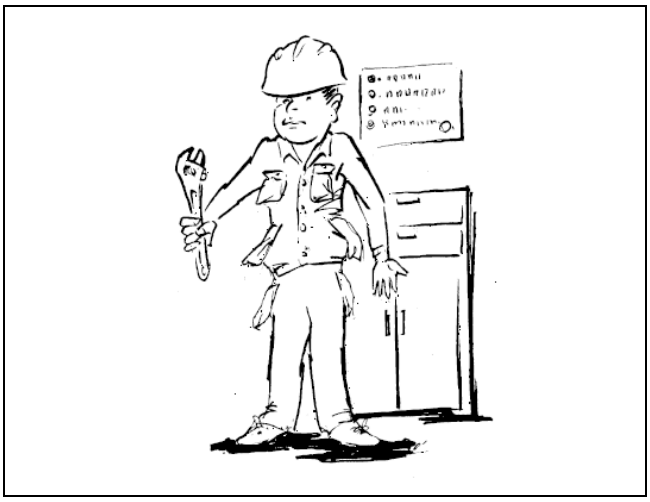


Ensure all protection plates and covers of the machine are fasten to the machine. Normally, the protection plates and covers are removed during the service and repairing of the machine. If there is any damage, please repair it before the operation of the machine.

Please ensure that there is no chip, greasy dirt, tool or other matters irrelevant to the machine on the machine, especially on the instrument panel. Put the irrelevant matters in place, such as the lunch boxes and tool boxes.

Protect foreign matters from entering the components of the system when to inspect the opened oil tanks or water tanks. Please empty the clothes pockets and move wrenches and nuts with great care before the dismantling of the box.

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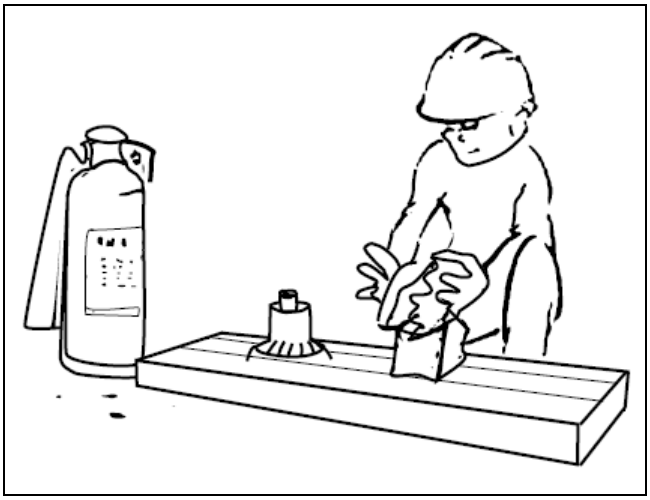


Learn about the gesture singles and the signal sources at the working site and only receive the signals from one person.

Never keep the service and repair solution in glass containers.

Please observe relevant laws and regulations when to dispose hazardous materials such as lubricant, fuel, coolant, solution, filter, accumulator and other materials.

Take great care during the operation of the cleaner. Do not use flammable materials as the cleaner of the parts, such as diesel fuel, petroleum and other inflammables.



Report all necessary repair work in a timely manner.

Persons without permission or authorization cannot stay onto or around the machine.

It is prohibited to refit the machine without LiuGong's consent, and LiuGong will not responsible for the aftermath due to refit.

Compressed air

Compressed air may lead to death. When use the compressed air for cleaning, wear the mask, protection suits and shoes. Do not point the compressed air to others or oneself. The compressed air may penetrate the skin and lead to severe injury or even death. The maximum pressure of the compressed air for cleaning should be lower than 0.2MPa.

High-pressure solution

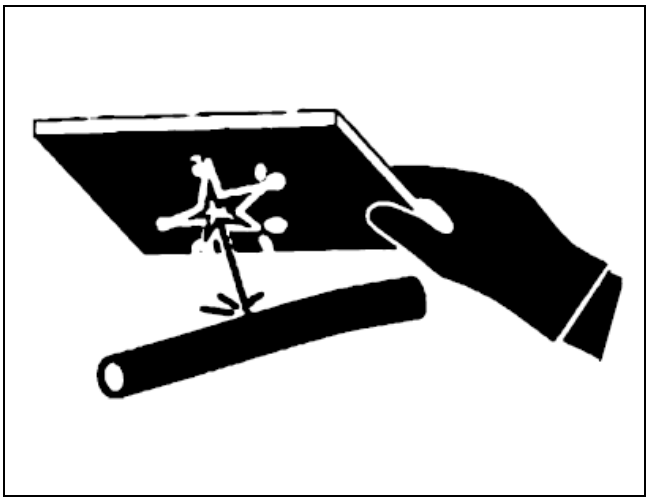
⚠ Warning: when servicing or changing the pipes of hydraulic system, you shall check the system pressure had been released in order to prevent from scalding by high-pressure oil. hydraulic oil under pressure will damage your skin severely when it spattered on you.

Take care when dismantle the hydraulic pipelines or connectors. When the oil spouts, the released high-pressure oil may lead to the continuous movement of the hoses.

Normally, before shutting off the hydraulic pipelines, place the relevant working devices in order and release the residue pressure from the pipelines. Otherwise, when to dismantle the hydraulic pipelines, the pressure provided by the loader to the working devices may lead to the spouting of the hydraulic oil.

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Please wear safety glasses and leather gloves when to check leakages. Do not use the naked hands to check the leakage but plate or paper plate.



Even if the pressured liquid is leaked from a hole as small as a pin hole, it may penetrate the muscles and lead to death. If spattered by the spouted high-pressure oil, please contact a doctor and take a medical treatment immediately.



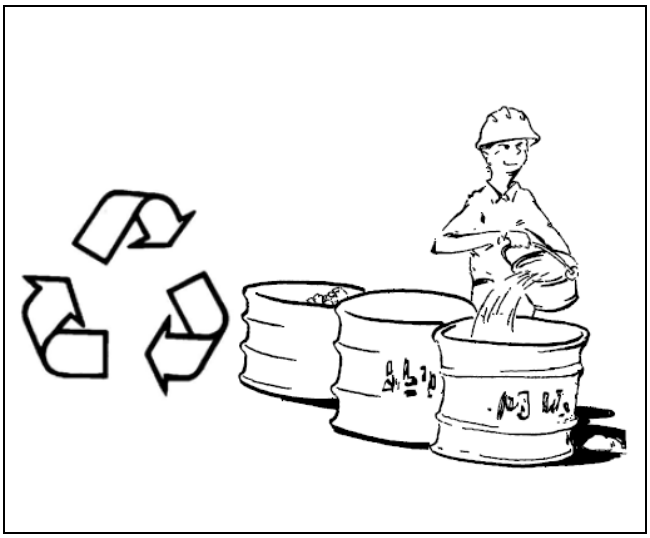
Safe disposal of waste liquid

Inappropriate disposal of waste liquid will endanger environment and ecology. Please observe local laws and regulations when to dispose the waste liquid.

It is mandatory and necessary to collect the liquid spattered during the inspection, service, test, adjustment and repair with containers.

Before opening any fluid cavity or resolve the parts containing liquid, the proper container shall be prepared well firstly.

Use proper container when liquid draining. Do not use the food or drink containers because they may be taken as drinks by others.



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Battery application precautions

High-pressure nitrogen, a dangerous article, is mounted in the accumulator, therefore read the following requirements and properly use the accumulator:

- The accumulator must be checked before the charging of nitrogen. It is prohibited to charge the accumulator with air if the accumulate does not have a nameplate, or the words of the nameplate are missed and unable to be identified with the kinds, or if the steel seal marks are incomplete or cannot be read clearly, or if there is defect with the body and therefore cannot ensure safe use.
- The accumulator is only charged with nitrogen. It is prohibited to charge the accumulator with oxygen, compressed air or other flammable air to avoid explosion.
- Slowly charge the nitrogen into the accumulator to avoid the breakage of the capsule.
- The air valve of the accumulator shall be mounted upward vertically. The accumulator must be stably fastened to the supporter. Do not use the welding method to fasten the accumulator.
- Do not drill the accumulator any time or carry open fire or heat sources close to the accumulator.
- Never conduct any welding operation on the accumulator.
- Since the accumulator is a high-pressure container, it must be replaced and repaired by professional operators.
- Release the air before discarding the waste accumulator.

Asbestos

If sucked in asbestos dust, it will endanger your health. This product is not containing asbestos, and LiuGong Machinery Co. Ltd recommended to use genuine LiuGong spare parts. If materials that you need to deal with containing asbestos fiber, please abide by the following rules:

- Never use compressed gas when cleaning. Water can be used for descending the dust.
- It can uses the vacuum cleaner with high filtering properties.
- Do not grind the materials containing asbestos dust.
- Please observe local laws and regulations when to dispose asbestos.
- Bath your body after contacted with asbestos.
- If required, it can uses effective protective mask.



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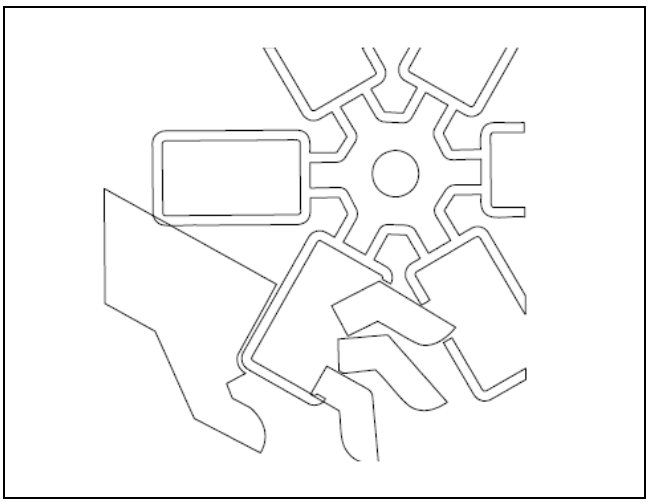
Prevention of extruding or cutting off

Do not make your hands, arms or any other bodies placed among the moving parts. e.g. between work implement and cylinder, between machine and working implement.

Working under the work implement, you shall support the machine properly. Do not support the work implement depending on hydraulic cylinder. If control mechanism moving or hydraulic oil line leaking, it will cause the work implement drops.

If it is necessary to remove the shield, you must fix well the shield after the repair.

For safety, you shall check all protectors, such as door, safety shield and hood, etc. to make sure they are correctly installed to avoid from the hurt caused by moving parts. e.g. revolving vane of engine has the risk of sharing the fingers, therefore shut down the engine or keeping a safety distance when servicing. If any door, hood and other protector damaged, it shall be repaired or replaced before operating the machine.



Make sure there's no foreign matters in the vanes of engine fan. Fan vanes will thrown or cut out the tools and other things that dropped or pushed in it.

Unless otherwise stated, any adjustment is not permitted to be performed when machine or engine is running.

If the repair procedure must be performed when machine running, do not let the machine in an unattended status. Arrange one operator seated in the seat, and prepare to shut down the engine at all times.

Do not use twisted or worn wire rope. Wear gloves when using and transporting.

When forcing to extrude the bayonet, you shall make sure no one standing around it. You shall wear safety goggles in order to protect you eyes.

Knocking object with hammer, please make sure the flying debris will not hurt others.

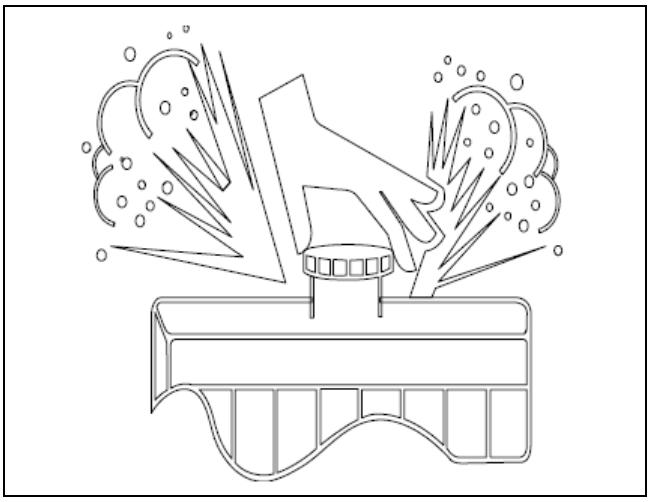
Prevent burns

Running for some time, parts of the machine will hot, and those parts shall be inspected or repaired after cooled down.

Coolant

Under working temperature, the cooling liquid of the engine has been pressed and at high temperature, the radiator and all the pipes connected to the radiator contain hot water or vapor, if you touch them, serious burn would occur.

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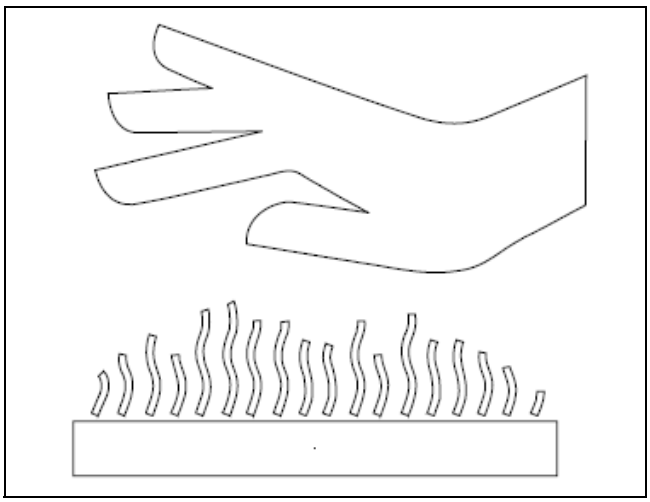
During checking the cooling liquid level, the engine shall be closed down and the filler cap shall be cooled to meet that it can be manually screwed off.

Slowly loosen the filler cap of cooling system to release the pressure.

Coolant contains alkali which may causing injury, and do not make it contact with your skin, eyes and mouth.

Oil

Hot oil and parts will cause personnel injury, and do not make the hot oil and parts contacting with your skin.



Under working temperature, the oil tank is hot and contains pressure.

When opening oil filler cap of hydraulic oil tank, the engine shall be stopped, and cool the filler cap down until it can be opened by bare hands.

Remove the tank cover slowly to release the pressure of hydraulic oil tank, averting scalded by hot oil.

Before all disassembling pipes, connector, or relevant parts, relieve the system pressure.

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Battery

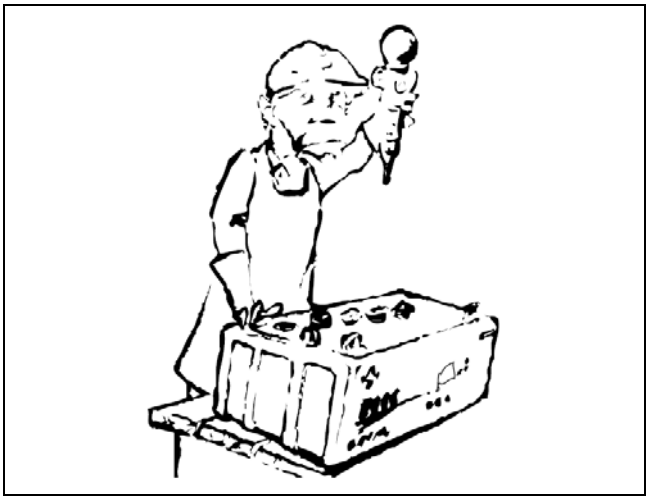
Smog discharged from the battery may cause explosion.

Battery and electrode may contains lead, and do not touch it with bare hands directly. Wash your hands just after battery repair.

Do not smoke when inspecting the level of battery electrolyte.

Electrolyte is a kind of acidic material, and please do not let your skin and eyes touched by electrolyte. Once touched, you should use water to wash it and timely to seek medical advice.

You shall wear safety goggles and glove when inspecting battery.



Protection for fire and explosion

All fuels, such as most of lubricants and some cooling agent, are flammables.

Fuel leaks on the hot surface or electrical elements may cause fire.

No smoking when refilling or within refiling area, and the place storing flammables.



Clean and tight all electrode connector. Daily inspect the wire for loose or wear. Before start, make sure tighten the loosen power supply, and repair or replace the worn electric wires.

Scheduled inspect the electrical circuit to avoid from overload or short circuit that will causing fire hazard.

Stored the fuel, lubricant into containers with relevant marks, preventing from operating and used by non-staff personnel.

Put the cleaning cloth or other combustible materials with oil impregnated into protective container, and set at a safe place. Do not perform welding or flame cutting onto the pipe containing flammable liquid. Before welding or cutting, the operation shall be perform until it is cleaned by flammable liquid.

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Accumulated combustible materials such as fuel, lubricant or junk on the machine shall be clean up.

Do not operate the machine near open fire.

Make sure the battery is far away from open fire and sparks, and do not smoke at the place of battery charing.

Do not charge the frozen battery to avoid of explosion.

Diethyl ether

⚠ Warning: Ether is forbidden for starting machine

Any attempt action of using ether to start the engine may cause serious damage of engine or personnel injury or death.



Piping, pipe and hose

Do not warp or knock the high-pressure pipe, and do not install the abnormally warped or broken pipe or hose onto the machine.

Repair the pipe and hose of loosen or broken fuel and lubricant circuit and hydraulic system in time. Leakage will cause fire hazard, and if you need repair or replace, please contact the authorized dealer by LiuGong Machinery Co., Ltd.

If following problems occurred, it shall be replaced.

- Damage or leakage of connector.
- There is corrosion with the outer of the hose and the exposure of the reinforced steel wires.
- Local eminence of hose uplift
- Obvious twist and flattening of the hose.

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- Reinforced hose guide wire is embedded into the outer layer.
- Misplacement of the end connectors.

Make sure all pipe clamps, guard board and heat shield are installed, for preventing from shaking or overheating by friction with other parts.

When removing the connecting pipe of the compressor, it is forbidden to be approached with open fire, or it will generate toxic gas, and result in poisoning. No smoking when maintaining and servicing, otherwise, the generated toxic gas will burn the body or sucked by human, and it also cause personal injury and death.

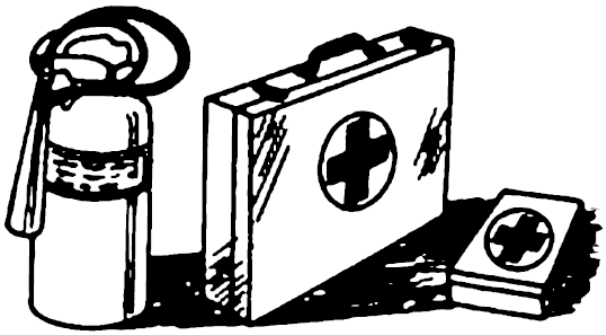
Fire extinguisher and first aid kit

Fire extinguisher provided by the machine shall conform to the related local laws and regulations, and it shall be maintained and improved for satisfying the requirements. For more information, please contact your local authorities.

You should know how to do when fire occurred or human injured.

The construction site must have first-aid kit in stock. regular inspection shall be performed, supplemented some medicines if required.

Selected some contacts of phone number (such as doctor, first-aid center, fire station and so on) use for communication in emergency. Paste the contact list onto specified location to ensure all staff known that the contact information and correct ways.



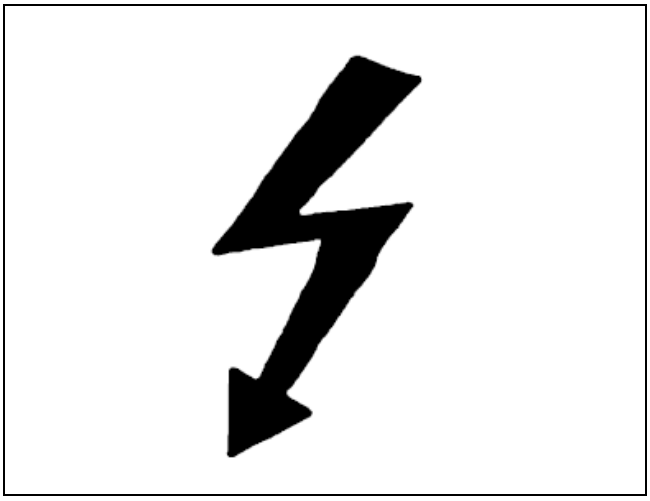
Inspect and maintain the fire extinguisher frequently. Follows the recommended method of application listed on the operation panel.

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Prevention of injury by thunder

Never try to access the machine when lightning near it.

If you seating in the cab while the thunderstorm occurred, please keep inside the cab; and if you're on the ground, please stand away from the machine.



Tyre

Service, removal, repair and install of tyre and hub shall apply special tools and technology, therefore the maintenance and service shall be implemented by tyre repair shop.

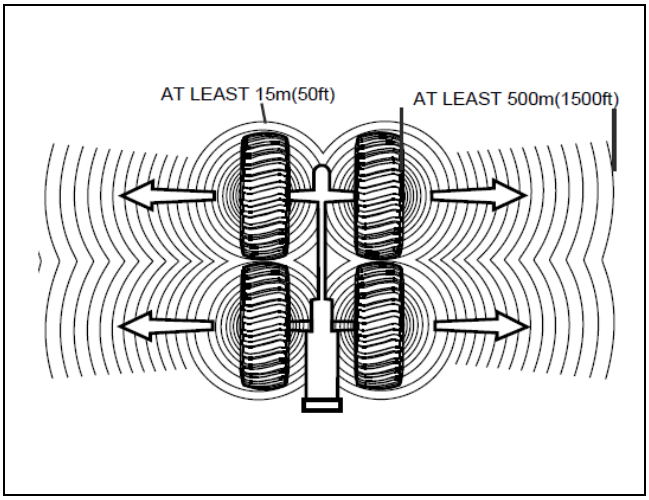


Pneumatic tyre can explode due to the heating and the firing of its internal air. It is due to gas expansion or burning because of heating caused by rim heating or electric welding, external flame, or frequent braking.

Power of tyre explosion is much bigger than that of bleeding, the explosion will make the tyre, hub and drive parts burst apart for 500m away, and the explosive force and debris will cause personnel injury and property loss.

Do not get close to the heated tires. Ensure the distance to the minimum extent (at least 15 meters). (As shown in the figure) stand outside the shadow area.

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It is suggested to inflate the tyre using dry nitrogen gas (N_2). If tyre already has inflated air, it is suggested to use nitrogen for air pressure adjustment, and the nitrogen can be mixed with atmospheric gas. Tyre inflated with nitrogen can reduce the possibility of explosion due to nitrogen gas is noninflammable.

In the same way, nitrogen is helpful to prevent from oxidation and rubber age deterioration and corrosion of rim parts.

In order to prevent from over-inflation, it needs correct inflating device and operation trainings for the application. Because of incorrect device or improper applications, it may cause tyre or rim broken.

Incorrect tyre rim service will cause tire blow-out, and such a explosive power will result in serious death. Only trained personnel by proper tools and procedures can maintain and service the tyre rim.

Inner space of driver cab

This LiuGong device is equipped with and meet the industry standard of: “SAE J154”and “ISO 3411”cab, and standard provided the requirements to the cab space.

Any refit of cab shall not occupy the specified space. Installation of added radio, fire extinguisher and other devices must make the specified space kept well. Any object bringing in the cab shall not occupy the specified space. Lunch-box or other things shall be fixed. When driving on uneven ground or tilting, those articles shall not strike the cab and damage it.

Steering bracket locking device

Connect steering bracket locking device when lifting and transporting machine.

Connect steering bracket locking device when do service near articulated joint

Separate steering bracket locking device before operating machine.

Refer to “steering bracket locking device” in operation for more details.

Precautions for attachments

It shall be installed and commissioned by qualified personnel; the operator shall be trained, and his/her operation and service shall be performed strictly according to the operation instructions for attachments.

When installing and using the spare attachment, please read related instructions, manuals and informations about the attachments.

Incorrect installation or purchase of attachments will not only cause safety issues, but also have

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the negative effect on service life and operation of the machine.

Do not use the attachments unauthorized by LiuGong. Using unauthorized attachments will cause safety issues, adversing the normal operation of machine and influencing its service life. It is forbidden to make any refit on the attachments without permissions, otherwise all at your peril.

LiuGong Machinery Co., Ltd will be not responsible for the injury, accident and damage off machine due to using unauthorized attachments.

Safety operation of machine

Access the machine

Before getting on/off the machine, please clean the oil dirt and mud on handrail or stairs. In addition, broken parts shall be repair, and the loosen bolt shall be tightened.

Only the place with handrail or stairs can be accessed.

When getting of/off the machine, you will face to the machine, holding the handrail while stepping stairs, to keep the three-point contact (two feet one hand or two hands one foot).



It is prohibited to jump out from machine.

It is prohibited to get on/off the machine during operation.

Never serve the control lever as handrail for getting on/off the machine.

Do not take tools or other things to climb up and down the machine.

Know about your machine

You are able to operate all devices on the machine.

Know about all the purposes of control system,

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instrument and indicator.

Know about the rated load, velocity range, brake and steering characteristic, turning radius, and height of operating space.

Remember that rain, snow, ice, broken stone, soft ground and others will change the working capacity of machine.

Study the safety signs (such as DANGER, WARNING, CAUTION) on the machine and other signs.

Know about your workspace

Know about your future workspace in advance as far as possible. Please check: location of slope, ditch, falling objects or suspensions, soil conditions (soft or hard), zone of accumulated water and swamp, rocks and stumps, buried foundations, boundary of pillar or wall, boundary of buried garbage or earth fill, holes, obstacles, muds, amount of traffic, heavy dust, heavy smoke, heavy fog, buried or hanging electricity, gas, telephone, water, sewage or other utility pipelines' accurate positions. If necessary, you shall invite a public service company to mark them out before starting works, and close or move those facilities.

Before starting the engine

You shall inspect your machine carefully before working, and make all systems are in the good operation conditions. And dispel all other personnels standing around your machine away from the workspace.

Keep the stairs and handrail clean. Before getting on the machine, please clear all dirt mud and tiny sands stuck on your shoes.

Check if all structural parts and covering parts are not damaged due to collision.

Check if all safety devices, such as door, guard board, cover, etc., are installed properly as as to prevent from damaging by moving parts, and if broken, please repair it in time.

Check if hydraulic system does not leak, and inspect the hose, steel pipe is not worn.

Check if all fastener parts are not loosen or lost.

Check if electric wire harness is not worn or broken, the fuse is in good condition, and the connector is firmly fastened.

Check if the fluid level of engine and fuel system

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is normal, and drain out the water and sediments from oil-water separator. Discharge waste liquid according to local regulations.

Replace all broken or lost parts, and necessary lubricating work shall be done in accordance with the lubrication point listed on schedule service table.

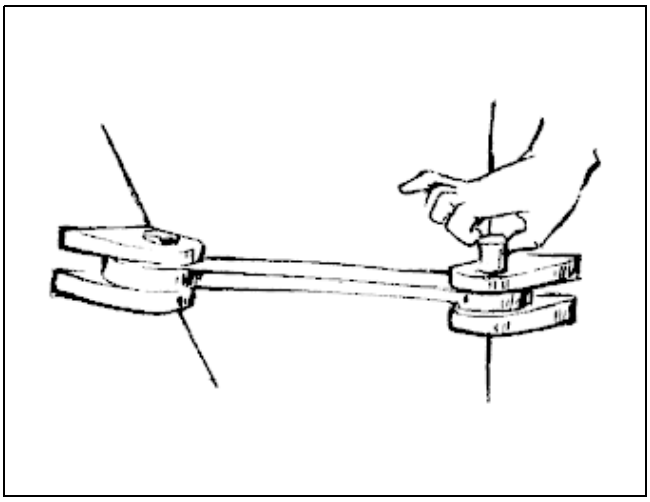
Purge all loose masses out of driver cab, because the loose mass will affect the operation and resulting in accidents.

Make sure all windows are cleaned and the wipers can work in normal.

Adjust the seat to appropriate position to make the operator seated comfortably and easy to operate the machine. Check if the anchorage of seat belt and safety belt is not damaged. Safety belt shall be replaced after three-year's application.

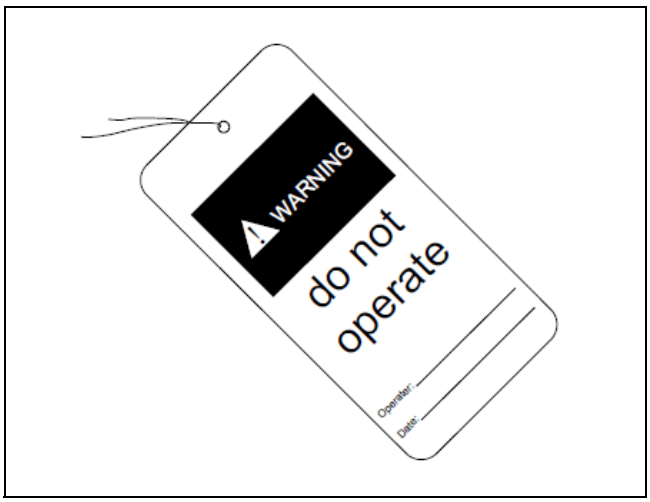
Make sure illuminating systems of machine is in normal operation, and the working site have sufficient lighting.

Check to ensure steering lock is fixed in release position.



Engine starting

If warning sign of “Do not operate” pasted on control lever, then the engine shall be not started.



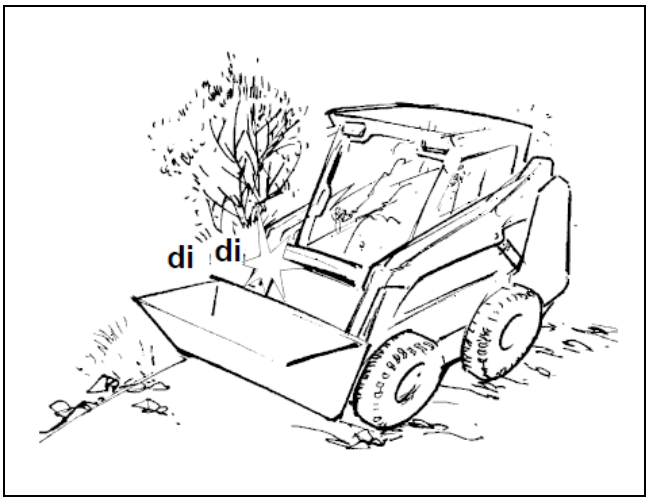
Make sure operator is seated and fastened the seat belt securely, and then start the machine.



Before start the engine, make sure hydraulic control rod is placed in neutral position.

When starting engine, you shall press the horn as a warning.

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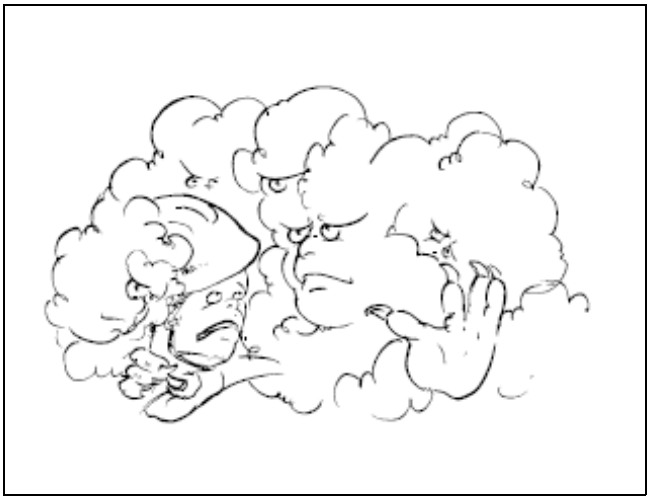
You shall start the engine only seated in the cab, and it is forbidden to short circuit the starter motor to start the engine. Such a operation will damage the electrical system of machine through bypass starting system, and even personnel injury or death.

Observe the pressure gage, instrument and warning indicator after engine started, and make sure that they are in normal operation, and their readings are in working range.

Observe and listen carefully to the machine for any fault, if existing fault or abnormal condition, stop the machine immediately, and resolve the fault before further operation.



Engine exhaust will cause decease or death. If it is necessary to start the engine in a closed or unventilated place, you need to open the windows and doors to guarantee the sufficient ventilation so as to prevent from poisoning of gas. If it still cannot providing sufficient ventilation after windows and doors opened, then you need to install a fan.



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Before operating machine

No one is permitted to stay on/around the machine, and please fasten the seat belt firmly.

Make sure all windows, lampshade, reverse mirror are clean, and fix the opened or closed window and door well.

Adjust the position of rear view mirror for having the best visual field from the operator's seat, especially the filed near the machine.

Clear all obstacles on the driving path of machine. Take care for the high-voltage line, canal and other dangers.

Make sure all the horns, backup alarm (if equipped) and other warning devices can work normally.

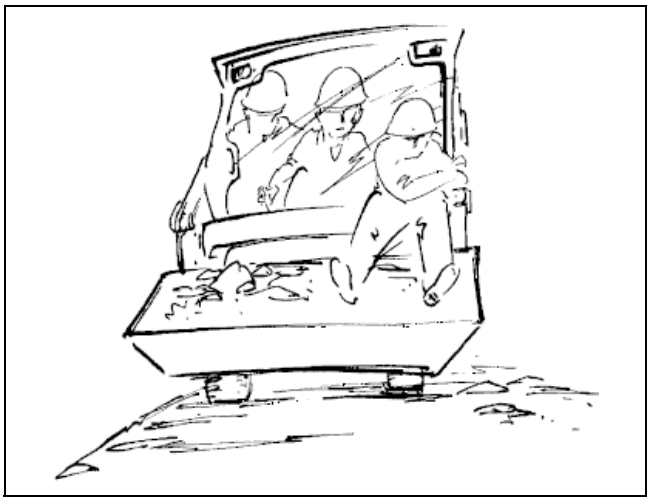
Machine operation

Before driving on a public road, please check this machine satisfy the requirements of local laws and regulations, and acquired driving license on road from related authorities. Please follow your local traffic laws when driving on a road.

You should confirm the safety conditions of your surroundings before driving, and ascertain the relationship between driving direction and driving pedal/control lever.

Keep correct posture on the seat When you do not sit on the seat in correct posture or leave seat to operate machine, it may cause accidents.

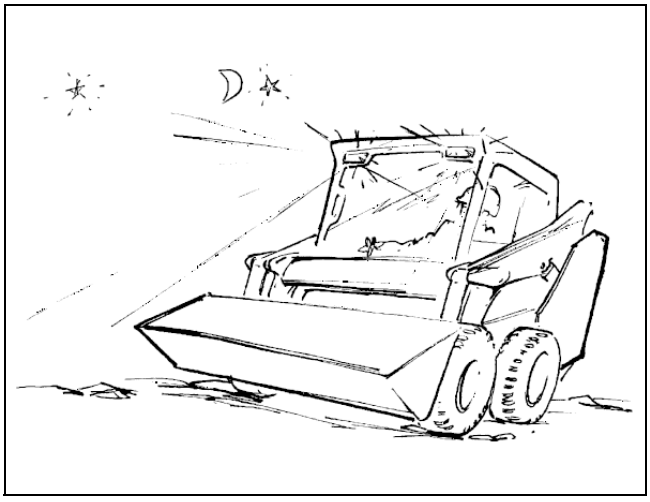
In case of extra seat, safety belt and Roll Over Protection System (ROPS), the accommodation of a passenger is strictly prohibited.



Before starting formal work, you should drive the machine to a wide site, and check the working condition of all control levers and protectors are normal.

If found out any item (such as noise, vibration, smell, incorrect display of instrument, air and oil leaks, etc) needed to be repaired during operation, you should make a report for the item needing repair immediately.

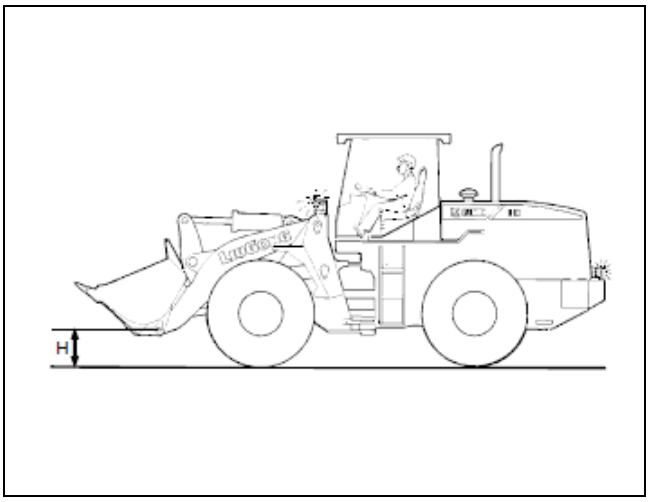
Dust, heavy rain, dense fog and so on will blur your sight. Maintain the clean and good conditions of windows, mirrors and lamps. When the visibility descended, please slow down and use appropriate lights.



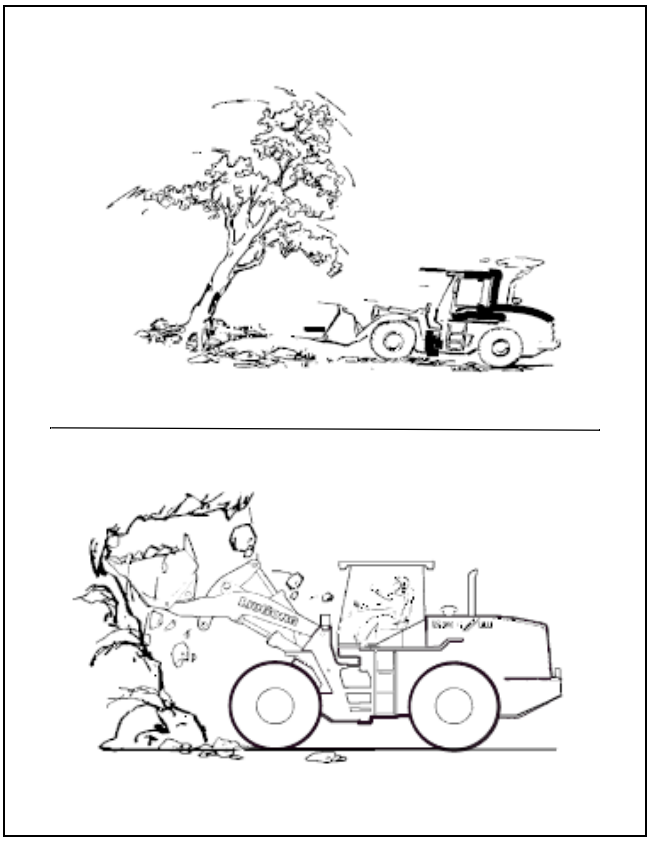
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If driving or operating the machine in a bad vision or crowded region, please use signalman, and keep the signalman inside your sight and coordinating with hand signals.

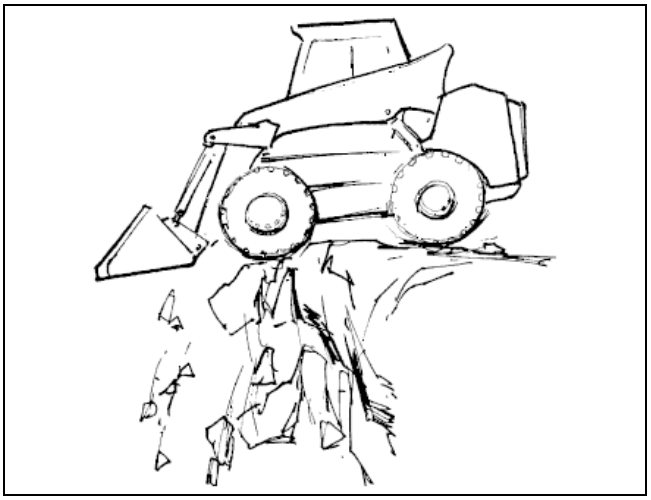
Adjust the height of loading end to ground clearance of 450 -500mm (17 -20 in) beneath the boom lower hinge pin for traveling.



Prevent from working on the edge of cliff, under the dike or dump, and on the road surface with insufficient support capacities, or at the overhanging objects, in order to avoid collapse.

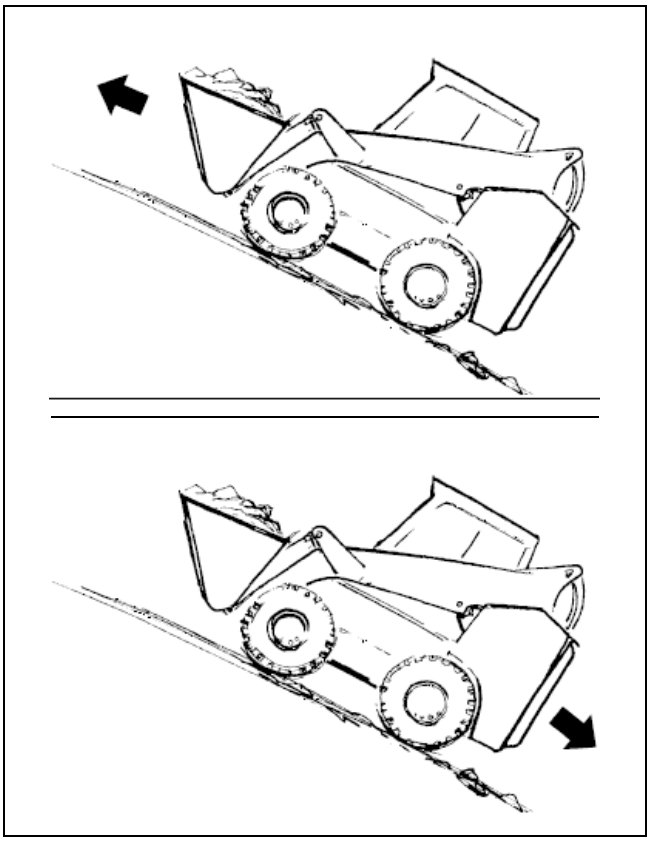


Avoid any condition that may cause machine roll-over. Machine may roll over when working on hills, banks or slopes. The machine might also roll over when passing canals, dumps or other unexpected obstacles.



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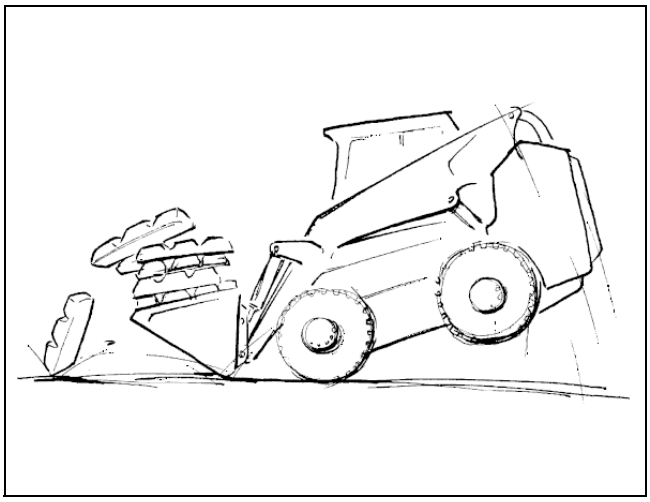
The machine should work in straightly forward or backward manner on a slope. Do not turn on the slope or move in a crosswise way to avoid machine roll-over.



If the machine starting lapsing from hill, you shall unload materials and drive the machine downhill.

In order to avoid machine roll-over or work implement damaged, the load of machine shall be kept inside the specified maximum load.

When operating machine, do not exceed its specified capacity.



Do not use bucket or boom for lifting operation. The machine only undertake the specified work, and if exceeded its serviceable range for other operation, it will damage the machine. For the specified operation, please refer to “Application” and “Main technical performance and parameters”.

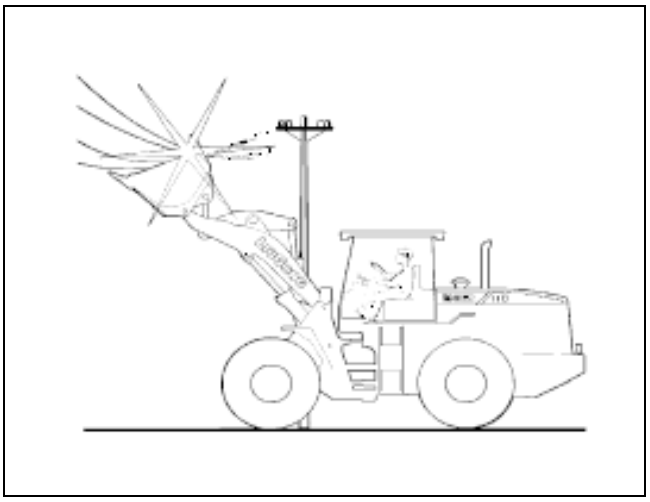
Do not directly put sling on the bucket teeth for lifting heavy loads.

Do not lift staff by loader. Do not take bucket as platform for operator, and do not allow anyone to ride on bucket.

Pay more attentions to the works beside the high-voltage line. When machine is in the construction site with the danger of touching cable, please consult power company before operation.

Contacting the cable will cause serious accident or casualties, therefore any part of the machine is not allow to approach the cables. You shall check the upper part of machine, in order to know the distance among cable, machine and ground is enough. If it is possible, the best way is to cut down the power supply, and requiring for the guide of signalman.

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If any part of machine contacted with high voltage power supply:

- Warning others for preventing from contacting the machine and away from it.
- If you can separate the contact point, change the operation that making contacting with high voltage power supply, and kept away from the dangerous region.
- If you cannot separate that point, please stay in the machine until power supply department cut down the power wire, and inform you the power has been disconnected.
- If encountered extreme cases that people is forced to escape (such as fire) caused by high voltage power, please jump out of the machine by two feet together as far as possible instead of walking step-by-step, and do not touch the earth with your hands. You shall continuously jump forward by two feet together until your reached the safety distance away from the machine and power supply.

When towing, make sure trailers with sufficient strength. Trailer only can connect to the towing bar and hinges, and it is prohibited anyone stepping across the steel wire or similar devices between trailer and towed vehicle.

Before towing, make sure no one is standing between the machine and trailer. Traction frame or traction pin of towing equipment shall centered align and connect withe the towing bar on the machine.

Park the machine

Level ground shall be selected for parking the machine, and use parking brake (if equipped) to lower the work implement to the ground so as to prevent from machine moving and damage or hurt.

Consider for any possible hazard in high altitude, such as rolling rocks, high-tension cable, etc.

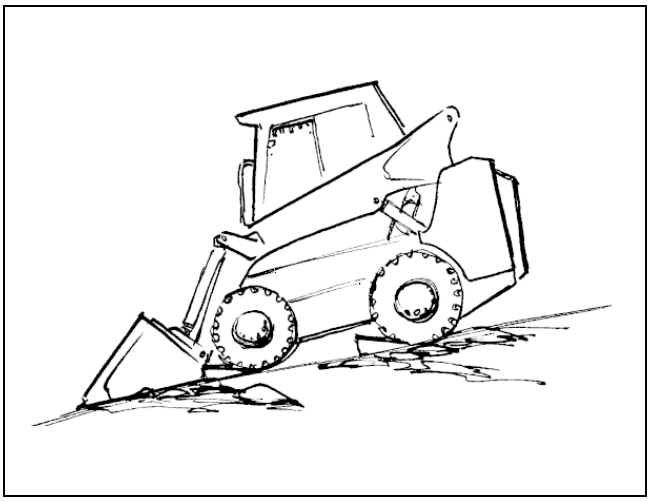
Consider for road conditions. Do not park the machine at the cliff edge, uncovered excavation pits or sags.

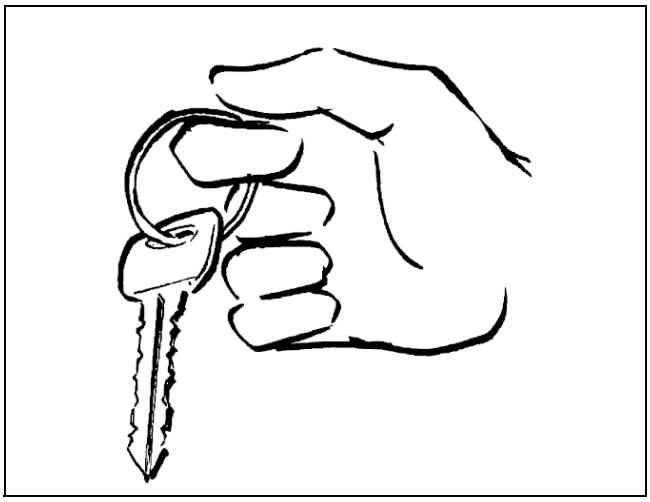
Consider the changes of environmental conditions, such as flood, heavy snow, heavy storm, chilly weather and so on. Those extreme conditions will damage the machine.

Considering that the place where the machine needed to approach and other potential emergency situations will not cause traffic block.

If the machine needed to be parked on a slope, you shall lower the bucket and other work implements to the ground, and apply parking brake (if equipped), then shut down the engine. Place the block under the tyre in order to prevent machine moving.

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Know about all road regulations, if parking on the road, it may needs extra signal light or flash light for other people or vehicles.

Before leave the machine, lower the attachment or other work implements onto the ground, and applying parking brake (if equipped).

Place the hydraulic control lever at middle position, and the gear shifting level is placed in neutral position.

Apply parking brake (if equipped).

Make the engine keeping idling for 5 minutes for cooling down gradually.

Shut down the engine, place the safety handrail at the lifting position, and remove the key.

Turn the disconnect switch to the OFF position in order to prevent from battery being damaged and discharged due to the leakage of electricity from some elements or short circuit of the battery.

When leaving the machine, please lock up all devices with the key. Remove the key and take it with you.

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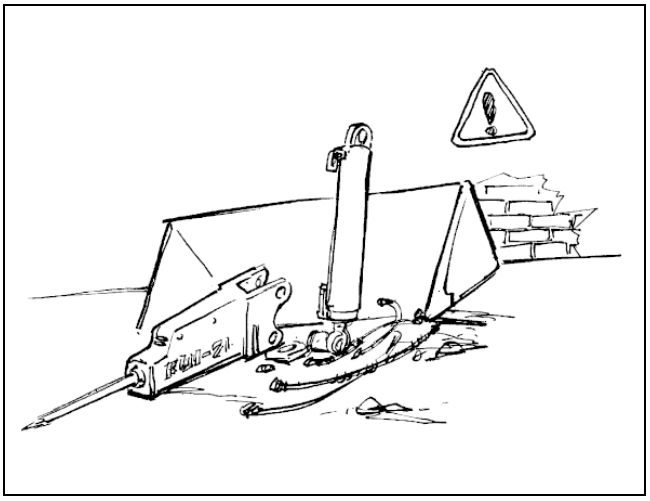
Lower down the work implement when engine cut-out

⚠ Note: for the machine equipped with electric-hydraulic control rod, the engine start switch shall be placed at ON position in order to lower the work implement. After it lowered down, the start switch shall be turned to OFF position.

Move all control levers to the “Down” position so as to lower the work implement down onto the ground or trailer. When the control lever released, they will return to the “Keep” position.

Attachment storage

Store the attachments and tools safely to prevent serious injuries or death caused by overturning. Keep the child and bystander standing or playing far away from the storage area.



Safety service for the machine

Preparations for workspace

Select a region where has sufficient space, light, ventilating, clean and smooth to do repairing work. Clean the working floor, wipe off the fuel, lubricant and water, and then sand some sands or other absorbing materials on slippery ground. Keep the workspace clean and dry.

Correctly support the mechanism

During operation, attachments or general assembly of mechanism are located at a lower position from the surface of earth, or fix and support the attachments on a certain platform. Use wedge to prevent the machine from moving during service and service.

If you must to work over/beneath the lifted mechanism, please support the machine or attachments safely. Never treat the hydraulic system as a support mechanism. The mechanism shall be supported on a stable support. Do not work under the mechanism supported with a single support only.

Loading and discharging of machine

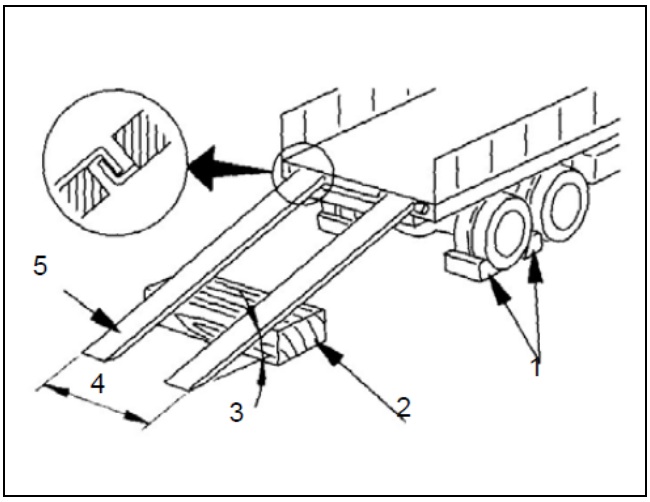
It shall follows the state and local regulations for limits of weight, length, width and height of the materials when shipping.

Know about the right procedure for loading and unloading.

Load and discharge on a level ground.

Wedge the wheel of transport vehicle with wedge ① to make it unmovable.

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1. Wedge
2. Block
3. Angle (maximum angle is no more than 15°)
4. Distance between ramp
5. Ramp

Apply the ramp with fitted size, sufficient intensity, lower angle and fitted height. Make the ramp is anti-skid without muds or snow.

Fix the machine with chain and cushion block.

Keep the bystander far away from it.

Fix all work implements, and place it on the transport location.

Welding operation

Electric welding operator shall have professional certificate, and the work shall be performed at the place with appropriate equipment. Operator shall follows the attentions below during welding:

- During welding the machine, you must disconnect the connectors of main power cut-off and instrument system, disconnect the battery, controller, GPS and other electronic components.
- Clear the paints on the place where needed welding so as to prevent the generation of harmful gas.
- Do not inhale the flue dust of paint.
- It is prohibited to weld on or near the rubber hose, wire or pressure pipes.
- Release the surplus pressure out of the machine, and forbid to weld the pipe installed on the machine.
- You should wear eyeshield and protective clothing during welding. Use signboard to indicate welding operation is performing, and use separation screen to protect other people.
- The ventilation of electric welding site shall be in good condition.
- Clear up all inflammable materials, and the operation site must be equipped with fire extinguisher.



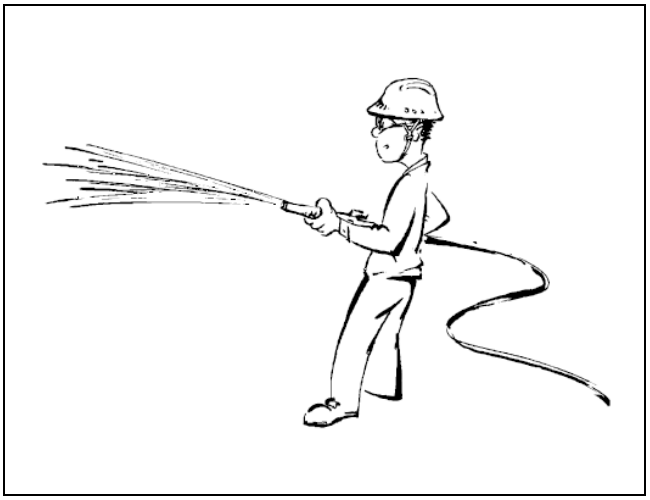
Regular cleaning machine

In order to prevent from hurt or damage, the machine shall be cleaned periodically, and remove all cumulative grease, oil or shatters for keeping the cleanliness of engine compartment, radiator, battery, hydraulic pipe, fuel tank and driver cab.

You should wear anti-skid shoe while cleaning, to prevent from slipping down on the slippery

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surface. And pay attention to the hazard of chemical substances, high-pressure water jetting and materials spattering, etc.



Do not directly spray the water onto the sensor, connector and instrument of electric system, and if water entered the electric system, it may cause the hazard of explosion and failure.

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2 Engine System

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Tools list

Name	Specification (Qty.)
Open-end wrench	7#、8#、10#、13#（2）、14#、16#、18#、19#、21#、22#、24#、 27#、 30#、 32#、 36#、 50#
Cross screwdriver	---
Slot type screwdriver	---
Nipper plier	---
Oil basin	---
Torque wrench	20-100N•m， 90-300N•m， 160-680N•m
Scissor	---
Plastic sealing bag	---
Ribbon	---
Travel crane	3t
Chain, sling and hook	3t
⚠ Remark: removed standard parts should be placed with relevant material together to avoid mixing.	

⚠ “Front” mentioned in this chapter refers to the forward direction after starting the machine; other directions are by this analogy.

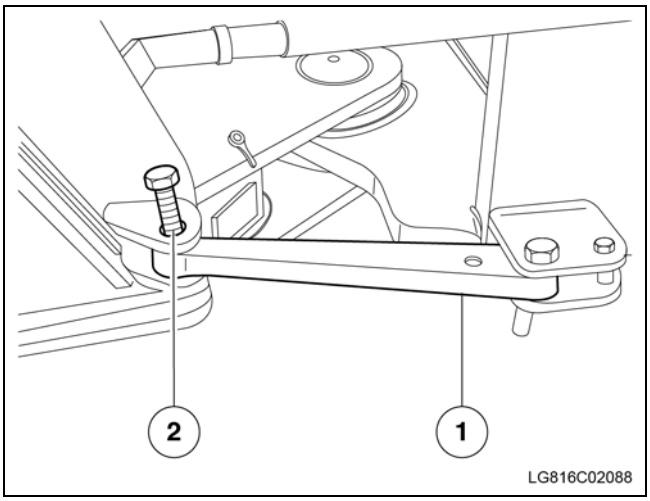
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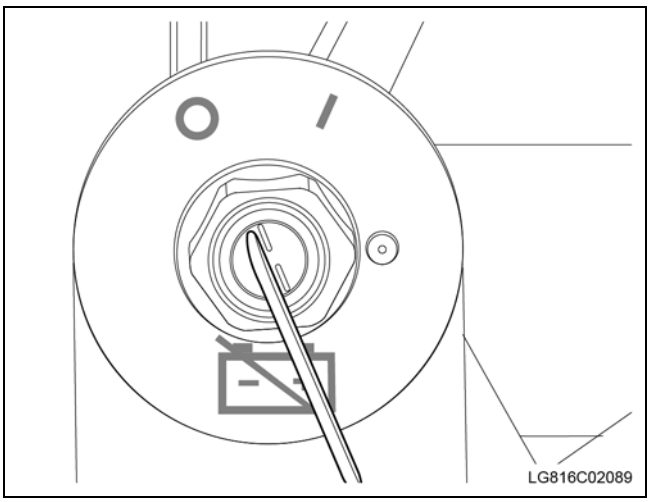
Radiator

Removal of radiator

1. Park the whole machine.

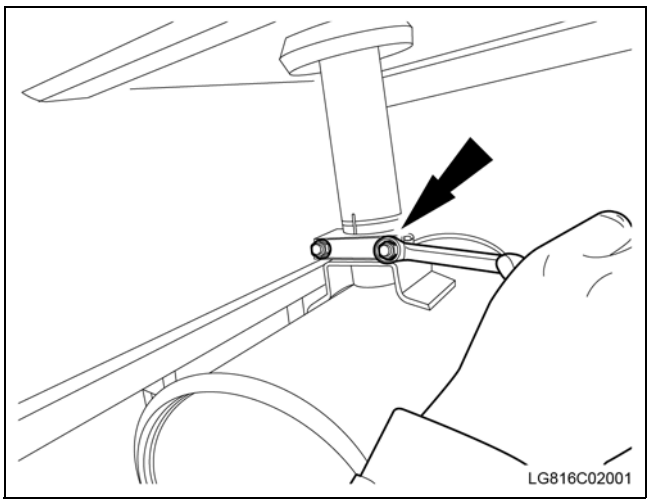
   Park the whole machine on a flat ground, pull the parking brake to the up-most position. Dismantle the anti-rotating bumper (1),with a nipper plier, connect the bumper with the front and rear frames with its pin(2), open the left side housing door, and set the negative switch to power off position.





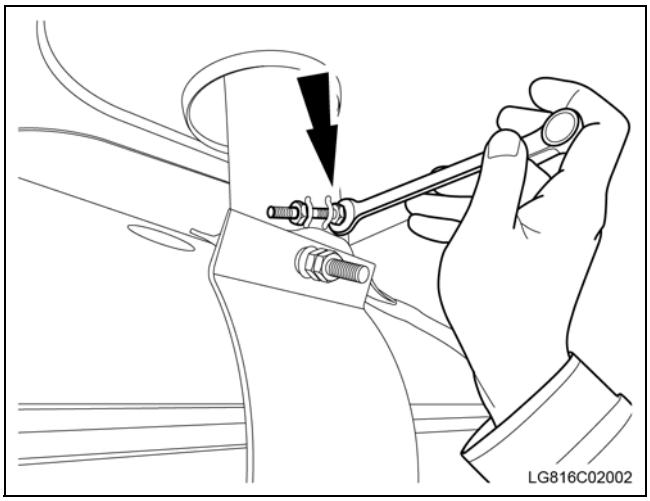
2. Remove diesel engine exhaust pipe.

   Open the side cover door, loosen the two fixing bolts to the mounting clamps of diesel engine exhaust pipe with a 14# wrench, remove exhaust pipe and place properly.



3. Remove diesel engine air filter cap.

   Remove the two fixing bolts to the mounting clamps of the diesel engine air filter cap with a 13# wrench and store the bolts properly.

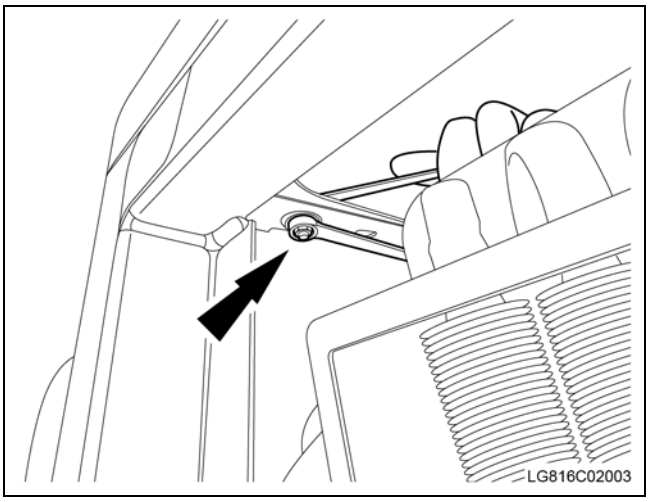


4. Remove upper cover

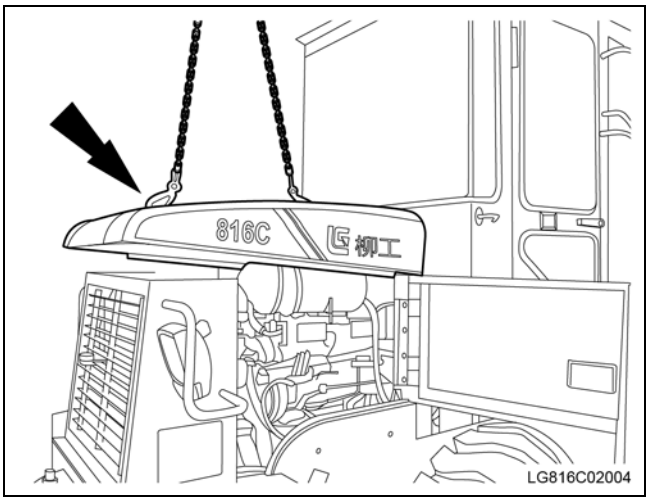
   (a) Fasten the nut connecting the upper cover and the rear cover with a #13 wrench.

   (b) Remove two bolts with a #13 wrench and remove the two bolts and nuts connecting the upper cover and the portal frame in the same way.

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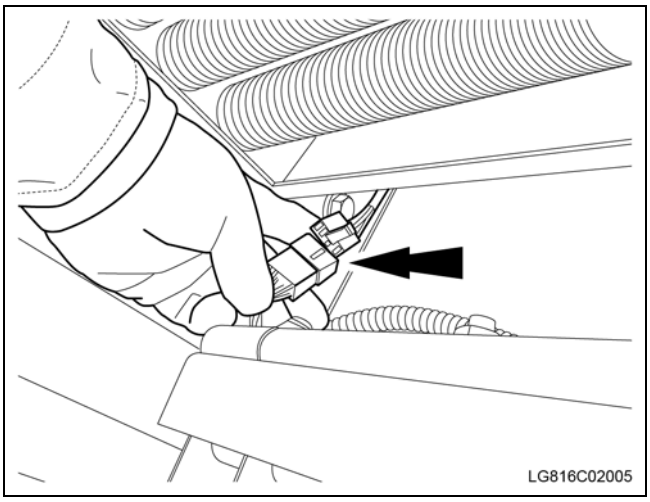


(c) Lift the upper cover off to a flat ground with a travel crane and sling tools, protect the surface paint.

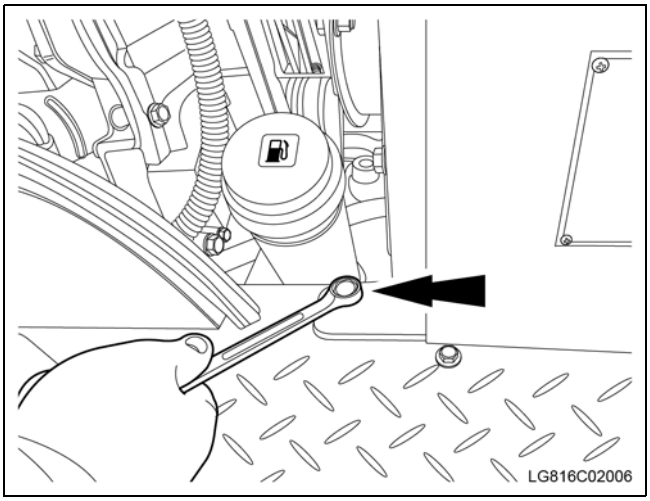


5. Remove the rear cover.

(a) Pull off the working light harness plug.



(b) Remove the four rear cover mounting bolts with a #16 wrench, remove the rear cover and place on a flat ground properly, carefully protect the surface paint.

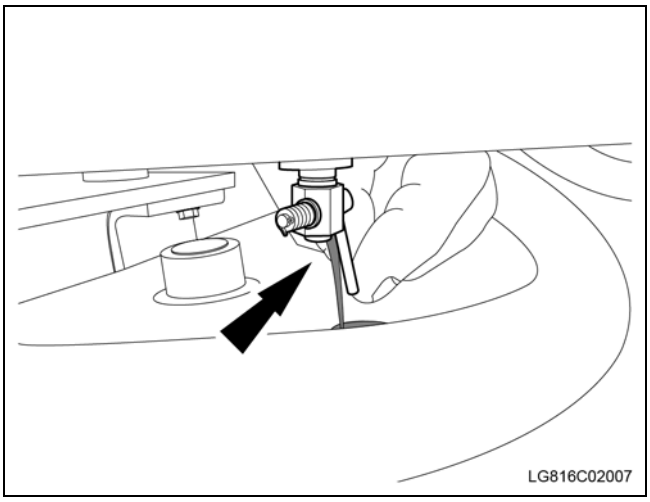


6. Drain the anti-freeze solution.

(a) Place a clean oil basin under the diesel fuel tank, prepare a clean hose about 1m long with its diameter slightly larger than radiator water relief valve port, connect one end to the water relief valve and the other end into the oil basin.

(b) Pull out the water relief valve knob, drain anti-freezing solution to the oil basin, close the valve after drain the oil.

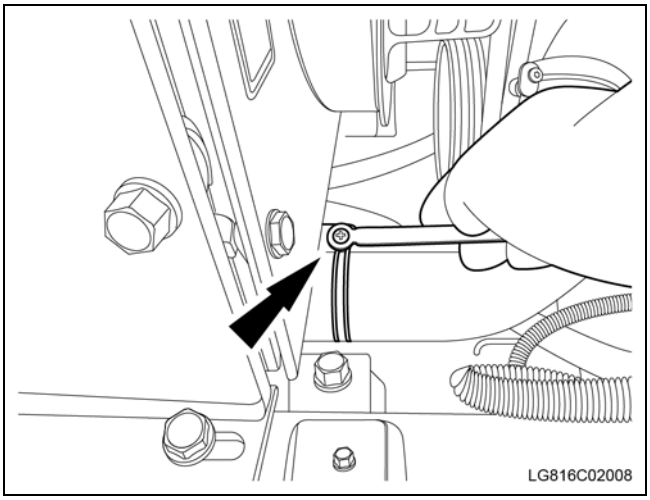
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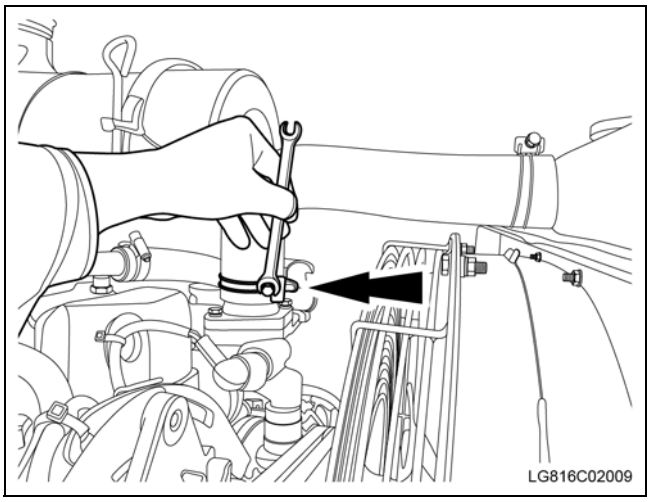


(c) Move the oil basin away and properly protect it, prevent foreign objects from dropping into the basin.

7. Remove the radiator water pipe.

(a) Loosen the bolts to the clamps of the upper and lower radiator cooling hoses connecting with the diesel engine.



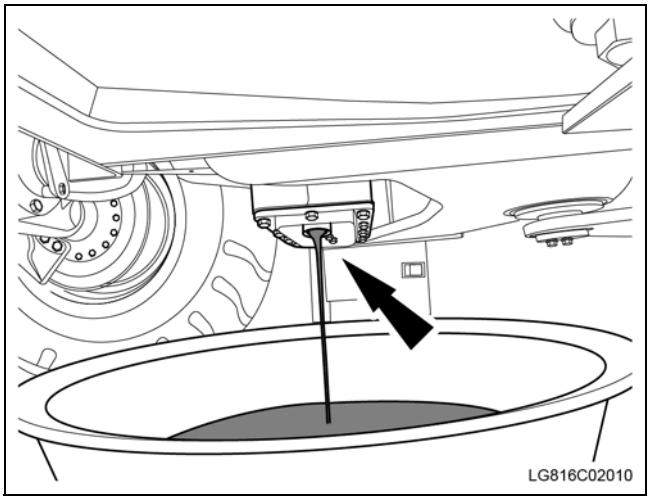


(b) Pull off the hose, wrap up the hose connectors and radiator connectors with clean plastic bag and ribbon to prevent foreign matters dropping in.

8. Drain hydraulic transmission oil

(a) Place a clean oil basin under the gearbox, wipe clean the gearbox oil drain and the area around it with a clean wiping cloth.

(b) Remove the gearbox oil drain with a clean #24 wrench, drain the hydraulic transmission oil into the basin.

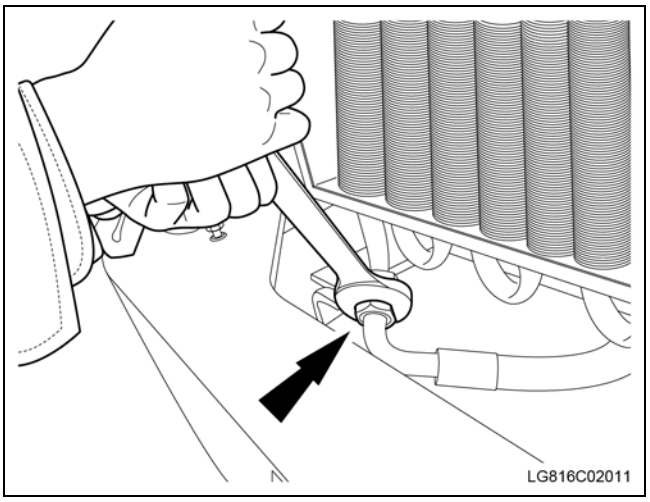


(c) Install the oil drain and move the oil basin away and properly protect it, prevent foreign objects from dropping into the basin.

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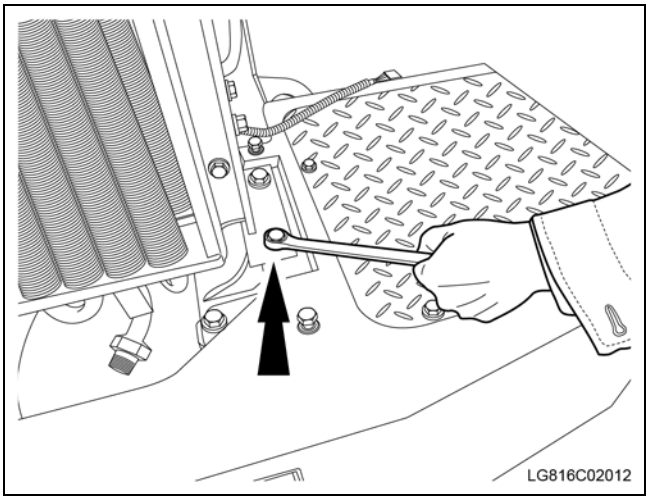
9. Remove the radiator oil pipe.

Remove the two hose connectors at the lower rear side of the radiator with a #34 wrench, wrap up the connectors for hose and radiator with a clean plastic bag and ribbon, avoid foreign objects getting into it.

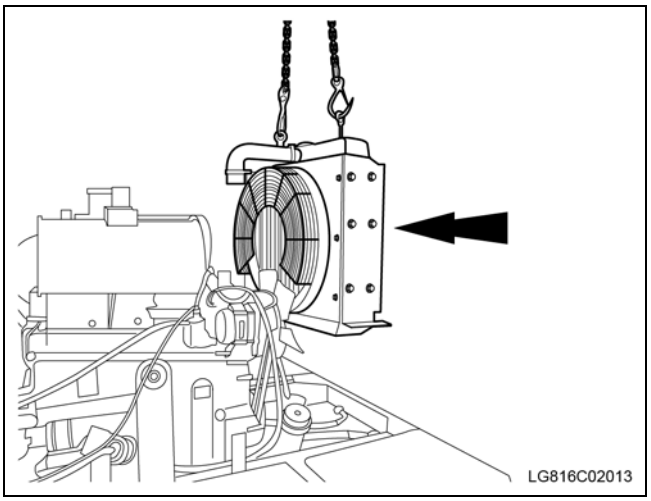


10.Remove the radiator

(a) Remove the four radiator mounting bolts with a #18 wrench, place two sling rings in the two holes on the top of the radiator, turn in at least 3 circles.



(b) Lift up the radiator with a travel crane and sling from the sling ring position, rotate the diesel engine fan blades while lifting the radiator to disengage the fan blades from the radiator protective cover, avoid crashing between protective cover and fan blades.

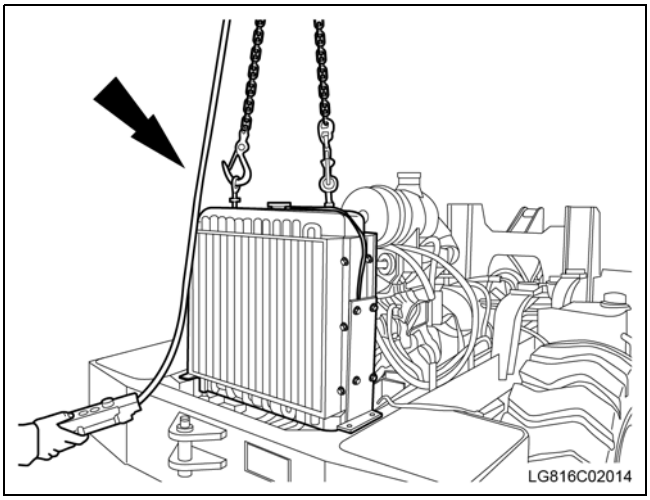


(c) Lift the radiator and place it properly to a special tooling and wait for repair or replacing.

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Installation of Radiator

1. Install radiator



(a) Sling the radiator above the mounting position of the rear frame with travel crane and sling and sling rings.

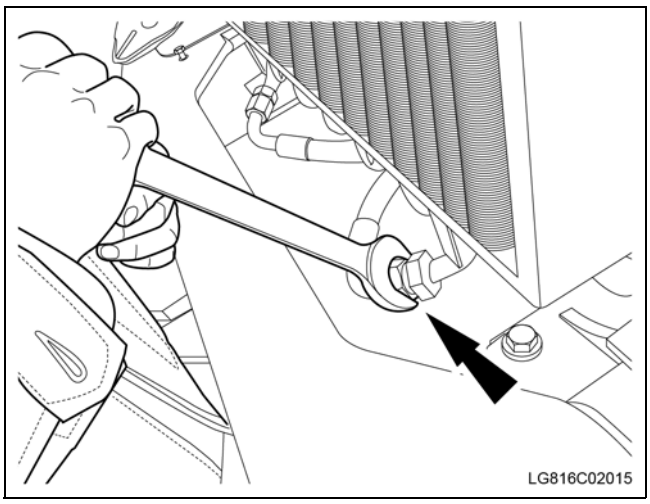
(b) Rotate the diesel engine fan blades, lower the radiator so that the fan blades could enter into the radiator protective cover, rotate slightly the fan blades to enable the radiator to lower further down until the radiator places onto the rear frame steadily.

(c) Align with the mounting holes and install the bolts, forwardly adjust the radiator position so to get the minimum distance between the fan blades and the cooling fins, that is, at least 1/3 of the fan blade of diesel engine enters the cowl axially.

(d) Tighten bolts with a #18wrench, torque to 90±12N•m, pay extreme attention not to clash the fan blades with the protective cover or extrude during installation

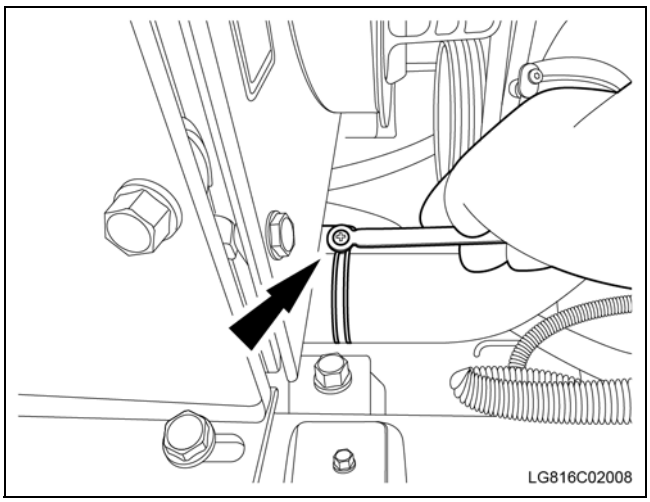
2. Connect oil pipes.

Remove the protective plug from the cooling hose and hose connectors, replace the o-rings in the connector with new ones, connect and tighten the hose connector with the radiator connector with a #32 wrench torque to 102±10N•m.

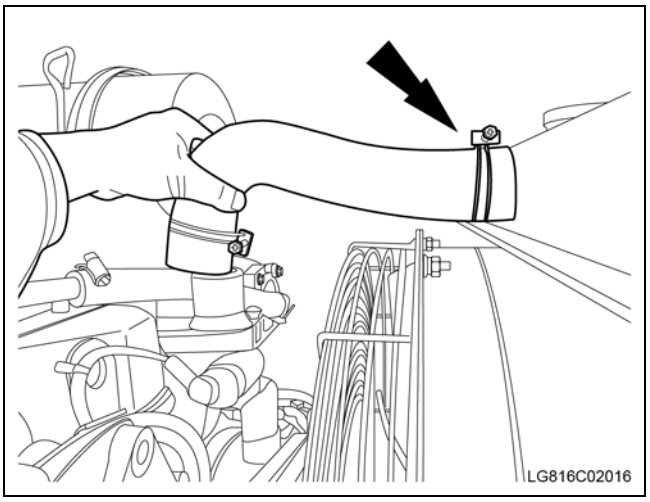


3. Connect radiator water pipe.

Remove the protective bag from the hose and the radiator connection, connect the lower diesel engine radiator hose to the radiator connection port, upper radiator hose to the diesel engine connection port, tighten clamp nut with a cross screw driver or a #8 wrench.

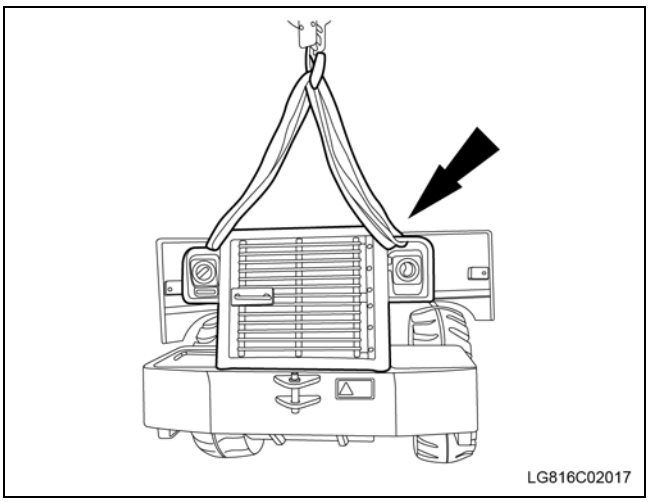


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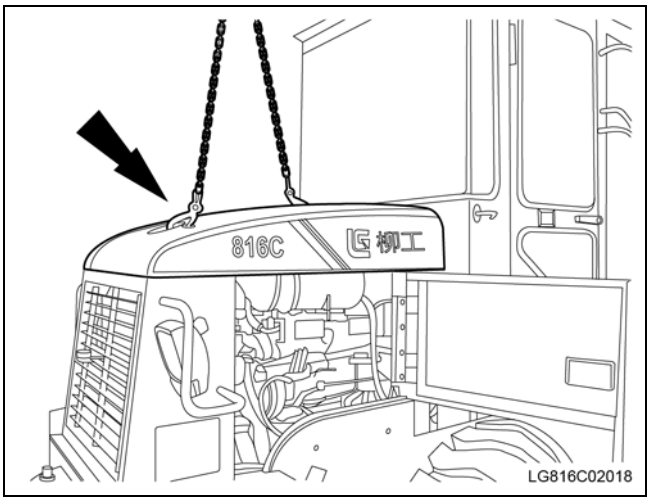
4. Install rear cover.

Place the rear cover to the rear mounting position of the radiator, align the mounting holes and install the mounting bolts and pre-tighten, plug in the rear work light harness plug.

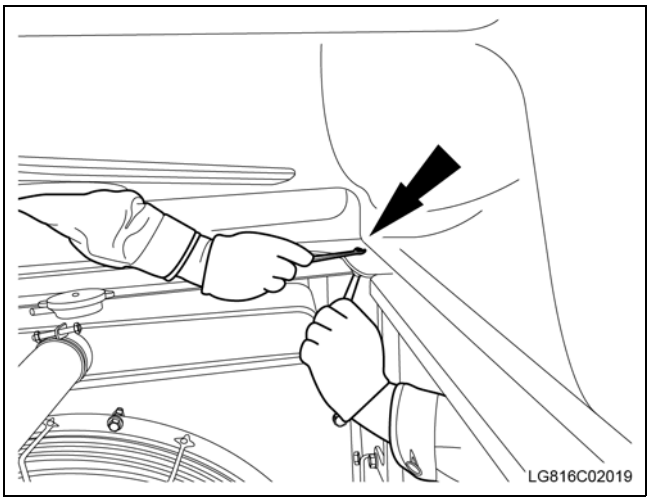


5. Install upper cover.

(a) Lift the upper cover above the portal frame and rear cover with travel crane and sling, align the mounting holes and install bolts and nuts, properly adjust relative positions.



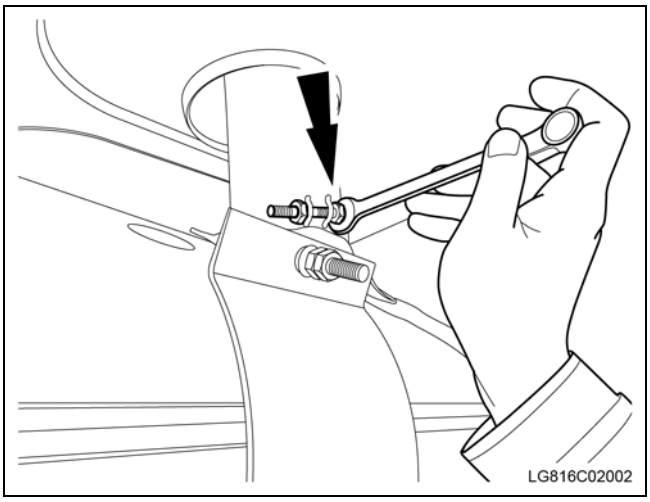
(b) After all the rear cover and upper cover sides are aligned, tighten rear cover bolts with a #16wrench, torque to 52±7N•m, tighten upper cover bolts with a #13wrench, torque to 26±4N•m.

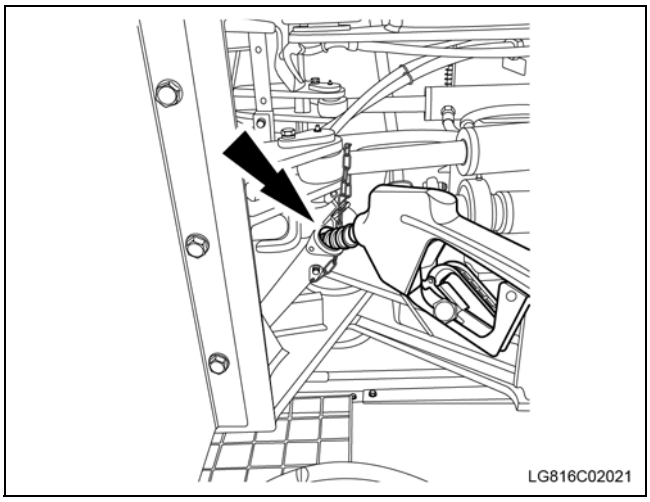


6. Install air filter cap and exhaust pipe.

Install diesel engine air filter cap, exhaust pipe to the diesel engine, adjust exhaust pipe port backwards, tighten clamp bolt with a #13 wrench.

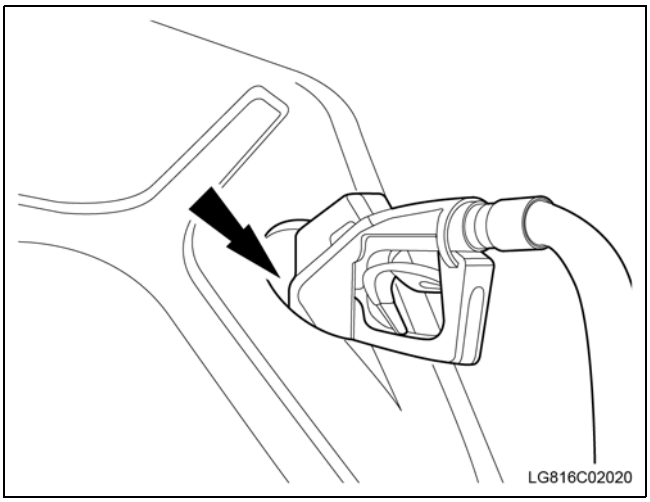
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7. Fill in anti-freeze and hydraulic drive fluid.

   (a) Open the anti-freezing solution refilling cap on the top of the radiator, fill in appropriate amount of anti-freezing solution to the level 20-30mm from the tank port, recap the cap.

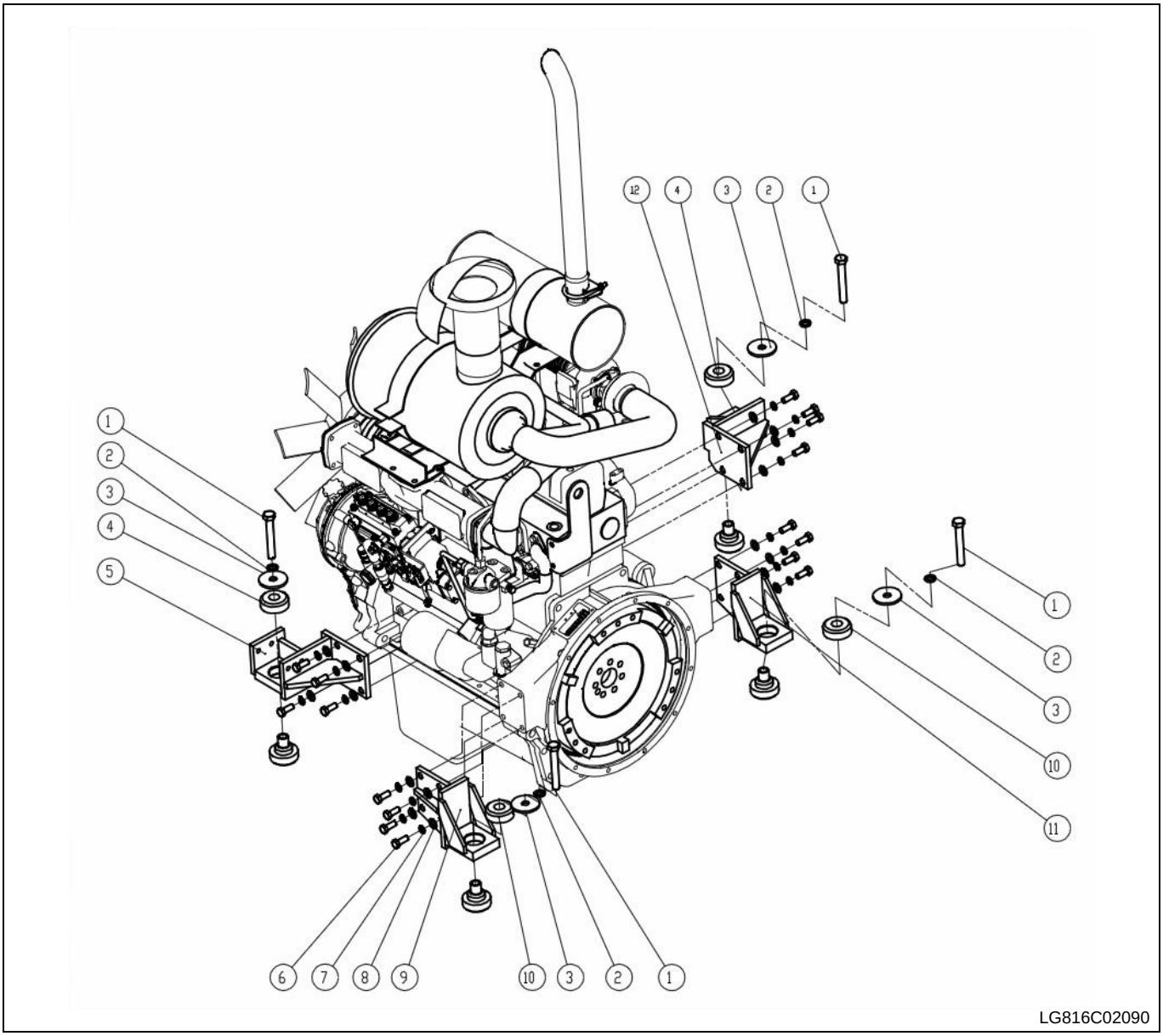


   (b) Unscrew the plug of the gearbox oil filling pipe, fill in appropriate amount of hydraulic transmission oil level reference to the dip-stick, replug the rubber plug and tighten.

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Engine

Engine exploded view



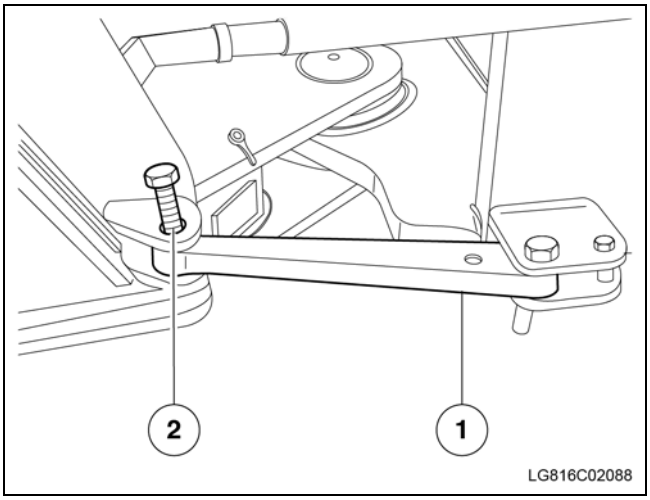
1. BOLT
2. WASHER
3. PLATE
4. SHOCK ABSORBER
5. BRACKET
6. BOLT
7. WASHER
8. WASHER
9. BRACKET
10. SHOCK ABSORBER
11. BRACKET
12. BRACKET

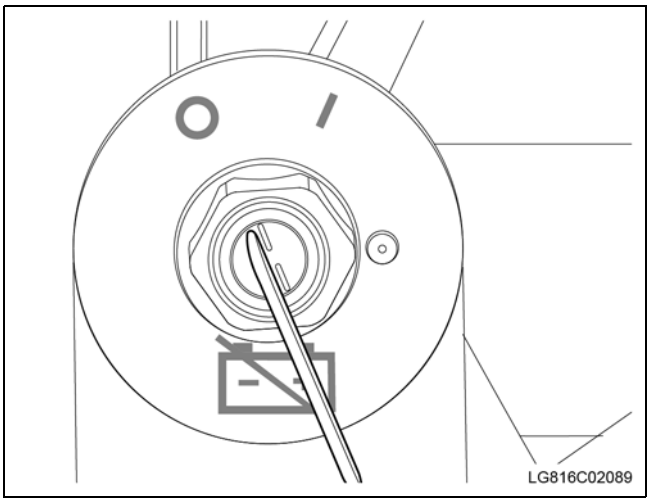
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Removal of engine

1. Park the whole machine and discharge the pressure of the machine.

   (a) Park the whole machine on a flat ground, pull the parking brake to the up-most position. Dismantle the anti-rotating bumper (1)with a nipper plier, connect the bumper with the front and rear frames with its pin(2).





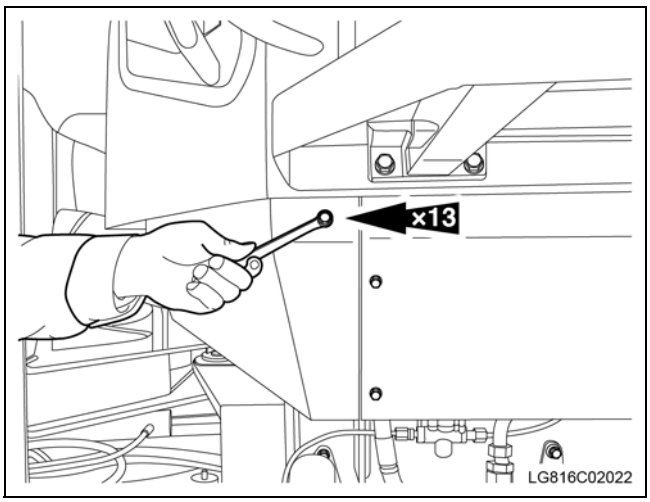
   (b) Push and pull the control rod forward and backward repeatedly to release the pressure in hydraulic system.

   (c) Step on the braking pedal for over 30 times to release the pressure in air piping.

   (d) Open left cover door, set the negative switch to power off state.

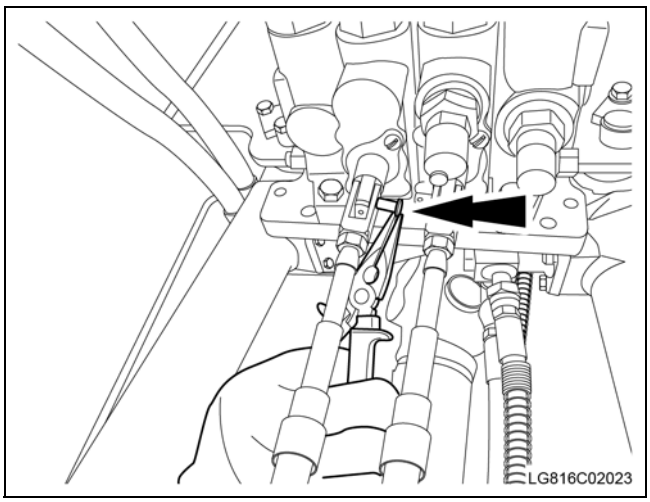
2. Remove the plate.

   Remove plate bolts (13bolts) with a #13wrench, remove 4 plates.



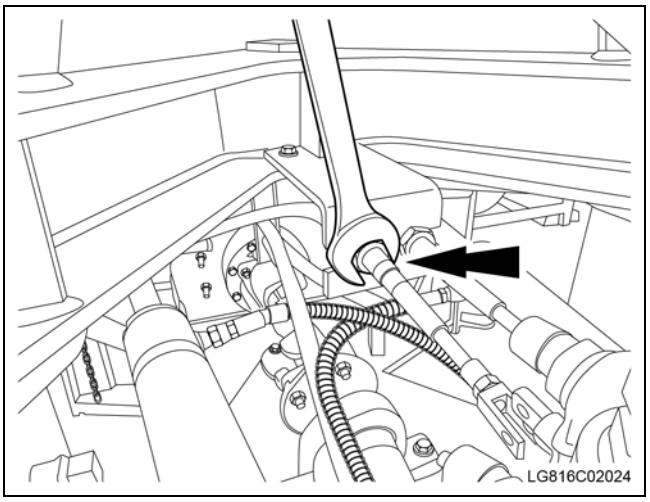
3. Remove control valve flexible shaft.

   (a) Remove the connecting pin to the two push-pull flexible shaft and the control valve rod.



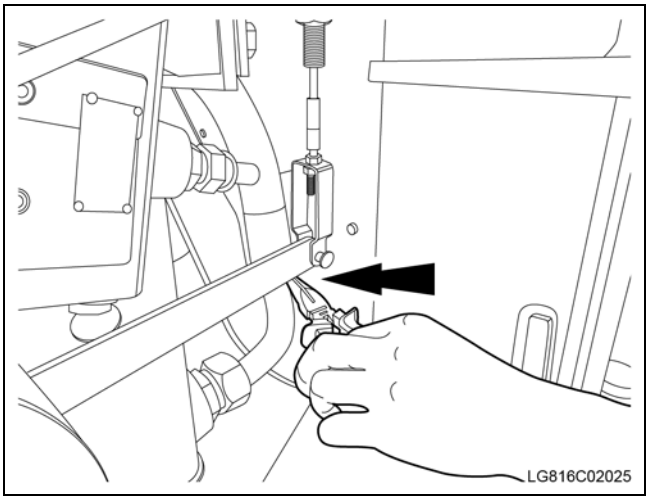
   (b) Remove the 2soft shaft fixing nuts with a #32 wrench, remove flexible control shaft.

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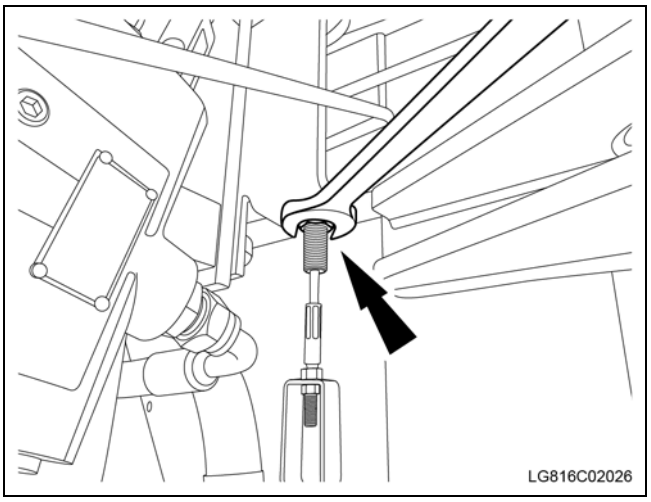


4. Remove the hand brake flexible shaft.

(a) Remove the pin connecting the hand brake flexible shaft with the transmission braking link with a nipper plier, remove the flexible shaft end.

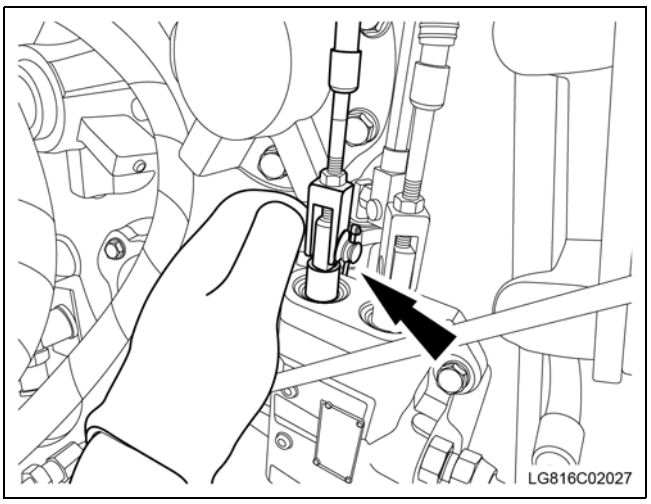


(b) Remove flexible shaft fixing nuts with a #24wrench, remove flexible control shaft.



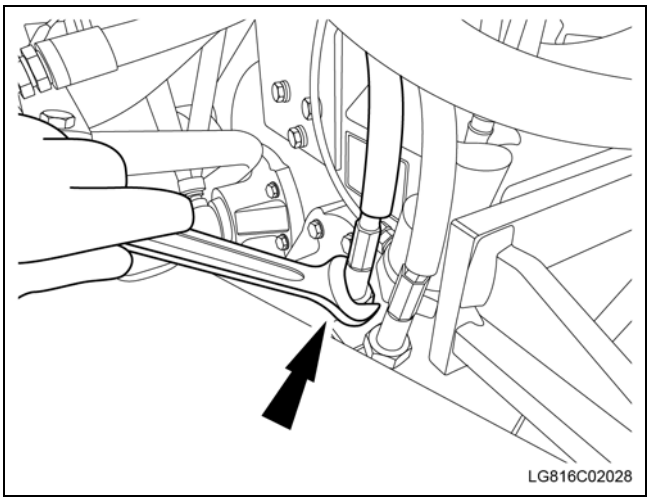
5. Remove transmission flexible control shaft.

(a) Remove the connecting pin to the two push-pull flexible shafts and the shift control valve rod.



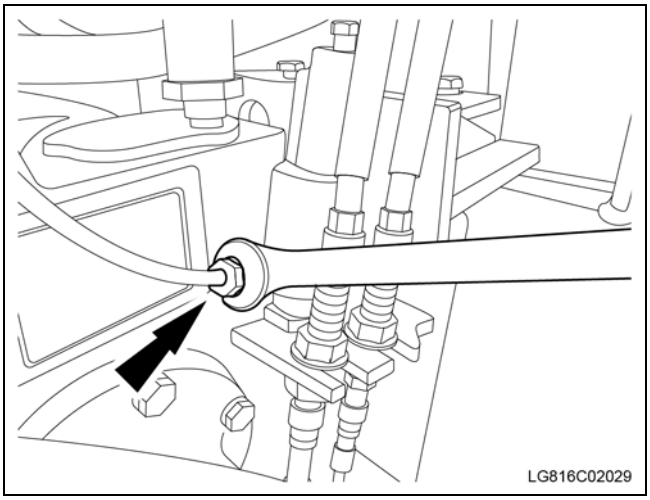
(b) Remove the 2soft shaft fixing nuts with a #24wrench, remove flexible shaft.

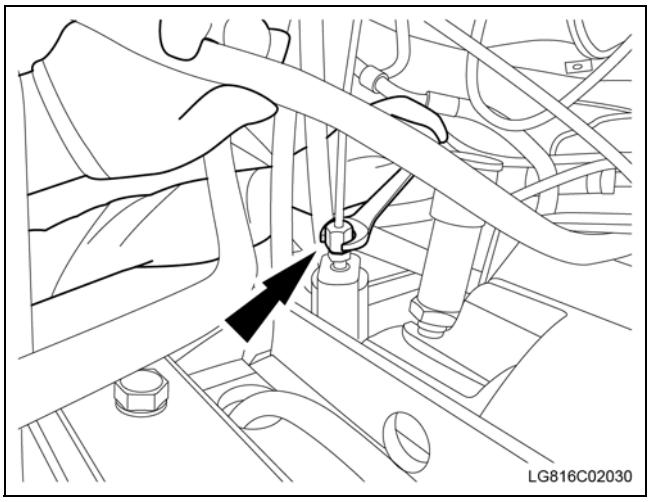
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6. Remove shutoff valve air pipe.

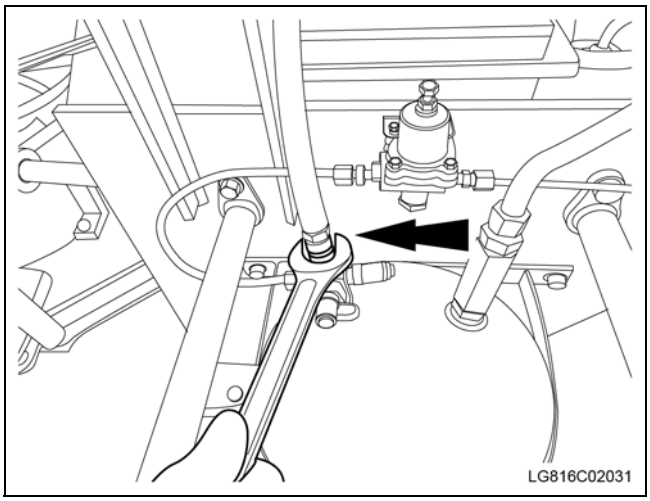
   Remove air pipe connectors 2on the shutoff valve with a #16 wrench, remove the air pipe.



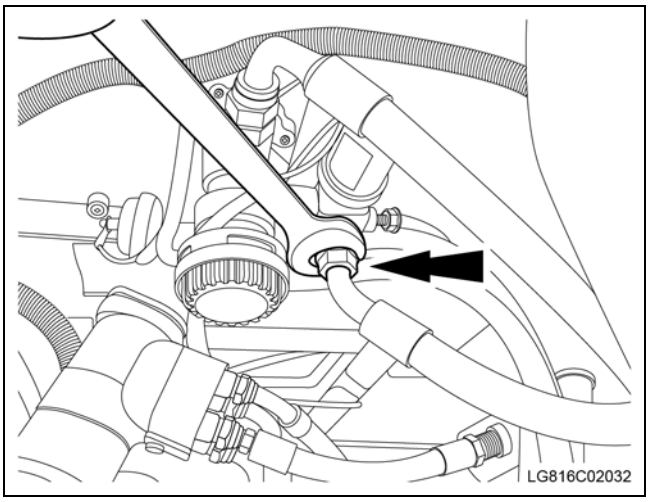


7. Remove air braking pipe.

   Remove the hose connector connecting the booster from the foot operated braking valve, the air pipe connector connecting foot operated braking valve on the air tank, remove the air pipe end.

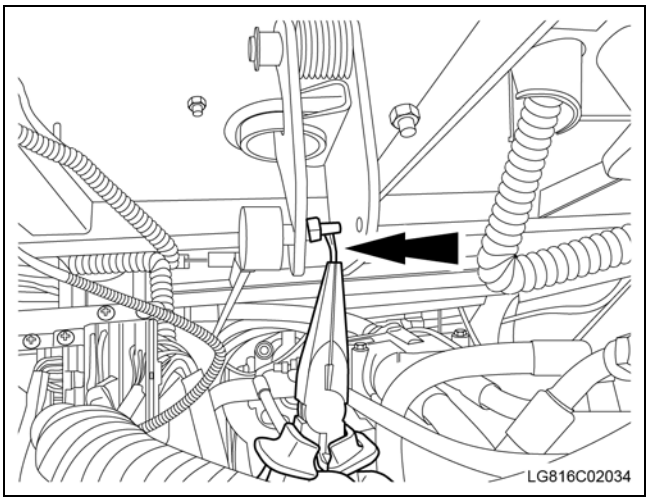


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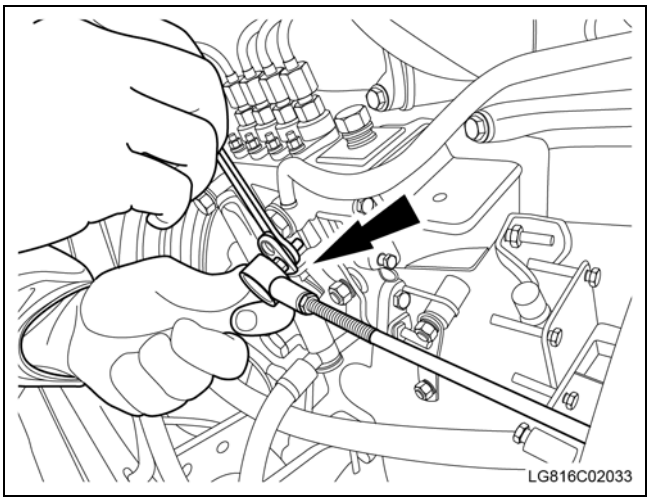


8. Remove the accelerator linkage.

(a) Remove the connecting pins to the mounting bolts on the two ends of the accelerator linkage with a nipper plier.

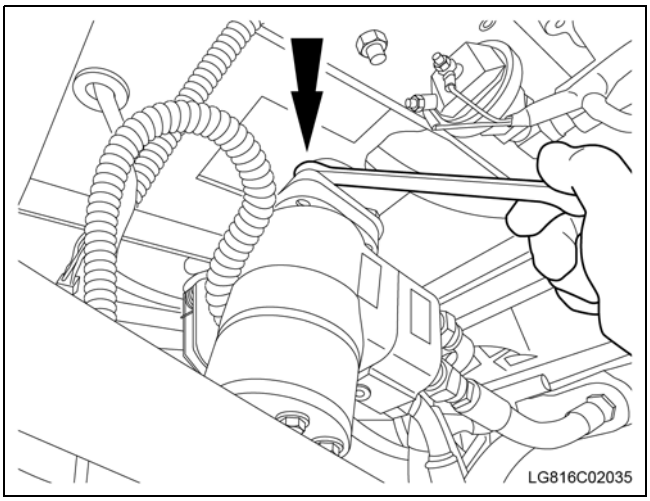


(b) Remove the fixing nut on the mounting bolt with a #10 wrench, remove the accelerator linkage.



9. Remove the metering pump.

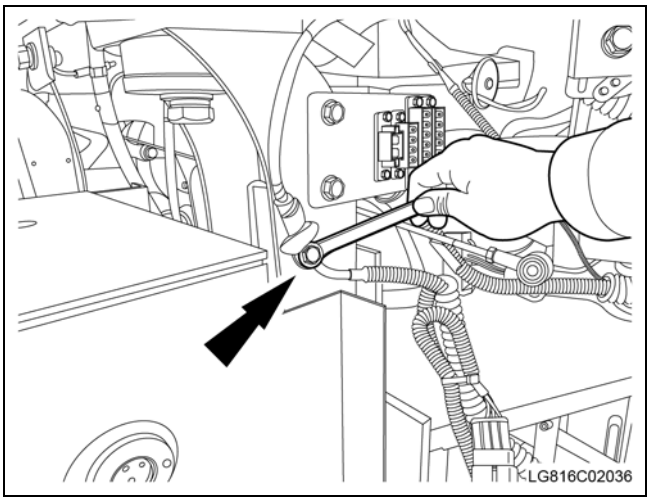
Remove the four bolts connecting steering from the metering pump with a #16 wrench, Remove the metering pump, place it on the frame.



10. Remove the cab earthing cable.

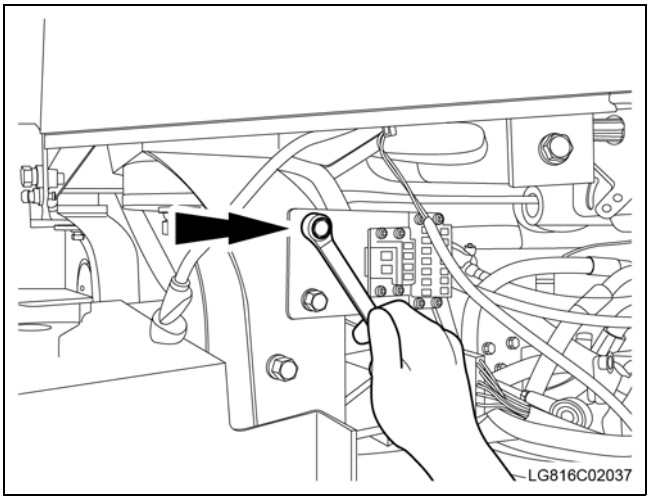
Remove the earthing cable harness bolt connecting with the cab on the rear frame with a #16 wrench, remove the harness.

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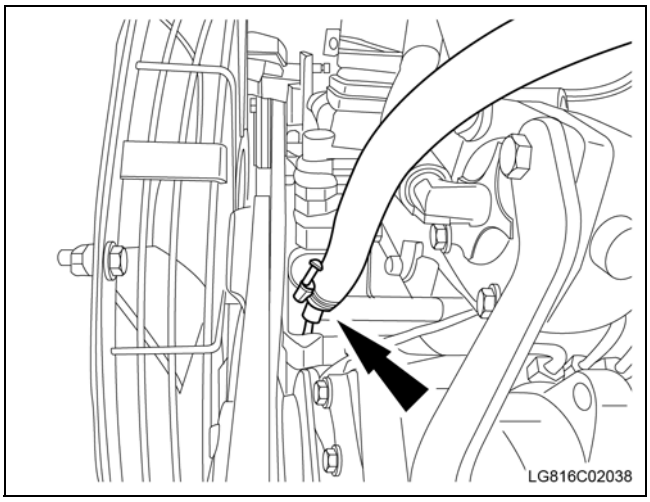
11.Remove the plug-in mounting board.

Pull out the harness plug on the plug-in mounting board, remove mounting board fixing bolt with a #16 wrench, remove plug-in mounting board.



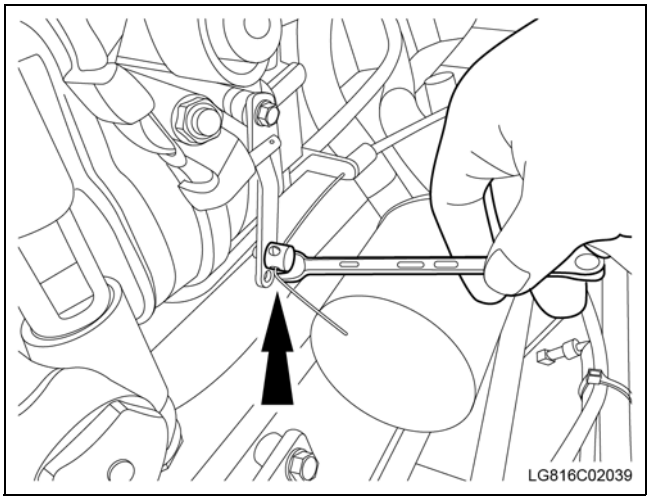
12.Remove the water pipe of the warm air blower.

Switch off the water relief valve on the diesel engine, remove the fixing screw of the clamp of the warm air blower inlet and outlet water pipes with a #8 wrench and cross-screwdriver, remove the lower end of the water pipe.



13.Remove the choke cable.

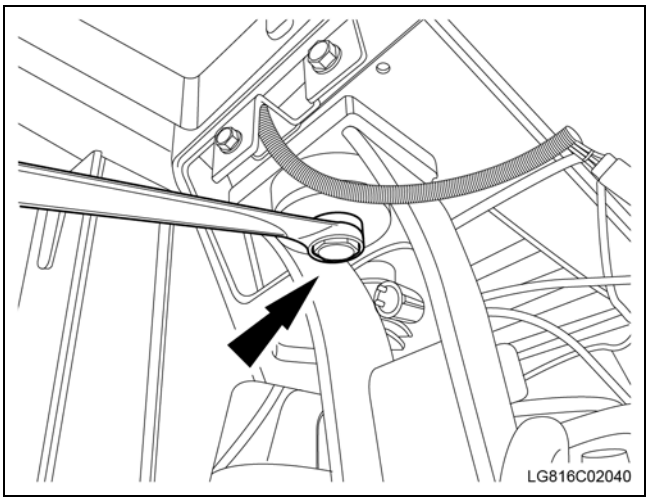
Remove the fixing bolt to the choke cable on the diesel engine with a #8 wrench, straighten out the choke cable end and take out from the mounting hole.



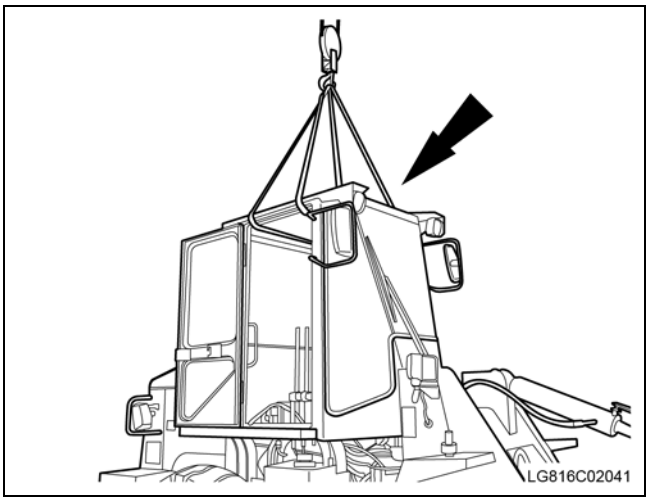
14.Lift the cab.

(a) Remove the cab mounting bolts 4 with a #30 wrench.

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(b) Lift the cab and place on a special bracket with travel crane and sling (2T), straighten out the flexible shaft, hose and harness during lifting to prevent parts from damage in the process of lifting.

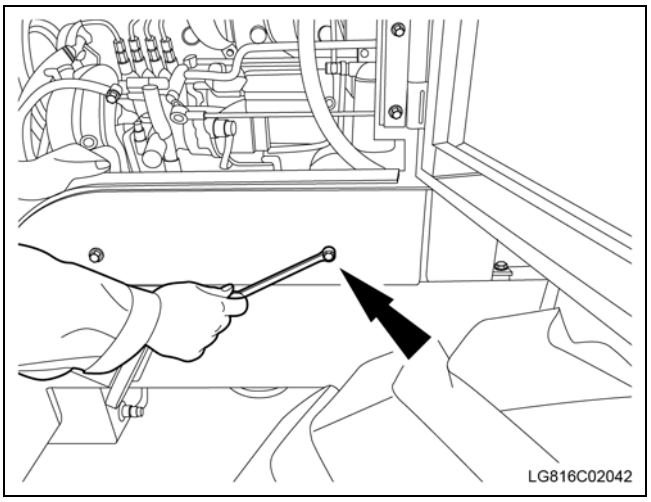


15.Remove the radiator.

Refer to “Removal of radiator”(p. 2-3) to remove assembly and its components and place them properly.

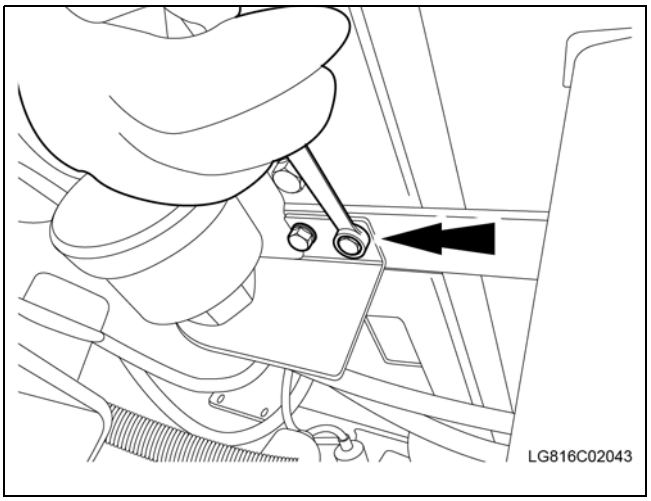
16.Remove the side cover.

Remove the left and right side cover mounting bolts with a #19 wrench, remove the side cover and store properly, avoid damaging to the surface paint.



17.Remove booster oil cup.

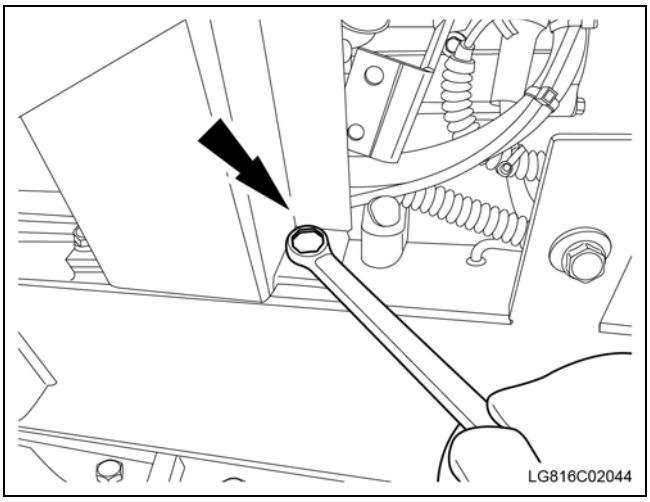
Remove the mounting nuts of the booster oil cup with a #13 wrench, remove booster oil cup and place it erectly and properly.



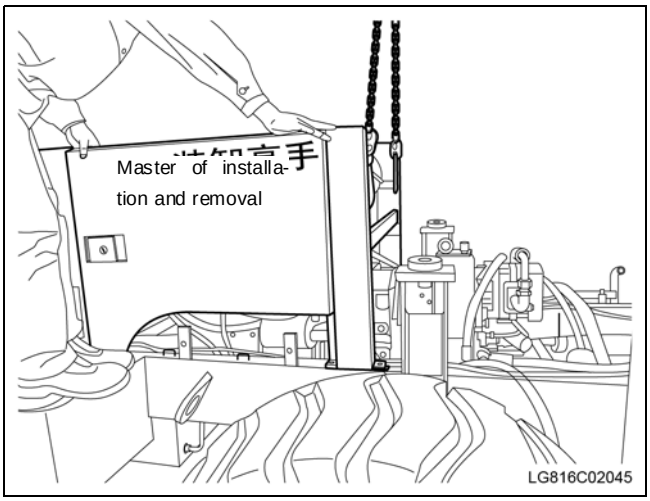
18.Remove the portal frame side cover as.

(a) Remove the fixing bolts of the four portal frames on the vehicle frame with a #16 wrench.

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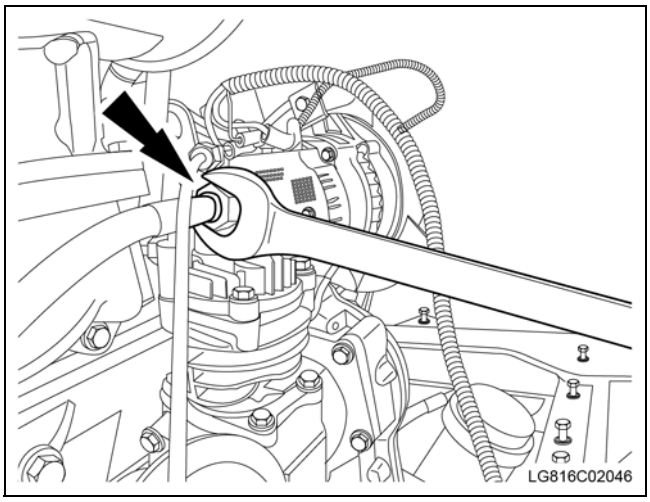


(b) Lift the side cover of the portal frame with travel crane and sling and put properly in place, avoid damage to the surface paint.



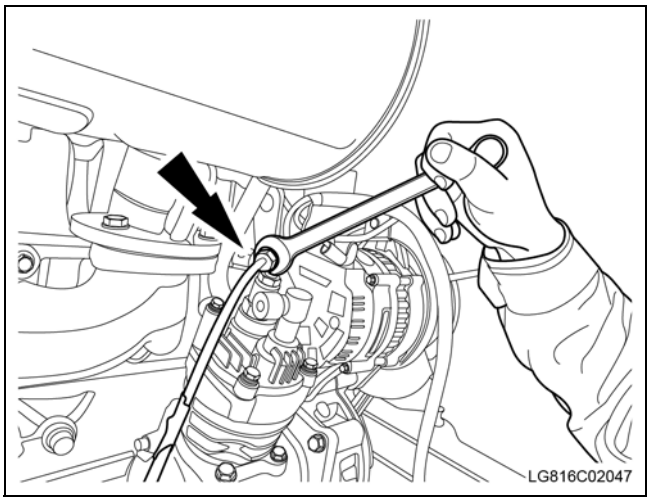
19.Remove compressor air pipe.

Remove the air pipe joint connecting the air tank from the diesel engine with a #27 wrench.



20.Remove the pressure regulating valve air pipe.

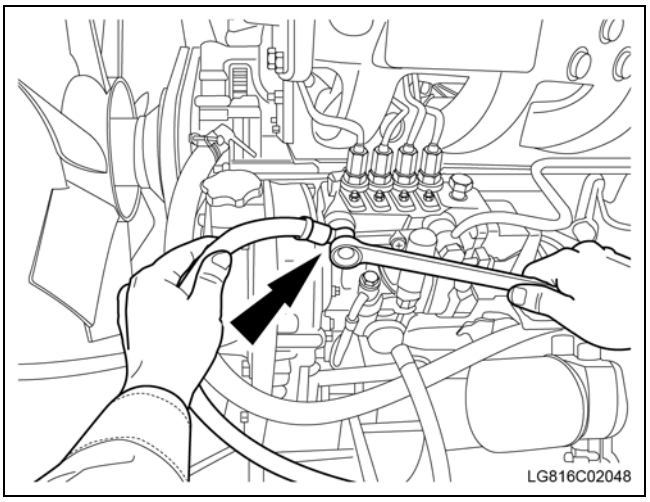
Remove the air pipe joint connecting the pressure regulating valve from the diesel engine with a #16 wrench.



21.Remove diesel fuel pipe

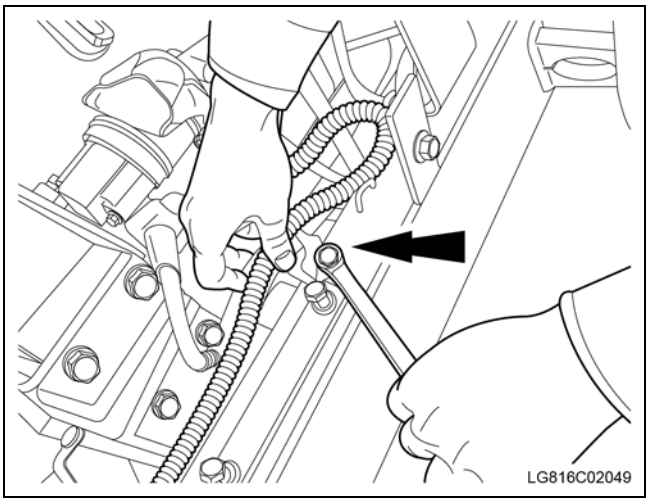
Remove bolts from the diesel fuel inlet pipe and return pipe joints, remove the diesel fuel pipe joint and wrap up with a clean plastic bag, reinstall hose mounting bolts back to the diesel engine.

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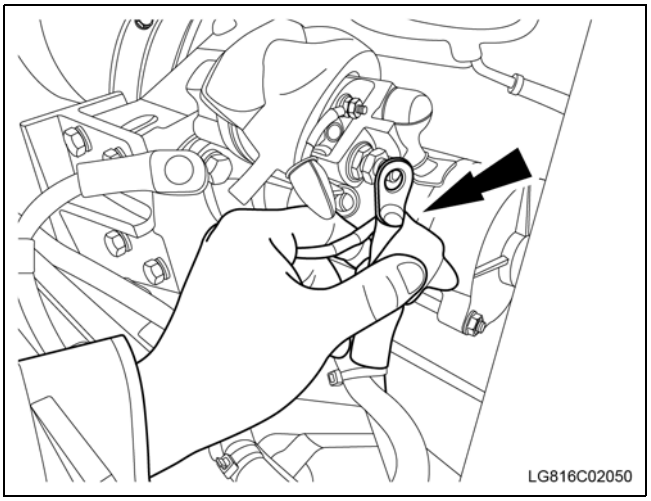
22.Remove diesel engine harness and sensor harness.

(a) Unplug the connecting cable sleeve of the vehicle frame to starter motor, remove wire harness connector bolt with a #16 wrench, remove the harness.

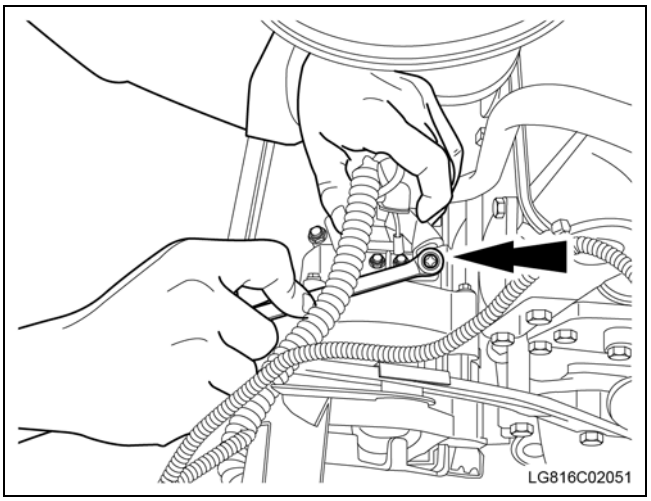


(b) Pull out the cable connector sleeve from the battery positive pole to starter motor with a #16wrench,remove the fixing nut from the starter and remove the wire harness.

(c) Pull out wire harness connector sleeve from the rear vehicle frame of the starter, remove fixing nut with a #7 wrench, remove the wire harness.

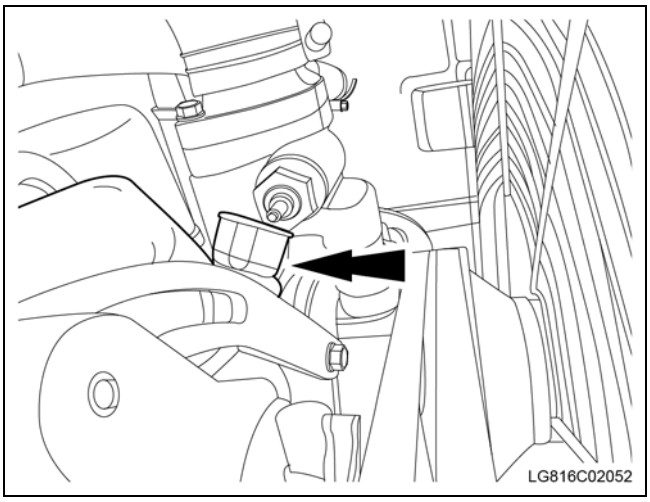


(d) Pull out the engine wire harness connector sleeve, remove fixing nut of the wire harness connector with #7 wrench and #10 wrench, remove wire harness.

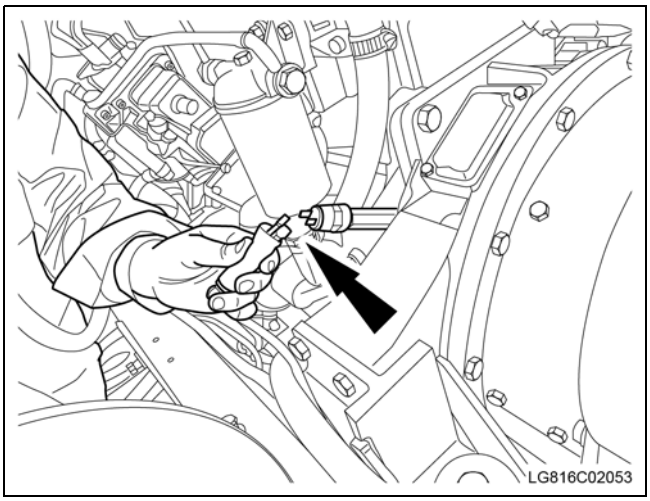


(e) Pull out the wire harness connector sleeve of the water temperature sensor, remove the fixing screw with a cross screw-driver, remove wire harness.

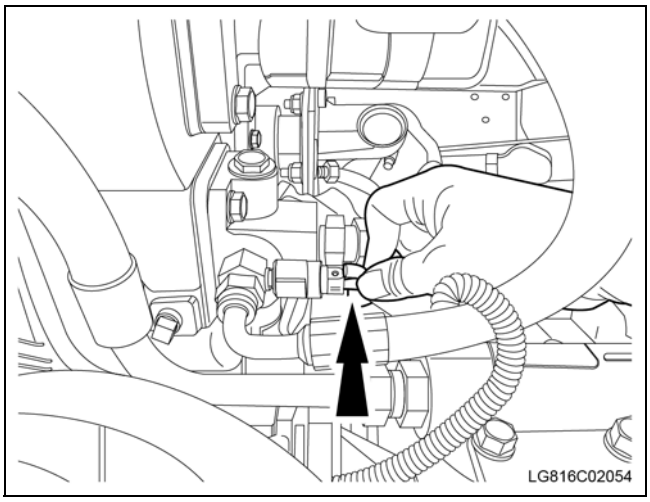
https://truckmanualshub.com/



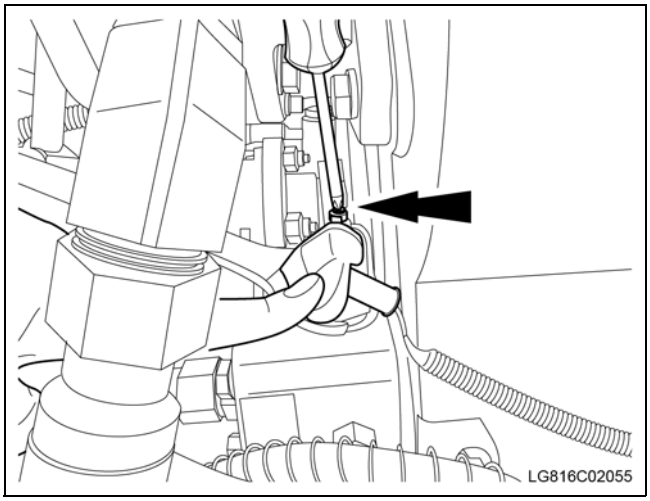
(f) Pull out the wire harness joint sleeve of the engine oil pressure sensor, pull out the joint.



(g) Pull out the wire harness joint sleeve and joint of the transmission oil pressure sensor.



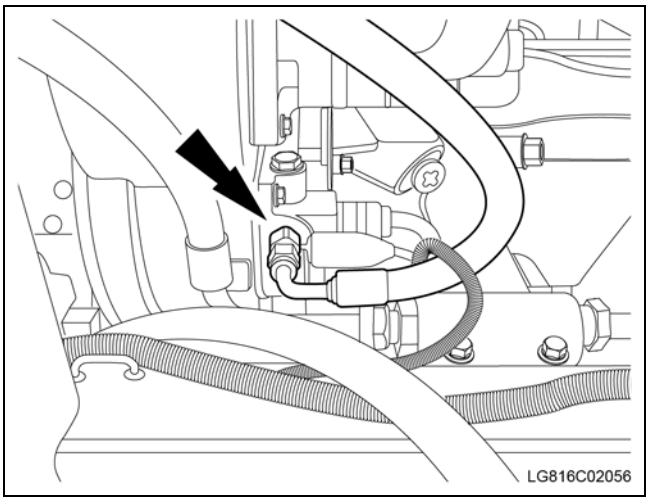
(h) Pull out the wire harness joint sleeve of the torque converter oil temperature sensor, remove the fixing screw with a cross screwdriver, remove wire harness.



23. Remove hose from torque converter to shift control valve.

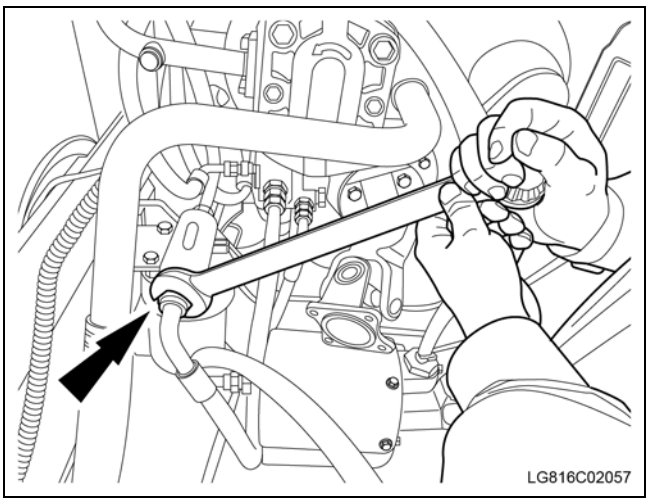
Remove hose joint from torque converter to shift control valve with a #24 wrench, wrap up the hose joint and torque converter joint with a clean plastic bag, avoid foreign objects in.

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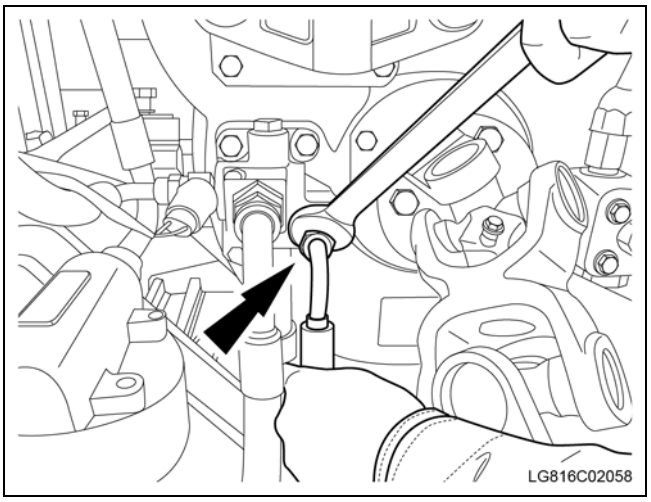
24.Remove oil filter outlet hose.

Remove hose connecting oil filter to torque converter with a #32 wrench, wrap up the hose joint and torque converter joint with a clean plastic bag, avoid foreign objects in.



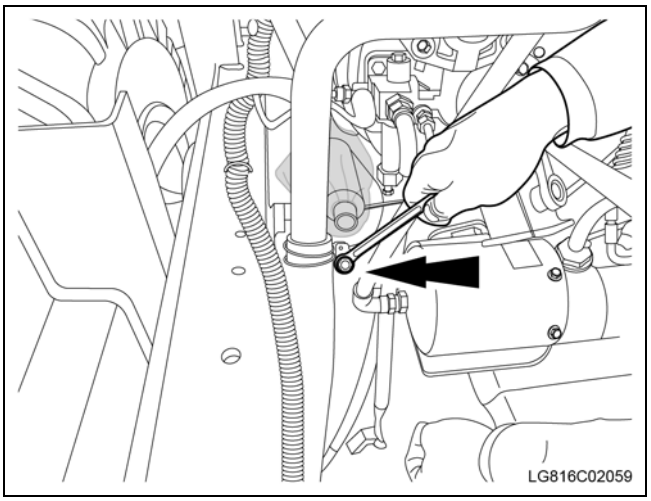
25.Remove transmission refilling hose.

Remove hose from torque converter to transmission refilling hose with a #22 wrench, wrap up the hose joint and torque converter joint with a clean plastic bag, avoid foreign objects in.



26.Remove working pump inlet hose.

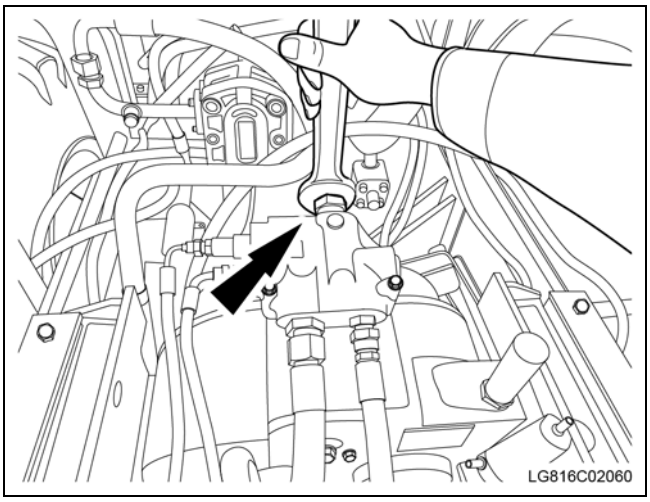
Remove strap screwed from the working pump inlet hose with a#10 wrench or a cross screw driver, remove the upper end of the hose and wrap up the hose and the pipe joint with a clean plastic bag and ribbon to avoid foreign objects.



27.Remove priority valve inlet hose.

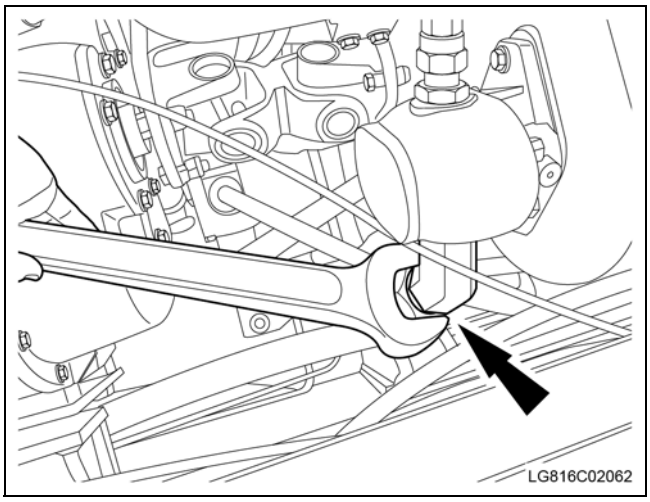
Remove inlet hose connecting working pump to priority valve with a #36 wrench, wrap up the hose joint and priority joint with a clean plastic bag, avoid foreign objects.

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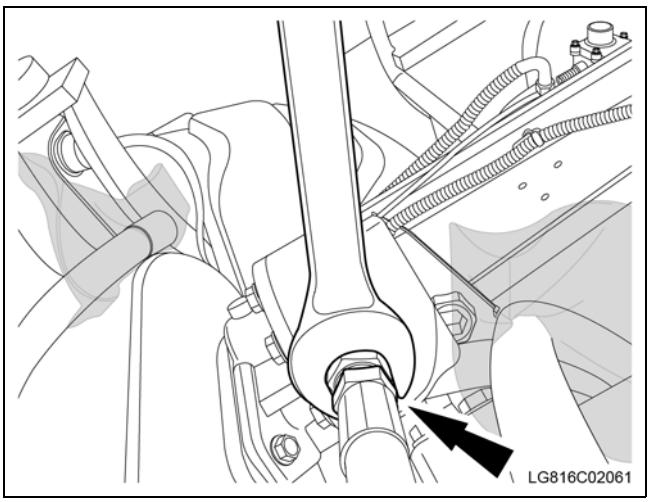
28.Remove variable pump outlet hose.

Remove the outlet hose of the variable pump to the oil filter with a #32 wrench, wrap up the hose joint and the variable pump joint with a clean plastic bag to avoid foreign objects.



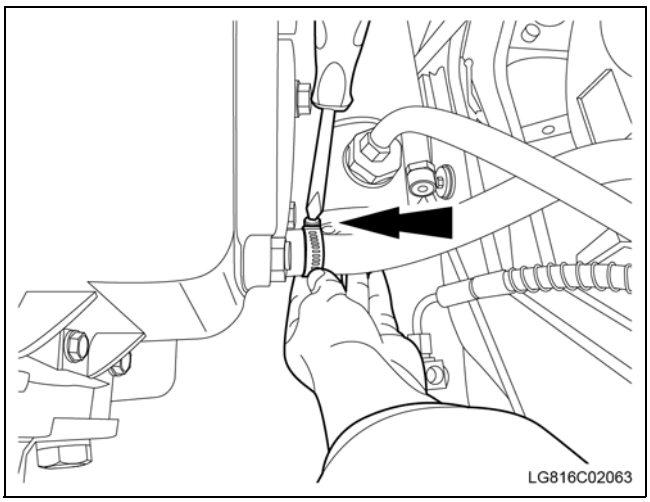
30.Remove torque convert return oil hose.

Remove strap screw of the torque converter return oil hose with a straight screw or a #8 wrench, wrap hose and torque converter joints with a clean plastic bag to avoid foreign objects.



29.Remove variable pump suction hose.

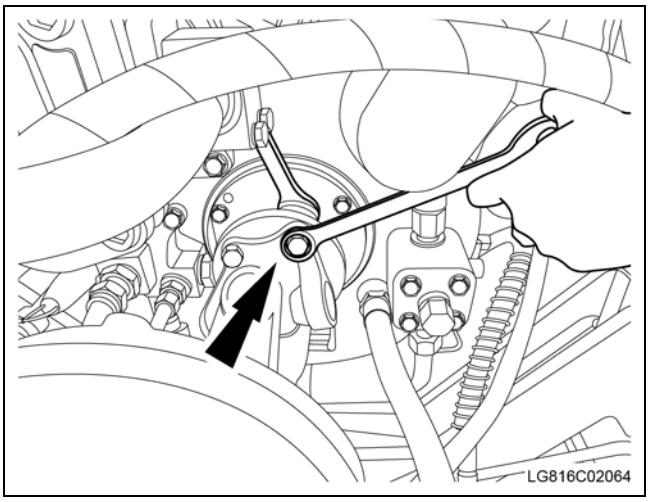
Remove the suction hose of the variable pump connecting to the gearbox with a #50 wrench, wrap up the hose joint and the variable pump joint with a clean plastic bag to avoid foreign objects.



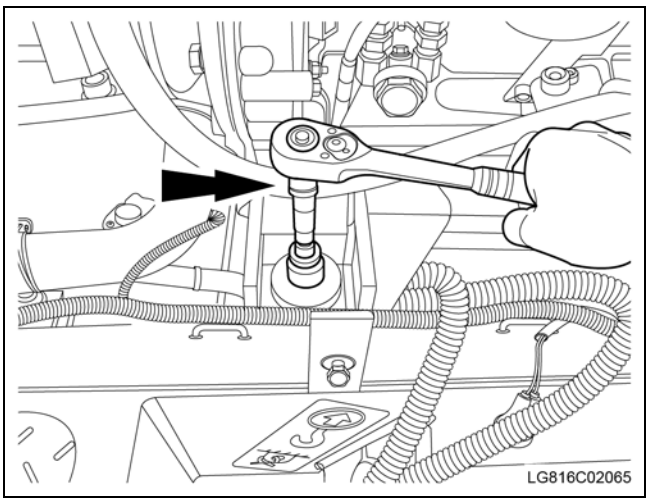
31.Remove bolts from transmission shaft set and diesel engine bolt.

(a) Hold the fitting nut of the transmission set with a #19 wrench, remove mounting bolt with a #18 wrench.

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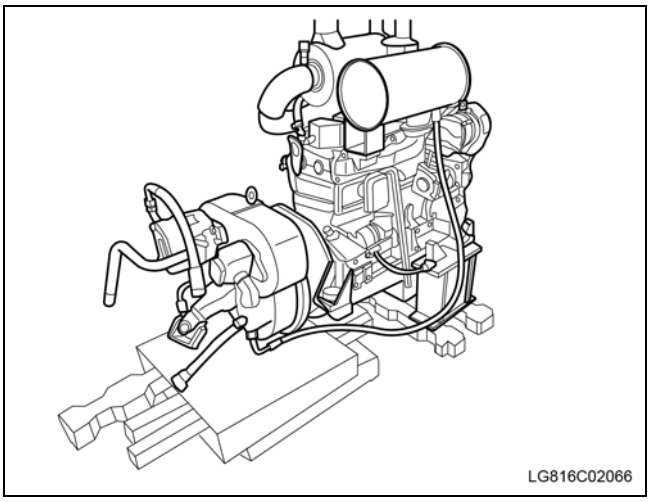


(b) Remove diesel engine bracket nut with a #24 wrench, remove bolt and shock.



32.Lift diesel engine torque converter as.

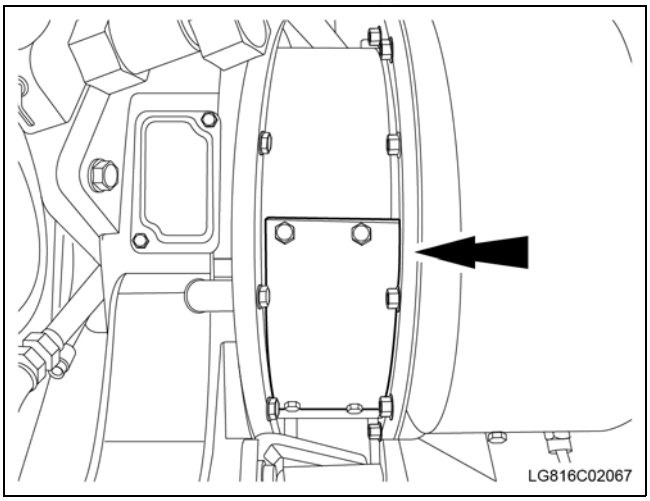
Lift up diesel engine torque converter as for 10cm high with travel crane and sling (3T), remove transmission shaft set and shock pad, then lift torque converter as to a special tooling and place properly.



33.Remove torque converter

(a) Lift torque converter with travel crane and sling and pull up tight the sling.

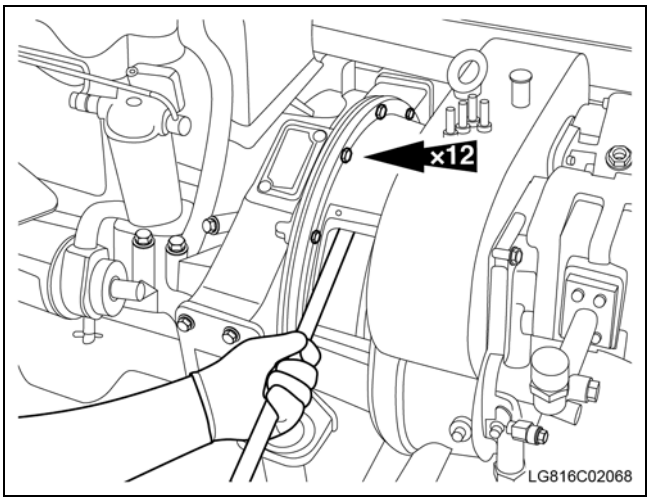
(b) Remove left upper cover of the torque converter with a #13 wrench.



(c) Remove the nine bolts on torque converter connecting with diesel engine with a #18 wrench.

(d) Remove the mating bolts on torque converter connecting with diesel engine with a #16 wrench.

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(e) Remove torque converter and lift to a special tooling and place properly, repair or replace the diesel engine or the torque converter.

Installation of engine

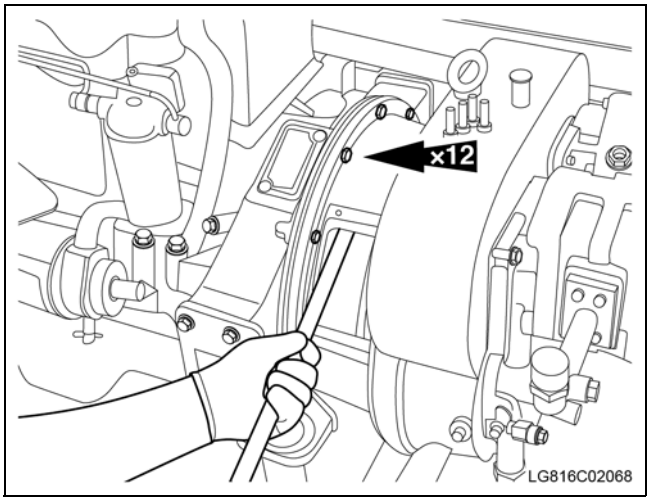
1. Install torque converter

(a) Apply gasket sealant adhesive to torque convert sealing ring set.

(b) Install sling ring on torque converter, lift torque converter with travel crane and sling to the mating point on the diesel engine.

(c) Apply thread locking sealant to mating bolt, align with mating holes then install 12 mating bolts, cross tighten bolts in symmetry with a #16 wrench, torque to 52±7N•m

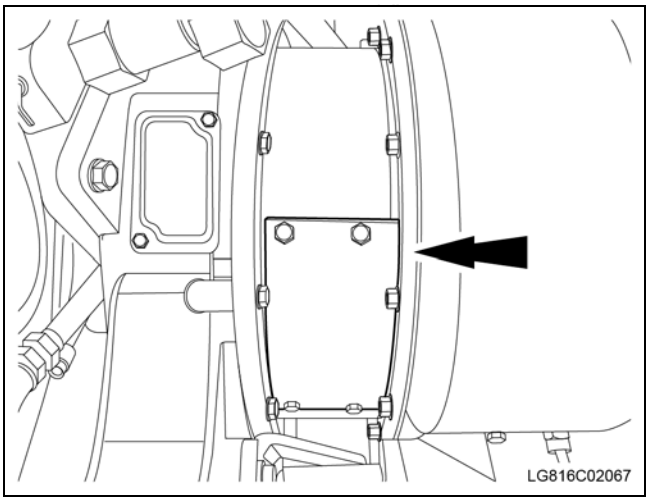
(d) Rotate the inner gear ring of the torque converter with a crowbar until the gear ring bolt hole faces you then insert the bolt coated with thread locking sealant.



(e) Tighten with a #18 wrench, torque to 90±12N•m.

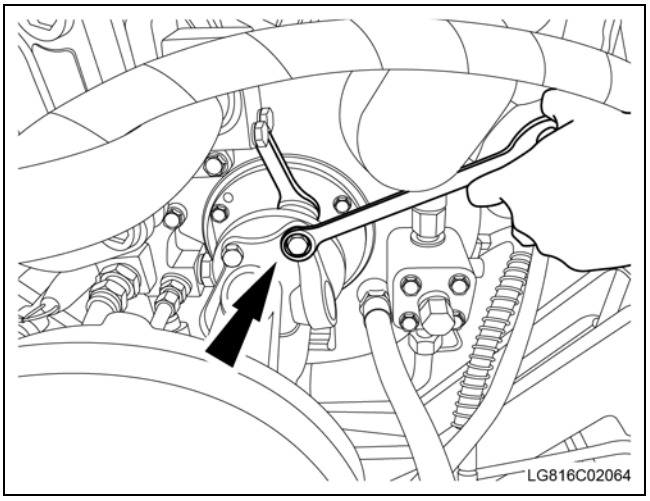
(f) Rotate gear ring twice With each turn 120°, Install the rest bolts in the same way, cover the shrouding and tighten with a #13 wrench.

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2. Install transmission shaft set.

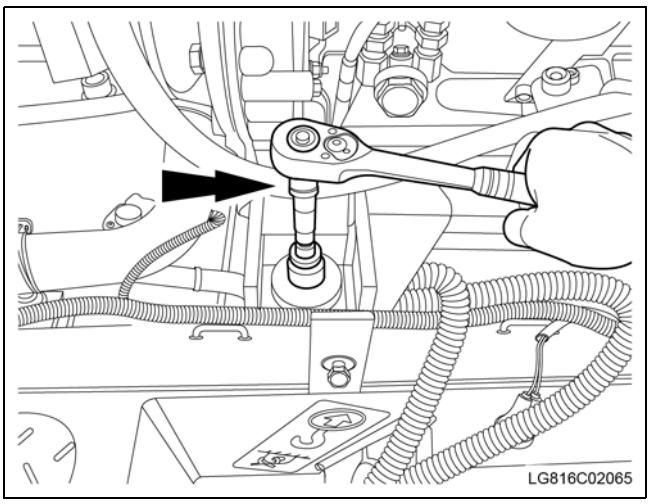
Place shock pad on the rear frame diesel engine mounting bracket, Lift the diesel engine torque converter as to 10cm above the rear frame mounting bracket with travel crane and sling, install mating transmission shaft to torque converter flange with bolts.



3. Install diesel engine

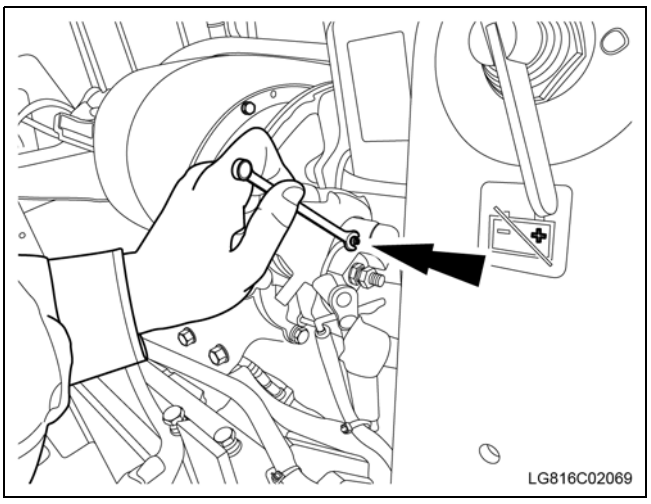
(a) Place shock pad, washer, washer and bolt to the diesel engine bracket, align with the mounting hole then place the diesel engine onto the frame, tighten with a #24 wrench, torque to 225±35N•m.

(b) Tighten mating transmission shaft bolt with #18 and #19 wrench, torque to 100±12N•m.



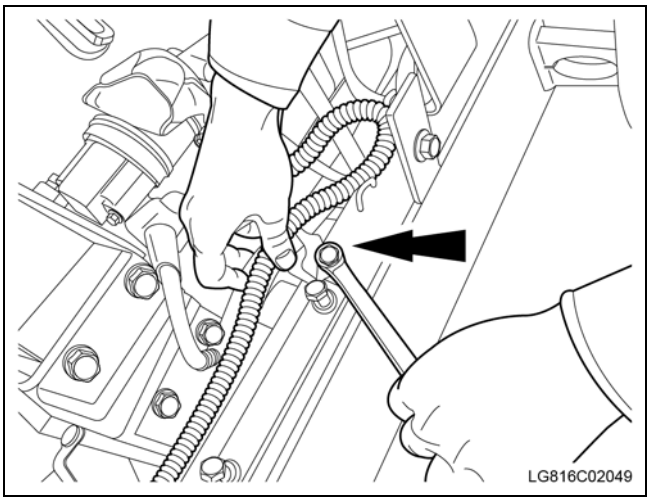
4. Connect wire harness.

(a) Install rear frame wire harness to starter motor with a #7 wrench, Install battery positive pole to starter motor wire harness to starter motor with a #16 wrench, cover sleeve.

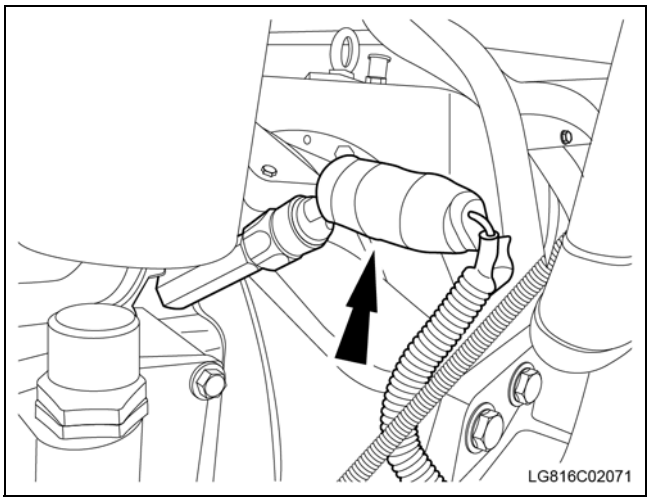


(b) Fasten the vehicle frame to starter motor wire harness to the vehicle frame with a bolt with a #16 wrench, cover the sleeve.

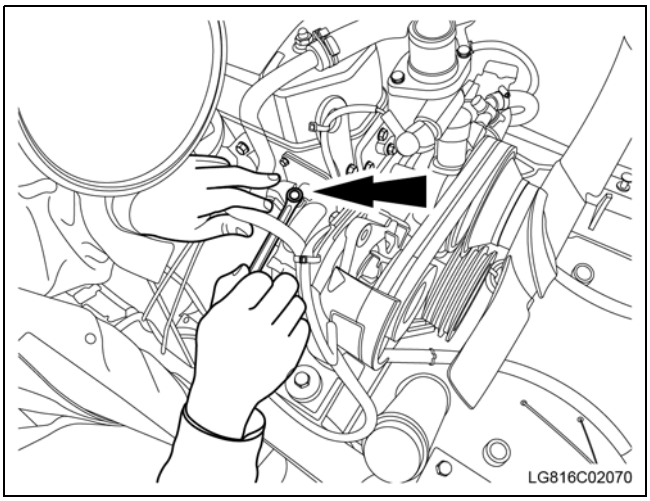
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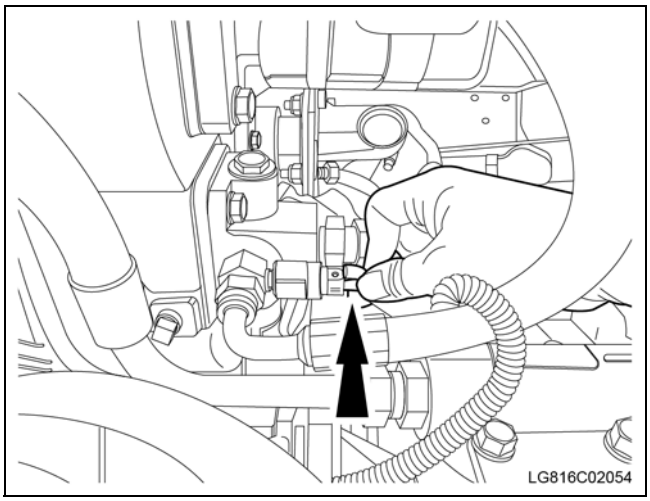
(c) Mount the engine wire harness to the engine with its nut with a #10 wrench, cover the sleeve;



(e) Plug the joint of the wire harness of the variable speed oil pressure sensor to the sensor cover wire harness joint.

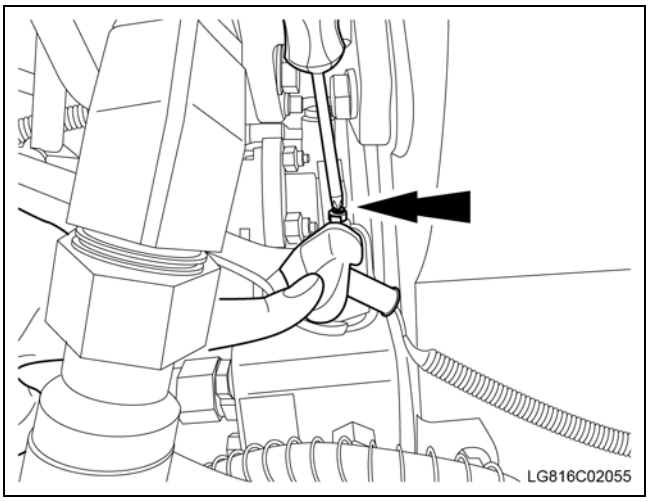


(d) Plug the engine oil pressure sensor wire harness joint to the sensor, cover harness sleeve.



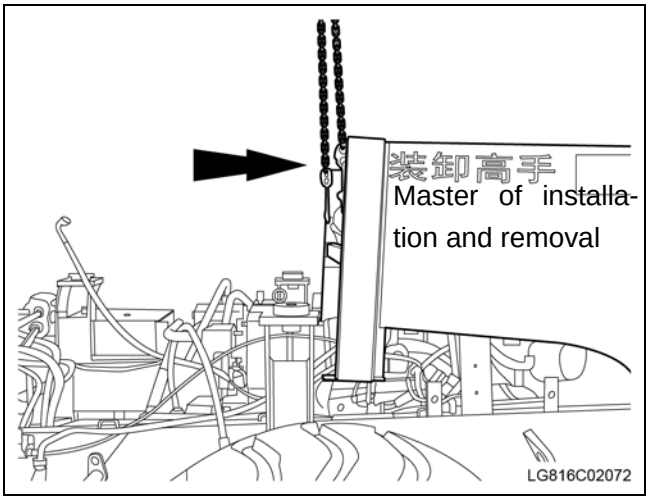
(f) Install the wire harness joint of the torque converter oil temperature sensor to the sensor, cover the wire harness sleeve.

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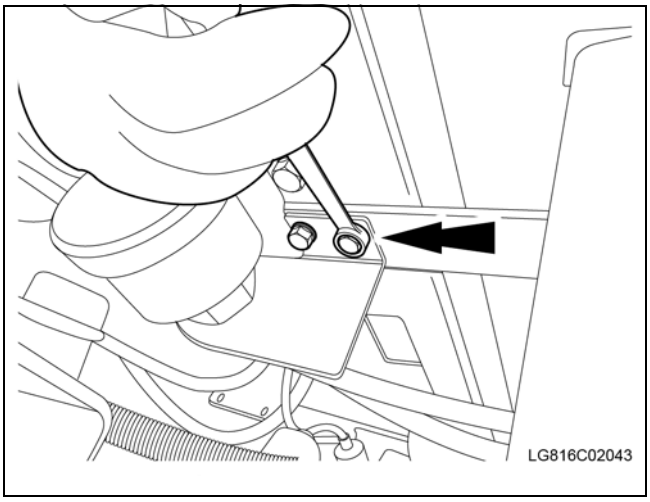
5. Install portal frame side cover as.

   Lift the side cover as of the portal frame to the rear frame mounting position with travel crane and sling, align with the mounting hole to insert mounting bolts, adjust the portal frame to upright position then tighten bolts with a #16 wrench, torque to 90±12N•m.



6. Install booster oil cup.

   Fasten the booster to the portal frame with previously removed bolts, tighten with a #13 wrench, torque to 26±4N•m.

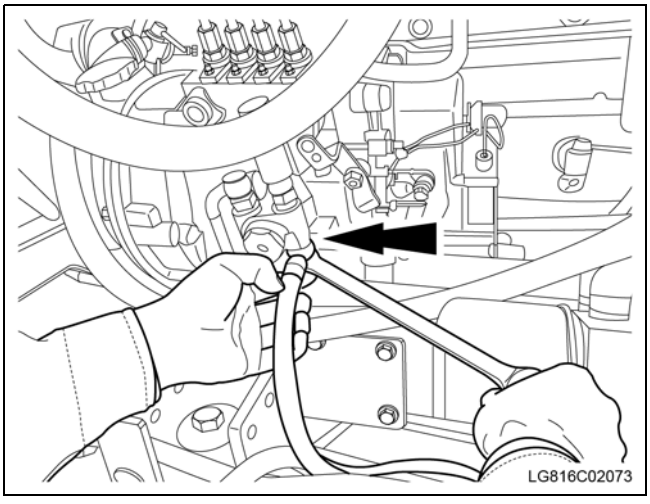


7. Install radiator

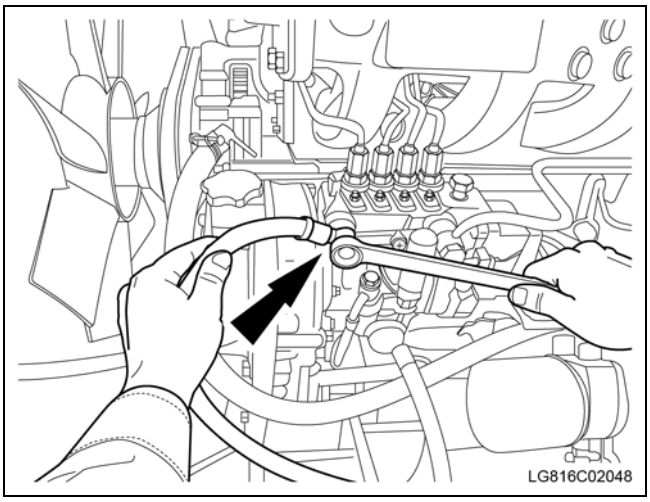
   Refer to “Installation of Radiator”(p. 2-7) to assemble radiator, radiator pipelines, rear cover, upper cover and other components to the machine.

8. Connect diesel engine pipe.

   Fasten diesel engine inlet pipe, return pipe to diesel engine joints with its bolts, tighten with a #19 wrench.

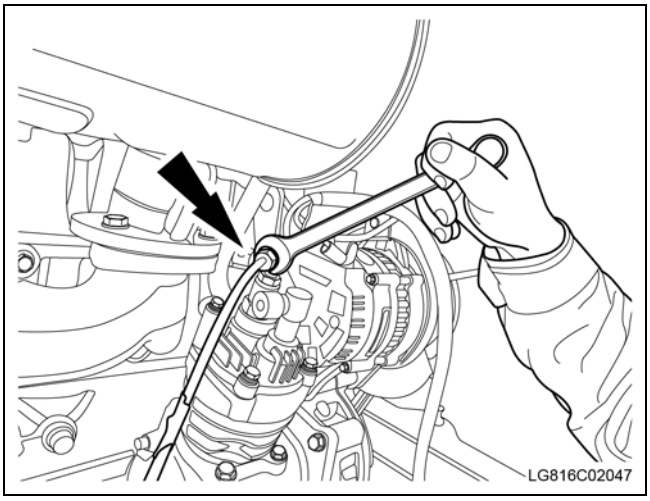


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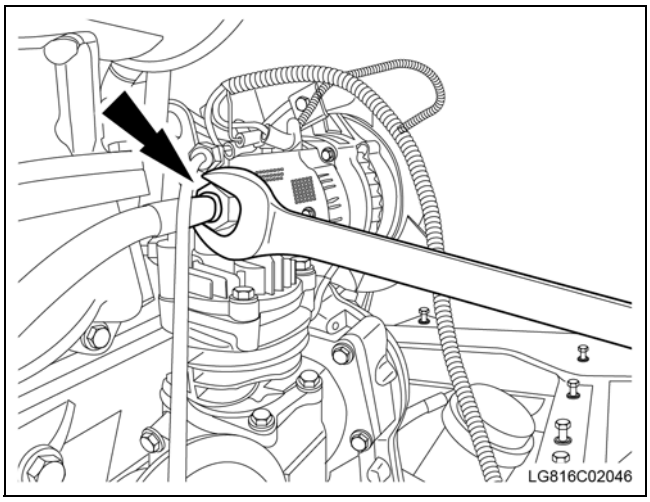
9. Connect the pressure regulating valve air pipe.

Connect the pressure regulating valve air pipe to the related joints on the compressor, straighten the hose free of twists and interference then tighten hose joint with a #16 wrench.



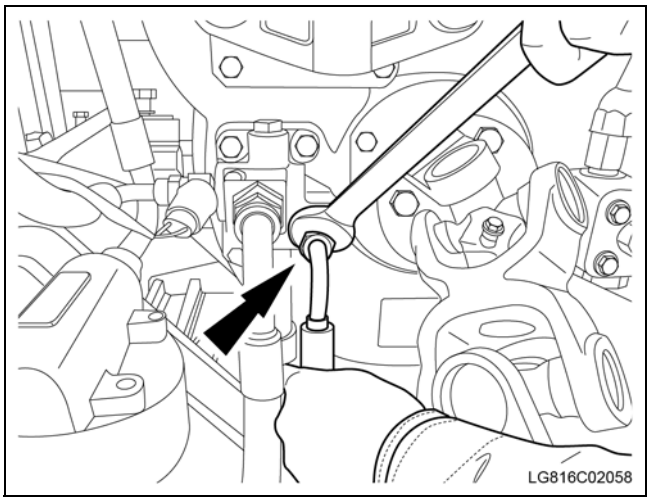
10.Connect compressor air pipe.

Connect compressor air pipe to the compressor joint, place a paper pad at the joint, straighten the hose free of twists and interference then tighten hose joint with a #16 wrench.



11.Connect the hose of torque converter to transmission refilling pipe.

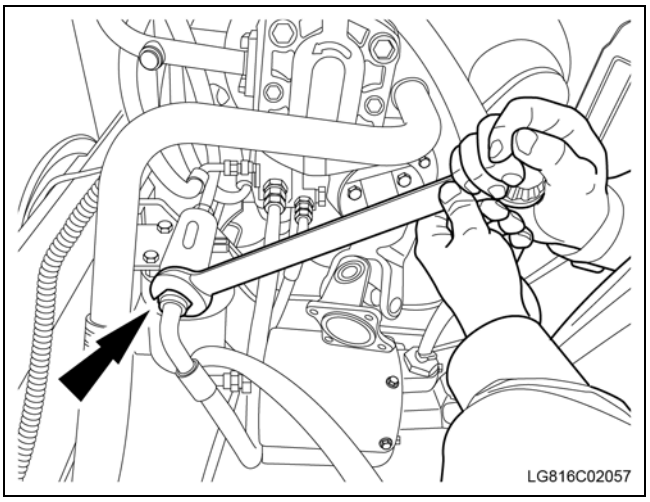
Connect the hose from torque converter to transmission refilling pipe to the torque converter, replace the O-ring at the connection with new one, straighten out the hose along its direction free of twists and interference, then tighten joint with a#22 wrench, torque to 25±5N•m.



12.Connect oil filter outlet hose (at torque converter side).

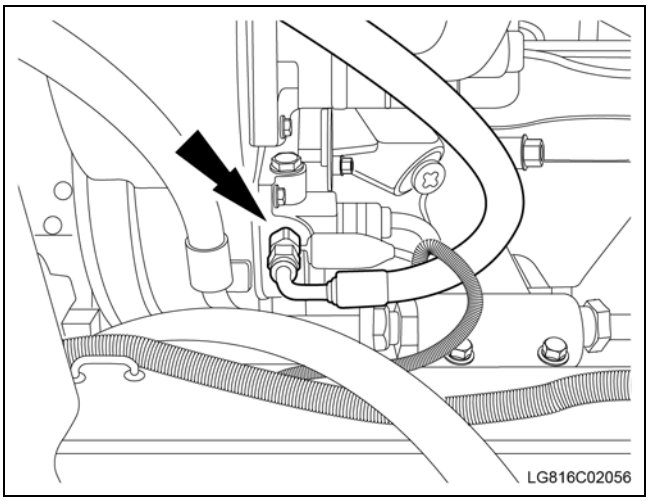
Connect the oil filter outlet hose to torque converter, replace the o-ring at the connection with new one, straighten out the hose along its direction free of twists and interference, then tighten joint with a#32 wrench, torque to 102±10N•m.

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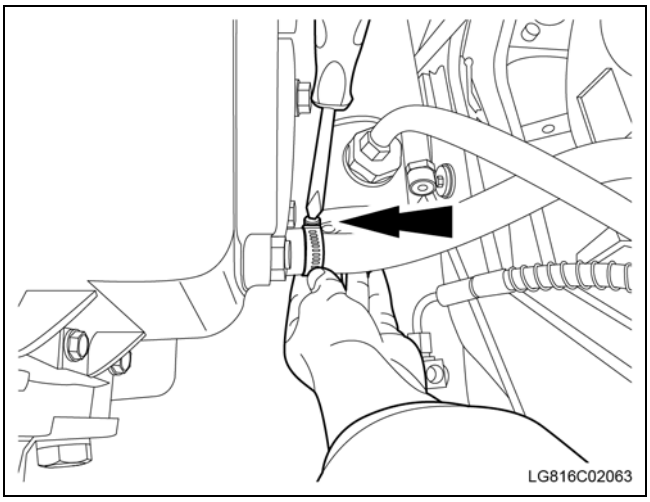
13.Connect torque converter to shift control valve hose.

Connect the hose from torque converter to shift control valve hose to torque converter, replace the O-ring at the connection with new one, straighten out the hose along its direction free of twists and interference, then tighten joint with a #24 wrench, torque to 40±5N•m.



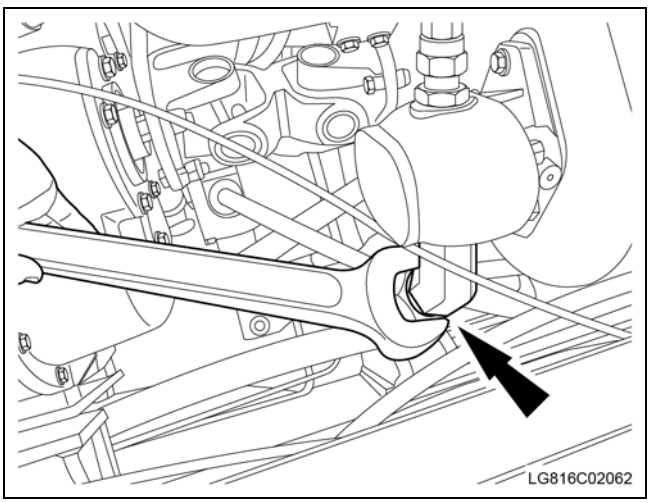
14.Connect torque convert return oil hose.

Connect torque converter return oil hose to gear box, straighten out hose along its direction free of twists and interference, then tighten joint hose clamp screw with a straight screwdriver.



15.Connect variable pump suction hose.

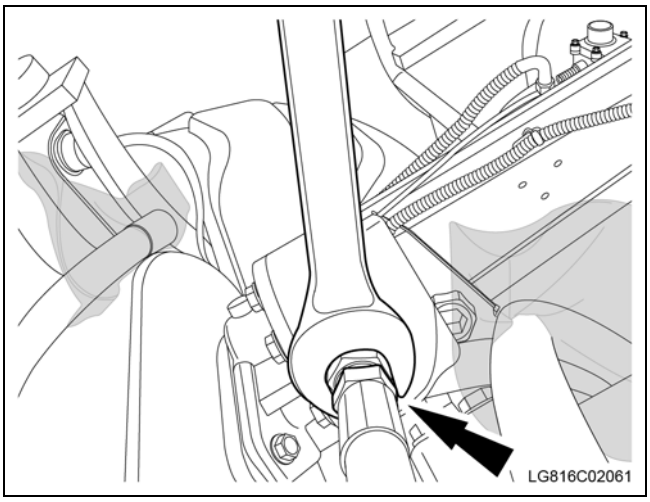
Connect variable pump oil suction hose to variable pump lower joint, replace the o-ring at the connection with new one , straighten out the hose along its direction free of twists and interference ,then tighten joint with a#50 wrench, torque to 190±20N•m.



16.Connect variable pump oil outlet hose.

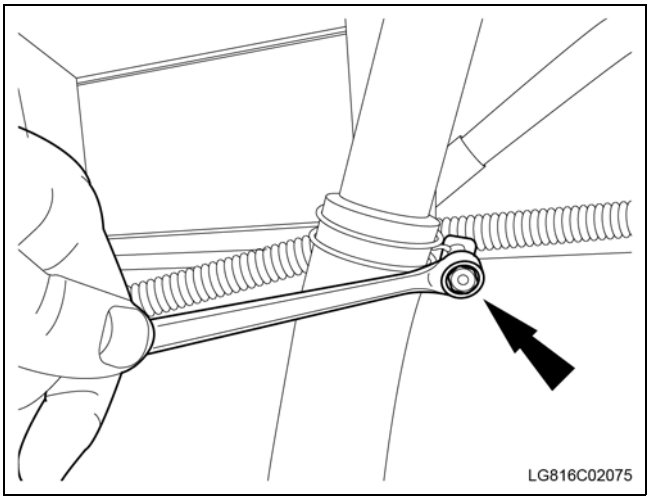
Connect variable pump oil outlet hose to variable pump upper joint, replace the O-ring at the connection with new one, straighten out the hose along its direction free of twists and interference, then tighten joint with a #32 wrench, torque to 102±10N•m.

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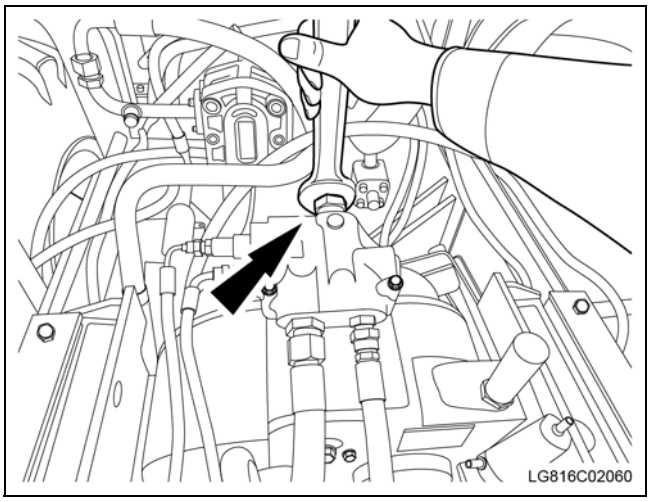
17.Connect working pump oil inlet hose.

Connect working pump oil inlet hose to inlet steel pipe, straighten out the hose free of twists and interference, then tighten clamp screw with a #10 wrench,

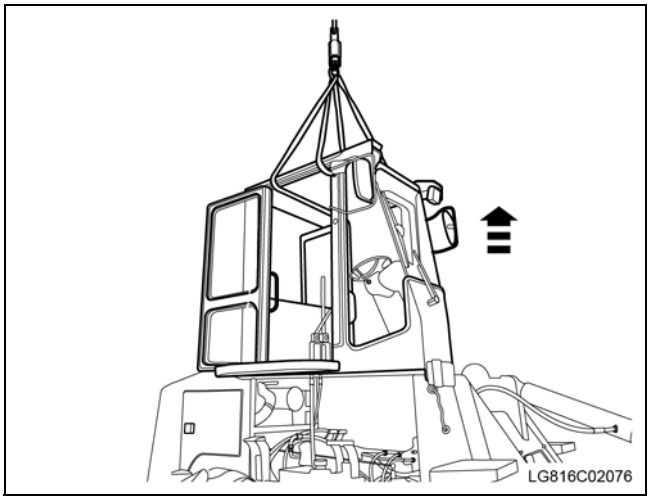


18.Connect priority valve inlet hose.

Connect priority valve inlet hose to priority valve rear joint, replace the o-ring at the connection with new one, straighten out the hose along its direction free of twists and interference, then tighten hose joint with a #36wrench, torque to 120±15N•m.



19.Lifting of cab



(a) Lift cab to 50cm above the whole machine mounting position with travel crane and sling, straighten out all wire harnesses, flexible shaft, pipings and pass through the corresponding holes on rear vehicle frame.

(b) Place the 4shock pad on the mounting bracket.

(c) Slowly lower cab to vehicle frame, align with the mounting holes and install shock pad, thrust washer, washer and mounting bolts from bottom to top, cross tighten mounting bolts4 with a #30 wrench, torque to 430±50N•m.

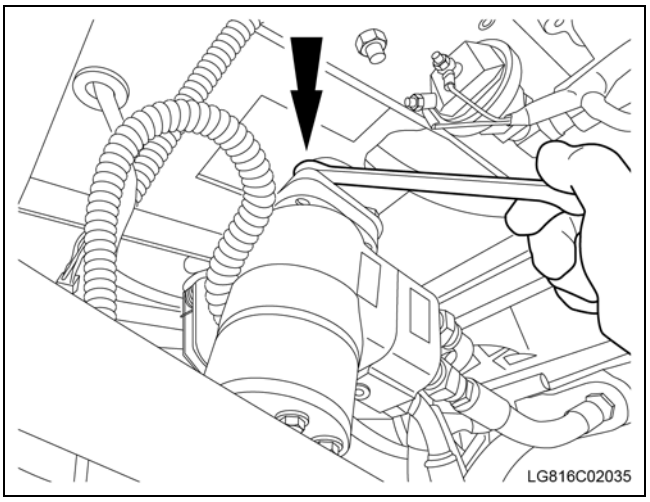
https://truckmanualshub.com/

20.Install metering pump

(a) Lift metering pump up to the joint port at the lower steering gear box.

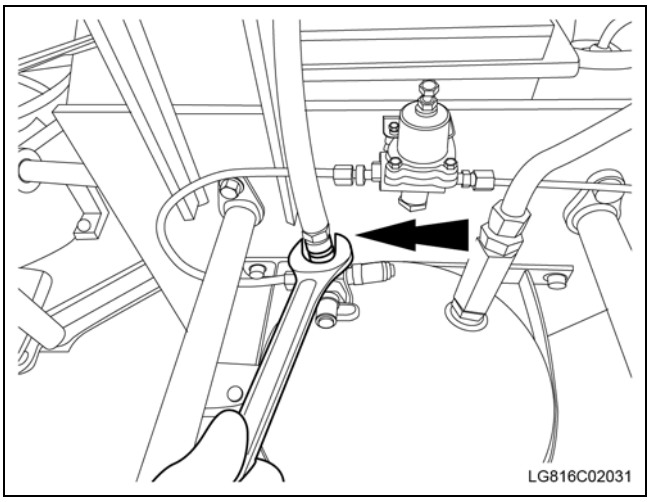
(b) Rotate steering wheel position until inner slot lines up, then push steering gear upward and connect with steering gear box.

(c) Install four mounting bolts and tighten with a #16 wrench, torque to 52±7N•m.

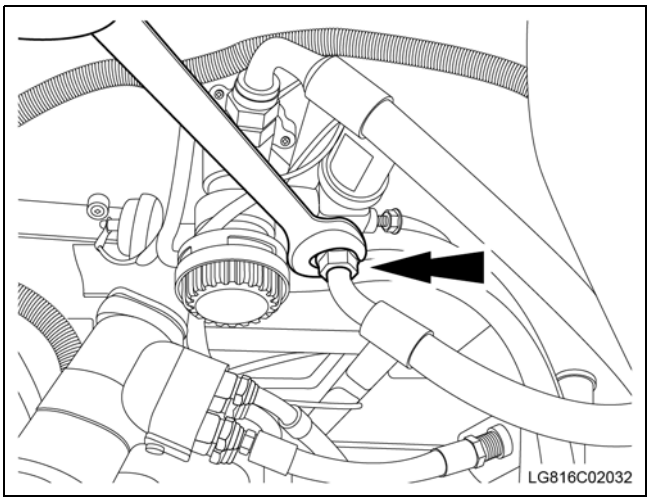


21.Install air braking pipe.

(a) Connect the foot braking valve to air tank hose , replace the O-ring Oat the connection with new one, straighten out the hose along its direction make sure it is free of twists and interference, then tighten joint with a #27wrench, torque to 66±7N•m.



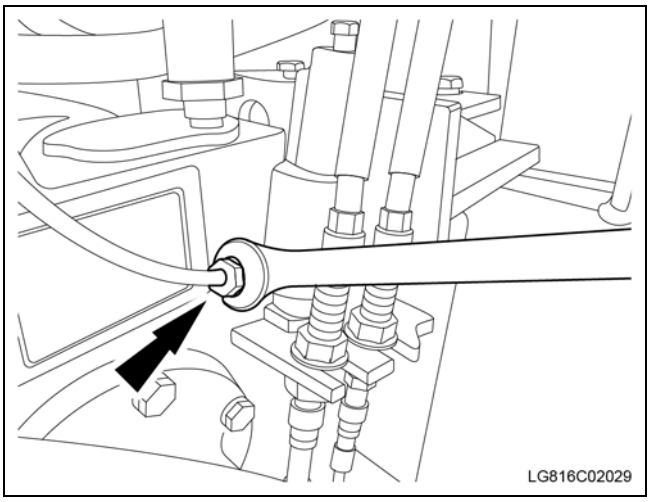
(b) Connect the hose from foot braking valve to booster to foot braking valve in the same way.

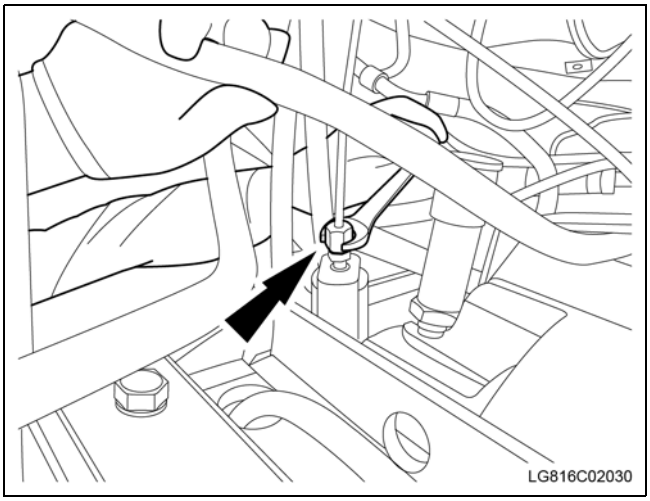


22.Install shutoff valve air pipe.

Connect the nylon air pipe connecting shutoff valve to corresponding joint on shutoff valve, straighten out the hose along its direction make sure it is free of twists and interference, then tighten hose joint with a #16 wrench.

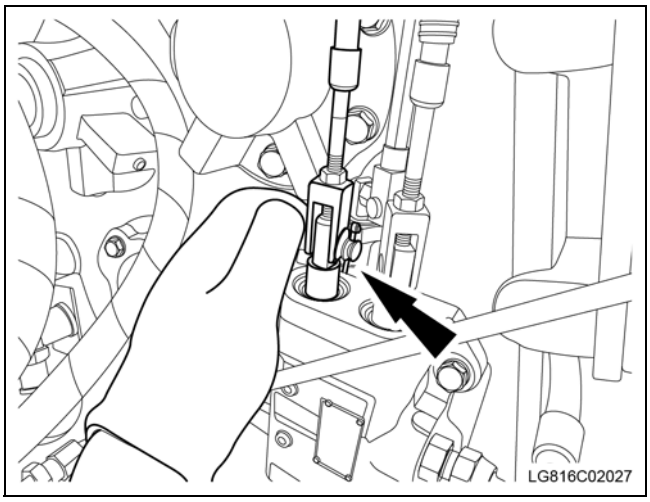
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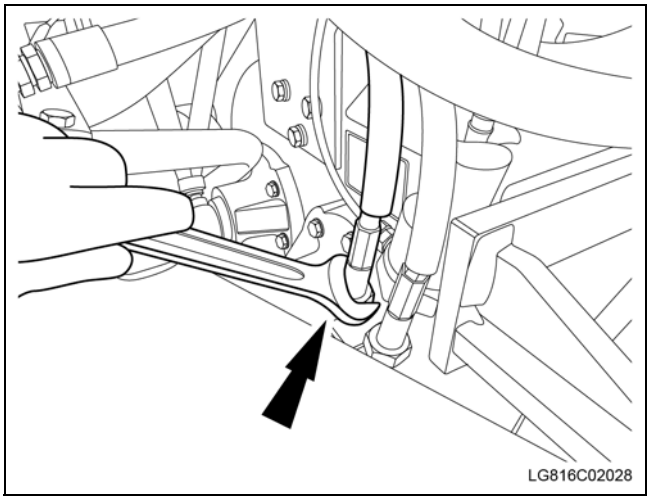


23.Install shift control flexible shaft.

(a) Connect shift control flexible shaft to variable speed control valve linkage with a round- shoulder pin, install washer and pin at the end of round-should pin, bent the pin with a nipper plier.



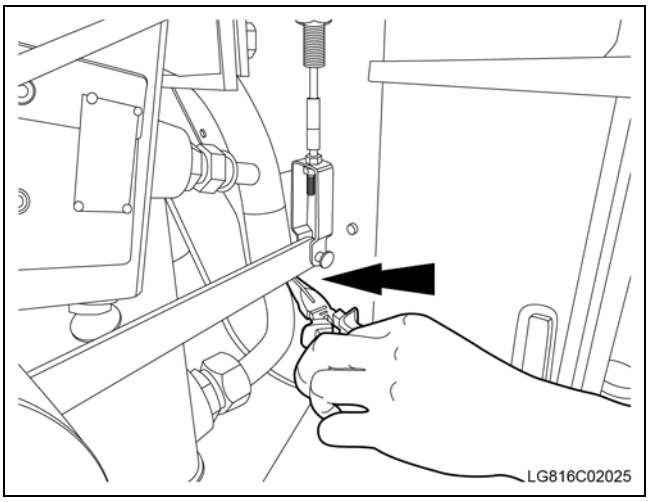
(b) Adjust shift position to set variable speed control linkage upright in intermediate position and turns flexibly and freely without jam, fasten it to the bracket with its own nut on the flexible shaft, tighten nut with a #24 wrench.



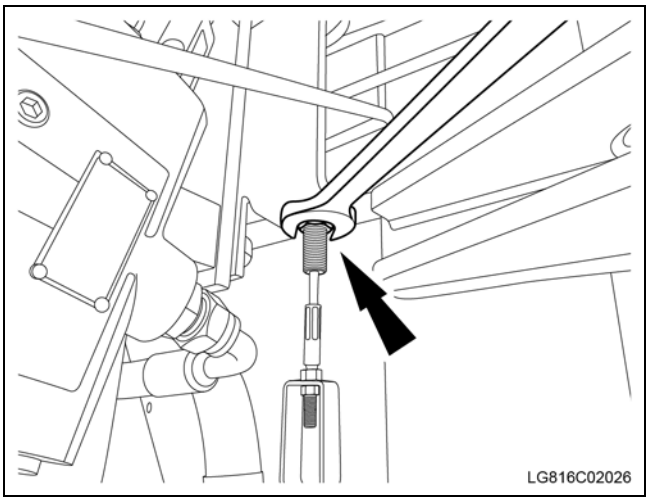
24.Install hand brake flexible shaft

(a) Connect hand brake flexible shaft to transmission braking linkage with a round-shoulder pin, install washer and pin at the end of round-should pin, bent the pin with a nipper plier. and fasten the flexible shaft to the bracket with its own nut.

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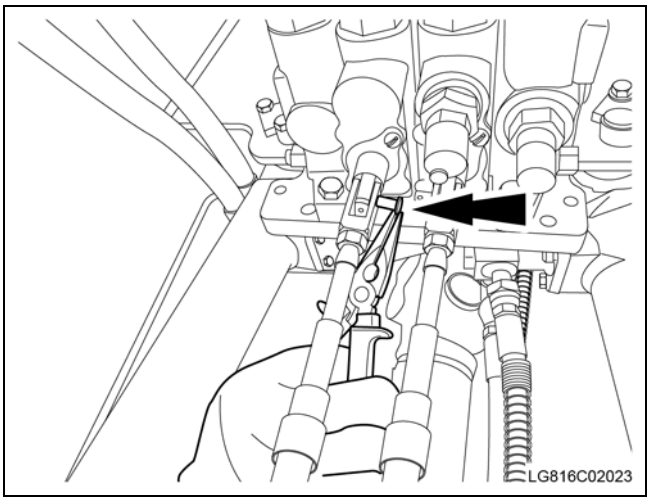


(a) Place hand brake lever to lowest position, adjust nut to set the brake linkage at level, tighten the nut.

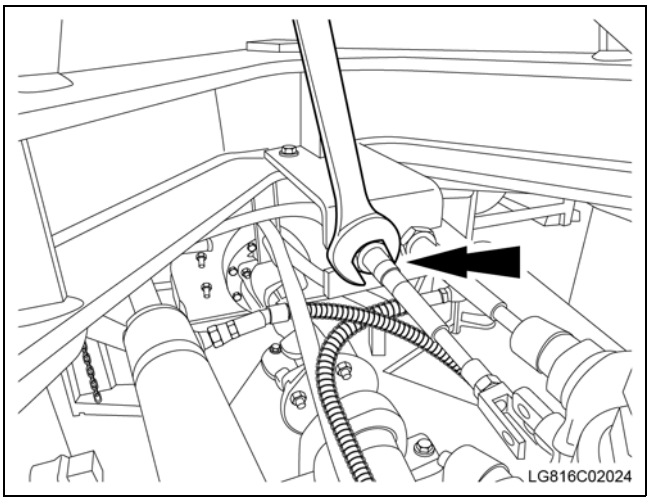


25.Install control valve flexible shaft.

(a) Connect control lever flexible shaft of swing arm oil cylinder to control valve flexible shaft with a round-shoulder pin, install washer and pin at the end of round-should pin, bent the pin with a nipper plier. and install control lever flexible shaft of bucket title cylinder.



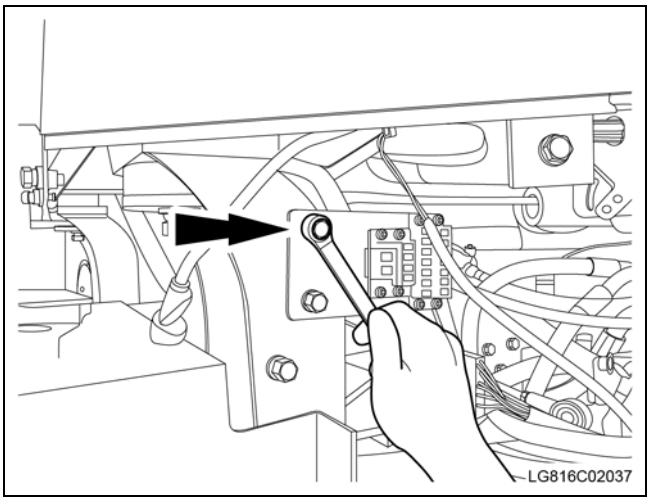
(b) Install flexible shaft to bracket with its own nut, adjust nut position to set control rod upright and control valve rod is in intermediate position, tighten nut with a #32 wrench.



26.Install plug-in mounting board and wire harness.

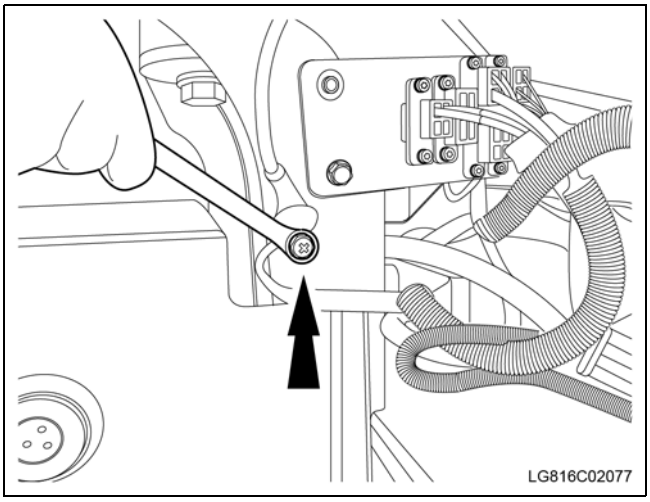
Install plug-in mounting board to vehicle frame with two bolts, tighten with a #16 wrench, torque to 52±7N•m， then plug the rear frame wire harness to the corresponding bayonet socket．

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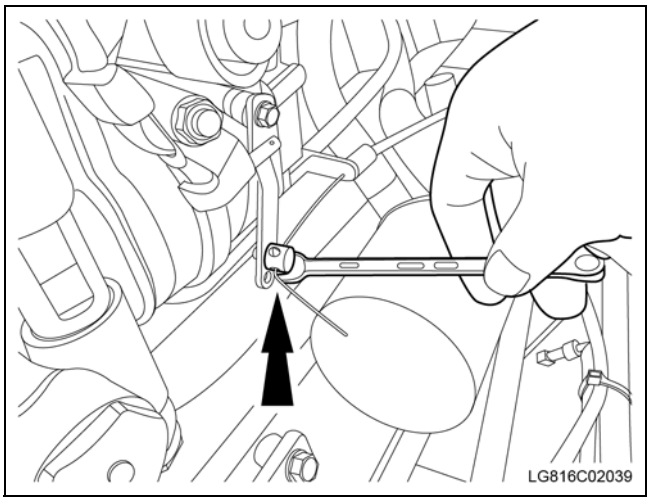
27.Connect the cab grounding wire harness

Connect cab grounding wire harness to rear vehicle frame with its own bolt, tighten with a #16 wrench, torque to 52±7N•m .



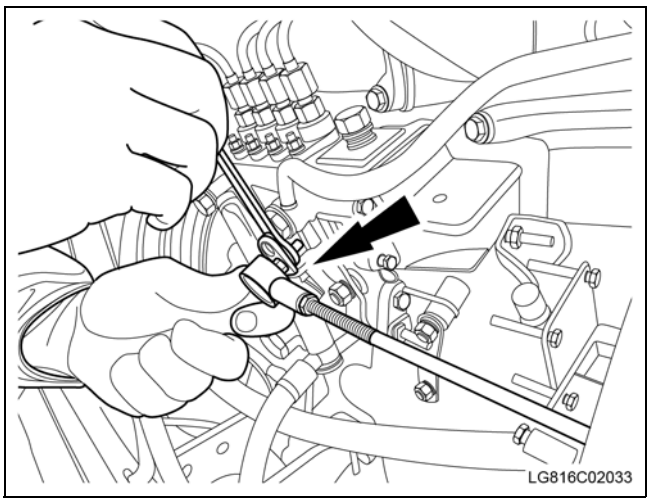
28.Install flame-out switch.

Insert flame-out switch through the hole on flame -out rod of diesel engine, tighten bolt with a #8 wrench, bent the end extruding the joint.

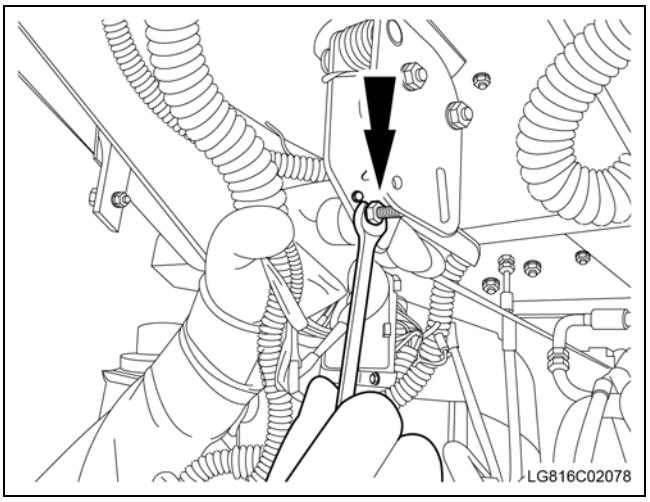


29.Install accelerator linkage.

Connect the two ends of the accelerator linkage with diesel engine and accelerator pedal with washer, nut and pin, tighten nut with a #10 wrench, bent the pin with a nipper plier.

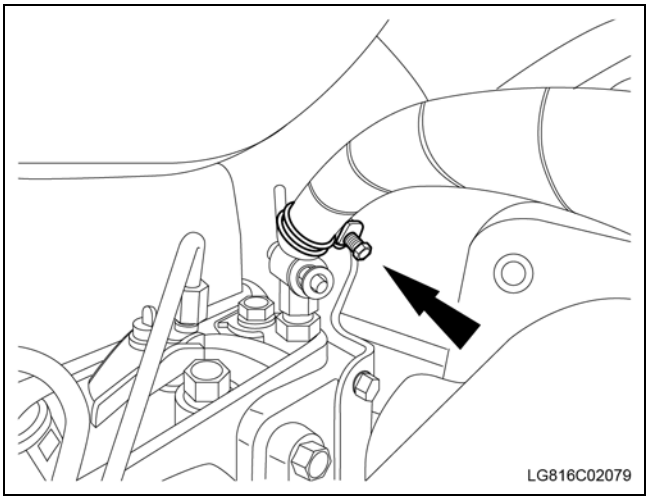


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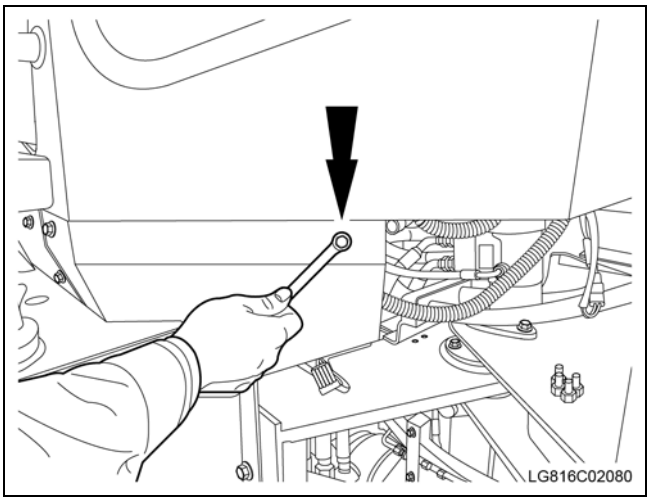
30.Install water pipe of the warm air blower.

Connect water pipe of the warm air blower to front water valve of diesel engine, outlet pipe to rear water valve, tighten pipe clamp screw with a #8 wrench.



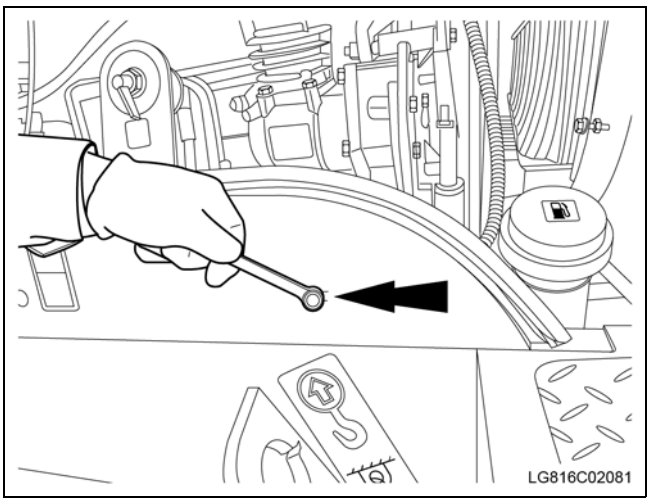
31.Install plate.

Fix the four plates to the cab with bolts, tighten the bolts with a #13 wrench.



32.Install lower side cover.

Install left and right side cover to rear vehicle frame with bolts, adjust their positions, make sure the front edge lines up with the upper cover, tighten bolt with a #13 wrench.



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Diesel fuel tank

Removal of diesel fuel tank

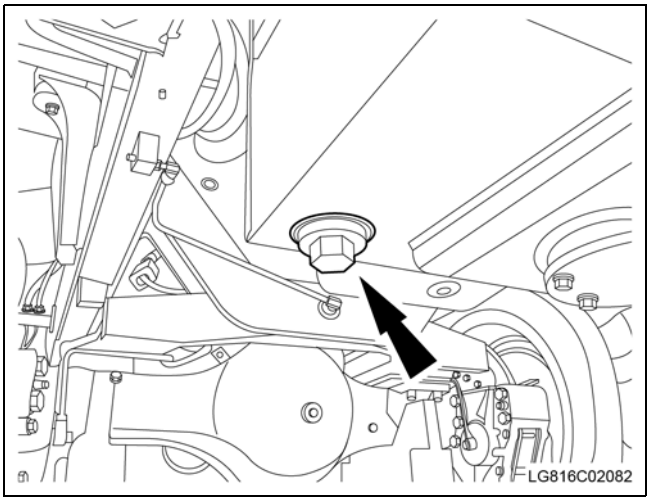
1. Remove the radiator

   Refer to “Removal of radiator”(p. 2-3) to remove assembly and its components and place them properly.

2. Drain diesel fuel

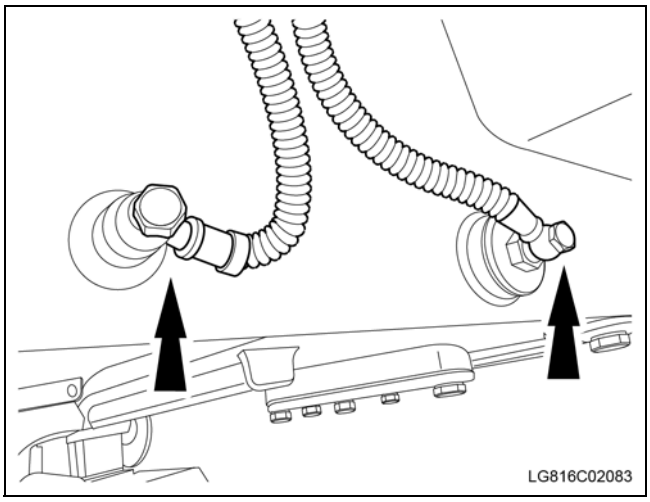
   (a) Place a clean oil basin under the diesel fuel tank, wipe clean the oil drain with a clean towel, then unscrew drain plug with a #36 wrench.

   (b) Move the oil basin away after the oil drain and store properly and protect the basin, avoid contamination to diesel fuel, put oil back to diesel fuel tank.



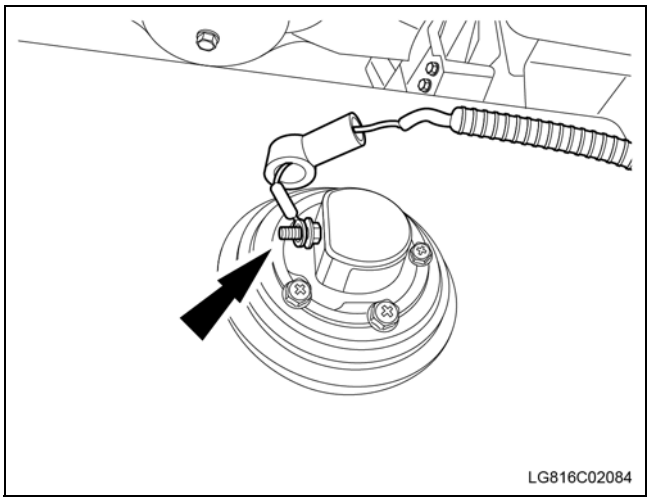
3. Remove diesel fuel pipe

   Remove bolts from the diesel fuel inlet and outlet pipe joints, remove the diesel fuel pipe joint and wrap up with a clean plastic bag, reinstall hose mounting bolts back to the diesel engine.



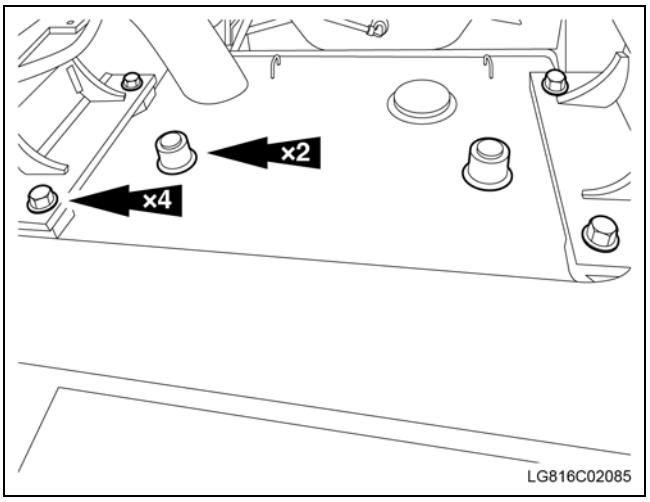
4. Remove the fuel sensor wire harness

   Pull out wire harness connector sleeve of the diesel fuel tank fuel sensor, remove fixing nut with a #8 wrench, remove wire harness.



5. Remove diesel fuel tank

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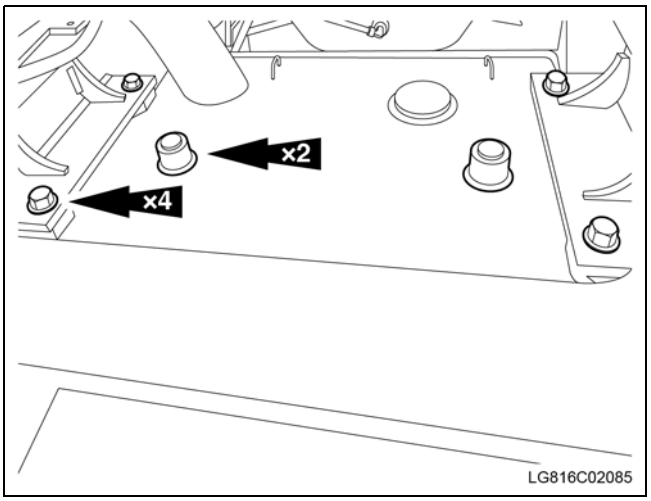
(a) Screw two sling rings into the threaded holes on the top of the diesel fuel tank, lift diesel fuel tank with travel crane and sling and hold sling tight.

(b) Place a tooling bench under the diesel fuel tank.

(c) Remove four diesel fuel tank mounting bolts with a #21 wrench, lower the oil tank onto the tooling bench, remove diesel fuel tank for repair or replace.

Installation of diesel fuel tank

1. Install diesel fuel tank



(a) Place the diesel fuel tank onto the tooling then move it under the rear vehicle frame mounting position.

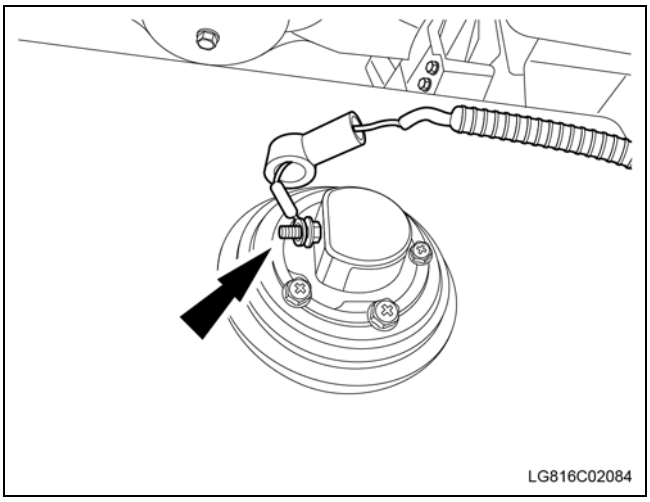
(b) Lift diesel fuel tank at the sling ring point with travel crane and sling and move to rear vehicle frame mounting position.

(c) Fasten it to the rear vehicle frame with four bolts, tighten bolts with a #21 wrench, torque to 145±20N•m .

2. Connect the fuel sensor wire harness

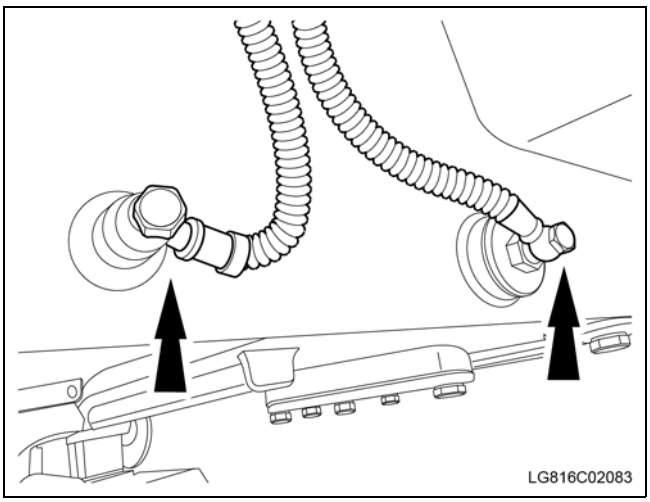
Connect wire harness joint of diesel fuel tank fuel sensor to the sensor, tighten with a #8 wrench, cover sleeve.

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3. Connect diesel fuel pipe

   Connect diesel fuel tank outlet pipe to the lower connection of diesel fuel tank with its own nut, connect the return pipe to the upper port, tighten bolts with a #19 wrench.



4. Install radiator

   Refer to “Installation of Radiator”(p. 2-7) to Install radiator as and components to the machine.

5. Fill in diesel fuel

   Unscrew the diesel fuel refilling cap, refill previously drained diesel fuel back into diesel fuel tank.

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Accelerator Linkage and Accelerator Pedal

Removal of Accelerator Linkage

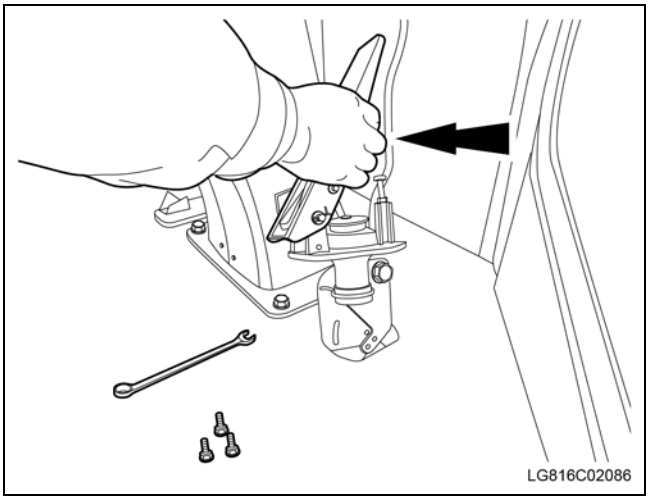
Refer to step 8 of “Removal of radiator”(p. 2-3).

Installation of Accelerator Linkage

Refer to step 29 of “Installation of Radiator”(p. 2-7).

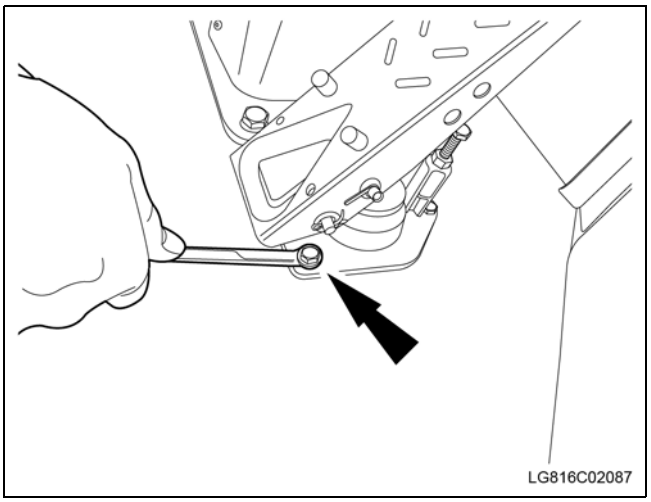
Removal of Accelerator Pedal

1. Remove the accelerator linkage
   Refer to step 8 of “Removal of radiator”(p. 2-3).
2. Dismantle accelerator pedal
   Remove the three accelerator fixing bolts with a #10 wrench, remove accelerator pedal.



Installation of accelerator pedal

1. Install accelerator pedal
   Insert accelerator pedal through the hole inside the cab from top to bottom align with the mounting holes then install three fixing bolts, tighten with a #10 wrench。



2. Install accelerator linkage
   Refer to step 29 of “Installation of Radiator”(p. 2-7).

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3 Power Train System

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Removal and Installation of Power Train System

Tools list

Name	Specification(Qty.)
Open-end wrench	8#、13#、16#、17#、18#、19#、21#、24#、30#、32#、36#、50#
Ratchet wrench	---
Sleeve	24
Cross screwdriver	---
Screwdriver	---
Nipper plier	---
Oil basin	---
Torque wrench	20-100N•m，90-300N•m，160-680N•m，
Scissor	---
Plastic sealing bag	---
Ribbon	---
Travelling crane	3t
Chain, sling and hook	3t
⚠ Remark: removed standard parts should be placed with relevant material together to avoid mixing.	

⚠ "Front" mentioned in this chapter refers to the forward direction after starting the machine; other directions are by this analogy.

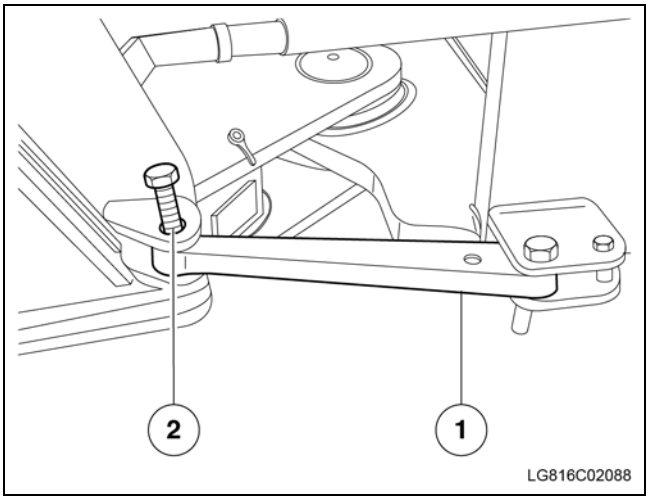
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Front tyre

Removal

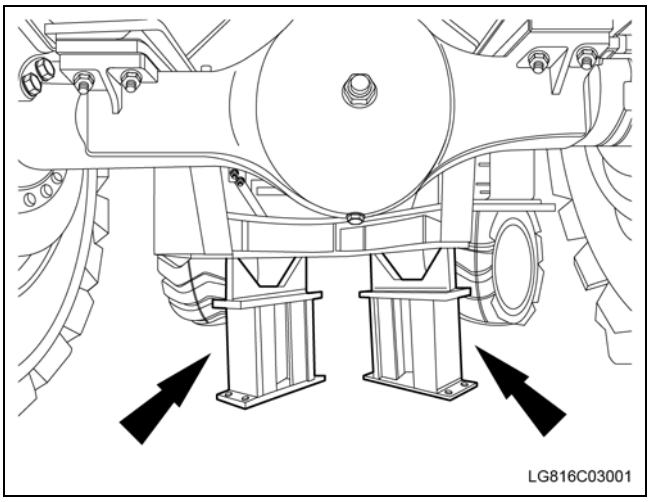
1. Stop the machine and support the front frame

   (a) Park the machine onto the level ground and connect the other end of anti-rotating bumper to the front frame to avoid relative rotation of front and rear frame.



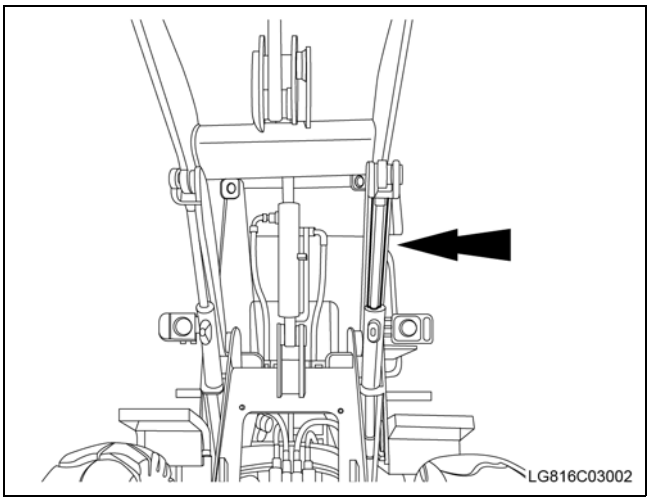
   (b) Start the engine, use the control lever to lift the bucket by 50 cm and then operate the lever again to dump the bucket mouth to the lowest point; lower the bucket by the control lever until the mouth touches the ground to support the frame and the tyres are 1 cm away from the ground.

   (c) Place the tooling stool under the front frame to support it.



2. Lift the boom and lower the bumper

   Collect the bucket to the end by operating the control lever, then lift the boom with operation of control lever again; place the bumper to the piston rod of boom cylinder; put down the boom to make the bumper support the boom and prevent the bucket sliding down.



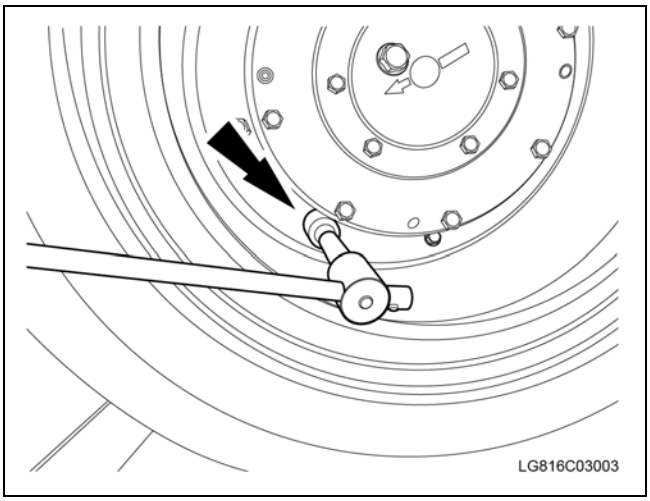
3. Remove rim nut

   Make sure support the tyre with two persons or more. Remove the rim nut with 30 # wrench, rod and ratchet wrench(or special wrench).

   ⚠ Note: the rim nut of left tyre is with left-hand thread and should be

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removed clockwise; the right rim nut is with right-hand thread and should be removed from the lower position to upper position.



4. Remove the tyre

Remove the front tyre and roll it to the level ground to place it for repair or replacement.

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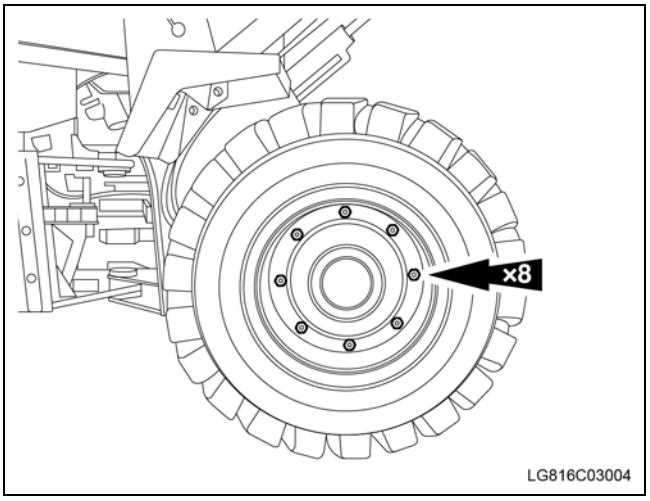
Installation

1. Install the front tyre

   Lift the required tyre to the front axle by traveling the machine to align the installation hole of rim with the rim bolt on the axle, then install the tyre to the axle.

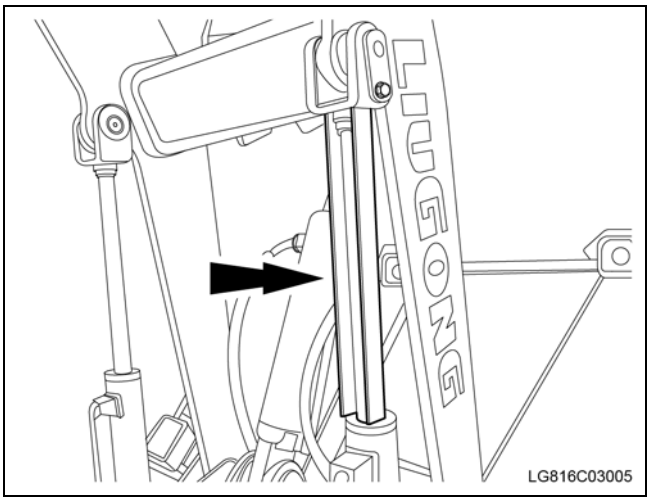
2. Install rim nut

   Coat threadlocker to the rim bolt and install the rim nut. Tighten the rim nut with 30# socket, rod and ratchet wrench by the crossing sequence with tightening torque of 310±45N•m.



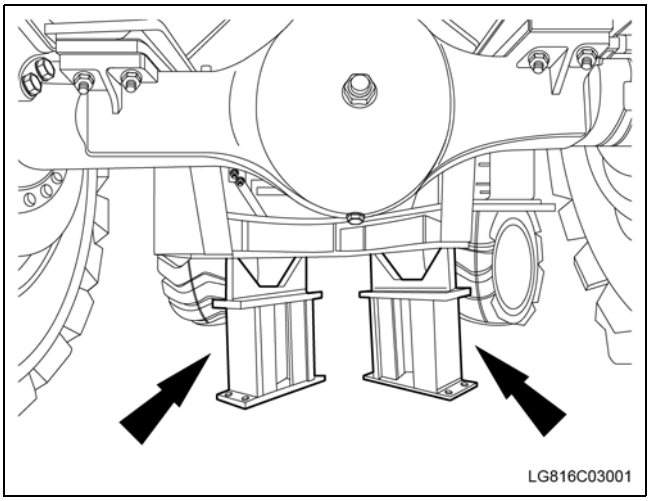
3. Lift the boom and remove the bumper

   Start the engine, dump the bucket to the end by operating the control lever; then lift the boom by operating the control lever again to remove the bumper.



4. Lower the boom to support the front frame

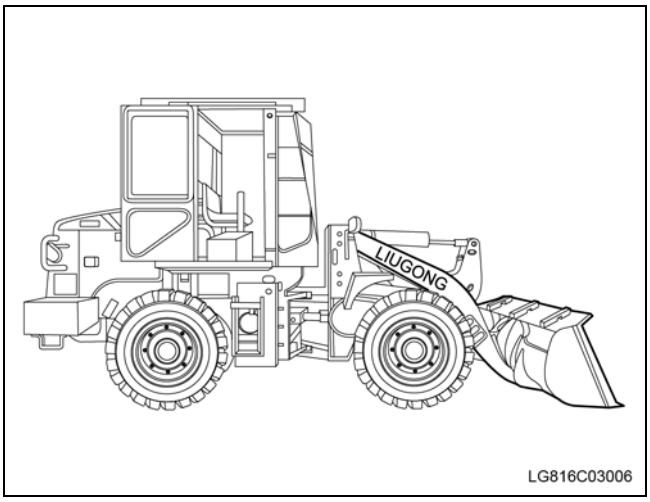
   Lower the boom by operating the control lever until the bucket mouth touches the ground and support the front frame to keep away from the tooling stool; remove the stool.



5. Lay down the complete machine

   Lift the boom by operating the control lever until the front tyre is placed to the ground steadily; collect and lay down the bucket.

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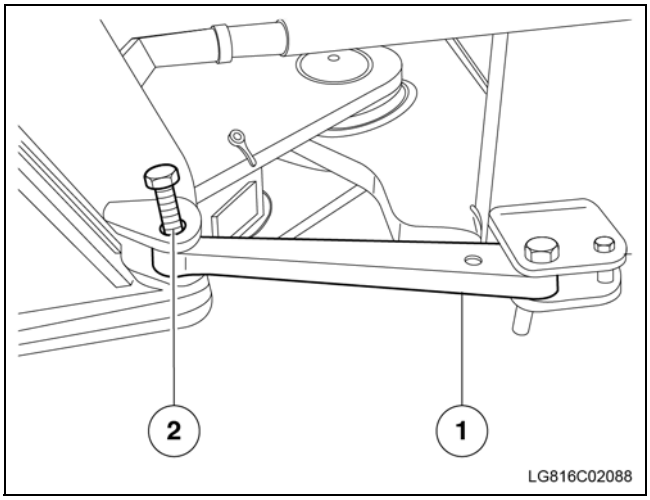


Rear tyre

Removal

1. Lay down the complete machine

   Park the machine onto the level ground, pull up the hand brake handle and connect the other end of anti-rotating bumper to the front frame to avoid relative rotation of front and rear frame. Start the engine and lift the bucket by 10cm with operation of control lever.

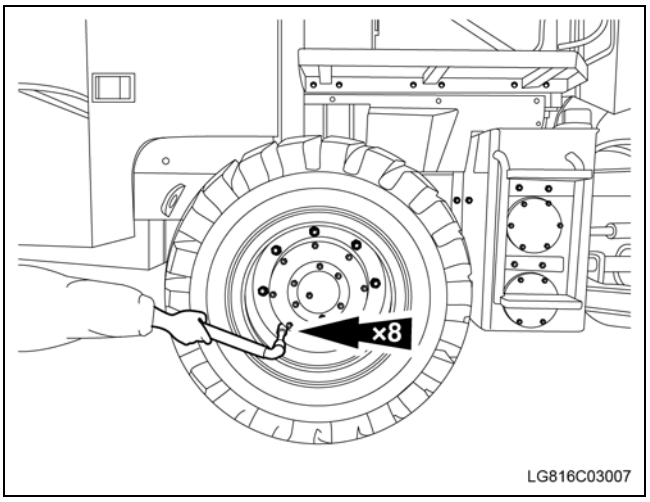


2. Unscrew the rim nut

   Unscrew the rim nut by one circle with 30# socket, rod and ratchet wrench or special wrench, do not remove the nut temporarily.

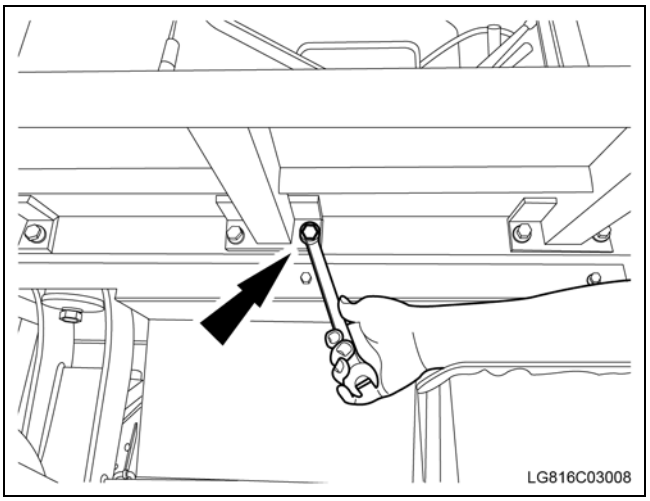
   ⚠ Note: the rim nut of left tyre is with left-hand thread and should be removed clockwise; the right rim nut is with right-hand thread.

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3. Remove fender

Install the lifting ring on the fender and hook the fender with the ring by traveling machine and lifting appliances; remove the fender with 18 # wrench and lift the it to the level ground to place.

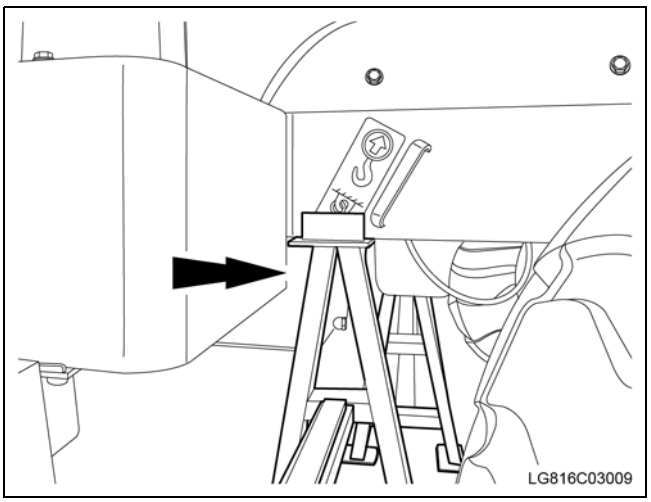


4. Remove the traction pin and support the rear frame

(a) Remove the traction pin with nipper plier.

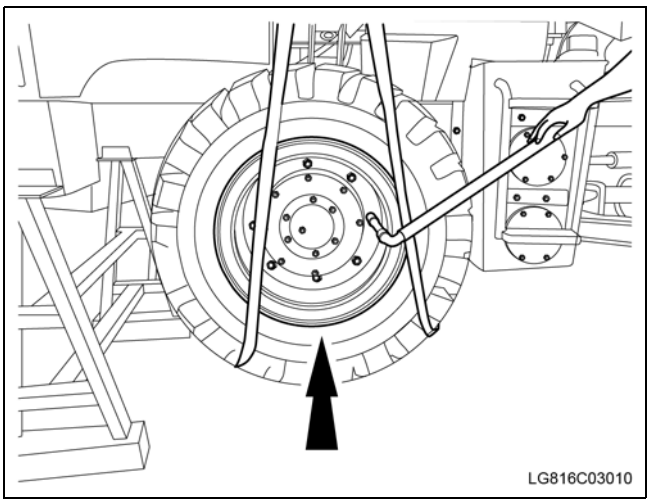
(b) Lift the rear frame on the position of lifting eye of traction pin by traveling machine and lifting appliances until the rear tyre is 1 cm away from the ground.

(c) Support the side plate between the lifting eyes of both sides on the rear frame and the battery box respectively using two tooling stools (or other stools with the same or higher strength).



5. Remove rim nut

Hang the tyre by traveling the machine and lifting appliances; remove the rim nut with 30# socket, rod and ratchet wrench or special wrench (the rim nut of left tyre is with left-hand thread and should be removed clockwise; the right rim nut is with right-hand thread). should be removed from the lower position to upper position).



6. Remove the tyre

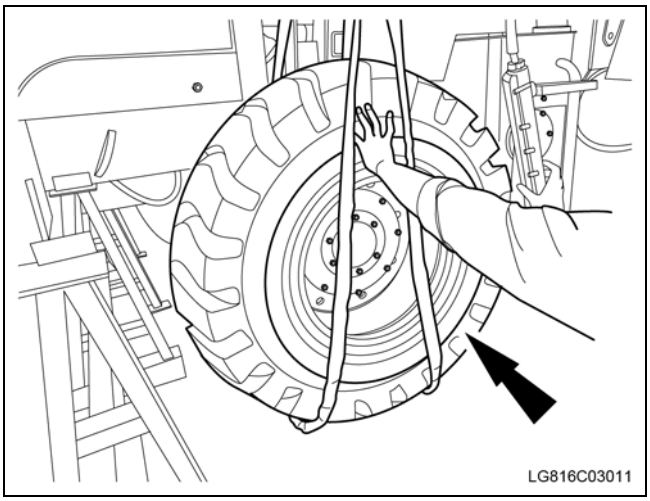
Lift the rear tyre to the level ground to place it for repair.

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Installation

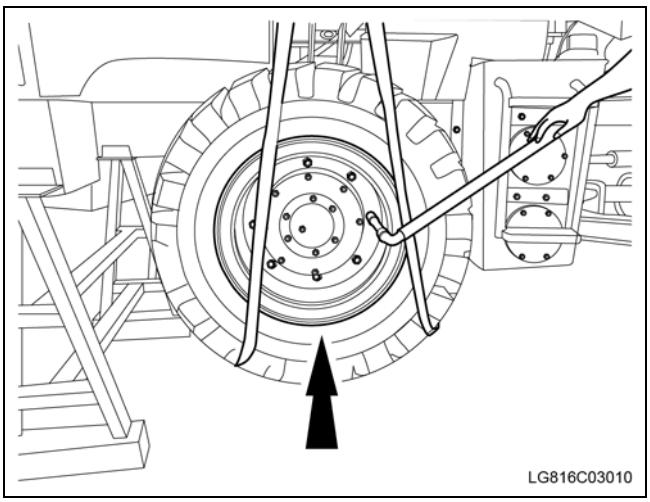
1. Install the rear tyre

Coat threadlocker to the rim bolt; lift the required tyre to the front axle by traveling the machine to align the installation hole of rim with the rim bolt on the axle, then install the tyre to the axle.



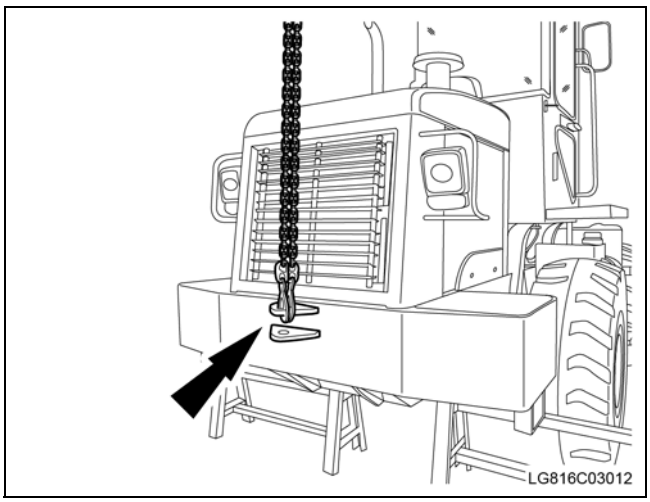
2. Install rim nut

Install the rim nut. Tighten the nut with 30# socket, rod and ratchet wrench by the crossing sequence (the rim nut of left tyre is with left-hand thread and should be tightened counterclock-wise; the right rim nut is with right-hand thread) with tightening torque of 310±45N•m.



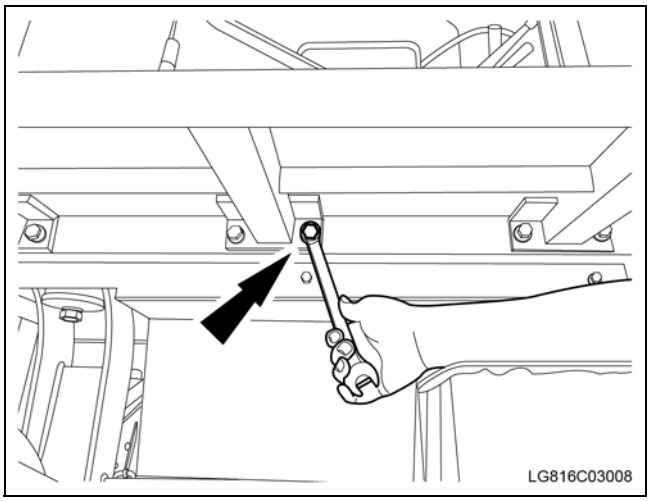
3. Remove the tooling stool

Lift the rear frame on the position of lifting eye of traction pin by traveling machine and lifting appliances until the rear frame is away from the tooling stool, remove the tooling stool and then operate the traveling machine to lower the frame; place the rear tyre onto the level ground steadily and remove the lifting appliances.



4. Install fender

Lift the fender to the cab side by traveling machine and lifting appliances; install the mounting bolt and washer and tighten them with 18# wrench with tightening torque of 90±12N•m.



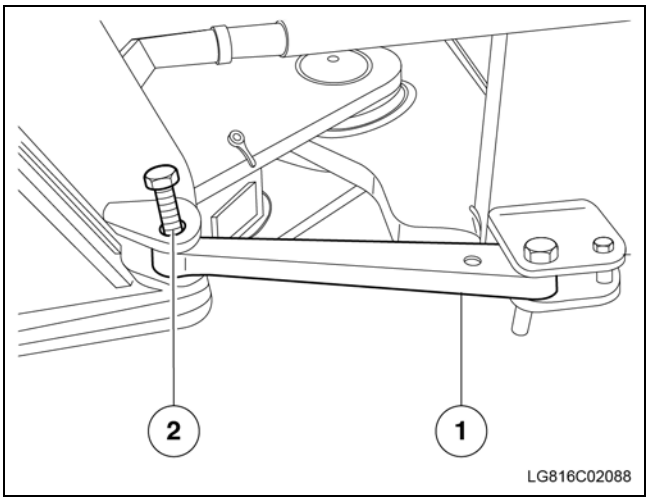
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Front drive shaft

Removal

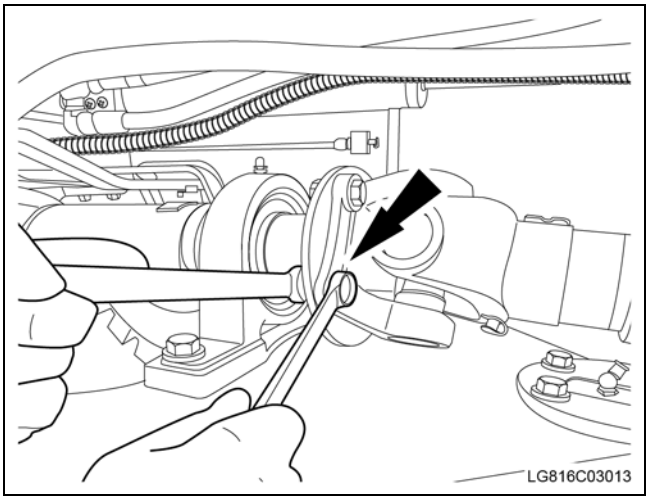
1. Lay down the complete machine

   Park the machine onto the level ground, pull up the hand brake handle and connect the other end of anti-rotating bumper to the front frame to avoid relative rotation of front and rear frame.



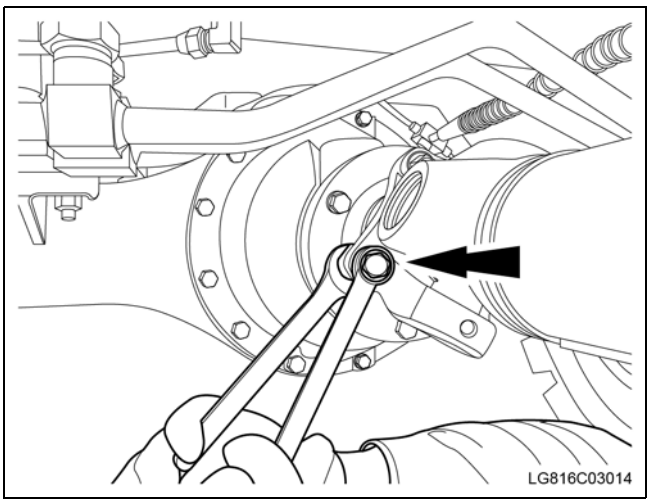
2. Remove front binder bolt and nut

   Fix the binder nut between the front drive shaft and middle drive shaft with 19# wrench; remove the binder bolt with 17# wrench.



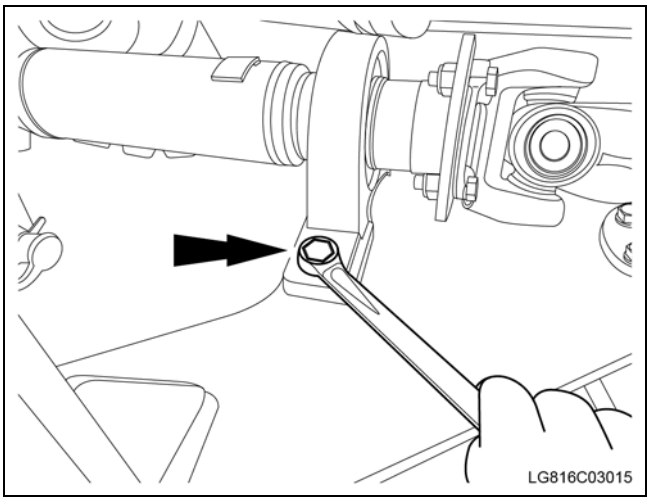
3. Remove the rear binder bolt and nut

   Fix the binder nut between the front drive shaft and front axle with 19 # wrench; remove the binder bolt with 17 # wrench.



4. Remove middle support

   Remove the middle support captive bolt between the rear end of front drive shaft and front frame with 21# wrench; remove the front drive shaft for repair or replacement.

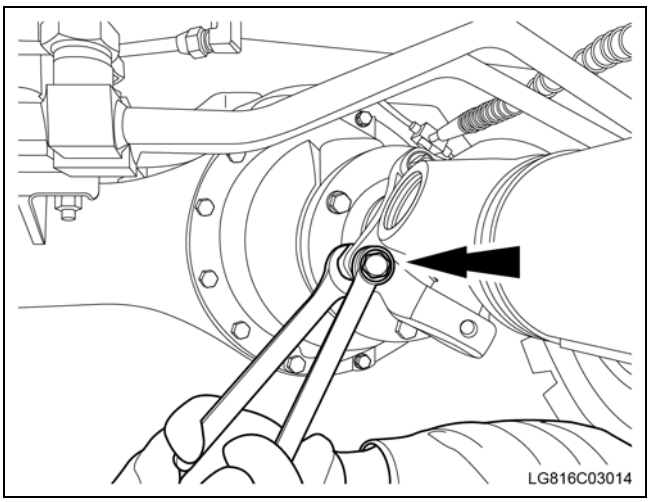


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Installation

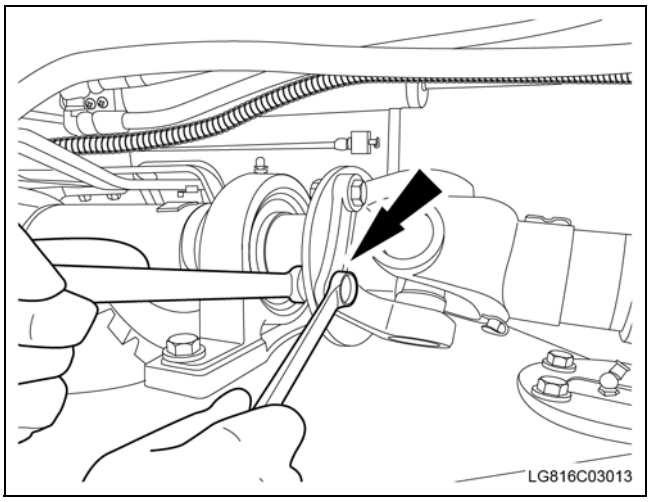
1. Connect the front axle

   Connect the mounting flange of front drive shaft and mounting surface of front axle; install the bolt and locknut and tighten then with 17# and 19# wrench and the tightening torque is 90±12N•m; fix the middle support to the front frame with middle support mounting bolt and pre-tighten the bolt.



2. Connect middle drive shaft

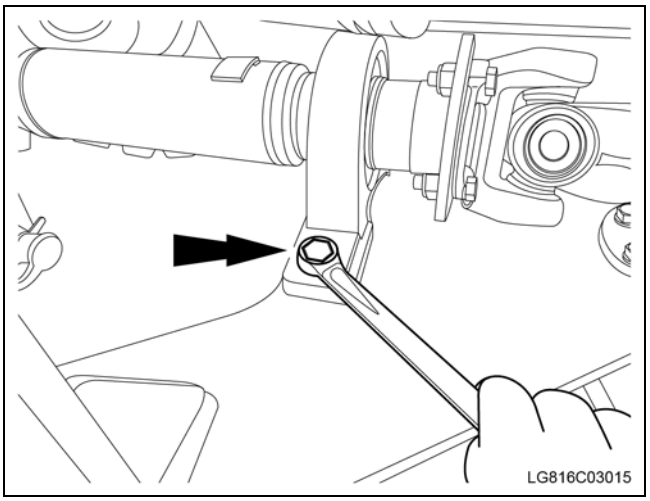
   Connect the flange of front drive shaft middle support end and mounting surface of middle drive shaft with bolts and nuts; tighten them with 17 # and 19 # wrench and the tightening torque is 90±12N•m;



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3. Tighten the middle support

Tighten the middle support mounting bolt with 21# wrench with tightening torque of 145±20 N•m.

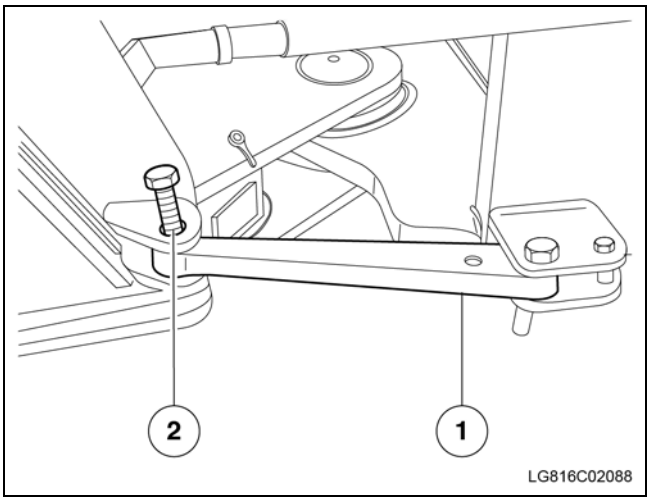


Middle drive shaft

Removal

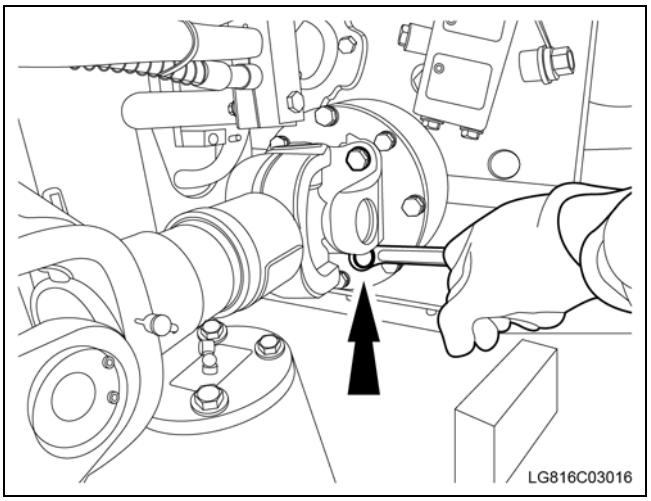
1. Lay down the complete machine

Park the machine onto the level ground, pull up the hand brake handle and connect the other end of anti-rotating bumper to the front frame to avoid relative rotation of front and rear frame.



2. Remove the rear binder bolt

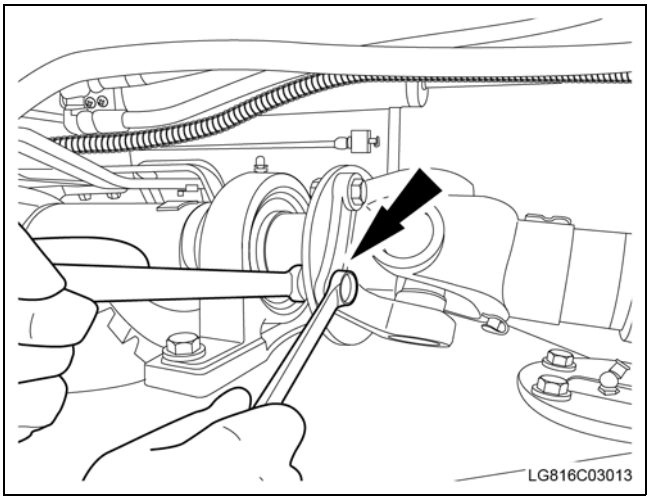
Remove the binder bolt of middle drive shaft and mounting surface of gear box with 19# wrench.



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3. Remove the front mounting bolt

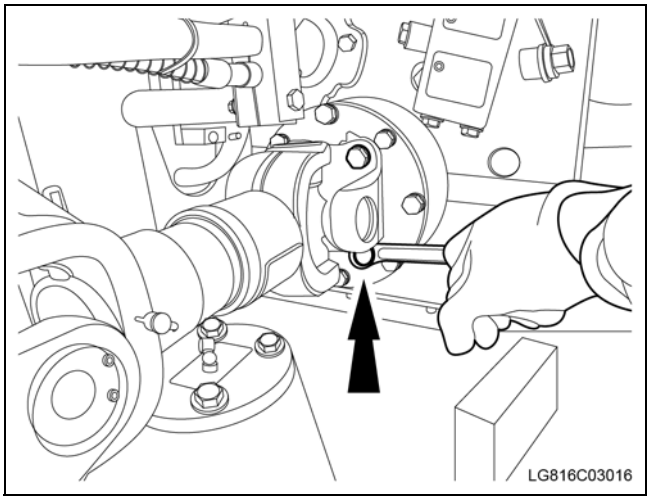
Fix the binder nut between the front drive shaft and middle drive shaft with 19 # wrench; remove the binder bolt with 17 # wrench and remove the middle drive shaft for repair or replacement.



Installation

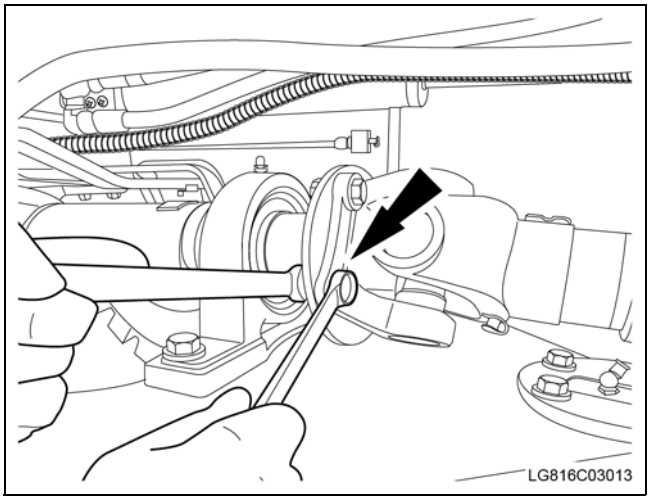
1. Connect the gearbox

Connect one end of middle drive shaft without grease to mounting surface of gearbox with bolts and nuts and tighten them with 19# wrench. The tightening torque is 90±12N•m.



2. Connect front drive shaft

Connect the flange of front drive shaft middle support and mounting surface of middle drive shaft with bolts and nuts; tighten them with 17 # and 19 # wrench and the tightening torque is 90±12N•m;



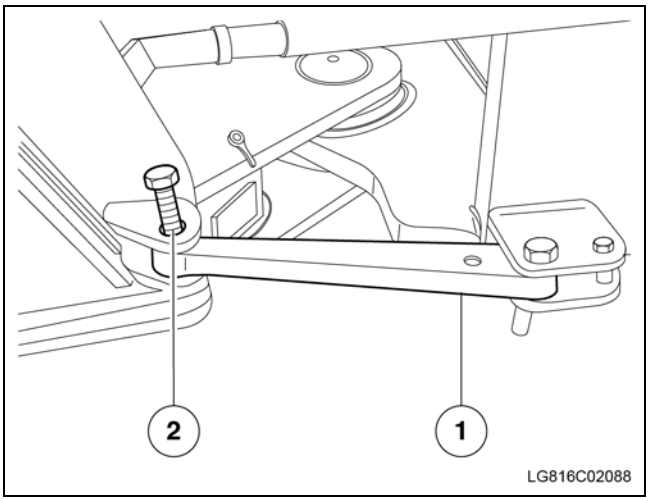
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Rear drive shaft

Removal

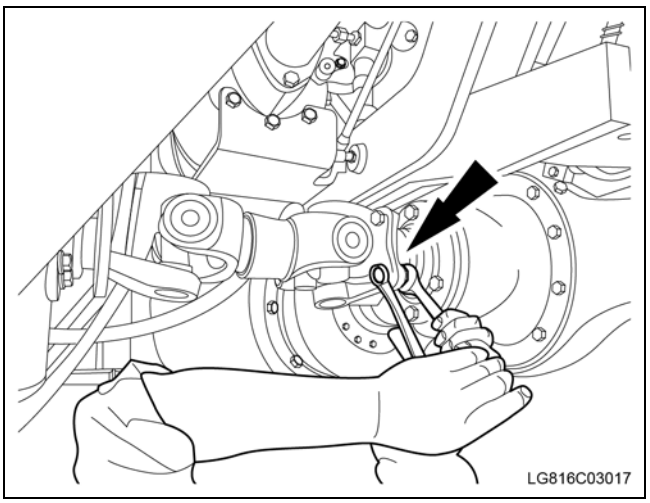
1. Lay down the complete machine

   Park the machine onto the level ground, pull up the hand brake handle and connect the other end of anti-rotating bumper to the front frame to avoid relative rotation of front and rear frame.



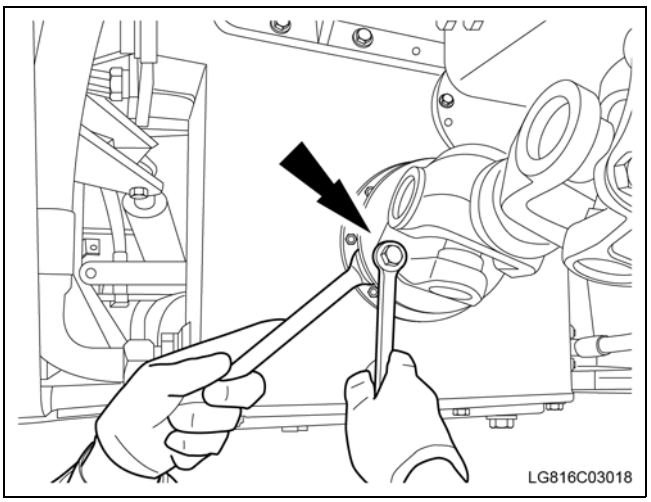
2. Remove the rear binder bolt

   Remove the binder bolt and nut of rear drive shaft and mounting flange of rear axle with 17# and 19# wrench to take down the drive shaft of this end.



3. Remove the front binder bolt

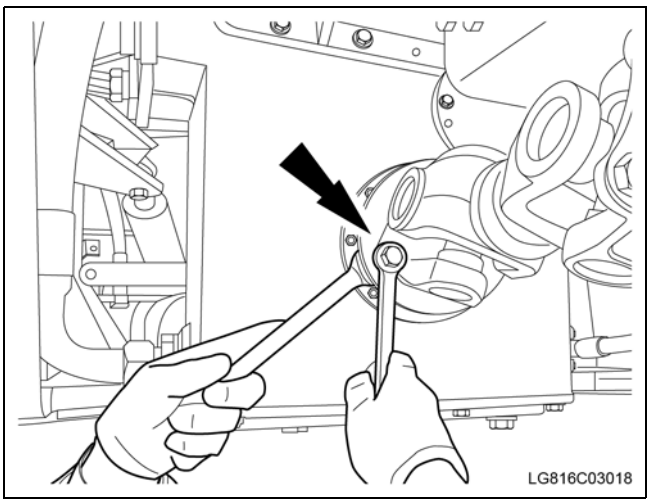
   Remove the binder bolt and nut of rear drive shaft and mounting surface of gearbox with 17# and 19# wrench to take down the rear drive shaft for repair or replacement.



Installation

1. Connect the gearbox

   Connect rear drive shaft to mounting surface of gearbox with bolts and nuts and tighten them with 17# and 19 # wrench. The tightening torque is 90±12N•m.

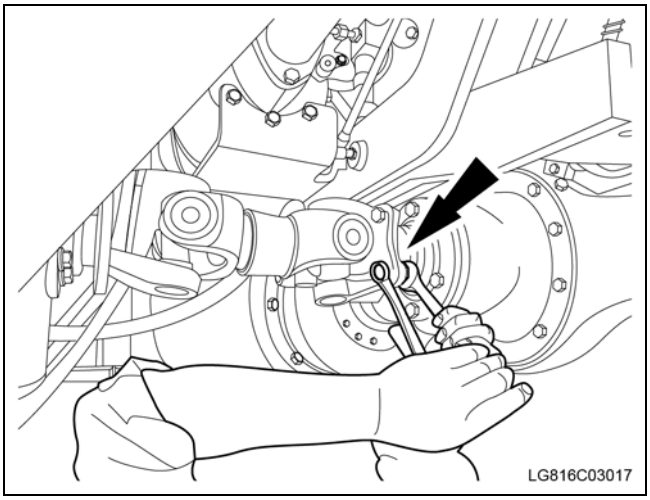


2. Connect the rear axle

   Connect rear drive shaft to mounting surface of

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rear axle with bolts and nuts and tighten them with 17# and 19# wrench. The tightening torque is 90±12N•m.

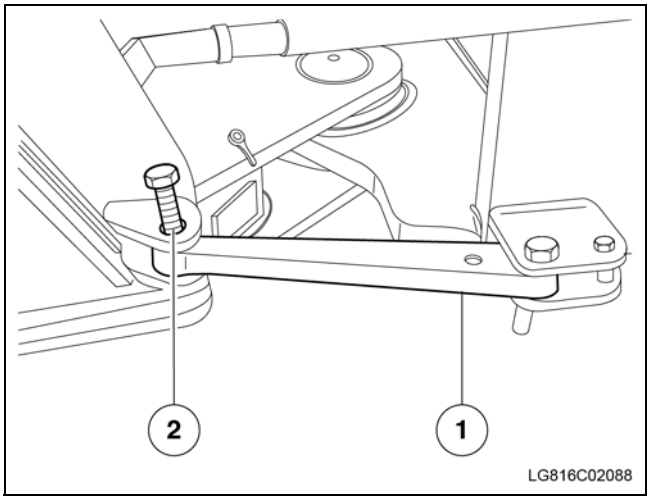


Drive shaft with coupling sleeve

Removal

1. Lay down the complete machine

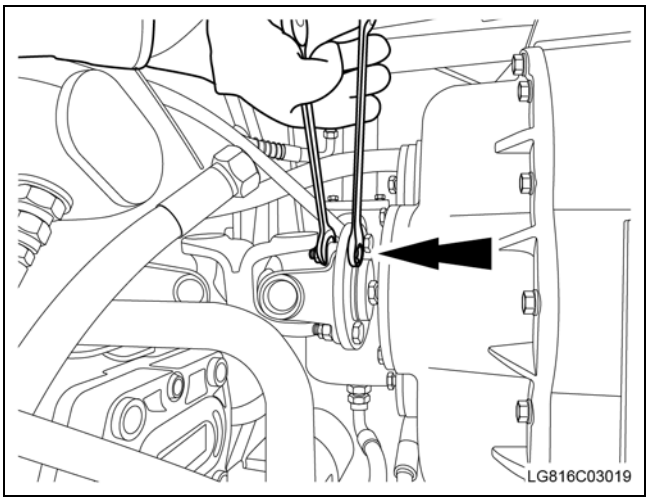
   Park the machine onto the level ground, pull up the hand brake handle and connect the other end of anti-rotating bumper to the front frame to avoid relative rotation of front and rear frame.



2. Remove the front mounting bolt

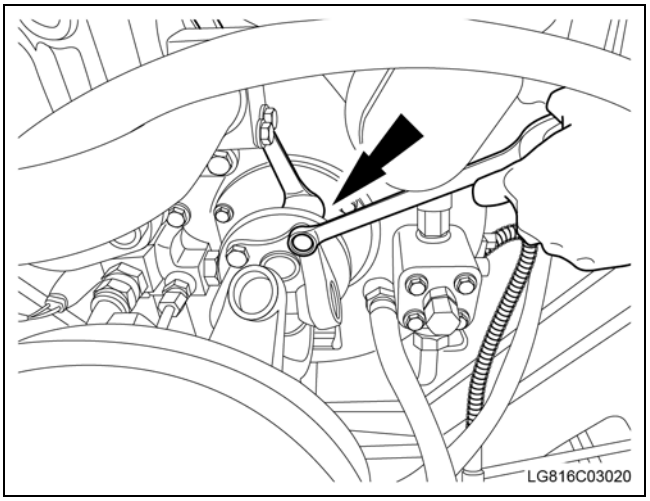
   Unscrew the binder bolt of front end flange on drive shaft with coupling sleeve and internal spline flange of gearbox with 17 # and 19 # wrench; remove the drive shaft and internal spline flange.

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3. Remove the rear mounting bolt

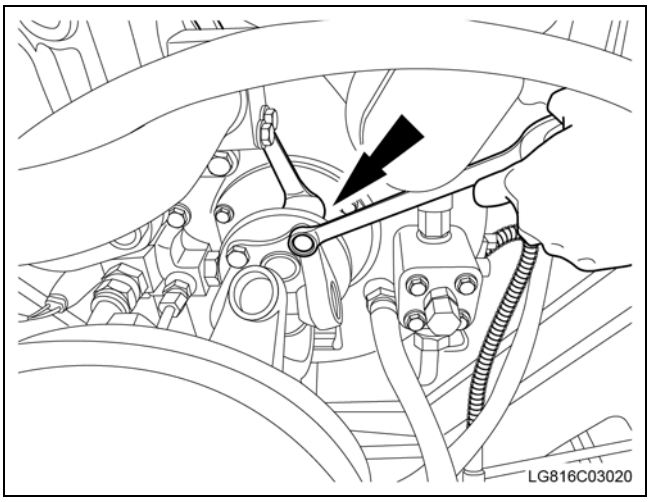
Fix the binder nut between the drive shaft with coupling sleeve and torque converter flange with 19# wrench; unscrew the binder bolt with 18# wrench and remove the drive shaft with coupling sleeve for repair or replacement.



Installation

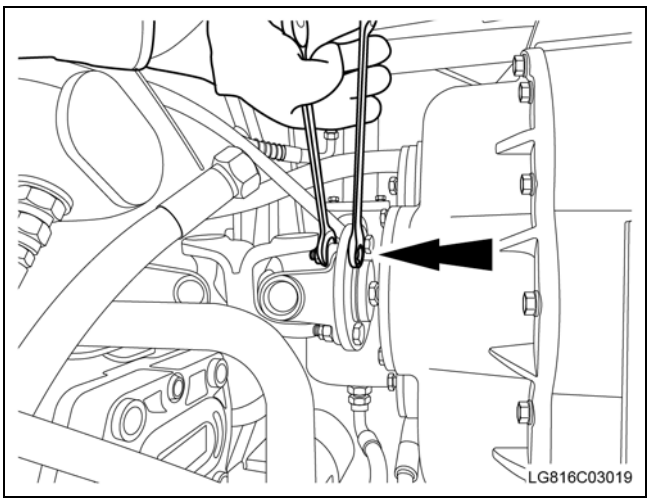
1. Install the rear mounting bolt

Connect the rear end of drive shaft with coupling sleeve to the torque converter flange with removed bolts and nuts; tighten them with 18 # and 19 # wrench and with tightening torque of 90±12N•m.



2. Install the front mounting bolt

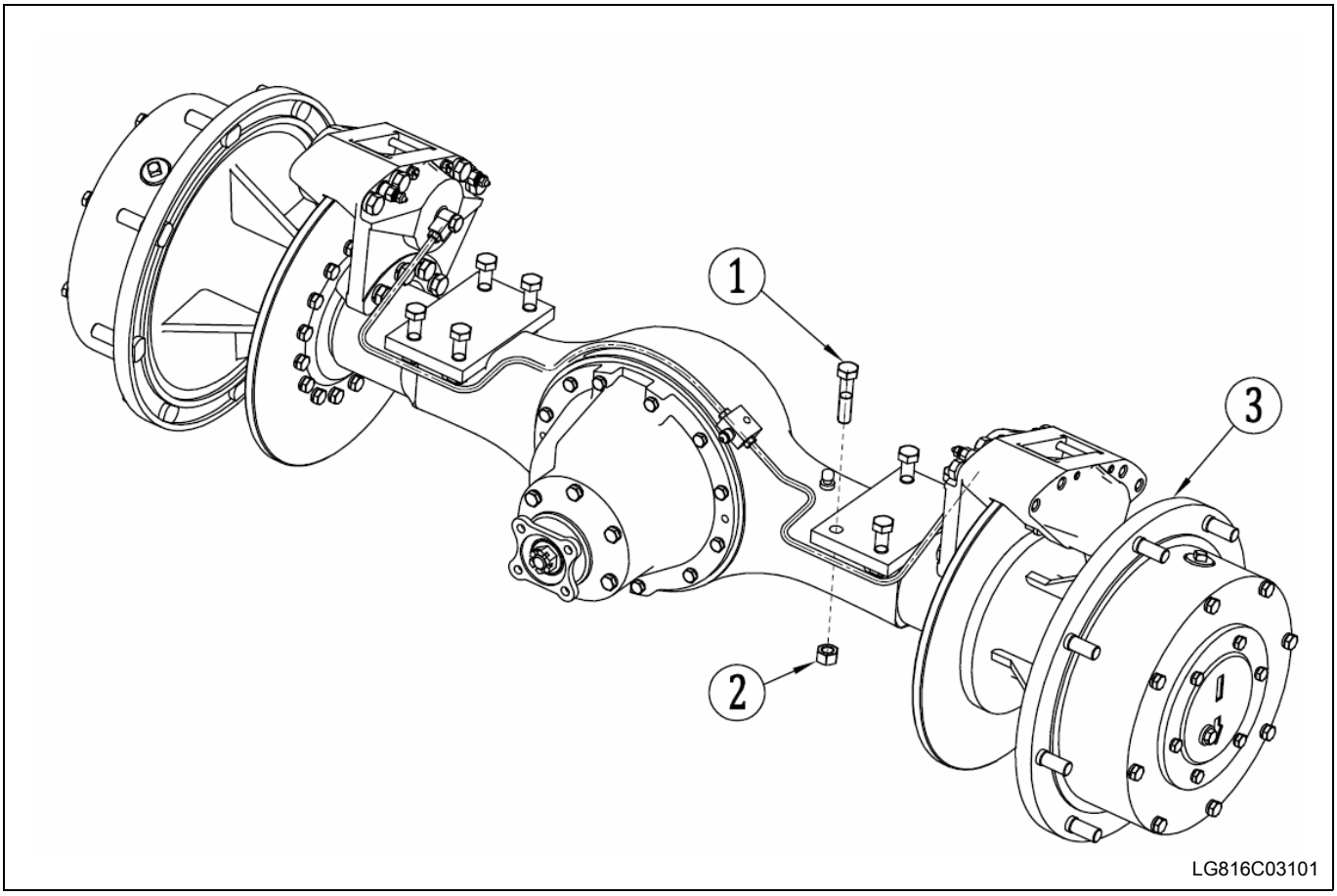
Install the internal spline flange into the gearbox; connect the front end of drive shaft with coupling sleeve to the internal spline flange with removed bolts and nuts; tighten them with 18# and 19# wrench and with tightening torque of 90±12N•m.



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Front axle

Front Axle Mounting Components



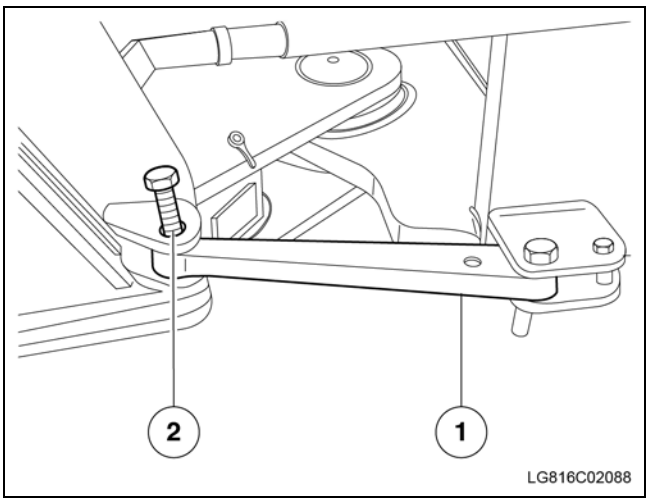
1. BOLT
2. NUT
3. FRONT AXLE

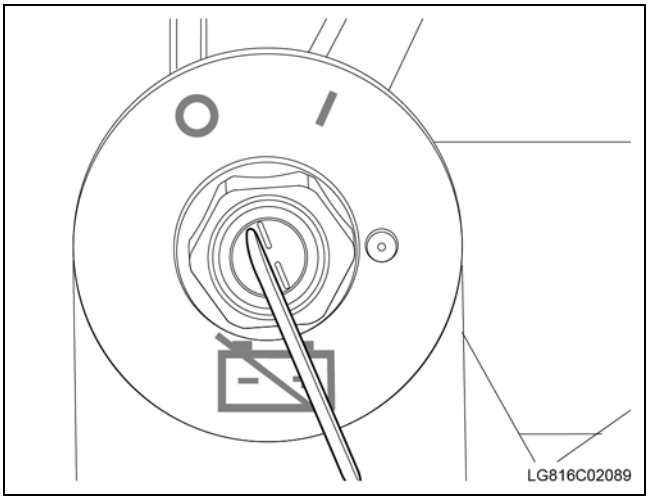
https://truckmanualshub.com/

Removal

1. Park the machine and discharge the pressure of the machine.

   (a) Park the machine on a flat ground, pull the parking brake to the up-most position. Remove the anti-rotating bumper (1)with a nipper plier, connect the bumper with the front and rear frames with its pin(2).





   (b) Push and pull the control rod forward and backward repeatedly to release the pressure in hydraulic system.

   (c) Step on the braking pedal for over 30 times to release the pressure in air piping.

   (d) Open left cover door, set the negative switch to power off state.

2. Remove the front tyre

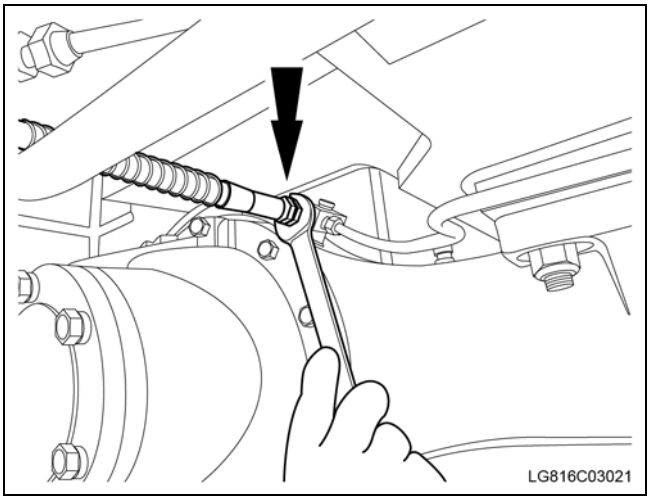
   Refer to “Removal and Installation of Power Train System”(p. 3-3)“Front tyre”(p. 3-4),to remove the front tyre.

3. Dismantle front drive shaft

   Refer to “Front tyre”(p. 3-4)step 2 to remove the connector of drive shaft and front axle.

4. Remove the brake hose

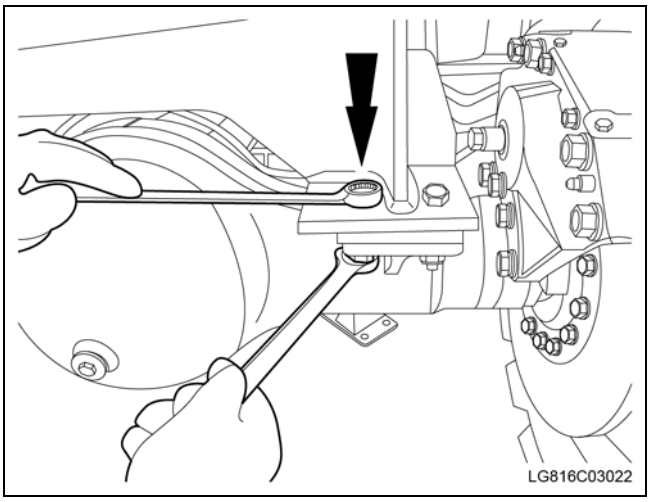
   (a) Remove the brake hose connecting with steel tube on the axle with 19# wrench; wrap up the hose connector and steel tube connector with clean plastic film and ties to avoid foreign material entering the hose.



5. Remove the bolts of axle

   (a) Hang the axle by traveling machine and lifting appliances. Drive the machine to tension lifting appliances upwards and jack up the axle; remove the bolts of axle with two 24# wrenches.

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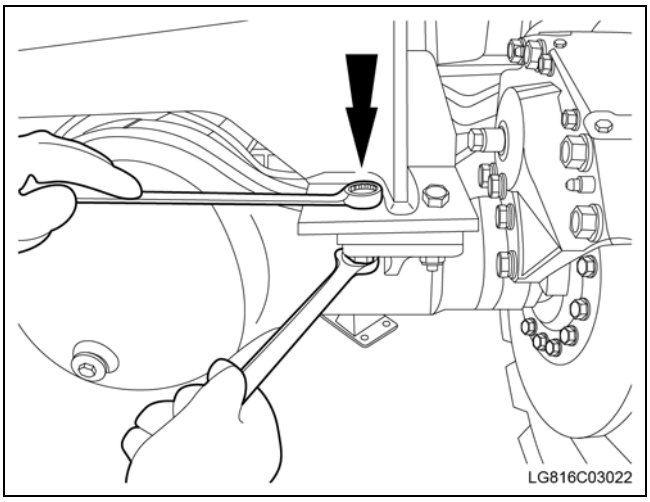
6. Remove the front axle

Lift the axle to the level ground to place it for repair or replacement.

Installation

1. Install the front axle

(a) Lift the required front axle to the mounting position under the front frame by traveling machine and lifting appliances; install the bolts and nuts of axle after aligning the mounting hole; tighten them with two 24 # wrenches and with tightening torque of 225±35N•m.

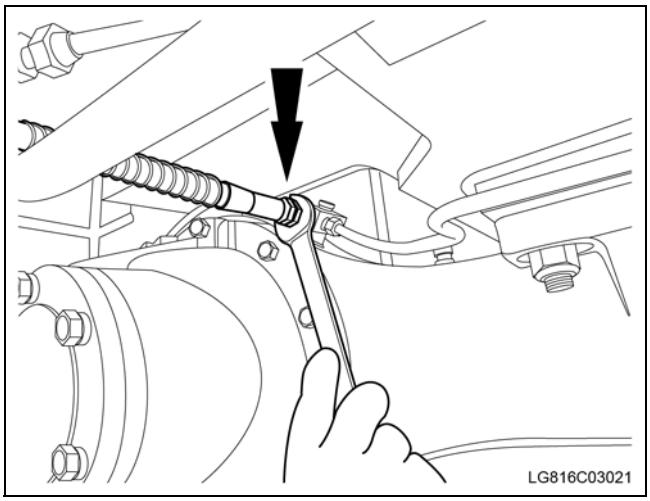


2. Install the front tyre

Refer to “Front tyre”(p. 3-4) to install two front tyres and lay down the bucket.

3. Install the brake hose

(a) Remove the protective plastic film on the steel tube connector of brake hose connector box; connect the brake hose connector with steel tube connector and tighten the connector with 19# wrench and with tightening torque of 30±4N•m.

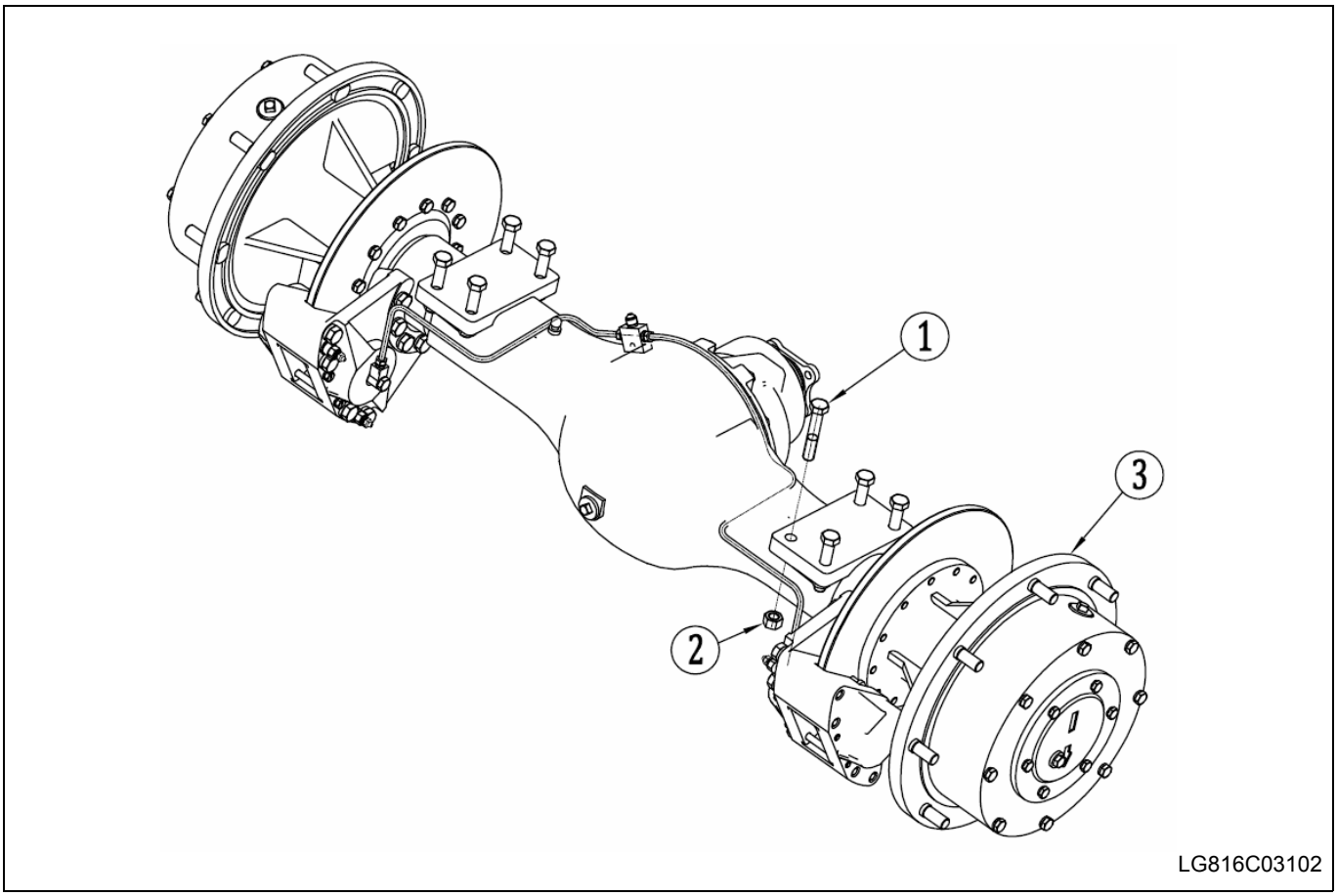


4. Install front drive shaft

Refer to “Front drive shaft”(p. 3-10) step 1 to assemble the front drive shaft onto the front axle.

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Rear axle



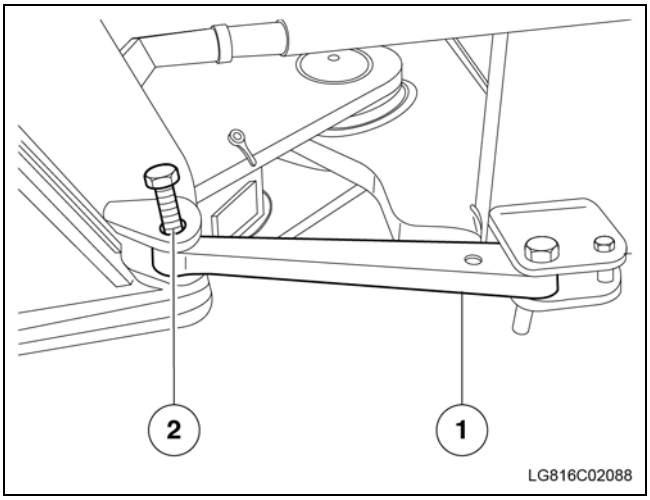
1. BOLT
2. NUT
3. REAR AXLE

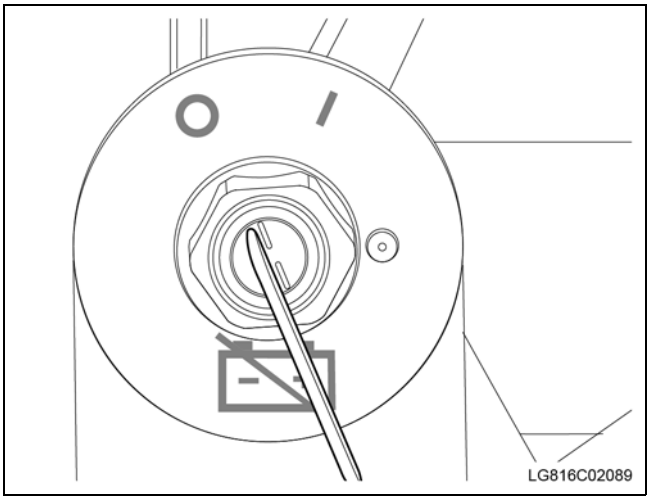
https://truckmanualshub.com/

Removal

1. Park the machine and discharge the pressure of the machine

   (a) Park the machine on a flat ground, pull the parking brake to the up-most position. Remove the anti-rotating bumper (1)with a nipper plier, connect the bumper with the front and rear frames with its pin(2).





   (b) Push and pull the control rod forward and backward repeatedly to release the pressure in hydraulic system.

   (c) Step on the braking pedal for over 30 times to release the pressure in air piping.

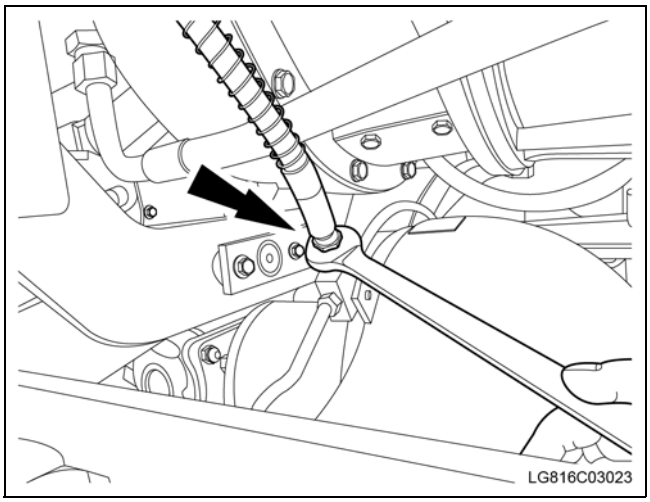
   (d) Open left cover door, set the negative switch to power off state.

2. Remove rear drive shaft

   Refer to “Rear drive shaft”(p. 3-14) to remove the rear drive shaft connecting with rear axle.

3. Remove the brake hose

   (a) Remove the brake hose of rear drive shaft connecting with brake steel tube connector on the rear axle with 19# wrench, and bind the connector with ties and plastic bags.



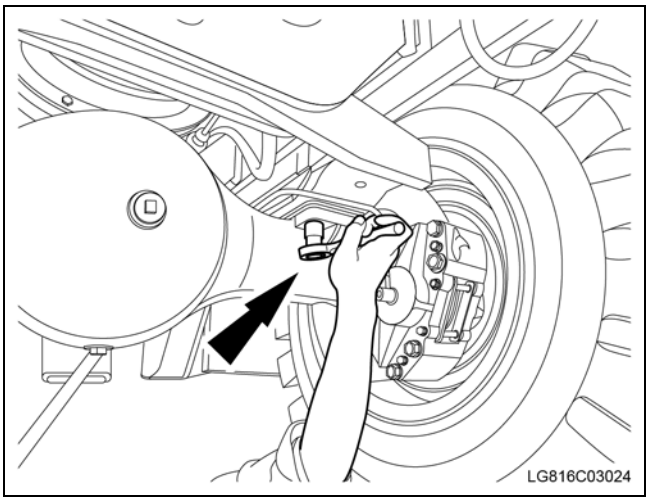
4. Remove the rear tyre

   Refer to “Front drive shaft”(p. 3-10) to remove the rear left and right tyres with 24# wrench.

5. Remove the bolts of axle

   (a) Hang the axle by two traveling machines and lifting appliances. Drive the machine to tension lifting appliances upwards and jack up the axle; remove the bolts of axle with 24# wrench and ratchet wrench.

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6. Remove the rear axle

Place a trolley under the rear axle, lower the rear axle and place it onto the trolley steadily. Pull out the trolley for repair or replacement of the axle.

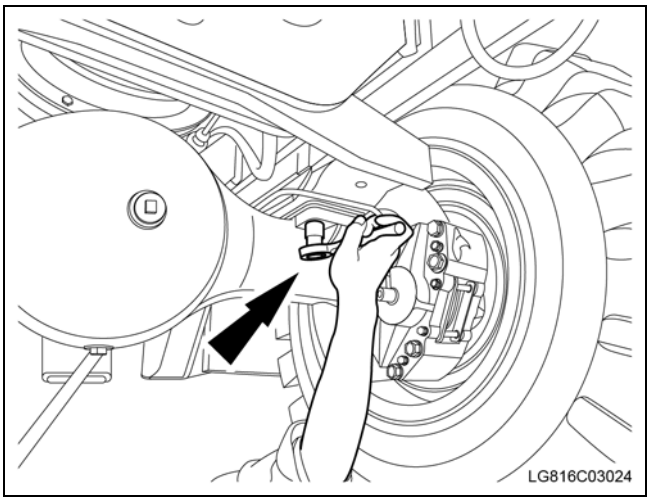
Installation

1. Place the rear axle

Place the required axle onto the trolley and push it under the mounting position of rear frame.

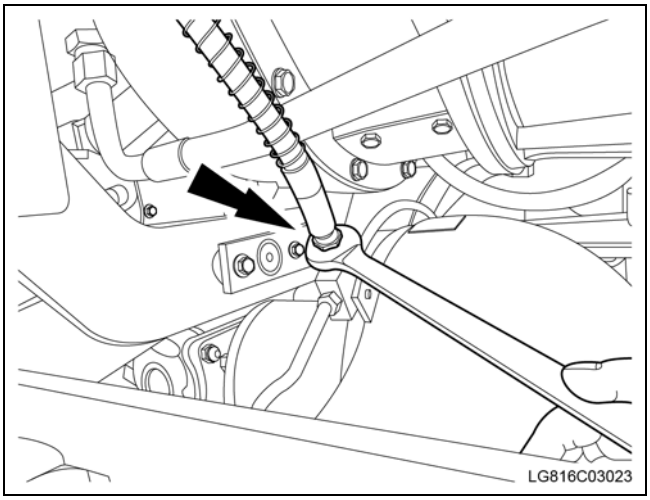
2. Lift and install the rear axle

(a) Lift the rear axle by traveling machine and lifting appliances to align the rear axle mounting hole with auxiliary frame mounting hole; then install the bolts and nuts of axle. Fix bolts head with 24# wrench and tighten the axle nuts with 24# socket and ratchet wrench; the tightening torque is 225±35N•m.



3. Install the brake hose

(a) Remove the protection on the brake hose and steel tube connector; connect the hose connector with steel tube connector and tighten the connector with 19# wrench and with tightening torque of 30±4N•m.



4. Install rear drive shaft

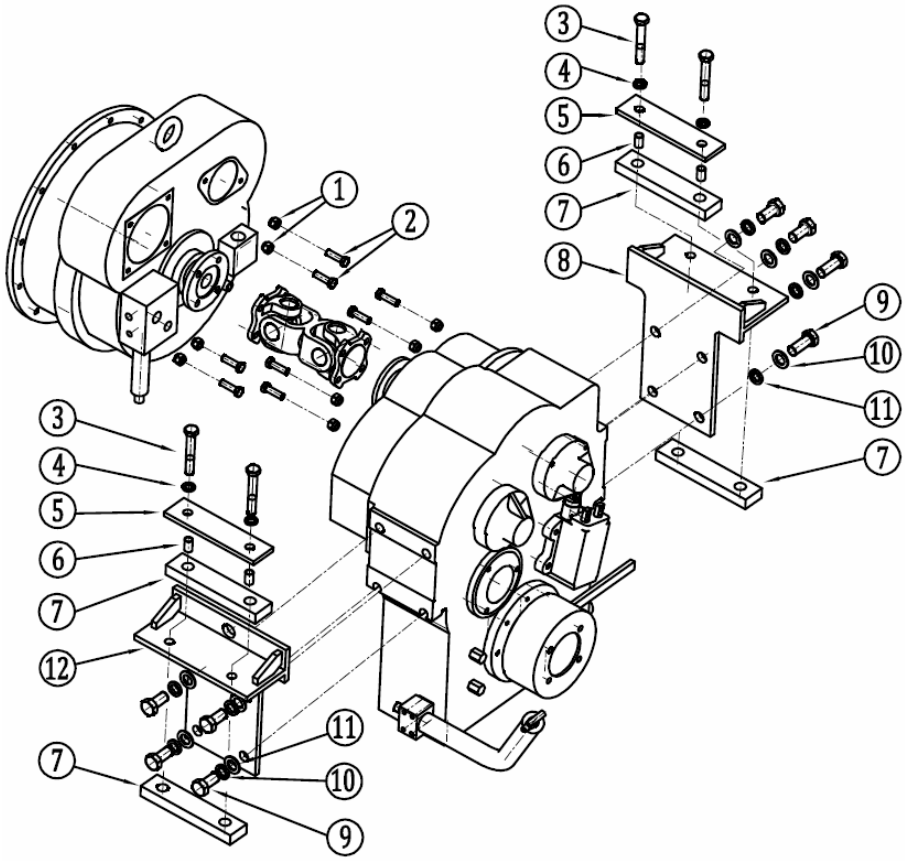
Refer to “Rear drive shaft”(p. 3-14) step 2 of installation to connect rear drive shaft to the rear axle and tighten them.

5. Install the rear tyre

Refer to “Front drive shaft”(p. 3-10), to assemble the left and rear right tyres onto the rear axle.

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Gearbox



1. LOCKNUT
2. BOLT
3. BOLT
4. WASHER
5. PLATE
6. BUSHING
7. CUSHION
8. BRACKET
9. BOLT
10 Washer
11. WASHER
12. BRACKET

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Removal

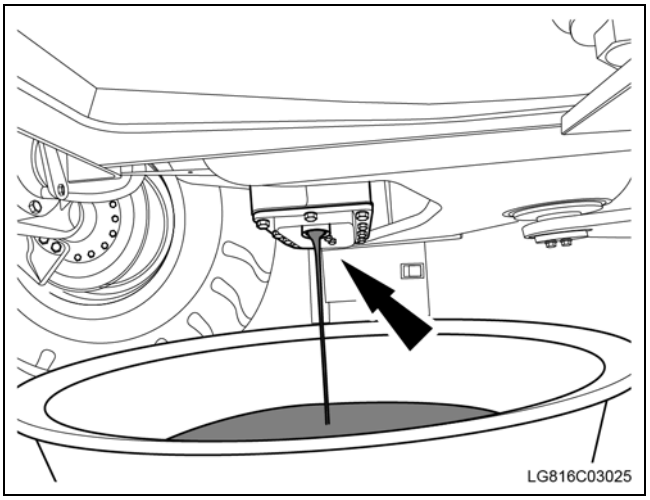
1. Dismantle and lift the cab

   Refer to “Removal of diesel fuel tank”(p. 2-35)step 1 -13 to remove the cab.

2. Drain out hydraulic transmission oil

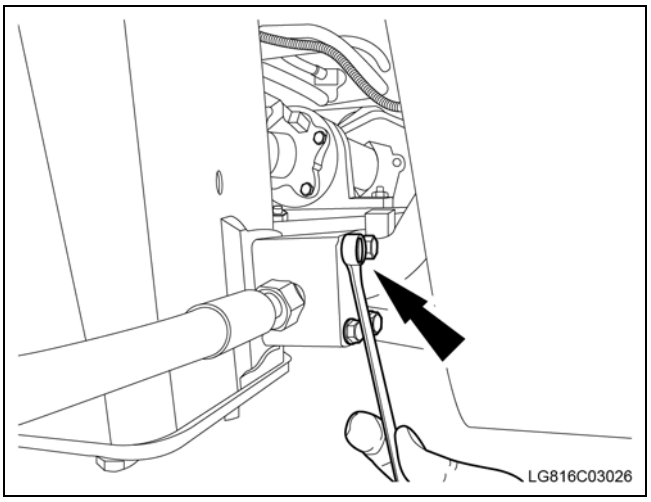
   (a) Place a clean oil basin under the gearbox, wipe clean the gearbox oil drain and the area around it with a clean wiping cloth.

   (b) Remove the oil drain nozzle of gearbox with clean 24# wrench and release all the hydraulic drive oil into the oil basin. Install the oil drain nozzle, remove the oil basin and perform good protection to avoid foreign material falling into the basin.



3. Remove gearbox filler tube

   (a) Remove the mounting bolt on the square flange of gearbox filler tube with 13# wrench, and protect the filler tube and gearbox upper connector with plastic bags and ties.



4. Remove rear drive shaft

   Refer to“Rear drive shaft”(p. 3-14) step 2 of removal to remove the connector of rear drive shaft and gearbox.

5. Remove middle drive shaft

   Refer to“Middle drive shaft”(p. 3-12) step 1 of removal to remove the connector of middle drive shaft and gearbox front mounting surface.

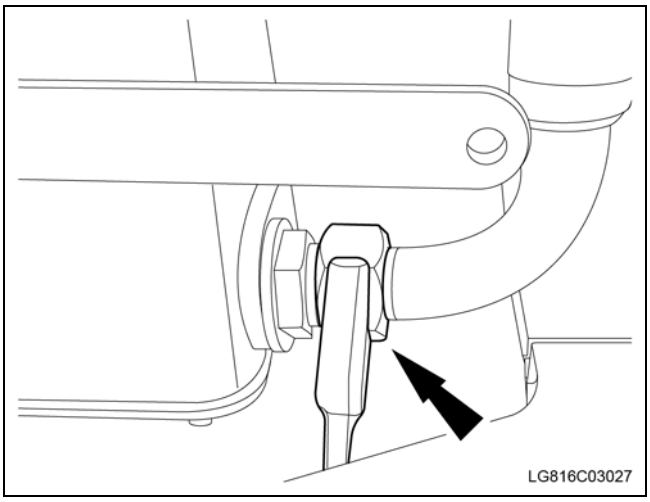
6. Remove drive shaft with coupling sleeve

   Refer to“Drive shaft with coupling sleeve”(p. 3-15) step 2 of removal to remove the connector of drive shaft with coupling sleeve and gearbox.

7. Remove variable pump suction hose

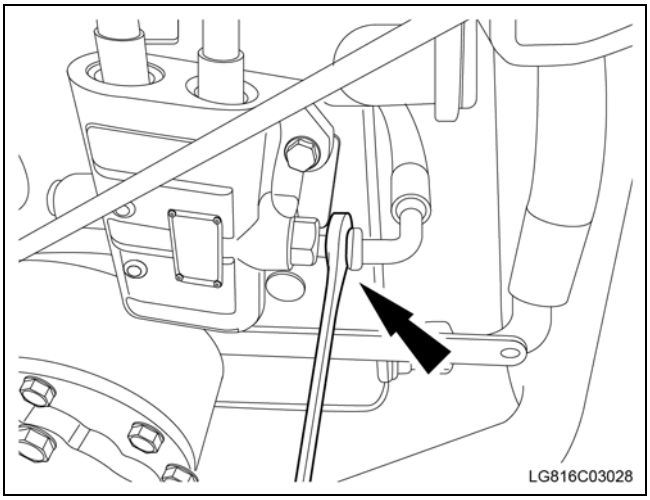
   (a) Remove the hose connector connecting the variable-speed pump of torque converter on the gearbox with 50# wrench and then protect the connector of hose and gearbox with plastic bags and ties.

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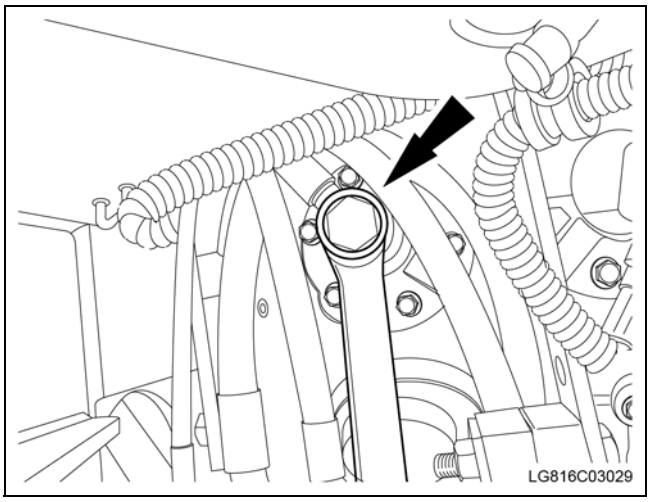
8. Remove shift control valve hose

(a) Remove the hose connector connecting the torque converter on the shift control valve with 24# wrench; take down the hose and protect the connector of hose and control valve with plastic bags and ties.



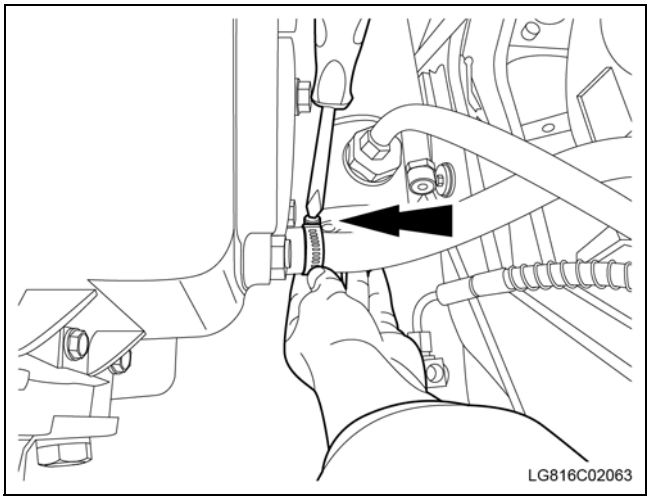
9. Remove the gearbox cooler hose

(a) Remove the bolt connecting the radiator hose connector on the gearbox with 32 # wrench, take down the connector and protect it with plastic bags and ties. Install the bolt onto the gearbox.



10.Remove torque converter return oil hose

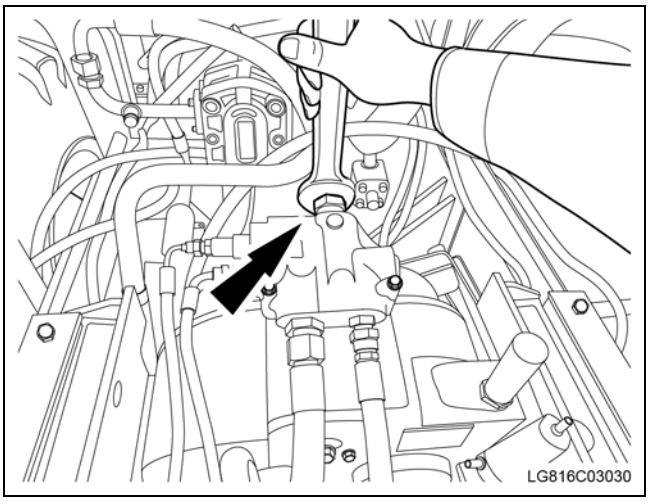
Unscrew the clamp tightening screw connecting the torque converter return oil hose with gearbox side with screwdriver or 8# wrench; take down the hose of this side and protect the hose and gearbox upper connector with plastic bags and ties.



11.Remove priority valve inlet hose

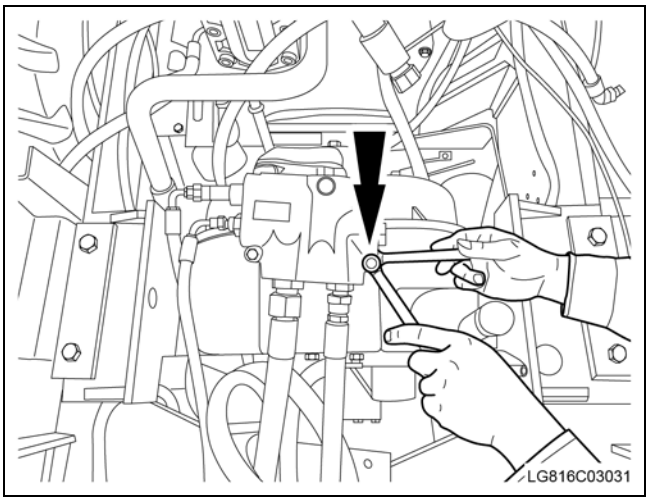
(a) Remove oil inlet hose connecting working pump on the priority valve with #36 wrench; protect the connector of hose and priority valve with plastic bags and ties.

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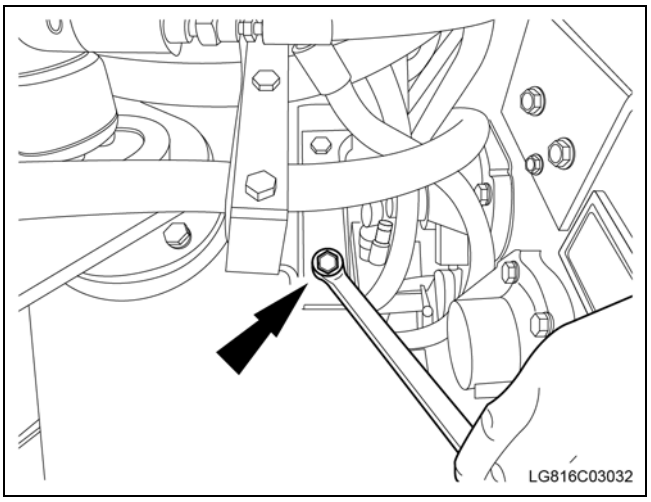
12.Remove the priority valve

(a) Fix the mounting nut of priority valve with a 13# wrench; remove the mounting nut of priority valve with a 13# wrench, and take down the priority valve from the gearbox.



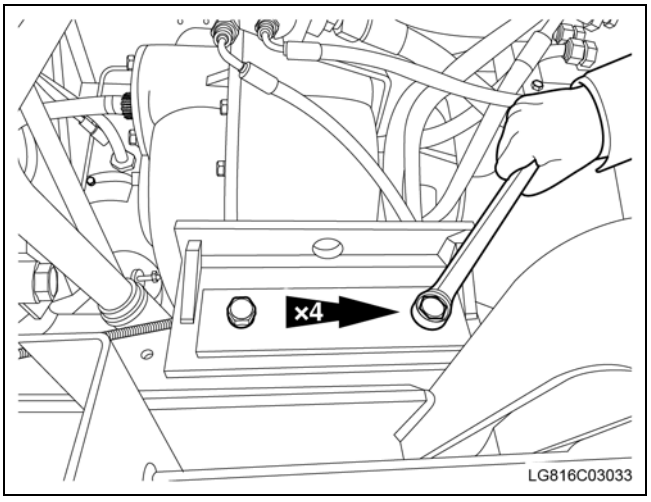
13.Remove the mounting plate of pipe clamp

(a) Remove the captive bolt on the mounting plate of pipe clamp with 16# wrench and take down the mounting plate.



14.Lift the gearbox

(a) Remove 4 mounting bolts of gearbox with 21# wrench.

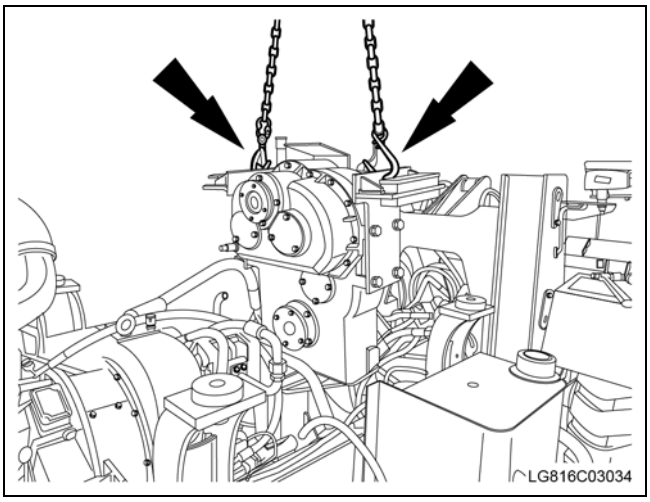


(b) Move the pipelines of converter to the front to avoid lifting gearbox being squeezed or bumped.

(c) Lift the gearbox by 10 cm with traveling machine and lifting appliances.

(d) Remove the connecting internal spline flange of drive shaft with coupling sleeve and then lift the gearbox onto the special tooling.

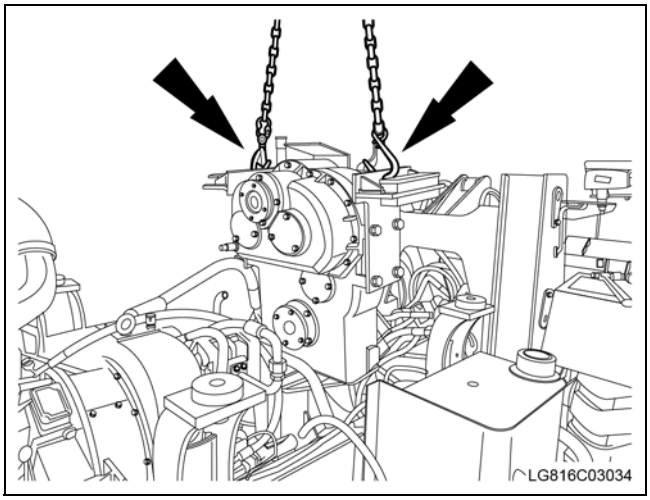
https://truckmanualshub.com/

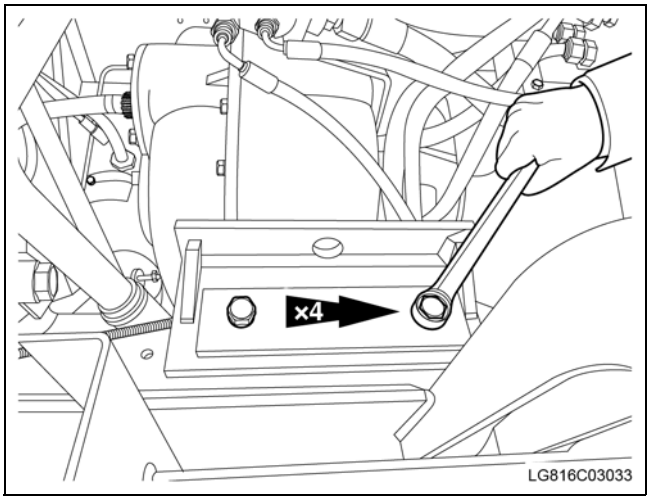


Installation

1. Install the gearbox

   (a) Lift the gearbox to the mounting position of 10 cm above on the rear frame by traveling machine and lifting appliances; install the removed shock pad, plate and mounting bolt. Tighten the bolt with 21# wrench with tightening torque of 145±20N•m.





2. Install middle drive shaft

   Refer to “Middle drive shaft”(p. 3-12)step 1 of installation to connect the rear end of middle drive shaft to the front mounting flange of gearbox and tighten it.

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3. Install rear drive shaft

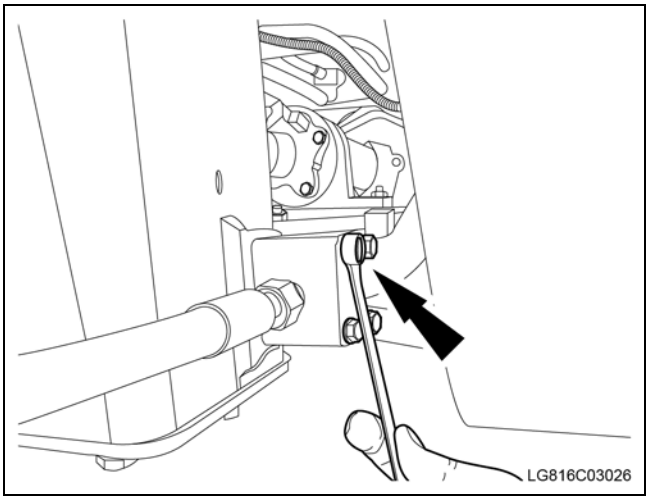
   Refer to “Rear drive shaft”(p. 3-14)step 1 of installation to connect the front end of rear drive shaft to the connecting flange on lower position of rear gearbox and tighten it.

4. Install drive shaft with coupling sleeve

   Refer to “Drive shaft with coupling sleeve”(p. 3-15)step 1 of installation to connect the rear end of drive shaft with coupling sleeve to the connecting flange on upper position of rear gearbox and tighten it.

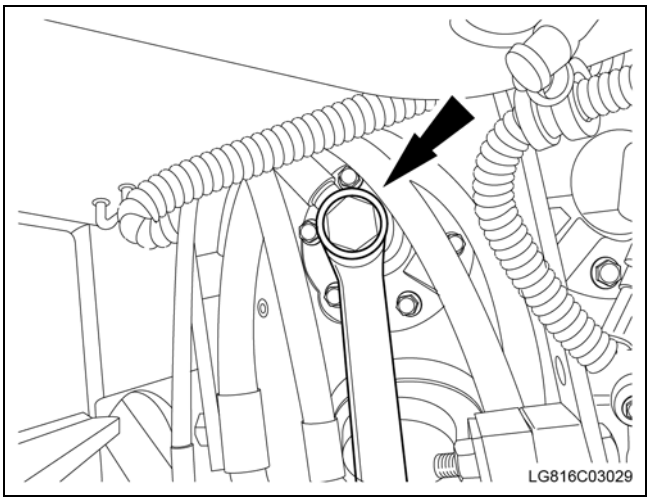
5. Install gearbox filler tube

   (a) Fix the filler tube to the oil filler of gearbox with previously removed bolts, tighten the bolts with #13 wrench and the tightening torque is 26±4N•m.



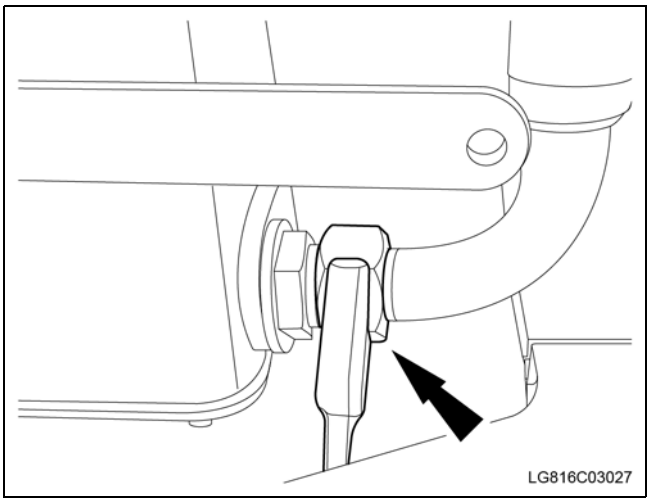
6. Connect the gearbox cooler hose

   (a) Remove the bolt on the cooler hose connector of gearbox and connect the hose connector onto the gearbox with bolts; tighten the captive bolts with 32# wrench and the tightening torque is 102±10N•m.



7. Install variable pump suction hose

   (a) Connect variable pump oil suction hose to the gearbox, replace the o-ring at the connection with new one, straighten out the hose along its direction free of twists and interference with other components, then tighten union nut with #50 wrench and the tightening torque is 190±20N•m.

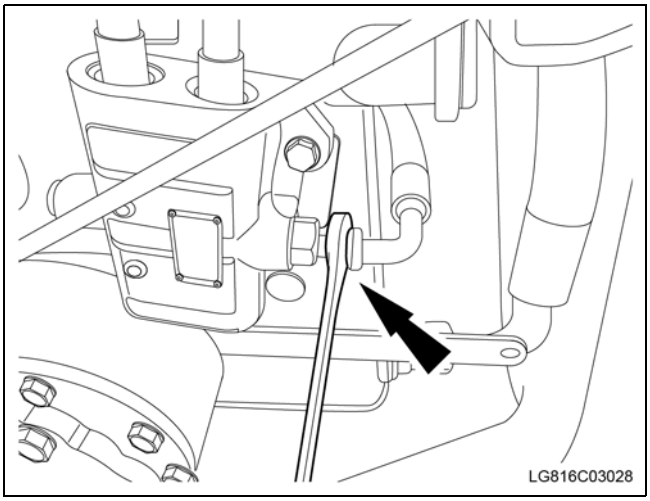


8. Install the shift control valve hose

   Connect shift control valve hose to the gearbox, replace the o-ring at the connection with new one, straighten out the hose along its direction free of twists and interference with other components, then tighten union nut with 24# wrench

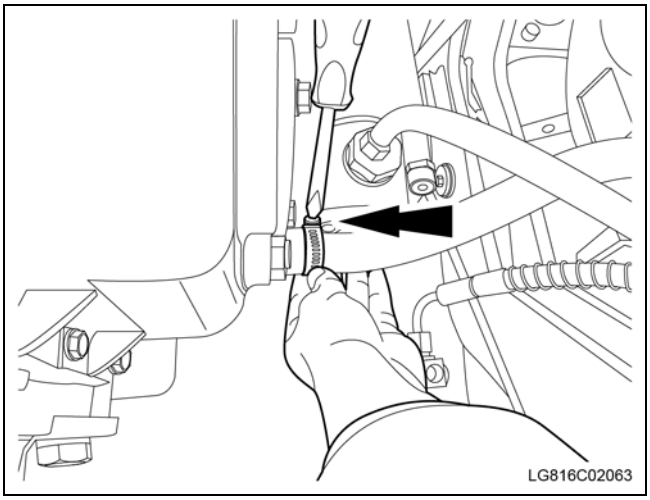
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and the tightening torque is 40±5N•m.



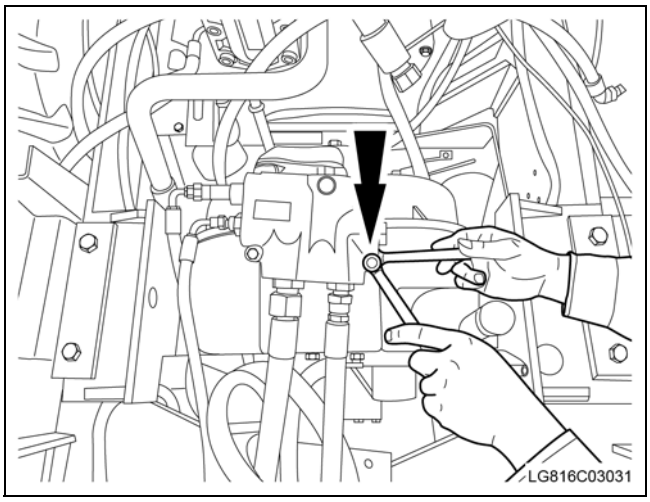
9. Install the torque converter return oil hose

(a) Connect torque converter return oil hose to gearbox, straighten out hose along its direction free of twists and interference, then tighten setscrew of hose clamp with a screwdriver.



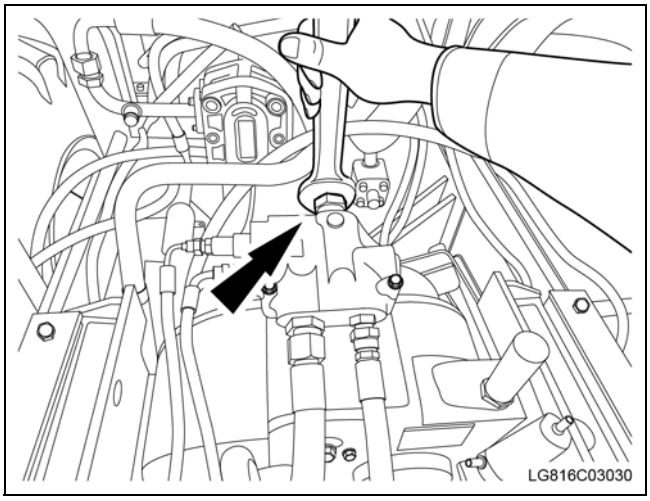
10.Install the priority valve

Fix the priority valve to the mounting plate with previously removed bolts and nuts, tighten the bolts with two 13# wrenches and the tightening torque is 26±4N•m.



11.Install priority valve inlet hose

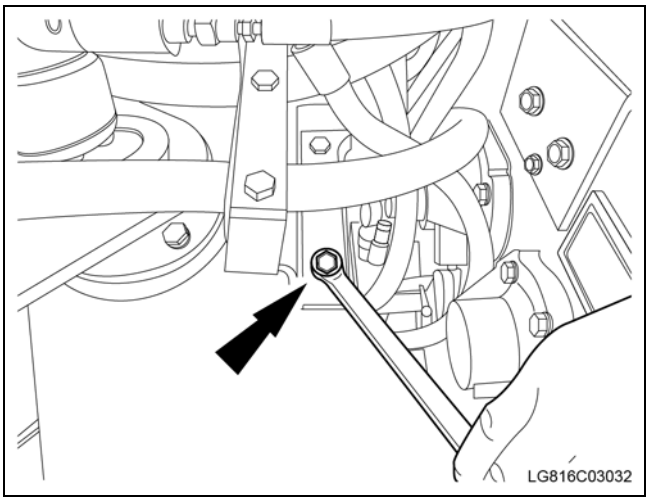
Connect priority valve inlet hose to the priority valve connector, replace the o-ring at the connection with new one, straighten out the hose along its direction free of twists and interference with other components, then tighten union nut with 36# wrench and the tightening torque is 120±15N•m.



12.Install the mounting plate of pipe clamp

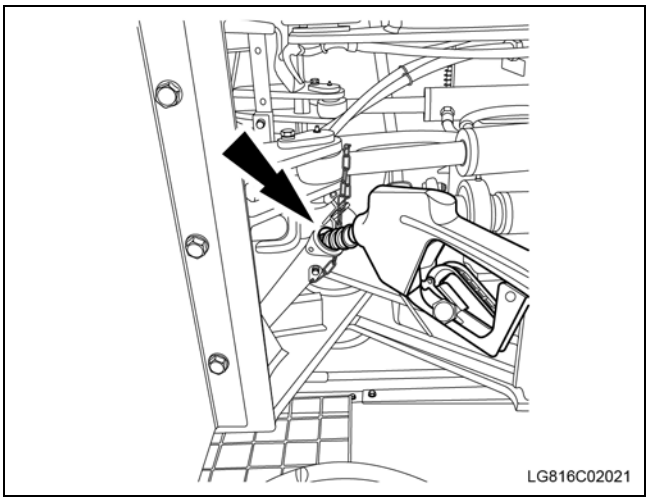
(a) Fix the mounting plate of pipe clamp to the frame with previously removed bolts, tighten the bolts with 16# wrench and the tightening torque is 26±4N•m.

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13.Fill hydraulic transmission oil

(a) Unscrew the filler tube plug, refill the drained hydraulic transmission oil from the filler tube port, replenish the lost hydraulic transmission oil and cover the tube plug.



14.Lifting of cab

Refer to step 19-32 of “Installation of diesel fuel tank”(p. 2-36).

Torque converter

Removal

1. Remove the working pump

   Refer to “HYDRAULIC PUMP”(p. 5-3)the removal to remove the working pump from the torque converter.

2. Remove the diesel engine torque converter components

   Refer to “Removal of diesel fuel tank”(p. 2-35) to remove the diesel engine torque converter components.

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Installation

1. Install the working pump

   Refer to “HYDRAULIC PUMP”(p. 5-3) the installation to assemble the working pump to the torque converter.

2. Install the diesel engine torque converter components

   Refer to “Installation of Radiator”(p. 2-7), assemble the torque converter to the diesel engine and then assemble the diesel engine torque converter components to the rear frame.

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Gearbox & Torque Converter

Basic parameters

Hydraulic torque converter is single-stage and single-phase centripetal turbine type.

Main performance parameters:

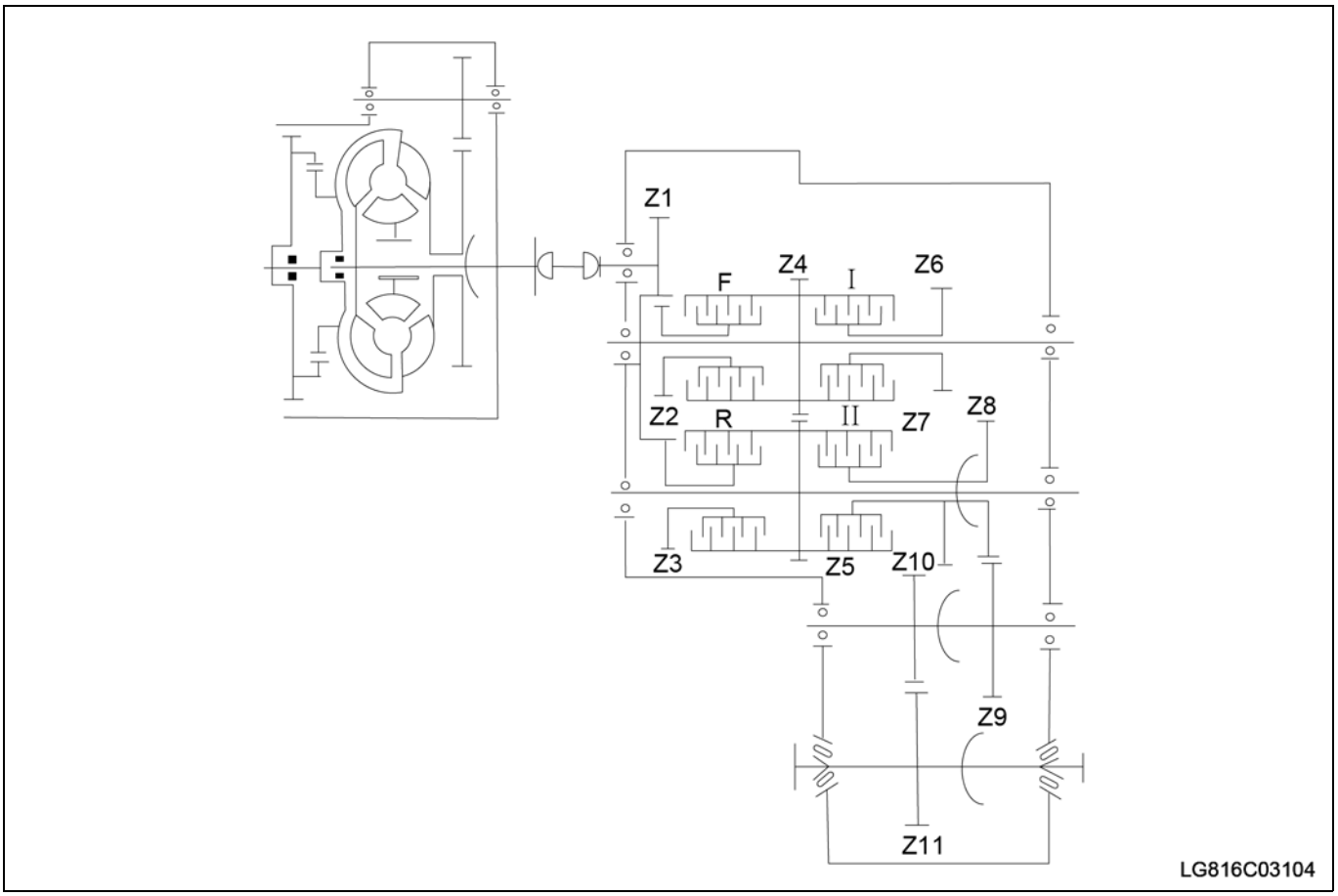
Item	Code	Value	Unit
Torque coefficient under stall condition	K0	3.6	
Nominal torque under stall condition	MBg0	29.8	N.m
Nominal torque under efficient condition	MBgη	35.7	N.m
Max. efficiency	ηmax	0.82	
Rated input power		41.2	KW

Gearbox

Gearbox type	Counter shaft power shift	
Rated power	40-50 kW	
Rated revolution speed	1800-2400 rpm	
Control oil pressure	1.2-1.5MPa	
Lubricantion oil pressure	0.15-0.25MPa	
Gears	Two gears for forward and two gears for backward	
Speed ratio	Basic type	IFI （1st gear for forward） =2.4693 IF II （2nd gear for forward） =0.8784 IR I (1st gear for backward)=2.5242 IR II （2nd gear for backward） =0.8980
	Acceleration type	IFI （1st gear for forward） =2.1544 IF II （2nd gear for forward） =0.7681 IR I (1st gear for backward)=2.2072 IR II （2nd gear for backward） =0.7852
	Deceleration type	IFI （1st gear for forward） =6.1061 IF II （2nd gear for forward） =2.1721 IR I (1st gear for backward)=6.2418 IR II （2nd gear for backward） =2.2204
Connection type of gearbox and torque converter	Torque converter and gearbox are independent power gearbox units and connected by drive shaft.	

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Basic working principle



Hydraulic torque converter is a kind of blade-type device with liquid as working medium; the gearbox of torque is achieved by the change of liquid moment of momentum in the working chamber. Its working principle is as follows: pump impeller is connected with engine flywheel by the power input components and receive the mechanical energy from the engine to convert it into liquid energy of working liquid; turbine receives the energy of working liquid to convert it into mechanical energy, and then transmit it through the power output components. Guide wheel changes the flow direction of working liquid and provide a counteraction torque to the working liquid to perform the functions of bending torque and speed change. Due to the particular structure and function of hydraulic torque converter, the adoption of working machinery has the function of self-adaption, vibration damping and insulation from the outside burden; this can satisfy the requirements of working mechanical traction condition to avoid the shutdown of engine because of abrupt growth of outside burden, so as to improve the service life of engine gearbox and trafficability and comfort of machine.

The power from engine is transmitted to the flange, universal joint and gears connected with it (Z1) through the torque changes of hydraulic torque converter.

When the speed control lever and steering control lever are in the middle position (neutral), although (Z1)

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meshes with (Z2) and (Z3), the machine will remain still due to the clutches are not combined and gear(Z2), (Z3) are idling.

When the steering control lever is on the current position and speed control lever is on the low-speed position, control pressure oil (1.2-1.5MPa) enters the control valve of gearbox; the pressure oil from the control valve enters the clutch piston through the pipeline and axial direction oil passage hole of end cover on forward low-speed position and clutch hub axle. The piston makes the two clutches drive and driven friction plate (F) and (I) bond under the pressure oil function. Input power from the input gear is transmitted to the output shaft through gear（Z2), (Z6), (Z7), (Z8), (Z9), (Z10), (Z11)then the 1st gear for forward is achieved.

When the steering control lever is on the forward position and speed control lever is on the high-speed position, it is the same as the 1st gear. Pressure oil enters the clutch piston to make the drive and driven friction plate of two clutches (F) and (II) mesh; power is transmitted to the output shaft through gear （Z1), (Z2), (Z4), (Z5), (Z8), (Z9), (Z10) and (Z11), then the 2nd gear for forward is achieved.

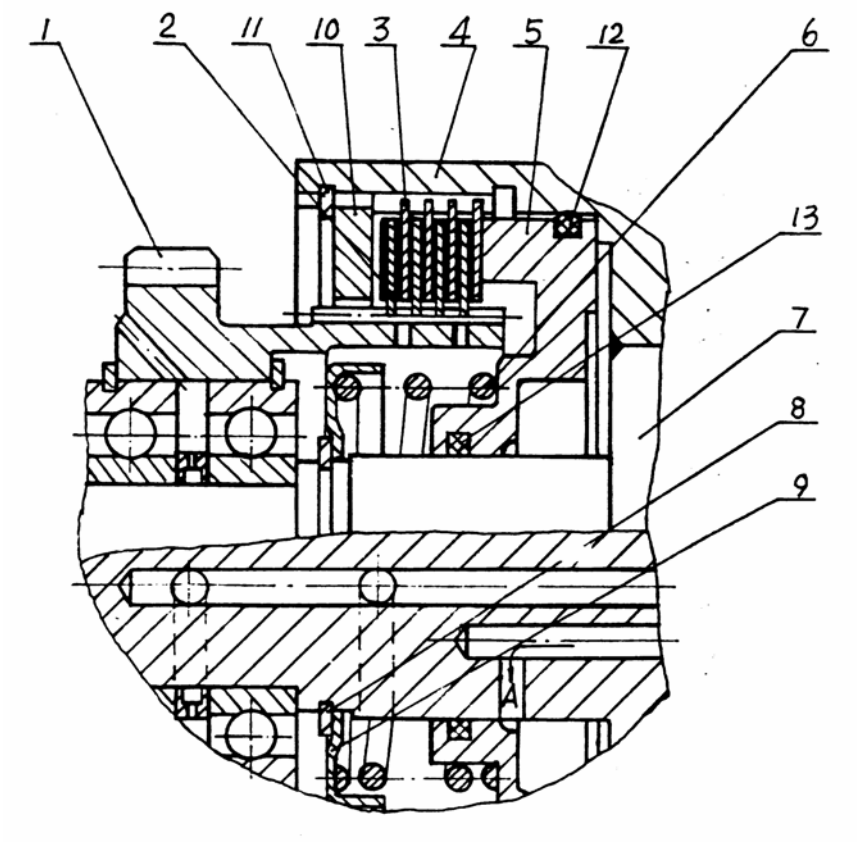
The achievement process of 1st gear and 2nd gear for backward is the same as the forward gear. Here it will not be repeated. Its gearbox route is:

1st gear for backward: input power from the gear (Z1) is transmitted to the output shaft through gear(Z3), clutch (R), gear(Z5) and (Z4), clutch (I),gear(Z6), (Z7), (Z8), (Z9), (Z10), (Z11), then the 1st gear for backward is achieved.

2nd gear for backward: input power from the gear(Z1) is transmitted to the output shaft through gear(Z3), clutch (R) and (II), gear(Z8), (Z9), (Z10), (Z11), then the 2nd gear for backward is achieved.

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Working principle of shift clutch



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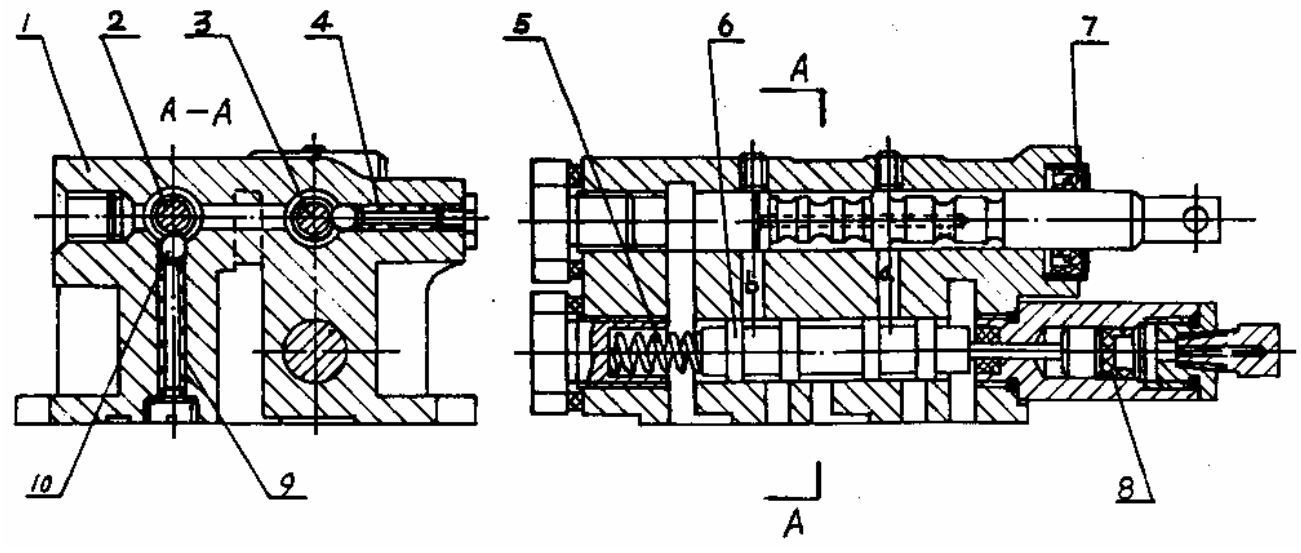
1. Drive gear
2. Drive plate
3. Driven plate
4. Driven drum
5. Piston
6. Spring
7. Shaft
8. Snap ring
9. Support disc
10. Cover
11. Snap ring
12. Seal ring
13. Seal ring

The gearbox is equipped with 4 shift clutches, that is, forward gear clutch, I gear clutch and II gear clutch. The basic structure of 4 clutches are the same with the working principle. The above figure is the structure sketch of shift clutch.

Shift clutch is wet clutch. There are 4 drive plates(2) and driven plates(3) respectively. External spline of drive gear(1) is connected with internal spline of drive gear(2) and it can perform axial movement on the internal spline; external spline of drive plate(3) is connected with internal spline of driven hub(4) and it can perform axial movement on the internal spline. One end of spring (6) is against left side of the piston(5), and the other end is supported on the shaft(7) through spring support disc(9) and snap ring(8). When the pressure oil enters the right oil chamber of piston(5) through the oil passage A, the piston will overcome the spring force to move leftwards to impact all the drive plates and driven plates and the clutches are combined to transmit power.

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Working principles of control valve



1. Valve body
2. Speed valve rod
3. Control valve rod
4. Spring
5. Spring
6. Block valve spool
7. Oil seal
8. Block piston
9. Spring
10. Steel ball

Gearbox is composed of speed valve, control valve, block valve and valve body, etc. Speed valve is composed of speed valve rod(2), spring (9) and steel ball(10). Pull the speed valve rod(2) can make the gearbox on the 1st, 2nd and neutral position.

Control valve is composed of control valve rod (3), spring (4) and steel ball. Pull the control valve rod(3) can make the gearbox on the forward, neutral, and reversing position.

Combination of control valve and speed valve can achieve the 1st and 2nd gear for forward and backward. For example, when pulling out the control rod (3), the pressure oil from main oil regulating valve enters control valve and then enters the forward clutch of gearbox through hole A; the pressure oil pushes the piston to make drive and driven plates of clutch connect and then the gearbox puts into forward gear. When speed valve rod is on the 1st or 2nd position, 1st gear or 2nd gear for forward is achieved. Similarly, when pushing the control valve rod, pressure oil enters the backward clutch of gearbox through hole B; the pressure oil pushes the piston to make drive and driven plates of clutch connect and then the gearbox puts into 1st or 2nd gear for backward.

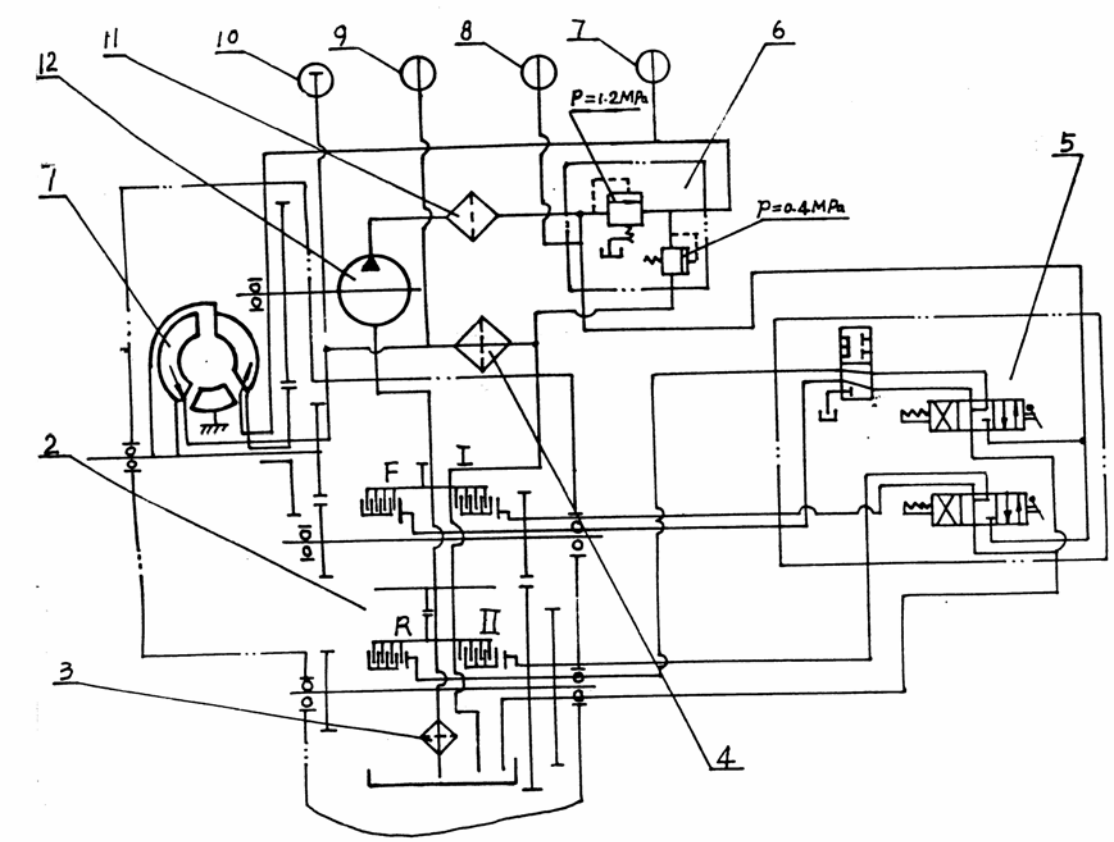
Block valve: block valve is composed of control valve AS, spool (6) and spring(5). When loader is running on the road without brake pedal being depressed, the block valve is on the middle position; when the brake pedal is depressed, the pressure oil from the brake system enters oil chamber of control valve to push the piston(8). Piston pushes the valve rod to move the spool (6) and compress spring (5). At this time, the

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block valve spool blocks the hole a and b of oil passage from the control valve to gearbox clutch to separate the forward or backward clutch and prevent them from transmitting power. This can not only benefit to loader brake, but apply all the power to working devices when the shovel loader is working.

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Oil passage system



1. Torque converter
2. Gearbox
3. Suction screen
4. Cooler
5. Control valve of gearbox
6. Main pressure regulating valve
7. Pressure gauge
8. Pressure gauge
9. Pressure gauge
10. Oil temp gauge
11. Oil filter
12. Oil pump

The gearbox gear pump (12) installed on the torque converter housing of upper gearbox sucks oil from the oil pan of gearbox through filter screen (3). Output oil from the gear pump enters the main pressure regulating valve (6) through the oil filter (11). The oil into the main pressure regulating valve is divided into two part, one part is to control valve of gearbox (5) (oil pressure is 1.2-1.5MPa). The other part is to hydraulic torque converter (1) through main pressure regulating valve (oil pressure is 0.4-0.6MPa). After the oil is output from the torque converter (oil pressure is 0.15-0.25MPa), it enters the two clutches housing through oil cooler(4) to lubricate the clutch friction plate. At the end, the oil returns to the gearbox.

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Installation and adjustment

Installation

The installation of gearbox & torque converter AS is based on the combination of impeller cover Φ47f6 shaft head and engine flywheel; lock the spring plate and engine flywheel with 12 M10 studs to transmit power. Connect the gearbox & torque converter AS and engine flywheel housing with 9 M12 studs to fix the front end. The gearbox sides is connected by support and mounting surface of frame to fix the rear end. Stack up rubber mat between the support surface of gearbox and mounting surface of the frame, adjust the shim and tighten it, otherwise, normal work of gearbox will be influenced.

Adjustment

Start the engine, check and adjust the oil passage system after the oil pump begins to work; adjust the shift control oil pressure to 1.2-1.5 MPa, overflow valve opening pressure of torque converter to 0.4-0.6MPa, and lubricant pressure of gearbox to 0.15-0.25 MPa. The control handle of gearbox and its connection mechanism must be flexible and without clamping stagnation; gear shifting must be accurate and distinct. Depress the brake engine accelerator to the end and the machine should be not started. Release the accelerator to start the machine; refilling oil must be within the indicating range of oil dipstick;

Adjust the brake connection mechanism to make sure reliable work of hand brake.

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Service

Operating oil

Gearbox and fitted torque converter share hydraulic drive oil. Oil level in the oil tank must be within the indication range of oil dipstick, that is, after the oil in the torque converter and pipeline is full, the oil level must be higher than the suction coarse strainer of oil pump; the oil must be clean and avoid foreign materials entering the oil.

Oil temperature, oil pressure

Oil temperature should not be higher than 95 ℃ for long-running time, and not higher than 120 ℃ for short-running time. If the temperature is too high, stop the machine to check, otherwise, the seal will be damaged and oil leakage will be caused. Replenishing oil pressure of torque converter, output oil pressure, shift oil pressure of control valve and lubricant pressure of gearbox must be within the specified range.

Oil replacement

For new oil tank, replace all the oil after 50h, replace once per 1,000h running, but replace once at least per year.

Cleaning

For the coarse strainer on the gearbox, clean once per 50h; later clean once per 500h; replace in time if damaged. Observe that if there are aluminium skimmings, iron scale and copper scale for easy analysis of wear pattern or fault in the gearbox driving parts and take correspond measures.

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Common faults and troubleshooting

Common faults and troubleshooting of torque converter

Fault phenomenon	Reasons	Troubleshooting
Output power is not enough	Engine speed decreases	Improve engine speed
	Gas exists in the working oil	Check the oil level in the oil tank
		Check the leak tightness of pipeline system
		Check whether the working oil goes bad
	Working oil temperature is too high	Reduce the oil temperature
	Inlet and outlet valve pressure of hydraulic torque converter is too low	Check the sensitivity of every hydraulic valve and leakage condition of working oil
Working oil temperature is too high	Working time for hydraulic torque converter in the low efficiency zone is too long	Reduce the external load or improve the engine speed
	Too low oil level in the oil tank or gas exists in the working oil	Fill working oil, check the leak tightness of pipeline system connection and if the working oil goes bad
	Used working oil doesn't meet requirements	Use the recommended working oil by this manual instead
	Oil pressure of oil supply system is too low	Check the hydraulic valve and improve the oil pressure
	Water in the cooling system is too little	Check and repair the water tank
	Supplying oil is not enough	Check the oil supply system
Oil pressure of oil supply system is too low	Counterbalance valve is invalid	Replace the counterbalance valve
	Oil inlet lines are blocked	Check oil lines
	The gearbox pump has insufficient oil supply	Check or replace the oil pump
	Seal ring in the hydraulic torque converter is damaged or seriously worn	Replace the seal ring
	Oil level in the oil tank is too low	Refill the working oil
	Oil filter is blocked	Clean or replace the oil filter
	Oil pressure gauge is invalid	Replace the oil pressure gauge
Oil penetration	Framework oil seal is damaged	Replace the framework oil seal
	O-ring is damaged	Replace the O-ring

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Common faults and troubleshooting of gearbox

Fault phenomenon	Reasons	Troubleshooting
Incapable of putting into gear	Gear shifting position is not accurate	Put into gear again or check the gearbox control valve
	Clutch piston oil is leaked	Remove and replace the O-ring
	Shift pressure is low	See the description below
	Oil passage of tank body is blocked	Remove, clean and dredge
Shift pressure is low	Adjustment of main pressure regulating valve is not appropriate or spring is broken and invalid.	Adjust or replace the spring again
	Oil level in gearbox is too low	Refill the oil to the oil pointer position
	Filter screen or oil passage is blocked	Clean and dredge
	Clutch oil is leaked	Replace the O-ring
	Shift oil pump is invalid	Repair or replace
Oil temperature is too high	Working time is long	Stop or idle running for a while
	Oil in the tank is little or too much	Refill oil to the overflow hole position
	Clutch disc slips	Check the oil pressure and seal ring
	Clutch can't be separated	Check the clutch control oil passage or control lever position
Shift oil pressure of some gear is low	Piston O-ring of this gear is damaged	Replace piston O-ring
	Seal ring of this oil passage is damaged	Replace the seal ring
	Oil passage of this gear is leaked or blocked	Check and troubleshooting
Gear is in disorder	Seal ring of shaft end is leaked	Replace the seal ring
The system oil is leaked	Connector is loose	Tighten the connector
	Seal ring is damaged	Replace the seal ring

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Axle

Overview

Drive axle of this machine is two-step gearing-down structure The 1st step reduction device adopts spiral bevel gear pair drive with large input torque, high efficiency drive and stable work; the 2nd step reduction device adopts planet-gear speed reducer structure (NGW) with good mass movement strength and stable output speed. Inter two-step reduction device adopts full-floating halt shaft connection to transmit power which has overcome the influence that axle housing has on half shaft drive during the work deformation process.

Main technical parameters

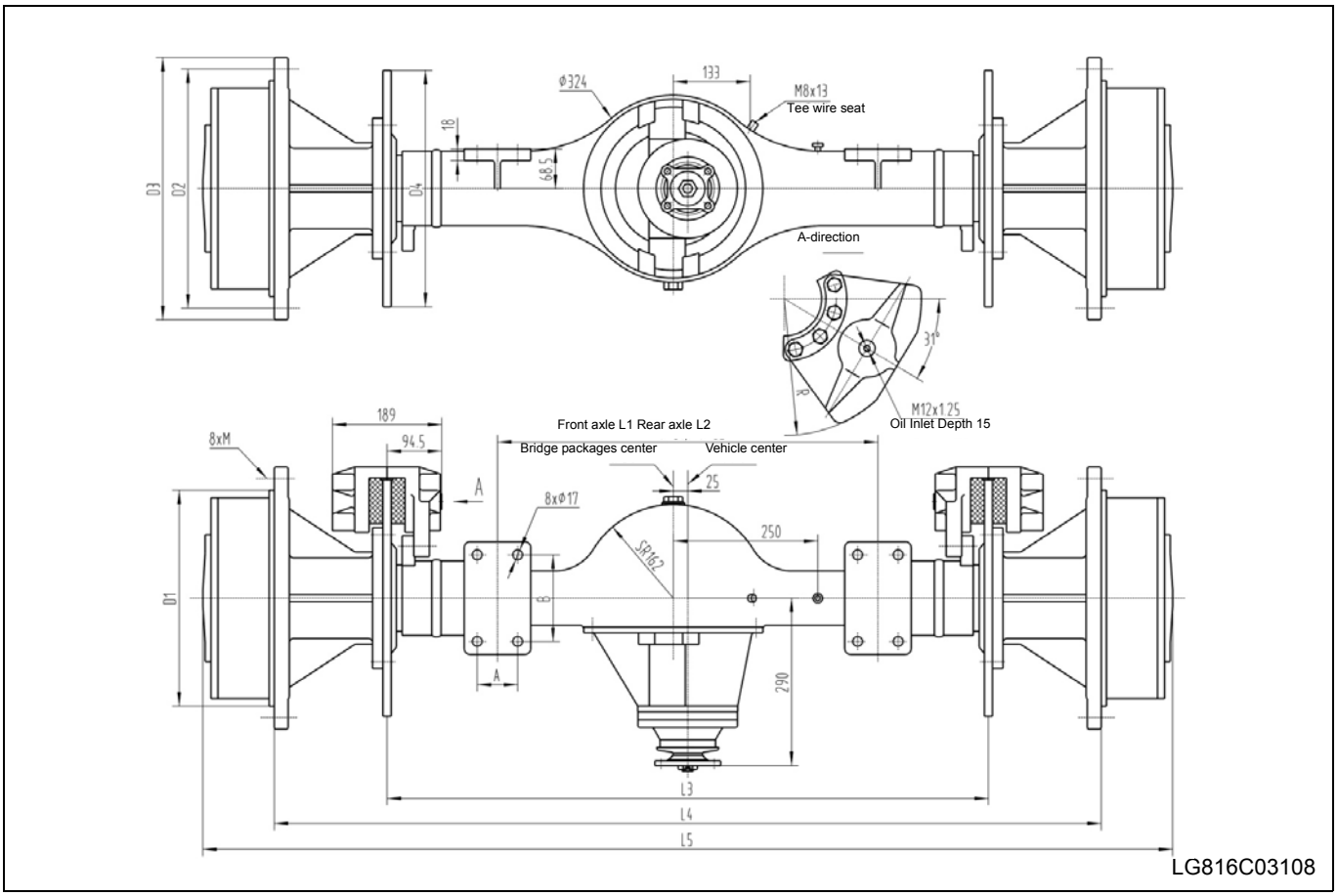
Product model	Main technical parameters						
ZL15F(A)	Max. load	Max. input torque	Total ratio	Main ratio	Wheel-end ratio	Braking moment	Oil pressure
	7500 kg	785N.m	18.84	5.833	3.23	8600N·m	9.8MPa

Main structure size

Model	L1	L2	L3	L4	L5	M	D1	D2	D3	D4	A	B	R
ZL15F(A)	658	720	1040	1430	1677	M18 ×1.5	φ374	φ414	φ454	φ410	70	150	237

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Structure features and working principle of drive axle



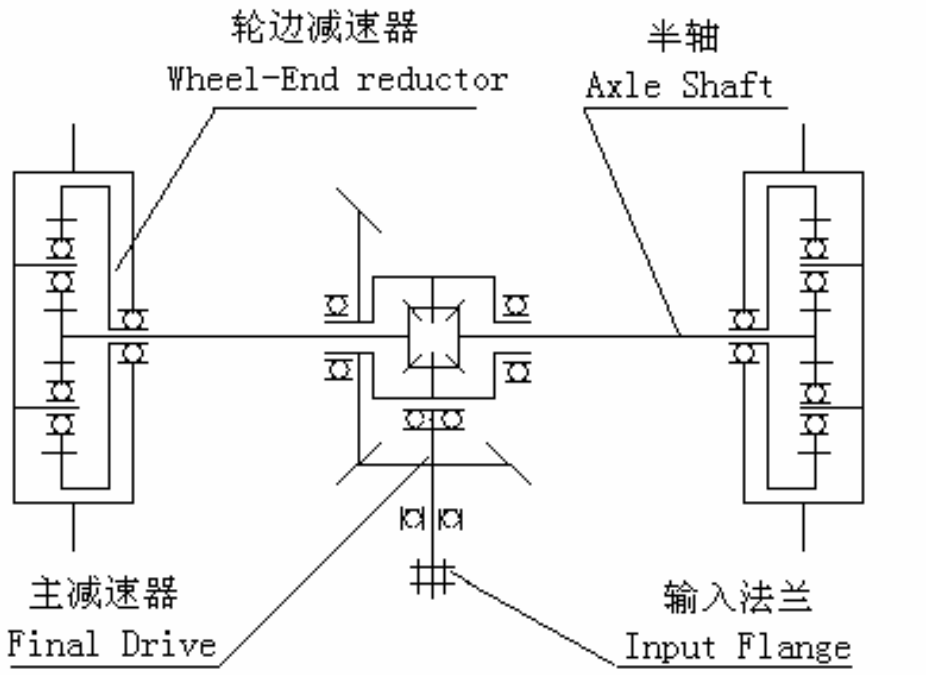
Main Structural Characteristics

ZL15F(A) drive axle is two grades reduction gearbox device. The first device adopts spiral bevel gear to transmit. The drive axle bears large input torque and has the capability of high gearbox efficiency and stable working. The second device adopts planetary reduction gearbox structure (NGW). Rigidity of whole movement of the drive axle is well and output speed is smooth. Between two grades device, we adopt full-floating axle shaft to connect and transmit power. The structure has overcome that axle housing in the course of working distortion brings the influence to axle shaft gearbox.

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Working principle

Transmission sketch



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Power torque of vehicle is inputted by drive shaft from input flange of drive axle. Final drive changes rotary direction to drive driven spiral bevel gear and differential case to rotate after it does reduction and differential. Differential case drives cross pin and planet bevel gears to transmit power to axle shaft gears. Axle shaft gears transmit power to two sides wheel-end reductors by axle shafts, finally transmit power to planet carriers after wheel-end reductors do reduction, thereby drive wheels to roll ahead. gearbox route of drive axle as follows:

Power torque of vehicle —— input flange —— final drive —— differential —— axle shafts —— wheel-end reductors —— wheels.

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Structure and working principle of brake

Structure of brake

Brake is hydraulic disc braking, It has features of large braking moment, stable and reliable braking. Brake consists of inside brake body, outside brake body, piston, braking plate, braking disc, etc. Braking disc is fixed with hub, they together rotate relative to wheel-end bearing axle on axle housing. Brake is fixed on drive axle housing.

Working Principle

When braking, high pressure braking fluid in braking line enter hydraulic cavities behind the pistons through brake oil inlet. It drives two sides pistons to push braking plates towards the middle. Thereby braking plates vice the rotating braking disc mounted on hub to make it bring friction moment and achieve the goal of braking.

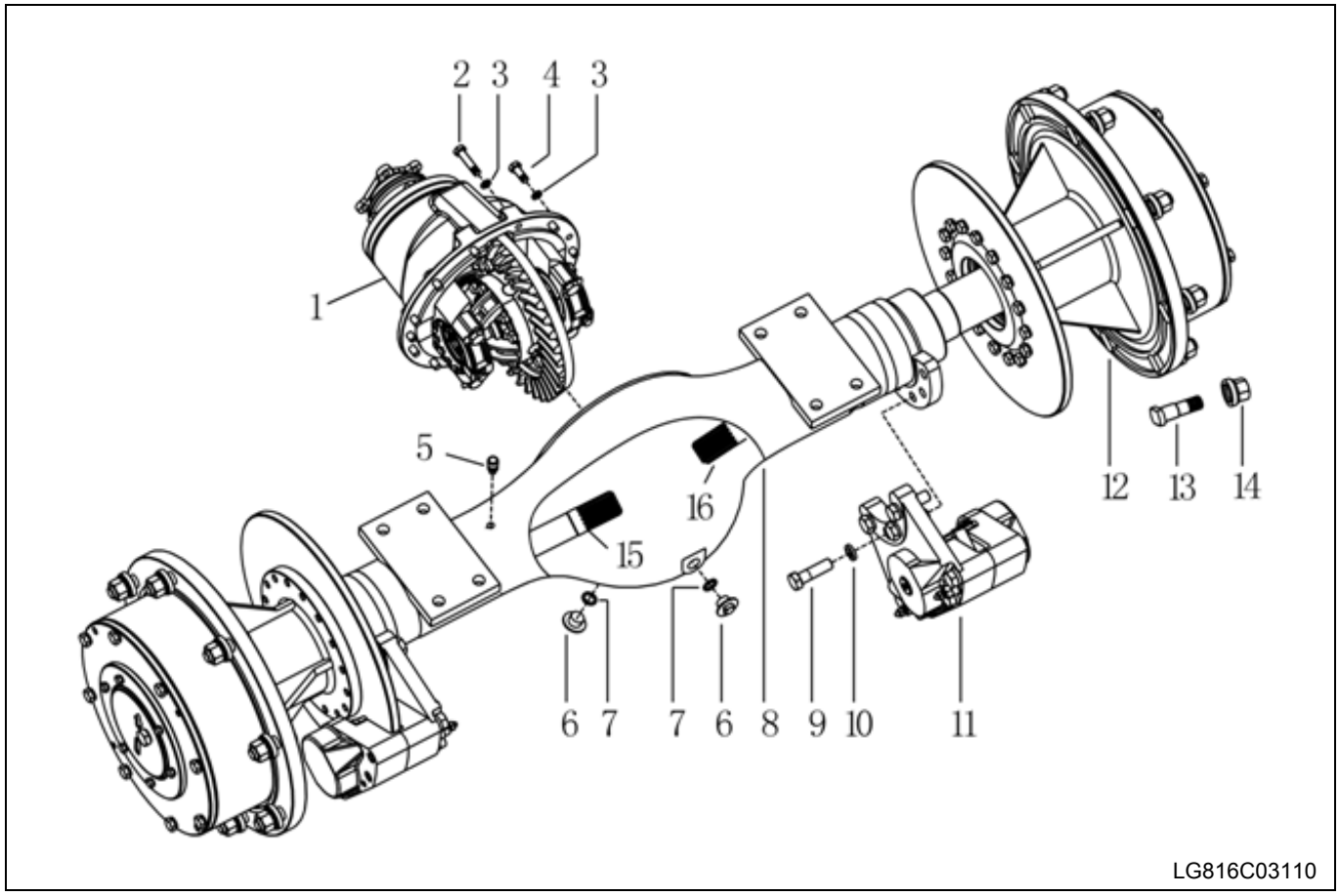
Working route: hydraulic of cylinder —— pistons move —— push braking plates —— vice braking disc.

Braking fluid: DOT3 or 719 synthetic.

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Drive axle AS parts list

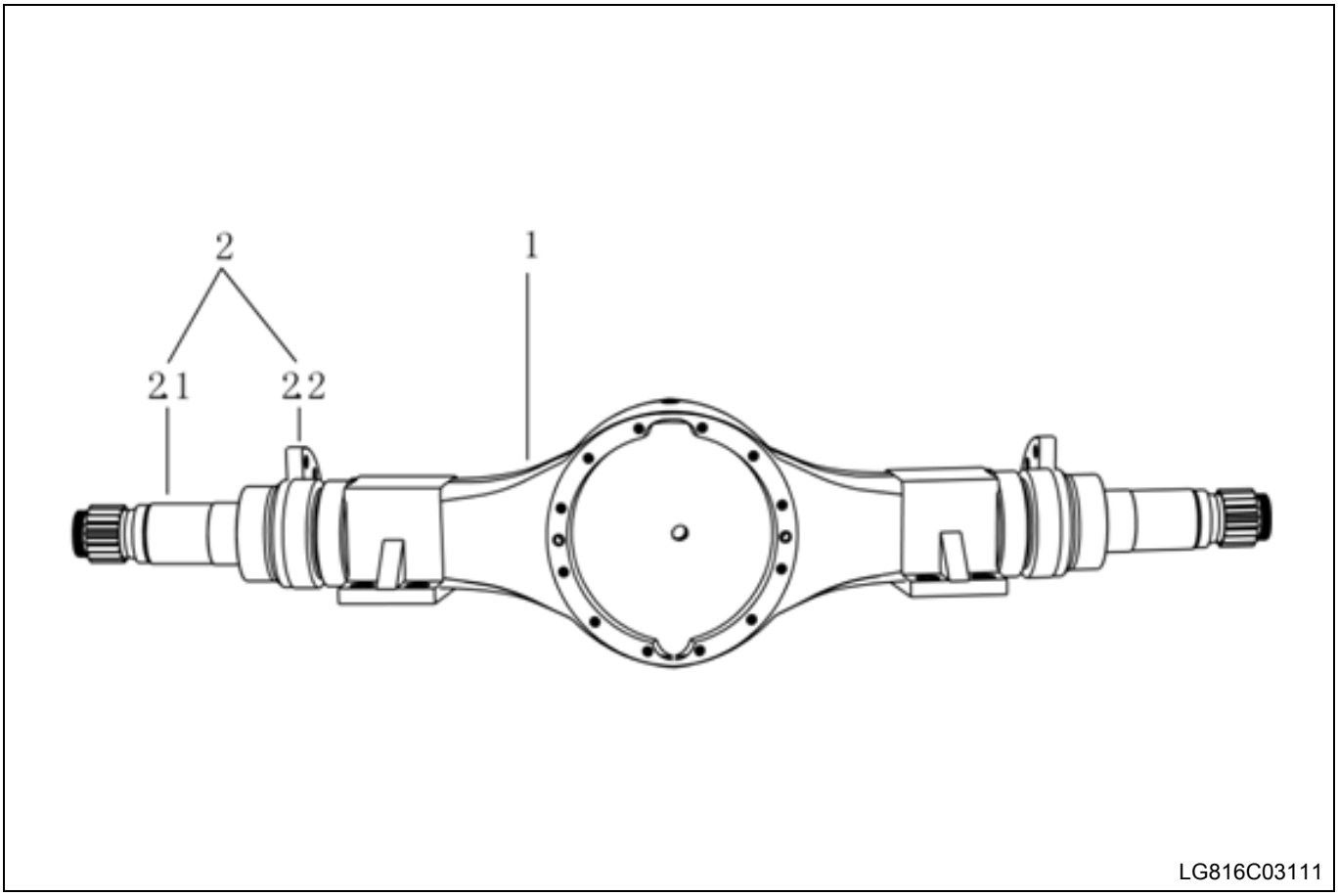
Drive axle AS



1. Final drive AS
2. Bolt
3. Washer
4. Bolt
5. Exhaust plug M10×1
6. Plug
7. Combine washer
8. Front axle weld
9. Bolt
10. Washer
11. Disc brake AS.
12. Wheel-end AS.
13. Rim bolt
14. Nut
15. Long axle shaft
16. Short axle shaft

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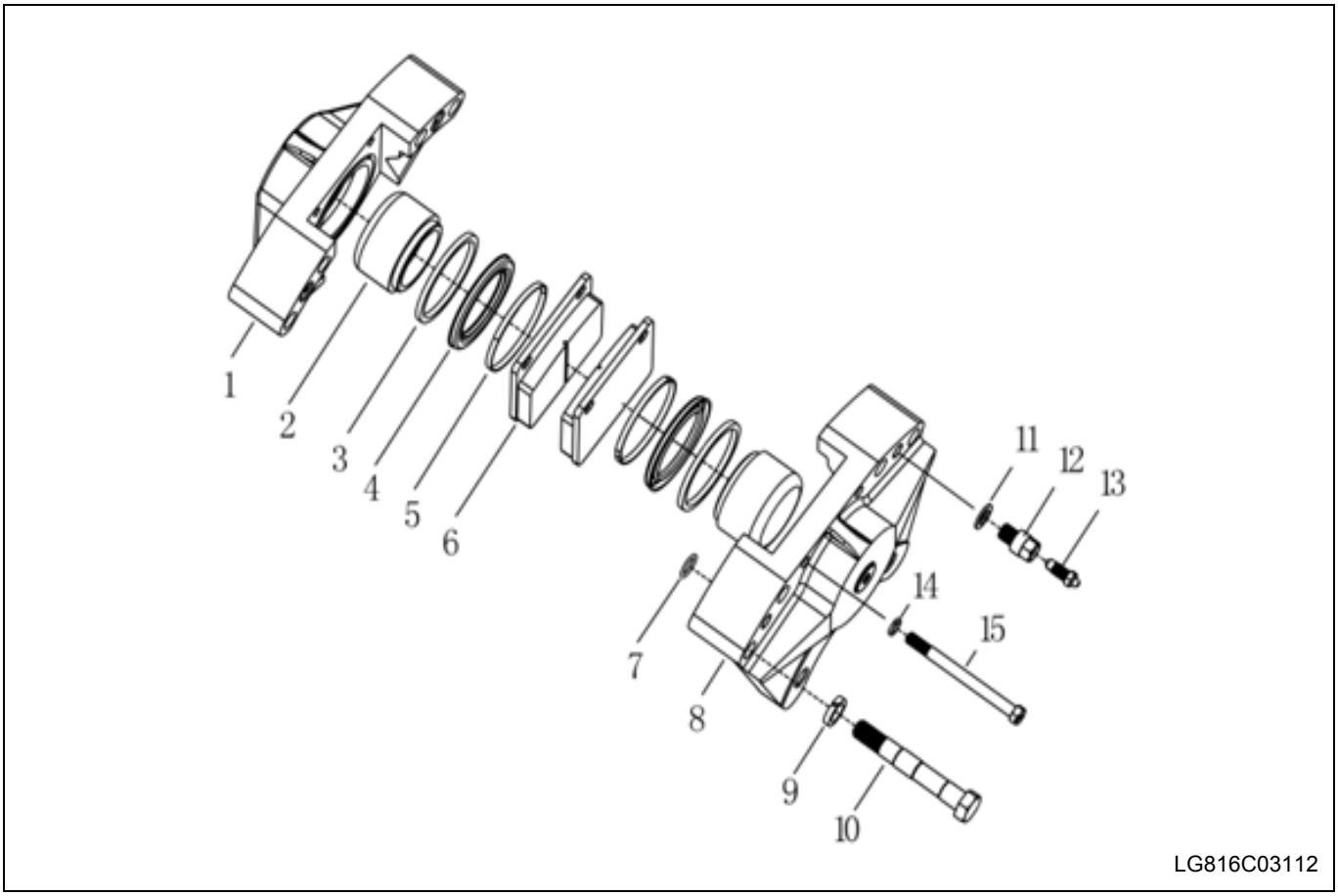
Axle housing AS



1 Axle housing
2 Shaft welding
2.1 Shaft
2.2 Brake carrier

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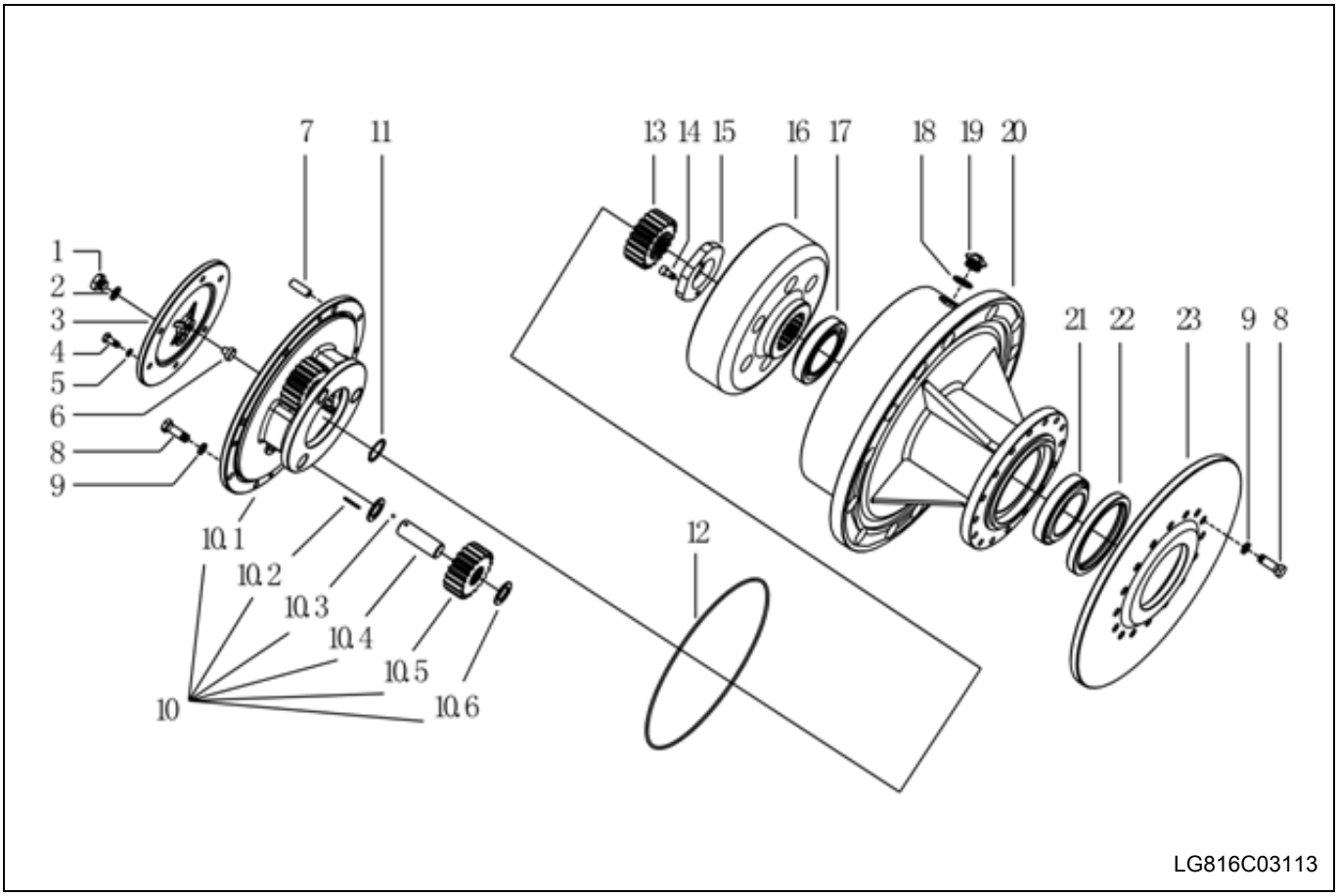
Clamp disc brake



1 Outside clamp
2 Piston
3 Rectangular ring
4 Dust shroud
5 Circlip
6 Braking plate
7 O-ring
8 Inside clamp
9 Washer
10 Bolt
11 Washer
12 Joint
13 Exhaust plug
14 Washer
15 Bolt pin

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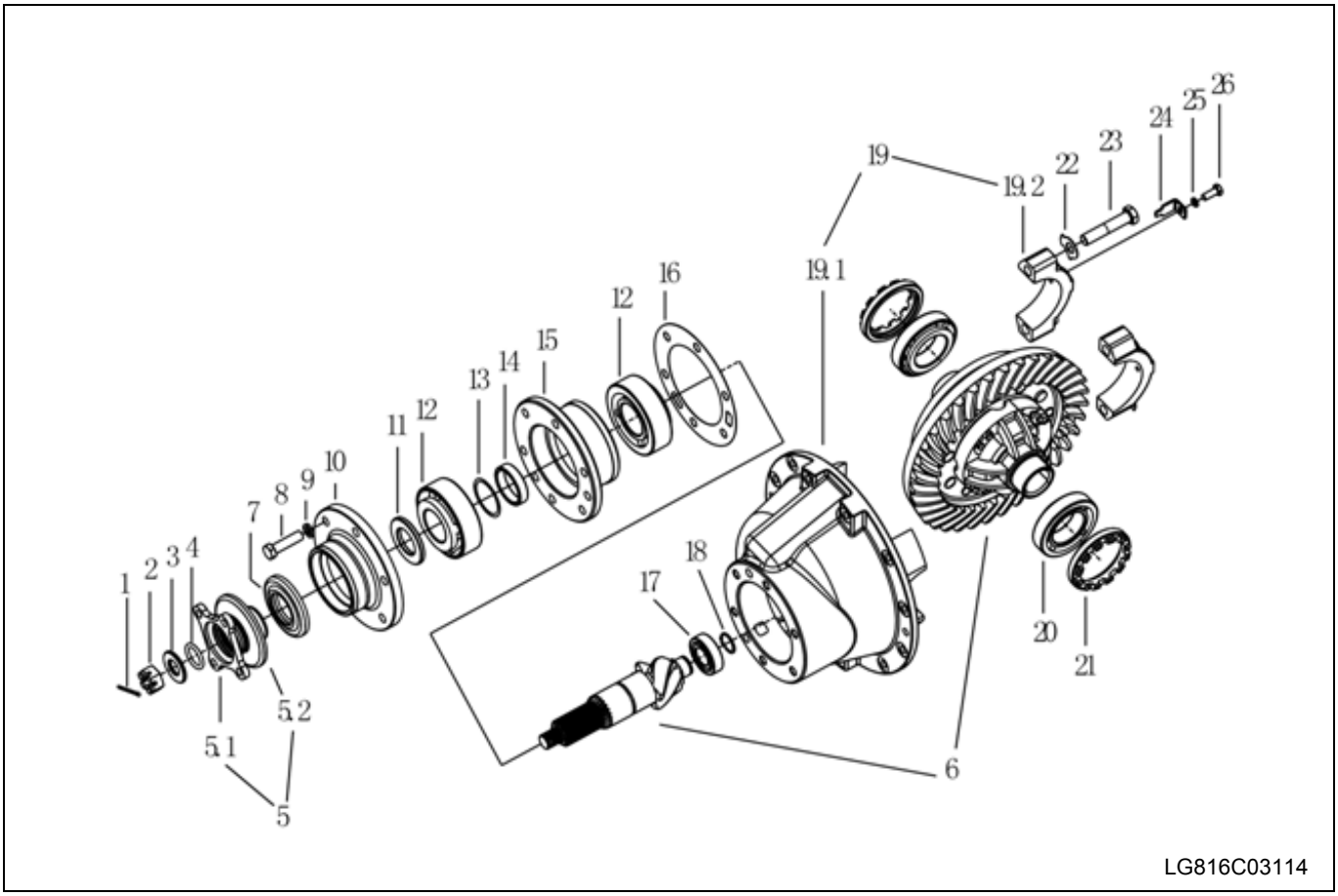
Wheel AS



1 Plug screw
2 Combine washer
3 Cover
4 Bolt
5 Washer
6 Pin
7 Pin
8 Bolt
9 Washer
10 Planet carrier AS
10.1 Planet carrier
10.2 Needle roller
10.3 Steel ball
10.4 Planet gear shaft
10.5 Planet gear
10.6 Circlip
11 Circlip
12 O O-ring
13 Sun gear
14 Screw
15 Locknut
16 Ring gear
17 Bearing
18 Combine washer
19 Plug
20 Hub
21 Bearing
22 Oil seal
23 Braking disc

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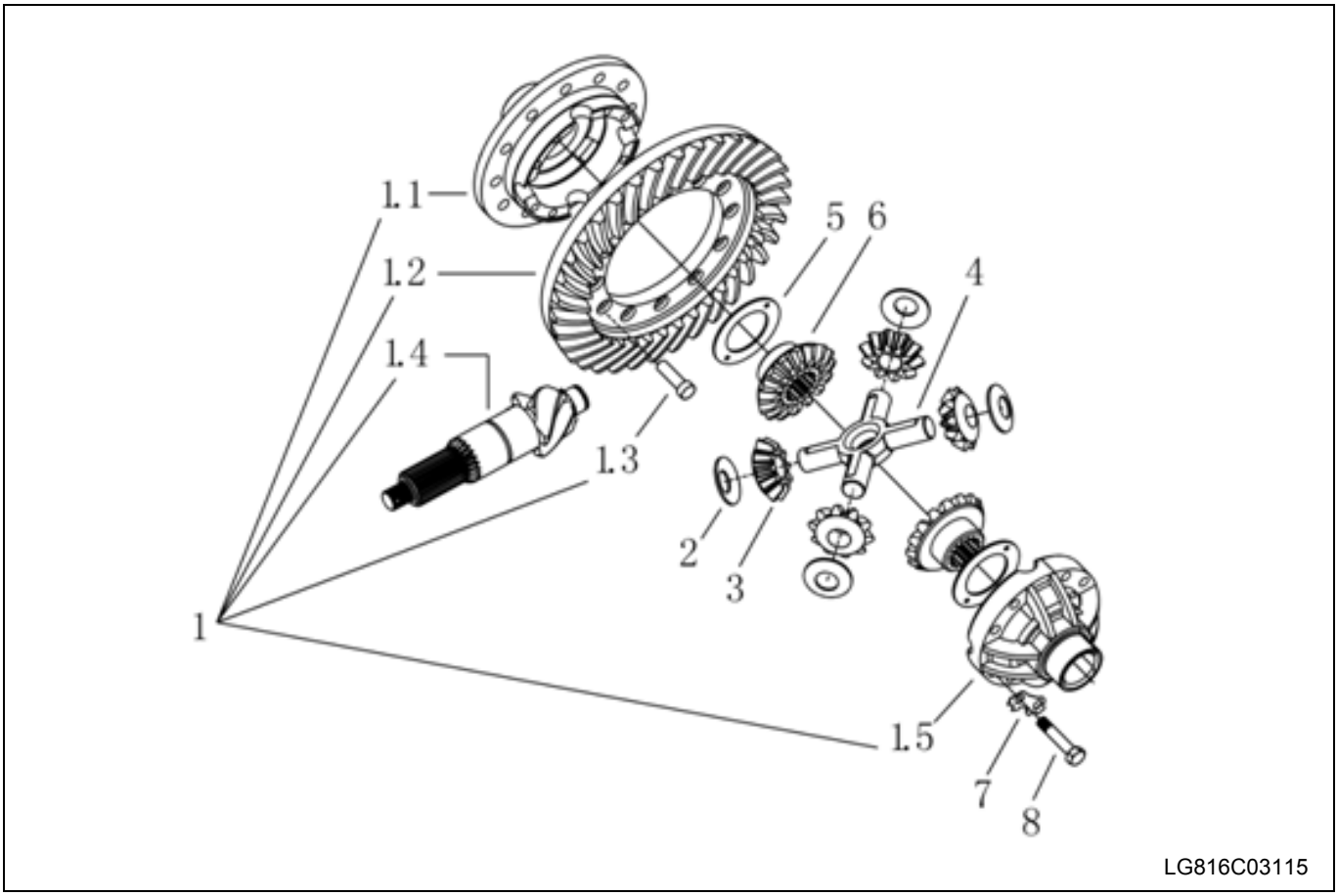
Main reducer



1 Cotter pin
2 Notch nut
3 Washer
4 O-ring
5 Input flange AS
5.1 Input flange
5.2 Dust shroud
6 Differential AS with drive and driven gear
7 Oil seal
8 Bolt
9 Washer
10 Bearing cover
11 Thrust washer
12 Bearing
13 Adjust washer
14 Bearing spacer
15 Bearing seat
16 Adjust washer
17 Bearing
18 Circlip
19 Final drive housing AS
19.1 Final drive housing
19.2 Differential. bearing cover
20 Bearing
21 Adjust nut
22 Lock plate
23 Bolt
24 Adjust nut lock plate
25 Washer
26 Bolt

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Differential AS with drive and driven gear pair



1 Drive and driven gear with differential housing
1.1 Differential left housing
1.2 Driven bevel gear
1.3 Rivet
1.4 Drive bevel gear
1.5 Differential right housing
2 Planet gear washer
3 Planet gear
4 Planet gear shaft
5 Axle shaft gear washer
6 Axle shaft gear
7 Lock plate
8 Differential housing bolt

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Analysis and preclusion of failure

Parts names	Phenomenon of the failure	Reasons of the failure	Preclusion measures
Final drive and differential	Loud noise	1. Gear backlash is oversize 2. Bearing is worn.	Adjust gear backlash Replace bearing
	Housing body early heats	Lubrication is bad. No lubricant or lubricant is excessive	Lubricate to oil level.
	Periodic unusual sound	1. Gear appears tooth breakage. 2. There is eyewinker inside. 3. Fasteners loose.	Replace gear. Bleed the oil port to inspect. Turn fasteners tight.
	Differential failure	Cross pin breakage.	Replace cross pin.
	Leakage	1. Oil seal ages and wears. 2. Sealant loses its efficiency. 3. Fasteners loose	Replace oil seal. Scrape off old sealant and smear afresh Turn fasteners tight.

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Wheel-end reductions	Wheel-end doesn't rotate	1. Axle shaft breakage. 2. Differential system failure.	Replace axle shaft. Adjust and replace differential system.
	There is unusual sound	1. Gear appears tooth breakage 2. There is eyewinker inside.	Replace gear. Bleed the oil port to inspect.
	Housing body early heats.	Lubrication is bad. No lubricant or lubricant is excessive.	Lubricate to oil level.
Brake	Braking failure	1. Oil line disconnects or is clogged 2. Piston O-ring ages and wears. 3. Piston and piston cylinder jam. 4. Hydraulic pressure isn't enough.	Connect or replace oil line. Replace O-ring. Replace brake. Inspect oil pump and exhaust gas in oil line.
	Friction lining doesn't release.	1. Piston seal ring ages and wears 2. Oil inlet joint looses 3. There is casting defect on brake body	Replace seal ring. Turn oil inlet joint tight. Replace brake body and repair.

4 Work Hydraulic System

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Removal and Installation of Work Hydraulic System Parts

Tool list

Name	Specification (Qty.)
Open-end wrench	10#、13#、18#、21#、24#、27#、、32#、36#
Screwdriver	---
Nipper plier	---
Torque wrench	20-100N•m，90-300N•m，160-680N•m，
Scissor	---
Copper bar	---
Long pieces of wood	1.5 m long
Plastic sealing bag	---
Ribbon	---
Travel crane	2t
Chain, sling and hook	2t
⚠ Remark: removed standard parts should be placed with relevant material together to avoid mixing.	

⚠ “Front” mentioned in this chapter refers to the forward direction after starting the machine; other directions are by this analogy.

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Control valve

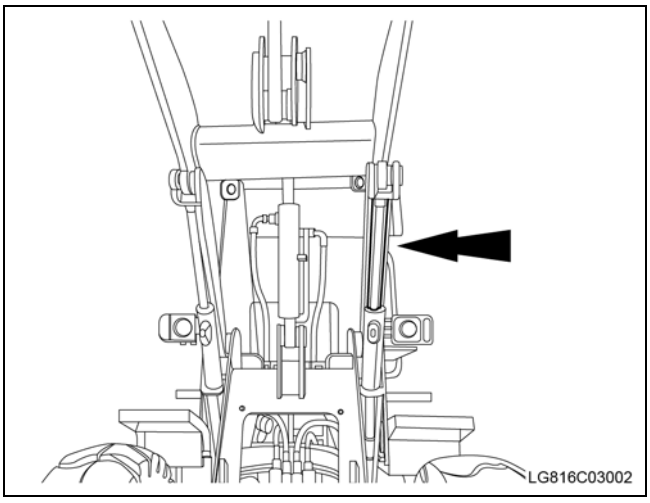
Removal

1. Park the machine and discharge the pressure of the machine

   (a) Park the machine on the level ground, and install anti-rotation bumper.

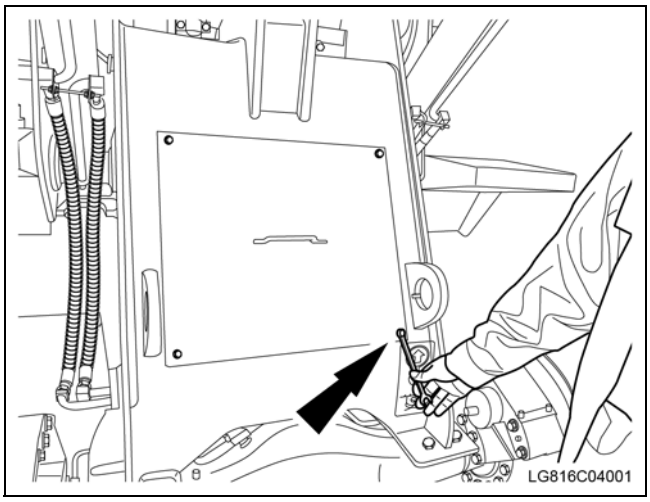
   (b) Start the machine and lift the boom, a bumper is installed on the boom cylinder piston rod to withstand the boom, and then put the boom down.

   (c) Shut the engine off, and push the operating lever back and forth more than 30 times, so as to discharge the hydraulic system pressure.



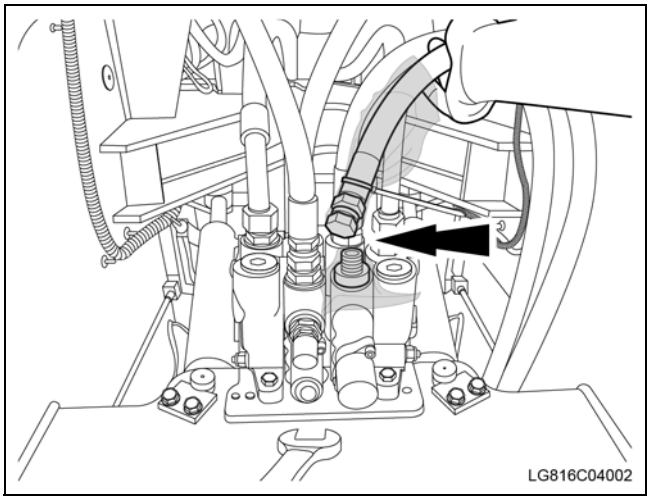
2. Remove front plate

   Remove 4 mounting bolts from front plate of front frame with 13# wrench, and take down the front plate.



3. Remove hose

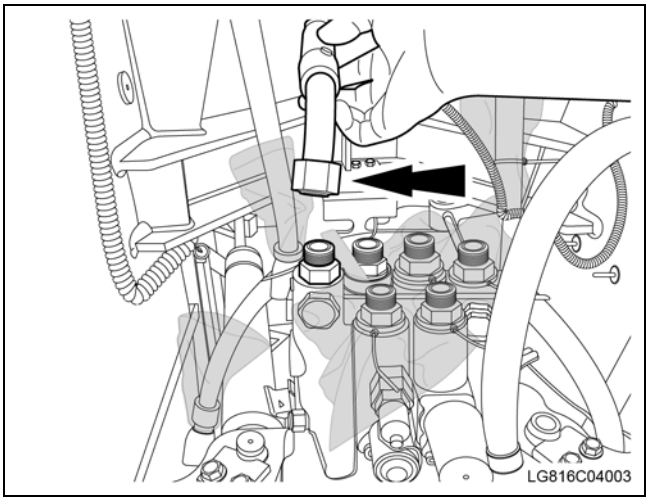
   (a) Use a wrench to remove the following parts on the control valve in order, including front boom cylinder hose fittings, front tilt cylinder hose fittings, multi-valve return hose fittings, rear boom cylinder hose fittings, rear tilt cylinder hose fittings and multi- way valve oil inlet hose (use 32 # wrench for the oil tank hose, and 36 # wrench for the control valve oil inlet and outlet hose).



   (b) Wrap the hose fittings and control valve fittings with clean plastic bags and ties, so that prevent foreign matter from entering

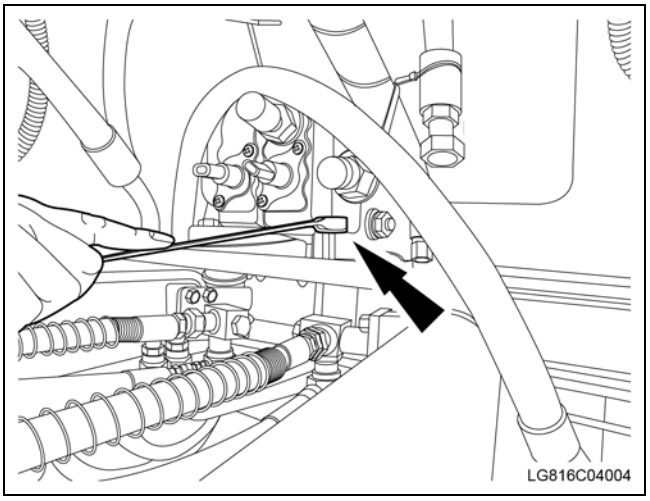
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the hydraulic system.



4. Remove the mounting bolt

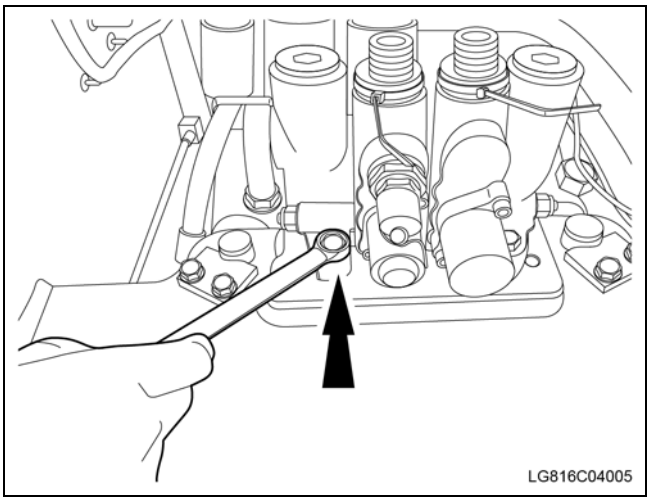
Use 18 # wrench to remove mounting bolts and nuts of the control valve, as well as remove the control valve to be repaired or replaced.



Installation

1. Installation of control valve

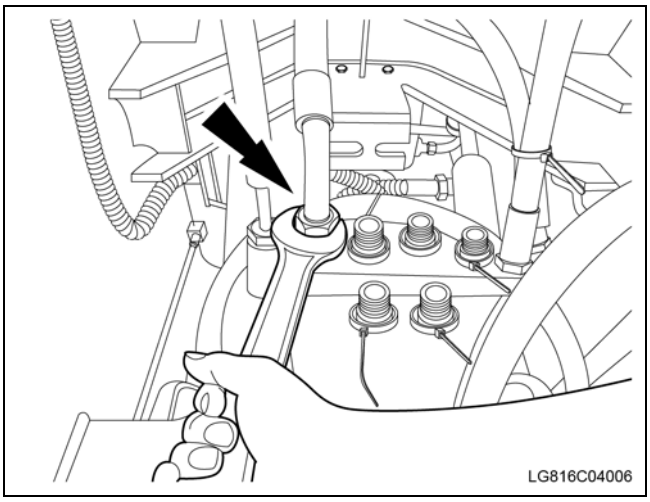
Use the removed bolts and nuts to install the control valve to the corresponding location on the front frame, and use 18# wrench to tighten the bolts with tightening torque of 90 ± 12 N• m.



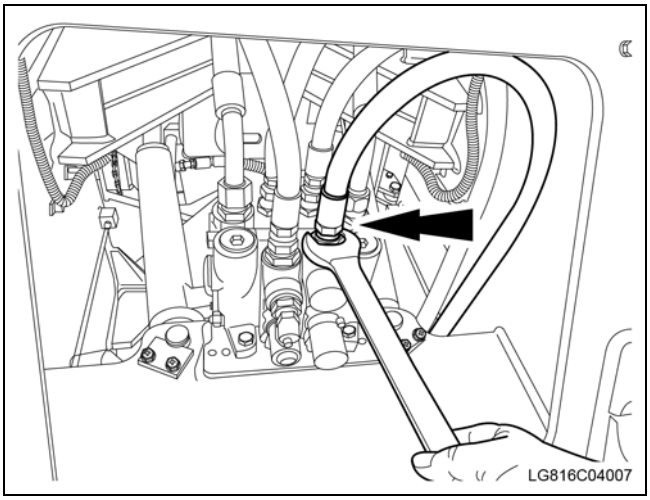
2. Connection hose

(a) Use a wrench to install the following parts on the corresponding connectors on the control valve, including the control valve oil inlet hose fittings, rear tilt cylinder hose fittings, rear boom cylinder hose fittings, control valve oil return hose fittings, front tilt cylinder hose fittings and the front boom cylinder hose fittings (use 32# wrench for the oil tank hose, and 36 # wrench for the control valve oil inlet and outlet hose). All O-rings on the joints should be replaced.

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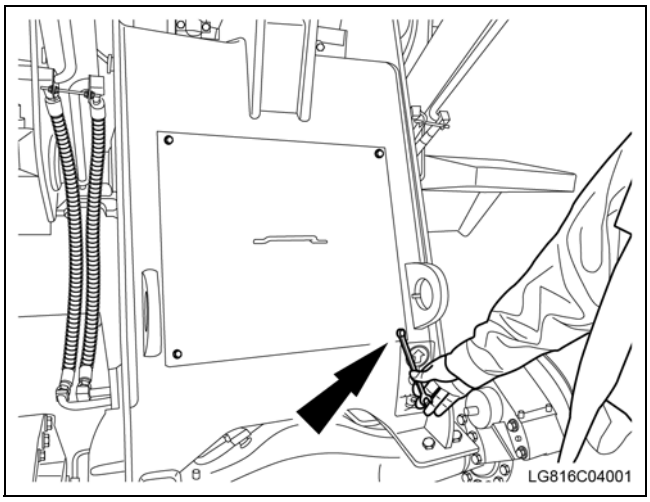


(b) Adjust all hoses without any distortion, and tighten the hose coupling nuts if other gp have no interference. Tightening torque of the control valve oil return hose is 120 ± 15 N•m, and that of the cylinder hoses is 102 ± 10 N•m.



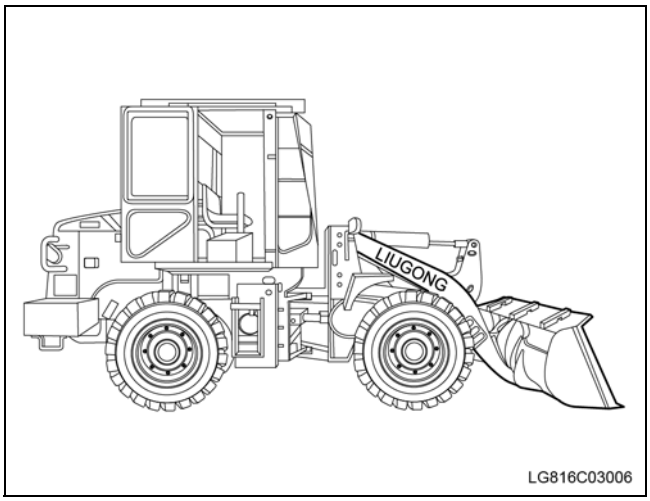
3. Install front plate

Use the removed 4 mounting bolts to install the front sealing plate to the corresponding location on the front frame, and use 13# wrench to tighten the bolts with tightening torque of 26 ±4 N•m.



4. Put down the boom

Start the machine, the operating handle will raise the boom after the hose is filled with hydraulic oil, and then remove the bumper, put the boom down and lay flat the bucket.



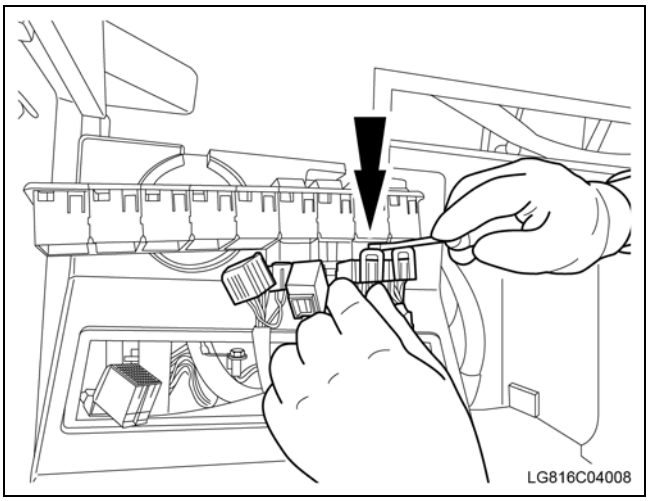
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Control lever AS

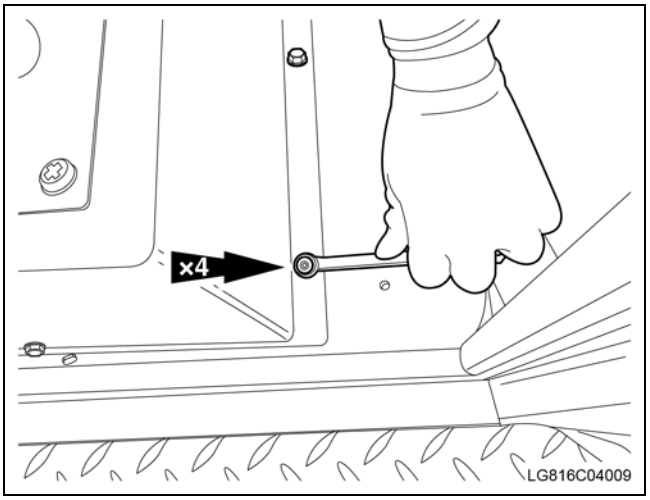
Removal

1. Remove operation box

(a) Use a screwdriver to pry the combination switch, and remove the harness connector.

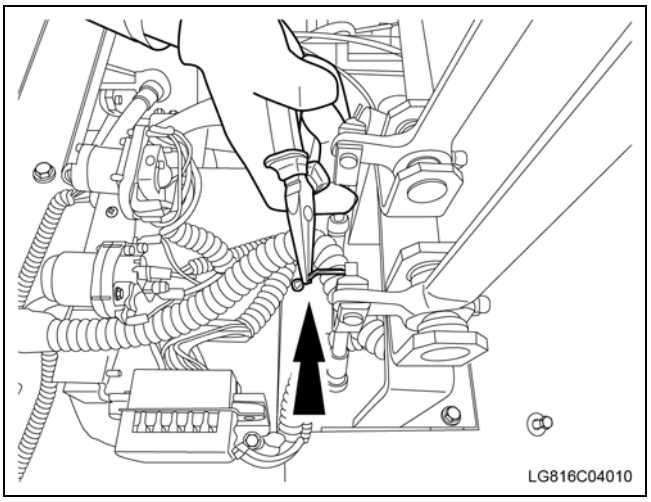


(b) Remove 4 mounting bolts from operation box with 10# wrench, and take down the operation box.



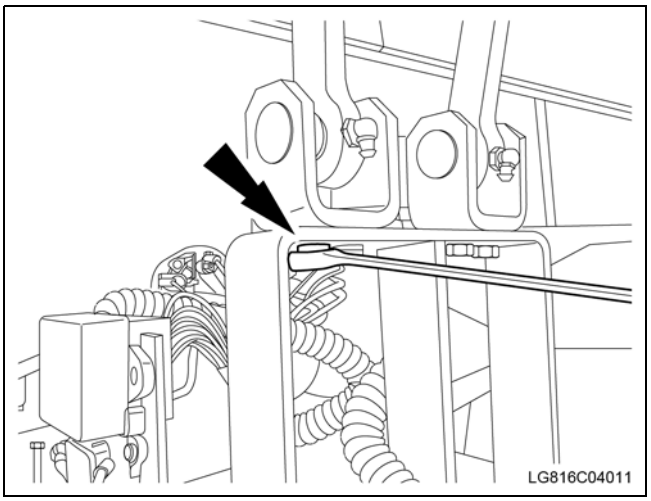
2. Remove the flexible shaft pin

Use needle-nose pliers to remove connecting pins and rounded shoulder pins between the flexible shaft and control lever.



3. Removal of control lever

Use 13# wrench to remove the binder bolts between two control levers and the bracket, and then remove the control lever to repair or replace.

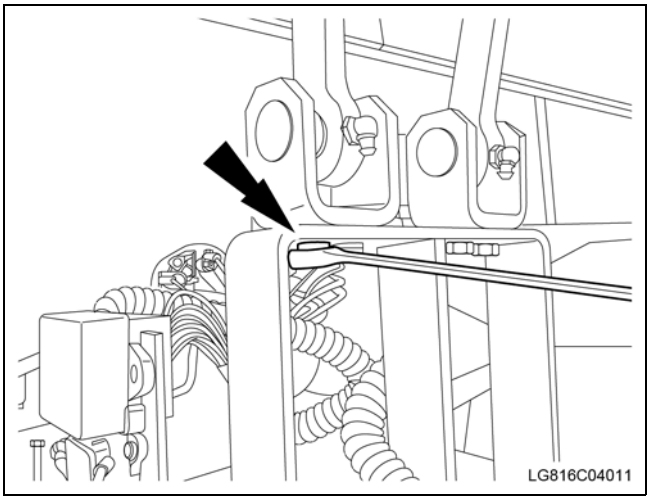


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Installation

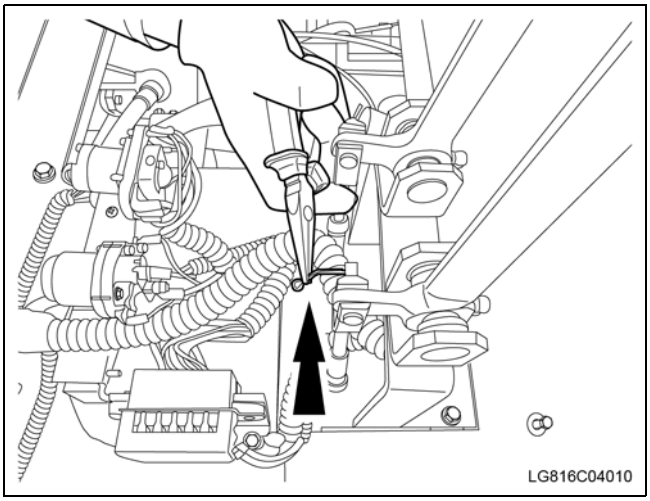
1. Install control lever

   Use the removed bolts to install 2 control levels to the bracket, and use 13# wrench to tighten bolts.



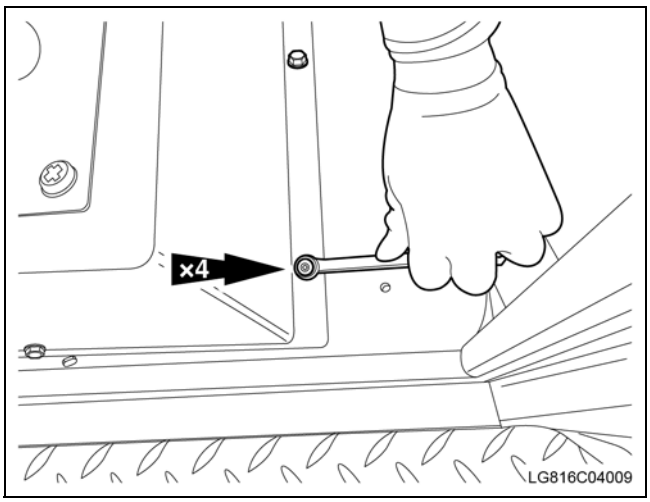
2. Install flexible shaft pin

   Use the removed round shoulder pins to connect the flexible shaft to the control lever, and then install pins at the end of the round shoulder pin as well as bend them with needle point pliers.

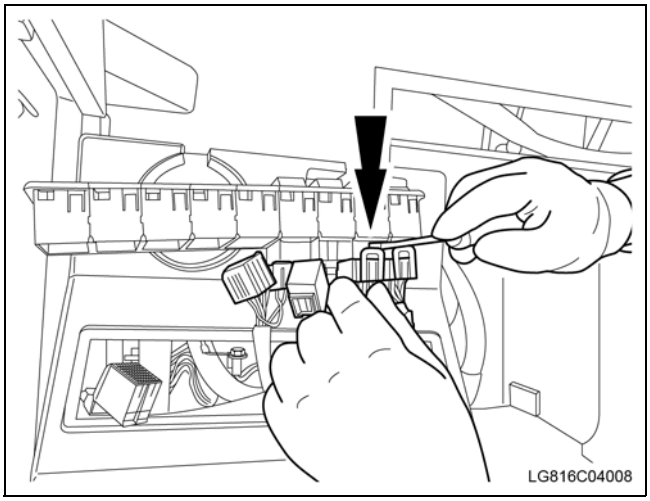


3. Install operation box

   (a) Use the removed bolts to fix a operation box to the cab floor.



   (b) Use 10# wrench to tighten, and plug in the combination switch harness connectors, install the switch to the operation box.



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Push and pull flexible shafts

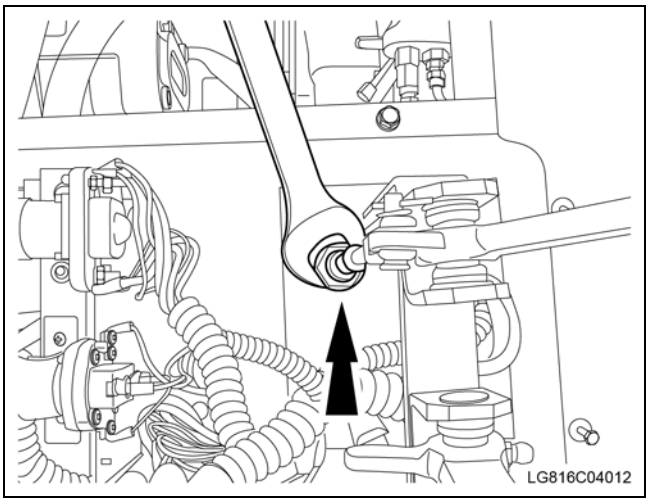
Removal

1. Remove the operation box and flexible shaft pins

   Refer to “Control lever AS”(p. 4-6)Step 3 for removal, remove the operation box, flexible shaft and control lever connecting pins.

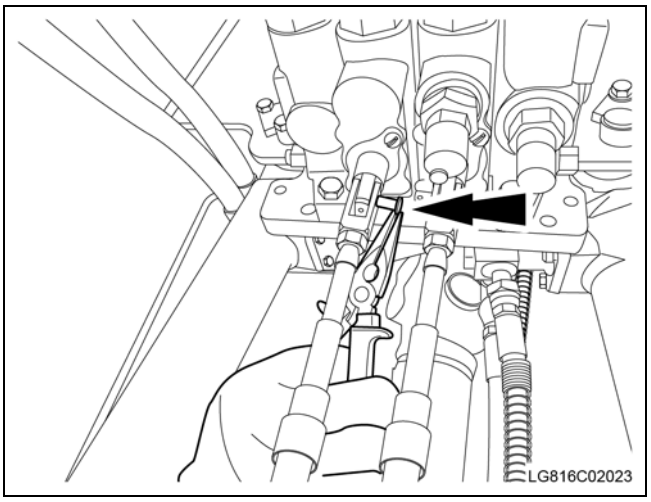
2. Remove fixing nuts on the bracket

   Remove the flexible shaft fixing nuts on the flexible shaft bracket with a 32# wrench, and pull the top of two flexible shafts from the beneath.

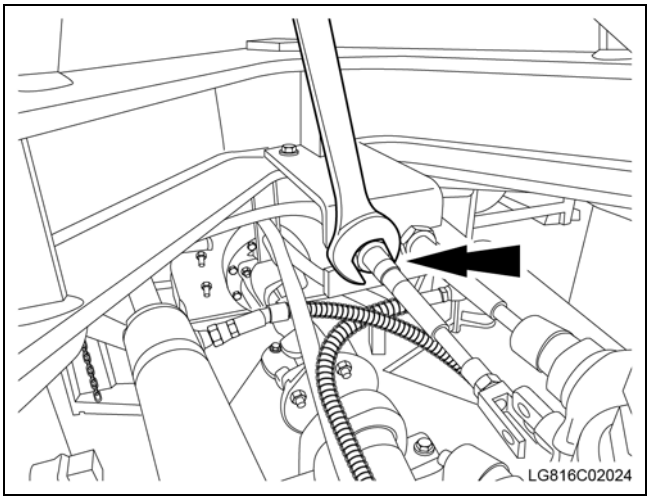


3. Remove the flexible shaft to the multi-channel valve connecting pin

   (a) Remove the connecting pin to the two flexible shaft and the control valve rod with nipple pliers.



   (b) Use 32# wrench to remove fixing nuts of 2 flexible shafts on the flexible shaft bracket, and then remove the flexible shaft, use pliers to cut the ties on the flexible bracket, and remove the flexible shaft from the crane.



Installation

1. Connect control lever

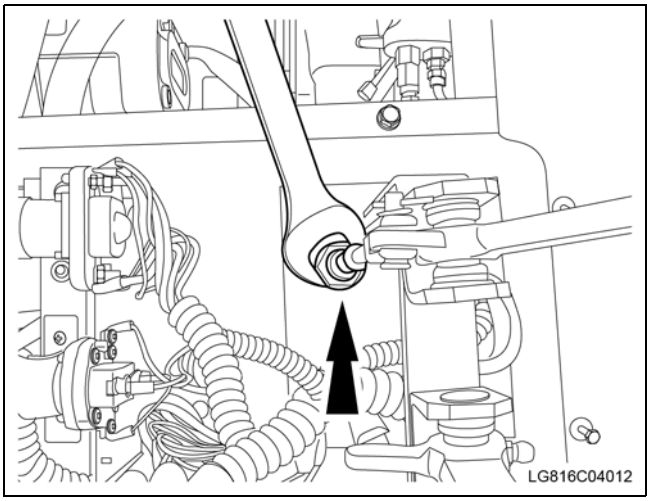
   Referring “Control lever AS”(p. 4-6)Step 2 for installation, connect the flexible shaft to the operating lever.

2. Fix the flexible shaft to the flexible shaft bracket

   Fix 2 flexible shafts to the bracket in the cab with

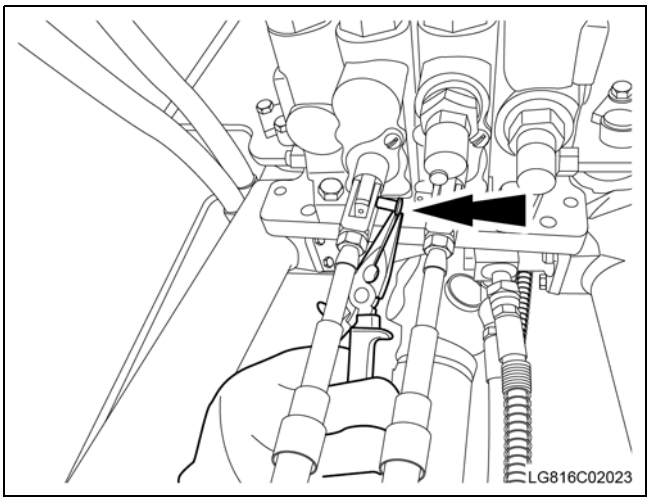
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own nuts, and use 32# wrench to tighten nuts.

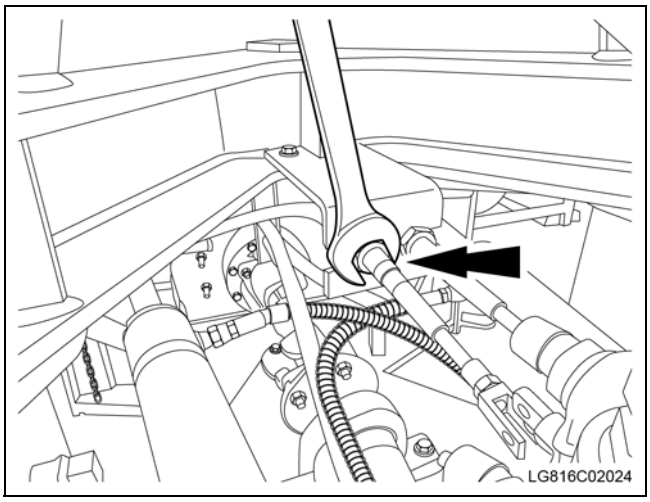


3. Connect control valve

(a) Connect control lever flexible shaft of boom arm oil cylinder to control valve flexible shaft with a round-shoulder pin, install washer and pin at the end of round-should pin, bent the pin with a nipper plier and install control lever flexible shaft of bucket title cylinder.



(b) Install flexible shaft to bracket with its own nut, adjust nut position to set control rod upright and control valve rod is in interme-diate position, tighten nut with a #32 wrench.



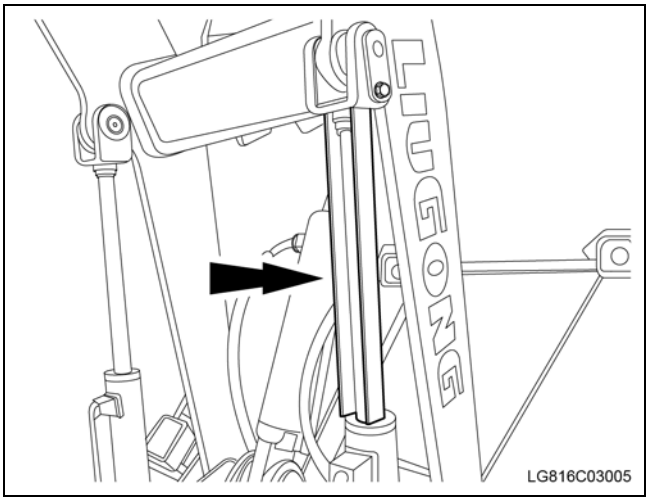
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Boom oil cylinder

Removal

1. Park the machine and discharge the pressure of the machine.

   (a) Remove the anti-rotation bumper, and connect it to the front and rear frames with own pins.



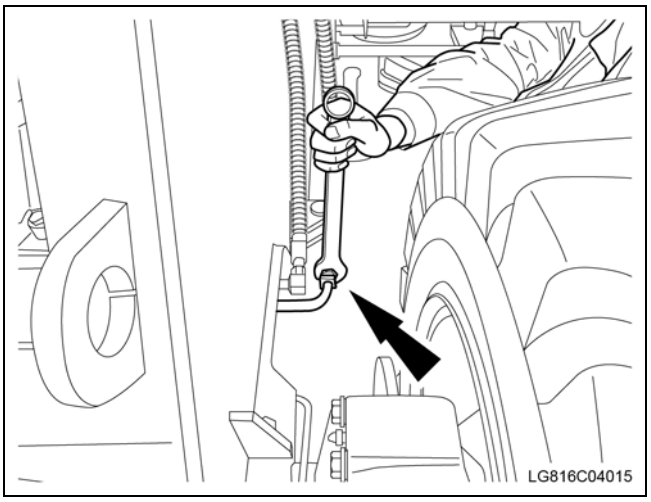
   (b) Pull the hand brake lever to the highest point.

   (c) Operate the control lever to lift the boom, and place the bumper to withstand the boom on the side boom cylinder piston rod, which needs no repair or replacement,

   (d) Lay down the boom, then shut off the engine, push and pull the control level back and forth more than 30 times, the hydraulic system pressure is released.

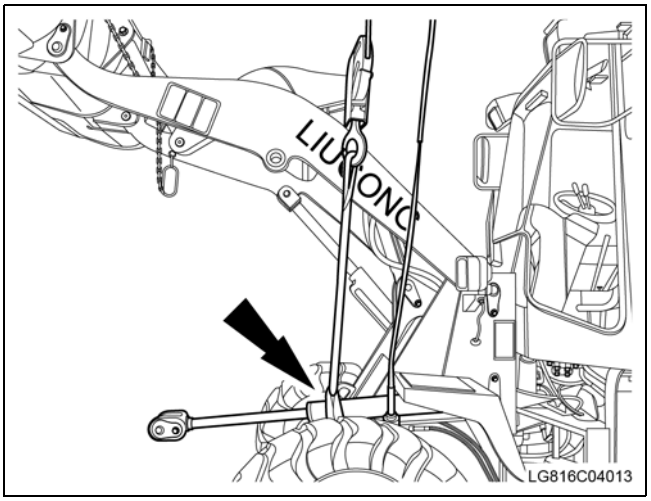
2. Remove hose

   Use 27# wrench to remove 2 hose AS which connect the boom cylinder; use clean plastic bags and ties to protect the removed hose connectors and pipe joints, so that prevent foreign matter from entering.



3. Remove boom cylinder pins (front)

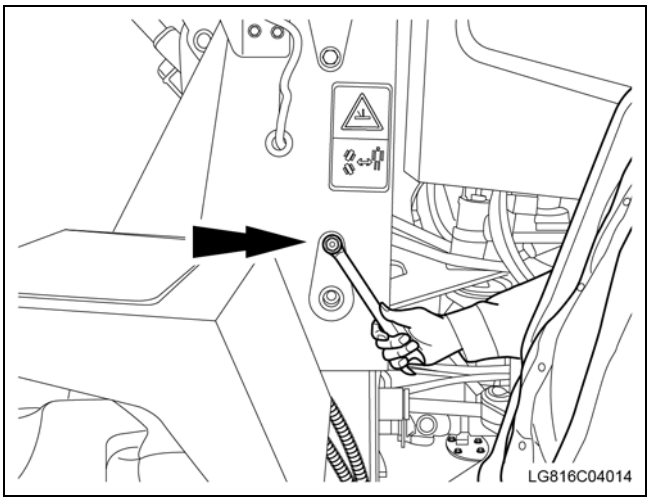
   Use the crane and spreader to carry the cylinder as the figure, and pull spreaders tightly to lift up the oil tank. Use 18# wrench to remove the pin lug plate mounting bolts, which connect the cylinder and boom, and then remove the pin.



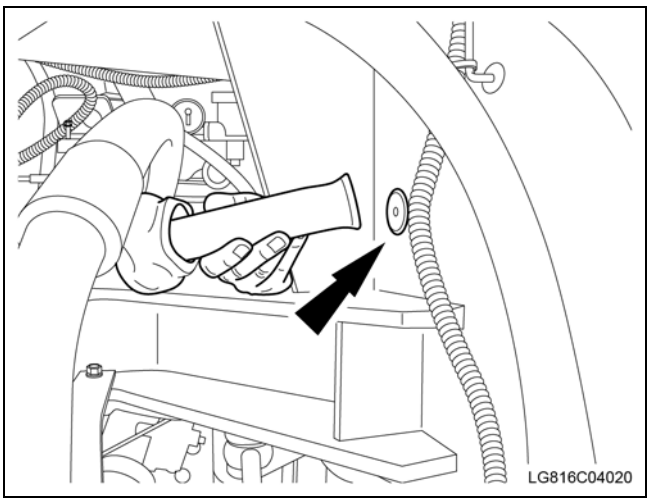
4. Remove boom cylinder pins (rear)

   (a) Remove the captive bolts connect the boom cylinder with the front frame with the 21# open-end wrench.

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(b) Use copper rod to knock out the pin, and then remove it.

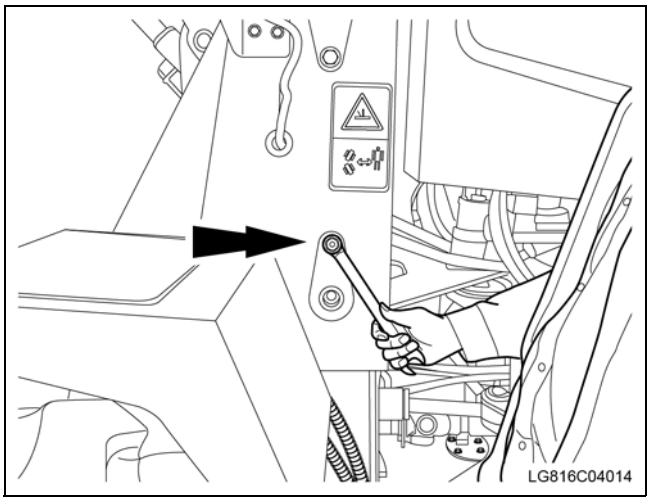


(c) Life the boom cylinder to the level ground and properly place, to be repaired or replaced. Surface painting should be protected during the life process.

Installation

1. Install boom cylinder pins (rear)

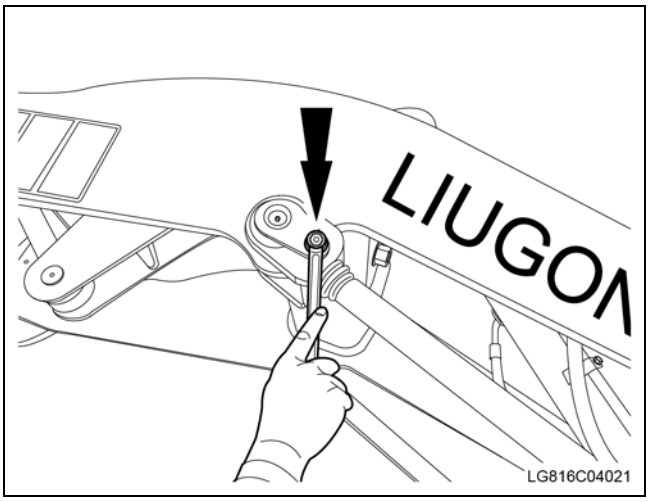
Use the crane and spreader to lift the mounting position of the boom cylinder large cavity into the front frame wing box, install the boom pin after align the mounting holes and lay down the adjusting pad. Wood is mounted on the pin lug plate, knock the lug plate to fit with the front frame wing box plate, insert mounting bolts, then use 21# wrench to tighten with tightening torque of 145 ± 20N•m.



2. Install boom cylinder pins (front)

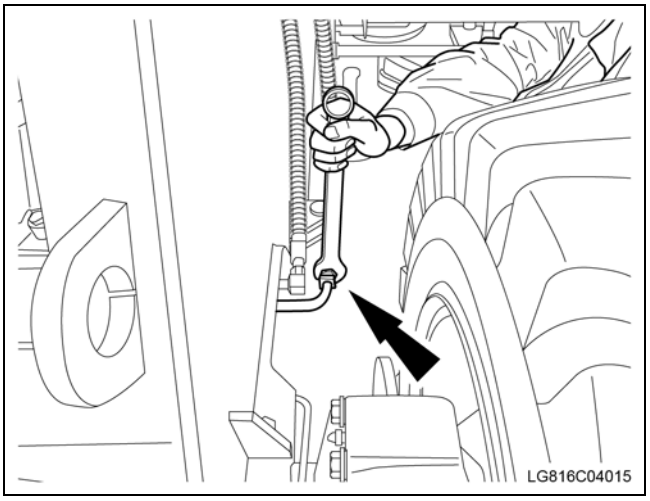
Use the crane and spreader to lift the boom cylinder, so that the medium mounting holes enter among the cylinder mounting plates. Align the boom cylinder mounting holes and place the adjustment pad, then insert the pin, knock the pin lug plate to fit with the cylinder plate by using a hammer while wood is mounted. Fit into the cushion covers and mounting bolts, and tighten them with 18# wrench, tightening torque is 90±12N•m.

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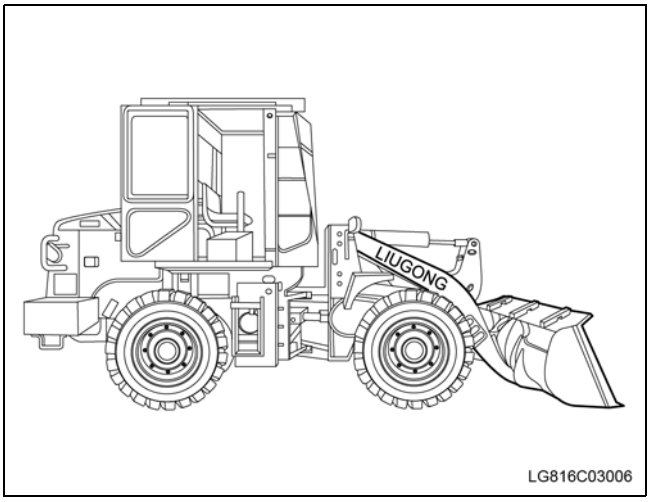
3. Connect to hose

Connect the boom cylinder hose connectors with the pipe connectors, the outer pipe connects to the small cavity hose, the inner pipe connects with the large cavity hose, all O-rings on the connection positions are replaced with new ones. Adjust the hose direction to make it without any distortion and interference with other components. Use 27# wrench to tighten the hose connector with tightening torque of 66 ± 7N•m.



4. Lower down the boom, and lay flat the machine

Start the machine, lift the boom cylinder, remove the bumper, put the boom to the end, and lay flat the bucket.



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Bucket tilt cylinder

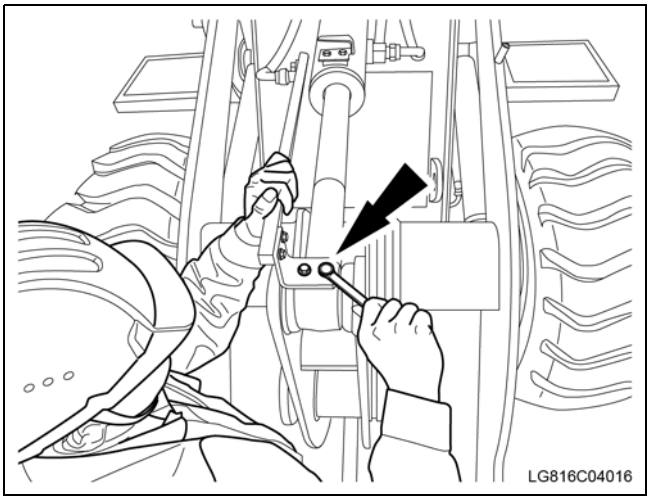
Removal

1. Park the machine and discharge the pressure of the machine

   Remove the anti-rotation bumper, connect it with own pins to the front and rear frames, pull the hand brake lever up to the highest point, and operate the control lever handle to lay flat the bucket. Shut the engine off, and push the operating lever back and forth more than 30 times, so as to discharge the hydraulic system pressure.

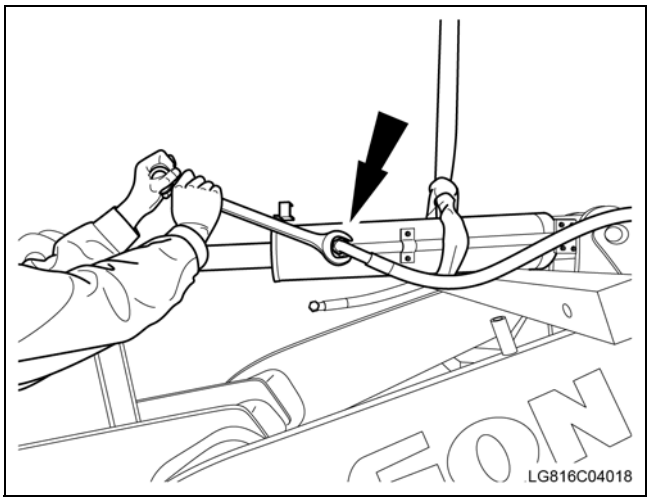
2. Remove the indicator rod

   With 13# wrench to remove the instructor rod setscrews on the tilt cylinder, remove the indicator rod and properly it to protect the surface of the paint.

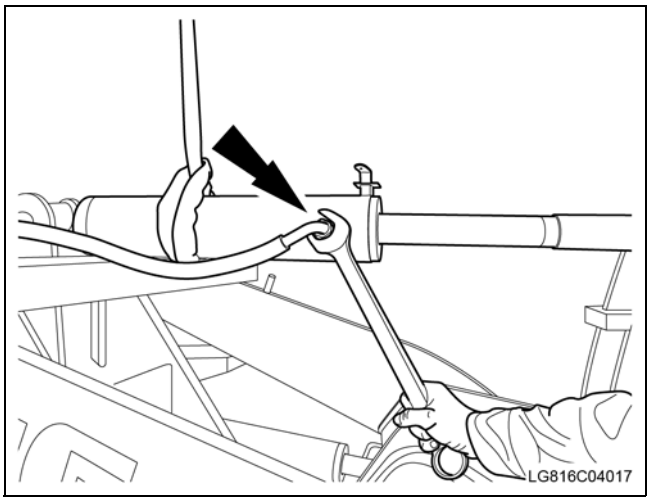


3. Remove hose

   (a) Place a piece of wood on the boom and below the tilt cylinder for supporting the tilt cylinder, as well as use the crane and spreaders to lift the tilt cylinder and tighten the spreader to hold it.



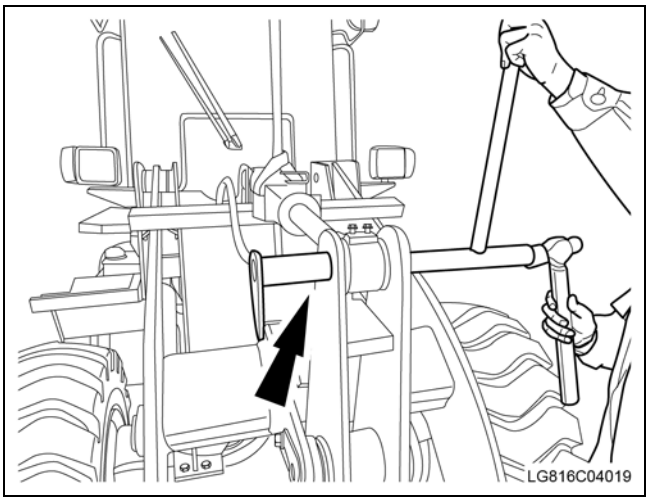
   (b) Remove the hose joints at both sides of tilt cylinder with 32# wrench, use clean plastic seal bag and strap to bind up the hose joint and cylinder pipe joint to prevent hydraulic system from entering foreign matters.



4. Remove cylinder front pin

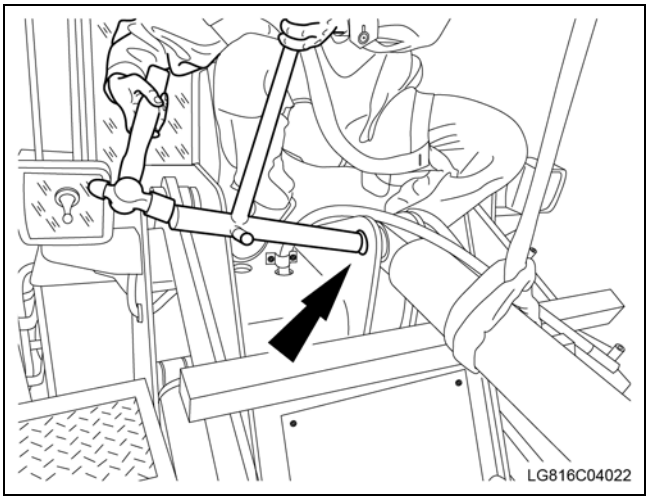
   Use 24 # wrench to remove plate captive bolts of the tilt cylinder and rocker arm connecting pin, and use a copper rod or knock-off tooling to knock the pin off.

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5. Remove cylinder rear pin

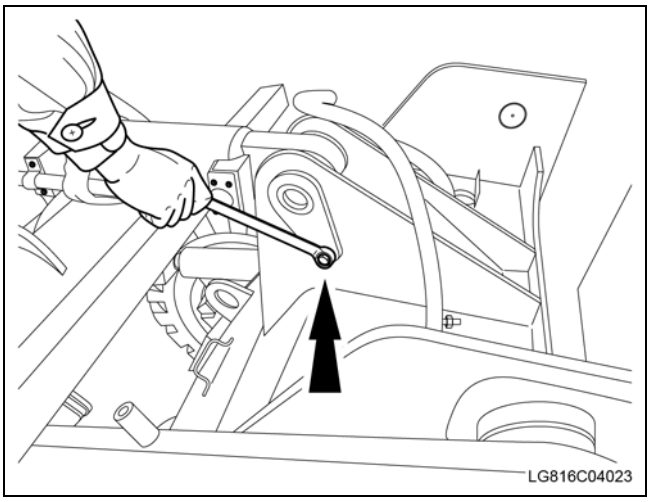
Use 21# wrench to remove plate captive bolts of the tilt cylinder and the front frame front arm connecting pin, and use a copper rod or knock-off tooling to knock the pin off. Life the tilt cylinder to the flat area and properly place for repairing or replacing, protect the surface paint during the lift and place process.



Installation

1. Rear pin of the cylinder

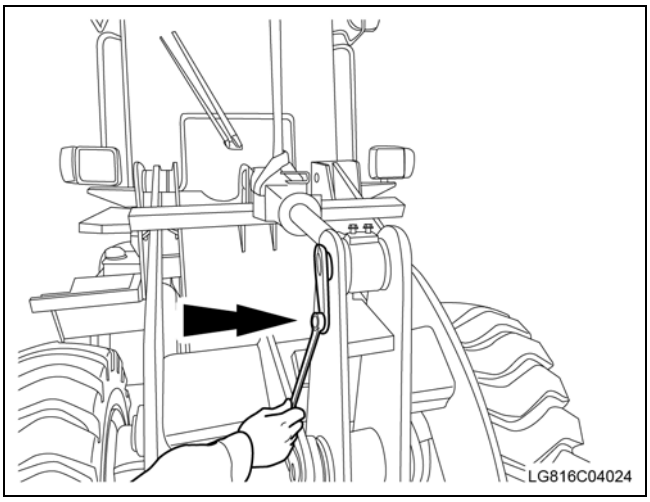
Use the crane and spreader to lift the mounting position of the tilt cylinder large cavity end to the position between 2 plates of the front frame front middle beam, install the bucket pin after align the mounting holes and lay down the adjusting pads. Wood is mounted on the pin lug plate surface, knock the lug plate to fit with the front middle beam side plate, insert mounting bolts, then use 21# wrench to tighten with tightening torque of 85 ± 10 N•m.

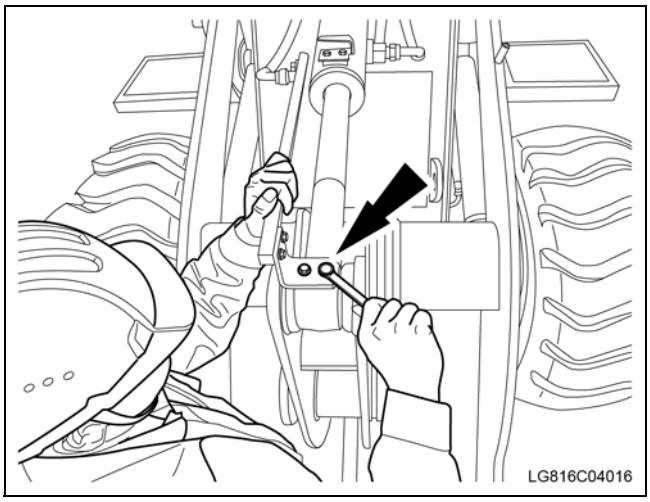


2. Install cylinder front pin

Use the crane and spreader to lift the mounting position of the tilt cylinder piston rod end to the position between 2 plates of the rocker arm, install the pin after align the mounting holes and lay down the adjusting pads. Wood is mounted on the pin lug plate surface, knock the lug plate to fit with the rocker arm side plate, insert mounting bolts, then use 24# wrench to tighten with tightening torque of 225 ± 35N•m.

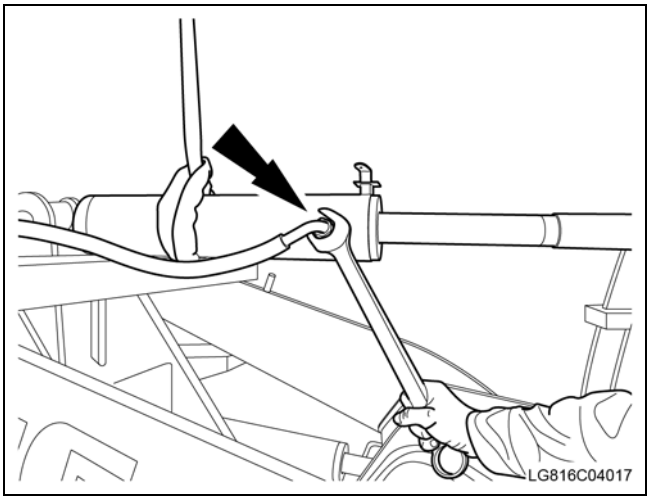
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3. Connect to hose

Connect tilt cylinder left and right hoses to relative joints, replace all O-rings at connection points with new ones, adjust the hose direction and position to make it not twisted and not interfered by other parts, ant then tight the hose joint with 32# wrench. Tightening torque is 102±10N•m.



4. Install the indicator lever

Use bolts to fix the indicator rod to the tilt cylinder, let the indicator lever backwards. Use 13 # wrench to tighten the bolts with the tightening torque of 26 ± 4N• m.

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Loader Control Valve

Technical parameters

Nominal pressure (MPa)	20
Nominal capacity (L/min)	120
Regulating range of work overflow valve (MPa)	8-22
Allowable back pressure (MPa)	1.5

Working principle

Use series-parallel oil circuit, its bucket valve is three-position six-way, it can control the bucket turn up, neutral and turn down three movements. The boom control valve is four-position six-way, which controls the boom-up, neutral, low down and floating four movements.

This series of control valve adopt the sub-piece structure, which consists of the inlet sheet, a plurality of commutator segments and the return oil slices. There are main relief valves in the main oil passage, which are used to adjust the main hydraulic system pressure. When all reversing valves are in the neutral positions, oil from the main pump flows back to the oil tank through the medium oil passage. When operating any reversing valve, the valve medium way is cut off, oil from the main pump pushes one-way valve to flow into the cylinder through the valve annular oil passage, to achieve the desired conditions. When the boom linkage is in a floating position, the cylinder upper and lower chambers are connected, and connect with the oil return way at low pressure. The cylinder is in a free-floating state by the working device weight and ground forces.

The secondary pressure relief valve can be inserted in the work oil port side according to the system requirements. Its function is sudden raise in cylinder pressure, being quickly opened, and protecting tanks and others. Its another function is to eliminate the negative pressure in the cylinder and oil trapped phenomenon, the negative pressure is generated by the executive body subject to external shocks.

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Fault and troubleshooting

Faults	Reasons	Troubleshooting
Pressure relief valve is not stable or tune.	⑴ Regulator screw loose ⑵ Regulator spring deformed or damaged (3) Relief valve core worn or stuck ⑷ Pump failure	(1) Readjust the pressure and tighten (2) Replace with new product (3) Replace relief valve, or remove and wash then reassemble. ⑷ Service the pump
When the valve stem is in the neutral position, the working mechanism is clearly descended.	⑴ Gap between the valve body and the valve stem is too large due to wear ⑵ Valve stem position is not centered. (3) Oil temperature is too high, and the viscosity is decreased. (4) Cylinder oil seal failure (5) The secondary relief valve is wore or stuck by dirt	⑴ Require clearance to replace the valve stem. ⑵ Let the stem position remain neutral. (3) Reduce the oil temperature ⑷ Service the cylinder (5) Replace or clean the secondary relief valve
Outer leakage	(1) O-ring is damaged (2) Oil temperature is too high (3)Bad seal for the oil port connector. ⑷ Relief valve locknut and the connection nuts between slices are loose.	(1) Replace with new product (2) Reduce the oil temperature (3) Check the corresponding parts fastener sealing ⑷ Fix corresponding parts
Reset Failure	(1) The return spring is damaged or deformed. (2) There is dirt between the valve stem. (3) The control mechanism is ineffective. (4) There are different axes among the reset parts.	(1) Replace with new product (2) Clean the parts (3) Adjust the control device (4) Reassemble and keep coaxial.

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Cylinders

SPECIFICATIONS

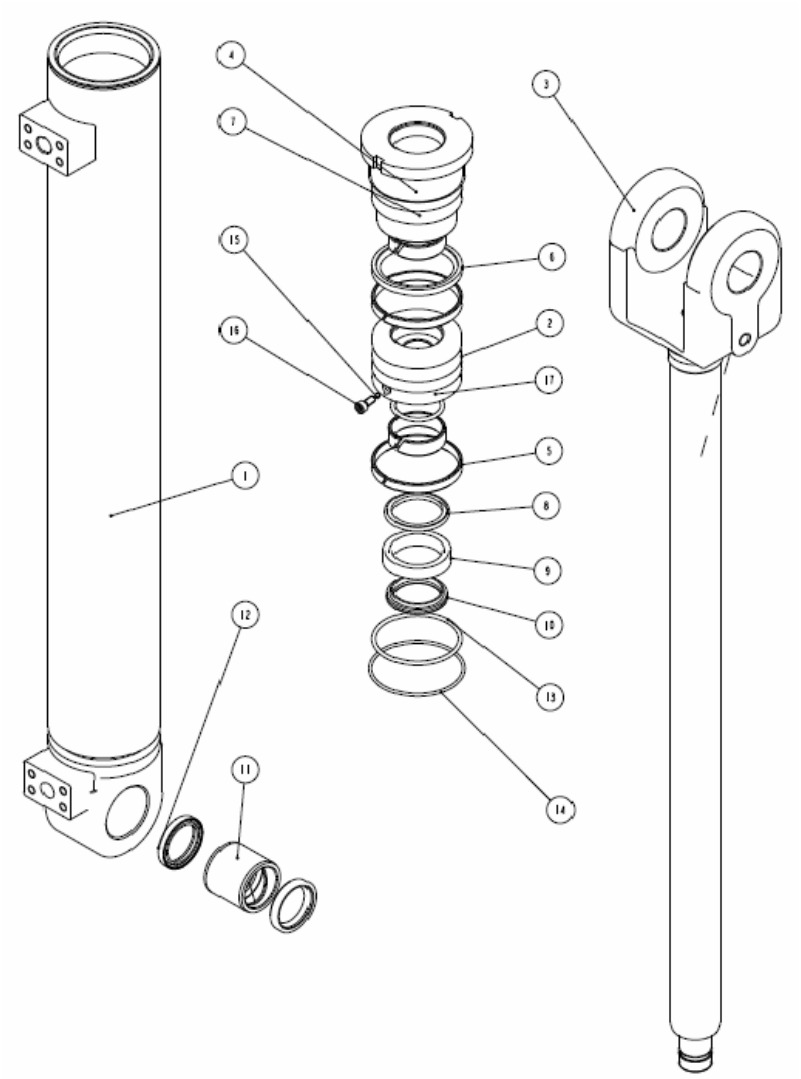
LIFT CYLINDER	39.9 kg
BUCKET tilt cylinder	45.6 kg

SPECIAL TORQUES

Tightening torque of the tilt cylinder	800N•m
The tilt cylinder screw tightening torque	16N•m
Tightening torque of tilt cylinder cover	1200N•m
Boom cylinder tightening torque	1000N•m
Tightening torque of boom cylinder screw	33N•m
Boom cylinder head tightening torque	1200N•m

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LIFT CYLINDER

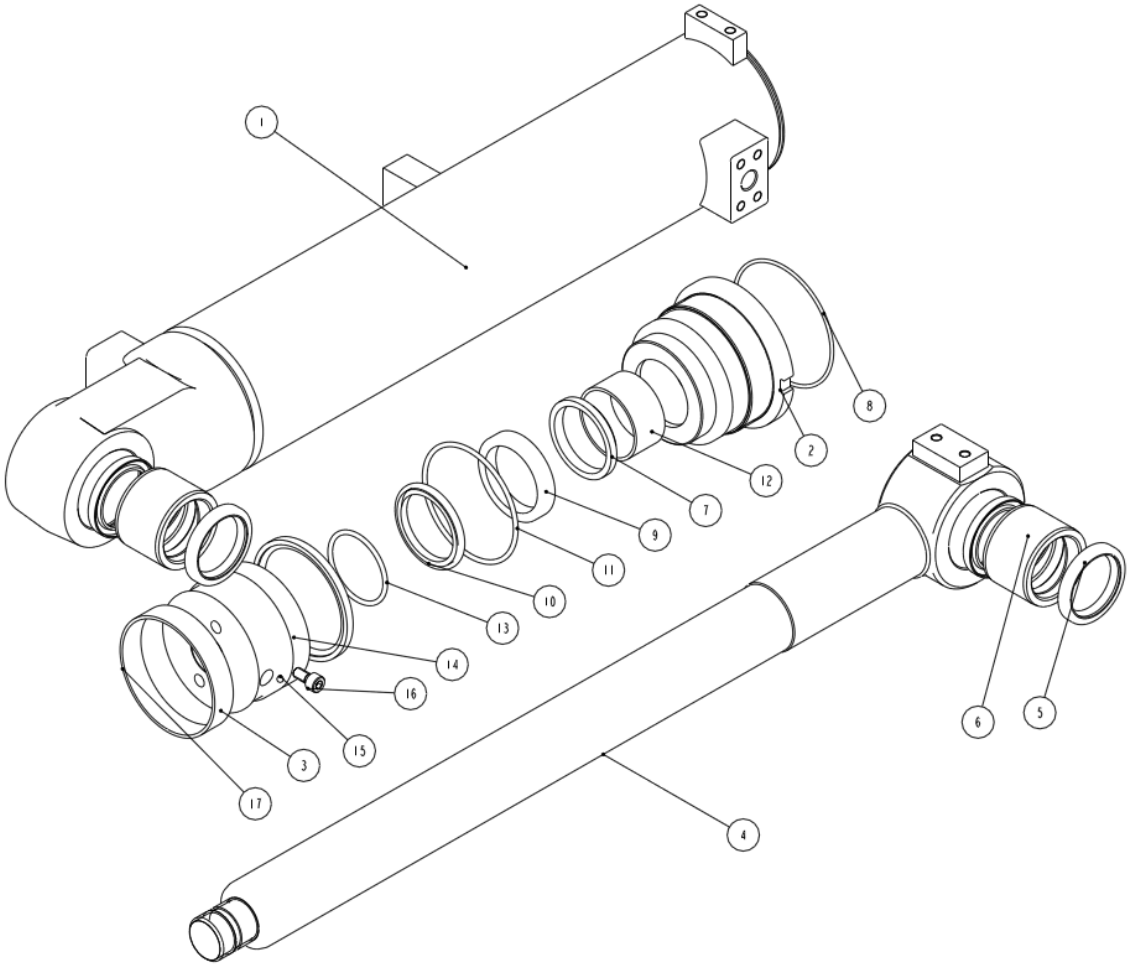


LG816C04100

1. Cylinder body
2. Piston
3. Piston rod
4. Cylinder head
5. Support ring
6. Combination seal for holes
7. Support ring
8. Combination seal for shaft
9. Y-shape seal ring
10. Dust ring
11. Bushing
12. Dust ring
13. O-ring
14. O-ring
15. Steel ball
16. Screw
17. O-ring

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BUCKET tilt cylinder



LG816C04101

1. Cylinder body
2. Cylinder head
3. Piston
4. Piston rod
5. Bushing
6. Seal ring
7. Dust ring
8. O-ring
9. Y-shape seal ring
10. Combination seal for shaft
11. O-ring
12. Support ring
13. O-ring
14. Combination seal for holes
15. Steel ball
16. Screw
17. Support ring

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Replace hydraulic oil

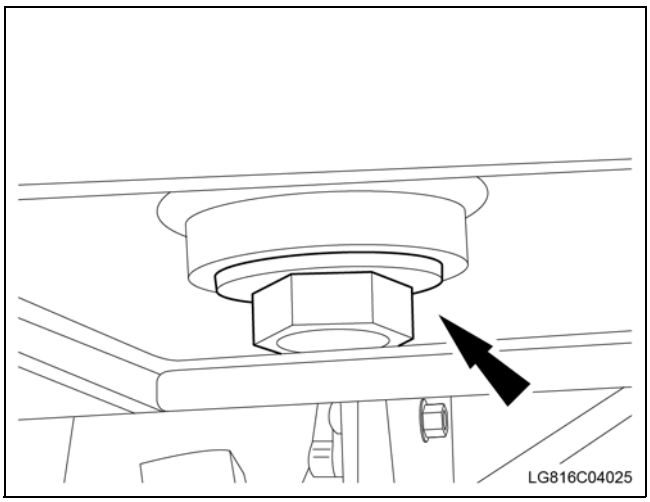
Because of poor working conditions, or hydraulic oil occurring deterioration for serious contamination, such as color black, oil foaming, please change the hydraulic oil.

⚠ Precautions for replacing hydraulic oil:

During the check, service, test and adjustment of the machine need to be careful, when to remove any hydraulic oil lines or dismantle any parts that contain liquid, prepare proper containers to collect such liquid. Dispose all liquid properly. During the oil change operation, great care should be given to hydraulic oil cleanliness; dirt isn't allowed to enter the hydraulic system.

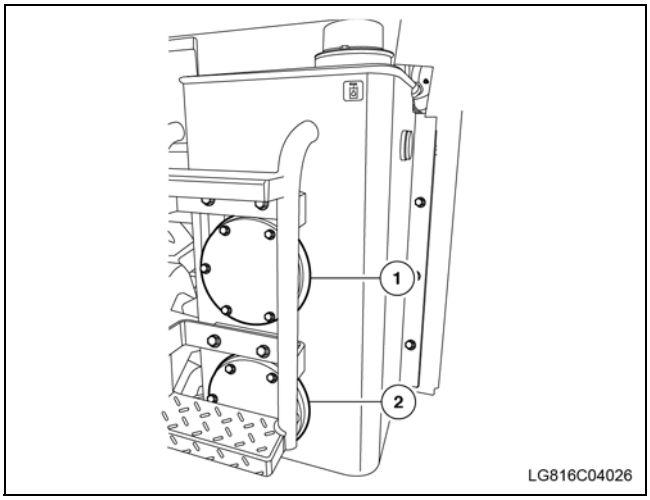
1. Park the machine on a flat and open spaces, pull the parking brake lever, and install the frame locking device.
2. Start the engine and run at idle for ten minutes, repeat to lift or lower the boom, and lean forward or backward the bucket during this period, and raise the hydraulic oil temperature.
3. Finally, put down the work equipment to the ground and slightly exert pressure downward, the engine is flame-out.
4. Clean the hydraulic tank drain port, and unscrew the oil drain plug, drain the hydraulic oil and use a container to hold it. Open the hydraulic oil tank filler cap at the same time, so that speed up the process of discharge of oil, the tank has a lock.

Hydraulic oil drain port plug



⚠ Note: Because the hydraulic oil may be at a higher temperature at this time, so to wear protective equipment, and carefully operate to avoid personal injury.

5. Remove the hydraulic tank flange cap below the oil filler, rinse hydraulic tank bottom and walls with clean oil, and finally wipe dry with clean cloth. (1,2 for the flange cap).

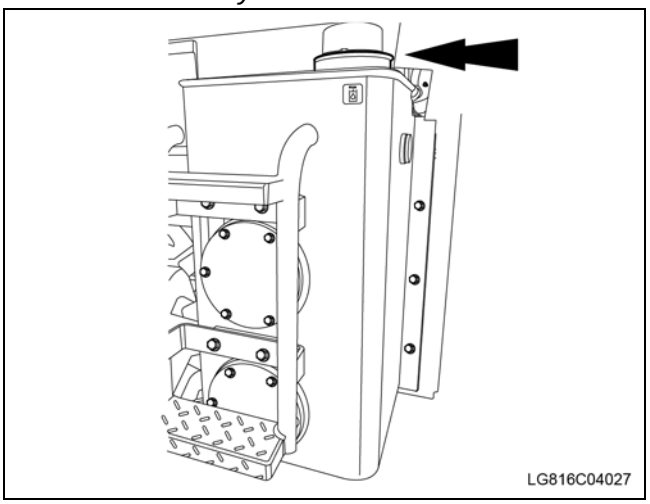


6. Install the hydraulic tank drain plug and hydraulic tank flange cover.
7. Add clean hydraulic oil from the

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hydraulic tank filler, till the oil level reaches the top scale of the hydraulic oil level gauge, and screw on the oil filler cap.

Hydraulic oil filler



8. Remove the frame locking device, and start the engine. Operate the working device control handle, repeat to lift and lower the boom, lean forward and backward the bucket, turn left and right to the maximum angle for 2-3 times, and fill cylinders and oil pipes with hydraulic oil. Then run the engine at idle for 5 minutes, in order to exhaust air from the system.
9. Turn off the engine, open the hydraulic tank filler cap, and add clean hydraulic oil to 2/3 scale of the hydraulic oil tank level gauge.

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Inspection and Service of Hydraulic System

Cycle Time—Check

	Action	Time
Hydraulic system operation time	Raise	4.4s
	Lower	2.85s
	Float	3s
	Dump	1.2s
	Sum of three items	8.6s

Required Tools

Stopwatch

Raise

1. Move the work tool to the TILT BACK position.
2. Lower the work tool completely.
3. Increase the engine RPM to high idle.
4. Move the lift control lever to the RAISE position. Hold the lift control lever in this position until the lift cylinder reaches the end of travel. Record the amount of time that is required for the work tool to travel from the ground to the full RAISE position. Refer to above table for the correct cycle time for the machine that is being serviced.

Lower

1. Position the work tool so that the work tool is flat on the ground.
2. Raise the work tool to the maximum height.
3. Increase the engine RPM to high idle.
4. Move the lift control lever to the full LOWER position and hold.

⚠ Note: Ensure that the lift control lever is NOT in the FLOAT position. Record the time from the full LIFT position to the ground. Refer to above table for the correct cycle time.

Float

1. Position the work tool so that the work tool is flat on the ground.
2. Raise the work tool to the maximum height.
3. Increase the engine RPM to high idle.
4. Move the lift control lever to the FLOAT/ DETENT position and hold. Record the time from the full LIFT position to the ground. Refer to above table for the correct cycle time.

Dump

1. With the boom cylinders in the fully extended position, tilt back the work tool as far as possible.
2. Increase the engine RPM to high idle.
3. Move the tilt control lever to the full DUMP position. Hold the tilt control lever in this position until the work tool is at the full DUMP position. Record the time to the full DUMP position. Refer to above table for the correct cycle time for the machine that is being serviced

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BOOM & BUCKET tilt cylinder Drift-Check

Required Tools

Stopwatch, flexible rule, infrared thermometer

BOOM Cylinder Drift—Check

⚠ WARNING

Sudden movement or accidental starting of the machine can cause personal injury or death to persons on or near the machine

To prevent personal injury or death, perform the following:

1. Park the machine on a smooth, level surface.
2. Lower the work tool to the ground and engage the parking brake.
3. Stop the engine and remove the key.
4. Block the wheels and install the steering frame lock.

⚠ WARNING

- Personal injury or death can result from sudden movement of the boom cylinders or the bucket tilt cylinders.
- Do not stand under the work tool when you are testing or adjusting the boom cylinders or the bucket tilt cylinders.
- Do not stand under the lift arms when you are testing or adjusting the boom cylinders or the bucket tilt cylinders.

This test will check the drift rate of the lift cylinders. The drift rates will change according to many conditions (hydraulic oil temperature, type of bucket, load in the bucket, etc). The values in the table are for an empty bucket.

1. Park the machine on a smooth, level surface.
2. Move the transmission direction control switch to the NEUTRAL position.
3. Engage the parking brake.
4. Place the steering frame lock in the LOCKED position.
5. Start the engine. Warm the hydraulic oil to normal operating temperature of approx-

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imately 49°C to 65°C (120 to 150°F).

6. To check the tilt circuit, raise the bucket to the maximum height and move the control lever to the HOLD position.
7. Turn the engine start switch to the OFF position.
8. Measure the distance of cylinder rod movement. The maximum permissible drift is 50 mm per 1 hour. (Record once every 15 minutes)
9. If the amount of cylinder drift is within the specification, this boom circuit is not causing a drift problem.
10. If there is too much drift, check the anti-drift valve for the lift function and check the ride control balance spool. If replacement of boom cylinder is required, refer to Removal and Installation, "Boom Cylinder--Removal and Installation".
11. Start the engine. Lower the bucket to the ground. Turn the engine start switch to the OFF position.

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BUCKET tilt cylinder drift-check

⚠ WARNING

Sudden movement or accidental starting of the machine can cause personal injury or death to persons on or near the machine

To prevent personal injury or death, perform the following:

1. Park the machine on a smooth, level surface.
2. Lower the work tool to the ground and engage the parking brake.
3. Stop the engine and remove the key.
4. Block the wheels and install the steering frame lock.

⚠ WARNING

- Personal injury or death can result from sudden movement of the boom cylinders or the bucket tilt cylinders.
- Do not stand under the work tool when you are testing or adjusting the boom cylinders or the bucket tilt cylinders.
- Do not stand under the lift arms when you are testing or adjusting the boom cylinders or the bucket tilt cylinders.

This test will check the drift rate of the bucket lifting cylinders. The drift rates will change according to many conditions (hydraulic oil temperature, type of bucket, load in the bucket, etc). The values in the table are for an empty bucket.

1. Park the machine on a smooth, level surface.
2. Move the transmission direction control switch to the NEUTRAL position.
3. Engage the parking brake.
4. Place the steering frame lock in the LOCKED position.
5. Start the engine. Warm the hydraulic oil to normal operating temperature of approximately 49 to 65°C (120 to 150°F).
6. To check the lift circuit, raise the bucket to the maximum height and move the control lever to the HOLD position.
7. Turn the engine start switch to the OFF position.

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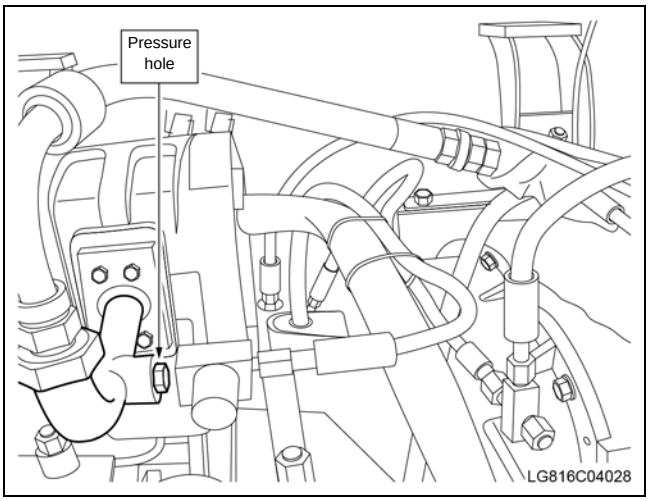
8. Measure the distance of rod movement. The maximum permissible drift is 20 mm per 1 hour. (Record once every 15 minutes)
9. If the amount of cylinder drift is within the specification, this tilt circuit is not causing a drift problem.
10. If there is too much drift, check the anti-drift valve for the lift function and check the tilt back line relief valves. If replacement of bucket tilt cylinder is required, refer to Removal and Installation, "Bucket tilt cylinder--Removal and Installation".
11. Start the engine. Lower the bucket to the ground. Turn the engine start switch to the OFF position.

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Relief Valve--Test and Adjust

Required Tools

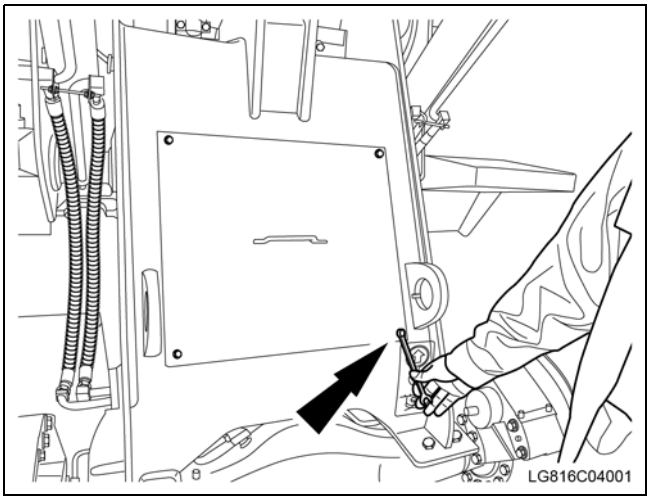
Pressure measurement connector, pressure gauge (0-25Mpa), infrared thermometer



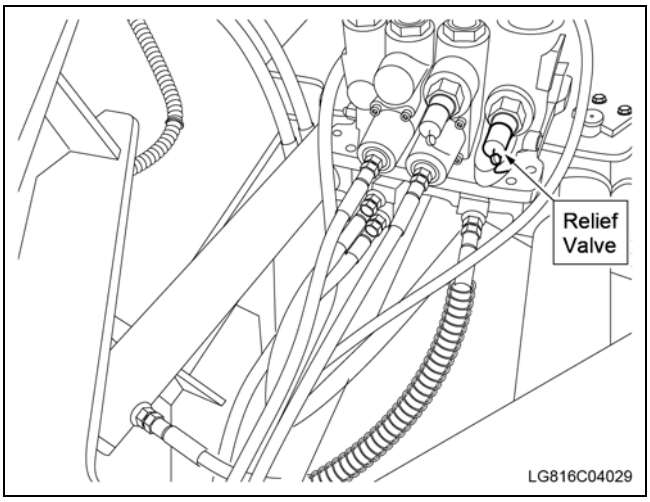
1. Start the engine and run the engine at high idle. Operate the control levers and move all the cylinders in order to increase the temperature of the hydraulic oil to normal operating temperature of approximately 49 to 65°C (120 to 150°F).
2. Lower the lift arms to the ground.
3. Turn the engine start switch to the OFF position.
4. Release the hydraulic system pressure.
5. Connect Pressure Gauge Group on the pressure tap.

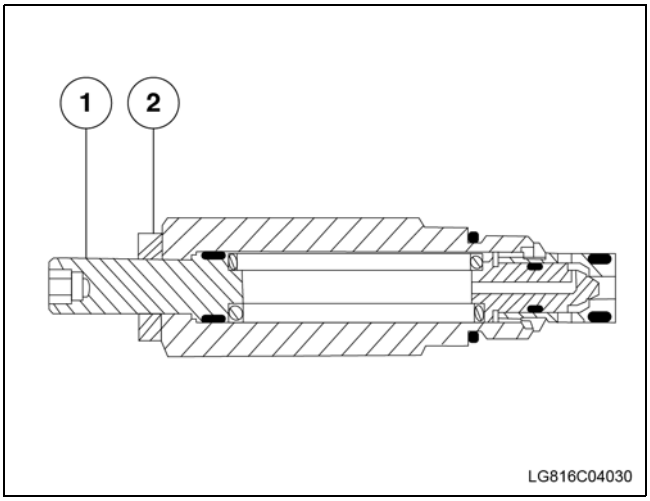
   ⚠ Note: In the following steps, do not keep the control lever in the RAISE position for more than five seconds while the pressure is at the relief setting.

6. Start the engine. Raise the work tool to the maximum height. Hold the control lever in the full RAISE position.
7. Increase the engine speed to high idle. Observe the pressure gauge with the control lever in the RAISE position. The pressure setting for the load sensing relief valve should be $18^{+0.5}_{-0.2}MPa$.
8. If the pressure setting of the load sensing relief valve is not correct, proceed with the following steps.
   (a) Position the work tool on the ground. Turn the engine start switch to the OFF position.
   (b) Remove the front guard group in order to access the load sensing relief valve.



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1. Adjustment screw 2. locknut

(c) Loosen locknut. Turn adjustment screw clockwise in order to increase the pressure setting. Adjust screw counterclockwise in order to decrease the pressure setting of the relief valve.

(d) After adjustment screw is turned for an adjustment, hold adjustment screw in place and tighten locknut.

(e) Repeat Steps 6 and 7.

9. If the pressure setting is correct, position the work tool on the ground.
10. Turn the engine start switch to the OFF position.
11. Release the hydraulic system pressure.
12. Remove the test equipment.
13. Install the front guard group on the machine.
14. Start the engine, position the work tool on the round. Turn the key start switch to the OFF position.
15. Place the steering frame lock in the STORE position.

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Inspection and adjustment of double-acting relief valve pressure

Required Tools

Pressure measurement connector, pressure gauge (0-25Mpa), infrared thermometer

Pressure test of the overload valve of the bucket large cavity

1. Start the engine and run the engine at high idle. Operate the control levers and move all the cylinders in order to increase the temperature of the hydraulic oil to normal operating temperature of approximately 49 to 65°C (120 to 150°F).
2. Lower the lift arms to the ground.
3. Turn the engine start switch to the OFF position.
4. Release the hydraulic system pressure.
5. Adjust the system maximum pressure to 21 MPa.
6. Connect Pressure Gauge Group on the pressure tap.
7. Start the engine. Raise the work tool height.
8. Increase the engine speed to high idle.
9. Manipulate the bucket control valve stem, lean backward the bucket till the pressure gauge shows the highest pressure, and then the gauge reading should be 20 MPa. If the pressure does not match, adjust the overload valve by referring to the previous section Method to Adjust the Relief Valve Pressure.
10. If the pressure setting is correct, adjust the system pressure to 18 MPA and position the work tool on the ground.
11. Turn the engine start switch to the OFF position.
12. Release the hydraulic system pressure.
13. Remove the test equipment.
14. Install the front guard group on the machine.
15. Start the engine, position the work tool on the round. Turn the key start switch to the OFF position.
16. Place the steering frame lock in the STORE position.

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Pressure test of the overload valve of the bucket small cavity

1. Start the engine and run the engine at high idle. Operate the control levers and move all the cylinders in order to increase the temperature of the hydraulic oil to normal operating temperature of approximately 49-65°C (120-150°F).
2. Lower the lift arms to the ground.
3. Turn the engine start switch to the OFF position.
4. Release the hydraulic system pressure.
5. Connect Pressure Gauge Group on the pressure tap.
6. Start the engine. Raise the work tool to the level height.
7. Manipulate the bucket control valve stem, lean forward the bucket to the maximum position till the pressure gauge shows the highest pressure, and then the gauge reading should be 12 MPA. If the pressure does not match, adjust the overload valve by referring to the previous section Method to Adjust the Relief Valve Pressure.
8. If the pressure setting is correct, position the work tool on the ground.
9. Turn the engine start switch to the OFF position.
10. Release the hydraulic system pressure.
11. Remove the test equipment.
12. Install the front guard group on the machine.
13. Start the engine, position the work tool on the round. Turn the key start switch to the OFF position.
14. Place the steering frame lock in the STORE position.

Other faults and troubleshooting

⚠ Note:

Because faults are caused for a variety of reasons, which can not be listed here, here only lists some of the common faults and their causes and solutions. If such problems are still not resolved, contact your nearest service provider or reseller for solutions.

I. The working device acts powerless

Possible cause	Solution
1. Hydraulic oil level is insufficient.	Add hydraulic oil to the specified oil level.
2. Hydraulic oil is serious polluted.	Replace hydraulic oil.
3. The work pump is poor in oil absorption, or there is serious leakage in the working pump.	Replace work pump.
4. The cylinder seals are damaged with serious internal leakage.	Replace cylinder seal parts or replace cylinder.
5. Control valve stem is worn, and the internal leakage is serious, or the control valve main overflow spring is fail, the set pressure is too low.	Replace spool, replace or adjust the main relief valve spring. If there is still serious internal drain, replace the control valve.

II . Too high temperature of hydraulic oil

Possible cause	Solution
1. Hydraulic oil tank level is insufficient.	Add hydraulic oil to the specified oil level.
2. The working pump is badly worn.	Replace work pump.
3. Return of the hydraulic oil is not smooth, oil return filter is clogged.	Clean or replace the oil return filters.
4. Mechanical work load is too large, the hydraulic system frequently overflows.	Avoid work in the excessive load.
5. Pressure of the control valve main relief valve is set too low, and the hydraulic system frequently overflows.	Measure whether the main relief valve’s pressure reaches requirements, and then re-adjust the pressure setting if not reach.

III. The boom sinks or the bucket falls

Possible cause	Solution
1. The cylinder seals are damaged, and the internal leakage is serious.	Replace cylinder seal parts
2. Control valve stem is wear, and the internal leakage is serious.	Replace the spool, and replace the control valve if there are still serious internal leakage.
3. One-way valve cone valve of the control valve overload valve is leaking for its poor sealing.	Replace the control valve.

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IV. The working device can't act

Possible cause	Solution
1. The control valve stem is stuck.	Replace the control valve.
2. The control valve main relief valve spring is fail, and the setting pressure is too low.	Replace spring of main relief valve.
3. The main relief valve is stuck, pressure is insufficient.	Replace the control valve.

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5 Steering Hydraulic System

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Removal and Installation of Steering Hydraulic System Components

Tool list

Name	Specification (Qty.)
Open-end wrench	13#、14#、16#、18#、19#、21#、24#、27#、36#
Oil basin	---
Torque wrench	20-100N•m，90-300N•m，160-680N•m，
Scissor	---
Plastic sealing bag	---
Ribbon	---
Travel crane	2t
Chain, sling and hook	2t
⚠ Remark: removed standard parts should be placed with relevant material together to avoid mixing.	

⚠ "Front" mentioned in this chapter refers to the forward direction after starting the machine; other directions are by this analogy.

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HYDRAULIC PUMP

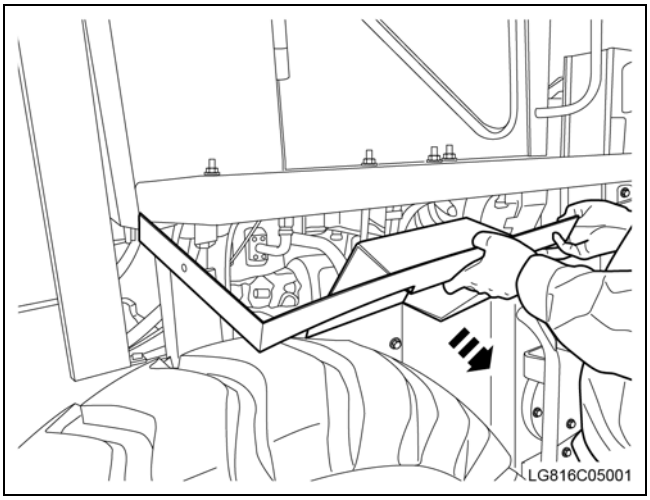
Removal

1. Discharge the pressure of the machine.

   Pull the handbrake handle to the highest point, put down the boom, and push/pull the control rod from front to back for more than 30 times on each, and release the pressure of hydraulic system.

2. Removal right plate

   Unscrew the mounting bolt on the right rear wall panel with 13# wrench, and remove the lower wall panel.

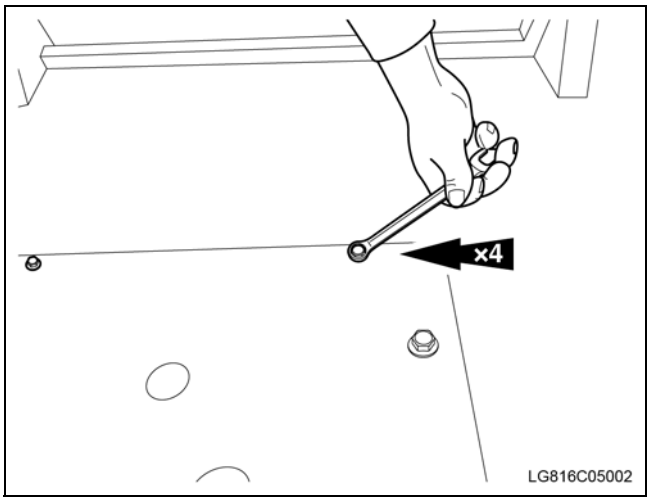


3. Remove driver seat, heater.

   Remove the driver seat and heater in accordance with the removal steps in “Seat” (p. 7-5) and “Heater Assy” (p. 7-6).

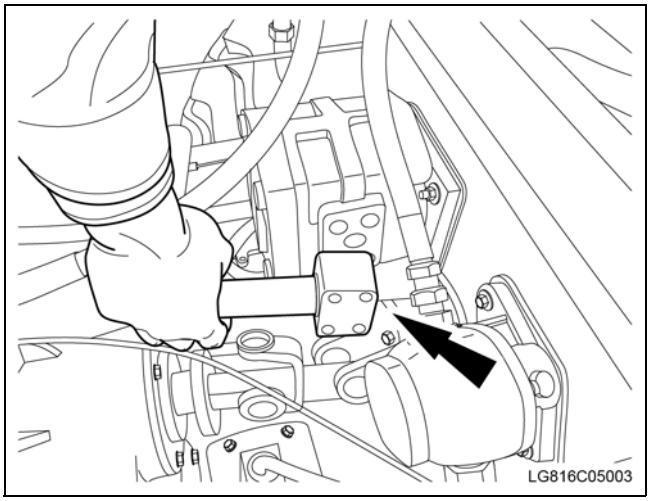
4. Remove the mounting base of heater

   Remove the 4 mounting bolts of heater mounting base on the cab floor with 14# wrench, and remove the mounting plate.

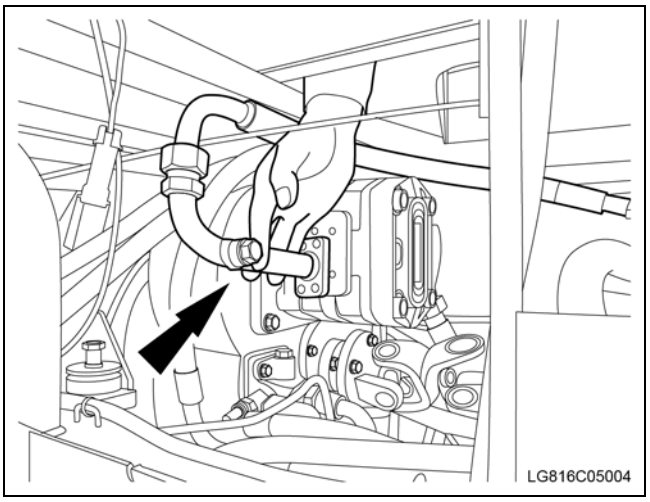


5. Remove the steel pipe

   Remove 4 mounting bolts from the oil inlet/outlet pipe of working pump using 13# wrench, and remove the mounting flange of steel pipe and wrap them with clean plastic bag and ties to prevent from the entry of foreign matters.

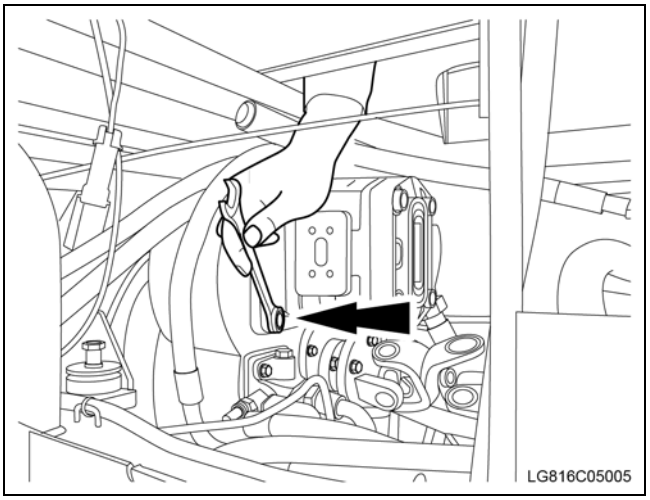


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6. Remove the working pump

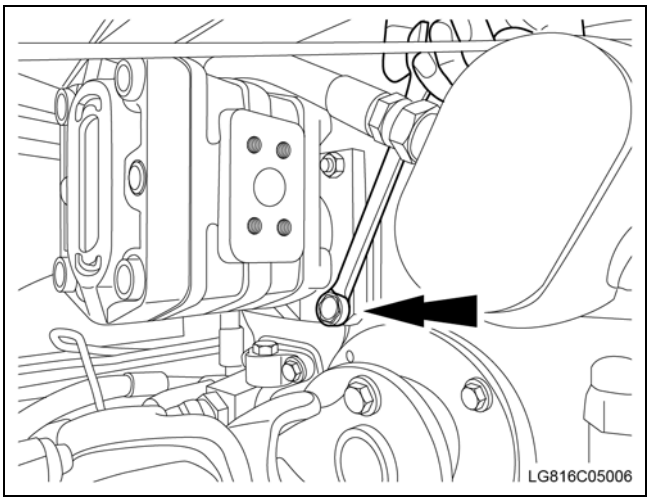
Remove 4 mounting bolts of working pump with 18# wrench, and remove the working pump for repair or replacement.



Installation

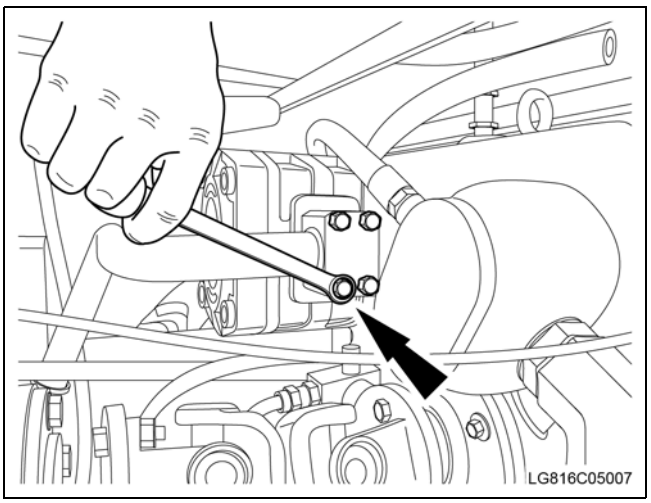
1. Install the working pump

Use the 4 removed bolts to install the working pump onto the corresponding position of torque converter, and tighten the bolts with 18# wrench, tightening torque 90±12N•m.

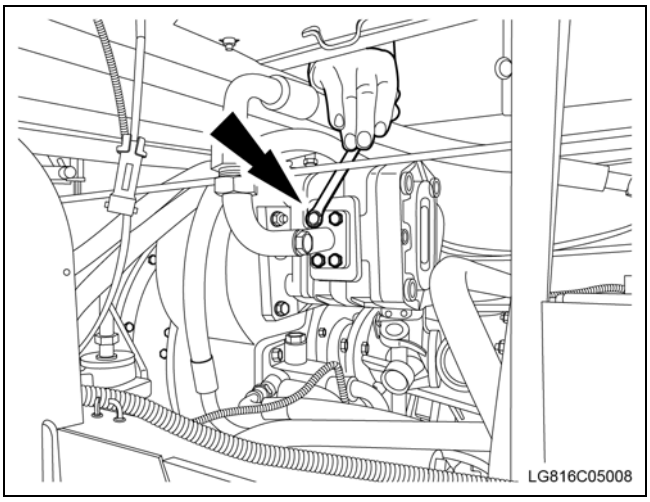


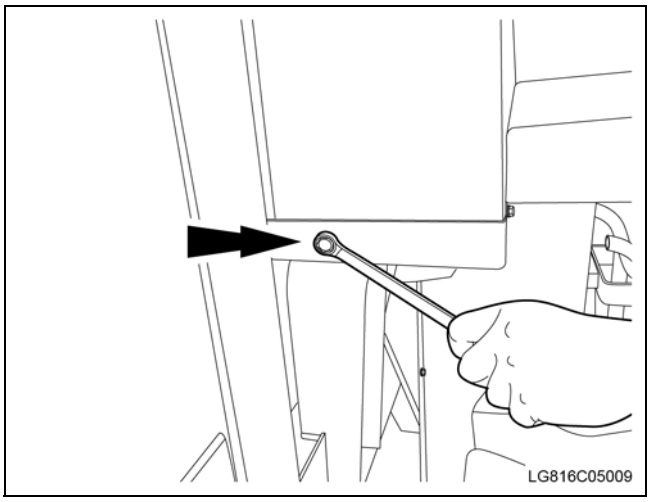
2. Install the steel pipe

Use the removed bolts to assemble the oil inlet and outlet pipe onto the working pump, replace the O-ring with new one, and tighten the bolt with 13# wrench, tightening torque 26±4N•m.



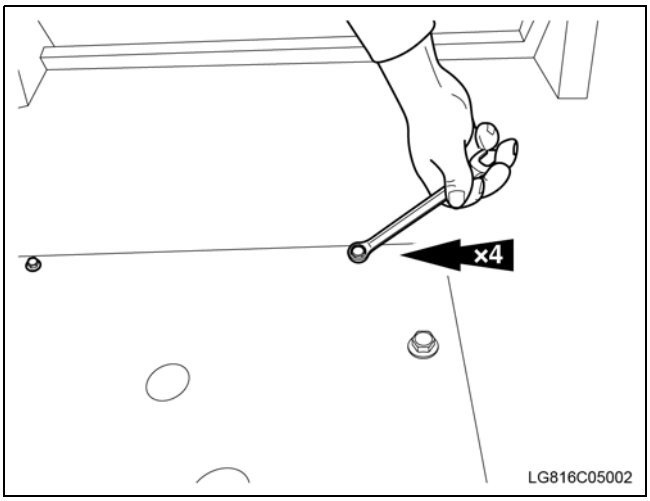
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3. Install cab floor

Use 4 removed bolts to assemble the heater mounting base onto the cab floor, and tighten the bolt with 14# wrench, tightening torque 26±4N•m.



4. Install heater, driver seat

Install the heater and driver seat back to the cab in accordance with “Heater Assy” (p. 7-6).

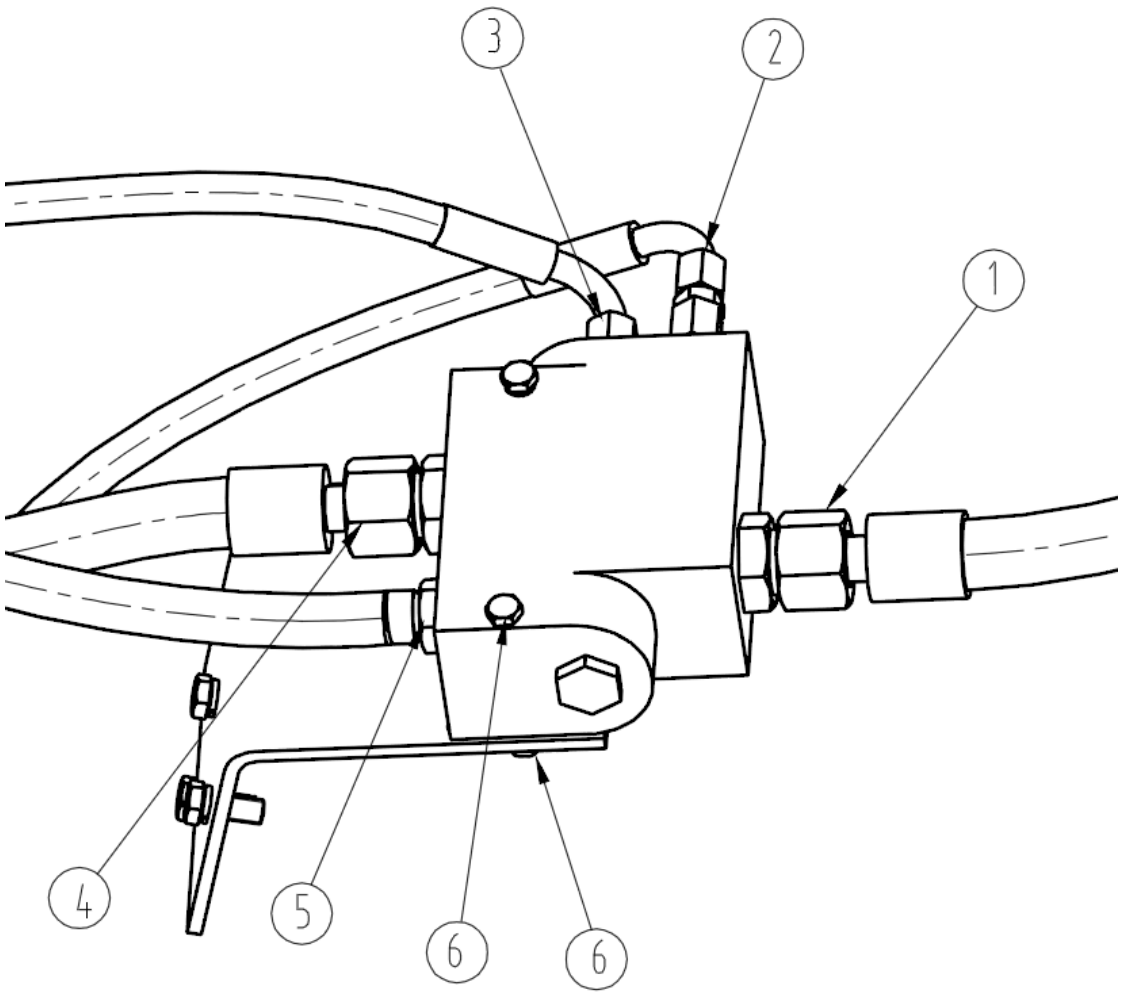
5. Install right plate

Fix the wall panel onto the cab with previously removed bolts, tighten the bolts with 13# wrench and the tightening torque is 26±4N•m.

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Priority valve

AUXILIARY STEERING PRIORITY VALVE ILLUSTRATION



LG816C05019

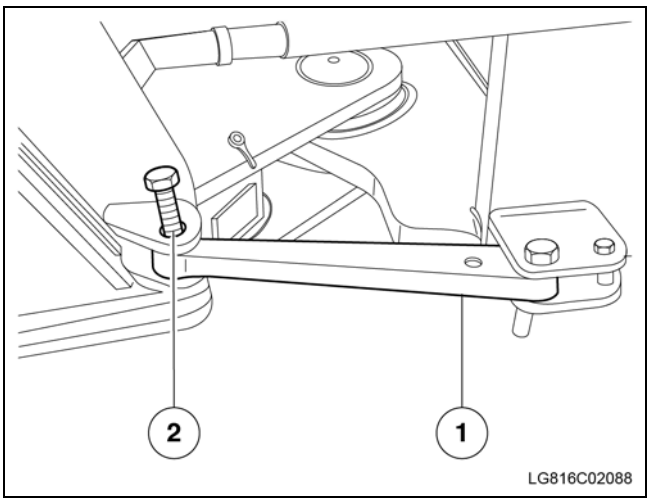
1. Priority valve inlet hose
2. Oil return hose of priority valve
3. Feedback hose from priority valve to steering gear
4. Hose from priority valve to multiple unit valve.
5. Hose from priority valve to steering gear
6. Mounting bolts and nuts of priority valve

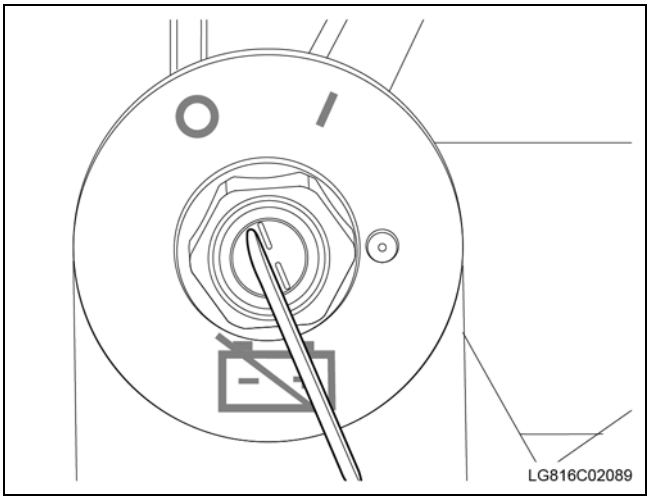
https://truckmanualshub.com/

Removal

1. Park the whole machine

   Park the whole machine on a flat ground, pull the parking brake to the up-most position. Dismantle the anti-rotating bumper (1)with a nipper plier, connect the bumper with the front and rear frames with its pin(2), open the side housing door, and set the negative switch to power off position.





2. Discharge the pressure of the machine.

   Pull the handbrake handle to the highest point, put down the boom, and push/pull the control rod from front to back for more than 30 times on each, and release the pressure of hydraulic system.

3. Remove driver seat, heater, floor and wall panel.

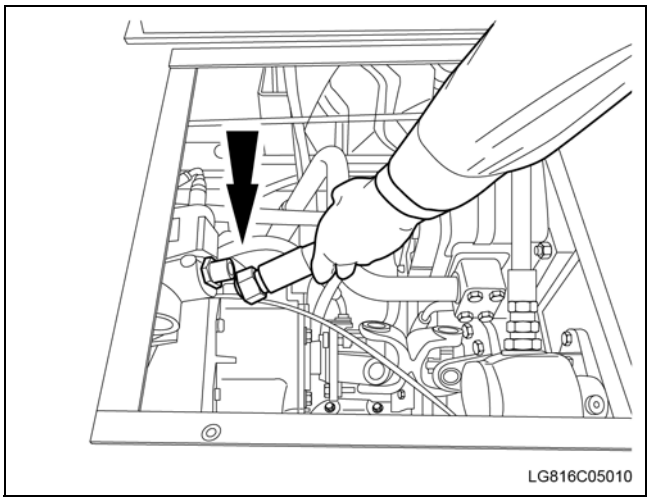
   Remove the driver seat, heater, heater mounting base and wall panel in accordance with “Removal and Installation of CSF CAB Components” (p. 7-4).

   ⚠ Note:

   Please prepare a basic for collecting the leaked liquid and treating them properly before the following steps.

4. Removal of oil intake hose

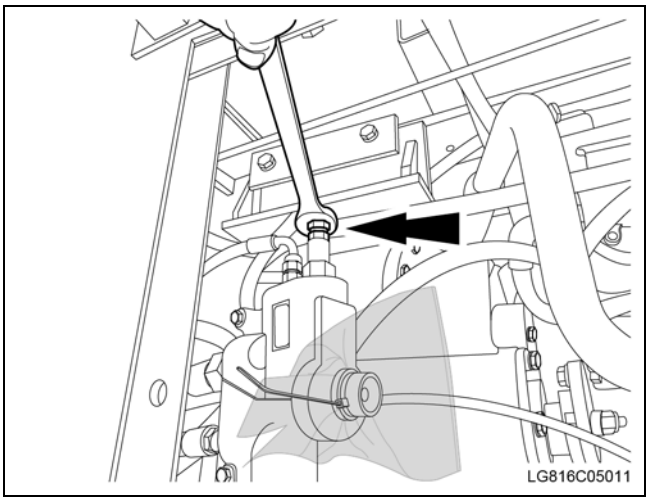
   Remove inlet hose connector of priority valve with a 36# wrench, wrap up the connectors and valve joints with a clean plastic bag and ties to avoid from foreign objects.



5. Removal of oil return hose

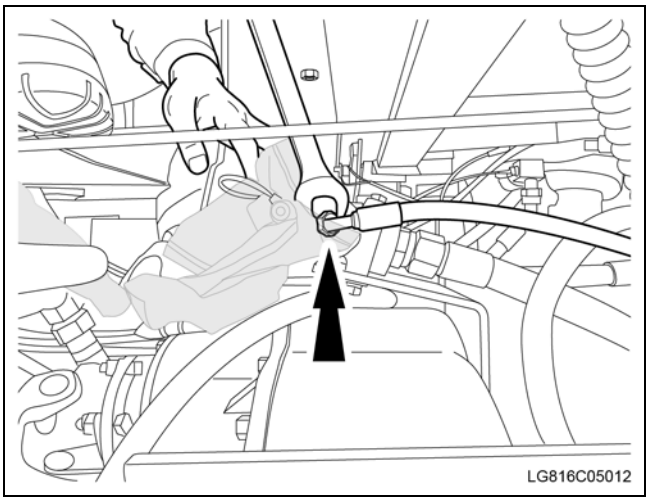
   Remove oil-return hose connector of priority valve with a 19# wrench, wrap up the connectors and valve joints with a clean plastic bag and ties to avoid from foreign objects.

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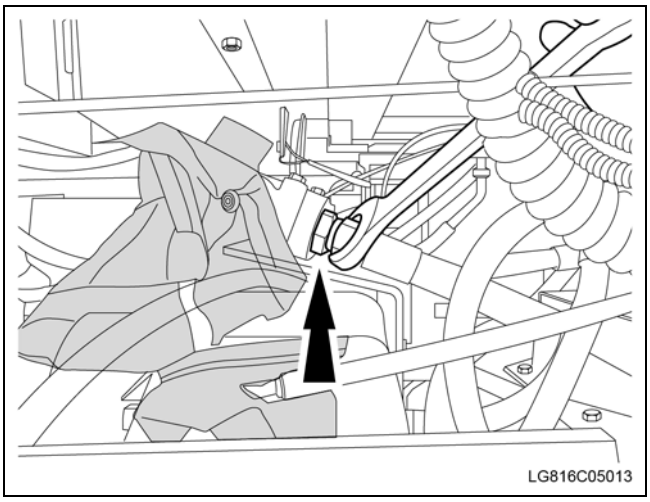
6. Remove to the feedback hose from priority valve to steering gear

   Remove feedback hose connector from priority valve to steering gear with a 19# wrench, wrap up the connectors and valve joints with a clean plastic bag and ties to avoid from foreign objects.



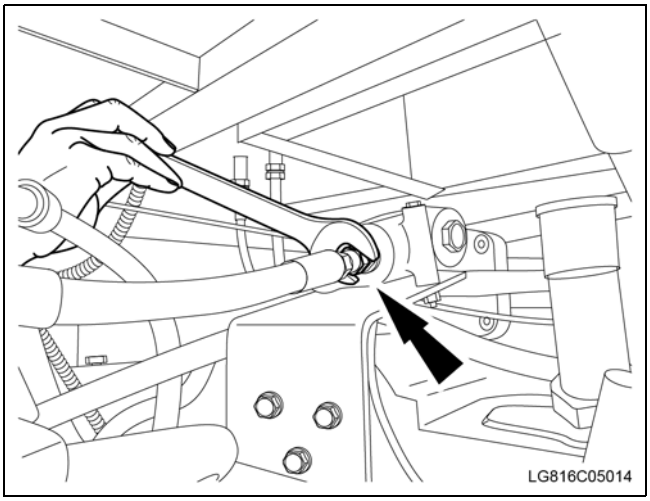
7. Remove to the multiple unit valve

   Remove oil-return hose connector from priority valve to multiple unit valve with a 36# wrench, wrap up the connectors and valve joints with a clean plastic bag and ties to avoid from foreign objects.



8. Remove to the hose from priority valve to steering gear

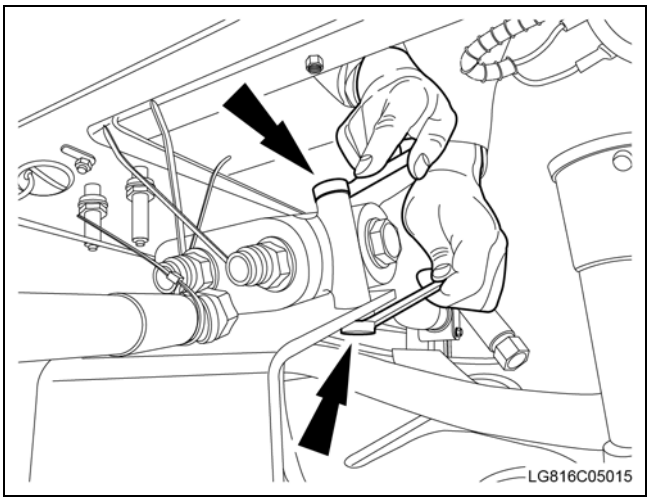
   Remove hose connector from priority valve to steering gear with a 27# wrench, wrap up the connectors and valve joints with a clean plastic bag and ties to avoid from foreign objects.



9. Remove the priority valve

   Remove 2 mounting bolts and nut of priority valve with 13# wrench, and remove the priority valve for repair or replacement.

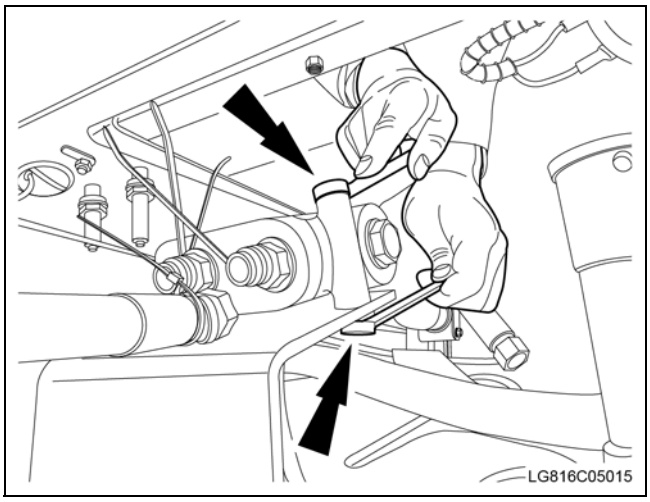
https://truckmanualshub.com/



Installation

1. Install the priority valve

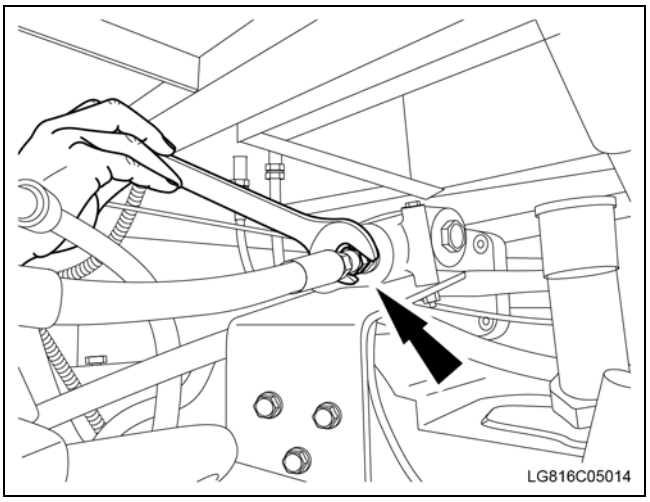
   Assemble the priority valve to the mounting plate of gearbox with the previously removed bolts and nuts, and tighten the bolts and nuts with two 13# wrenches, tightening torque 26±4N•m.



2. Connect to the hose from priority valve to steering gear

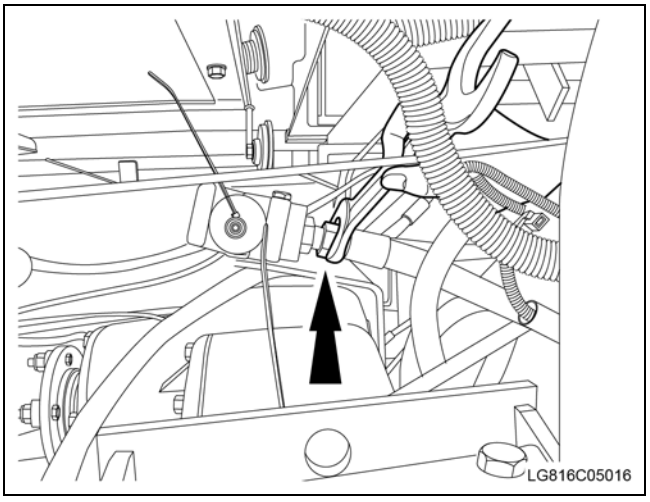
   Connect hose connector from priority valve to steering gear onto the connector on the left front of pipe priority valve, replace the O-ring at the connection with new one, straighten out the hose along its direction free of twists and interference with other components, then tighten union nut with 27# wrench and the tightening torque is 66±7N•m.

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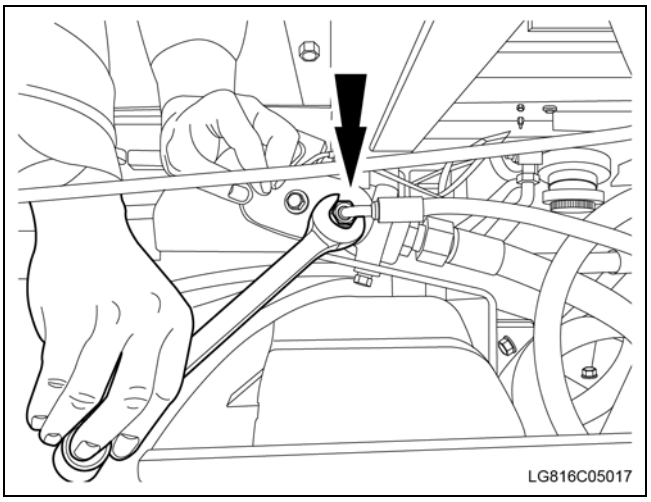
3. Connect to the multiple unit valve

Connect hose connector from priority valve to multiple unit valve onto the connector on the right front of pipe priority valve, replace the O-ring at the connection with new one, straighten out the hose along its direction free of twists and interference with other components, then tighten union nut with 36# wrench and the tightening torque is 120±15N•m.



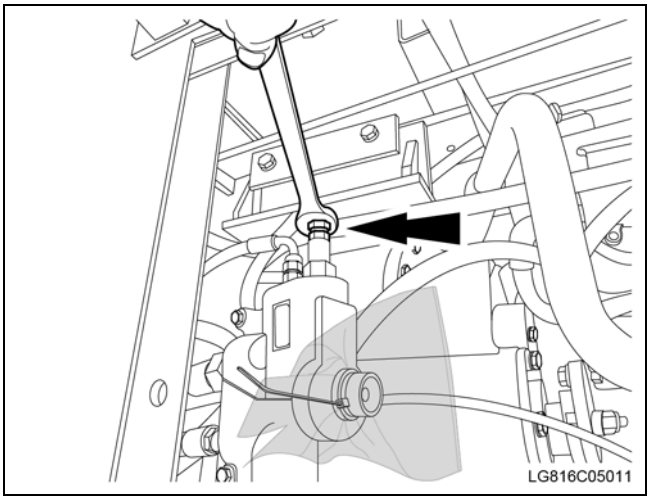
4. Connect to the feedback hose from priority valve to steering gear

Connect feedback hose connector from priority valve to steering gear onto the connector on the right front of pipe priority valve, replace the O-ring at the connection with new one, straighten out the hose along its direction free of twists and interference with other components, then tighten union nut with 19# wrench and the tightening torque is 16±3N•m.



5. Connecting oil return hose

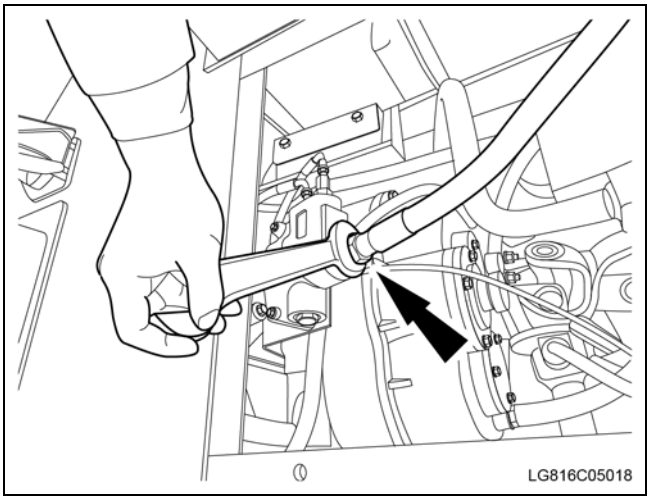
Connect oil-return hose connector of priority valve onto the connector on the right rear of pipe priority valve, replace the O-ring at the connection with new one, straighten out the hose along its direction free of twists and interference with other components, then tighten union nut with 19# wrench and the tightening torque is 16±3N•m.



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6. Connecting of oil intake hose

   Connect oil-inlet hose connector of priority valve onto the connector on the rear of pipe priority valve, replace the O-ring at the connection with new one, straighten out the hose along its direction free of twists and interference with other components, then tighten union nut with 36# wrench and the tightening torque is 120±15N•m.



7. Install heater mounting base, heater, driver seat and wall panel.

   Install heater mounting base, heater, driver seat and wall panel on the machine in accordance with “Removal and Installation of CSF CAB Components” (p. 7-4).

8. Put battery disconnect switch in ON position. Start engine and run at low idle for 30 seconds. Stop engine and check for leaks.
9. Check to make sure priority valve operates correctly.
10. Check fluid level in hydraulic reservoir. Add oil as required.

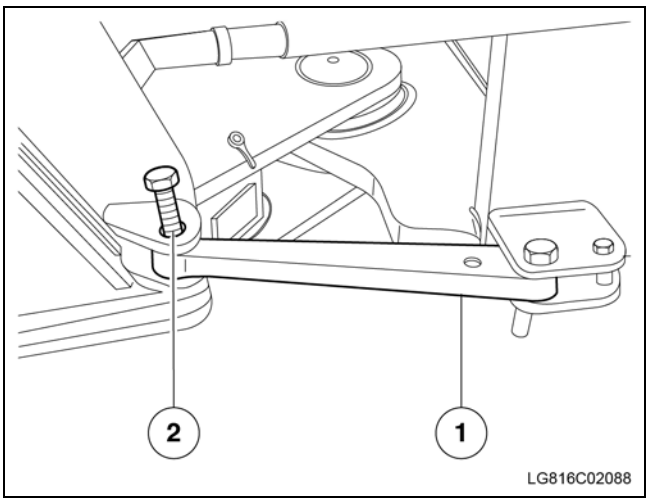
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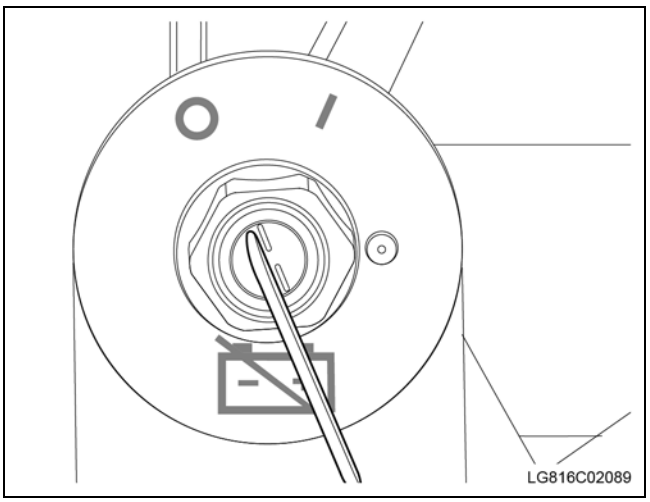
STEERING CYLINDER

Removal

1. Park the whole machine

   Park the whole machine on a flat ground, pull the parking brake to the up-most position. Dismantle the anti-rotating bumper (1)with a nipper plier, connect the bumper with the front and rear frames with its pin(2), open the side housing door, and set the negative switch to power off position.





2. Discharge the pressure of the machine.

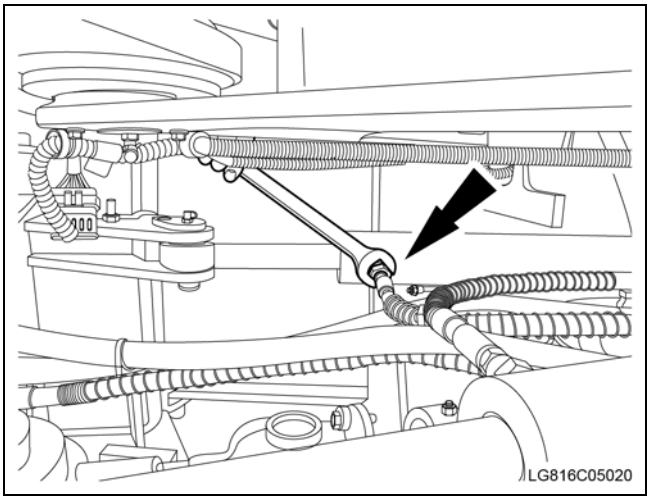
   Pull the handbrake handle to the highest point, put down the boom, and push/pull the control rod from front to back for more than 30 times on each, and release the pressure of hydraulic system.

   ⚠ Note:

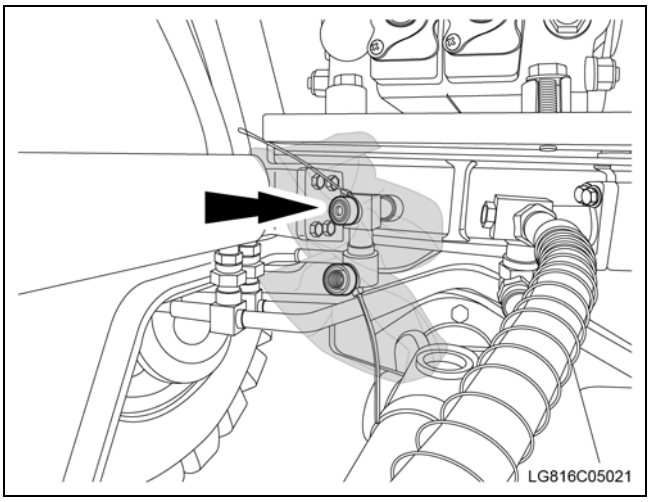
   Please prepare a basin for collecting the leaked liquid and treating them properly before the following steps.

3. Remove hose

   Remove the interdependent hose connector of left/right steering cylinder with 24# wrench, remove the hose connector from left/right steering cylinder to the hose connector of steering gear with 27# wrench, and wrap up the hose and pipe connector with clean plastic bag and ties for protection.



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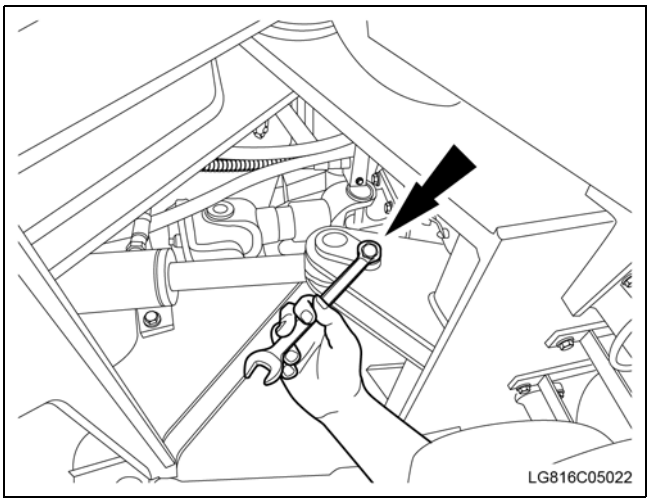


4. Remove lubrication pipe

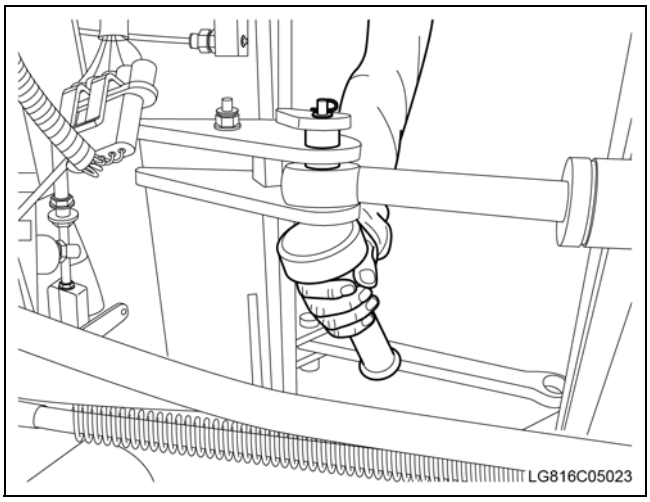
   Remove the grease pipeline of front steering pin in accordance with “Removal and Mounting of Lubrication Oil Lines” (p. 10-10).

5. Removal of rear steering pin

   (a) Remove the mounting bolts of left, right rear steering pin plate with 18# wrench.

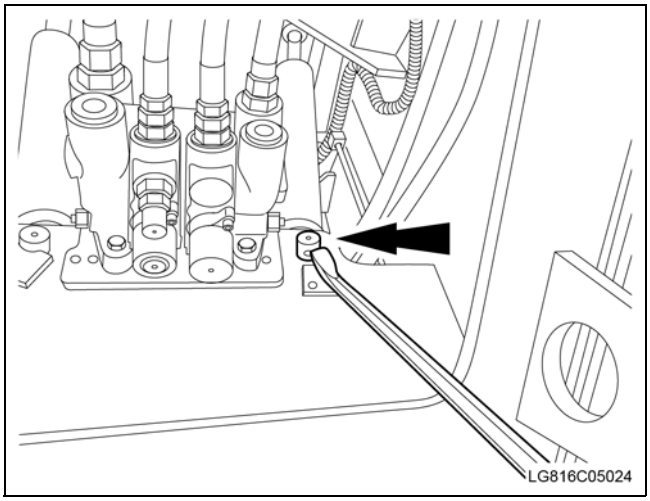


   (b) Knock pin shaft out by copper bar from top to the bottom.



6. Remove the front steering pin and take out the cylinder.

   Remove the mounting bolt of left, right front steering pin stop plate with 16# wrench, and take out the pin shaft using crowbar, then remove and place the steering cylinder well.



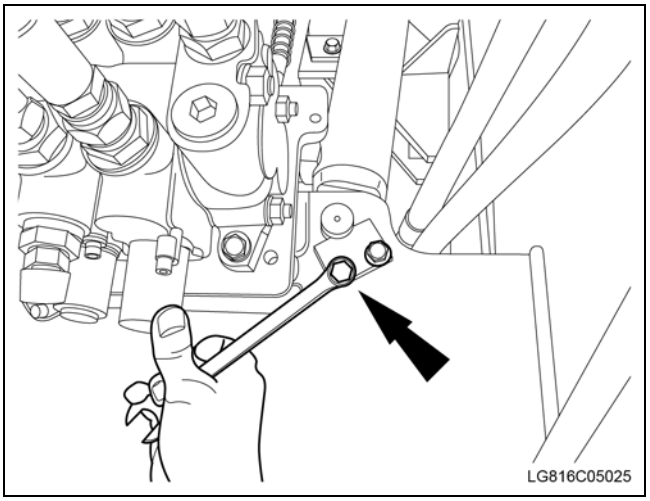
Installation

1. Install front steering pin

   Place the large chamber connection end of steering cylinder, install the pin shaft from top to bottom after exactly leveling the mounting pin hole, install the stop plate on the adjusted opening position, and fix it with bolts, and use 16# wrench to tighten the stop plate, tightening

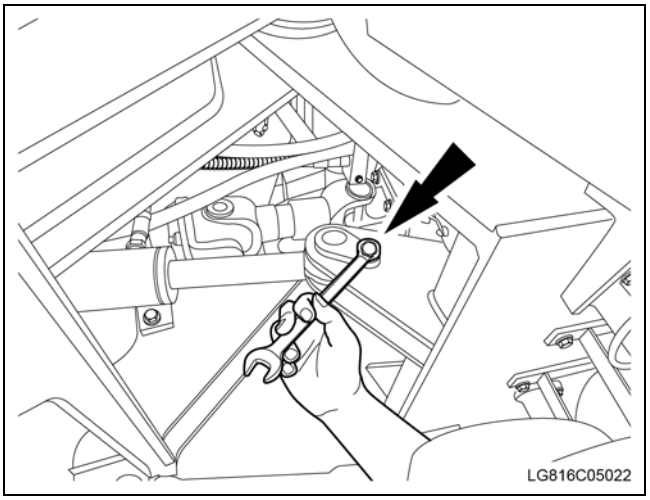
https://truckmanualshub.com/

torque 52±7N•m.



2. Install rear steering pin

Adjust the mounting hole at the piston rod end of steering cylinder with crowbar, in order to make it placing between the rear frame mounting supports, and aligned to its mounting hole. Install rear steering pin from top to bottom, knock the plate into the bottom cushioned with block or rubber, and fix the plate with bolts and fasten it with 18# wrench, tightening torque 90±12N•m.



3. Install lubrication pipe

Install one end of grease pipeline onto the front steering pin, and another end shall be installed on the frame, referred to the mounting procedure in the “Removal and Mounting of Lubrication Oil Lines” (p. 10-10).

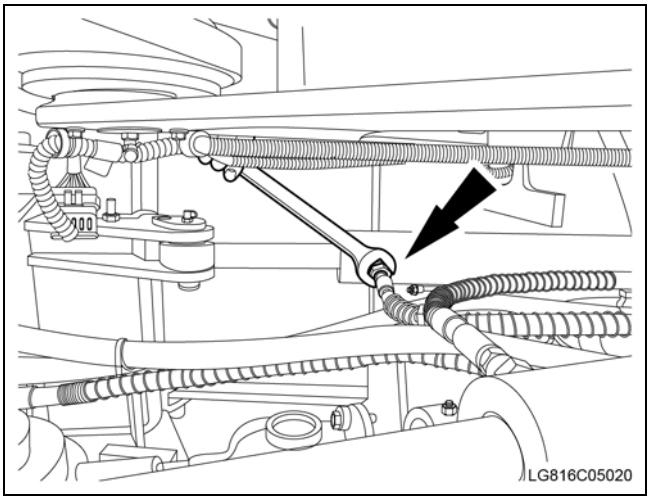
4. Connect to hose

(a) Connect the interdependent hose of steering cylinder to the connectors of two cylinders respectively, and connect the front joint of left steering cylinder with the back joint of right one, meanwhile connect the front joint of right steering cylinder with the back joint of the left one.

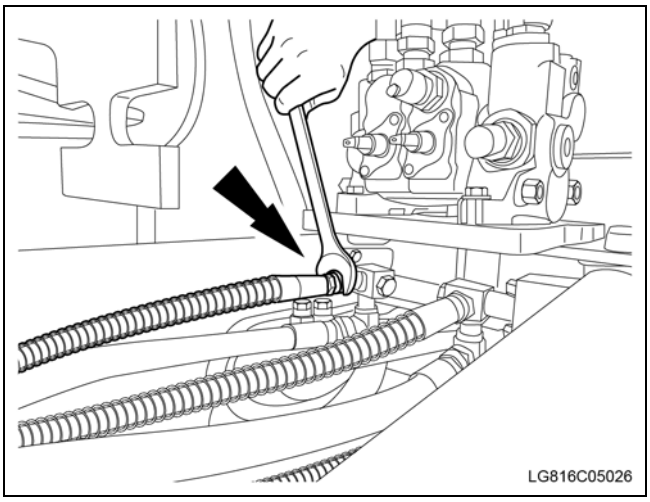
(b) Connect the hose from steering cylinder to steering gear to the correspondent hose connector separately, and upward hose connect with the right steering cylinder while the downward hose connect with the left steering cylinder, and all O-rings at connections shall be replaced with new one.

(c) Adjust each position of hose direction, to make it will not twisted and interfered with other parts.

(d) Tighten it with wrench, and tighten the interdependent hose with 24# wrench, tightening torque 40±5N•m. Hose to the steering gear will be tightened with 27# wrench, tightening torque 66±7N•m.



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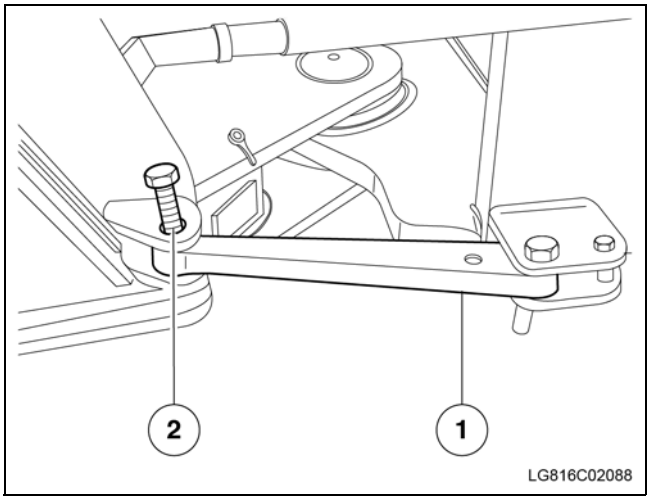
5. Put battery disconnect switch in ON position. start engine and run at low idle for 30 seconds. stop engine and check for leaks
6. Check to make sure STEERING CYLINDER correctly .
7. Check fluid level in hydraulic reservoir. Add oil as required.

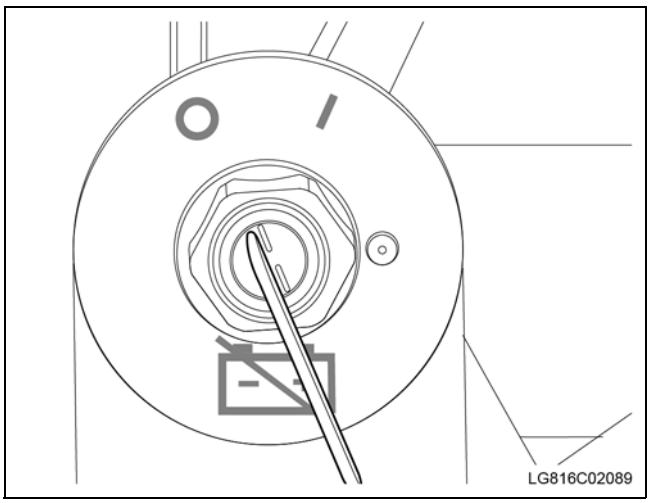
Steering gear

Removal

1. Park the whole machine

   Park the whole machine on a flat ground, pull the parking brake to the up-most position. Dismantle the anti-rotating bumper (1) with a nipper plier, connect the bumper with the front and rear frames with its pin(2), open the side housing door, and set the negative switch to power off position.

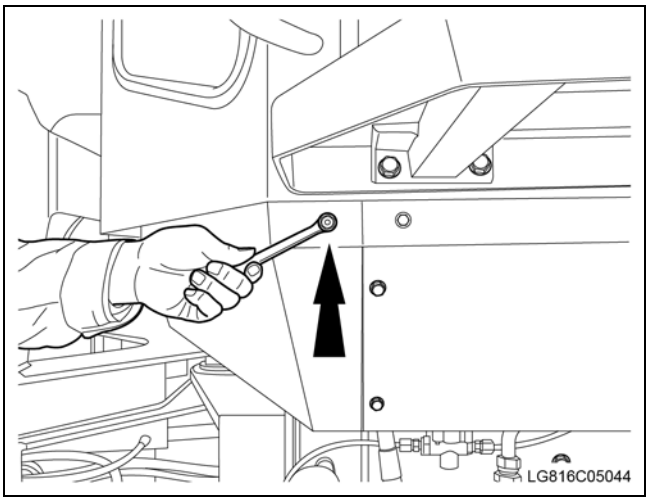




2. Removal of front panel

   Remove the mounting bolts from left/right front panel with 13# wrench, and then remove the front panel.

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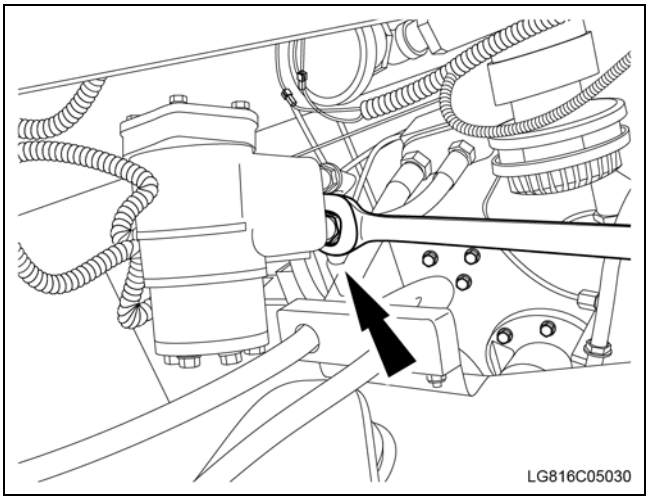


⚠ Note:

Please prepare a basin for collecting the leaked liquid and treating them properly before the following steps.

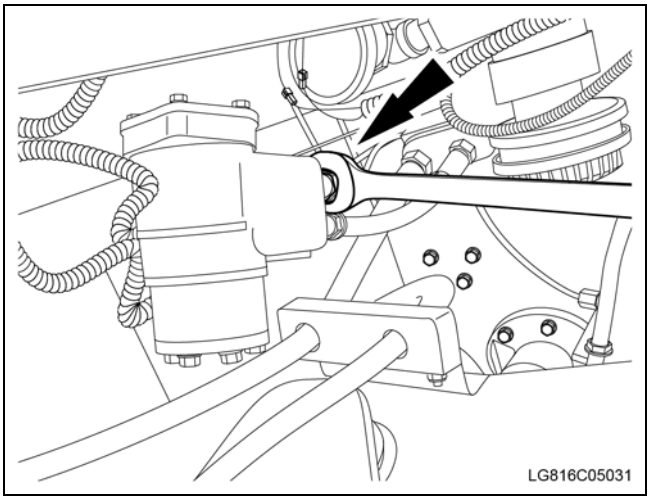
3. Removal of oil intake hose

Remove inlet hose connector of steering gear with 27# wrench, and wrap up the pipe fittings and connectors of steering gear with a clean plastic bag and ties to avoid from foreign objects.



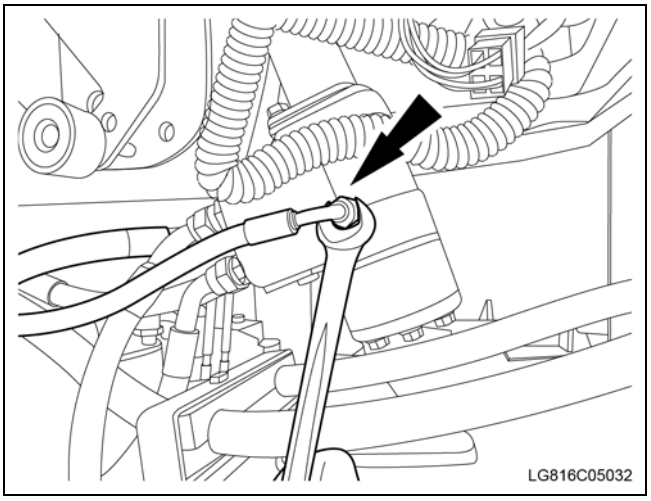
4. Removal of oil return hose

Remove oil-return hose connector of steering gear with 27# wrench, and wrap up the pipe fittings and connectors of steering gear with a clean plastic bag and ties to avoid from foreign objects.



5. Remove the feedback hose from priority valve to steering gear

Remove feedback hose connector from steering gear to priority valve with 19# wrench, and wrap up the pipe fittings and connectors of steering gear with a clean plastic bag and ties to avoid from foreign objects.

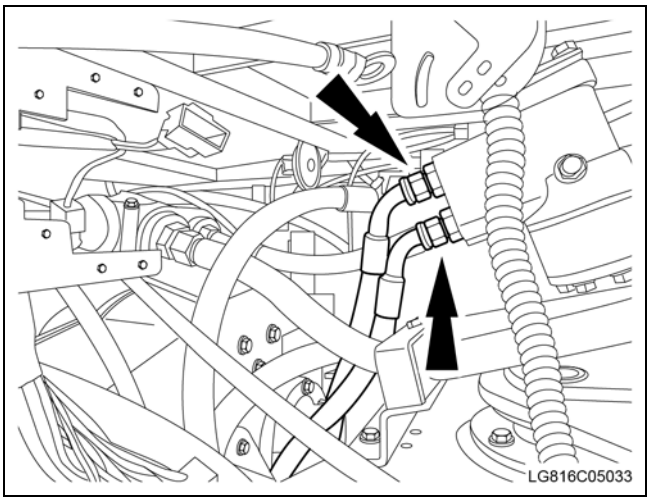


6. Remove hose of steering cylinder

Remove hose connector from steering gear to left steering cylinder and hose connector from steering gear to right steering cylinder in turn

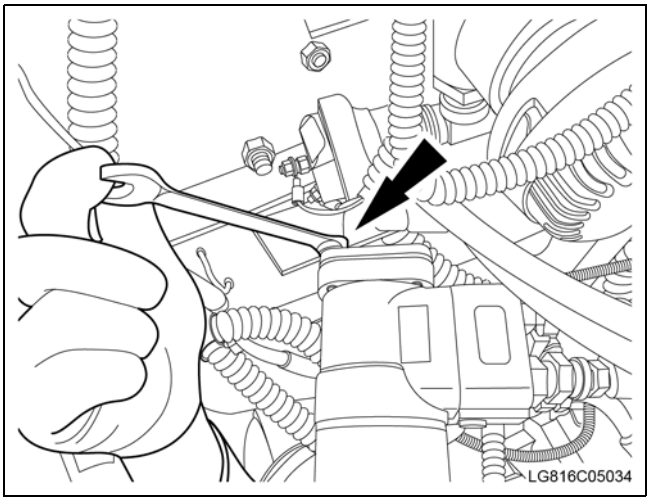
https://truckmanualshub.com/

with 27# wrench, and wrap up the pipe fittings and connectors of steering gear with a clean plastic bag and ties to avoid from foreign objects.



7. Remove steering gear

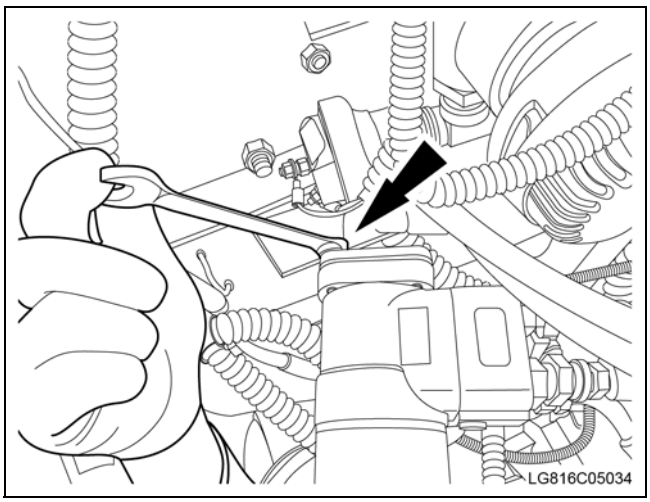
Remove 4 mounting bolts of steering gear with 16# wrench, and remove the steering gear for repair or replacement.



Installation

1. Install steering gear box

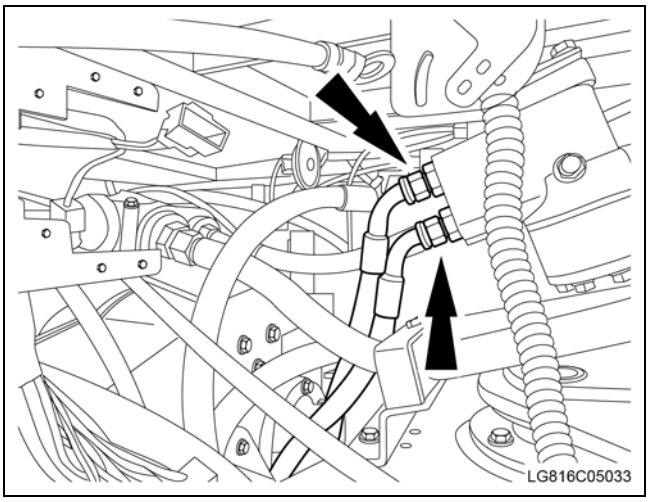
Lift up the steering gear to reach the interface at lower part of steering gear box, and rotate steering wheel position until inner slot lines up, then push steering gear upward and connect with steering gear box. And install 4 mounting bolts and tighten them with 16# wrench, tightening torque 52±7N•m.



2. Connect hose of steering cylinder

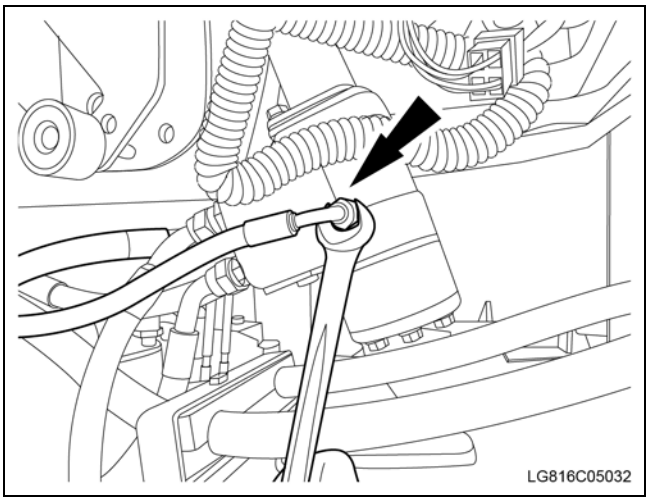
Connect the hose connector from steering gear to steering cylinder to the connector at right upward of steering gear and connect the hose connector from steering gear to left steering cylinder to the connector at right lower of steering gear, replace the O-ring at the connection with new one, straighten out the hose along its direction free of twists and interference with other components, then tighten union nut with 27# wrench and the tightening torque is 66±7N•m.

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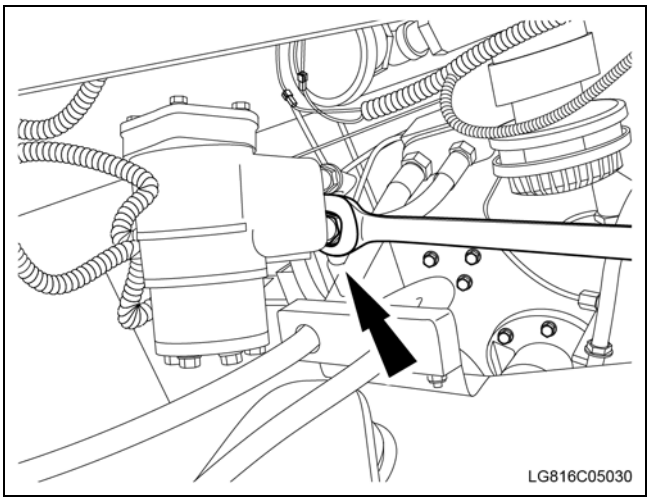
3. Connect feedback hose from priority valve to steering gear

Connect feedback hose connector from steering gear to priority valve onto the connector on the right of pipe priority valve, replace the O-ring at the connection with new one, straighten out the hose along its direction free of twists and interference with other components, then tighten union nut with 19# wrench and the tightening torque is 16±3N•m.



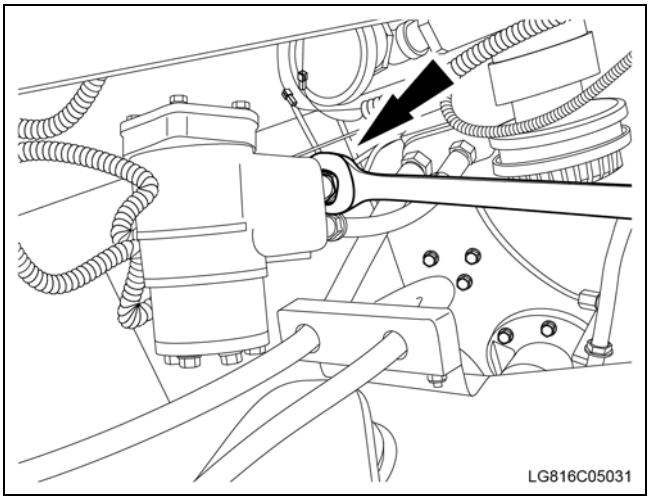
4. Connecting of oil intake hose

Connect oil-inlet hose connector from steering gear to priority valve onto the connector at left lower part of pipe priority valve, replace the O-ring at the connection with new one, straighten out the hose along its direction free of twists and interference with other components, then tighten union nut with 27# wrench and the tightening torque is 66±7N•m.



5. Connecting oil return hose

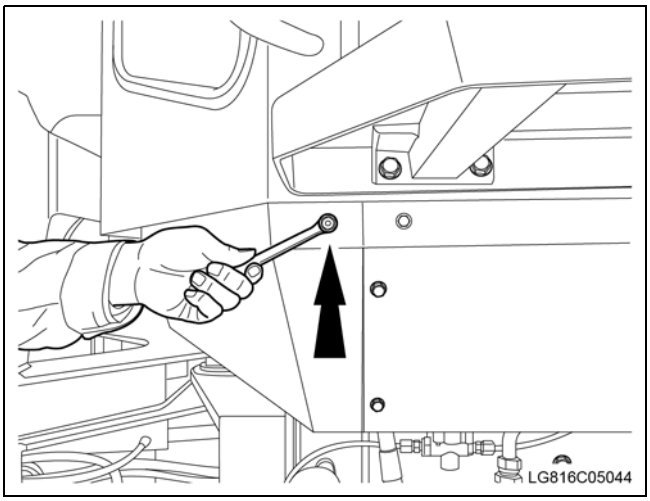
Connect oil-return hose connector from steering gear to priority valve onto the connector at left upper part of pipe priority valve, replace the O-ring at the connection with new one, straighten out the hose along its direction free of twists and interference with other components, then tighten union nut with 27# wrench and the tightening torque is 66±7N•m.



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6. Install hoarding

   Assemble the left, right front panel onto the cab using bolts, and tighten the bolts with 13# wrench, tightening torque 26±4N•m.



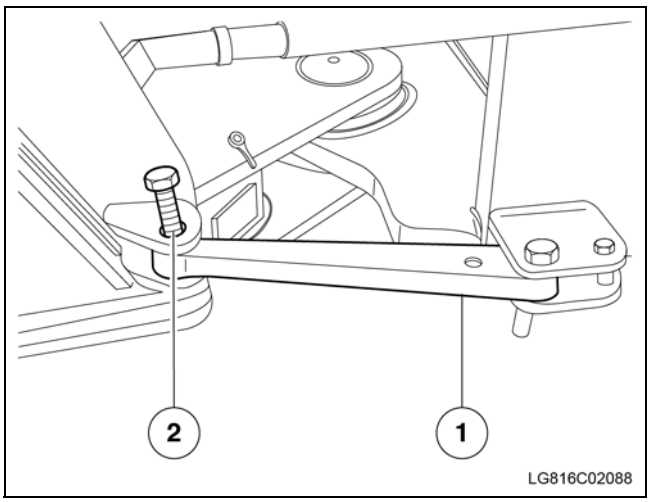
7. Put battery disconnect switch in ON position. start engine and run at low idle for 30 seconds. stop engine and check for leaks.
8. Check to make sure STEERING PUMP correctly.
9. Check fluid level in hydraulic reservoir. Add oil as required.

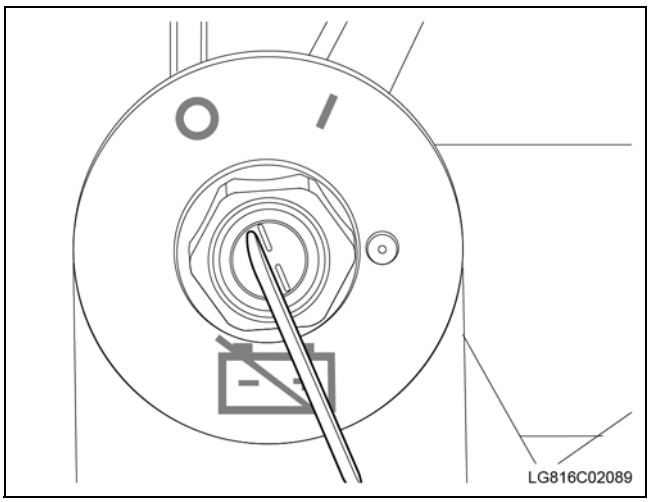
Hydraulic oil tank

Removal

1. Park the whole machine

   Park the whole machine on a flat ground, pull the parking brake to the up-most position. Dismantle the anti-rotating bumper (1) with a nipper plier, connect the bumper with the front and rear frames with its pin (2), open the left side housing door, and set the negative switch to power off position.





2. Discharge the pressure of the machine.

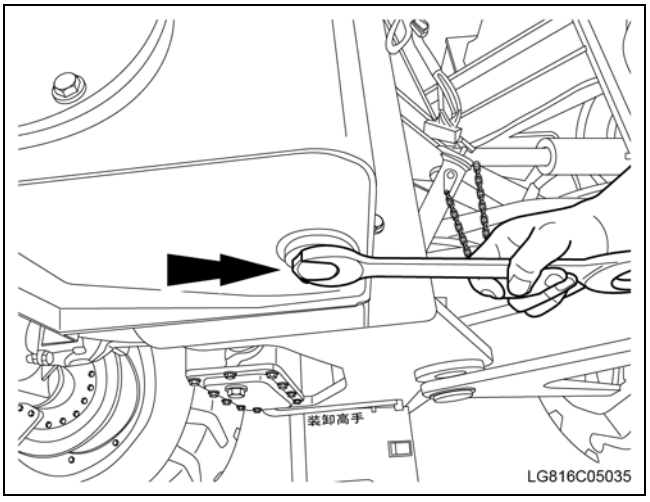
   Pull the handbrake handle to the highest point,

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put down the boom, and push/pull the control rod from front to back for more than 30 times on each, and release the pressure of hydraulic system.

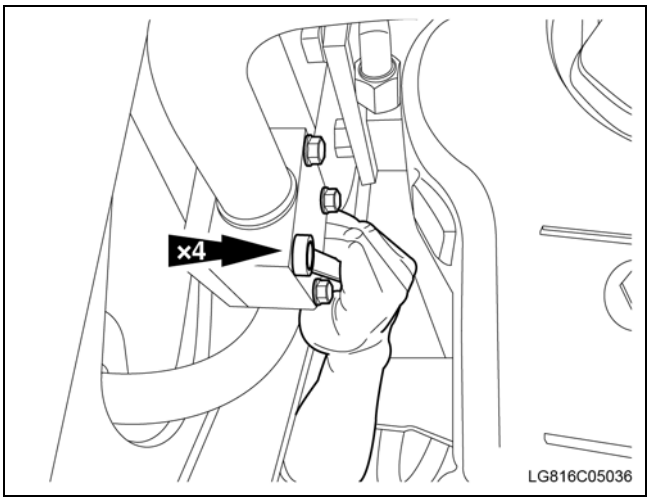
3. Drain the hydraulic oil

Clean the fuel outlet and its surroundings below the hydraulic oil tank with clean towel, and place a spotless oil bath under the fuel outlet, and unscrew the plug at fuel outlet port with 36# wrench. All oil shall be drained in the bath, then move away the oil bath, and keep and protect it well so as to avoid from foreign matters entered. Finally, reinstall drain plug to the fuel tank.



4. Remove steel oil return pipe

Remove 4 mounting bolts from oil-return pipe of hydraulic oil tank with 16# wrench, and wrap up the steel-pipe flanged joint with plastic bag and ties to prevent from foreign objects.

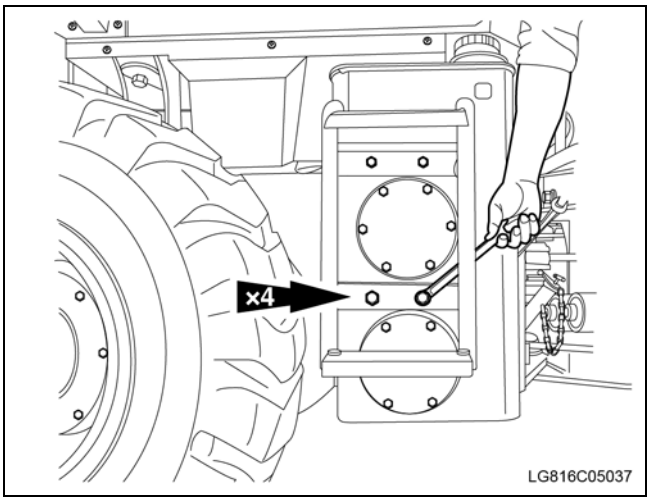


5. Remove oil-outlet hose

Remove the connecting hose from hydraulic oil tank to working pump in accordance with the No. 28 removal step in the “Removal of engine” (p. 2-11).

6. Removal of ladder

Remove 4 mounting bolts on the ladder of hydraulic oil tank with 18# wrench, and remove the ladder.

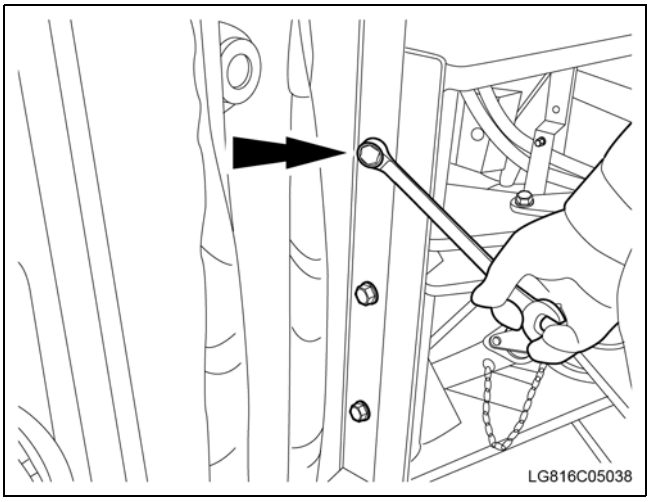


7. Remove hydraulic oil tank

Use crane and sling to hang and slightly tighten the hoist for holding the tank, and unscrew the 5 mounting bolts from hydraulic oil tank with 21# wrench, support the tank and suspend it to a

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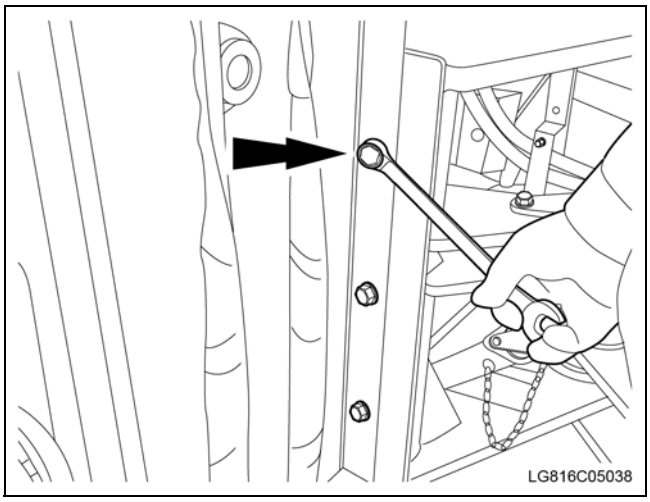
horizontal surface for well-placed, and prevent from paint damaged during hoisting.



Installation

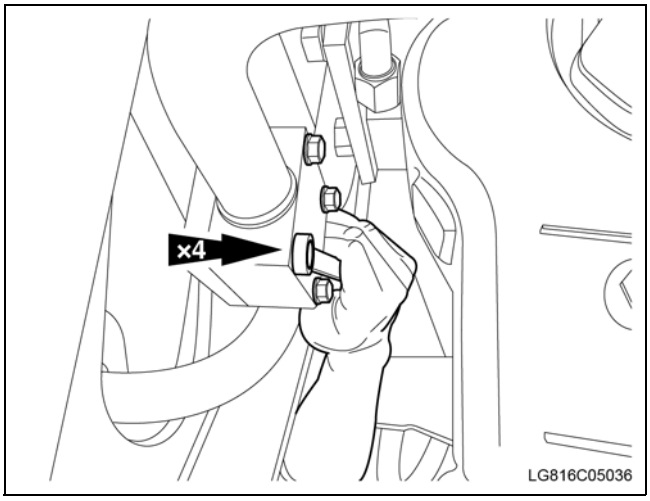
1. Install hydraulic oil tank

   Hoist the hydraulic oil tank to the right mounting position of rear frame with travel crane and sling, align with the mounting hole to insert mounting bolts, and then tighten bolts with a 21# wrench, torque to 145±20N•m.



2. Reinstall oil return steel pipe

   Connect the oil-return flange of hydraulic oil tank to steel-pipe flange on the fuel tank, and fix and tighten the bolt with 16# wrench, tightening torque 52±7N•m.



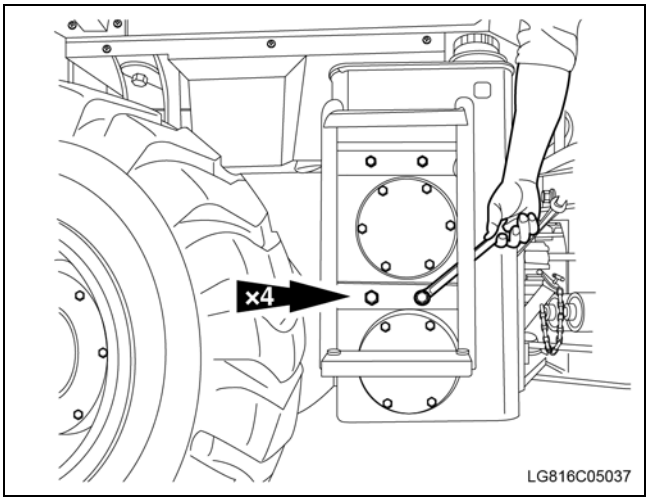
3. Install oil intake hose

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Assemble the connecting hose of working pump and hydraulic oil tank onto he steel pipe in accordance with the No. 17 step in “Installation of engine” (p. 2-23).

4. Install ladder

   Fix ladder to the hydraulic oil tank with previously removed bolts, and tighten with 18# wrench, tightening torque 90±12N•m.



5. Refill the hydraulic oil to a desired liquid level. (For operation, please refer the chapter of replace hydraulic fluid)
6. Put battery disconnect switch in ON position. start engine and run at low idle for 30 seconds. stop engine and check for leaks.

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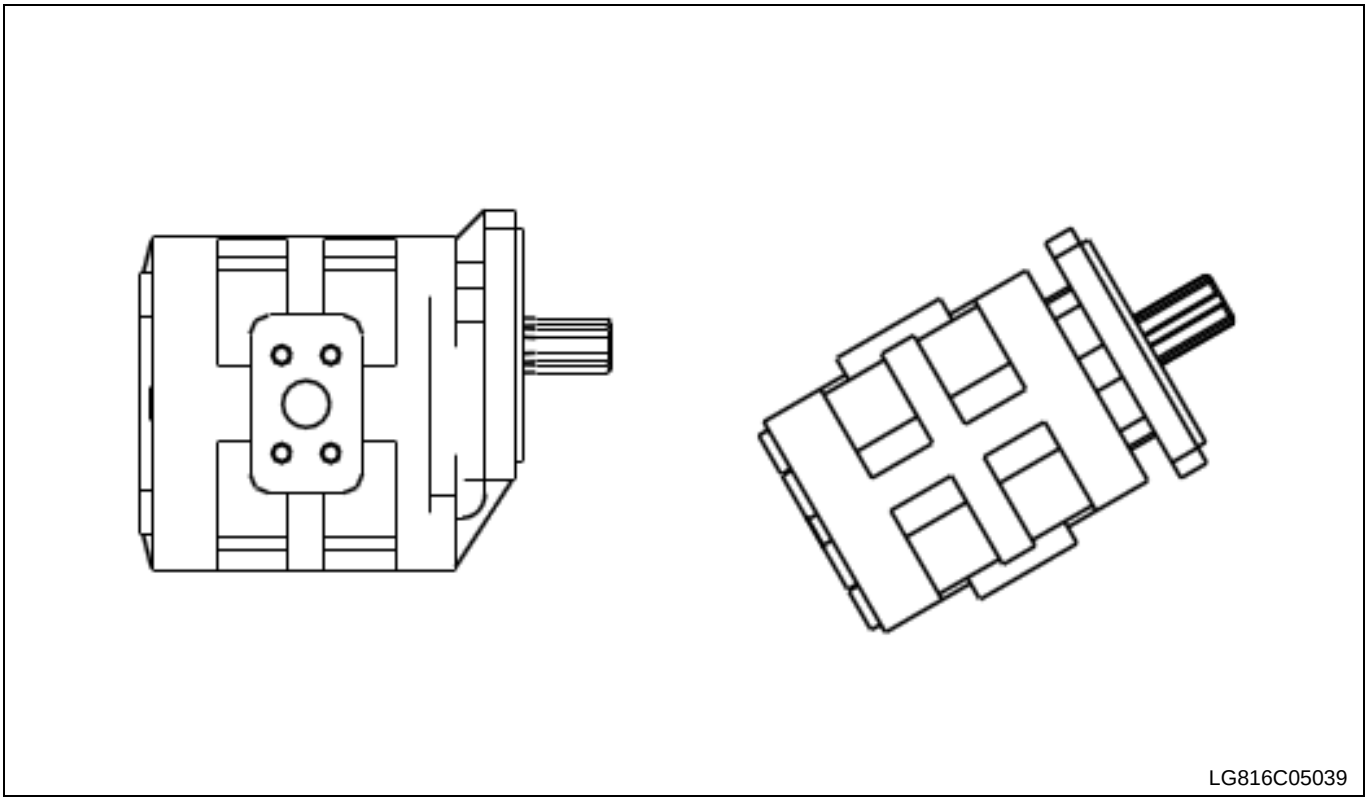
PUMP

PUMP SPECIFICATIONS

Main pump is working pump, and it provides high pressure oil for the working circuit, to actuate the hydraulic oil tank to work in order to realize the set function of the work implement.

General information

Exterior drawing of working pump



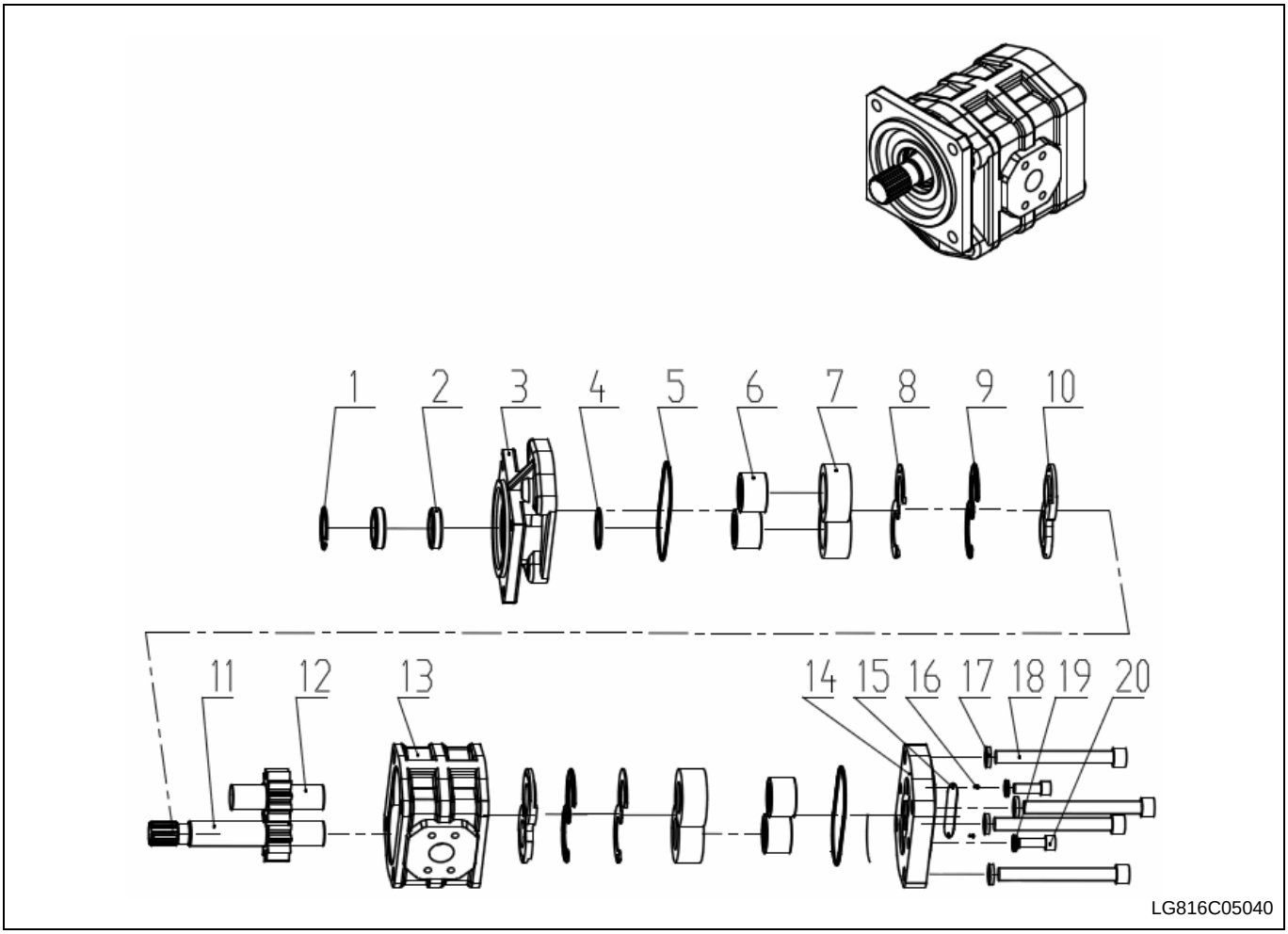
LG816C05039

Technical parameters of working pump

Item	Parameters	Service conditional	Remark
Displacement (cm^3)	50ml/r	---	---
Rated revolution speed (r/min)	2200(r/min)	---	---
Maximum speed (r/min)	2800(r/min)	---	---
Maximum pressure (MPa)	25MPa	---	---
Rated pressure (MPa)	20MPa	---	---
Volume efficiency	0.92	---	---
Operating fluid	Anti-wear hydraulic oil	46#	---
Rated power	51.33kW	---	---

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PUMP PARTS AND PART LIST



No.	Part code	Parts name	Qty
1	GB893.1-86	Backup ring	1
2	GB9877.1-88	CBJ2 oil seal	2
3	CBGj2-02	Cover	1
4	GB893.1-86	Backup ring	1
5	CBGj3-T1	Sealing element	1
6	644907	Bearing	4
7	CBGj2-08	Bearing	4
8	CBGj2-05	Auricled stopper	2
9	CBGj2-03	Auricled sealing	2
10	CBGj2-07	Side plate	2

No.	Part code	Parts name	Qty
11	CBGj2-01	Drive gear shaft	1
12	CBGj2-10	Drive gear shaft	1
13	CBGj2-06	Pump body	1
14	CBGj2-09	Rear cover	1
15	BP-1	Sign	1
16	GB827-86	Rivet	2
17	GB93-87	Washer	4
18	CBGj2-11	Screw	4
19	GB93-87	Washer	2
20	GB70-85	Screw	2

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Repair of working pump

Working pump is the power source of hydraulic system, and its volume efficiency will influence the speed and efficiency of actuator directly. It is not recommended to be dismantled or installed by non-professionals due to the working pump is a precise hydraulic element, and the broken pump shall be returned to the manufacturer and repaired by professionals; after repair, working pump shall perform the test of airtightness and volume efficiency in order to guarantee its performance and normal application.

Installation requirements for working pump

1. Before installation, you shall understand fully about the rotating direction and adapt the requirements of the entire machine.
2. Inlet and outlet port of working pump shall keep clean without dirts, and its surface shall no injuries so as to guarantee the sealing effect of O-ring.
3. Before assembling the working pump, check the depth of connection mounting hole is larger than the pump's shaft extension length or not, in order to prevent from culmination phenomenon, pump burnt out. Installation of bond axis and jacket shall be free without stuck.

Cautions for pump service

1. Apply a moderate force during installing and removing, and the rude operation is not allowed; user shall not open the pump without manufacturer's consent, otherwise the manufacturer cannot guarantee its product performance.
2. Pay attention to the working pump service during operation, usually clean and wash the inlet/outlet port of strainer, reasonably replace the hydraulic oil and check all screws at connections for looseness, etc.
3. Inlet, outlet port of working pump shall be mounted firmly and sealing device is secured, otherwise it may cause oil leak or air suction, which will affect the pump's performance.
4. It is not allow to operate the working pump under maximum pressure, maximum speed or overloaded circumstances, otherwise it may influence the service life.
5. Oil temperature is required to be kept lower than 80℃, otherwise it may influence the viscosity of hydraulic oil and also accelerate the oxidation of fluid.

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Troubleshooting for working pump

Fault phenomenon of oil pump	Possible cause	Handling method
Oil pump noise	Air intake system	Fasten all connectors
	Insufficient oil supply	Refill the oil to a proper level
	Oil is cold	Operating in a low speed
	Suction strainer is too dirt	Clean or replace the filter
	Suction tube is blocked	Remove the stoppage
	Air filter in tank is blocked	Clean or replace the air filter
	Bad right alignment between pump and input shaft	Inspection
	Serious resonant vibration; resonant vibration with the peripheral elements of tank, pipeline.	Check if mounting bolts of piping, element is tightened.
Pump obtuse or no response	Insufficient oil supply	Refill the oil to a proper level
	Relief valve insufficient pressure regulating	Readjust the pressure of relief valve
	Pump worn or broken	Repair or replacement
	Valve is worn, leak or stuck	Repair or replacement
Oil temp risen	Pressure regulating of relief valve is too low	Readjust or replace the pressure of relief valve
	Low viscosity of fluid	Replace with recommended hydraulic oil
	Oil is dirty	Replace the oil totally
	Oil level too low	Refill the oil to a proper level
	Pump worn or broken	Repair or replacement
Oil foaming	Air entered the system through suction pipe	Fasten all connectors
	Oil level too low	Refill the oil to a proper level
	Lip type seal (oil seal) of main revolving shaft is worn or damaged	Replaced the lip type seal (oil seal) of main revolving shaft
Flow rate is not enough or low pressure	Side plate broken	Replace side plate
	Relief valve failure	Replace relief valve
	Air intake system	Fasten all connectors
Oil still leaking after replace the lip type seal (oil seal) of main revolving shaft	Worn lip type seal (oil seal) damage the sealing area of drive gear shaft	Replace the drive gear shaft
	Seal ring worn or damaged	Replace the seal ring

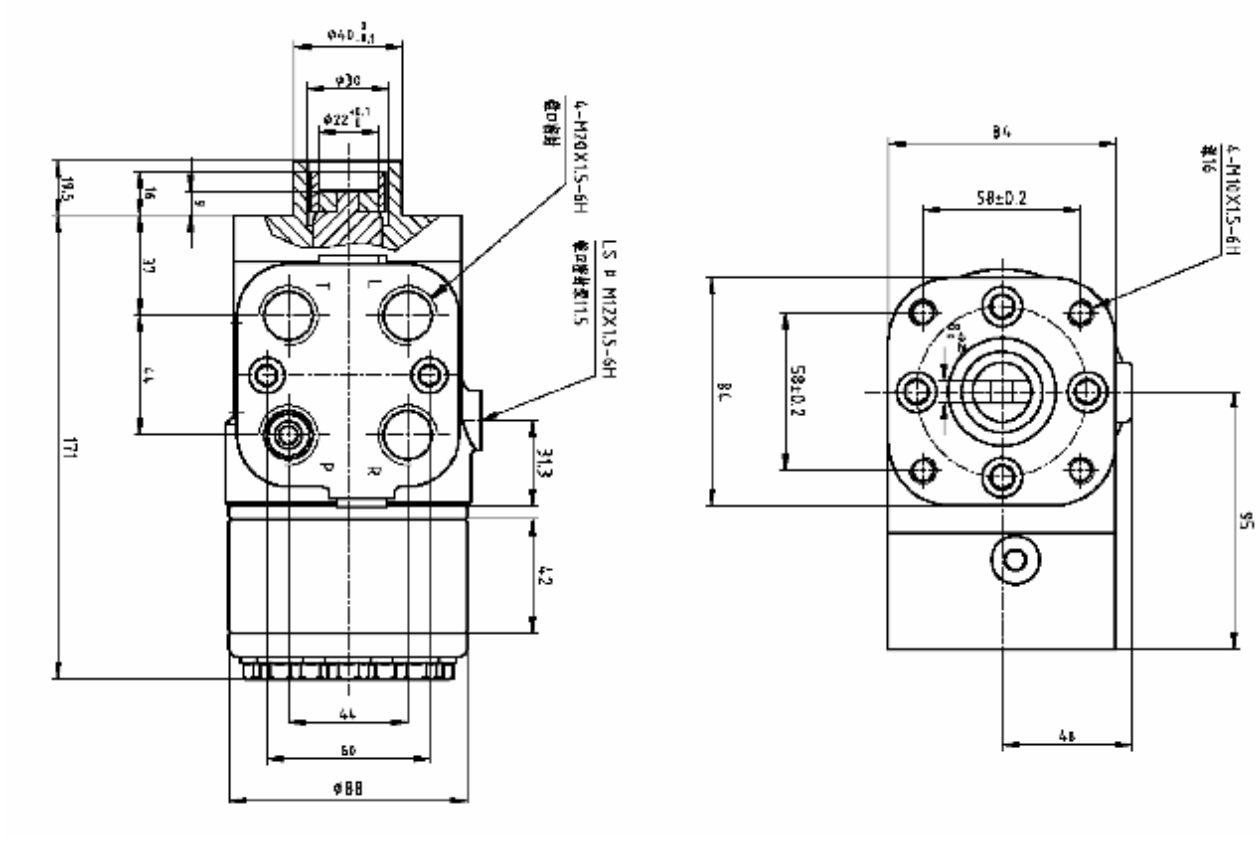
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METERING PUMP

Specifications

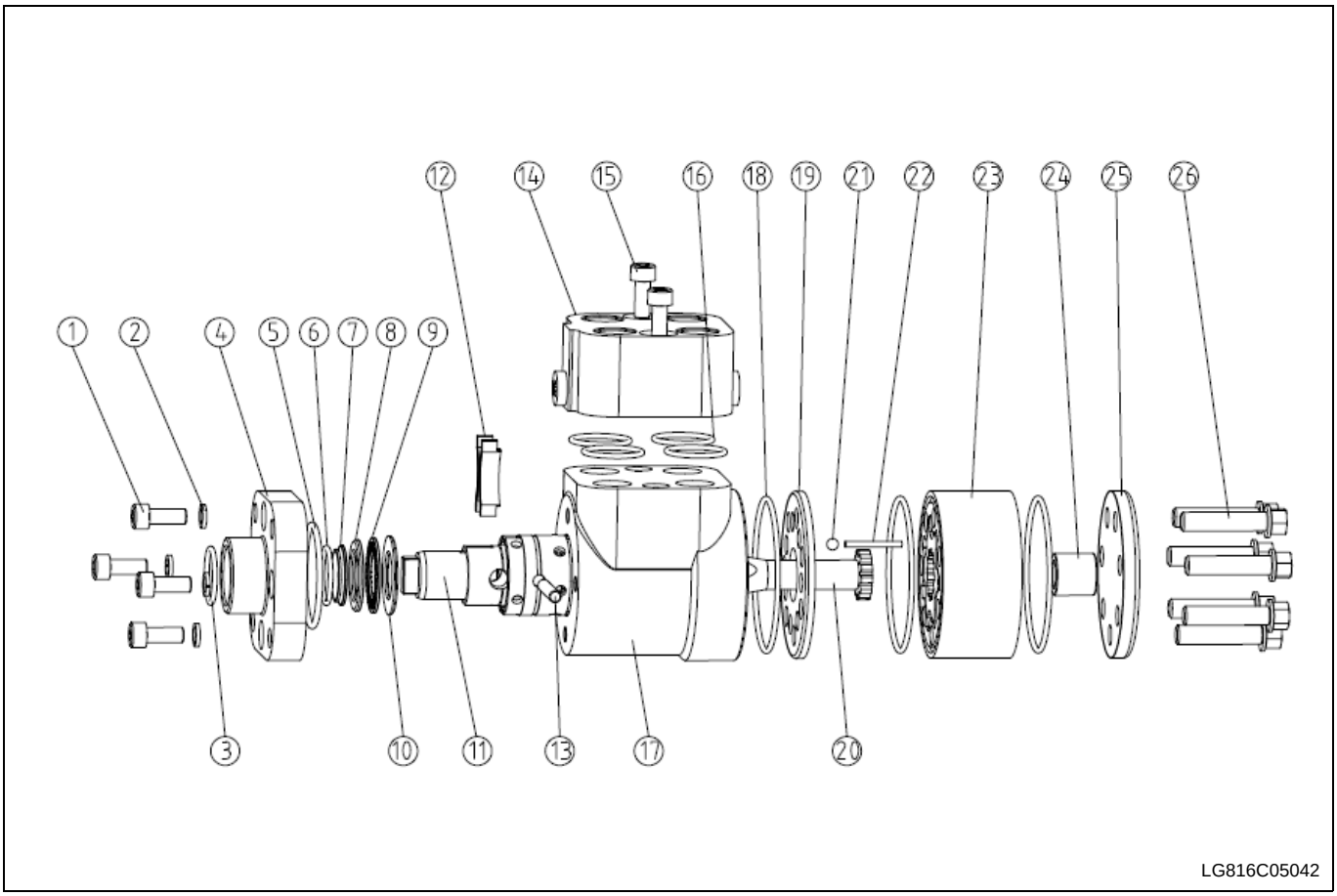
Model of steering gear	BZZ-320
Code of steering gear	502-7177/831-2204
Displacement	320ml/r
Steering moment	2.8-3.2N•m
Max pressure at inlet	17.2MPa
Maximum continuance	2.1MPa

Exterior drawing of steering gear



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No.	Name	Qty	No.	Name	Qty
1	Screw	1	14	Valve block	1
2	Spring washer	4	15	Screw	2
3	Dust ring	4	16	O-seal	4
4	Cover	1	17	Valve body	1
5	O-seal	1	18	O-seal	3
6	Shaft sealing component 1	1	19	Baffle	1
7	Shaft sealing component 2	1	20	Universal driving shaft	1
8	Retainer	1	21	Steel ball	1
9	Needle bearing	1	22	Pin	1
10	Slip ring	1	23	Rotor, stator pair	1
11	Spool and valve bushing pairs	1	24	Block	1
12	Leaf spring	6	25	Rear cover	1
13	Taper	1	26	Bolt	7

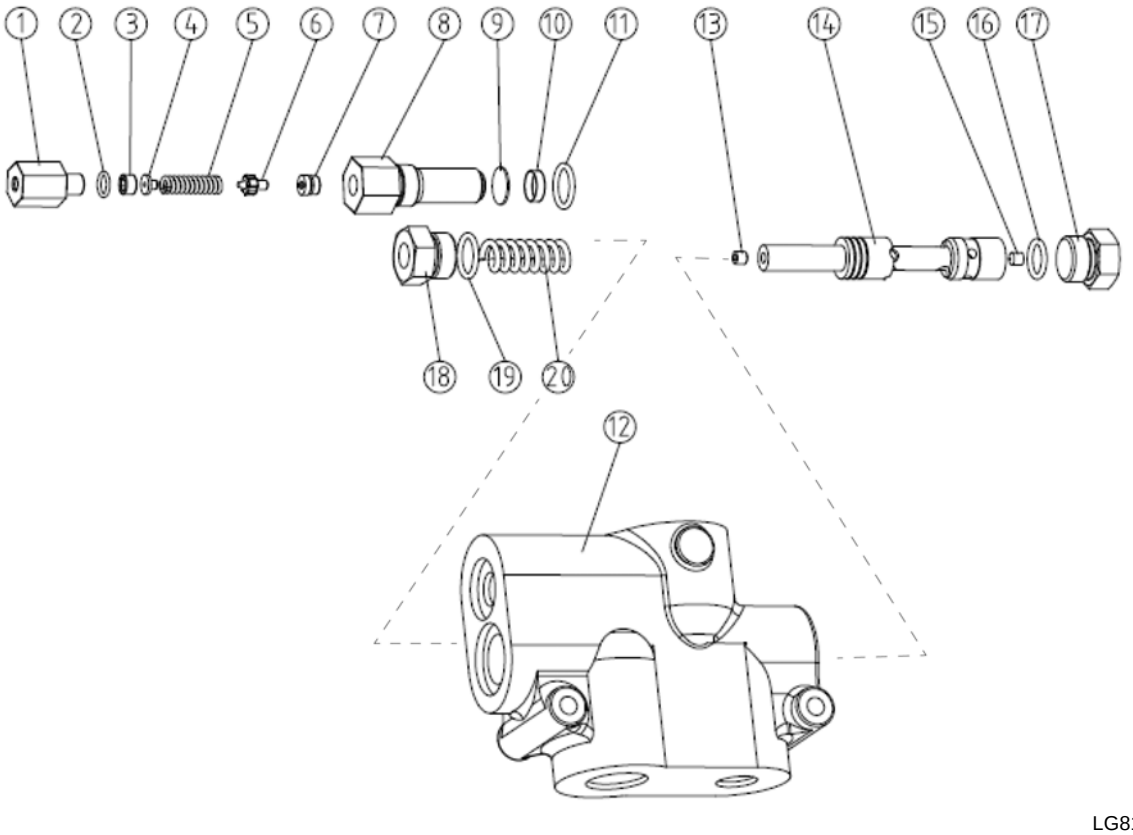
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STEERING PRIORITY VALVE

Specifications

Model of priority valve	VLE150
Code of priority valve	882-2902-058
Rated flow rate is	150L/min

STEERING PRIORITY VALVE



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Commissioning and servicing of the drive hydraulic system

Steering hydraulic system commissioning

⚠ WARNING

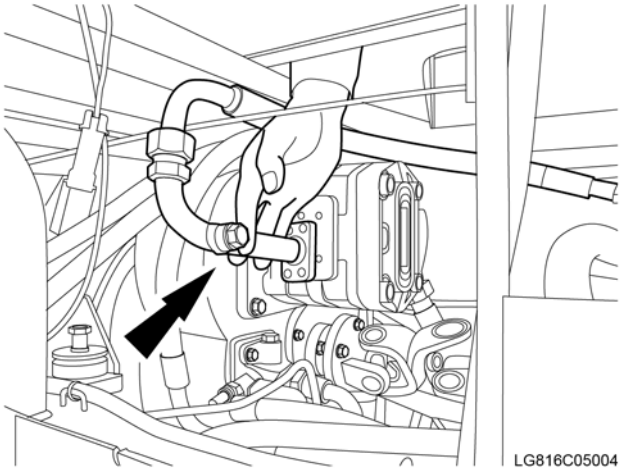
Personal injury can result from hydraulic oil pressure and hot oil.

⚠ Note:

During testing and adjusting the steering hydraulic system, the machine shall be placed on a smooth ground, and keep far away from the operating people and machines. Only one person can operate the machine independently during operation. Other people must be kept far away from the machine to prevent from accidents.

Adjust the pressure of safety valve

1. Park the machine on a smooth, level surface. Move away from other operating machines and away from personnel. Lower the implements to the ground. Stop the engine.
2. Permit only one operator on the machine. Keep all other personnel away from the machine or in sight of the operator.
3. Engage the parking brake. Put blocks in front of the wheels and behind the wheels.
4. Install steering frame lock in the LOCKED position so the machine cannot articulate.
5. Depress the brake pedal repeatedly. This will relieve any pressure that may be present in the brake hydraulic system.
6. Move the implement control levers through the full range of travel. This will relieve any pressure that may be present in the implement hydraulic system. Place the lift control lever in the HOLD position. Place the tilt control lever in the HOLD position.
7. Turn the steering wheel several times in both directions in order to relieve the pressure in the steering system.
8. Install a pressure gauge at pressure-measuring port of working pump, and its regulating range is 0-25MPa.



9. Start the machine, increase the accelerator to make the machine running in a high speed.
10. Rotate the steering wheel until the safety valve opened, and at this time,

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the pressure of the gauge shall be in 14.8±0.3MPa.

11. If the readings is incorrect, you can adjust the adjusting bolt of priority valve with tools, and then repeat the step 9 and 10 until the gauge readings become right.
12. Remove the pressure gauge, bumper.

Service and repair of the drive hydraulic system

⚠ WARNING

- Personal injury or death can result from machine articulation or movement.
- Machine frames can move and a person can be crushed.
- Connect the steering frame lock link between the front and rear frames before working on machine.

⚠ Note:

- Personal injury or death can result from escaping fluid under pressure. Escaping fluid under pressure, even a very small pin-hole size leak, can penetrate body tissue and cause serious injury and possible death. If fluid is injected into your skin, it must be treated immediately by a doctor familiar with this type of injury. Always use a board or cardboard when checking for a leak.
- Performance tests for the steering system can be used for a diagnosis of poor performance and for finding the source of oil leaks inside the hydraulic system.
- This section provides probable causes to a known problem. Since there may be several probable causes, specific inspections or specific instrument tests may be recommended. These inspections and tests will help to identify the cause that is most probable.

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Problem List

1. Turning the steering wheel is difficult.
2. The steering wheel will not return to the NEUTRAL position. The machine is steering all of the time.
3. The impact at full articulation is too high.
4. The machine turns too slowly in both directions.
5. The machine turns too slowly in both directions only when the machine turns against a load.
6. The machine does not turn when the steering wheel is turned.
7. The machine turns but the operator does not turn the steering wheel.
8. The machine turns too quickly in order to make small steering corrections when the machine moves at fast speeds.
9. The pump makes noise and the steering cylinder rod does not move freely.

Problem 1

Turning the steering wheel is difficult

Probable causes And Solutions

1. The oil is cold.

   Operate the work implement to make oil temperature rise.

2. There is a leak or blockage in the load sensing line.

   (a) Check O-ring is not fall-out, damaged, and if exist, replace the O-ring.

   (b) Check the feedback hose is not broken, and if exist, replace the hose.

3. There is a leak or blockage in the steering pump and the steering pump pressure is low.

   Replace the steering gear or adjust the pressure of safety valve.

4. Bolts are too tight for the metering section of the steering metering pump.

   After unscrewed the bolt, reinstall according to the specified torque.

5. The check valve for the steering metering pump is missing.

   Adjust the pressure of safety valve or replace the steering gear

Problem 2

The machine does not turn evenly.

Probable causes

1. The steering metering pump is sticking.

   Replace the steering gear

2. The margin pressure of the steering pump is set too high.

   Adjust the pressure of priority valve

Problem 3

The machine turns slowly in both directions.

Probable causes

1. Springs for the steering metering pump are not adjusted correctly.

   Connect pipeline correctly.

2. There is not enough flow from the pump.

   Replace the priority valve or steering gear

3. The margin pressure setting for the steering pump is too low.

   Adjust the set pressure of priority valve.

Problem 4

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The steering wheel turns with slight resistance but the machine does not turn.

Probable causes

1. Oil is leaking from the steering cross-over relief valve.
2. A seal in the piston has worn out.

   Replace cylinder seal ring.

Problem 5

The machine turns slowly in both directions only when the machine turns against a load (high resistance).

Probable causes

1. Oil is leaking from the relief valve seat or from the seals.

   Replace the seal ring of priority valve or replace the priority valve.

Problem 6

The machine does not turn when the steering wheel is turned.

Probable causes:

1. The steering control valve spool is sticking.

   Replace the steering gear

Problem 7

The machine turns but the operator does not turn the steering wheel.

Probable causes

1. The spool in the steering control valve does not return to the NEUTRAL position correctly.

   Check the steering wheel is return or not, if returned, replace the steering gear.
2. The orifices in the steering control valve are plugged.

   Remove the priority valve and clean with kerosene.
3. Springs for the steering metering pump are broken or damaged.

   Repair the broken pipeline.

Problem 8

The machine turns too quickly in order to make small steering corrections when the machine moves at fast speeds.

Probable causes

1. The adjustment of the steering metering pump is not correct.

   Re-commissioning the steering gear.
2. The orifices in the steering control valve are plugged.

   Remove the priority valve and clean with kerosene.
3. The margin pressure of the steering pump is set too high.

   Adjust the priority valve to specified pressure.

Problem 9

The pump makes noise and the steering cylinder rod does not move freely.

Probable causes

1. There is air in the steering hydraulic circuit.

   Exhaust to the hydraulic oil.
2. The viscosity of the oil is incorrect.

   (a) Check if abnormal viscosity of oil is caused by temperature, and solve it.

   (b) Check if the condition is caused by oil deteriorated or substandard cleanliness, if yes, filter or replace the hydraulic oil.
3. The oil level in the hydraulic oil tank is low.

   Refill the hydraulic oil to a desired position.

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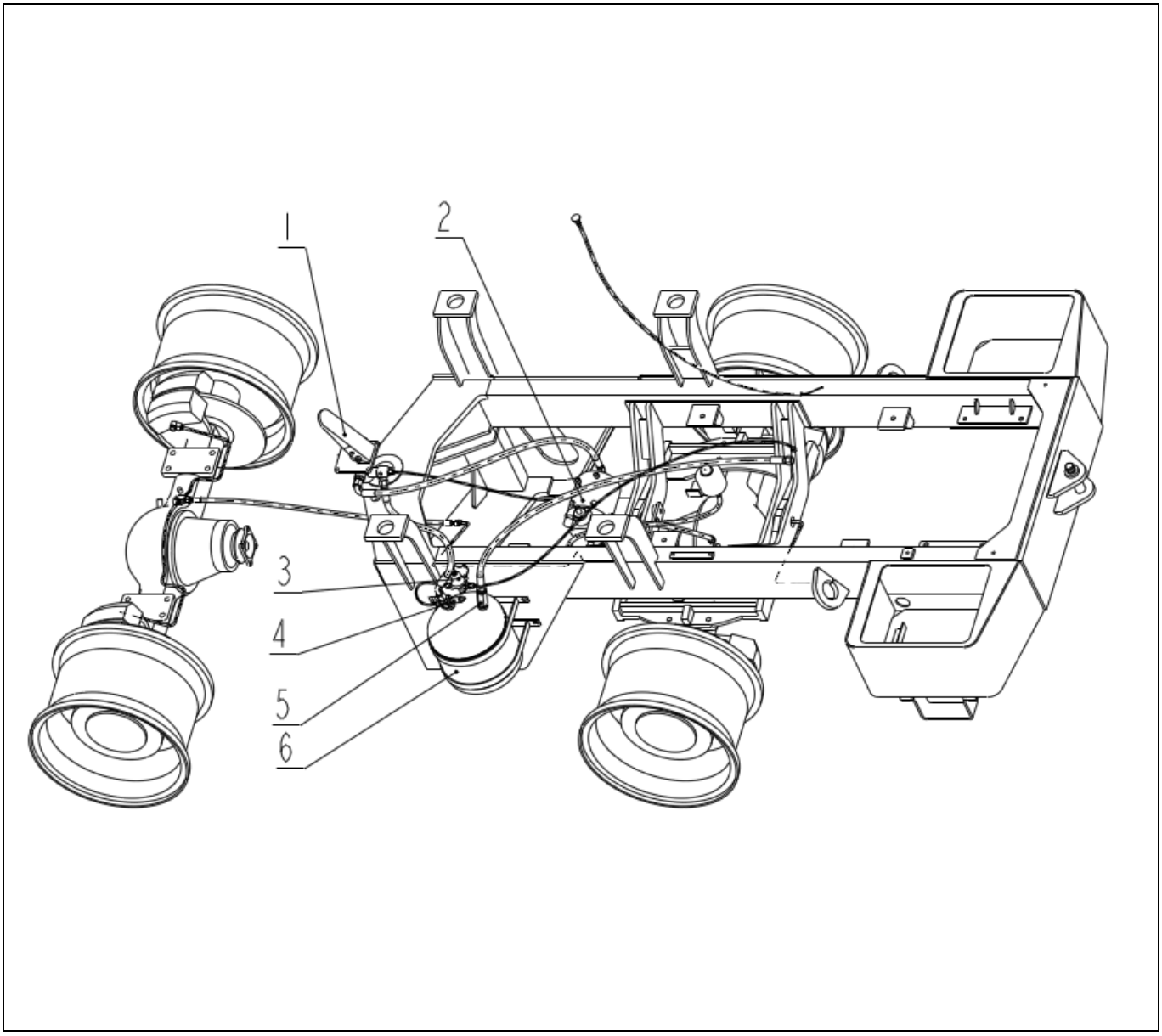
6 Brake System

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Charge the air tank 6-24
Check the service brake 6-24
Exhaust of brake system 6-25
Refill brake fluid 6-26
Check the performance of parking brake 6-27
Service of brake system 6-27
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Removal and Installation of Brake System Components

Component location illustration



1. BRAKEVALVEMOUNTINGAS
2. ASSISTOR
3. PRESSUERREGULATOR
4. SAFETYVALVE
5. CHECKVALVE
6. AIRKETTLEAS

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Tool list

Name	Specification (Qty.)
Open-end wrench	8#, 13#, 16#, 18#, 24#, 27#, 30#
Nipper plier	
⚠ Remark: removed standard parts should be placed with relevant material together to avoid mixing.	

⚠ "Front" mentioned in this chapter refers to the forward direction after starting the machine; other directions are by this analogy.

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Handbrake

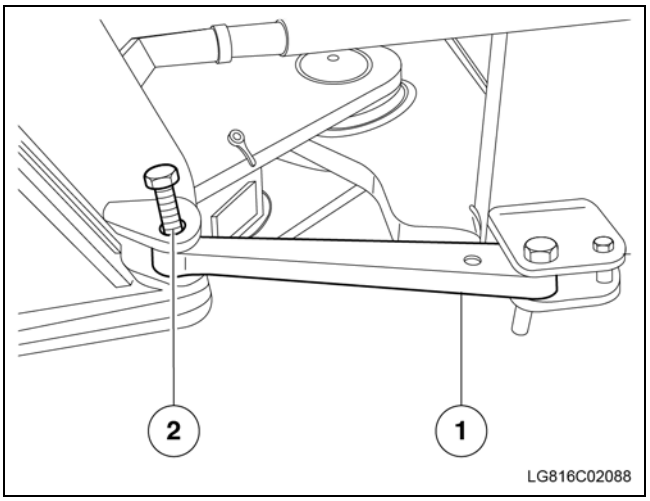
Removal

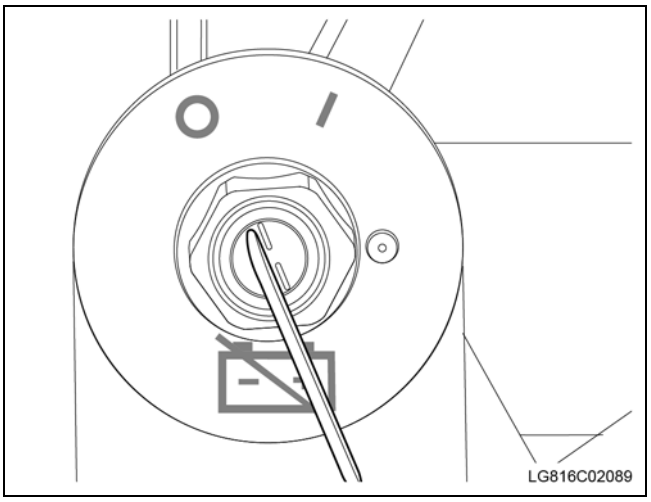
1. Park the machine and discharge the pressure of the machine

   (a) Park the machine on a flat ground, pull the parking brake to the up-most position. Dismantle the anti-rotating bumper (1)with a nipper plier, connect the bumper with the front and rear frames with its pin(2).

   (b) Push and pull the control rod forward and backward repeatedly to release the pressure in hydraulic system. Step on the braking pedal for over 30 times to release the pressure in air piping.

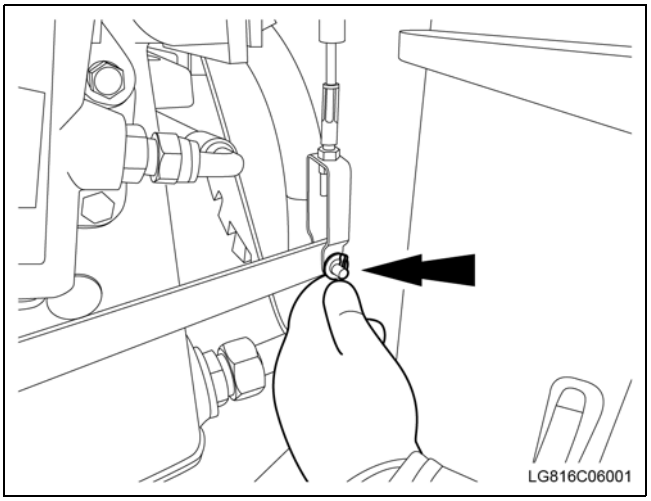
   (c) Open left cover door, set the negative switch to power off state.





2. Removal of pins

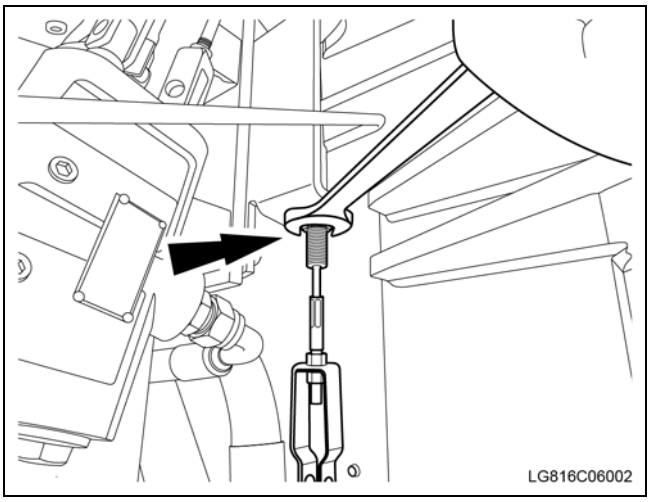
   Park the vehicle on a horizontal road surface and loose the handbrake; remove the flexible shaft connecting pin near handbrake disc the using needle-nose pliers, and then separate the brake lever and flexible shaft.



3. Removal of fixing nut

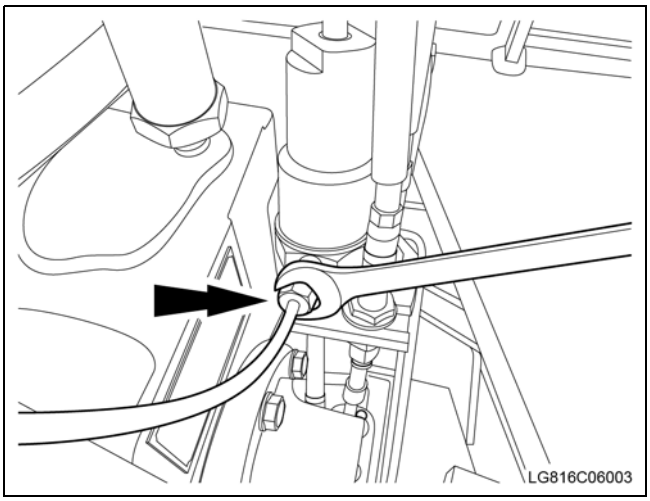
   Unscrew the fixing nut of flexible shaft using 24# open-end wrench, and remove the flexible shaft from the fixed support.

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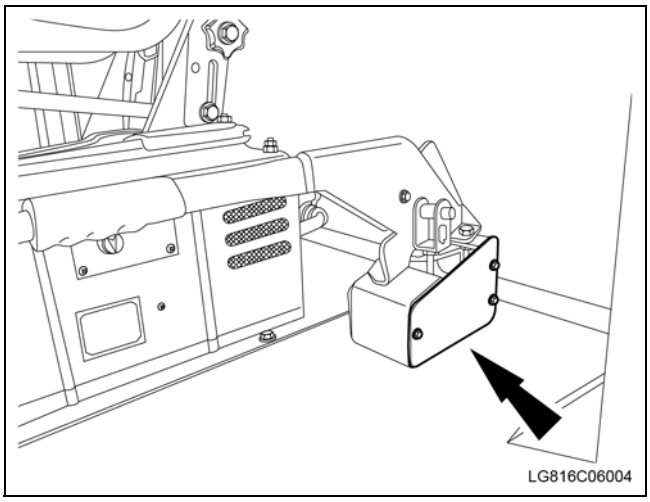
4. Removal of air pipe

Remove the air pipe of cut-off valve using 16# open-end wrench, and remove the air pipe which is connecting with cut-off valve end under the handbrake using 16# open-end wrench.



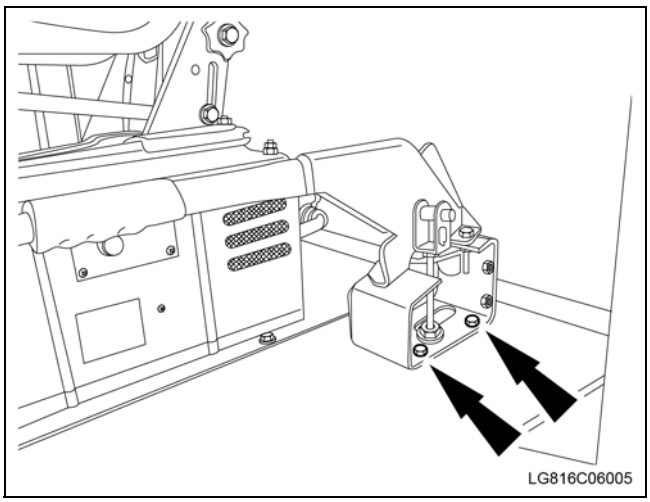
5. Removal of plate

Remove the bolts of handbrake support using 13# open-end wrench, and remove the plate outside the handbrake support.



6. Removal of handbrake

Remove the mounting bolt of handbrake support using 16# open-end wrench, and then the hand-brake can be removed.

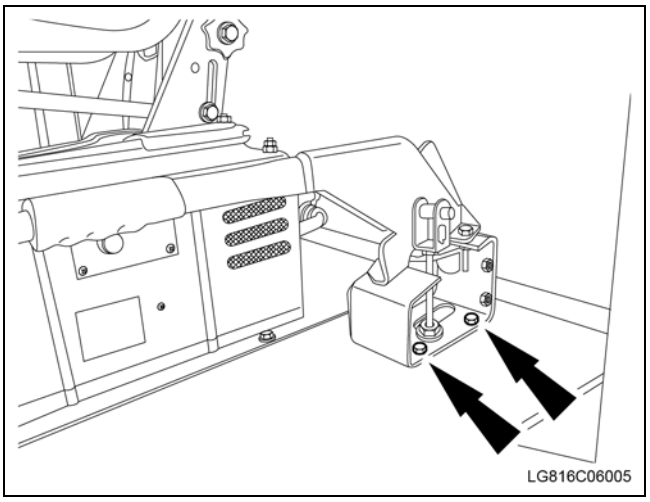


Installation

1. Install handbrake

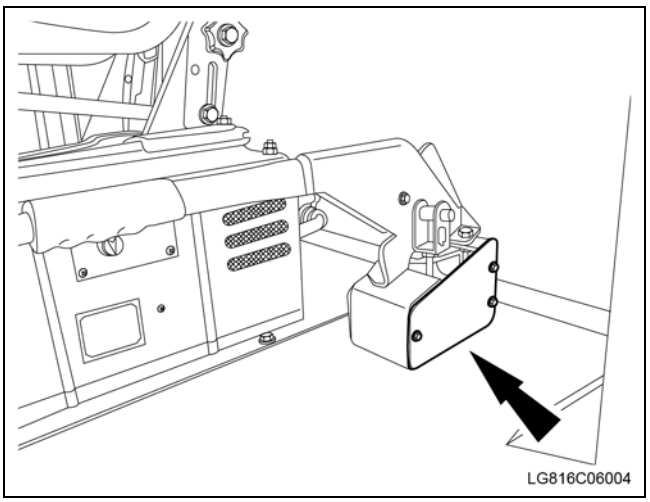
The handbrake flexible shaft passes the floor of cab, and the support shall be fixed on the cab floor with bolts, and tighten them with 16# open-end wrench, tightening torque 26±4N•m.

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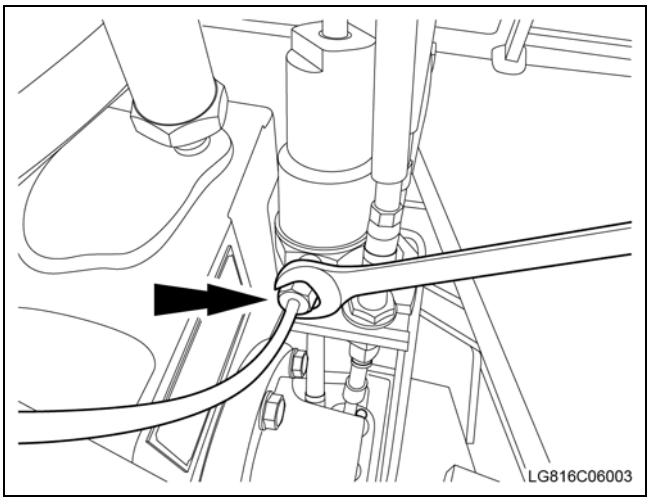
2. Install plate

Install the plate on the side of handbrake AS with 13# open-end wrench, bolt and washer, tightening torque 26±4N•m.



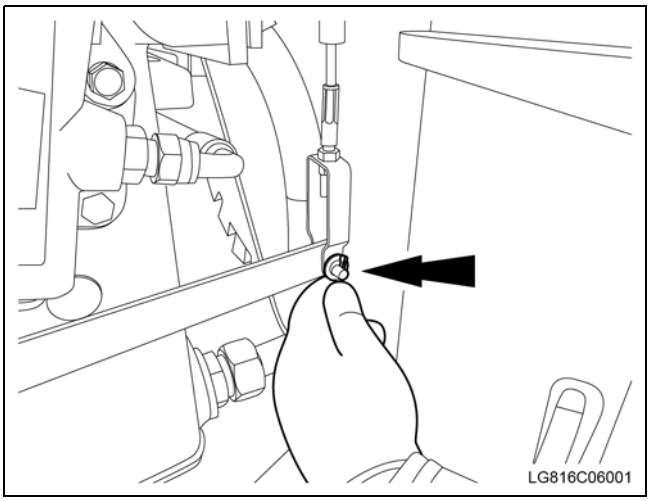
3. Install nylon hose

Install the handbrake AS onto the air pipe location of cut-off valve as shown in the figure with 16# open-end wrench by passing the air pipe of floor.



4. Install pin

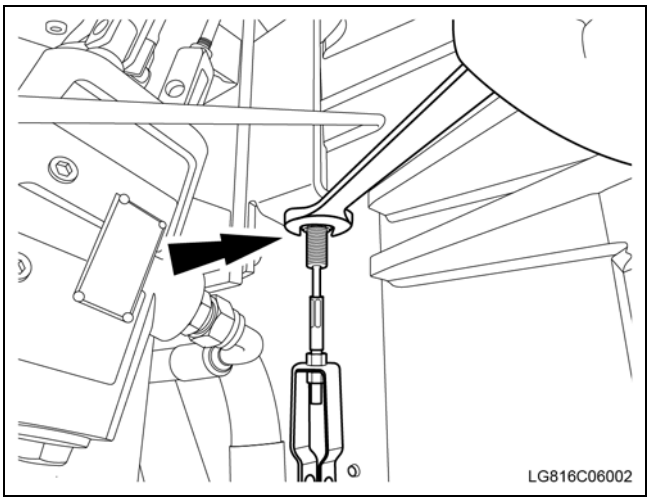
Connect the handbrake flexible shaft to the brake lever, fitted well with pin, washer and pins, and break apart the cotter pin to 60-90°with needle-nose pliers.



5. Fixing flexible shaft

Place the brake handle to level, adjust the adjuster nut to make the brake lever to a level, and tighten the nut with assembling tool of 24# open-end wrench.

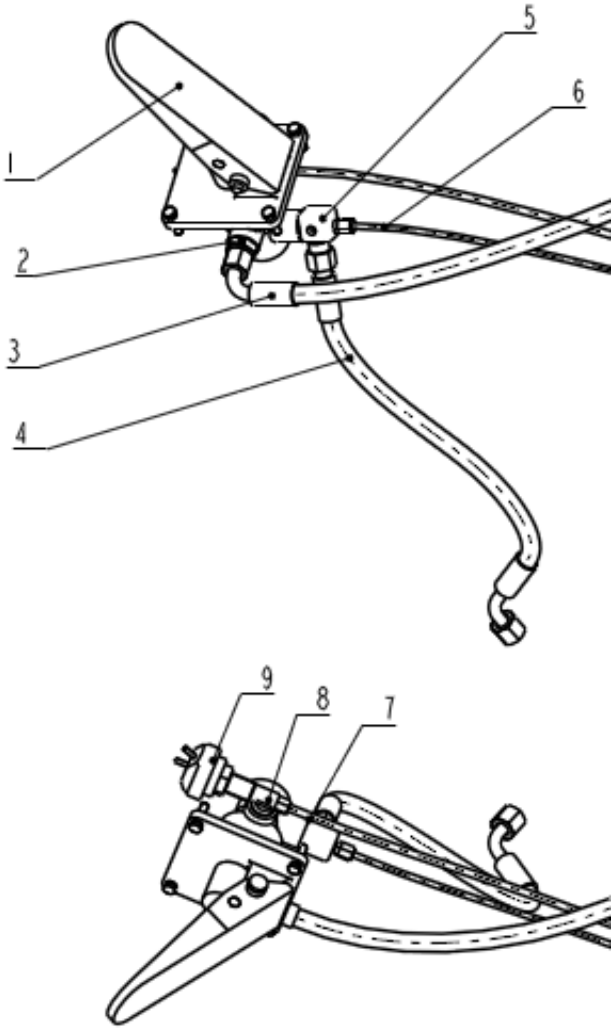
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Air brake valve

BRAKE VALVE ILLUSTRATION

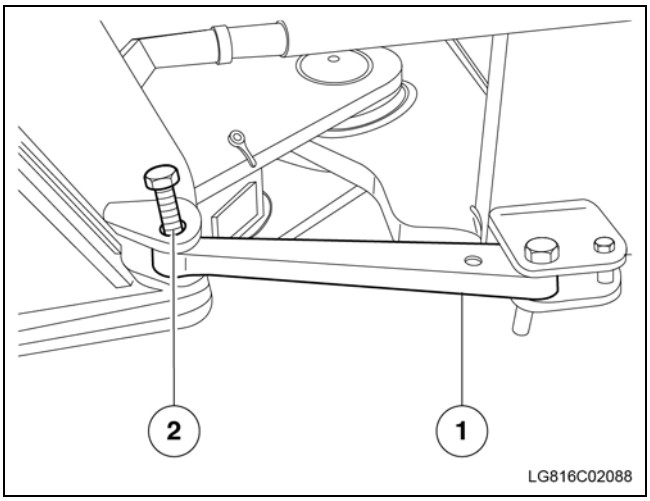


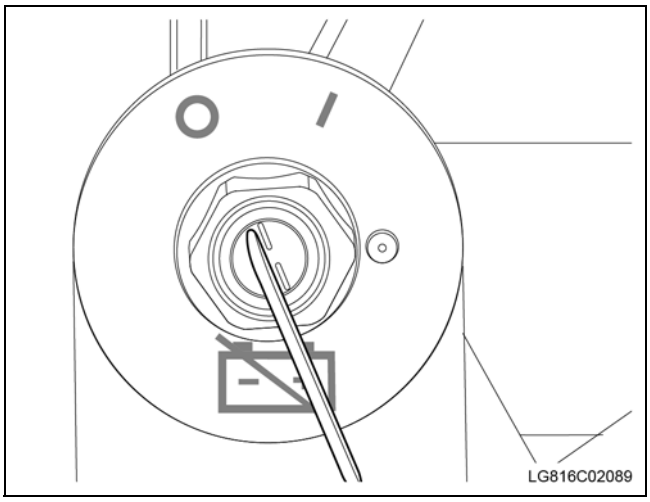
1. BRAKEVALVE
2. CONNECTOR
3. PAKINGBRAKELINE
4. INTAKE BRAKE HOSE
5. FOUR-WAY VALVE
6. NYLONHOSE
7. NYLONHOSE
8. TEE
9. BRAKELIGHTSWITCH

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Removal

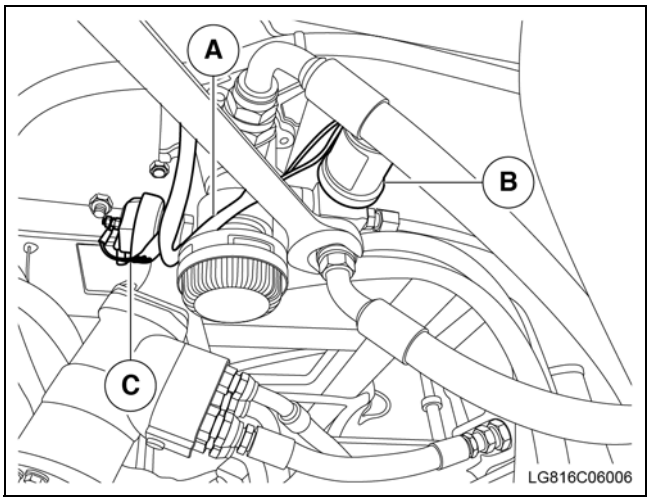
1. Park the machine and discharge the pressure of the machine.
   (a) Park the machine on a flat ground, pull the parking brake to the up-most position. Dismantle the anti-rotating bumper (1) with a nipper plier, connect the bumper with the front and rear frames with its pin(2).
   (b) Push and pull the control rod forward and backward repeatedly to release the pressure in hydraulic system.
   (c) Step on the braking pedal for over 30 times to release the pressure in air piping.
   (d) Open left cover door, set the negative switch to power off state.





2. Removal of electric switch

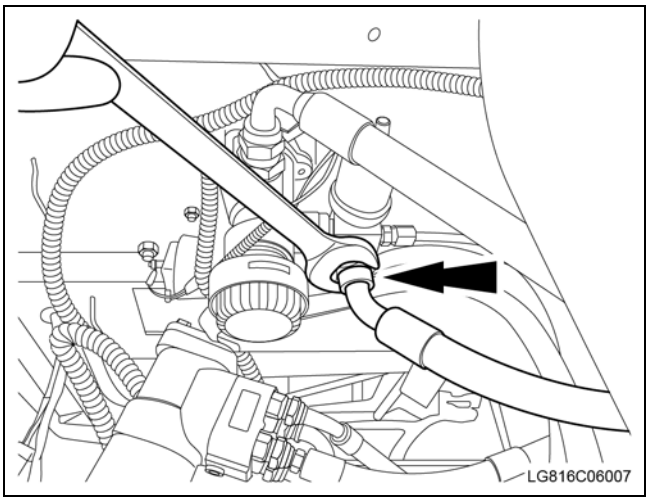
   Remove the air braking sensor harness (A) with 8# open-end wrench, and remove sensor (B) and pneumatically operated switch with 30# open-end wrench.



3. Remove hose

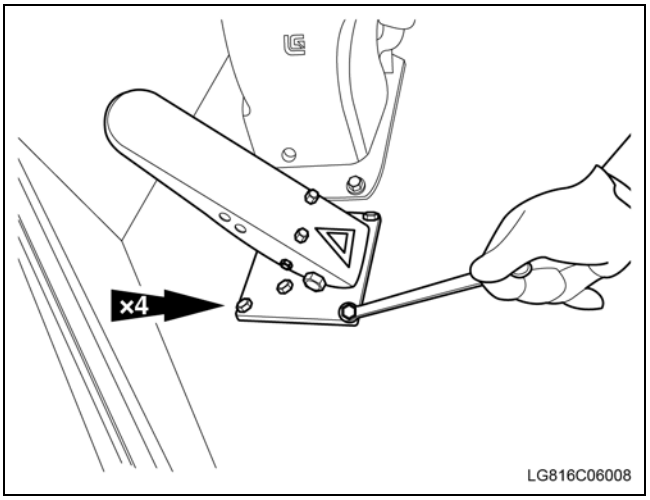
   Remove the connecting hose of air brake valve with 30# open-end wrench, and make related signs for joints and hoses before removal in order to assemble and recognize in convenience.

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4. Remove air brake valve AS

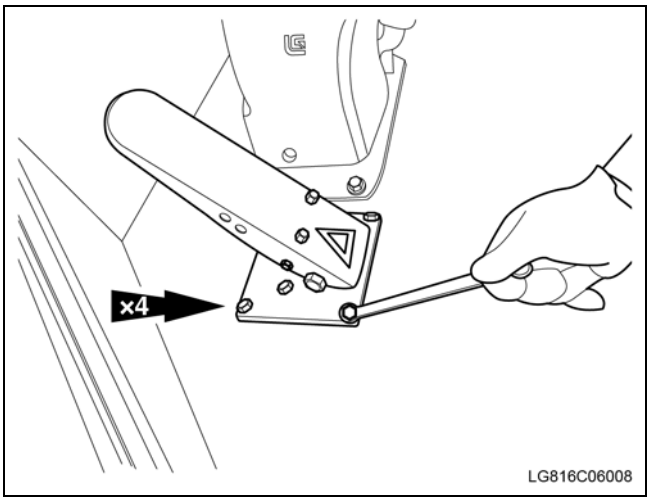
Remove the 4 captive bolts with 13# open-end wrench, and remove the air brake valve.



Installation

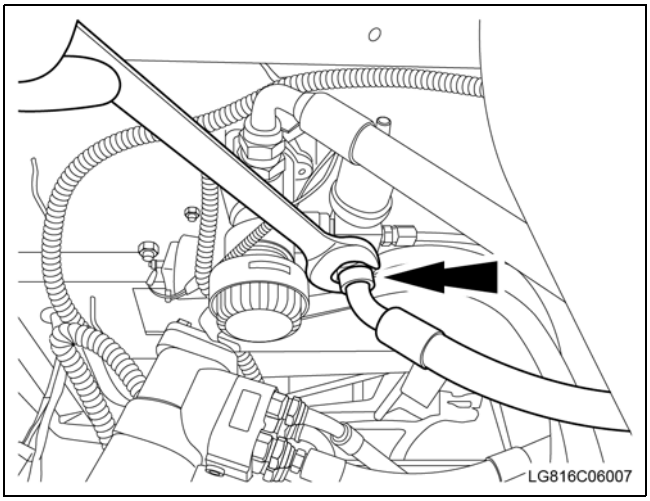
1. Install air brake valve

Place the air brake valve onto the assembling position inside the cab, and fastened on the cab floor by M8 bolt and related washers, with assembling tool of 13# open-end wrench, tightening torque 26±4N•m.



2. Install air pipe

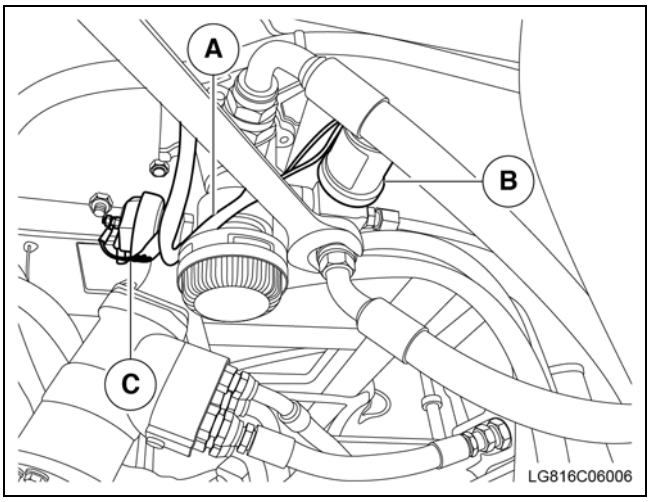
Check the connections at both sides of air tube in accordance with the signs marked before removal, replace or assemble it directly, and tighten it after assembled using 30# open-end wrench.



3. Connect harness sensor of electric appliance

Connect the sensor, air braking switch, wire harness well and tighten all connectors with 8# open-end wrench according to the following figure.

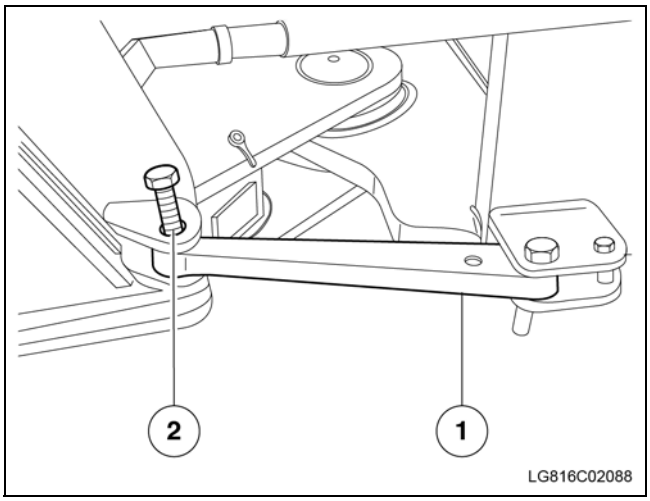
https://truckmanualshub.com/



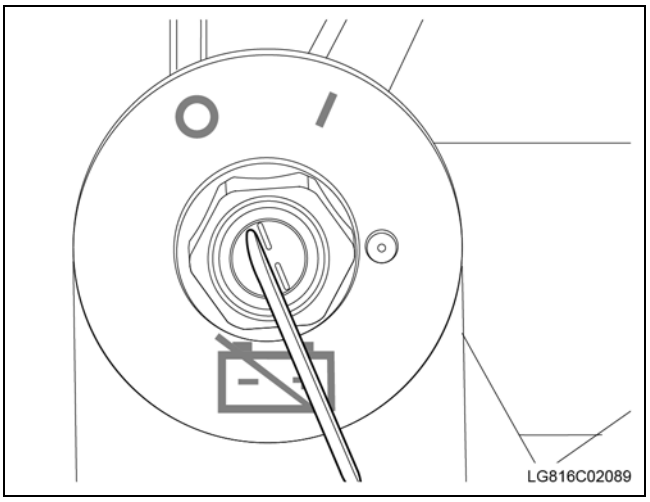
Assistor

Removal

1. Park the machine and discharge the pressure of the machine.
   (a) Park the machine on a flat ground, pull the parking brake to the up-most position. Dismantle the anti-rotating bumper (1)with a nipper plier, connect the bumper with the front and rear frames with its pin (2).
   (b) Push and pull the control rod forward and backward repeatedly to release the pressure in hydraulic system.
   (c) Step on the braking pedal for over 30 times to release the pressure in air piping.
   (d) Open left cover door, set the negative switch to power off state.

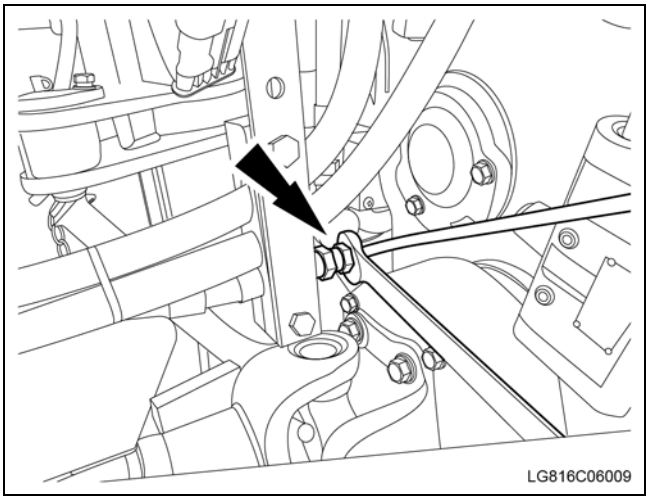


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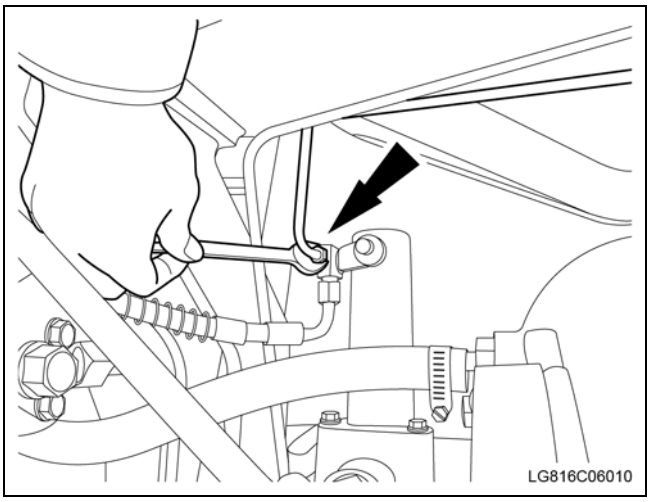
2. Remove the pipe

Remove the front end of assistor pipe fittings located under the hinged plate with 18# open-end wrench.



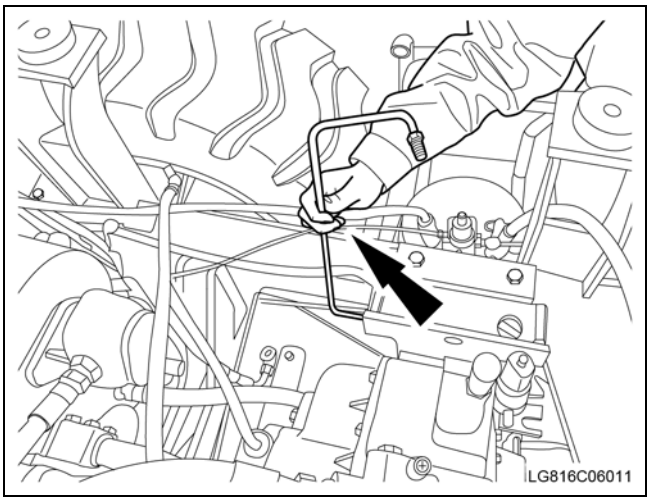
3. Remove the connectors

Remove the connector between steel-pipe connection and assistor end with 18# open-end wrench.



4. Remove the pipe

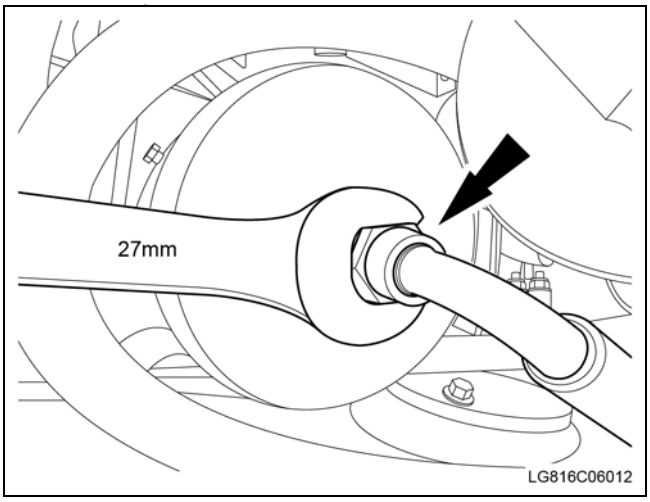
Take out the pipe along the frame edge.

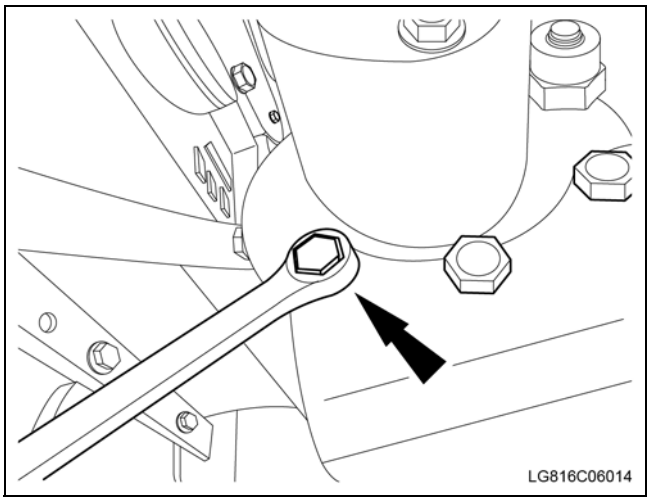


5. Remove assistor pipe

Remove the hose connector which connected with assistor with 27# open-end wrench (remove them on both sides).

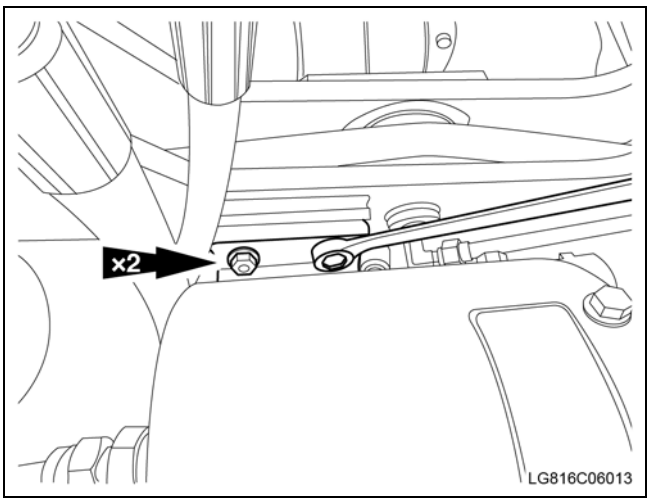
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6. Remove the frame bolt

Remove the captive bolt of assistor support and frame with 16# open-end wrench, and take out the assistor and its support from the frame.



7. Remove the components of assistor

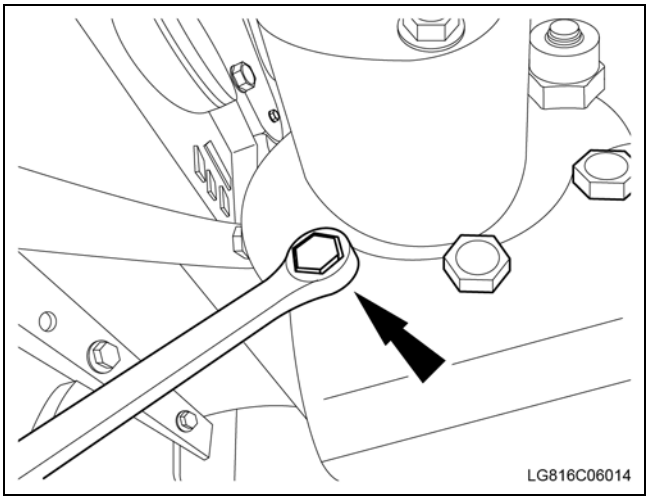
Remove the assembling bolt of assistor and support with 16# open-end wrench, and remove the assistor from the frame.

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Installation

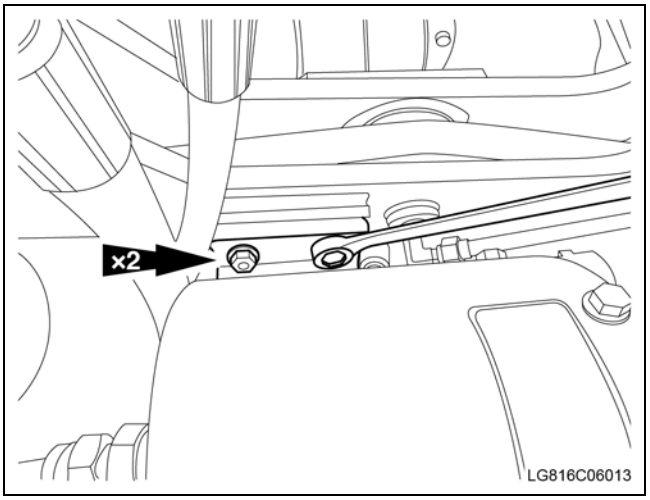
1. Combining assistor components

   Combine the assistor and its fixed support with 16# open-end wrench, tightening torque 52±7N•m.



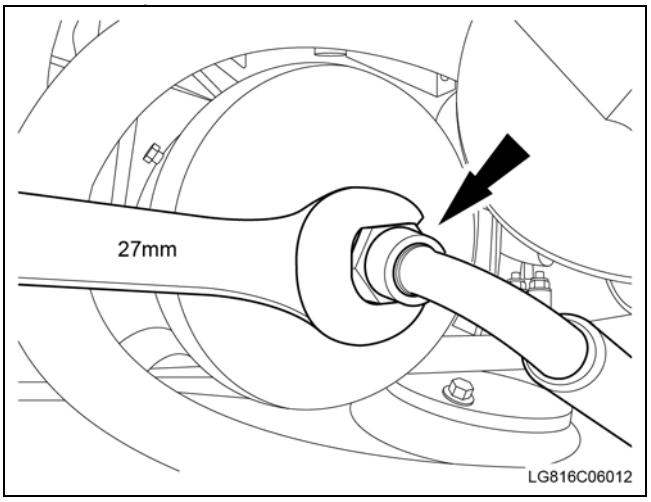
2. Install assistor

   Install the assistor onto rear frame with 16# open-end wrench, tightening torque 52±7N•m.



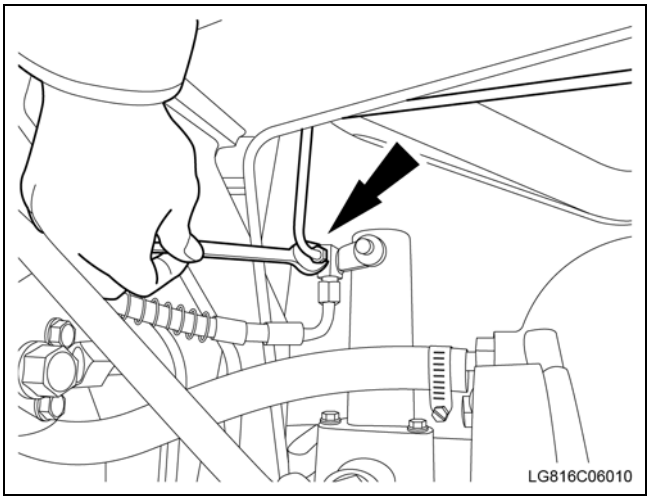
3. Connect with correspondent air and oil pipes.

   Install the hoses on both sides of assistor with 27# open-end wrench, and then tighten them.



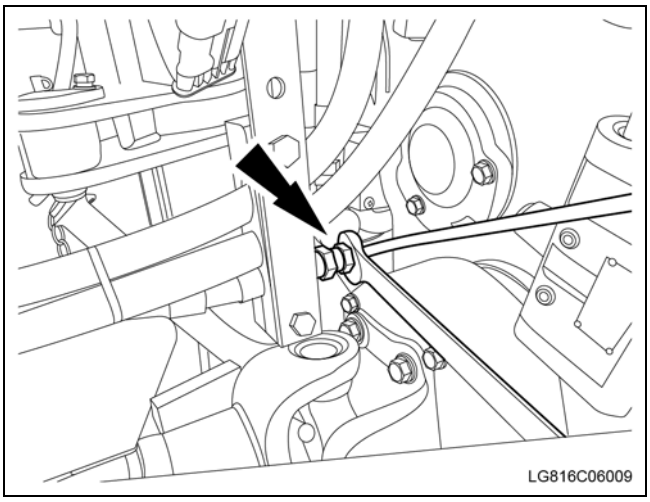
4. Assemble pipes

   (a) Install connecting pipe, and make it pass the side of frame to reach the front end; and tighten the pipe and assistor end firstly with 18# open-end wrench, and tighten the connectors.



   (b) And then fix the front end of pipe onto the hose connector with 18# open-end wrench.

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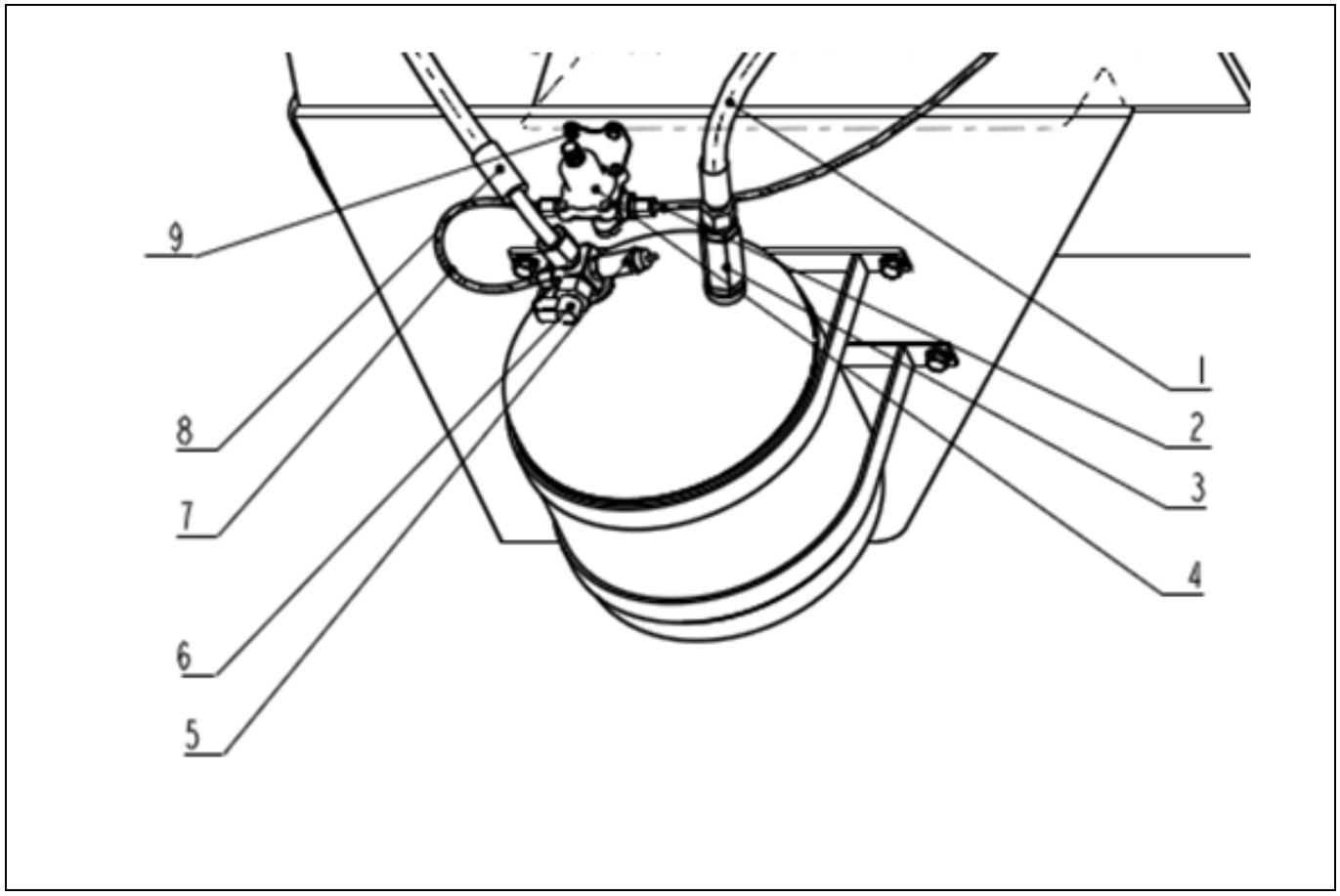
5. Debug and check no oil or air leak

   Start up the machine on a flat land, depress the brake pedal and check all connectors for oil and air leaks.

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Charging valve, check valve and safety valve

BRAKE VALVE ILLUSTRATION

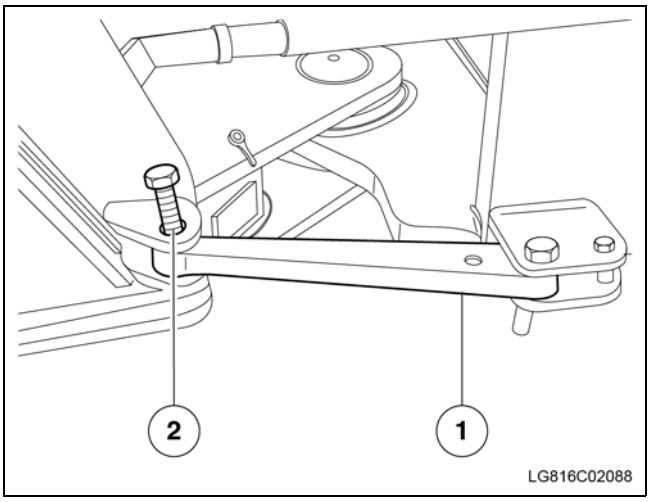


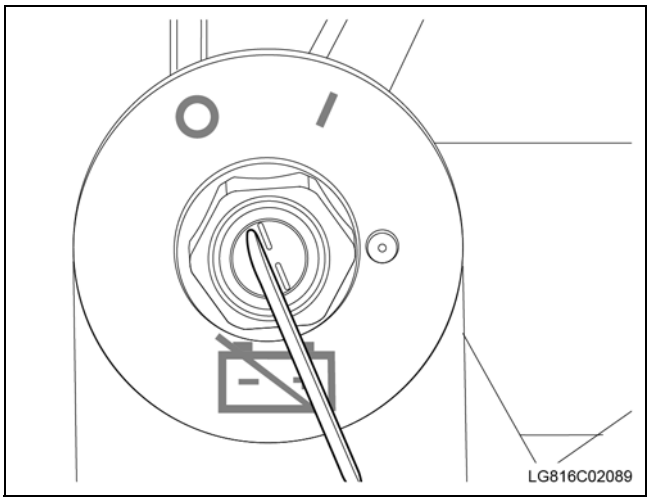
1. INTAKE HOSE
2. NYLONHOSE
3. CHECKVALVE
4. PRESSUERREGULATOR
5. SAFETYVALVE
6. AIRVALVE
7. NYLONHOSE
8. BRAKEHOSE
9. BOLT

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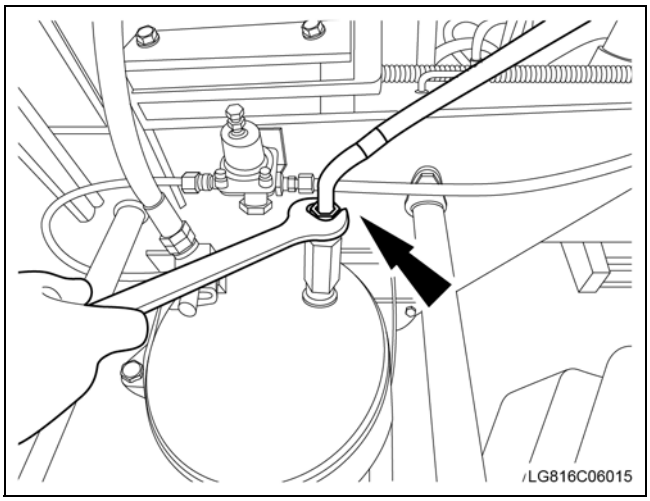
Removal

1. Park the machine and discharge the pressure of the machine.
   (a) Park the machine on a flat ground, pull the parking brake to the up-most position. Remove the anti-rotating bumper (1) with a nipper plier, connect the bumper with the front and rear frames with its pin(2).
   (b) Push and pull the control rod forward and backward repeatedly to release the pressure in hydraulic system. Step on the braking pedal for over 30 times to release the pressure in air piping.
   (c) Open left cover door, set the negative switch to power off state.



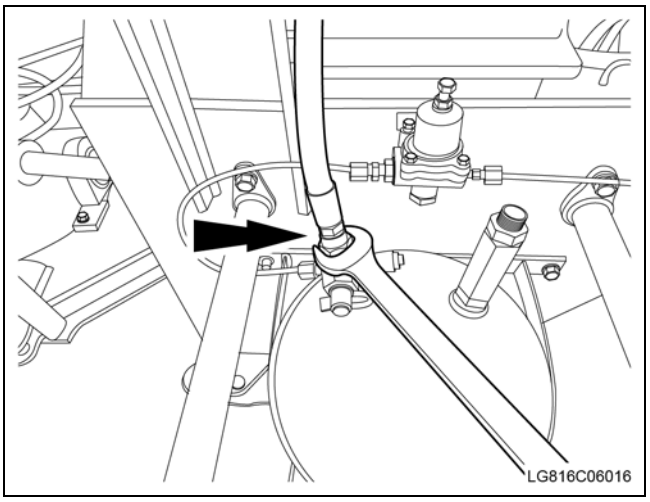


2. Remove the air pipe
   (a) Separately remove the air pipe from the wire woven air pipe connected with the check valve with 27# open-end wrench.

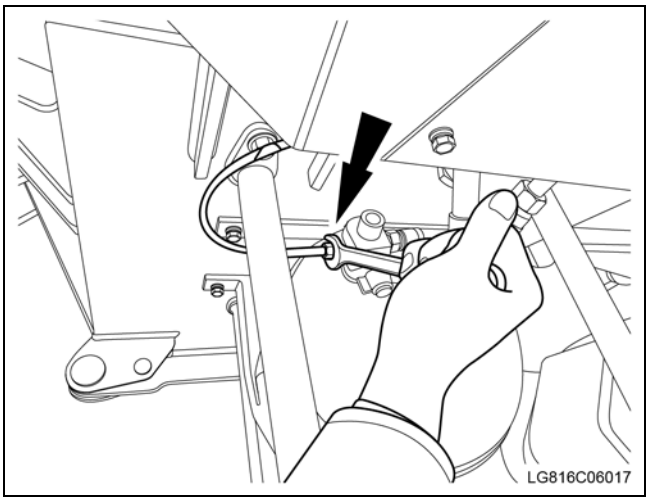


   (b) Separately remove the air pipe which connected with the safety valve block AS with 27# open-end wrench.

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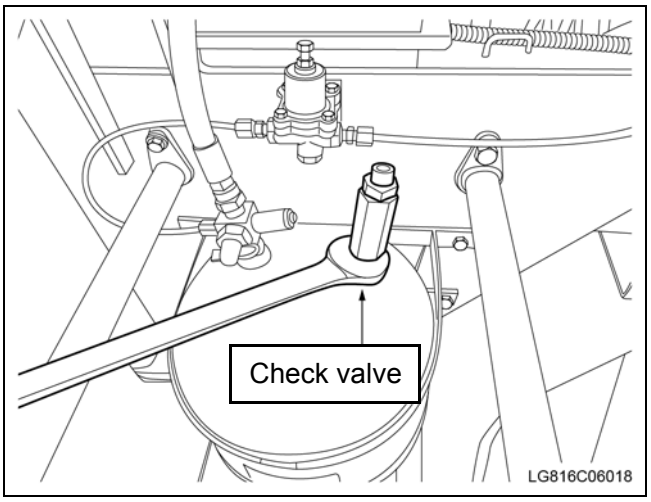


(c) Remove the nylon hose which connected with the safety valve block with 18# open-end wrench.

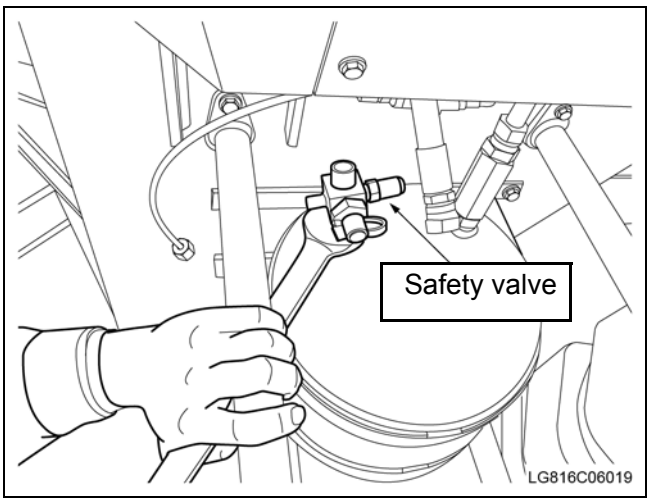


3. Remove the check valve and safety valve

(a) Remove the check valve, safety valve and charging valve with 30# open-end wrench.



(b) Remove the safety valve and charging valve AS with 30# open-end wrench.

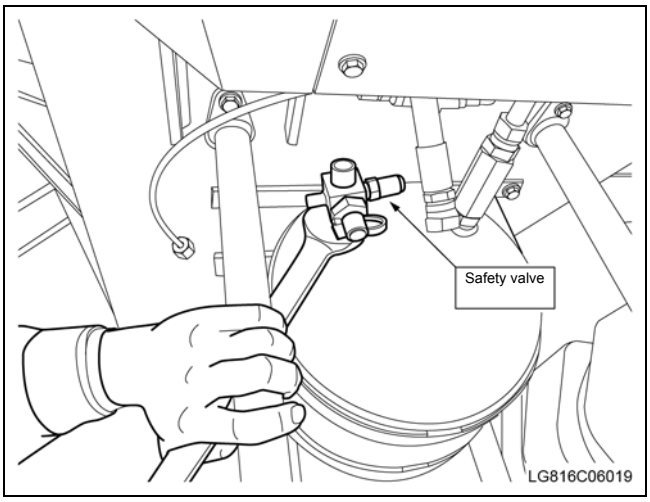


Installation

1. Install the check valve and safety valve

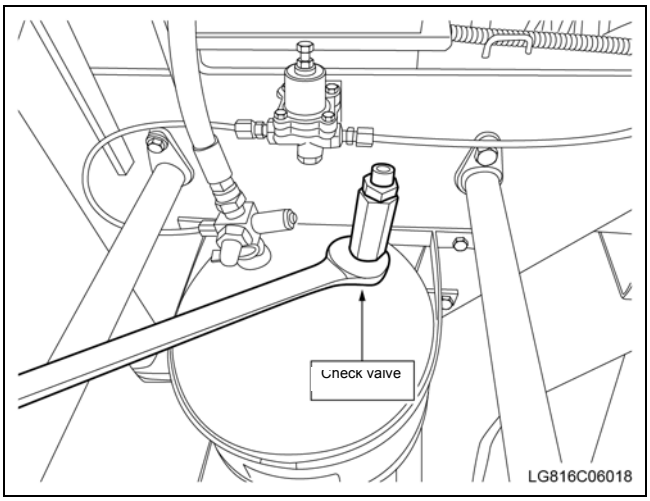
(a) Install the safety valve, charging valve onto the air tank with 30# open-end wrench in accordance with the removal operation.

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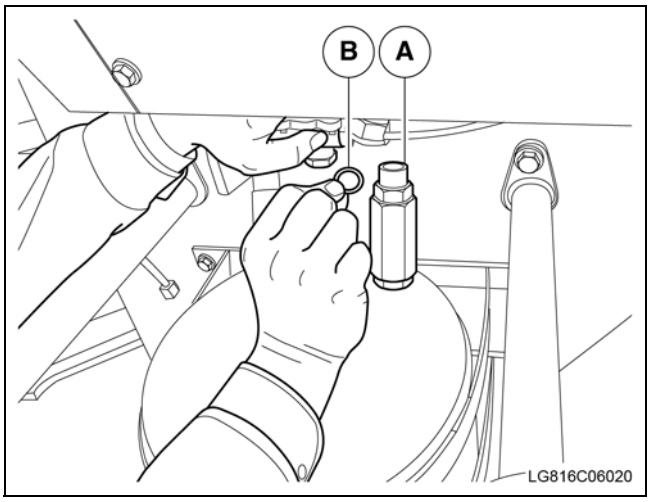
(b) Install the check valve onto the air tank with 30# open-end wrench.

(c) Install the pressure regulator onto the frame with 10# wrench, and tighten it.

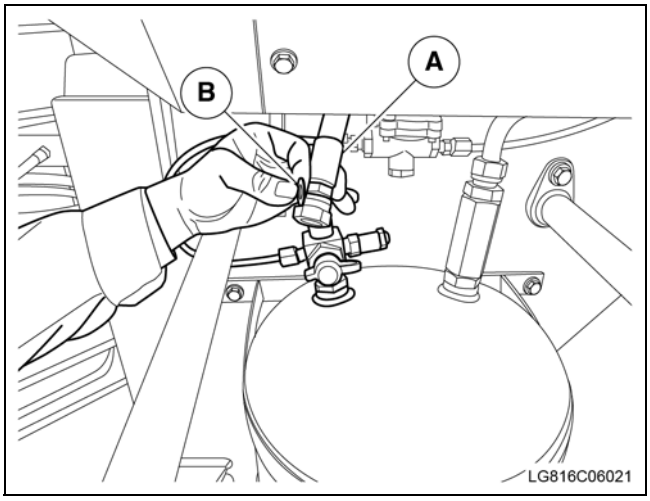


2. Connect the air pipe

(a) When assembling the wire woven pipe on the check valve (A), a compound paper washer (b) shall be placed between the connector and hose, and finally tighten the connector with 27# open-end wrench.



(b) Connecting nylon air tube can be connected directly; assemble intake pipe on the safety valve and air pipe (A) of air operated valve, a compound paper washer (b) shall be placed between the connector and hose, and finally tighten the connector with 27# open-end wrench and the nylon air pipe shall be tightened by 18# open-end wrench.



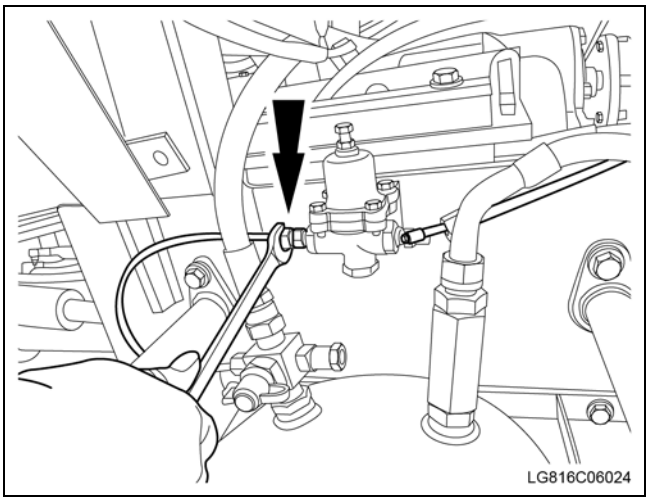
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Pressure regulator

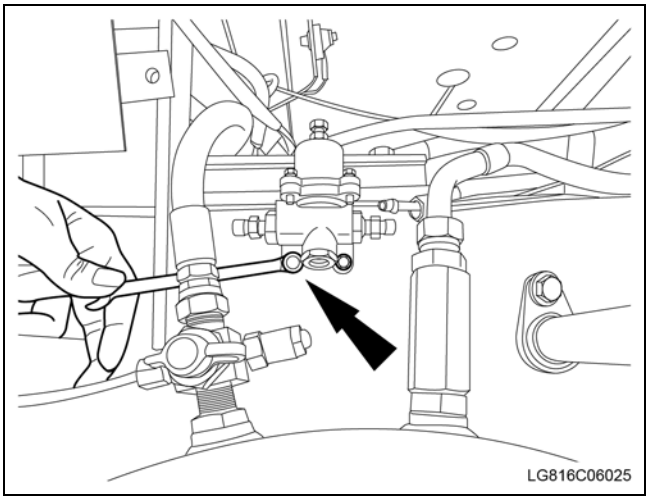
Removal

1. Remove the pressure regulator

(a) Remove the connecting air pipe on both sides of the pressure regulator with 16# open-end wrench.



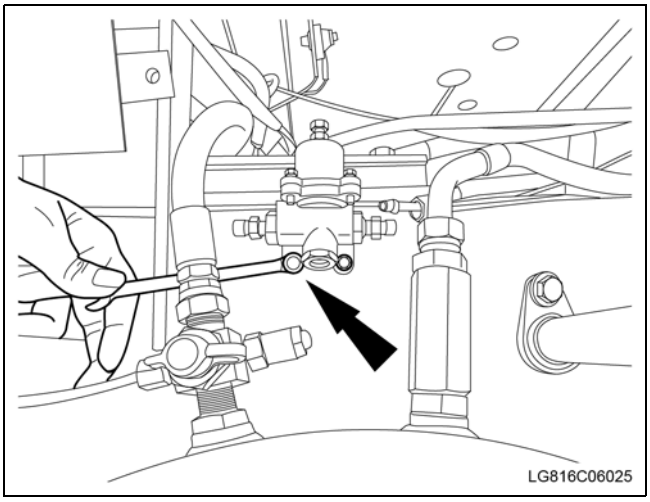
(b) Remove the pressure regulator with 10# open-end wrench.



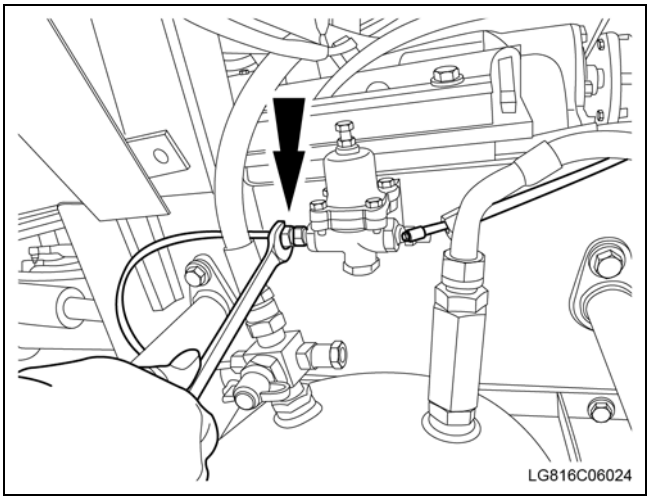
Installation

1. Install the pressure regulator

(a) Install the pressure regulator onto the correspondent position of rear frame with a bolt according to the figure, and tighten the bolt with 10# open-end wrench.



(b) Connect the nylon hose on the air reservoir with the front connector of pressure regulator, and connect the nylon hose connector with the rear connector of pressure regulator, and tighten the nuts of connectors with 16# wrench, and the nylon hose must not distort after being tightened.



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Air tank AS

Removal

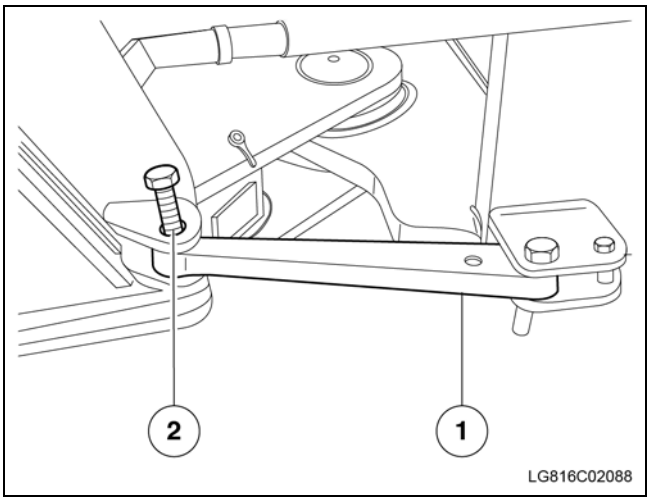
1. Park the machine and discharge the pressure of the machine

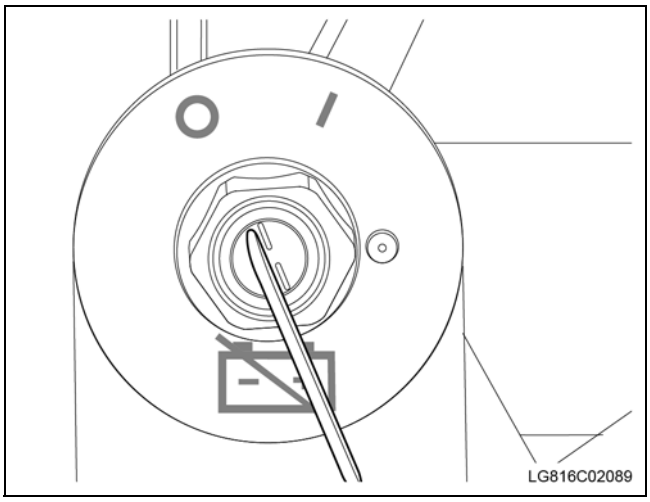
   (a) Park the machine on a flat ground, pull the parking brake to the up-most position. Dismantle the anti-rotating bumper (1)with a nipper plier, connect the bumper with the front and rear frames with its pin(2).

   (b) Push and pull the control rod forward and backward repeatedly to release the pressure in hydraulic system.

   (c) Step on the braking pedal for over 30 times to release the pressure in air piping.

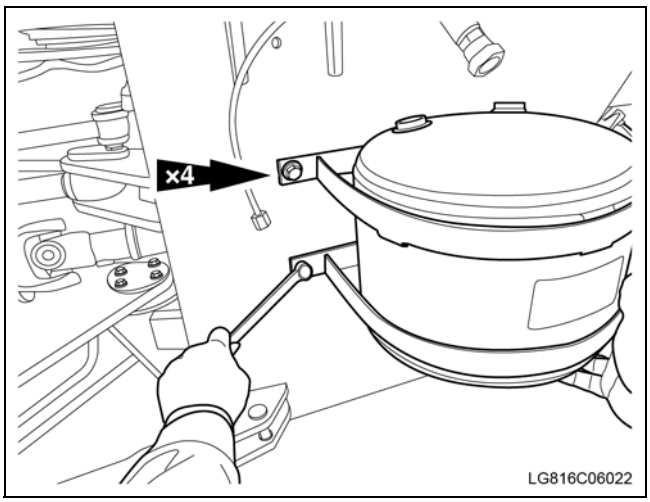
   (d) Open left cover door, set the negative switch to power off state.





2. Remove air tank

   Remove 4 bolts from air tank with 16# open-end wrench, and the air tank can be removed directly.

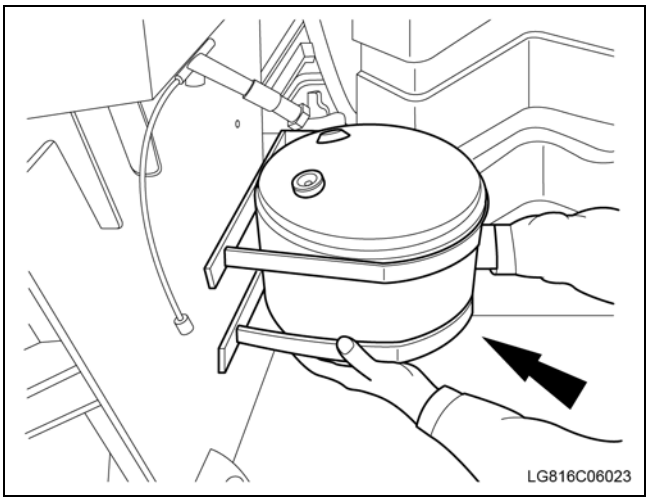


Installation

1. Install air tank

   Refer to the removal procedure, place the end face with two mounting holes upwards, and assemble the air tank onto the frame with 16# open-end wrench and bolts, tightening torque 52±7N•m.

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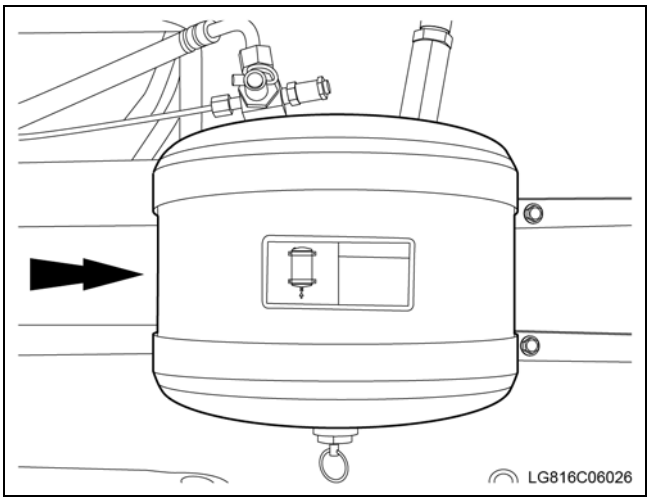


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BRAKE SYSTEM TROUBLESHOOTING

Check the precharge pressure of air tank

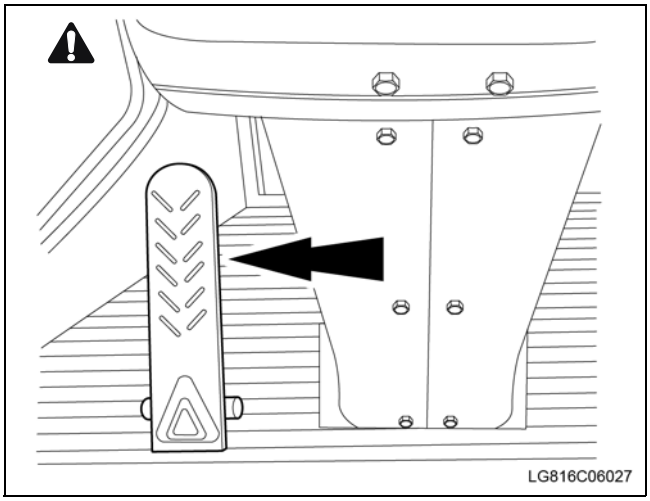
Brake system of the machine required by air tank is installed at left of rear frame and lower part of cab.



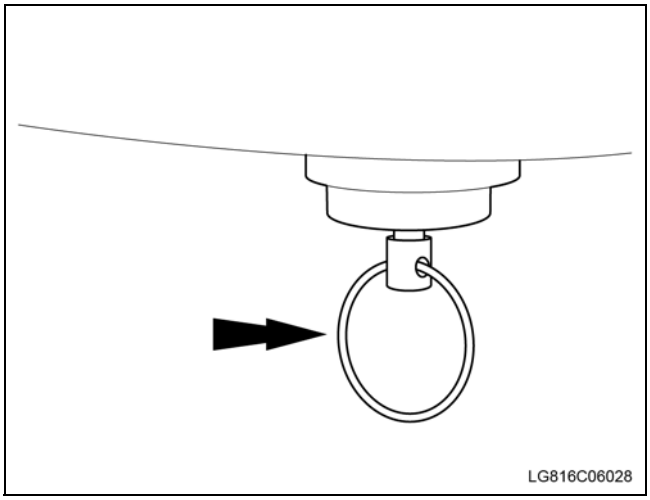
⚠ Note: check the precharge pressure of air tank according to the scheduled service to guarantee the normal operation of service brake system.

Special tool shall be used for checking the precharge pressure of air tank, and performed by the trained professionals.

1. Park the machine on a flat and open site with the bucket lied on the ground, gearbox control lever placed at neutral position and engine cut-out. And then turn the starting switch to first gear in clockwise, and then powered on.
2. Continue depress left/right brake pedal for 10 times, and drain the compressed air inside the air tank.



3. Slowly lift the drain link beneath the air tank, and drain the residual air and water from the tank.



⚠ WARNING

During the operation, do not splash the compressed air to any person for preventing of injuries.

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Charge the air tank

⚠ Note:

- If insufficient charging pressure for air tank, it shall supplement timely, otherwise it may influence the normal operation of the brake system.
- Special tool shall be used for checking the precharge pressure of air tank, and performed by the trained professionals.

1. Park the machine on an flat ground, and lay the bucket on the ground.
2. Push the gearbox control lever to middle position, and pull up the parking brake handle for applying parking brake.
3. Start the engine and depress the accelerator pedal, and this time the air compressor will charge the air tank while the readings of air pressure gauge in the cab will be approx. 0.78 MPa, which certify that the pressure in air tank is already enough and the charging work is finished.

Check the service brake

⚠ Note: before checking the performance of service brake, you shall inspect the performance of parking brake so as to guarantee the effects of parking safety and panic braking.

Drive the machine on a flat and dry road at 25 km/h speed. Depress the service brake pedal to park the machine completely. After the machine stopped, pull up the parking brake handle, and then release the service brake pedal. Braking distance shall not exceeding 9.56 m.

⚠ WARNING

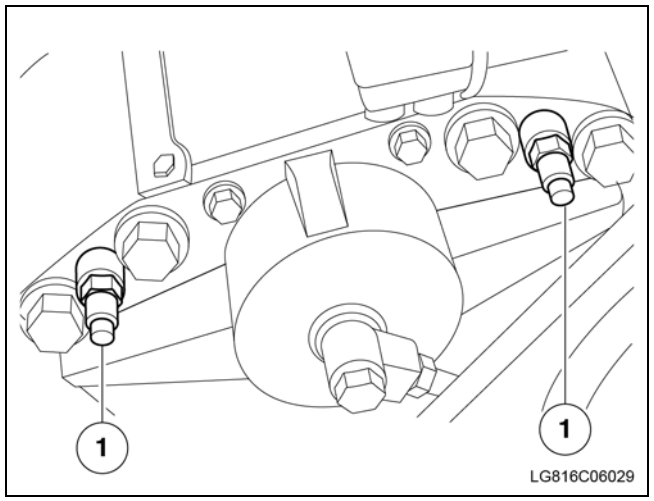
If the machine moves during inspection, it may cause personal injury.

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Exhaust of brake system

If gas existed in the hydraulic lines of brake system, this may influence the braking performance. Therefore, system exhaust shall be performed after service brake system. Specific operations are as follows:

1. Clear the sediment incrustation at hydraulic oil lines, liquid cup, deflating valve of brake system.
2. Fill up the liquid cup of front assistor with brake oil.
3. Start the engine and shut down until the readings of air pressure gauge is 0.71-0.78MPa.
4. Encase a transparent hose for air bleeding into deflating valve, and place the other end into the oil holder.
5. Release the deflating valve (1) of front axle for exhausting, and depress and hold the brake pedal after that pedal has been pressed for several times, until fluid column without air bubbles has discharged.



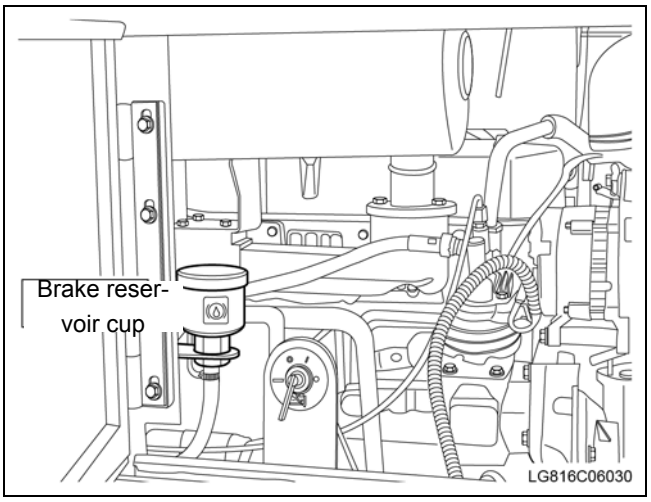
6. Release the brake pedal after tightened the deflating valve. During exhausting, the brake oil shall be supplemented to the liquid cup timely so as to avoid from the air entered the system again.
7. Add oils into the liquid cup at a specified level, and tighten the liquid cup cover of the front assistor.
8. Exhaust the gas from rear axle brake lines in the same operation. And also refill brake oil into the oil cup for supplement to prevent from the air entered the oil circuit system again.

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Refill brake fluid

If hydraulic service brake system of the machine is a single pipeline of brake system with gas-pushed-oil, four-wheel braking, the front/rear assistor respectively in the brake system. The assistor is divided into two chambers, first chamber is driving cylinder for containing compressed air. Another chamber is assistor main pump, and containing brake oil. The pressure of compressed air is converted to liquid pressure, and make the pressure build-up to achieve the function of assistance.

Brake oil in the service brake system will loss due to various reasons, therefore, inspection shall be performed in scheduled period, and add brake oil.



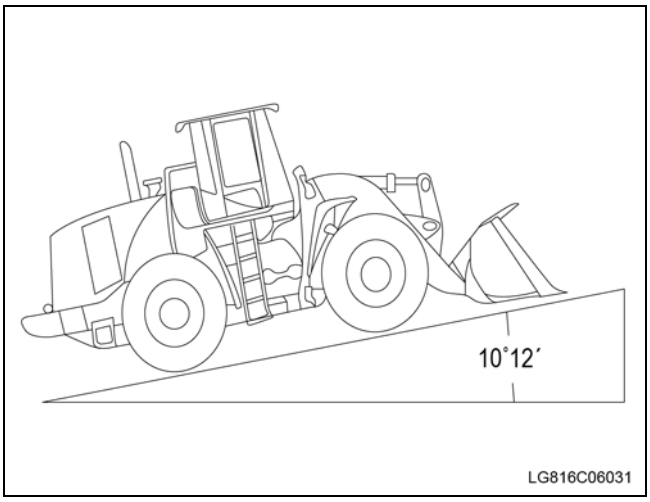
1. Place the machine on a flat ground, and clean the surroundings and outer surface of liquid cup and front assistor.
2. Carefully open the cover of liquid cup, and dust and impurity, etc. is not allow to drop in the cup.
3. Observe the brake oil level in the liquid cup, and the level shall be 15-20mm away from the oil filler; if not, please add brake oil.
4. Tighten well the cover of brake oil liquid cup.

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Check the performance of parking brake

⚠ Note: you shall frequently inspect the performance of parking brake so as to guarantee the effects of parking safety and panic braking.

1. Adjust the tire pressure of machine to the specified value, and flat the bucket to approx. 300mm from the ground. And confirm the machine having the performance of good service brake.
2. Start the engine, and drive the machine toward and on the 18% slope (10°12') and, the road surface shall be flat and dry.



3. Depress the service brake pedal, stop the machine and place the shift control lever to neutral position, and cut-out the engine.
4. Pull up the parking brake handle, and slowly release the service brake pedal and then check the machine will move or not.

⚠ WARNING

If car moving occurred in the inspection, it may cause personal injury or death.

Service of brake system

1. Frequently check the brake system for leaks, and all kinds of connectors, connections are secured without loosen.
2. Add compound brake oil into the oil chamber of front/rear assistor, and the height of liquid level is balanced with the oil cup strainer. Daily inspection, refill up timely when the liquid is insufficient.
3. Brake oil shall not be entrained with mineral oil. Otherwise it may damage the rubber components rapidly.

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Common troubleshooting for brake system

Due to the various reasons, we cannot list all of them, and only phenomena and possible causes for common failures will be listed. If any question during using our product, please contact service provider or dealer nearby.

⚠ Note: When removing the hose and connector, you shall confirm the residual pressure has totally eliminated from inside before operation.

Fault phenomenon (I): insufficient foot brake force

Possible cause 1: low brake pressure

Troubleshooting: check the gas tightness of air compressor, pressure regulator, safety valve, air bottle and pipelines.

Possible cause 2: clamp leaks

Troubleshooting: replace the broken sealing member from the clamp

Possible cause 3: gas existing in the hydraulic oil lines

Troubleshooting: exhaust the gas according to the previous stated method

Possible cause 4: worn or damaged sealing member cause air or oil leak

Troubleshooting: check and replace the worn or damaged sealing member from the assistor

Possible cause 5: clamp friction plate had been worn to the limit

Troubleshooting: check and replace the friction plate

Fault phenomenon (II): difficulty in gearshift

Possible cause 1: air brake valve failed

Troubleshooting: check the port of air brake valve having air-pressure or not after the air brake valve pedal released, and at this time, the outlet port of air brake valve shall have not air pressure. If there still some compressed air at outlet, then the stop bolt of air brake valve pedal shall be checked first, in order to make the pedal cannot returned. If there still some compressed air at outlet after eliminated this reason, then you shall check the return spring is not failed and the piston rod is stuck for further.

Possible cause 2: after the hand brake assembly lowered down, it still has compressed air entered the gearshift control valve.

Troubleshooting: check the emergency brake valve is not failed.

Possible cause 3: gearshift control valve failed

Troubleshooting: check the gearshift control valve

Fault phenomenon (III): brake cannot be released normally

Possible cause 1: air brake valve failed

Troubleshooting: check the air brake valve

Possible cause 2: assistor malfunction

Troubleshooting: check the assistor piston is not stuck or return spring is not failed

Possible cause 3: slave cylinder piston on the clamp cannot return

Troubleshooting: if brake fluid is polluted, then replace the brake oil; if the rectangular seal is broken, then replace that seal.

Fault phenomenon (IV): pressure of air tank drop rapidly after parking

Possible cause 1: pipe fittings loose or pipeline ruptured

Troubleshooting: tighten the connector or replace the pipe.

Possible cause 2: intake valve of brake valve is blocked by dirts or damaged

Troubleshooting: braking for some times to blow the dirts off or replace the brake valve

Fault phenomenon (V): pressure ascent slowly of air pressure gage

Possible cause 1: gas leaks

Troubleshooting: check the gas tightness of air compressor, pressure regulator, air reservoir, connectors and pipelines.

Possible cause 2: air compressor out of work

Troubleshooting: check the working conditions of air compressor.

Possible cause 3: intake valve of brake valve or drum is not sealed

Troubleshooting: check or replace the air brake valve.

Fault phenomenon (VI): insufficient emergency and parking brake force

Possible cause 1: too large clearance between the brake drum and friction drum.

Troubleshooting: re-adjust the clearance or replace the friction plate according to the operating requirements

Possible cause 2: oil existing on the friction plate

Troubleshooting: clean and wash the friction plate

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6.2.1 Safety valve

Function:

The safety valve is applicable to air brake system to protect the inflation pressure in the air brake pipeline from exceeding 900kPa.

Working principle:

Compressed air enters the valve through air inlet. When the inflation pressure reaches 850~900kPa, the safety valve opens to release air to protect the air brake pipeline.

Technical parameters:

1. Rated working pressure: 1000kPa;
2. Opening pressure: 850~900kPa;
3. Operating temperature: -30~+80 ℃ .

Installation connection size:

1. Mounting size: Z1/4″;
2. Connection size: Air inlet Z1/4"
3. Outline dimensions: S19×50

Correct use and maintenance methods

1. Precautions for use

1) Before installation, remove the protection plug of the air inlet;

2) The nuts on the safety valve assembly are adjusted before leaving factory; users are not allowed to adjust or remove without authorization.

2. Cautions for maintenance

1) When the safety valve assembly leaks air seriously, replace the wear parts immediately;

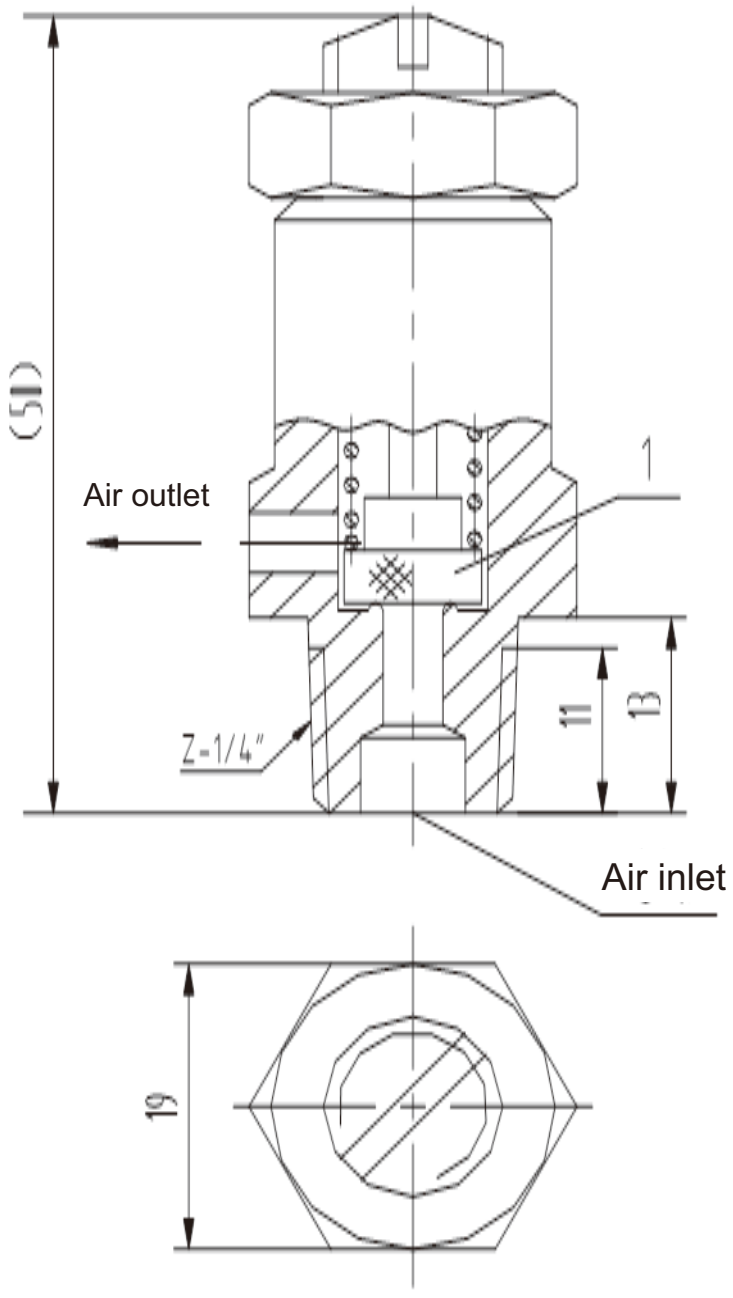
2) When replacing quick-wear parts, the corresponding damaged fastening nuts must be replaced. Ensure the nuts are installed in place and fixed firmly and do not damage other parts. After replacement, it shall not work until passing test.

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Common fault, fault analysis and troubleshooting

S/N	Common faults	Fault analysis	Trouble shooting
1	Outlet air leakage	The safety valve stem assembly is damaged	Replace the safety valve stem assembly

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1- Safety valve rod assembly

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6.2.2 Inflation valve

Function:

This product is used mainly for inflating the tyres of construction trucks.

Working principle

The air inlet end of the product is connected with the air reservoir through pipeline; the air outlet has no air out;

When the tyre needs to be inflated, connect the air outlet of the product directly to the tyre inflation connector; when the air outlet is disconnected from the tyre inflation connector, the inflation stops.

Major technical parameters

1. Rated working pressure: 784kPa;
2. Operating temperature: -30~+80 ℃ ;
3. Weight: 0.11kg

Key connection size

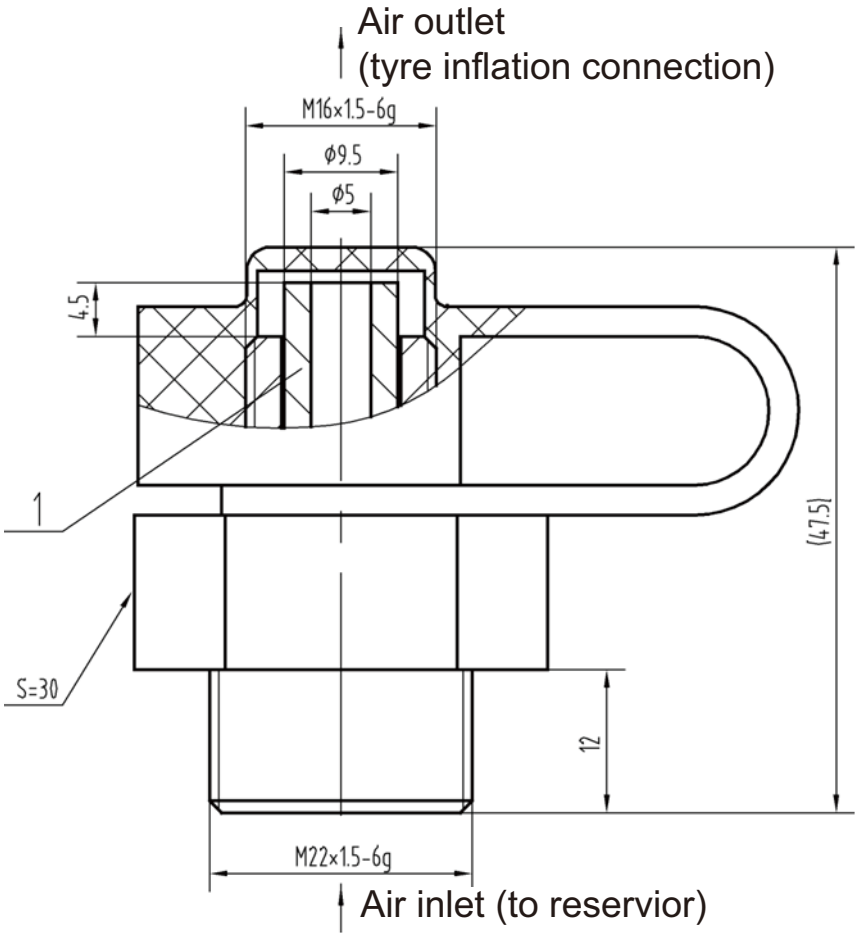
1. Connection size: Air inlet M22×1.5; Air outlet M16×1.5
2. Outline dimensions: S30×（47.5）

Correct use and maintenance methods:

1. Ensure the air in the brake pipeline is clean and dry.

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2. When not inflating, protect the air outlet of the product by rubber plug



6.2.3 Pressure regulator

Function:

The pressure regulating valve is used for adjusting the pressure in the air circuit. When the pressure of air reservoir is higher than the regulated pressure, the pressure regulating valve opens automatically to remove load from the air compressor.

Working principle:

The compressed air from the air reservoir reaches below the diaphragm b through air inlet. When the pressure reaches the regulation value, the pressure will overcome the pressure of spring a, push the diaphragm to move upward and open the valve c. The pressure below the diaphragm b enters the air compressor through the small hole in the middle of the pull rod and the air outlet, and opens the pressure relief device to remove load from the air compressor. Then, the air compressor is operating at no load, and will not inflate the air reservoir. If the pressure in the air reservoir decreases due to braking action, the pressure below the diaphragm fails to overcome the force of spring, the diaphragm moves downward and the valve c closes; the valve body and valve c open at the same time to release the pressure at the air outlet 2 end

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and the air supply state of air compressor recovers.

Technical parameters:

1. Rated working pressure: 784kPa;
2. Operating temperature: -30~+80 ℃ ;
3. Opening pressure: 800~850kPa;
4. Closing pressure: 680~720kPa.

Installation connection size:

1. Mounting size: 2-φ7;
2. Connection size: Air inlet and outlet 2-Z1/8”;
3. Outline dimensions: 66×74×112

Correct use and maintenance methods:

1. Precautions for use

1) Before installation, remove the protection plugs from the air inlet and outlet;

2) The bolts and nuts on the pressure regulating valve are adjusted before leaving factory; users are not allowed to adjust or remove without authorization.

2. Cautions for maintenance

1) Replace the quick-wear parts if the pressure regulating valve leaks seriously;

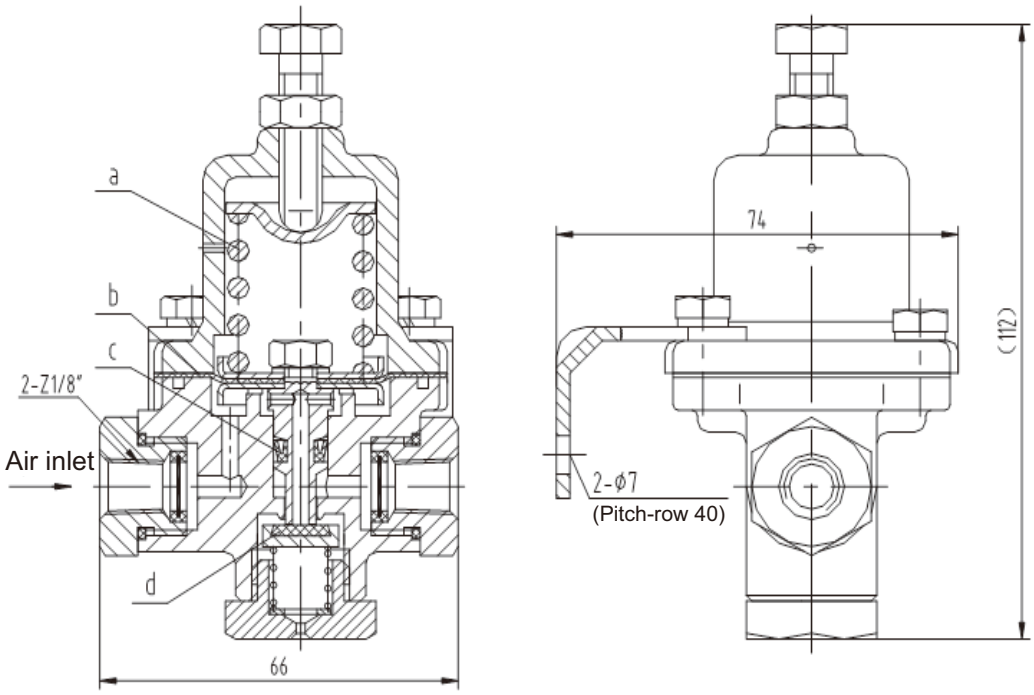
2) When replacing quick-wear parts, the corresponding damaged fastening bolts and nuts must be replaced. Ensure the bolts and nuts are installed in place and fixed firmly and do not damage other parts. After replacement, it shall not work until passing test.

Common fault, fault analysis and troubleshooting

S/N	Common faults	Fault analysis	Trouble shooting
1	Regulator valve leaks	The diaphragm is damaged	Replace the diaphragm
		The sealing ring is damaged	Replace the seal ring

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Figure:



6.2.4 One-way valve

Function:

The check valve is applicable to the air brake system of construction trucks and automobiles, to control the one-way flow of pressure without returning.

Working principle:

The compressed air comes out of the air outlet from the air inlet through check valve a. When the pressure of the air inlet decreases, the spring b will close check valve a to disenable the pressure of air outlet to return.

Technical parameters:

1. Rated working pressure: 784kPa;
2. Working temperature: -30~+80 ℃

Installation connection size:

1. Mounting size: 2-M22×1.5;
2. Connection size: Air inlet M22×1.5;
3. Outline dimensions: S32×72.

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Correct use and maintenance methods:

1. Precautions for use

1) Before installation, remove the protection plugs from the air inlet and outlet;

2) The check valve is proved qualified before leaving factory; users are not allowed to remove without authorization.

2. Cautions for maintenance

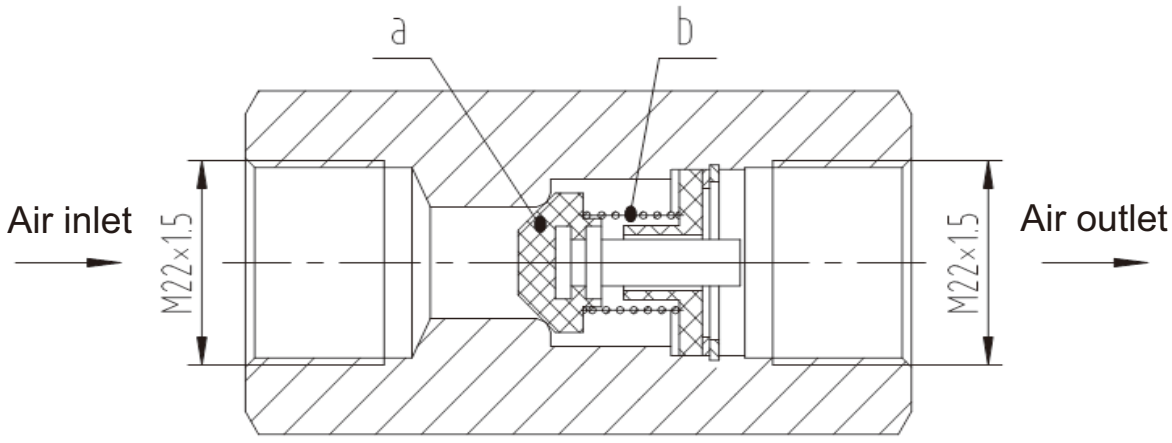
1) Replace the quick-wear parts if the check valve leaks seriously;

2) When replacing wear parts, replace corresponding the damaged fasten circlip must be replaced, and ensure it is installed in place and fixed firmly; do not damage other parts. After replacement, it shall not work until passing test.

Common fault, fault analysis and troubleshooting

S/N	Common faults	Fault analysis	Trouble shooting
1	Check valve leaks	Check valve assembly damaged	Replace one-way valve assembly

Figure:



a- One-way valve as,b- Spring

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6.2.5 Air brake valve

Function:

This product is applicable to single-circuit air brake system of all engineering trucks; it is the main device of foot-controlled brake.

Working principle:

When the driver steps down the brake pedal 2, apply force to balance spring 4 through top rod 3 to push the piston 6 move downward; open the air inlet valve 7, and the compressed air transmits to air outlet from air inlet. When releasing pedal 2, the return spring 5 pushes the piston 6 to move upward; air inlet valve 7 returns to close the gallery between the air inlet and air outlet, the compressed air of the air outlet is exhausted via the vent.

Major technical parameters:

1. Rated working pressure: 784kPa
2. Working temperature: -30~+80 ℃
3. Working medium: Air

Mounting and connecting size:

1. Connecting thread 3-M22×1.5
2. Mounting size 4-φ9

Correct use and maintenance methods:

1. Precautions for use

1) Before installation, remove the protection plugs of each air inlet and air outlet. Ensure the pedal is firmly connected with the valve body, adjusting bolts shall adjust the valve clearance well (ensure the roller can be rotated manually), and tighten nuts.

The M8 bolts are connected firmly through 4-φ9 hole.

When connecting pipelines, distinguish the air inlets and air outlets well. The one with "1" on the connection is the air inlet; with "2" on the connection is the air outlet; with "3" on the connection is the air vent.

2. Cautions for maintenance

1) The pipelines and air reservoirs of the air brake system shall be subject to rust prevention treatment, and keep clean.

1) There shall be draining and filtering device. Drain off water in the air reservoir regularly to ensure the air source is clean.

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2) Leave enough space to ensure the pedals to move smoothly.

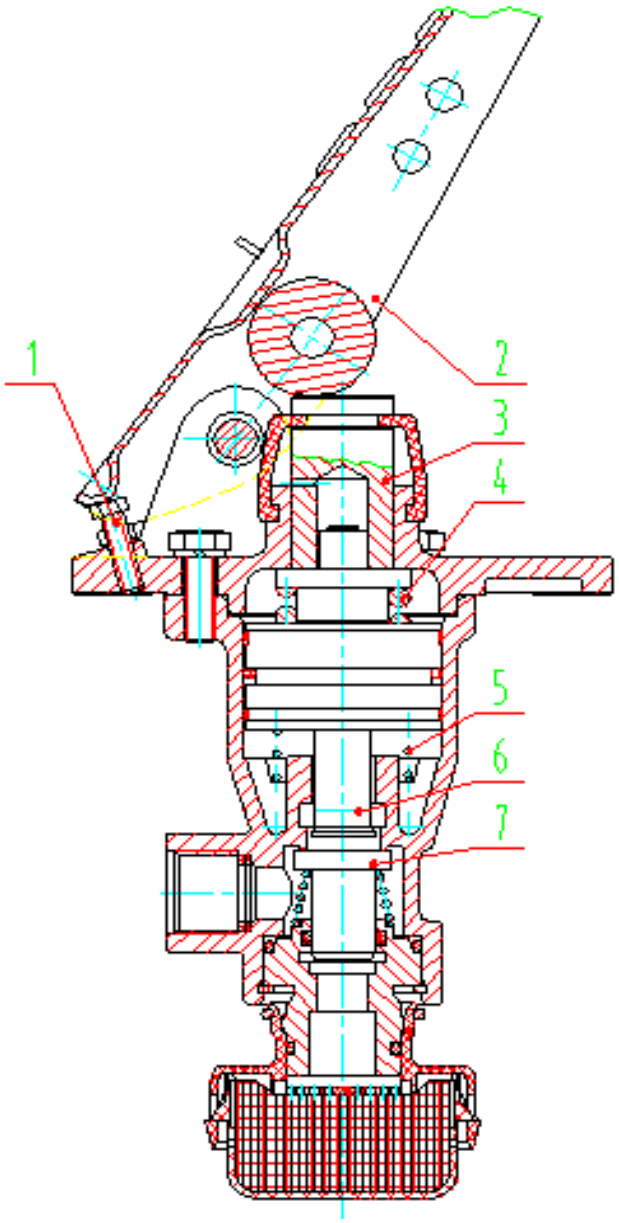
3) When replacing wear parts, replace corresponding parts according to the wear part in kind. The damaged fasteners (circlips and bolts) during replacement must be replaced, and ensure the installation is in place, firm and reliable. Do not damage other parts. After replacement, it shall not work until passing test.

The moving part of the air brake valve shall be maintained by grease. If the brake fails or is slow, check the brake system and the wear parts of the air brake valve.

See fault, fault analysis and elimination methods:

Common faults	Fault analysis	Trouble shooting
Non-working condition air leakage	The surface of valve has foreign matters or the rubber part is damaged	Steps of cleaning or replacing valve: 1 Unscrew the dust cover; 2 Remove the circlip by internal circlip pliers. When removing the circlip, press the exhaust valve by hand to prevent the spring from ejecting the exhaust valve and causing personal injury; 3 Remove the parts successively; 4 Wipe the parts clean; 5 Apply moderate amount of grease to rubber ring; 6 Install the parts according to the order of removal; if parts are damaged, replace the corresponding parts.
Working condition air leakage	The surface of valve has foreign matters or the rubber part is damaged	Clear the foreign matters on the working surface of the valve or replace wear parts
Exhaust unsmooth	There are foreign matters in the valve body and the piston moving is obstructed	Clean the parts
	Pedal roller and the push rod are not adjusted well	Re-adjust the screws to make the roller on the pedal just in contact with the push rod. (the roller can be rotated by hand)

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1. Screw
2. Pedal
3. Push rod
4. Balance spring
5. Return spring
6. Piston
7. Intet valve

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7 Cab and Covering Parts

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CAB STRUCTURAL FRAME （CSF）

⚠ WARNING

The cab structural frame (CSF) is a special safety component of your machine.

DO NOT attach any device to the CSF for pulling purpose.

The CSF is a certified structural support and any damage, fire, corrosion or modification will weaken the structure and reduce your protection. If this occurs, the CSF MUST be replaced so that it will provide the same protection as a new CSF.

After an accident, fire or rollover, the following MUST be performed before returning the machine to field or job site operation.

- **The CSF structure MUST be replaced.**
- **The CSF mounting or suspension, operator seat and suspension, seat belts and mounting components and wiring within the operator's protective system MUST be carefully inspected for damage.**
- **All damaged parts MUST be replaced.**

DO NOT WELD,ATTEMP TO STRAIGHTEN OR REPAIR THE CAB STRUCTURAL FRAME.

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CAB(CSF) Service & INSPECTION

After every 500 hours of operation or every six months, whichever comes first, do the following:

1. **Check the torque on the CSF cab mounting bolts; torque should be 360 to 460 N•m. If necessary, tighten the bolts to correct torque.**
2. **Check that seat belt mounting hardware is tight and seat belt(If have) is not cut or frayed. Check the torque on operators seat mounting bolts;torque should be 125 to 165N•m.If necessary,tighten the bolts to the correct torque.Replace parts that are worn or damaged.**

DO NOT INSTALL ATTACHMENTS THAT WILL MAKE THE TOTAL WEIGHT OF THE MACHINE MORE THAN THE WEIGHT SHOWN IN THE MAXIMUM GROSS VEHICLE WEIGHT.

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Removal and Installation of CSF CAB Components

Tool list

Name	Specification(Qty.)
Open-end wrench	10#、 13#、 16#、 17#、 18#、 24#
Cross screwdriver	---
Screwdriver	---
Box cutter	---
Nipper plier	---
Scissor	---
Drilling rig (pilot)	---
Special installation tool for seal	---
⚠ **Remark: removed standard parts should be placed with relevant material together to avoid mixing.**	

⚠ **"Front" mentioned in this chapter refers to the forward direction after starting the machine; other directions are by this analogy.**

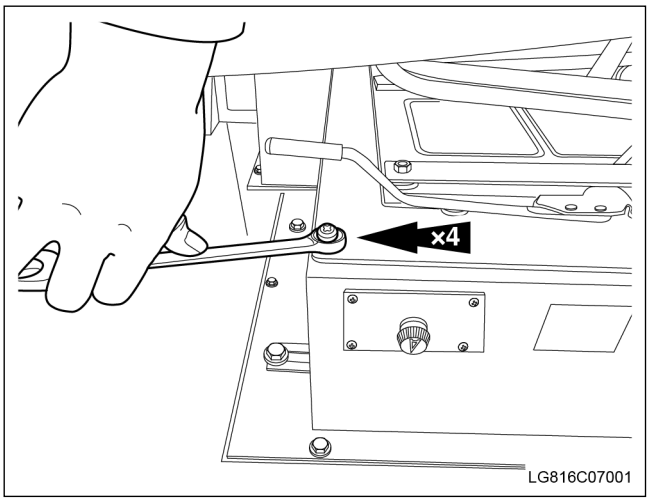
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Driver seat

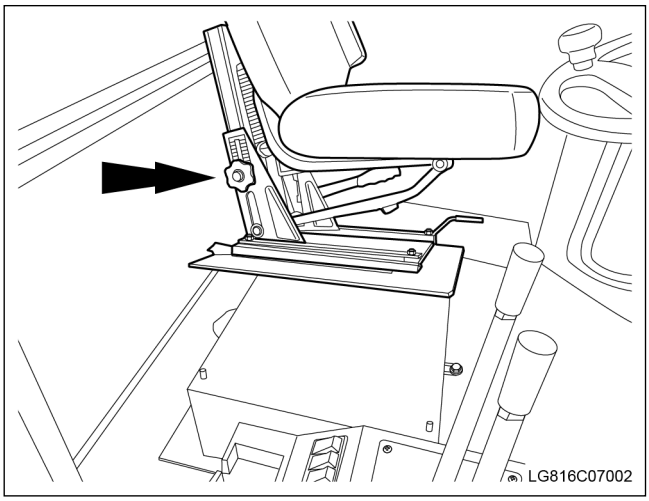
Removal

1. Remove the mounting bolt

(a) Remove 4 mounting nuts of driver seat with 17# wrench.

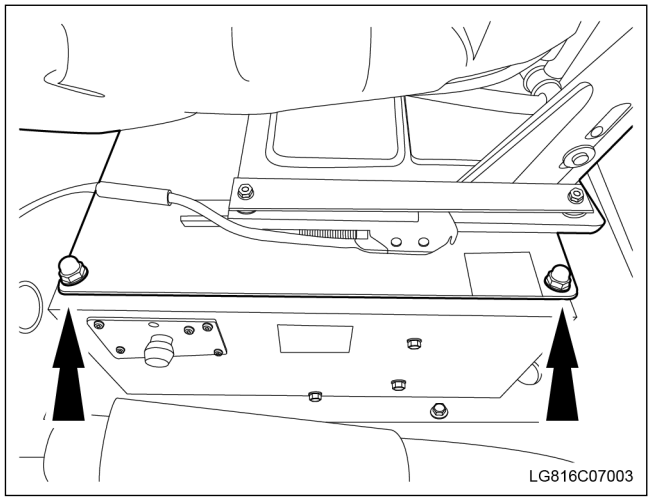


(b) Take the seat to a flat place, and place it properly for repair or replacement.



Installation

1. Take the seat above the heater, install the seat onto the heater with self-provided nuts after aligning the mounting holes, keep the seat facing ahead, tighten nuts with 17# wrench with the tightening torque of 52±7N•m.



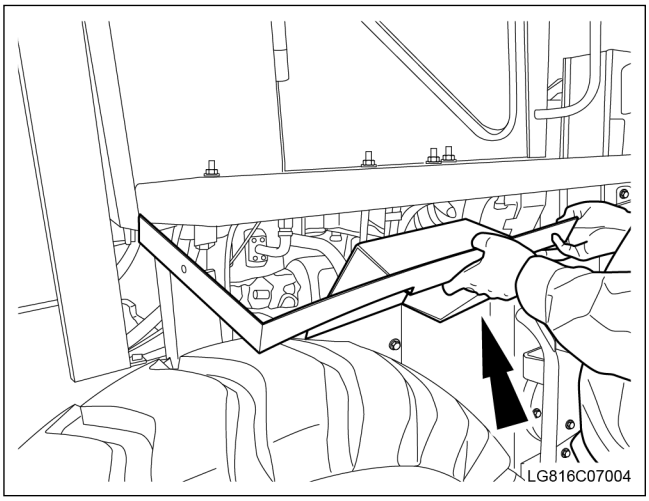
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Heater AS

Removal

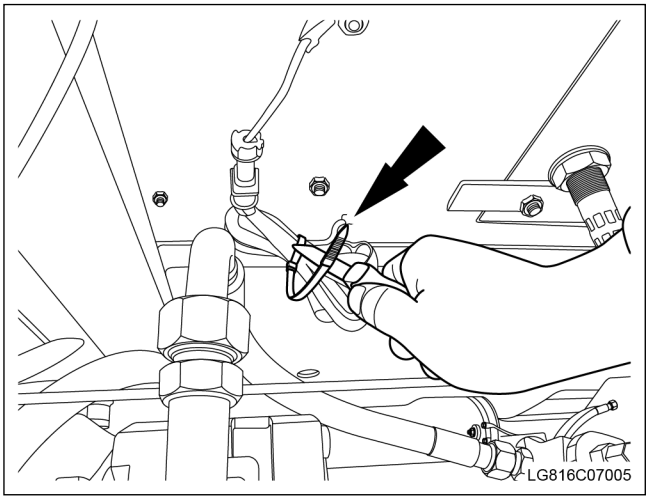
1. Remove the rear plate-rh

Remove the mounting bolt of rear plate-rh with 13# wrench, and take down the rear plate-rh.

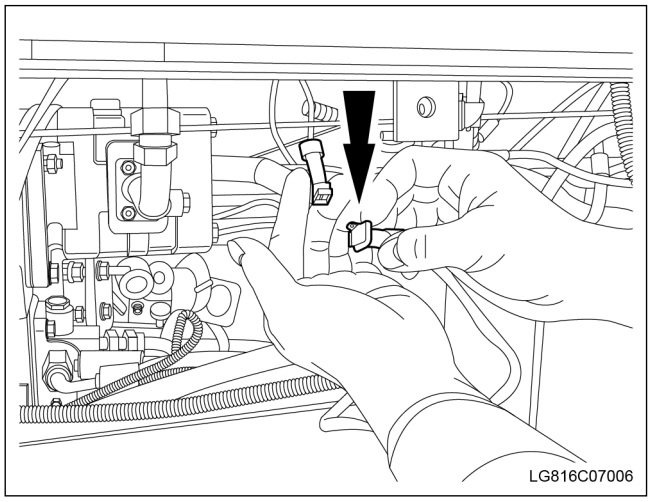


2. Remove the heater harness

(a) Cut off the heater harness strap below the cab with scissors or pliers.



(b) Unplug the harness connector, and sort the harness.

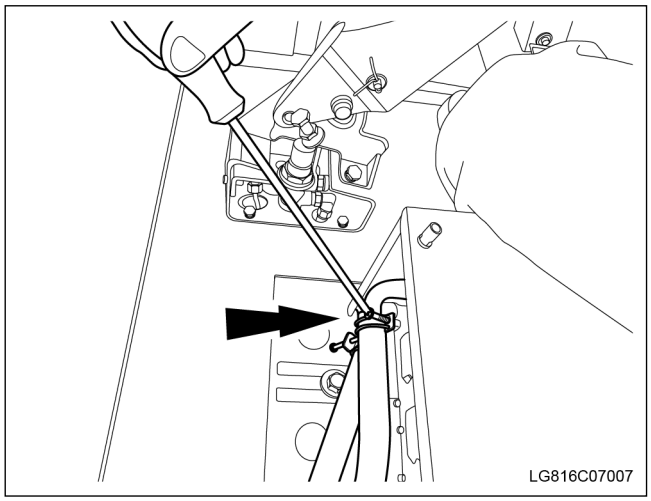


3. Remove driver seat

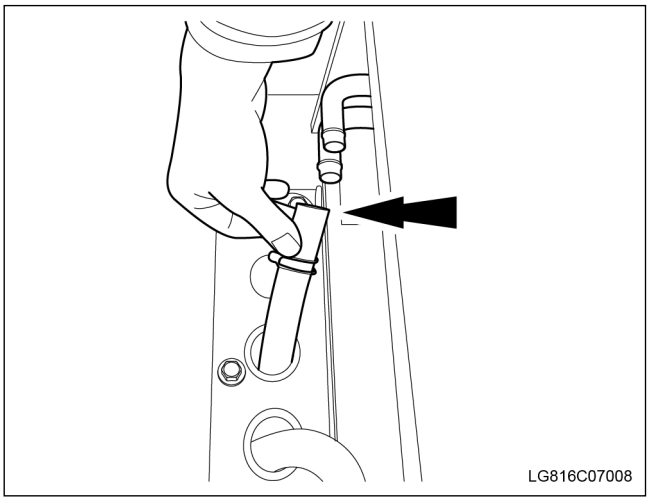
Refer to the“Driver seat”(p. 7-5) removal steps and remove the seat.

4. Remove the water pipe of the warm air blower

Loosen the clamp screws of heater water intake pipe and water outtake pipes with cross-screw-driver, and take down the water pipes.

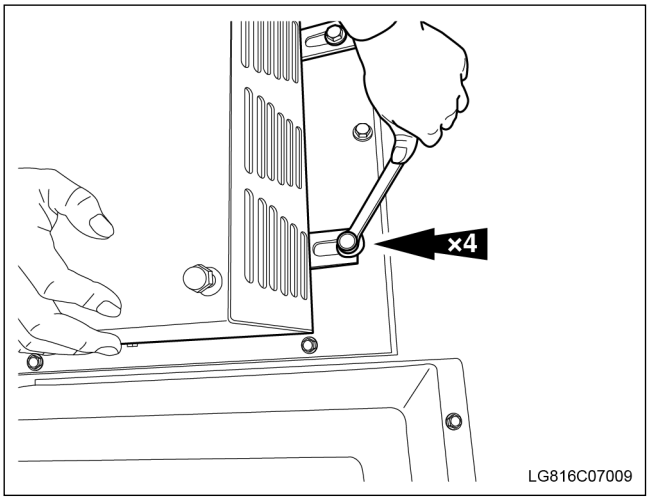


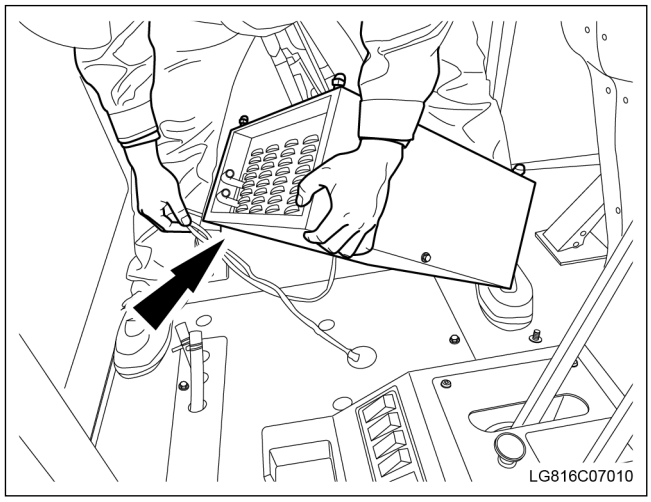
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5. Remove the heater

Remove 4 mounting bolts of heater with 16# wrench, and take the heater to a flat place for repair or replacement.

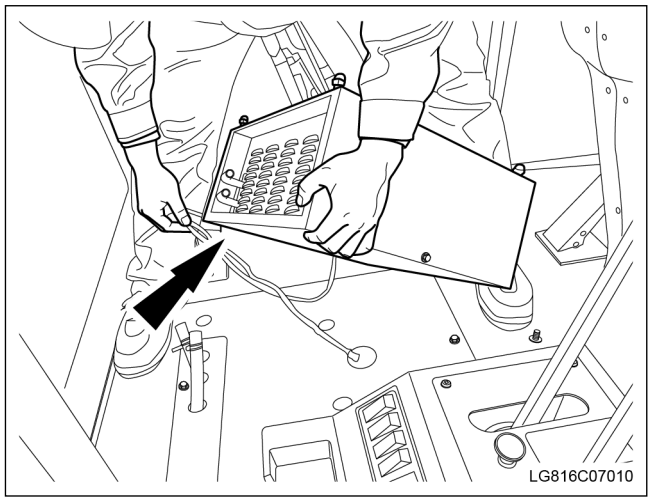




Installation

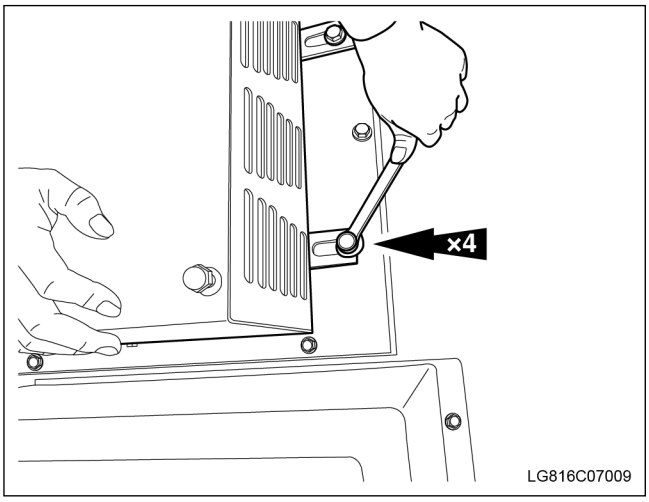
1. Install heater

(a) Take the heater to the cab installation position, penetrate the harness connector through the hole on floor, lay flat the heater on the cab floor, fix with removed bolts after align the mounting holes, and the connectors of heater water intake pipe and water outtake pipe is on the back.



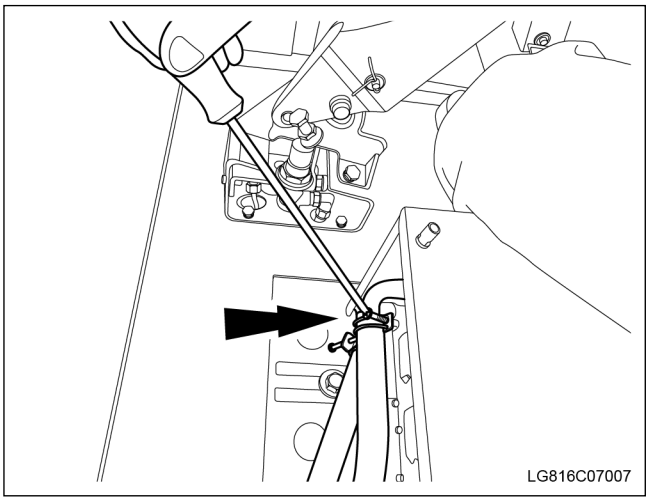
(b) Tighten bolt with a #16 wrench. Tightening torque to 52±7N•m.

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2. Connect the water pipes

Connect the heater water pipes to the connectors at the heater back, connect the lower connector to the water intake pipe and the upper connector to the water return pipe, and tighten the fastening screws of water pipe clamp with cross-screwdriver.

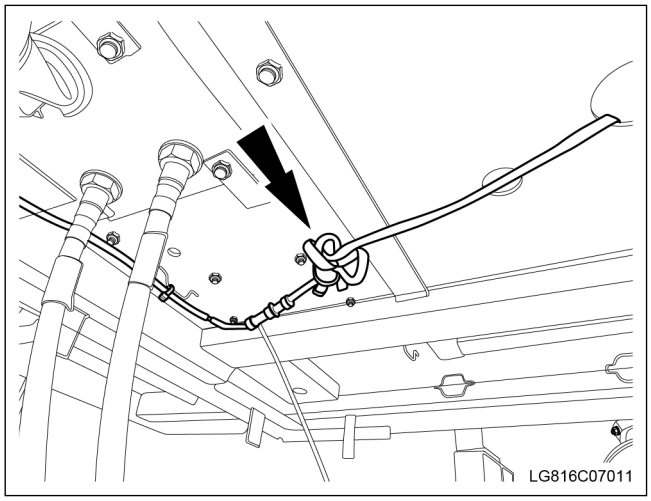


3. Install driver seat

Refer to “Driver seat”(p. 7-5)assembly, and install the driver seat into the cab.

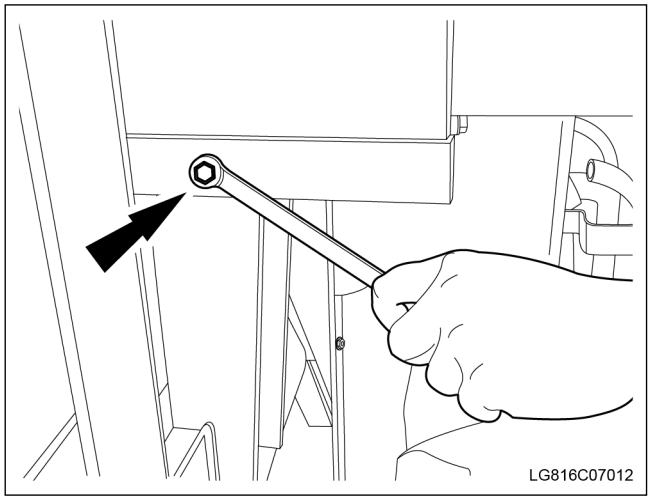
4. Connect harness

Connect the heater harness connector with the corresponding connector of cab harness, tie up the harness tidily onto the round steel below the cab floor with strap, and cut off the excess strap.



5. Install plate

install the rear plate-rh onto the cab with bolts, tighten bolts with 13# wrench with the tightening torque of 26±4N•m.



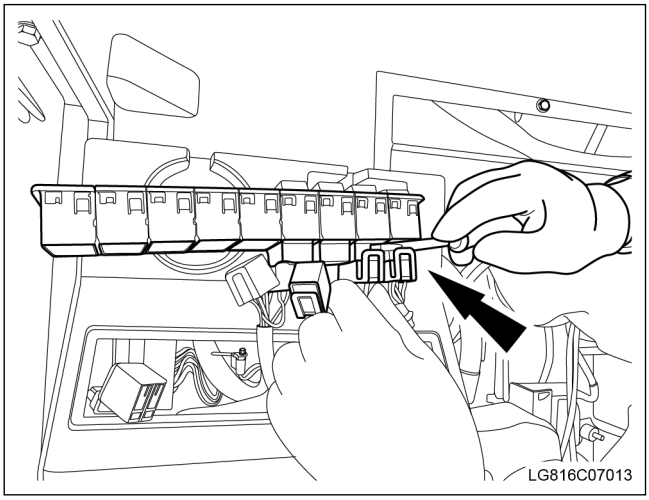
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Operation box

Removal

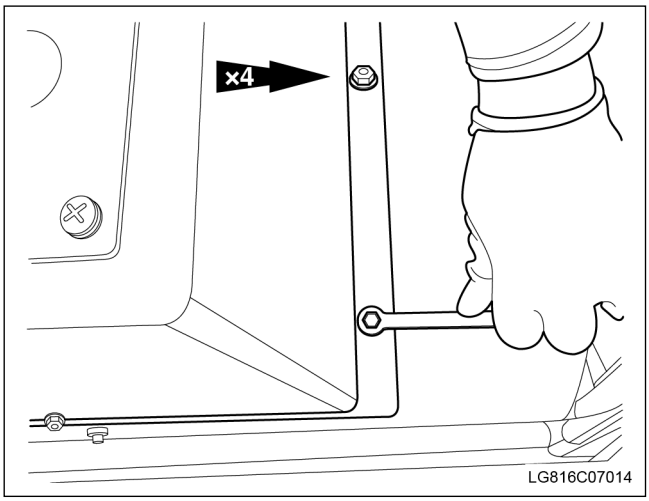
1. Remove switch

Turn off the machine, cut off all power, pry out the switch with screwdriver, and pull out the harness connector.



2. Remove operation box

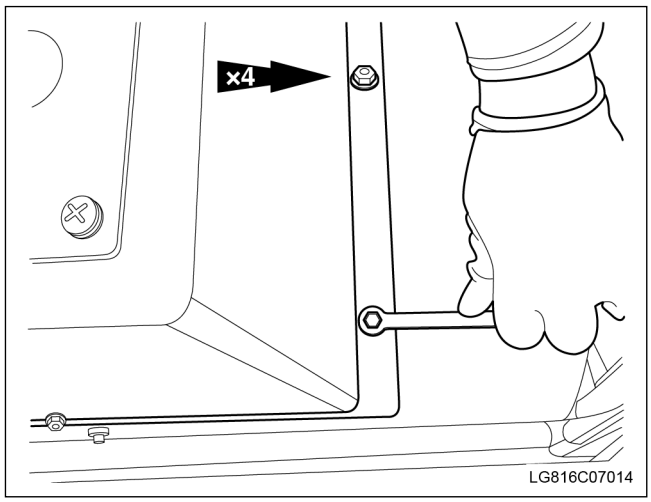
Remove 4 mounting bolts of control box with 10# wrench, and take down the control box for repair or replacement.



Installation

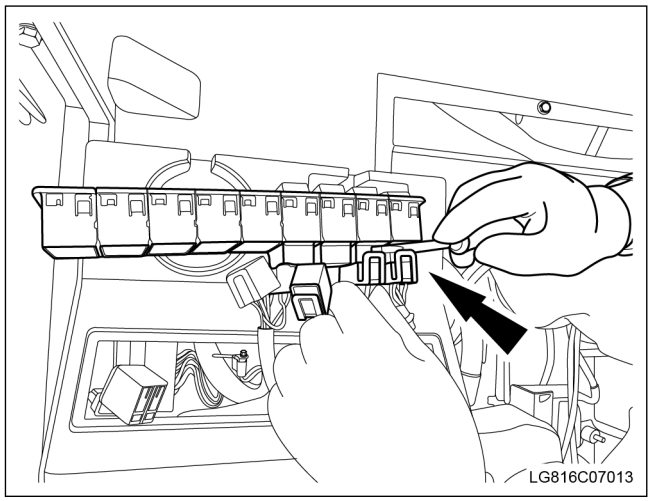
1. Install operation box

Fix the control box to the cab floor with removed bolts, tighten with 10# wrench with the tightening torque of 10.5±1.5 N•m.



2. Install switch

Connect the harness connector of combination switch, and install the switch onto the control box.



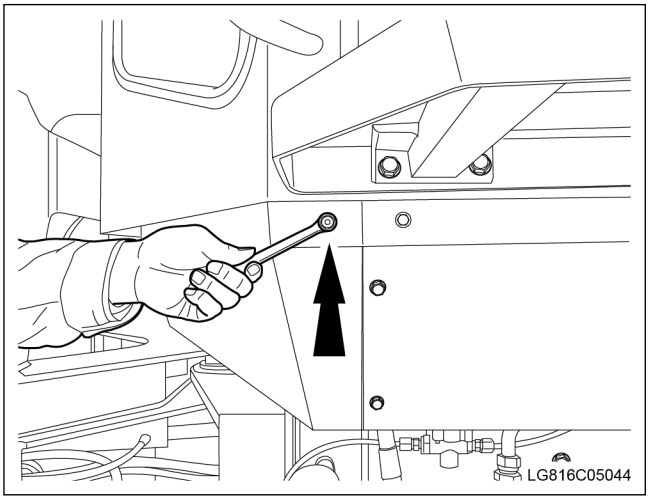
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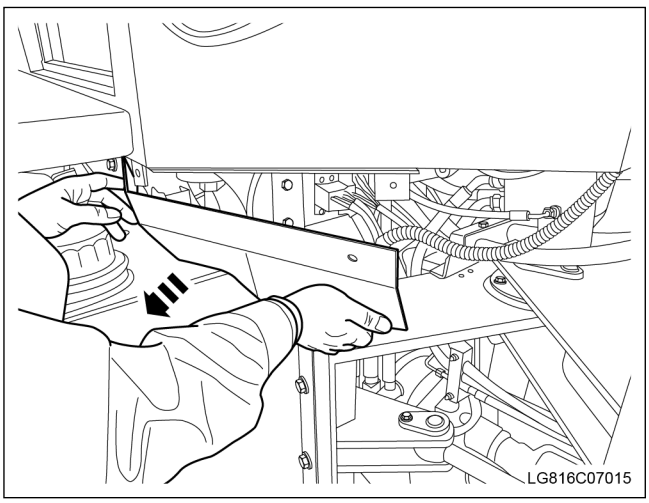
Steering gear box

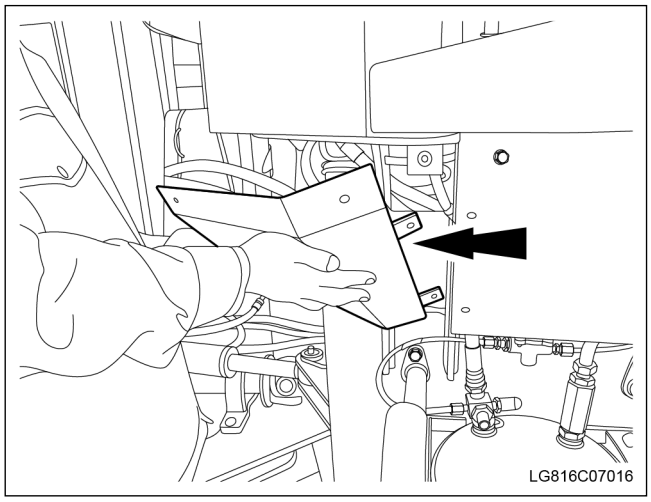
Removal

1. Removal of front plate

Remove the mounting bolts of front plate-lh and front plate-rh with 13# wrench, and take down the front plate-lh and front plate-rh.

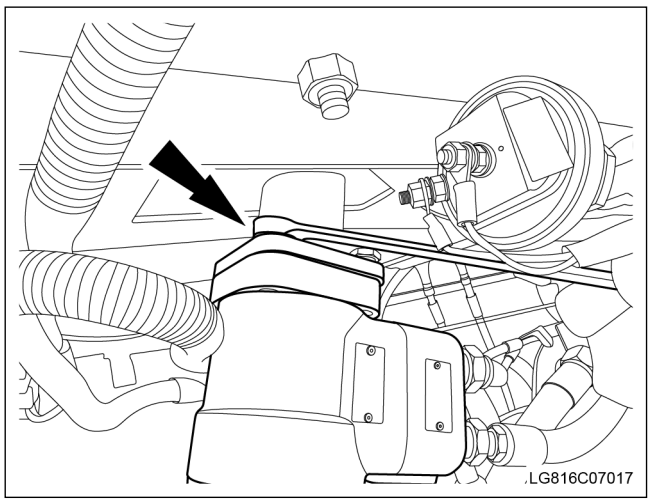






2. Remove steering gear

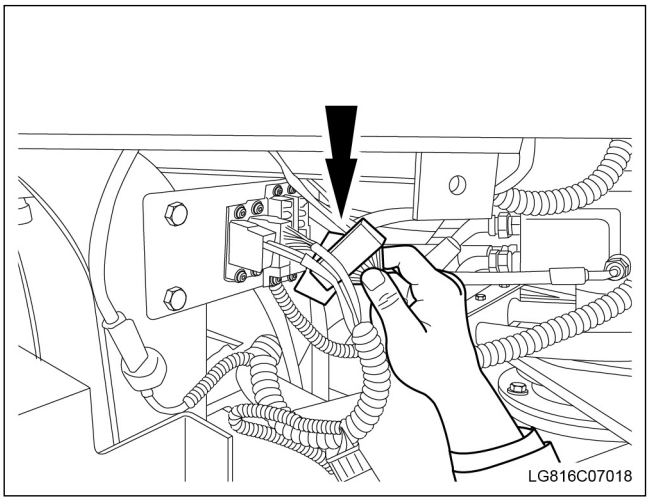
Remove 4 bolts connecting steering gear box from the steering gear with a #16 wrench, Remove the steering gear, place it on the frame.



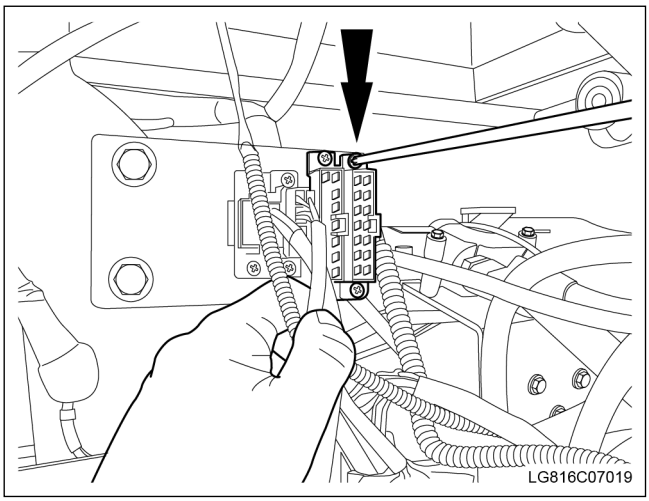
3. Remove the harness

(a) Unplug the harness connector connected with the front of connector mounting plate.

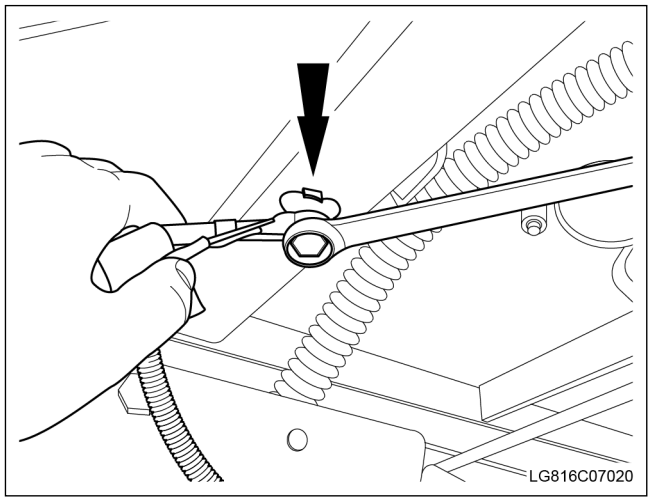
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(b) Remove the steering gear box harness socket installed on the connector mounting plate with cross-screwdriver.

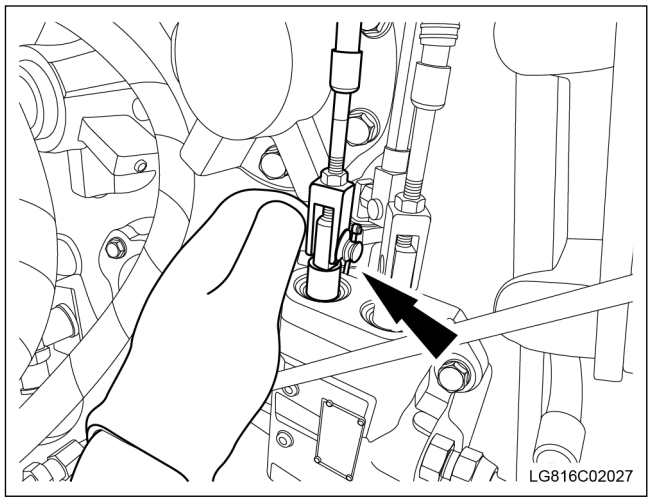


(c) Remove the steering harness earthing cable connector connected with the cab floor with 16# wrench.



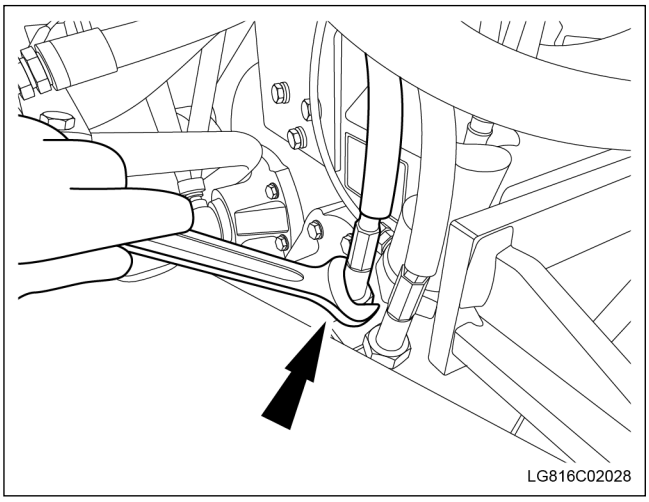
4. Remove transmission flexible control shaft

(a) Remove the connecting pin to the two push-pull flexible shafts and the transmission control valve rod.



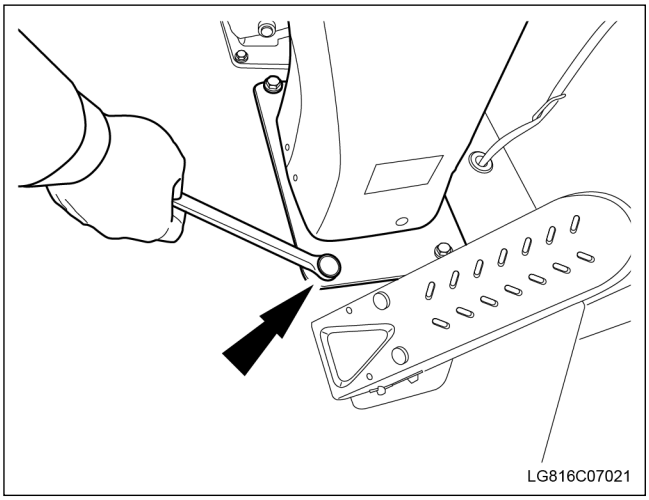
(b) Remove the 2 soft shaft fixing nuts with a #24wrench, remove flexible shaft.

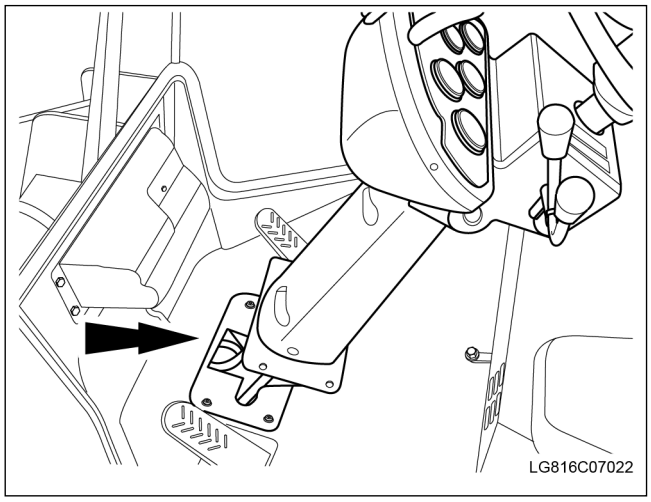
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5. Remove steering gear box

Remove the steering gear box mounting bolts on the cab floor with 18# wrench, and take down the steering gear box for repair or replacement.

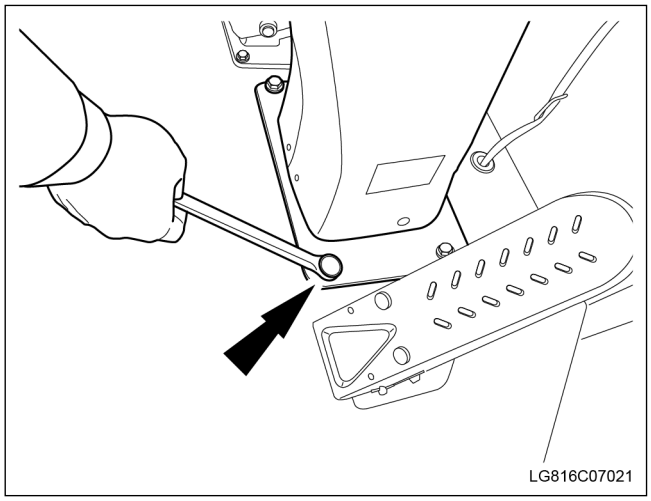




Installation

1. Install steering gear box

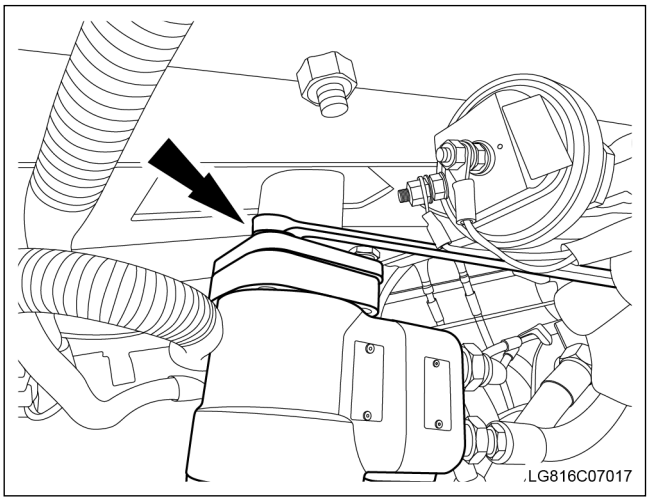
Fix the steering gear box to the cab floor with removed bolts, tighten with 18# wrench with the tightening torque of 90±12 N•m.



2. Install steering gear box

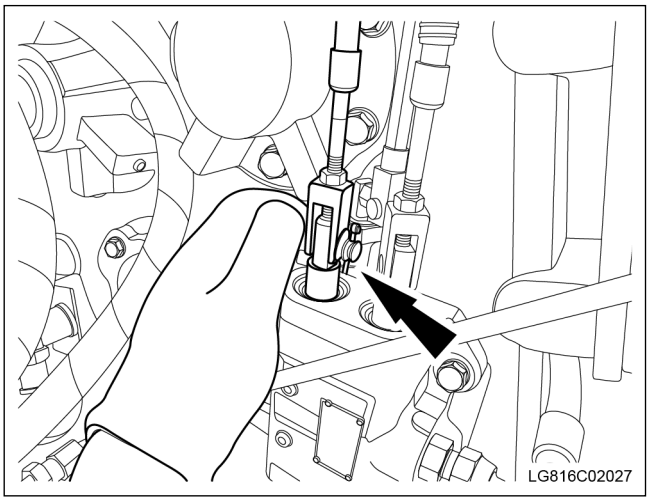
Lift up the steering gear to reach the interface at lower part of steering gear box, and rotate steering wheel position until inner slot lines up, then push steering gear upward and connect with steering gear box. And install 4 mounting bolts and tighten them with 16# wrench, tightening torque 52±7N•m.

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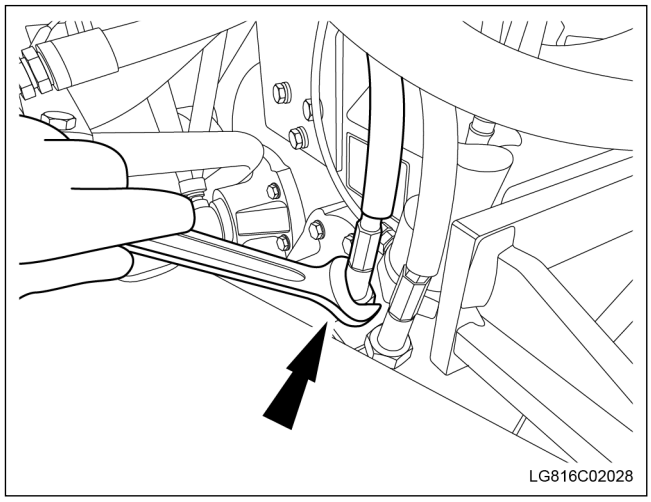


3. Install transmission control flexible shaft

(a) Connect the shift control flexible shaft to the shift control valve rod by round shoulder pin, install washer and pin on the end of round shoulder pin, bend the pin with needle nose pliers, and adjust gear positions to keep the shift control lever upright in N position and flexible without seizing.

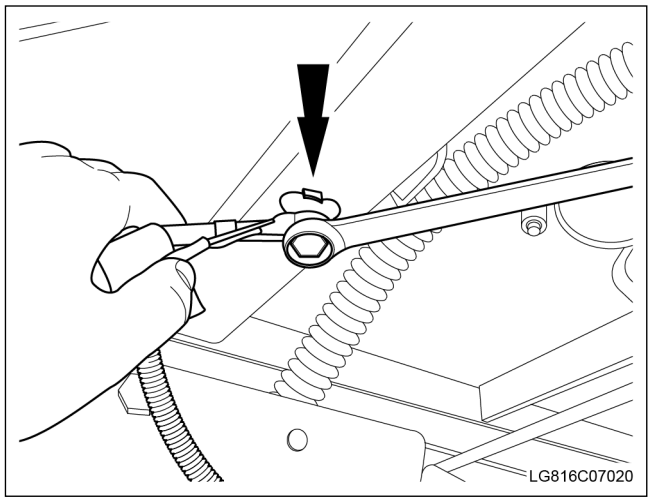


(b) Fix it to the bracket with self-provided nuts on flexible shaft, and tighten nuts with 24# wrench.



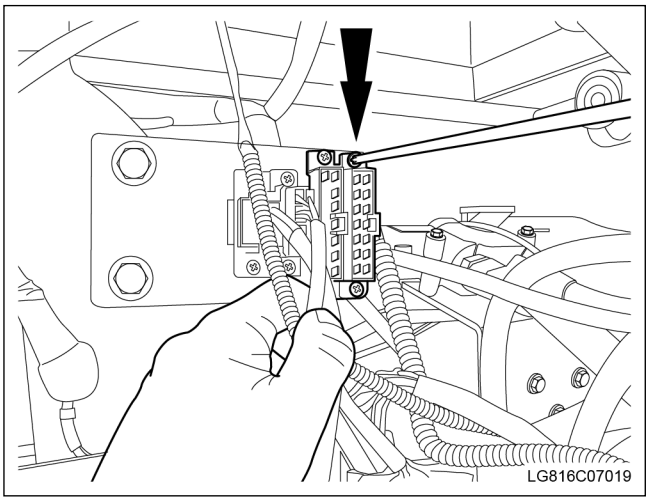
4. Install the harness

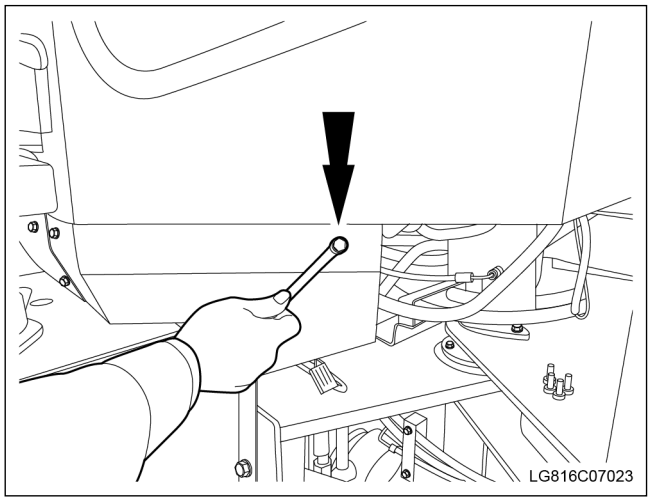
(a) Connect the earthing harness in steering gear box harness to the earthing harness below the cab floor with bolts, and tighten bolts with 16# wrench.



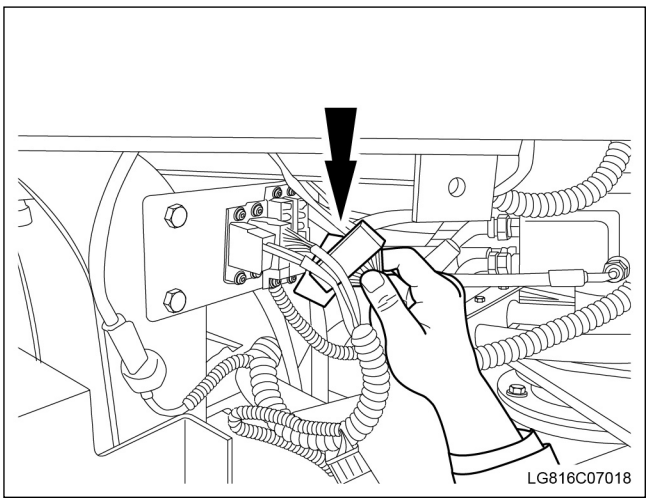
(b) install the steering gear box harness socket onto the connector mounting plate with self-provided screws, and tighten with cross-screwdriver.

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(c) Insert the harness connector into the corresponding socket of mounting plate.



5. Install the front plate

Fix the front plate to the cab with removed bolts, tighten with 13# wrench with the tightening torque of 26±4 N•m.

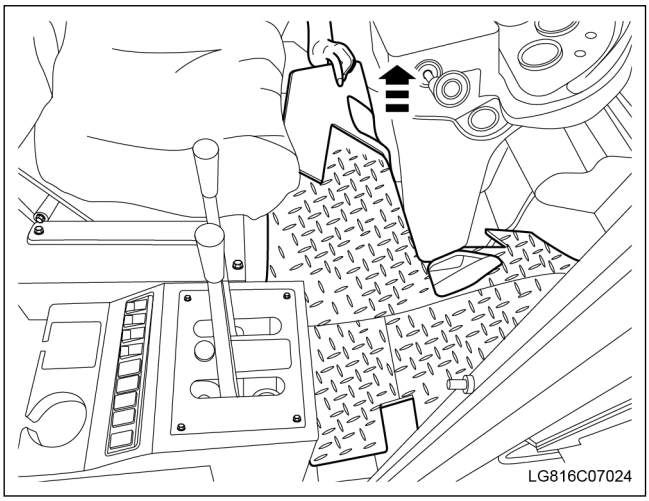
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Floor mat

Removal

1. Remove the floor mat

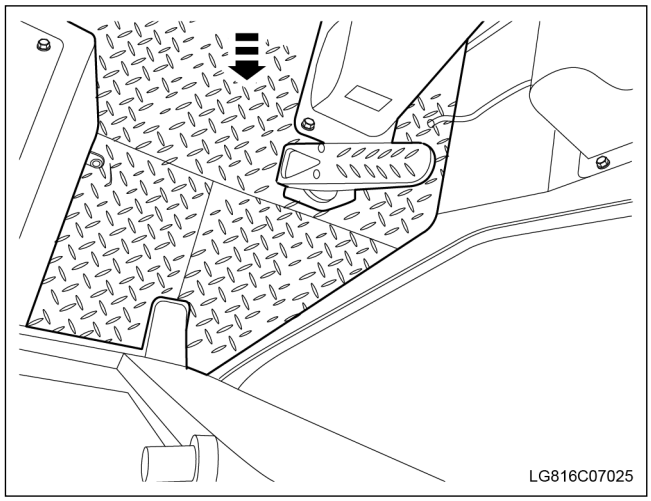
Raise the floor mat from one front corner of cab floor, take down the floor mat slowly, and pay attention to preventing the floor mat from being torn.

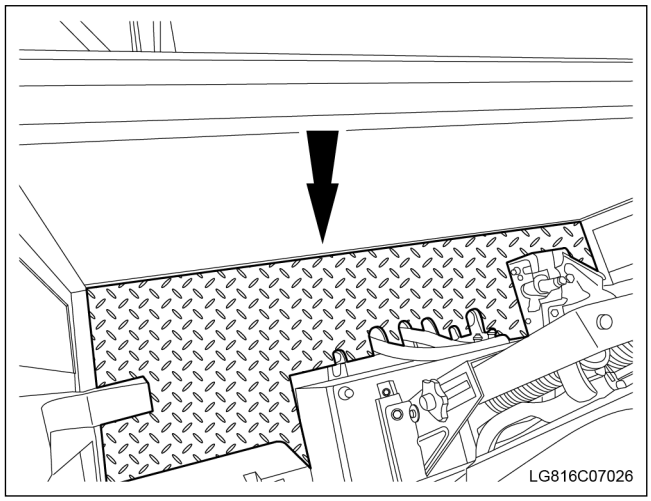


Installation

1. Install the floor mat

Keep the rubber surface of floor mat facing up and the sponge surface facing down, install onto the cab floor from rear with the floor mat facing down, adjust its position and flatten completely onto the cab floor.





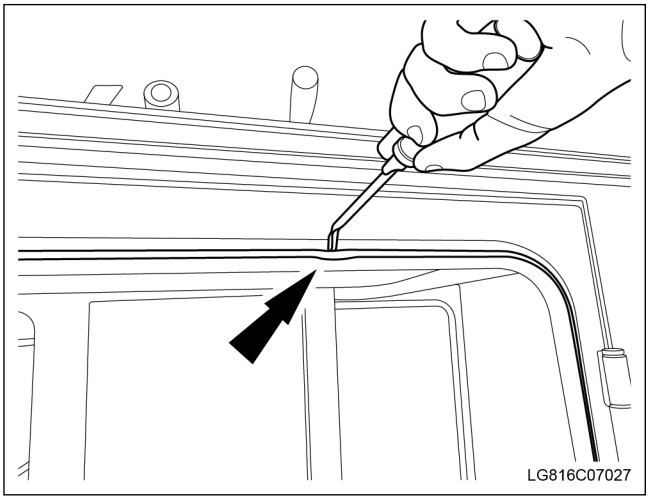
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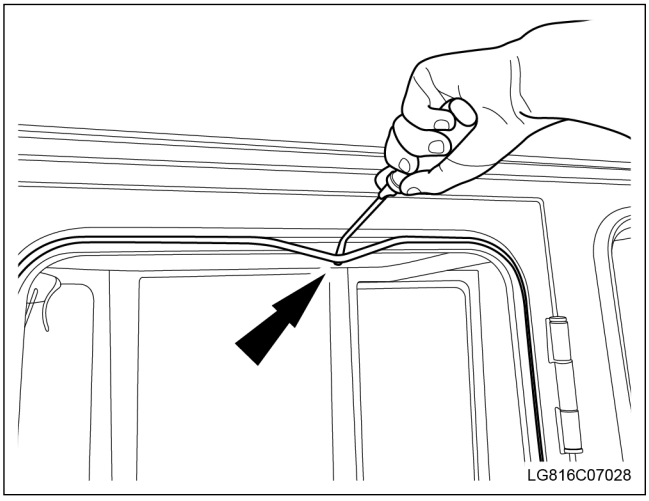
Cab glass

Removal (door glass)

1. Remove the seal

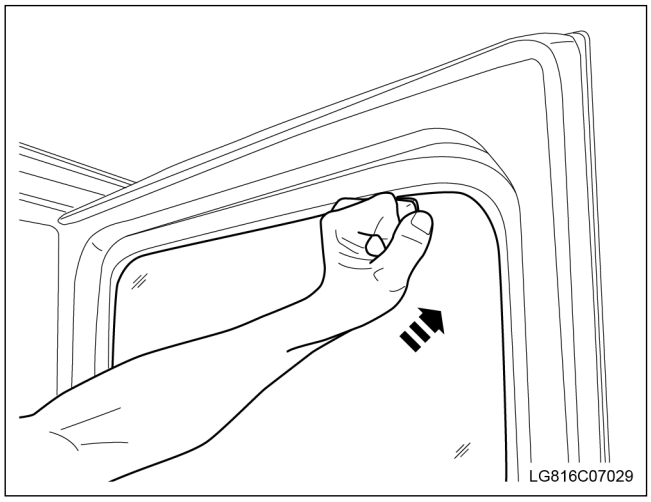
Dig up the thin seal in the middle of glass fixing seal with special tool, and remove the whole seal.

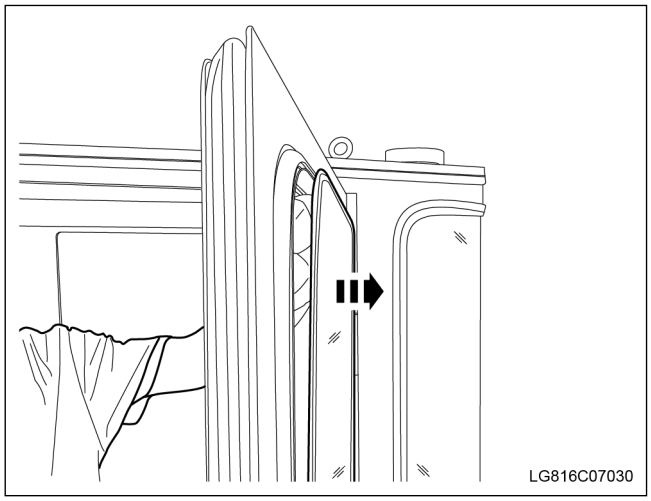




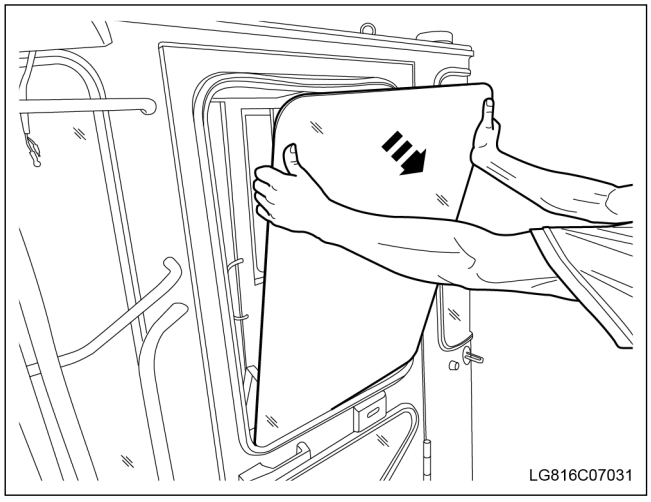
2. Remove the glass

(a) Push the upper part of glass from inside to outside to keep it just separated from seal.





(b) Take down glass from outside, and place properly.



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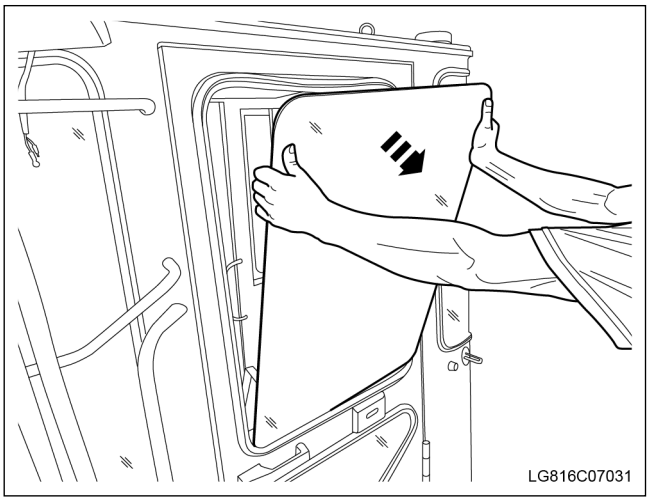
Installation (door glass)

1. Install the seal

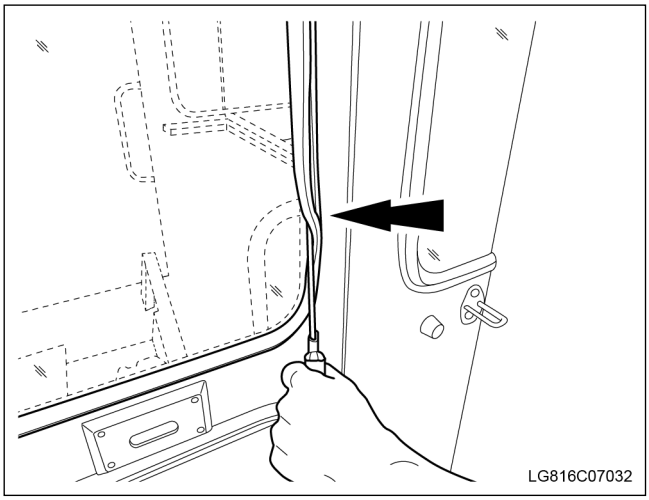
Install the glass fixing seal onto the glass mounting frame of cab door.

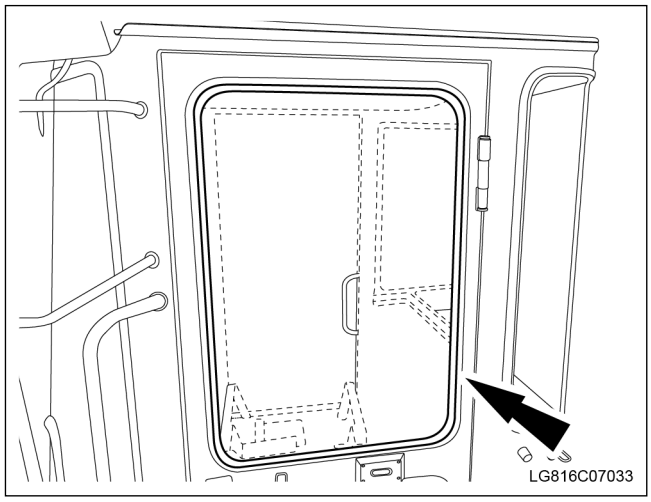
2. Install the glass

(a) Install the short side of glass into the fixing groove of lower frame seal.



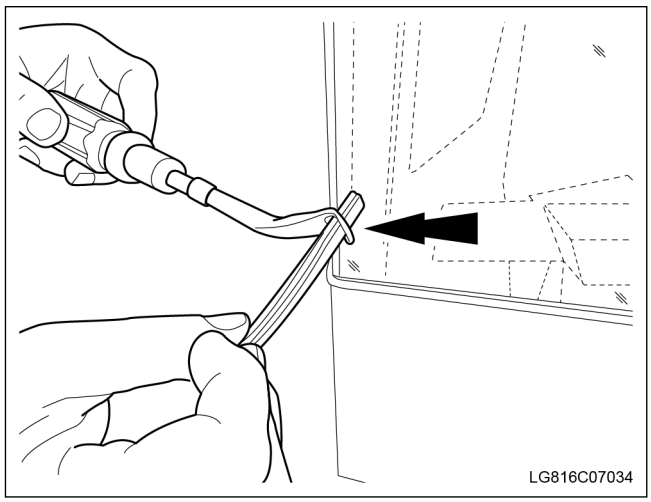
(b) Install into the seal fixing groove along the glass edge with special tool.





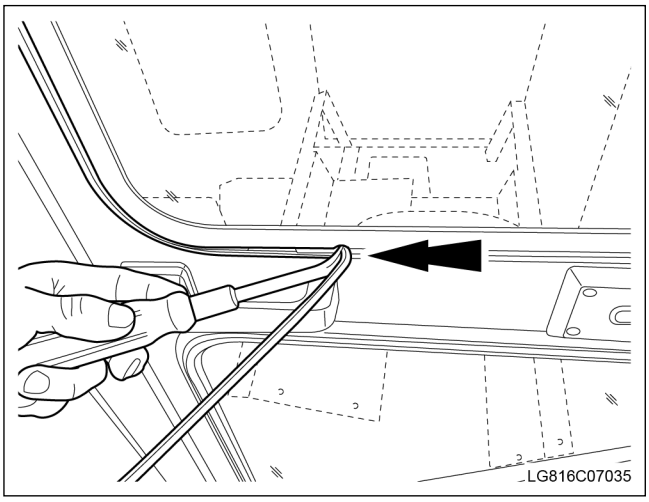
3. Install thin seal

(a) Penetrate one end of thin seal into the hole of special tool.

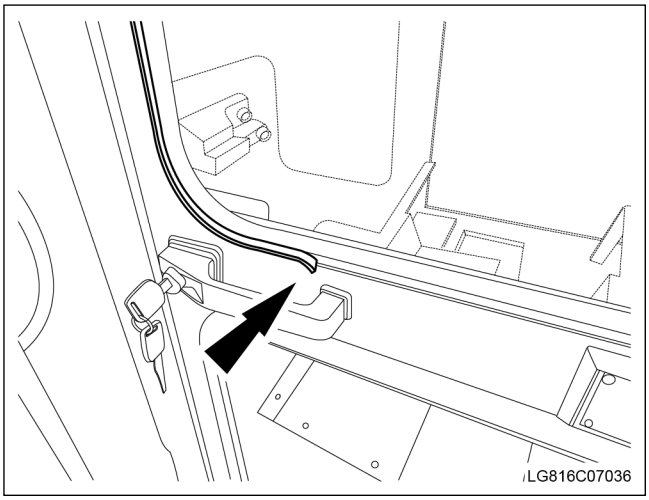


(b) Install the thin seal into the groove at the side of glass holdsown seal on cab door with special tool, and push forwards along the seal, until the thin seal fill up the whole groove of glass fixing seal.

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(c) Cut off the thin seal at the end with scissors or box cutter, and flatten the seal.



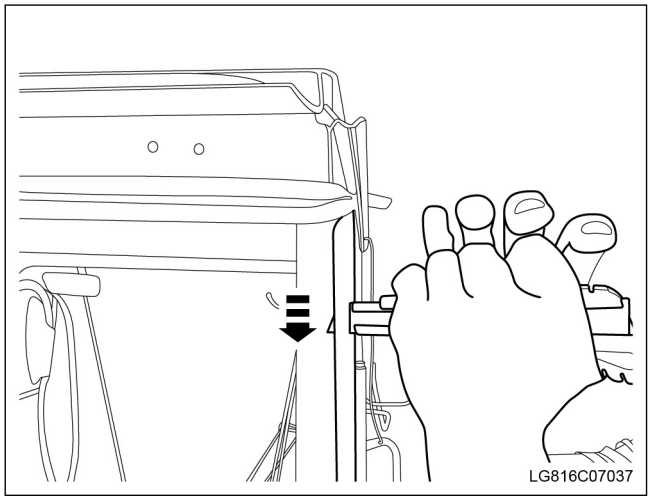
Removal (rear window glass)

1. Remove the seal

Refer to the removal of cab door seal, and dig out the middle of glass fixing seal with special tool.

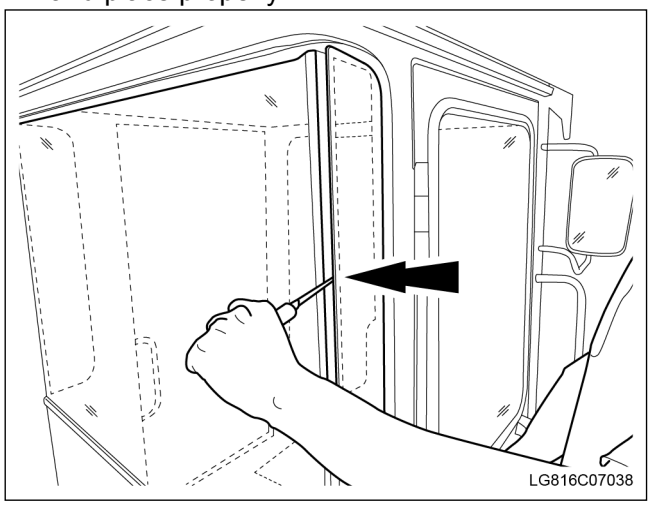
2. Cut off the glass seal

Slash the seal at both sides of rear window glass with box cutter from up to down.



3. Remove the glass

Hold the rear window glass, pry from both sides of rear window glass with special tool, separate the glass top from the seal, then take down the glass and place properly. Remove the glass at both sides of cab rear with the same method and place properly.

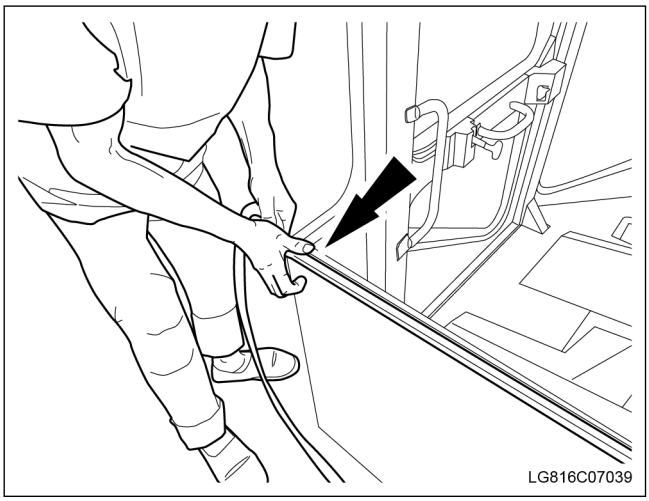


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Installation (rear window glass)

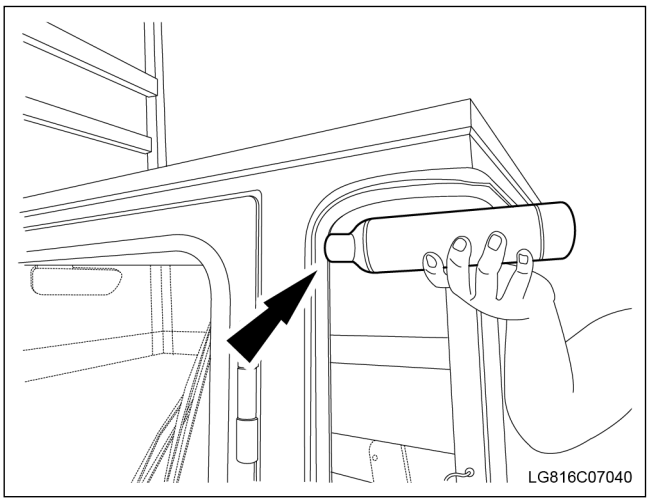
1. Install the seal

Install the glass fixing seal onto the glass mounting frame of cab rear window.



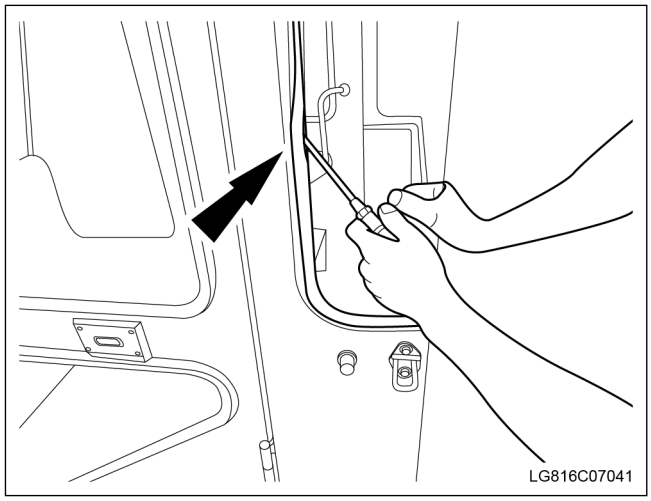
2. Lubrication seal

Spray water to the installed glass seal fixing groove to make it lubricated.



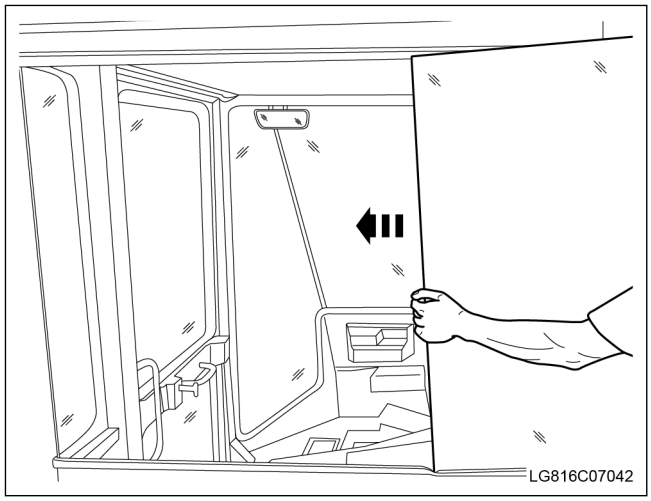
3. Install side glass

Install the side glass of rear window onto the fixing grooves above and below the seals from rear to front, and install the front edge of glass into the seal fixing groove along glass edge with special tool.



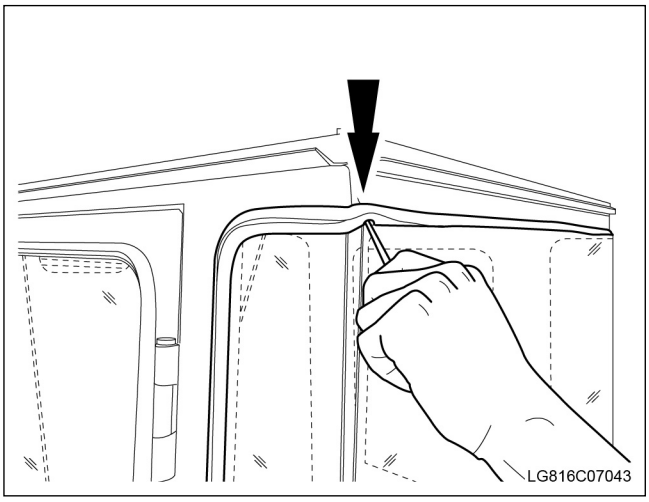
4. Install rear window glass

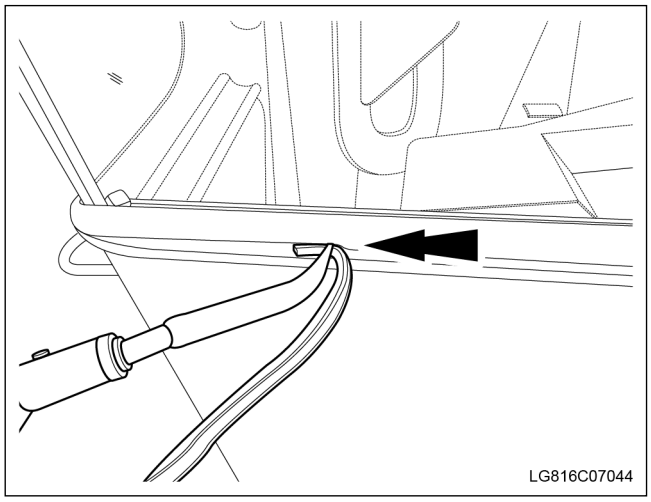
(a) Install the lower edge of rear window glass into the seal fixing groove from right to left.



(b) Install the glass top into the seal fixing groove along the upper edge of glass with special tool.

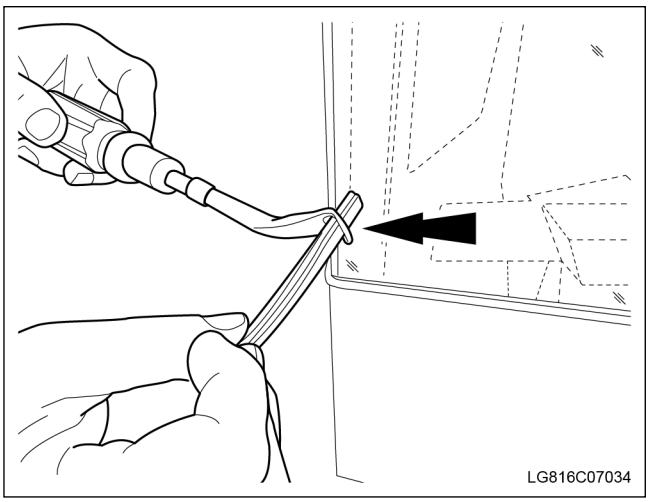
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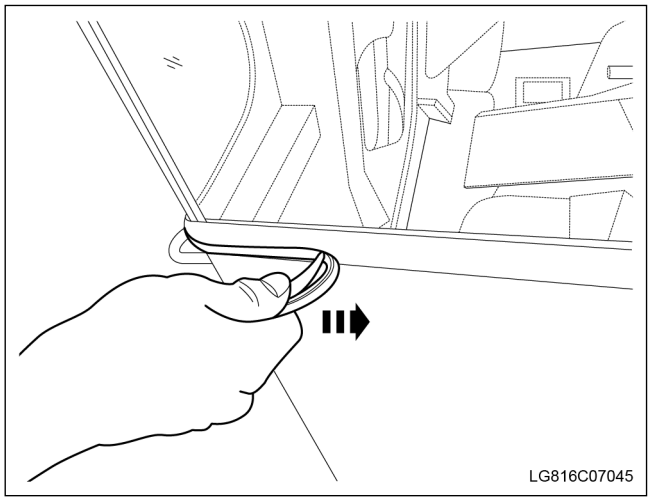


5. Install thin seal

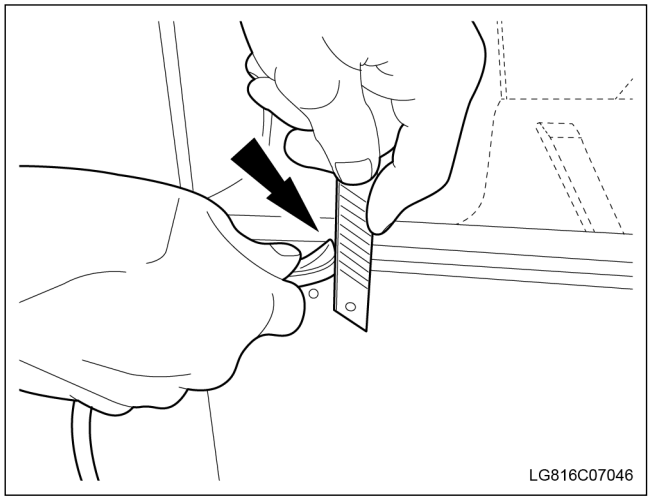
(a) Penetrate one end of thin seal into the hole of special tool.



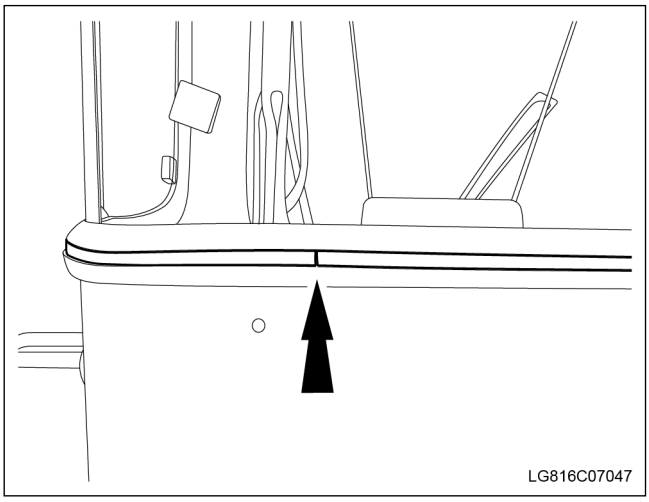
(b) Install the thin seal into the groove at the side of glass fixing seal on cab rear window with special tool, and push forwards along the seal, until the thin seal fill up the whole groove of glass fixing seal.



(c) Cut off the thin seal at the end with scissors or box cutter, and flatten the seal.



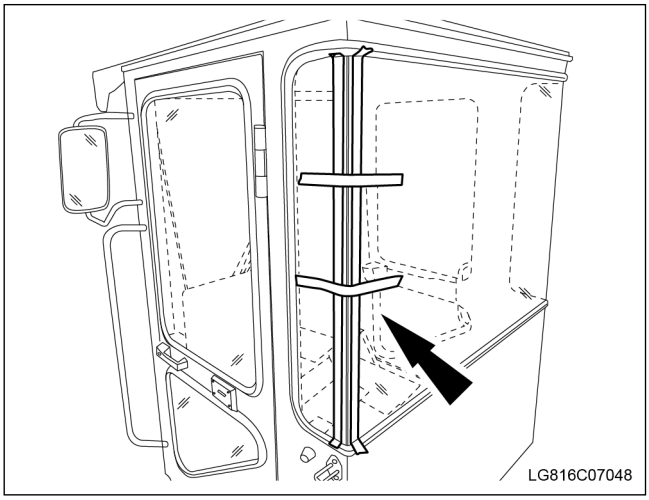
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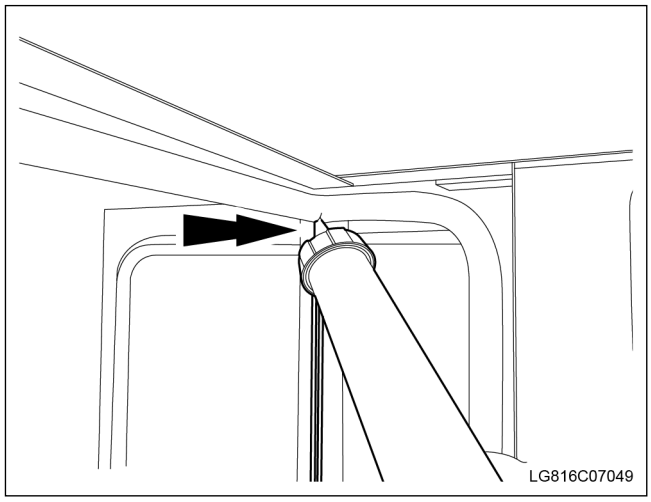
6. Apply glass seal

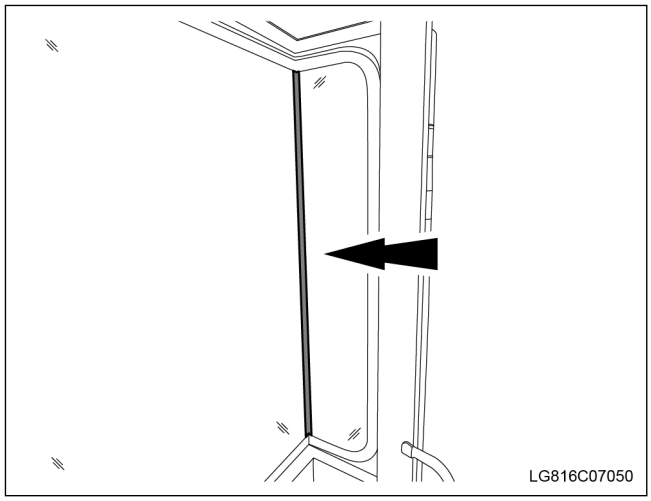
(a) Stick paper self-adhesive tape at 10mm of the edge of rear window glass and side glass.

(b) Adjust the position of cab rear window glass and glass at both sides to keep even spacing, and fix with tape.



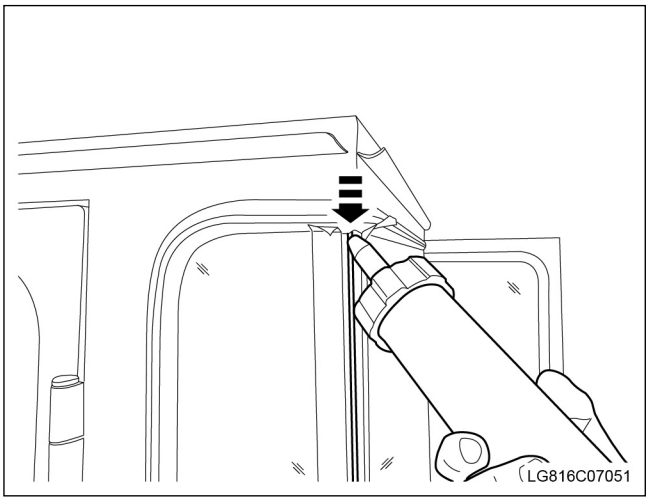
(c) Apply seal along the gap at the joint of rear window glass and side glass inside the cab from top corner to down.



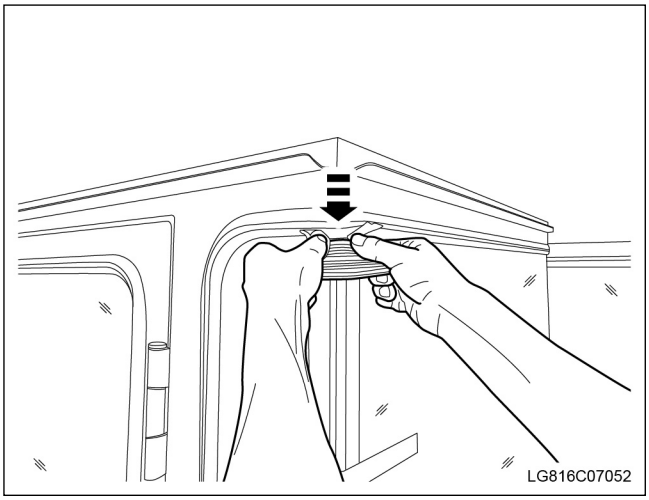


(d) After the inner seal is dried, remove paper self-adhesive tape stuck horizontally for fixing the relative position of glass, and apply seal at glass corner from up to down.

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(e) Flatten protruded seal with a rubber from up to down.



Removal (front window glass)

1. Remove the seal

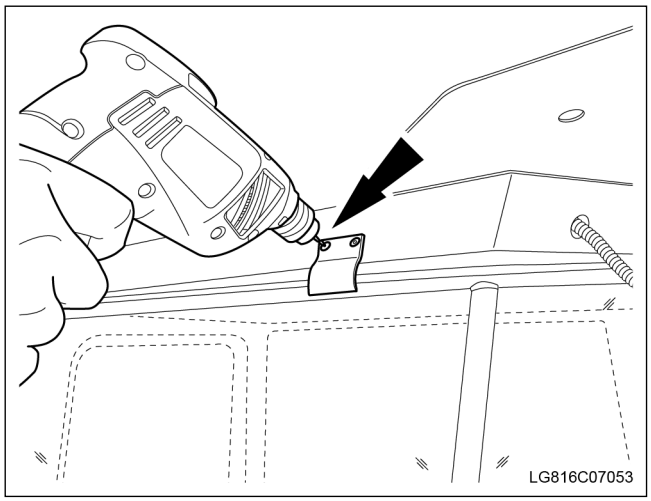
Refer to the removal of cab rear window seal, and dig out the thin seal in the middle of glass fixing seal with special tool.

2. Cut off the glass seal

Refer to the removal of cab rear window glass, and cut the connecting seal for front window glass at both side and middle front window glass with box cutter.

3. Remove the middle front window glass plate.

Remove the mounting rivet of retaining plate above the middle front window glass with drilling machine, and remove two plates.



4. Remove the glass

Refer to the removal of cab rear window glass, remove the middle front window glass and front window glass at both side in order.

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Installation (front window glass)

1. **Install the seal**

   Refer to “Cab glass”(p. 7-16) and install the glass fixing seal onto the glass mounting frame of cab front window.

2. **Lubrication seal**

   Refer to “Cab glass”(p. 7-16) spray water to the installed glass seal fixing groove to make it lubricated.

3. **Install the front window glasses at both sides**

   Refer to “Cab glass”(p. 7-16) and install the left and right front window glasses into the seal fixing groove.

4. **Install the middle front window glass**

   Refer to “Cab glass”(p. 7-16) and install the middle front window glass into the seal fixing groove.

5. **Install thin seal**

   Refer to “Cab glass”(p. 7-16), install the thin seal into the groove in the middle of glass fixing seal and flatten the seal.

6. **Install the middle front window glass plate**

   install the middle front window glass plate onto the glass mounting frame above the cab front with blind rivets, and rivet with riveting gun.

7. **Apply glass seal**

   Refer to “Cab glass”(p. 7-16) and apply seal on the joint of front window glass at both sides and middle front window glass.

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Removal and Installation of Covering Parts

Tool list

Name	Specification(Qty.)
Open-end wrench	13# （2）、 14#、 16#、 19#、
Torque wrench	20-100N•m， 90--300N•m
Traveling crane	1t
Lifting chain	1t
Hammer	
Scissor	
⚠ **Remark: removed standard parts should be placed with relevant material together to avoid mixing.**	

⚠ **"Front" mentioned in this chapter refers to the forward direction after starting the machine; other directions are by this analogy.**

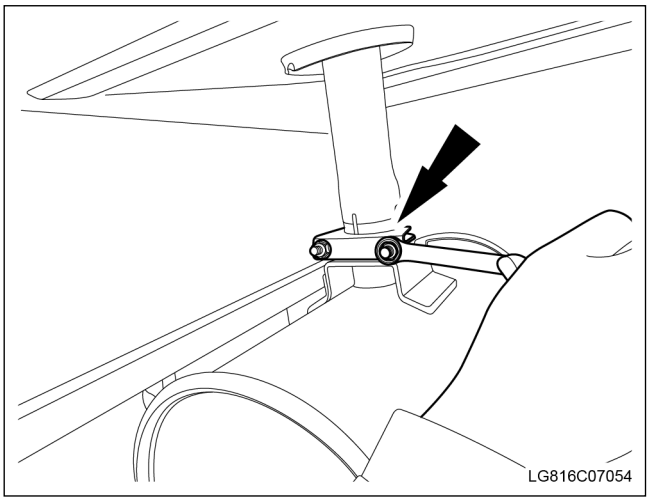
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Top cover

Removal

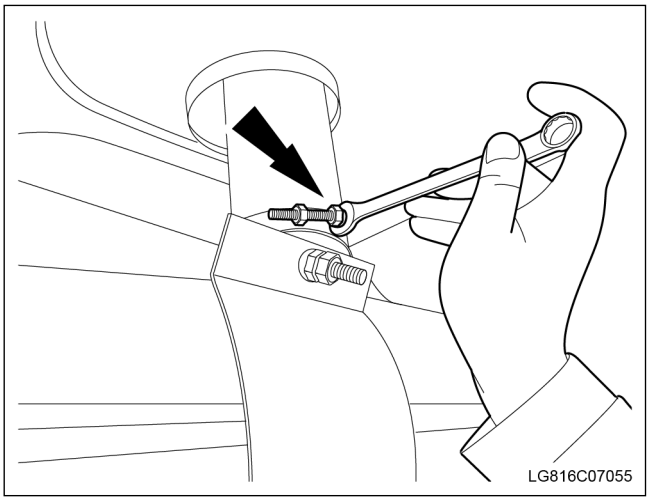
1. Remove diesel engine exhaust pipe

Open the side cover, loosen the two captive bolts to the mounting clamps of diesel engine exhaust pipe with a 14# wrench, remove exhaust pipe and place properly.



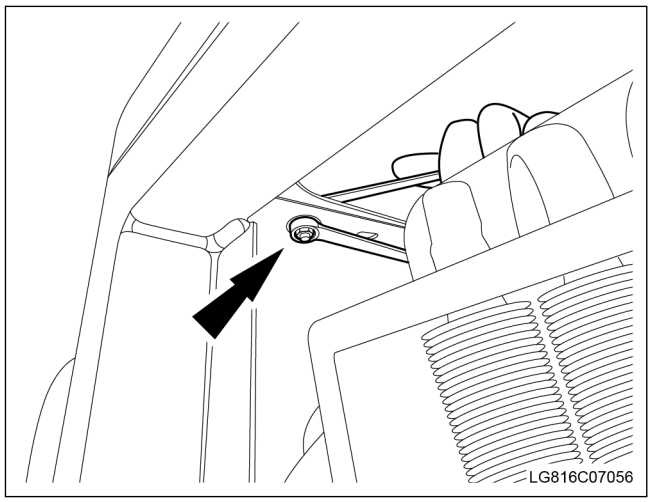
2. Remove diesel engine air filter cap

Remove the two captive bolts to the mounting clamps of the diesel engine air filter cap with a 13# wrench. Take down the air filter cap, place it properly.



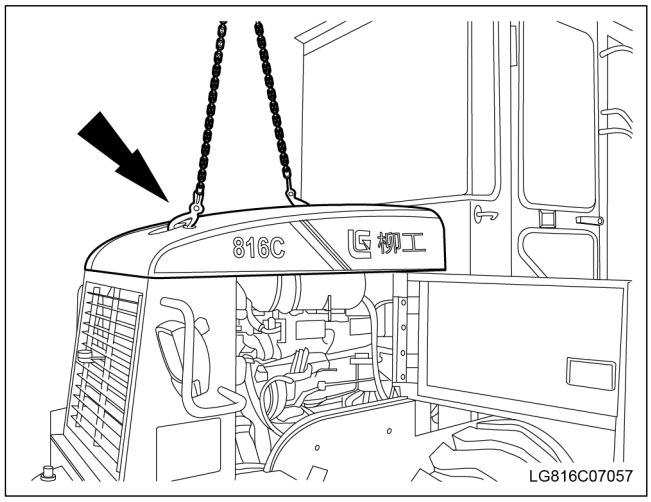
3. Remove upper cover

(a) Fix the connecting nuts fixing the top cover and cover with 13# wrench, and remove two bolts with 13# wrench.



(b) Remove two binder bolts and nuts of top cover and portal frame with the same method.

(c) Lift the upper cover off to a flat ground with a traveling crane and sling tools, protect the surface paint.

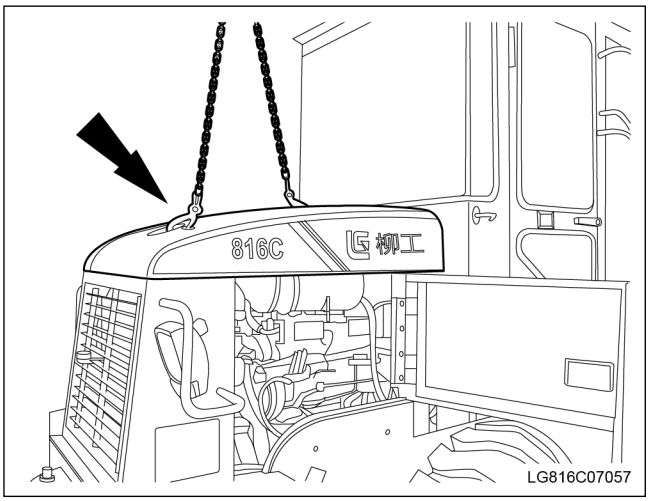


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Installation

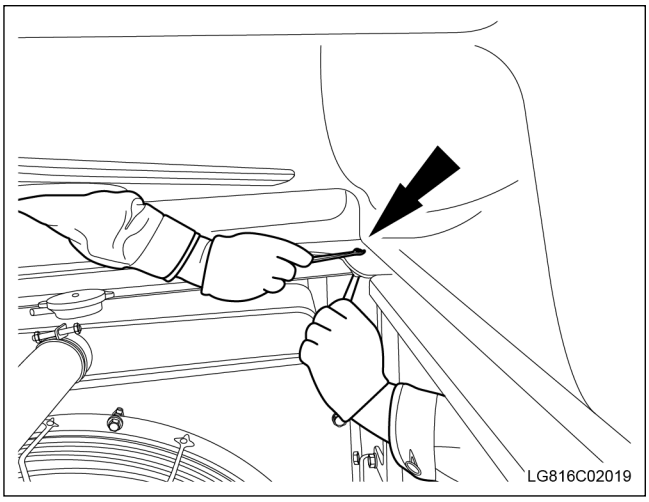
1. Install upper cover

(a) Lift the top cover onto the portal frame and rear cover with crane and sling.



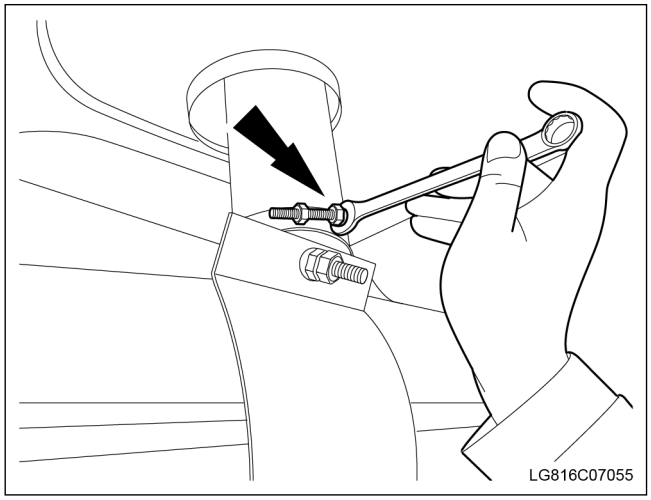
(b) Install the binder bolts and nuts after align the mounting holes.

(c) Adjust the relative position to align the sides of rear cover and top cover, tighten the mounting bolts of top cover with 13# wrench with the tightening torque of 26±4N•m.



2. Install air filter cap and exhaust pipe

Install diesel engine air filter cap, exhaust pipe to the diesel engine, adjust exhaust pipe port backwards, tighten clamp captive bolt with a #13 wrench.



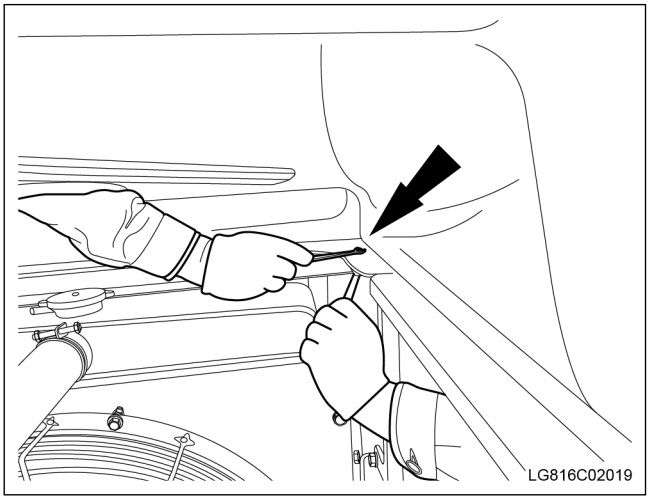
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Cover

Removal

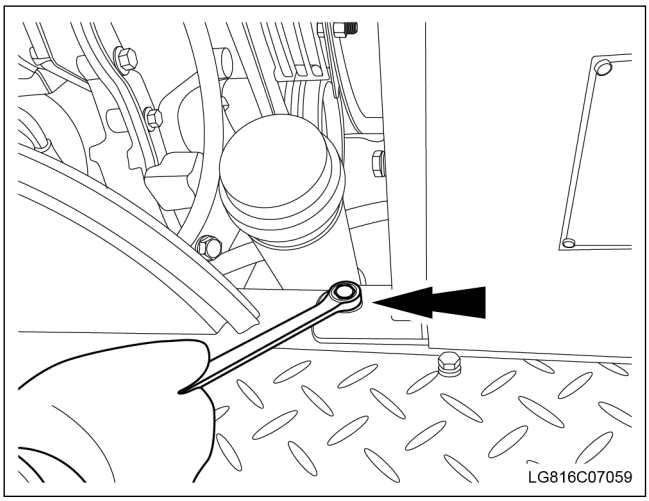
1. Remove the mounting bolts (upper side)

Remove the binder bolts and nuts of cover and top cover with 13# wrench.



2. Remove the mounting bolts (lower side)

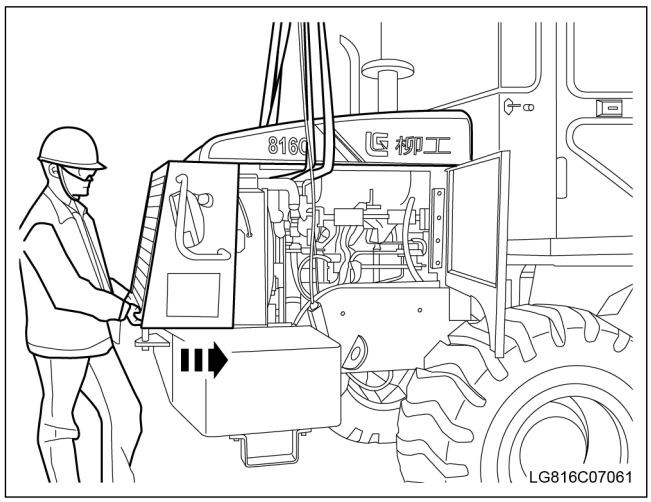
Remove 4 mounting bolts connecting the cover with rear frame with 16# wrench.

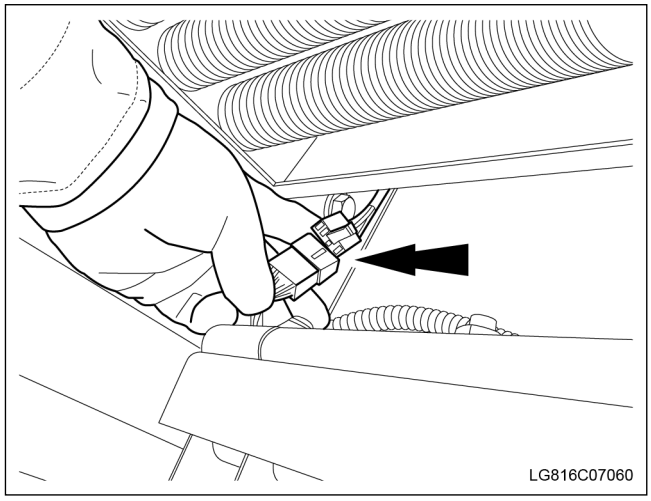


3. Remove the cover

(a) Pull off the rear working light harness connector.

(b) Lift the top cover with crane and sling, push out the cover from front to back, take down and place it properly on the ground, and pay attention to not squeezing harness and other parts in this process and protecting the surface paint.



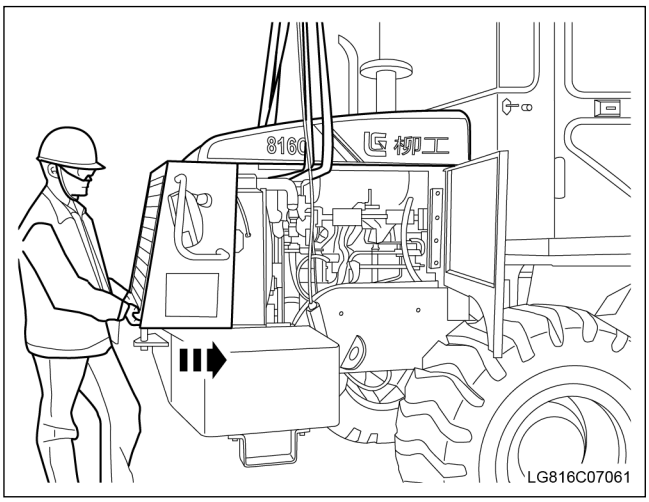


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Installation

1. Install cover

Lift the top cover with crane and sling, push the cover to the installation position, and pay attention to not squeezing harness and other parts.



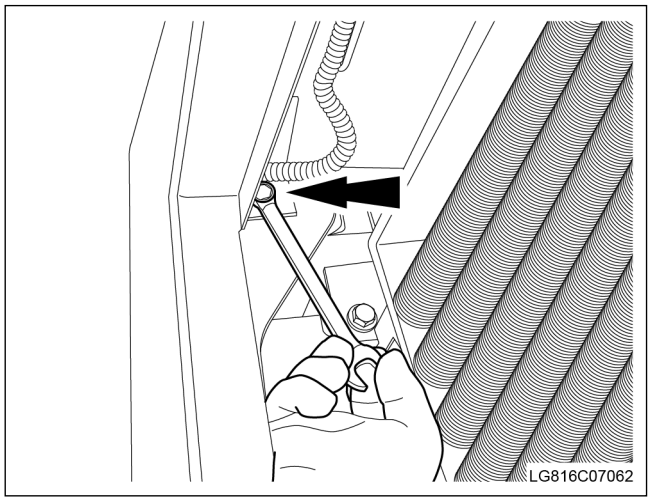
2. Install the mounting bolt

(a) Connect the cover to the rear frame with bolts.

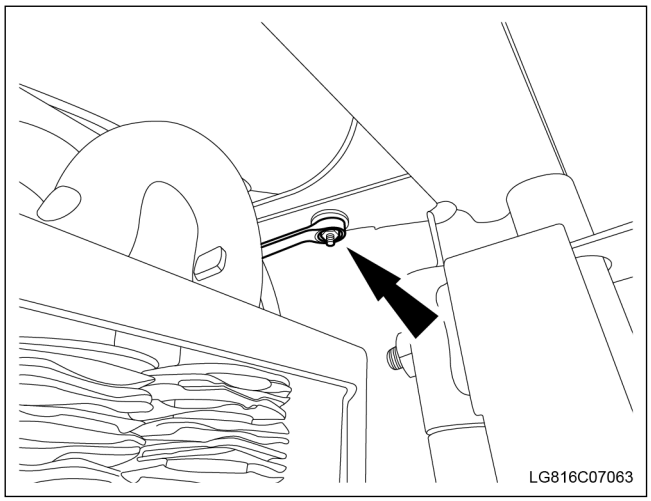
(b) Connect the cover with top cover by bolts and nuts, and take down the sling.

(c) Adjust the relative position of cover, top cover and side cover to keep both sides of cover and the side of side cover at the same plane, and the rear door of side cover and the rear side of top cover at the same plane.

(d) Tighten upper mounting bolts and nuts with 13# wrench with the tightening torque of 26±4N•m.



(e) Tighten lower mounting bolts and nuts with 16# wrench with the tightening torque of 52±7N•m.

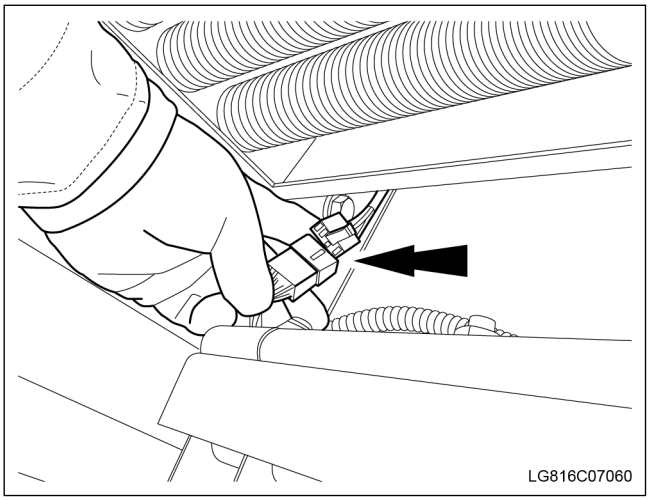


3. Connect harness

Connect the rear work light harness connector with the corresponding connector of rear frame

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harness.

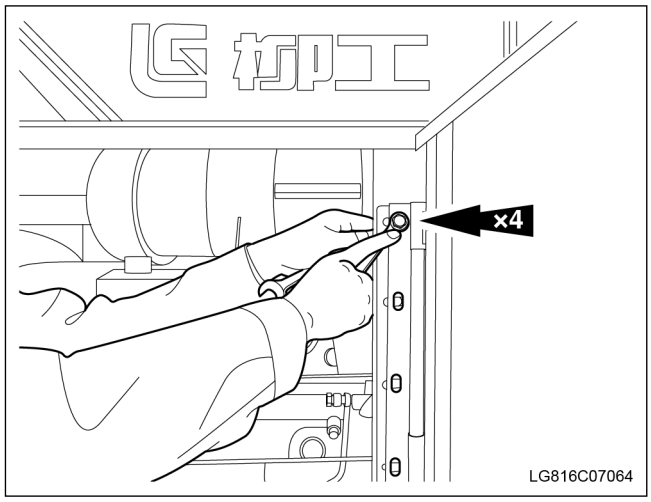


Upper side cover

Removal

1. Upper side cover

Remove 4 mounting bolts of top side cover-lh and top side cover-rh with 16# wrench from down to up, take down the top side cover and place properly, and prevent damage to the surface paint in this process.



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Installation

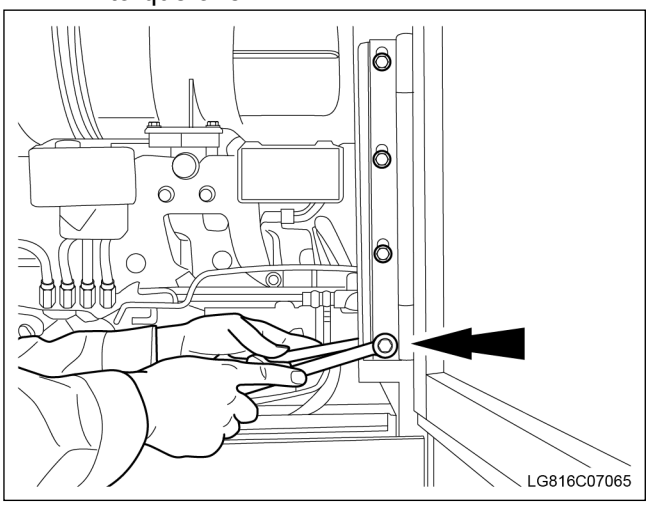
1. Install the top side cover

(a) Fix the top side cover-lh and top side cover-rh respectively to the left and right installation positions on the portal frame with bolts.

(b) Adjust the position to keep the distance between the top side cover and portal frame greater than 10mm, so as to ensure free opening and closing.

(c) The distance between the top side cover, top cover and cover must be greater than 3mm and less than 5mm.

(d) The outer surface of top side cover and cover outside must be parallel, and their distance must be less than 5mm, tighten bolts with 16# wrench with the tightening torque of 52±7N•m.

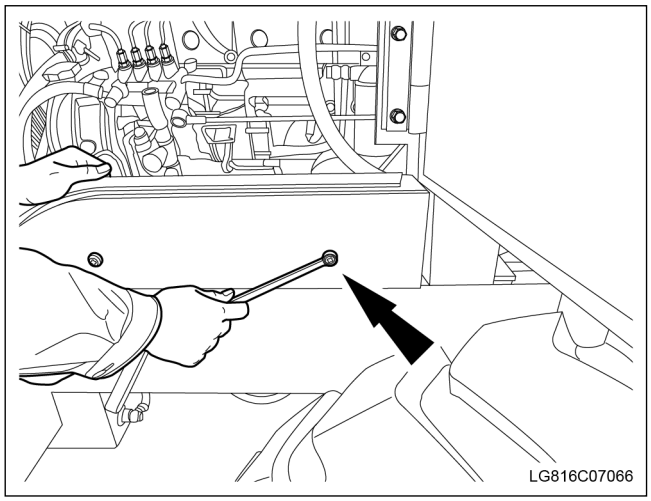


Lower side cover

Removal

1. Remove the side cover

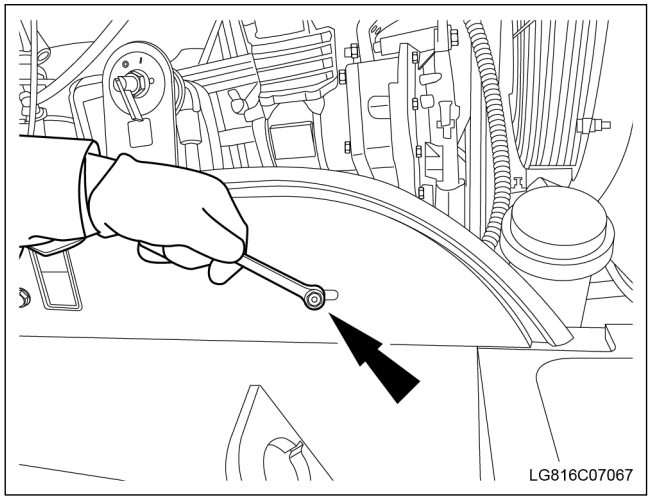
Remove the left and right side cover mounting bolts with a 19# wrench, remove the side cover and place it properly, avoid damage to the surface paint.



Installation

1. Install lower side cover

Install left and right side cover to rear frame with bolts, adjust their positions, make sure the front edge lines up with the upper cover, tighten bolt with a 13# wrench.



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Portal frame

Removal

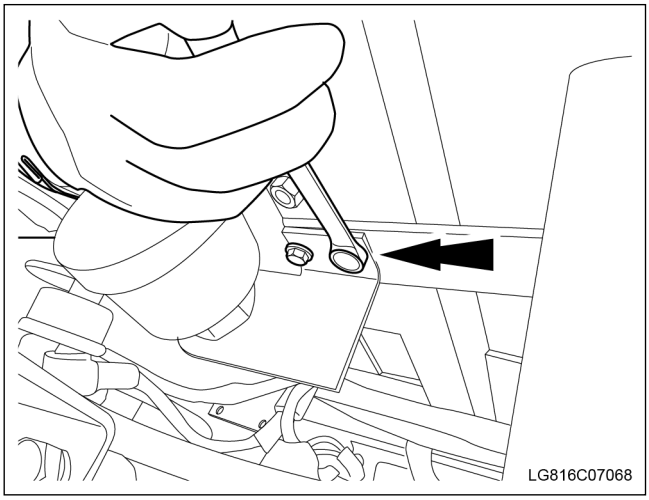
1. Remove the top side cover and cover

(a) Refer the “Upper side cover”(p. 7-29) removal process to remove the top side cover.

(b) Refer the “Top cover”(p. 7-25) removal process to remove the top cover.

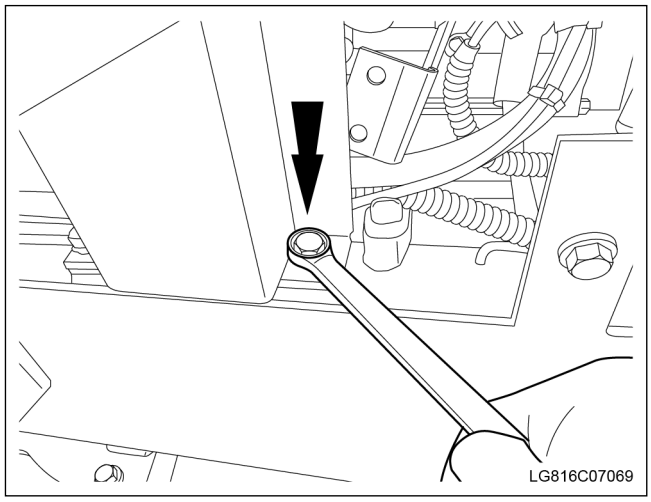
2. Remove assistor grease fitting

Remove the mounting bolts of the assistor grease fitting with a 13# wrench, remove assistor grease fitting and place it properly.



3. Remove the portal frame

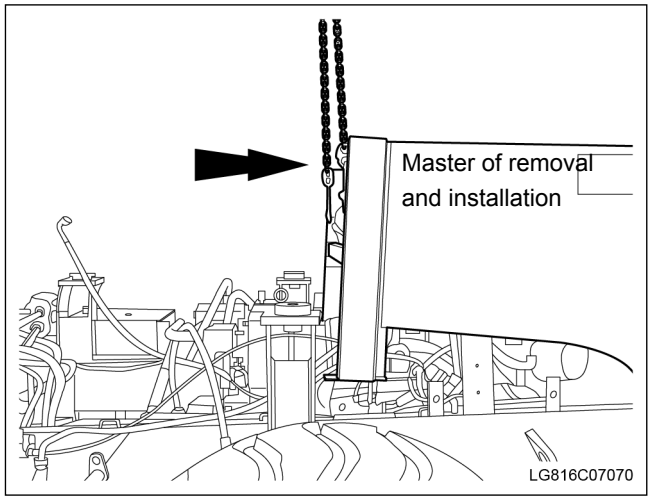
Remove 4 captive bolts of portal frame on the frame with 16# wrench, take down the portal frame with crane and sling and place properly, and prevent its surface paint from bump and damage.



Installation

1. Install the portal frame

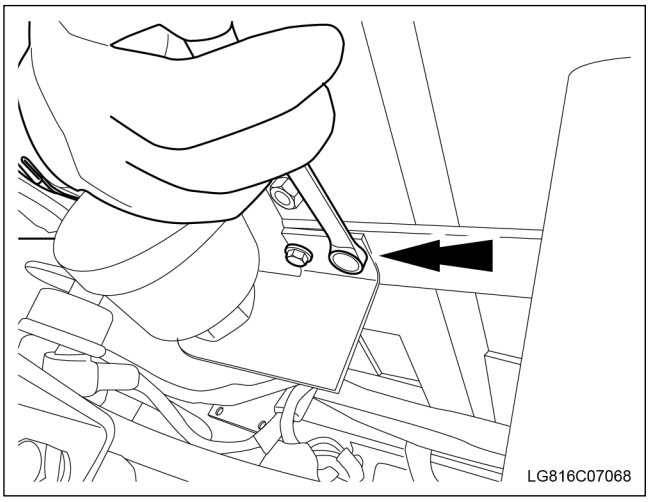
Hoist the portal frame to the rear frame mounting position with traveling crane and sling, align with the mounting hole to insert mounting bolts, adjust the portal frame to upright position then tighten bolts with a 16# wrench. Tightening torque is 90±12N•m.



2. Install assistor grease fitting

Tighten the assistor to the portal frame with previously removed bolts, tighten with a 13# wrench. Tightening torque is 26±4N•m.

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3. Install the top cover and top side cover

(a) Refer to “Top cover”(p. 7-25), and install the top cover onto the portal frame and rear cover.

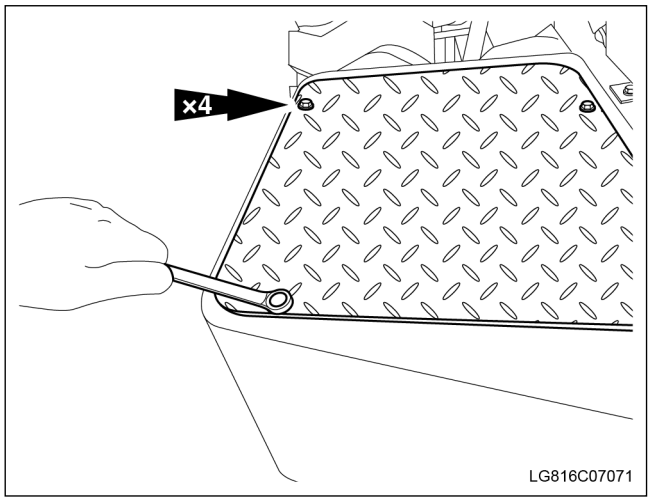
(b) Refer to “Upper side cover”(p. 7-29), and install the top side cover to the portal frame.

Battery box cover

Removal

1. Remove the battery box cover

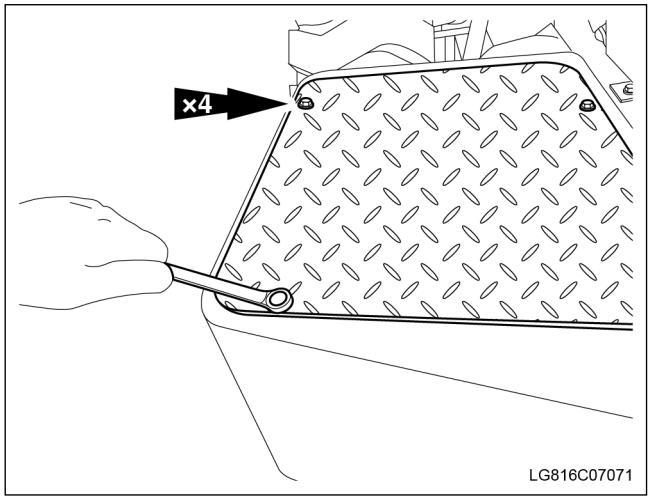
Remove 4 mounting bolts of each of battery box cover-lh and battery box cover-rh with 13# wrench, take down the battery box cover and place it properly, and prevent paint from bump.



Installation

1. Install the battery box cover

Fix the battery box covers to the installation positions above the battery box-lh and battery box-rh of rear frame with bolts, tighten with 13# wrench with the tightening torque of 26±4N•m.



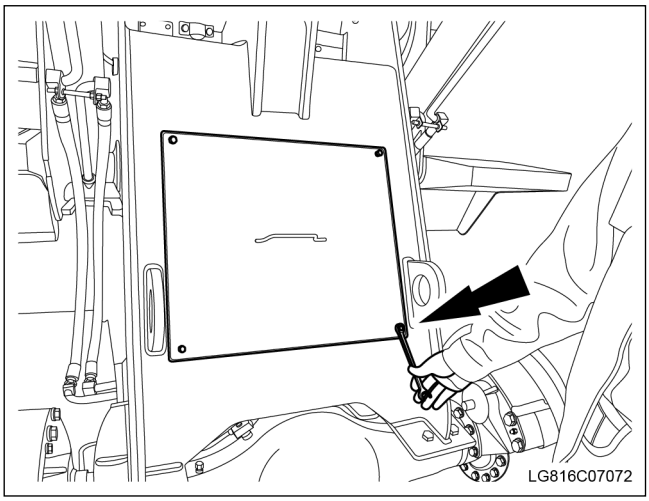
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Install the front frame plate

Removal

1. Remove front plate

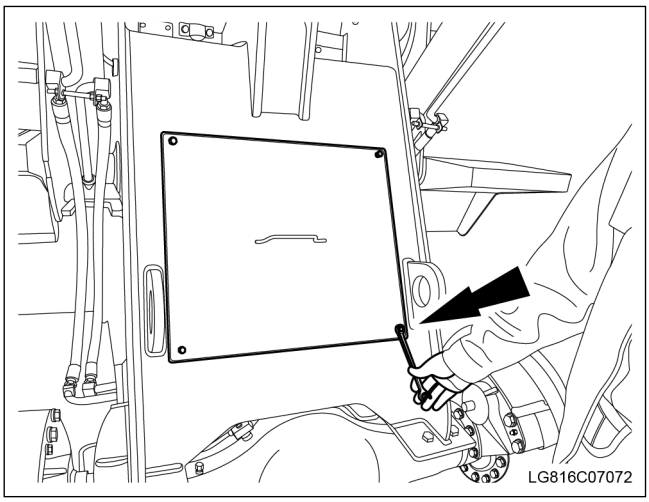
Remove 4 mounting bolts on the front plate of front frame with 13# wrench, take down the front plate and place it properly, and prevent the surface paint from damage.



Installation

1. Install front plate

Use the removed 4 mounting bolts to install the front plate to the corresponding location on the front frame, and use 13# wrench to tighten the bolts with tightening torque of 26 ±4 N•m.

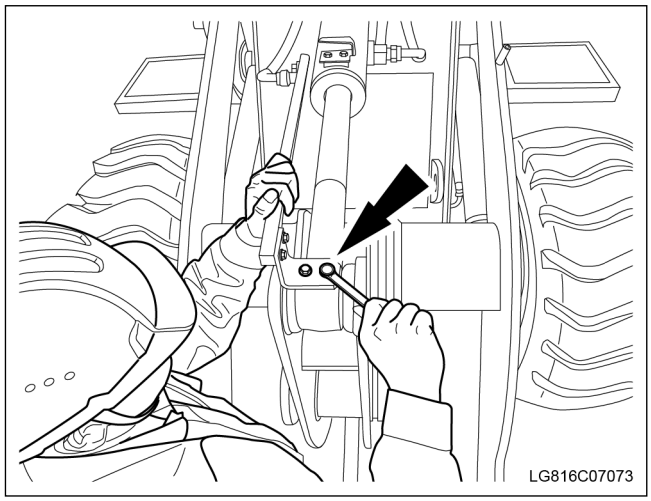


Indicator rod

Removal

1. Remove the indicator rod

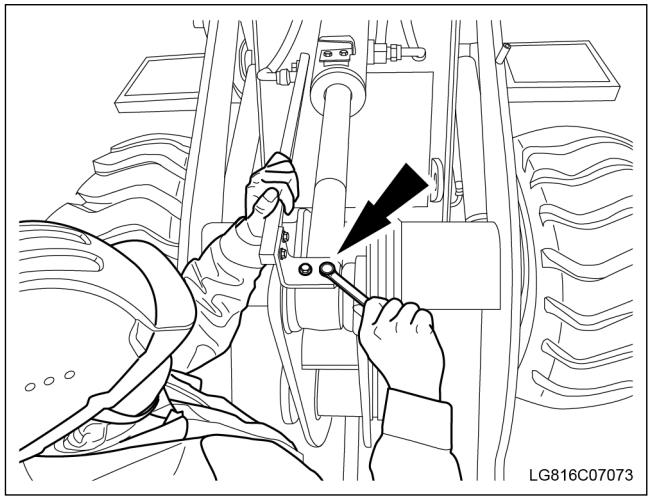
With 13# wrench to remove the instructor rod setscrews on the tilt cylinder, remove the indicator rod and place it properly to protect the surface of the paint.



Installation

1. Install the indicator lever

Use bolts to fix the indicator rod to the tilt cylinder, let the indicator lever backwards. Use 13 # wrench to tighten the bolts with the tightening torque of 26 ± 4N• m.



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Overview

System overview

Two 12V batteries connected in series supply power to 24V 816C loader. The batteries are installed in the battery box on the left of the frame, with a main power switch fixed on the left of the rear frame. The diesel engine is electrically started, with starter motor power of 5.5 kW. It is an alternator with power rating of 28V/27A. The machine fuse and load fuses of branch circuits are installed in the attached operation box on the right in the cab.

The work light at the upper part of the cab, dome light in the cab, electric fan and rear floodlight are directly controlled by the switch, the floodlight is controlled by pressing the main light switch, rotating the combination switch fixed to the orientation column, then the floodlight comes on.

For service brake, the switch under the brake pedal is on, the braking relay is energized and pulled in, and the brake light comes on. Push the combination switch forward (or pull back), and the turn signal light comes on.

Press the hazard signal light switch, and four turn signal lights flash simultaneously. The steering relay is installed in the attached operation box in the cab.

Press the combination switch button on the steering gear, the negative circuit of horn relay is connected, the relay is engaged, and the horn fixed below the cab sounds.

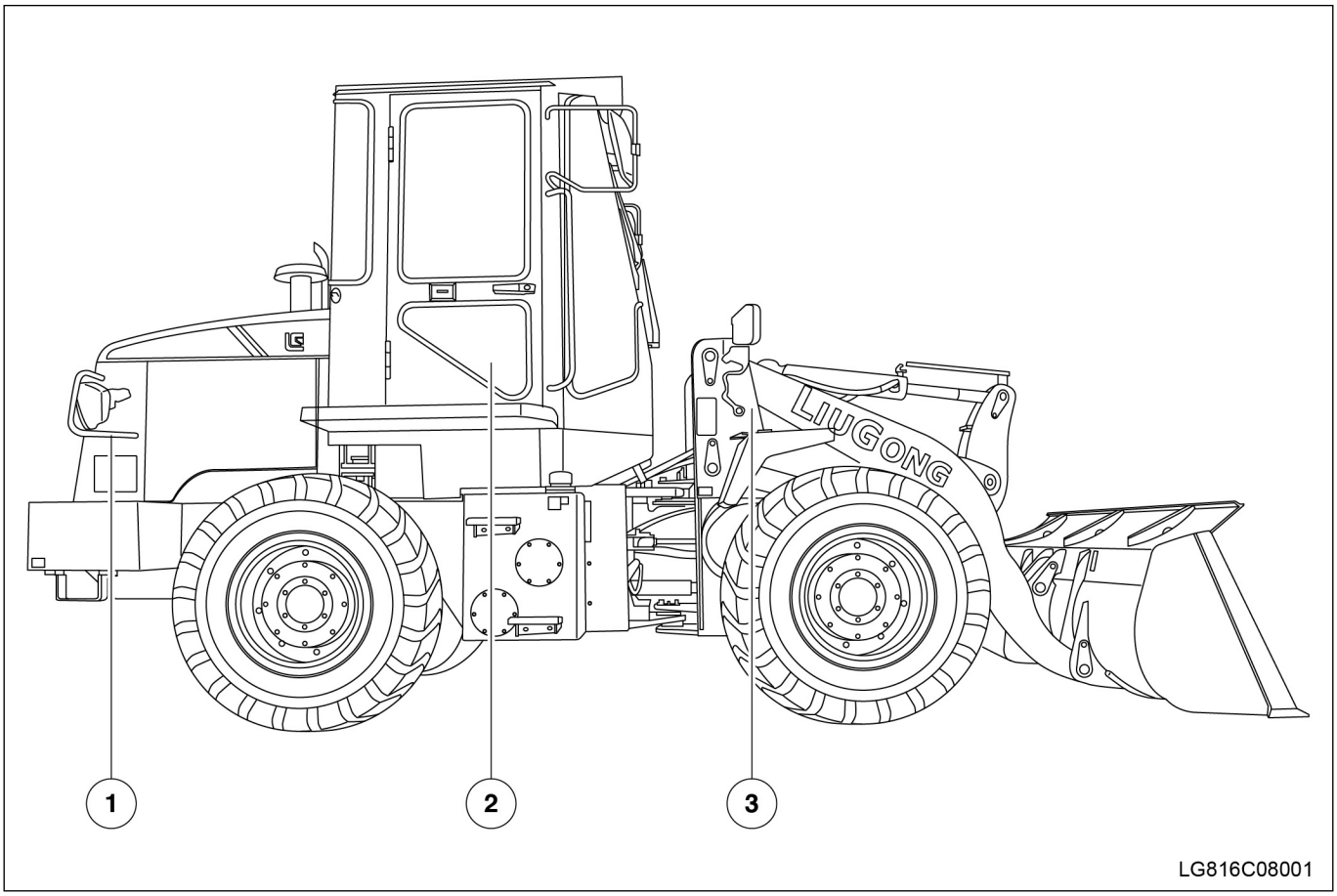
The front window is equipped with a glass wiper used when it rains. The wiper is only allowed to be used when it rains, and cannot be used to wipe dust and dirt on the glass. Dry wiping is forbidden to prevent overload burnout of the wiper motor.

This machine has the function of starting protection, and can prevent damage to the starter motor due to driver's misoperation. The start-up protection relay is installed in the attached operation box in the cab. After the diesel engine is successfully started, the alternator outputs an electric signal to cut off the starting circuit of starter.

The backup alarm is an optional part, installed at the rear part of the rear frame. Turn the control lever to the backup direction, the backup detector switch on the gearbox is on, related relays are engaged, and the backup alarm sounds.

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System components



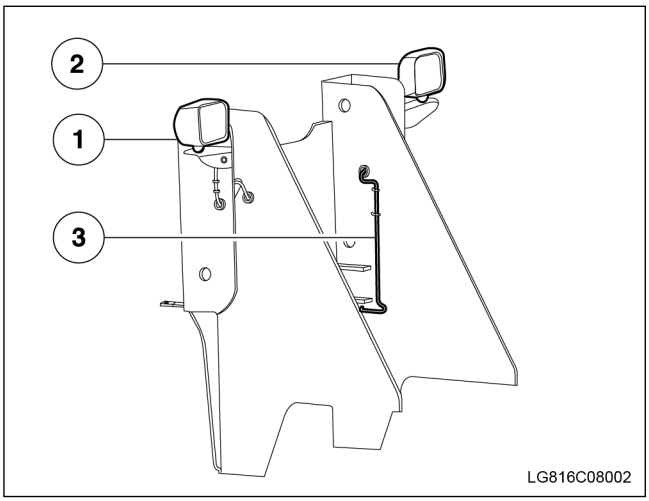
1. Rear frame electrical parts
2. Cab electrical parts
3. Front frame electrical parts

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Front Frame Electrical Parts

The electric part of the front frame includes front frame harness, front combination light-lh and front combination light-rh.

Component location

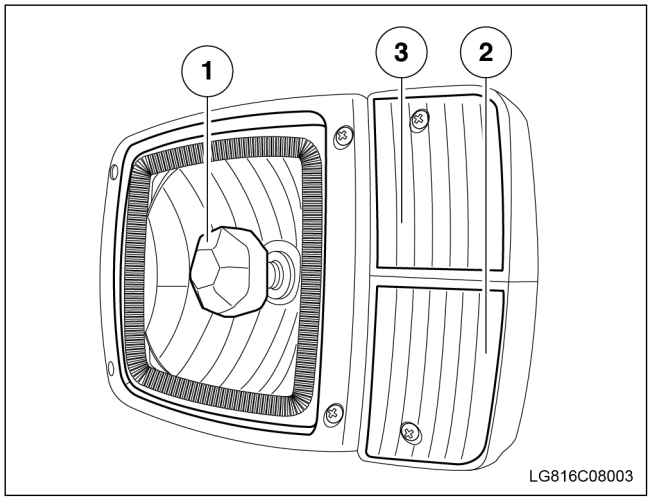


1. FR combination light 2. FL combination light 3. Front frame harness

Function introduction of component

Front combination light

The front combination light-lh and front combination light-rh have identical function, similar appearance, the light-lh appearance is as illustrated in the figure below.



1 Front floodlight 2. Clearance light 3. Turn signal light

1. Front floodlight

Used during driving at night under insufficient light.

2. Clearance light

Position light, clearance light, used on occasions such as parking or dark light, etc.

3. Turn signal light

(a) Left turn signal light

Used during overtaking and turning left. In addition, it is the same to the right turn signal light and used for the danger warning light when the machine is parked on the roadside because of malfunction.

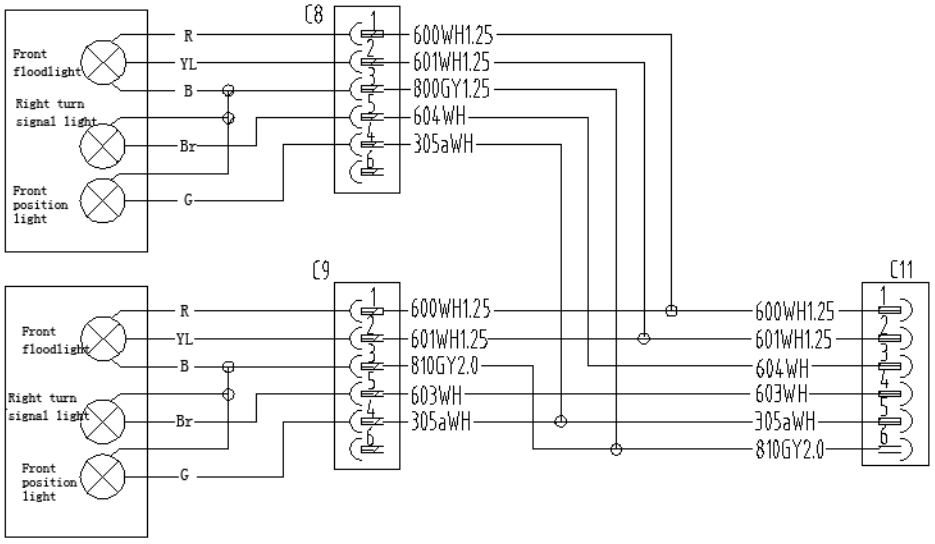
(b) Right turn signal light

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Used during driving back to the original lane, pulling out of a roundabout and turning right after overtaking. In addition, it is the same to the left turn signal light and used for the danger warning light when the machine is parked on the roadside because of malfunction.

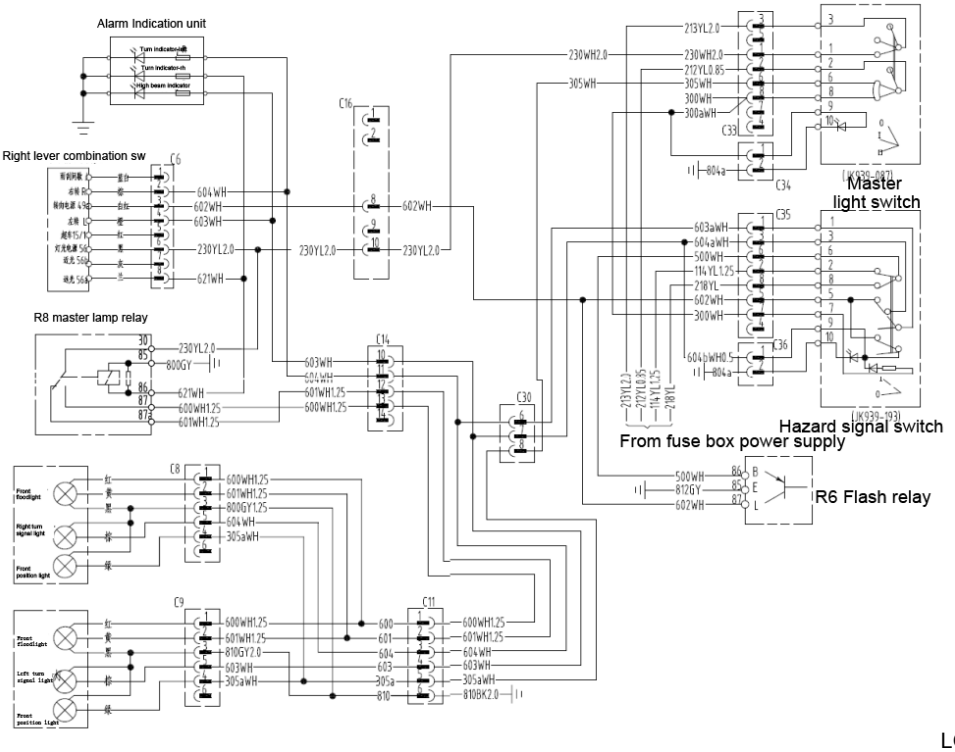
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Schematic diagram of front frame harness



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Control schematic of floodlight and turn signal light



LG816C08005

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Control circuit of front floodlight

No.213 wire output from the fuse box reaches the main light switch, No.230 wire is output from No.1 pin and reaches the combination switch lever through plug C16 after the switch is on, turn the switch, signal 621 is sent to the head relay, making the floodlight-lh and floodlight-rh come on respectively through connectors C14, C11, C8, C9.

The other signal 305 output from the main light switch reaches the front combination light through connectors C30, C11, C8, C9, making the position light come on.

Control of turn signal light

Turn signal light control is divided into two parts, No.114 and No.218 wires output from the fuse box are sent to the hazard signal light switch, No.114 wire is used for warning, and No.218 wire is used with the electric lock switch in ON position. The signal is output to the flash relay, relay output is divided into two ways, one to the combination handle on the steering gear box, the other to the hazard signal switch. When the hazard signal switch is pressed, the left and right turn signal lights and the indicator in the instrument panel simultaneously come on to alert pedestrians and machines. With the switch in normal position, push the combination switch forward, the left turn signal light comes on, pull the combination switch back, and the right turn signal light comes on.

Electric troubleshooting of front frame section

Inspection of floodlight fault

With neither left and right floodlights nor high beam indicator on, check the floodlight fuse, No.213 and No.230 wires, and measure the voltages of No.601 and No.600 wires on floodlight relay R8. With the high beam indicator on, with voltage thereon, measure whether No.810 wire of earthing cable of interface C11 between front frame harness and rear frame harness is in good condition. If the front floodlight comes on one side and does not come on the other side, then check the connector of the floodlight not on and the bulb. Check whether the bulb is black, if so, it is ascertainable that the bulb is damaged, and replace it.

Inspection of turn signal light fault

Neither turn indicator-lh nor turn indicator-rh comes on, you shall check the secondary steering switch, then check the flash relay. A turn indicator does not come on, check the turn indicator not on and corresponding wiring. Loose connection and bulb damage are possible faults.

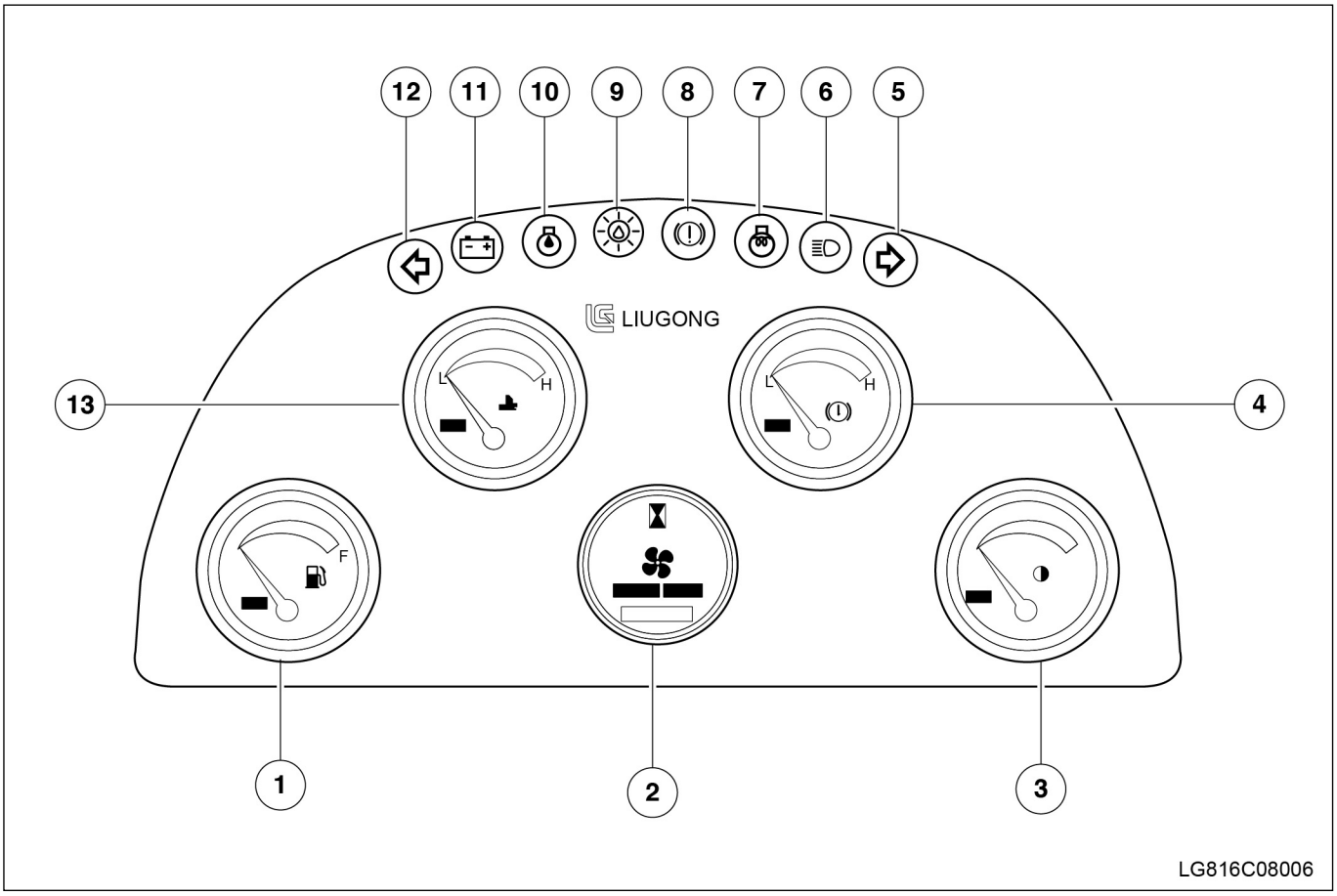
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Cab Electrical Parts

Electric appliances in the cab include three parts, the first part is electric appliance of steering gear box, including instrument part, electric lock, steering gear box harness, barometric sensor under cab, horn; the second part is electric appliance in the attached box on the right of the cab, including fuse, power supply relay, starter relay, switching relay and cab harness; the third part is work light, dome light, electric fan and work light harness at the top of the cab.

Instrument circuit

Instrument panel content

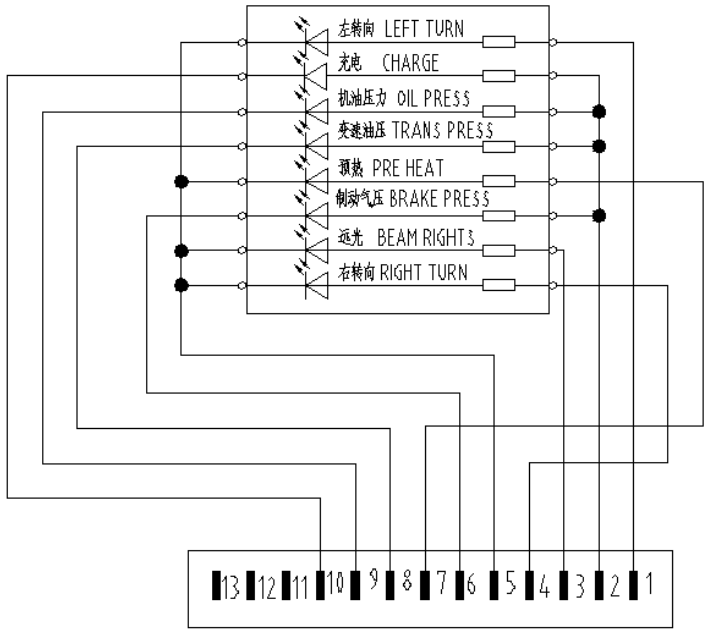


1. Fuel gauge
2. Working hour meter
3. Torque converter oil temp gauge
4. Brake air pressure gauge
5. Right steering (green)
6. High beam (blue)
7. Preheating indicator (red)
8. Brake air pressure (red)
9. Transmission oil pressure (red)
10. Engine oil pressure (red)
11. Charging indicator (red)
12. Left steering (green)
13. Engine coolant temp.

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The instrument panel interior can be split into LED alarm unit and instrument unit.

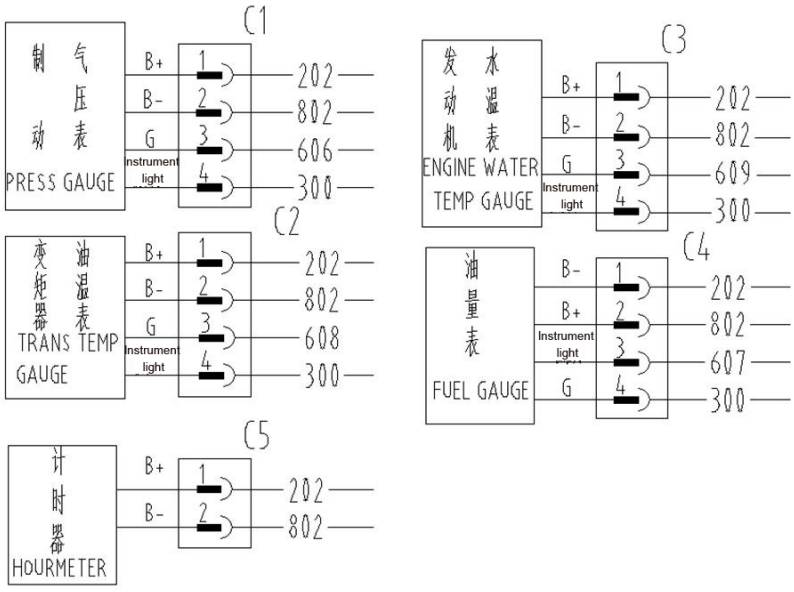
The turn indicator-lh, turn indicator-rh, high beam indicator and glow indicator in the alarm unit are positive controlled, when a positive signal is input, the indicators come on. The engine oil pressure indicator, transmission oil pressure indicator and brake air pressure indicator are negative controlled, when the input terminal is grounded, the indicators come on. The charge indicator input pin is equivalently grounded when the alternator does not generate power, with the indicator on, when the power generating D+ terminal of alternator outputs 24V, the charge indicator goes out. Wiring diagram of alarm unit is as below:



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The alarm unit can be integrally replaced when a fault has occurred.

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LG816C08008

The thermometer, fuel gauge and air pressure gauge used on this machine are moving-magnet instruments.

The reading of brake air pressure gauge corresponds to the resistance value of the air pressure sensor below the brake pedal.

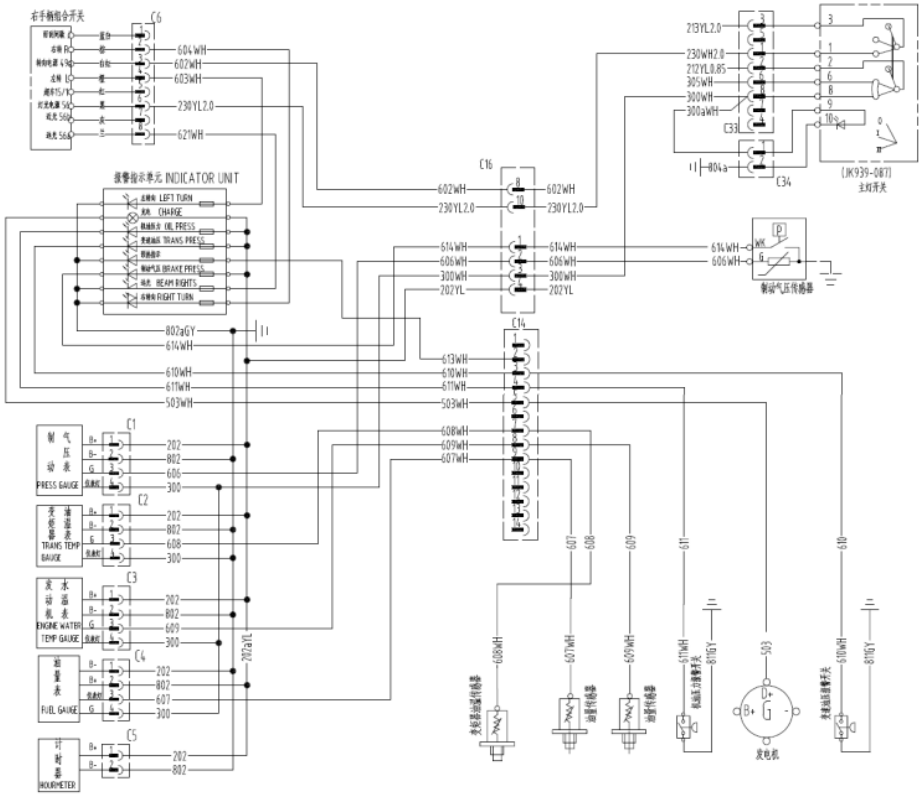
The resistance value of torque converter oil temp gauge corresponds to that of the oil temp sensor on the torque converter.

The resistance value of the coolant temp gauge corresponds to that of the coolant temp sensor on diesel engine.

The resistance value of the fuel gauge corresponds to that of the sensor on the fuel tank.

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Instrument wiring diagram is as below:



LG816C08009

The interiors of the instrument and sensor in this machine are not allowed to be opened.

The working principle of sensor will be introduced in the rear frame section.

Instrument and sensor wiring is shown in the Fig.:

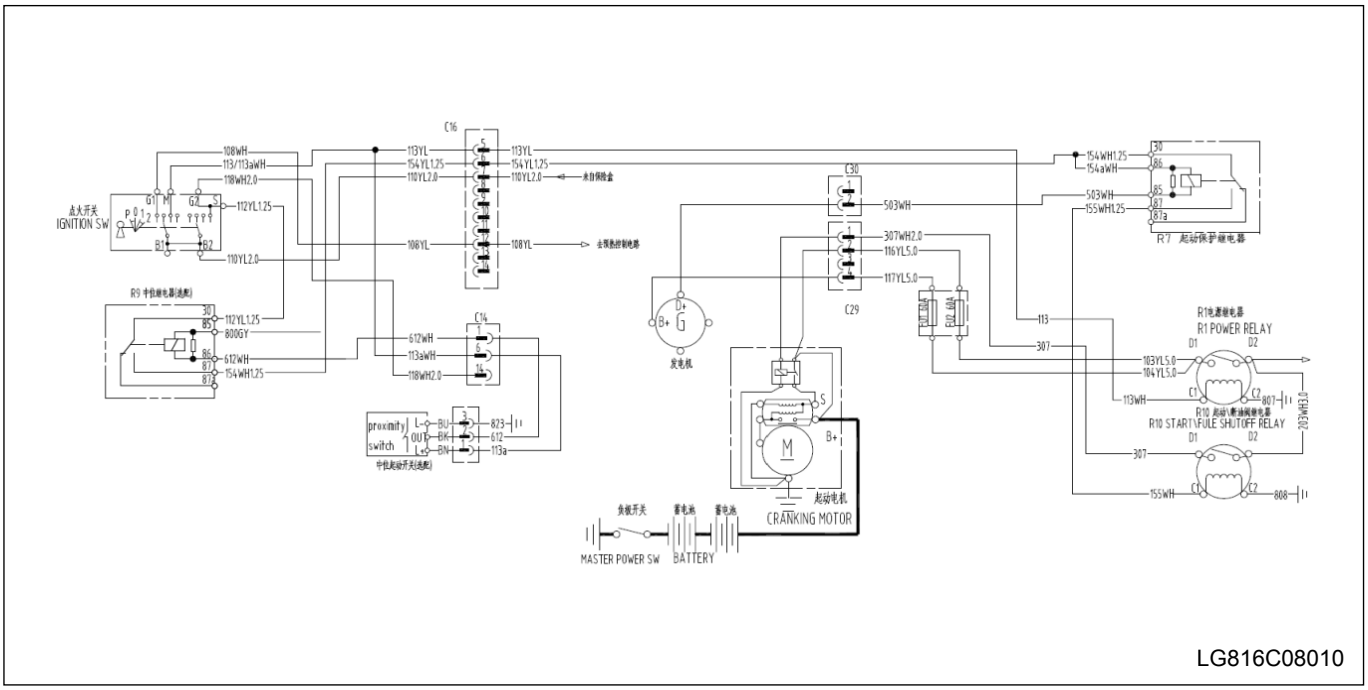
The signal channel of No.606 wire of brake air pressure gauge is: gauge--C1"3--C16"2--terminal G of air pressure sensor.

The signal channel of No.607 wire of oil level gauge is: oil level gauge--C4"3--C14"9--oil level sensor.

Other signals are analyzed similarly, there is no need to enumerate all the analyses here.

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Power supply circuit



LG816C08010

Start introduction to complete machine power supply and starter

After the power switch (also known as the disconnect switch) is on, two batteries are connected in series, with nominal voltage of 24V, the current circuit is No.116 wire at +B terminal of starter, connector C29, 60A fuse to a contact of the power supply relay, then connected with terminal B1-B2 of the electric lock through No.100 wire, 10A electric lock No.110. Switch on the electric lock (turn the electric lock to ON), terminal B1-B2 is connected with terminal M, No.110 wire and No.113 wire are connected, current flows through No.113 wire, and the power supply relay coil is earthed. After the power supply relay coil is energized, the contact switch is on, No.103 wire and No.101 wire are connected, and 12-way fuse box is energized. Supply power for complete machine load. The hazard signal light and dome light are energized immediately after the disconnect switch is connected, not through the power supply relay.

Introduction to starter circuit

Turn the electric lock to START position: terminal B1-B2, terminals M and S are connected with each other, No.110, 118 and 112 wires are connected. No.118 wire is not used in this model. The installation position of neutral starter relay is reserved inside the instrument panel, No.112 and 154 wires are shorted under normal conditions, and No.154 wire is connected with start-up protection relay R7. The other terminal of the relay coil is connected with terminal D+ of the alternator. After R7 is connected, R10 starter relay is connected, and No.307 wire of the starting coil of starter motor is energized. The starting coil and main terminal B+ of starter motor are simultaneously energized, namely that they have the starting condition.

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Principle introduction to start protection

The starter motor pinion drives the big flywheel to operate, after reaching the set speed, diesel engine fuel is combusted, and starting is successful. At this moment, the small wheel of starter motor shall be detached from the big flywheel; otherwise, the big flywheel drives the small wheel to rotate, and it will damage the starter motor. The start-up protection relay is added in design in order to avoid the occurrence of the above condition, with one terminal of the coil connected to the electric lock, and the other terminal connected to terminal D+ of the alternator. Feature of D+ terminal: the voltage is 0 V, earth potential when engine is still; the voltage is 24 V, high potential when diesel engine speed is close or over idle speed. After the diesel engine starting process is completed, both terminals of the coil of start-up protection relay R7 are 24V, the coil changes from pulled-in condition into release condition, and No.307 wire of the starter relay coil is de-energized.

Neutral starting function, the gear shifting of this model is controlled by a flexible shaft, and there are three positions: D, R and N. To start the machine, you shall turn the control lever to neutral position. The neutral starting function as we said means electric operation is live only when the shift control lever is in neutral position. The measures to be taken is that an electronic approach switch is installed near the shift control valve, and an induction block for detecting the flexible shaft position is installed near the flexible shaft bracket. The contact of approach switch is closed and the coil of neutral relay R9 is energized and pulled in only when the lever is in the N position. No.112 and No.154 wires are conducted. No. 154 wire is connected to relay R7.

⚠ Caution: The function is optional, and will only be added when required by customers. No.112 and No.154 wires are usually shorted.

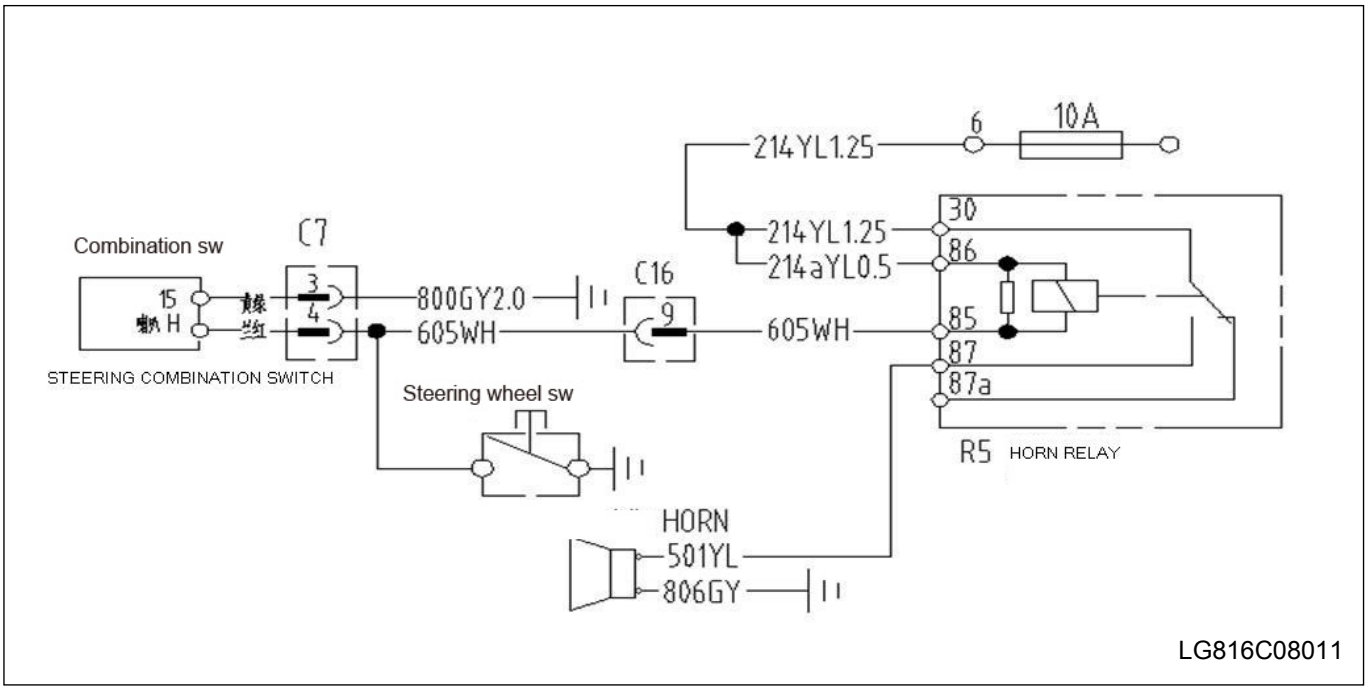
After engine starting, the alternator driven by the drive belt starts to generate power (nominal voltage 28V). The power B+ output by the alternator flows through the 60A fuse to No.104 wire through No.117 wire, on one hand, it supplies power to the batteries, on the other hand, it supplies power to the complete machine load through the relay to fuse box. After engine starting, the driver releases the electric lock key, the electric lock automatically returns to "ON" position, No.112 wire is de-energized, the starter relay contact is disconnected, No.307 wire is de-energized, and the starter motor stops operating.

Engine stopping

Make the machine in a stopped state, lower the bucket to be close to the ground, with the diesel engine runs at idle speed for around 2 minutes, lift up the choke cable, the engine is choked, the alternator no longer generates power, and the complete machine under electric load is de-energized. Turn off the switch, disconnect the disconnect switch of power supply, and the complete machine is de-energized.

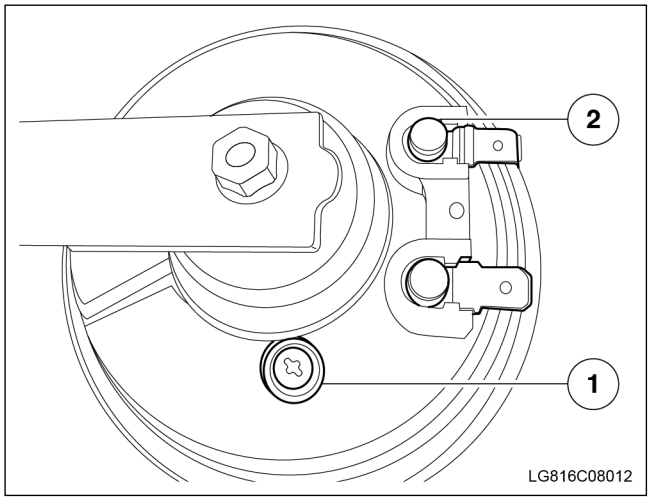
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Introduction of circuits relating to horn control circuit



Control principle

Pins 30 and 86 of the horn relay are connected with power supply 214 from the fuse, and pin 87 is connected with the horn. One terminal of its coil is connected with power supply 214, and the other terminal is connected with No.605 wire. When you press the combination switch horn button on the steering gear box or the upper cover in the middle of the steering wheel, No.605 wire is connected with ground 800. At this moment, the relay is pulled in, and the horn sounds.



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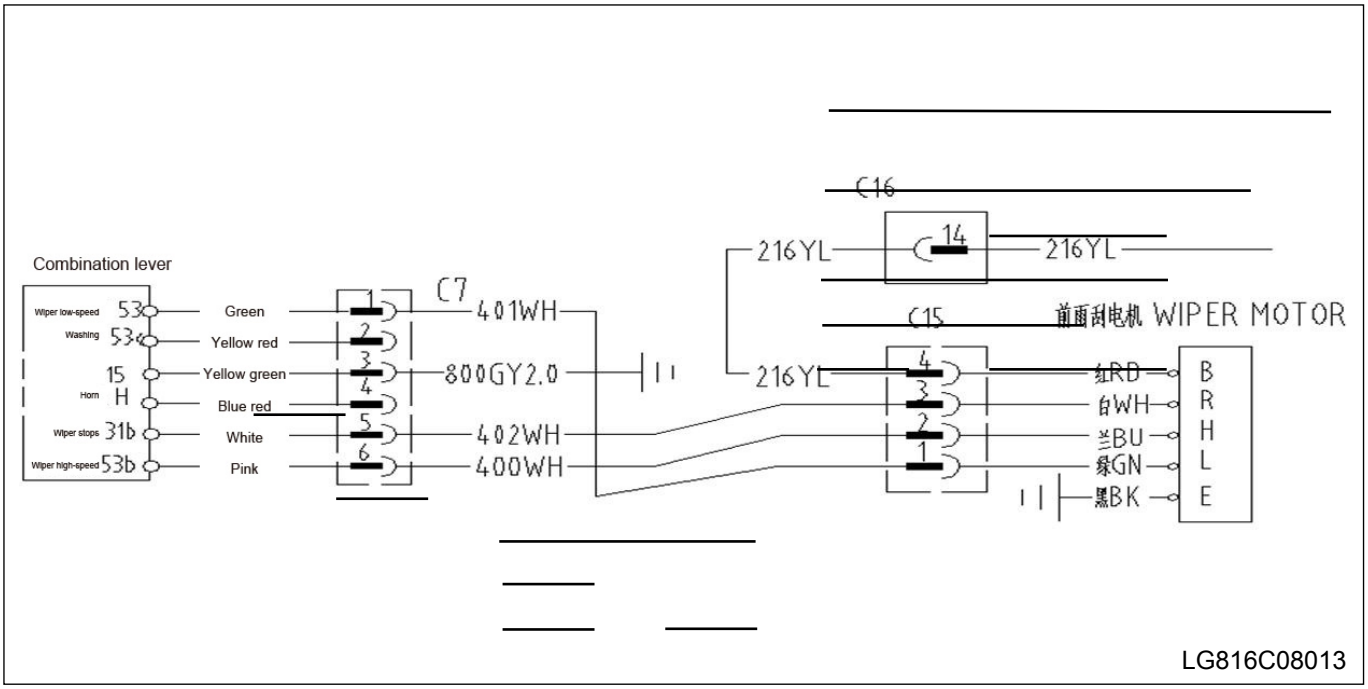
Service process of horn failure to ring

1. **Short No.214 and No.501 wires of the horn relay, the horn shall sound; otherwise, check the horn and harness plugs and the horn itself.**
2. **Short No.605 wire to ground, the horn sounds, it indicates that the relay is OK, and you shall check C16 and C7 combination switches and the switch on the steering wheel. On the contrary, if the horn does not sound, it indicates that the relay has a fault.**
3. **Refer to Figure LG816C08012, adjust the serial number 1 to change the sound frequency of the horn, serial number 2 is the horn coil, one terminal of the coil shall be connected with power supply, and the other terminal shall be connected with the earthing cable.**

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Introduction to wiper control system

Electrical principle



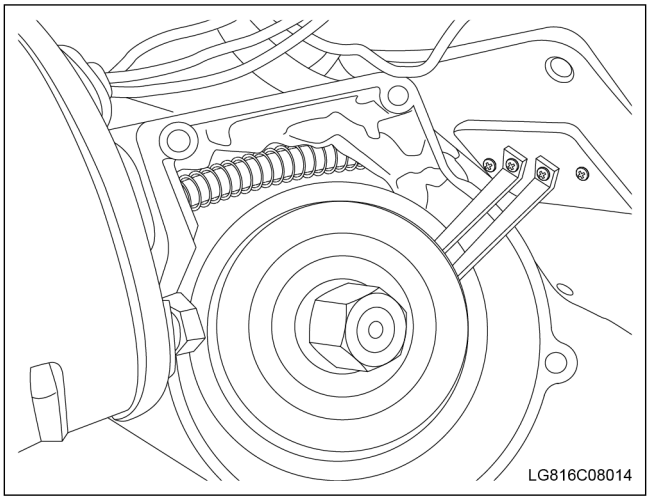
LG816C08013

The front wiper motor configured for this machine is a permanent magnet motor, using the method of negative control. As shown above, the wiper motor is externally connected with five wires, of which the red is for power wire (common brush lead of high-speed armature and low-speed armature), black for negative wire (connected to the ground through motor housing), blue for high-speed lead, green for low-speed lead, and white for reset wire. After the electric lock is switched on, No.216 wire is energized (24V). If the combination switch wiper function is in I position, No.401 wire and No.800 earth are connected, and the motor runs in low-speed position; if the wiper switch is in II position, No.400 wire and No.800 earth are connected, and the motor runs in high-speed position; if the wiper switch is off (i.e. change from I to O), No.401 low-speed wire and No.402 wiper blade reset wire are connected, switch to the initial position, and the wiper stops.

The motor is provided with an automatic positioning device inside to ensure that the wiper can always stop in the initial position. The wiper does not stop in the initial position, current passes through No.216 wire-low-speed winding-low-speed No.412 wire-combination switch pins 3 and 5 are connected-to chassis ground, and the motor continues to operate. When the wiper operates to the initial position, the reset line is disconnected from ground, and the red power cord is connected with the reset line. The low-speed armature of wiper motor is shorted, and immediately stalls after electromagnetic braking torque is generated.

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Wiper zero returning structure



Wiper troubleshooting

1. Motor not running

Dry wiping for a long time, the motor runs in an overload state, causing fuse melting and motor stalling; wiper control switch contact wear and poor contact also cause motor stalling; after the combination switch is replaced, incorrect switch model will cause wiper stalling, no wiper blade zero returning, fuse burning, etc., check whether internal wiring of switch meets the requirements.

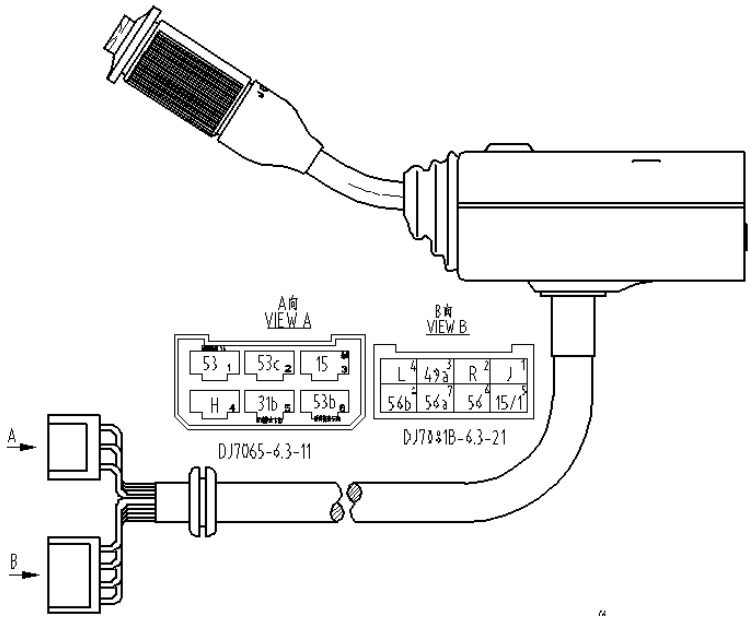
2. Motor running, no wiper blade movement

The cause is slipping of wiper blade and motor output shaft, the solution is to tighten the nut or replace the wiper blade.

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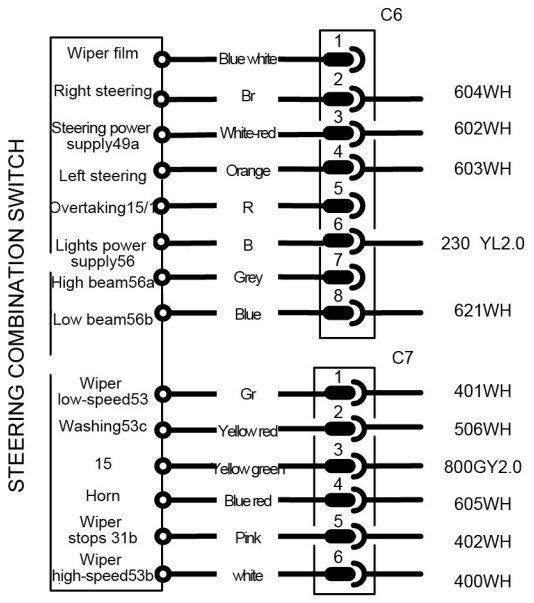
Combination switch

The combination switch is installed to the steering gear box steering column, the appearance and connector outgoing line are as illustrated in the figure below



LG816C08015

The function of the combination switch is as illustrated in the figure below



Steering wheel sw

LG816C08016

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The logical relationship of combination switch is as illustrated in the figure below

Contact No. (wire color)			L Orange	49a White-red	R Brown	56 Black	56b Grey	15/1 Red	56a Blue	15 Yellow green	J Blue white	31b White	53b Pink	53 Green	444c Yellow red	H Blue red
Rated current (A)			4.5	4.5	4.5	6.5	6.5	6.5	6.5		1	6	6	5	2	4
Switch position	Horn	OFF														
		ON								●						●
	Wash	OFF														
		ON								●					●	
	Wiper	0										●		●		
		Turn left (I)								●				●		
		Turn left (II)								●			●			
		Turn right (J)								●	●	●		●		
	Steering	Left	●	●												
		Middle														
		Right		●	●											
	Night lights	Blow				●			●							
		Middle				●	●									
		Up				●	●	●	●							

Precautions for checking the combination switch:

- The functions on connector A include horn, washer and wiper, all of which are negative controlled, and pin 15 is a ground pin. The functions on connector B are turn signal light and dimmer, pin 49a is connected to the turn signal power supply, and pin 56 is connected to the floodlight power supply.
- Complicated mechanical structure of the combination switch often causes some function damages. During service, do not connect the power supply on connector B to connector A; otherwise, it is easy to cause a short circuit to power supply, leading to unnecessary loss.

Electric fan

When the fan does not run, note to check the fan power supply and fan switch.

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Relay

Function of relay

1. Control function

Use low current controls high current or DC current controls AC current, and vice versa.

2. Switching function

The logical function can be achieved through the combination of relays (relationship of and, or, no).

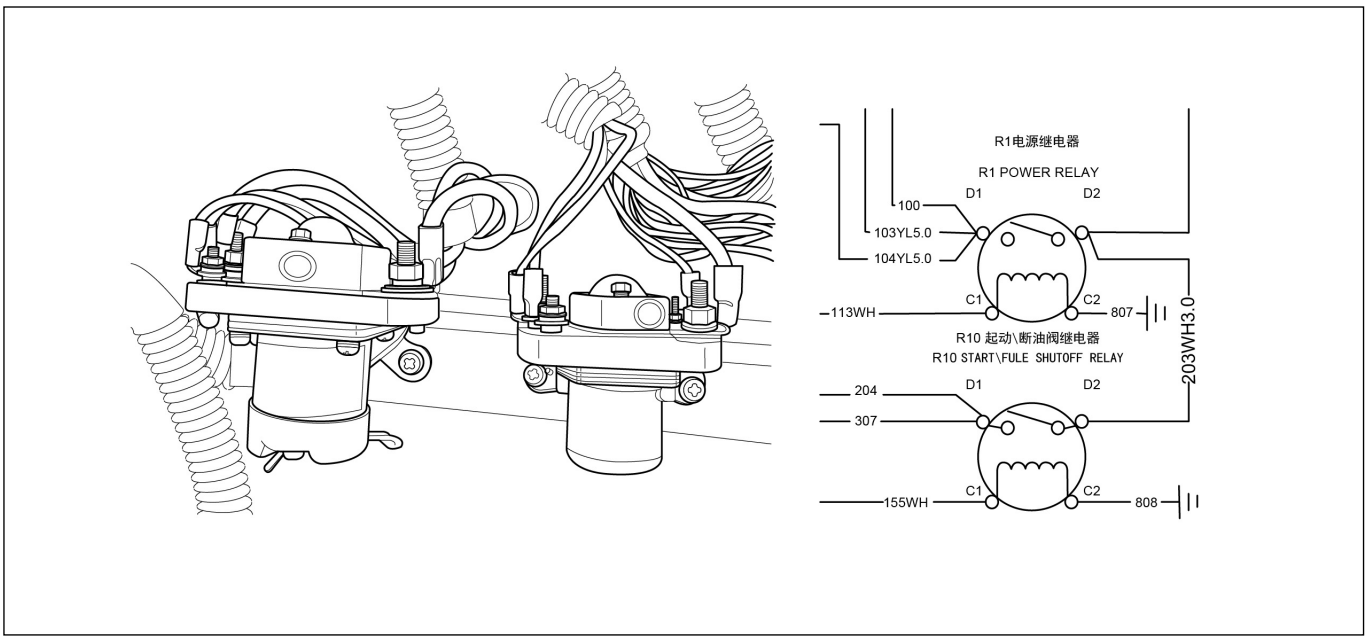
Determining the condition of relay

1. **Measure the voltages on two terminals at the control terminal, if there is voltage, it indicates internal binding or broken circuit of the coil.**
2. **Measure the voltage on the power supply terminal, if there is no voltage, find corresponding fuse; if there is voltage, measure the voltage on the load terminal. If there is no voltage on the load terminal, it indicates relay wear or ablation. The relay should be replaced.**

⚠ **It is important to note that the relay is not a vulnerable part, please check and judge carefully.**

Appearance of power relay and starter relay

The power relay and starter relay have the same principle, 2 thick terminals are connected with the power supply and load, 2 thin terminals are connected with the control line, and there is no division of positive and negative terminals. Wiring diagram of power supply relay and starter relay is as below.

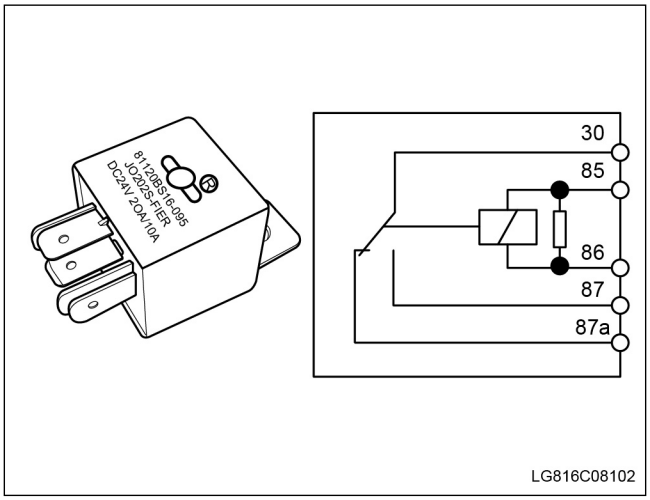


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Intermediate relay (conversion relay)

The R7 start-up protection relay, R5 horn relay, R2 backup alarm relay, R4 brake relay and R8 main light relay used in this electric system are all small intermediate relays.

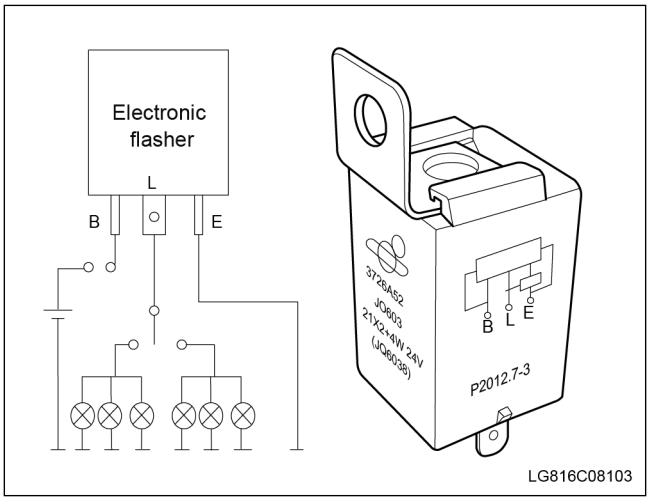
The appearance is as shown in figure: The wiring of intermediate relays is as shown in the right figure, 85 and 86 are connected with the control line, 30 is connected with the load power supply, 87a is a normally closed terminal, and 87 is a normally open terminal. 86 and 85 are internally connected with a resistor in parallel on the coil in order to eliminate the effect of the moment at which the relay is disconnected on electrical elements in the line.



Flash relay

The flash relay outputs a flashing signal for flashing of the turn signal light. There are three common categories of flash relays: 1. Capacitor type flasher; 2. Vane type flasher; 3. Electronic flasher. The electronic flash relay is used for this machine.

Wiring and Outline



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Three pins of electronic flasher

B: Power supply terminal;

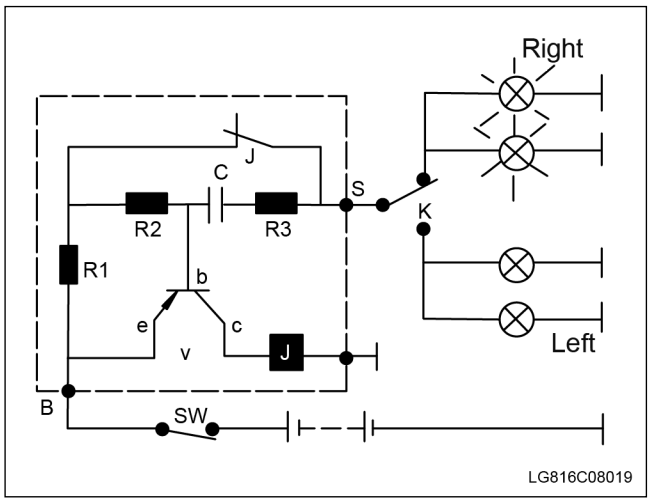
L: Flash control terminal;

E: Earthing terminal;

The electronic flash relay controls the relay coil to be energized and de-energized, connects and disconnects the contact and makes the turn signal light flash by using the switching characteristic of transistor and the charge and discharge delay characteristic of capacitor.

Working principle of electronic flash relay

For example, when you turn right, connect the power switch SW and turn signal switch K, current flows from battery positive--terminal B--resistor R1--normally--closed contact J of relay--terminal S--turn signal switch K--turn signal light-rh--earth--battery negative to form a circuit, and the turn signal light-rh comes on.



In the second process, when current flows through resistor R1, a voltage drop is generated on resistor R1, transistor VT is conducted due to forward bias, collector current flows through relay coil J, so that the normally-closed contact of relay is immediately opened, and the turn signal light-rh goes out with it.

In the third process, the base current of V flows to capacitor C for charging while triode transistor V is conducted.

In the fourth process, charging circuit: battery (+) -- power switch SW -- terminal B -- emitting electrode e and base electrode b of V -- resistor R3 -- terminal S -- turn signal switch K -- turn signal light-rh -- earth -- battery (-). In the process of charging, charging current gradually decreases with capacitor charge accumulation, so does the collector current Ic of transistor, when the current is not enough to sustain the pull-in of armature and released, the relay contact is closed again, and the turn signal light comes on again. At this time, capacitor C is discharged through resistor R2, normally-closed contact J of relay and resistor R3. The voltage drop generated on R2 by discharge current supplies reverse bias to the transistor and accelerates transistor cut-off. When the discharge current is close to zero, the voltage drop on R1 supplies positive bias to the transistor, so that the transistor is conducted.

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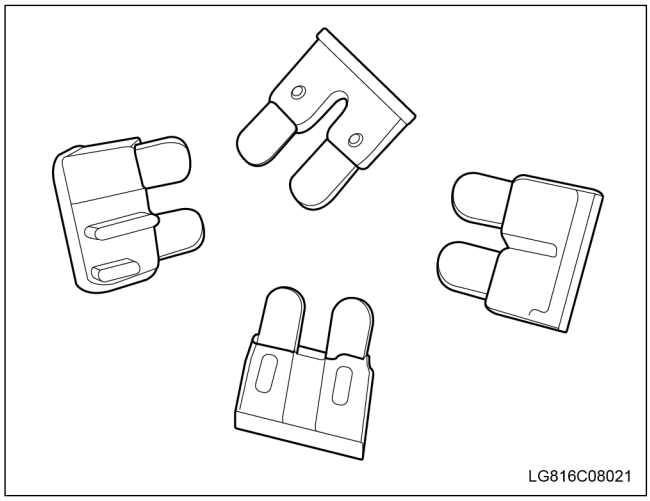
In this way, the capacitor is continuously charged and discharged, so the transistor is continuously conducted and cut off, the relay contact is controlled to be repeatedly opened and closed, making the turn signal light flash.

We can see from the above working principle of flash relay that only the pin B power supply, pin E earthed and pin L connected with turn signal light of flash relay can have the effect of blinking. Pin L has no flash signal output if the terminal L is suspended, that is to say, we cannot judge the condition of relay with terminal L suspended.

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Fuse

The fuse plays a very important role of safety protection in the circuit. See the Fig.



To replace the fuse, be sure to use a fuse of the same specification, and it is not allowed to use a copper wire for emergency treatment. The plate fuse and flat fuse (60A) used for this machine must be in strict conformity with relevant provisions of QC/T 420 Fuse-links for Motor Machines. Therefore, if fuses need to be replaced during the Service, please try to use the attachments provided by Liugong.

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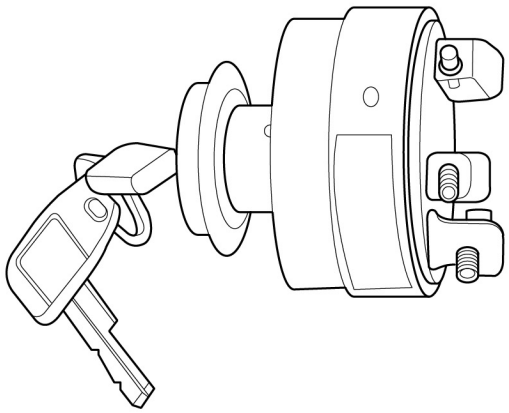
Electric lock

The stop position of electric lock is OFF, the 1st position of the key turned to the right is ON position, and the gears may be maintained. Turn on the complete machine power, the 2nd position of right turning is START position. After the external force is removed, return to the 1st position for starting the diesel engine. The 1st position of left turning cannot be maintained, but may be used for manual preheating.

This electric lock has pins B1-B2, M, S, G1, G2, and G1 is used when the preheating function is available.

B1-B2 is the power pin, connected with No.111 wire; M is the ignition pin, connected to No.113 wire; S is the start pin, connected with No.112 wire.

For the functional position diagram of this electric lock, see the table below. (Description: "●" indicates connected, for example, turn the electric lock to "ON", then B1-B2 and M are connected).



	B1	B2	M	S	G1	G2
OFF	●	●				
ON	●	●	●			
START	●	●	●	●		●
辅助	●	●			●	

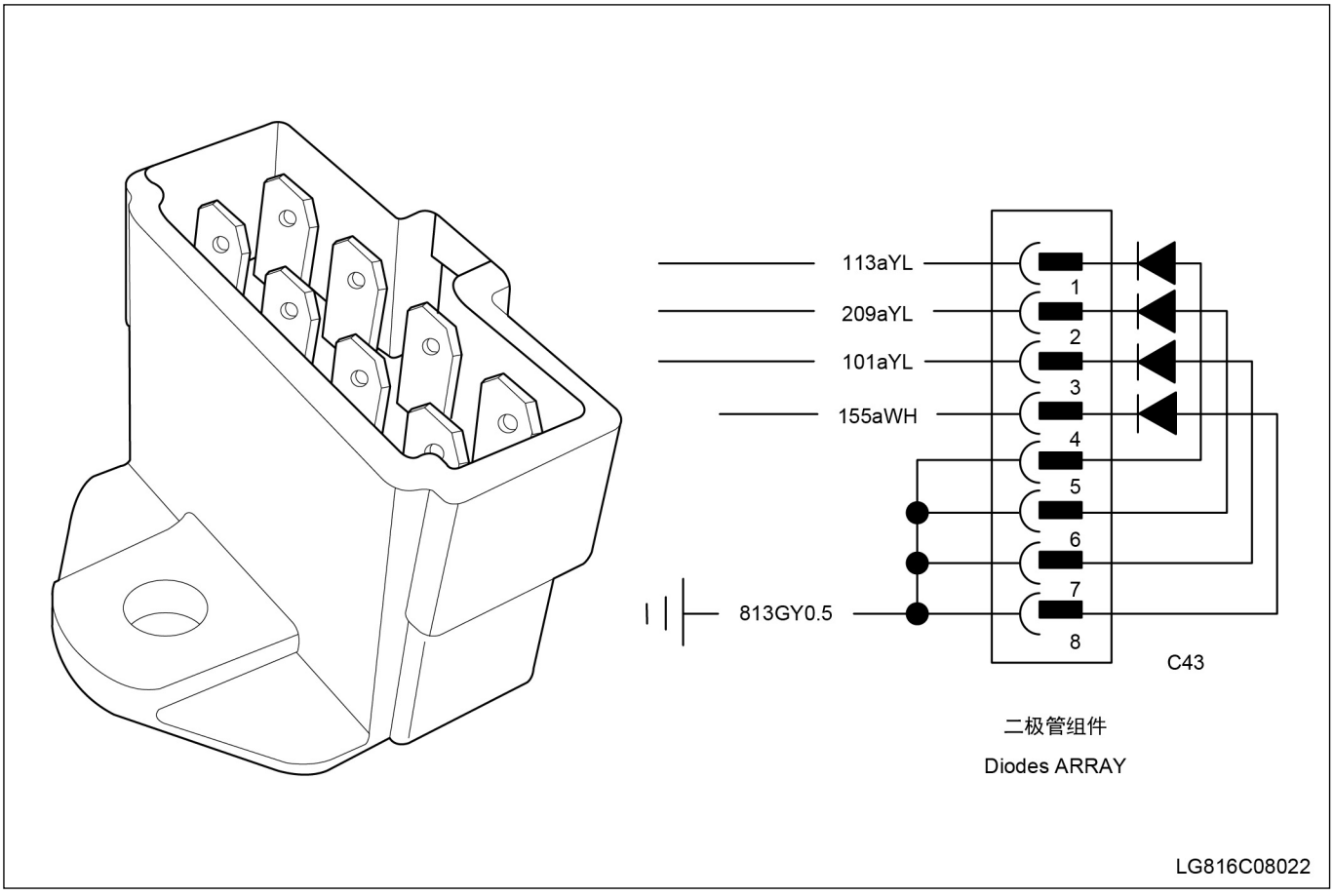
LG816C08020

The method of judging whether the electric lock is damaged: Detach No.113, No.118 and No.112 wires, select and use the DCV 200V range of multimeter, with the black pen earthed, measure the output point on the electric lock with the red pen separately, and its voltage should be consistent with the voltage on B2.

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Diode gp

This diode gp is formed by combining four diodes, as shown in figure, it is a diode unit between every two copper plates. The basic characteristic of diode is the unilateral conduction performance, i.e. forward conduction, reverse cut-off. The diode gp has an effect of "subsequent flow" on the relay coil in the circuit of this machine. The method of judging whether the diode gp is damaged: Connect the red pen of multimeter (diode range) to the diode positive (the upper copper plate is positive in the figure), connect the black pen to the diode negative (the lower copper plate is negative in the figure), the display value shall be between 500-700, inversely connect, and the highest position of multimeter shall display 1. If the diode is shorted due to breakdown, it will cause fuse melting of 10A electric lock. In this electric system, No.113, No.209, No.101 and No.155 wires are respectively connected with the diode negative to absorb the induced electromotive force generated by the electric fan, power supply relay, starter relay and other inductance elements when they are stopped.

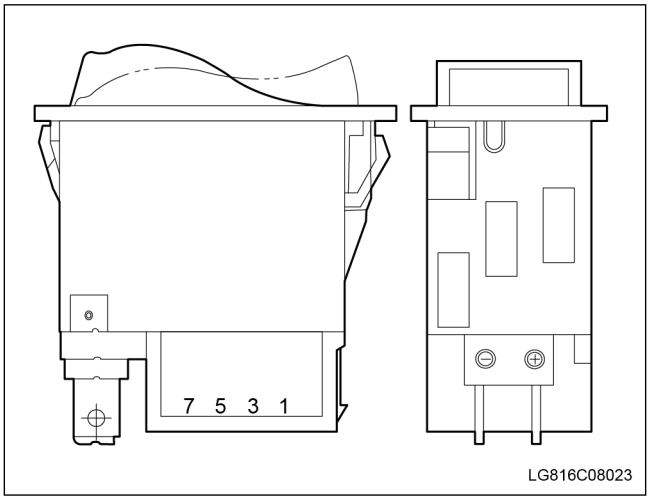


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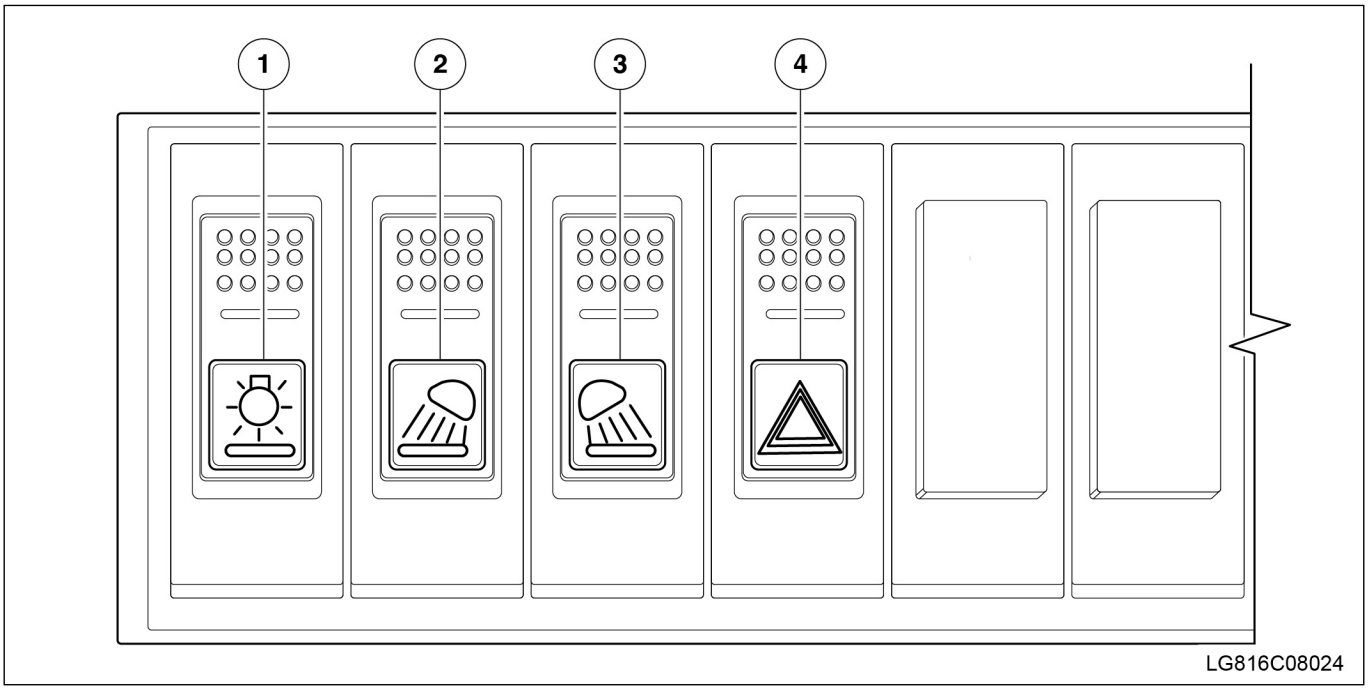
Switch

Wire identification of switch

There are pin numbers on the plastic housing of switch sides; one side is 1, 3, 5, 7 and 9 and the other is 2, 4, 6, 8 and 10. Pin 9 and 10 connect to the indicator: pin 9 to the positive and pin 10 to negative.



4 switches are used for this machine



1. Main light switch

2. Front work light switch

3. Rear floodlight switch

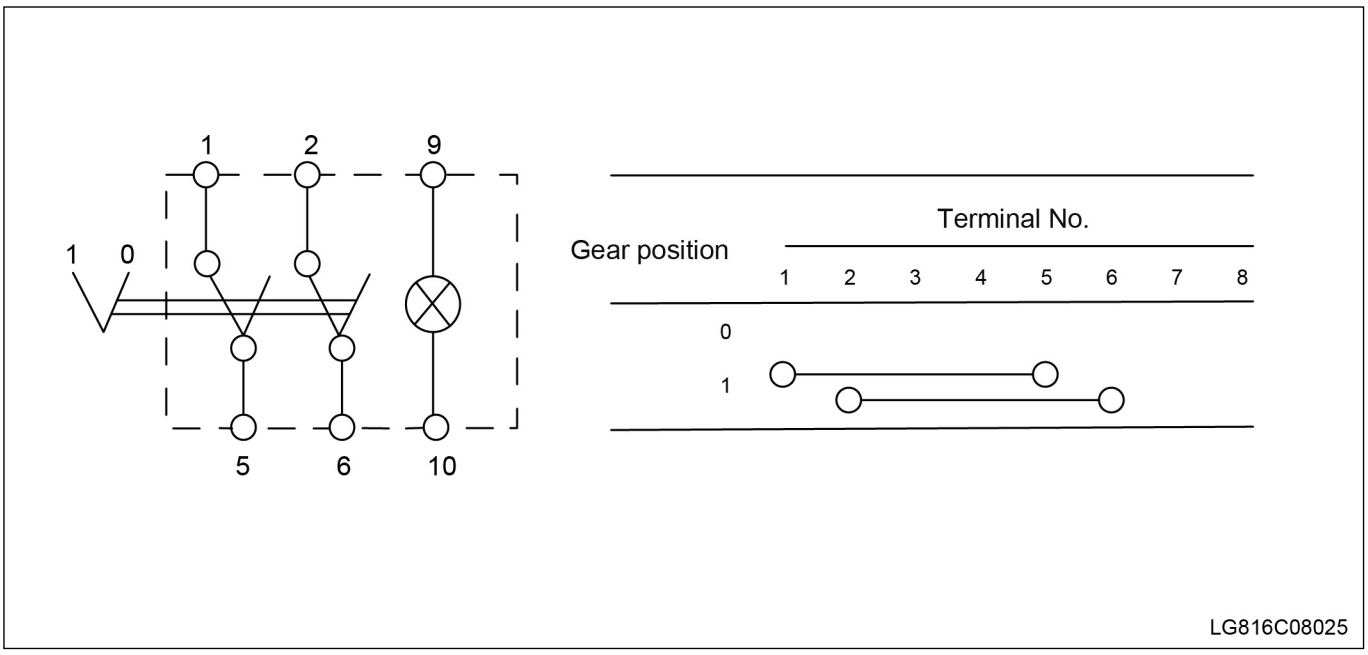
4. Emergency light switch

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1. **Main light switch, press the 1st position, the position light comes on, after the 2nd position is pressed, the floodlight low beam light comes on, rotate the combination switch, and the high beam light comes on.**
2. **Front work light switch, after it is pressed, both lights at the top of the cab come on.**
3. **Rear floodlight switch, after it is pressed, both lights on the rear engine hood come on.**
4. **Emergency light switch, after it is pressed, both turn signal light-lh and turn signal light-rh come on. After you turn off or remove the key, press the switch to supply power to No.114 wire. With the electric lock in ON position, press the switch to supply power to No.218 wire.**

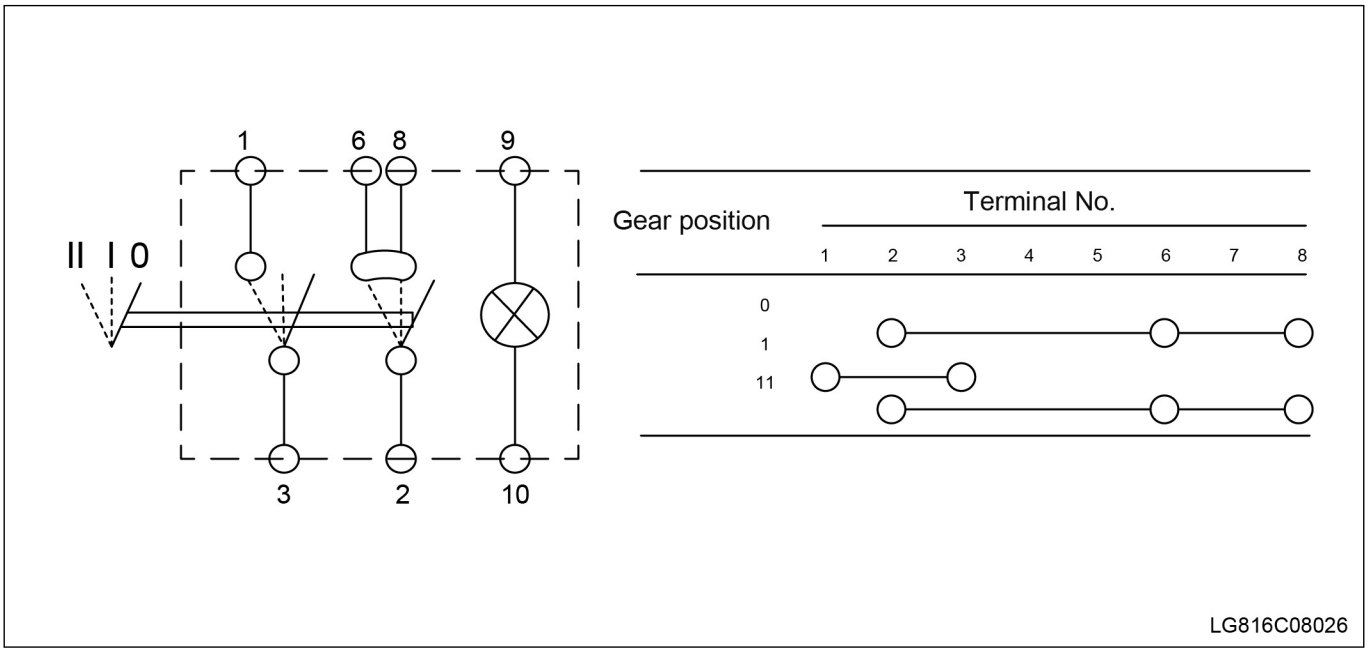
Switch wiring and positions relationship

Wiring and gear diagram of front work light and rear floodlight, switch model: JK939-157

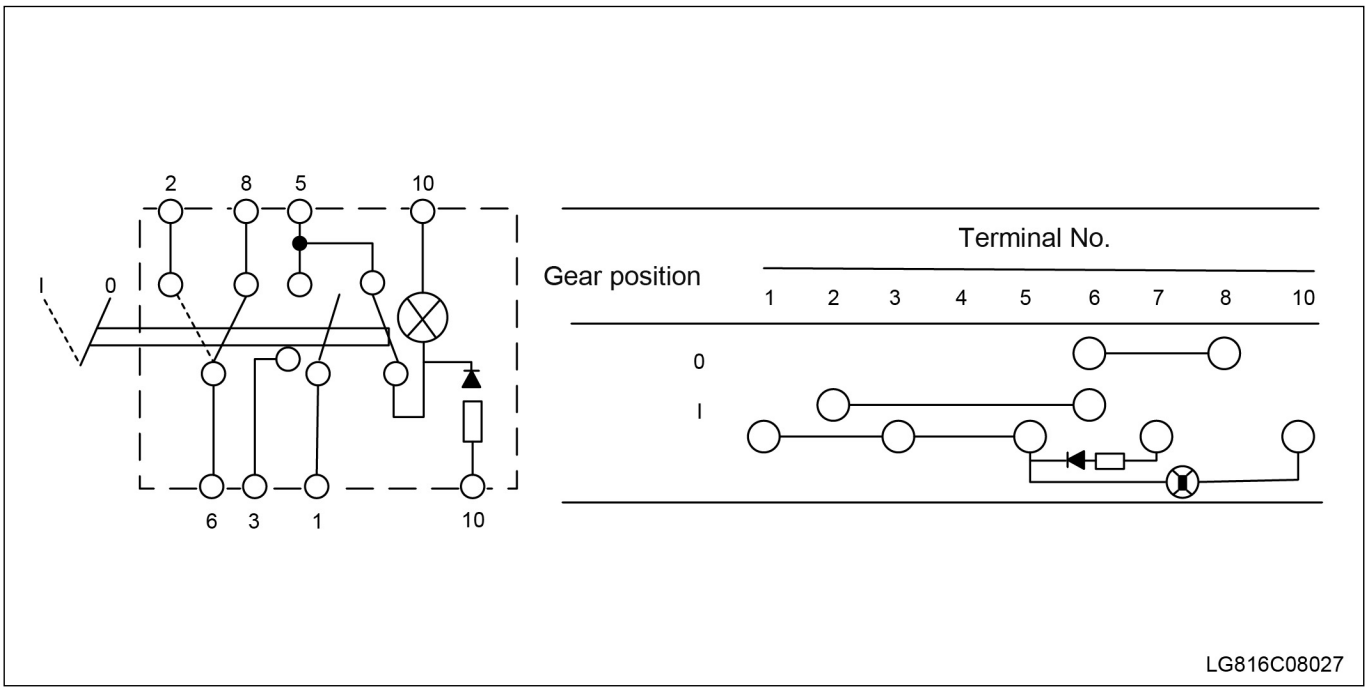


Wiring and position diagram of main light, switch model: JK939-087

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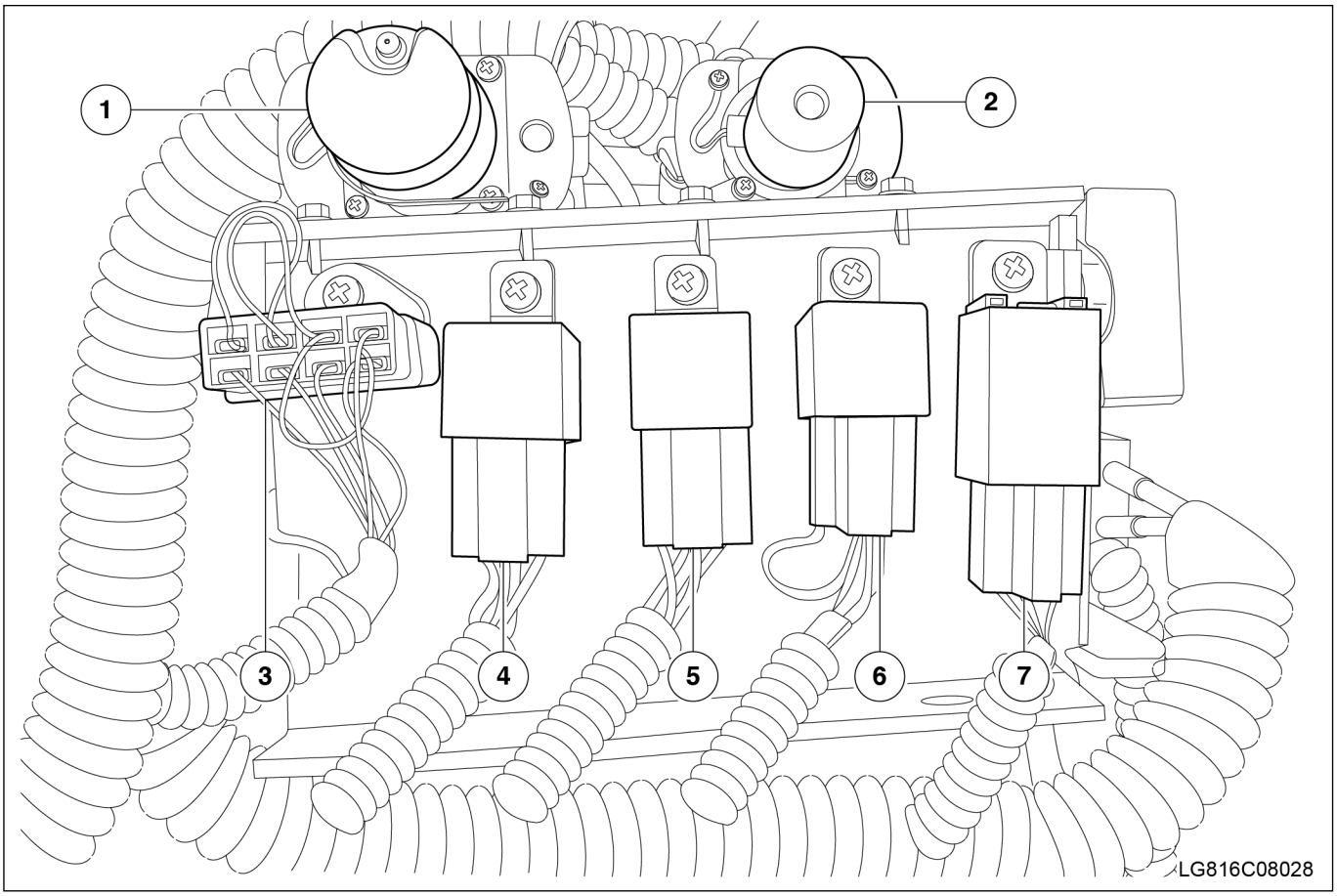
Wiring and position diagram of emergency light switch, switch model: JK939-193



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Relay AS

The relay AS is installed in the attached operation box on the right side of the cab.



1. Power supply relay
2. Starter relay
3. Combination diode
4. Brake relay
5. Horn relay
6. Start protection relay
7. Flash relay

Power supply relay type MZJ-100A/006, specification: DC, 24V/100A.

Starter relay model: MZJ-50A/006, spec: DC, 24V / 50A.

Flash relay type JQ603, specification: 21X2+4W.

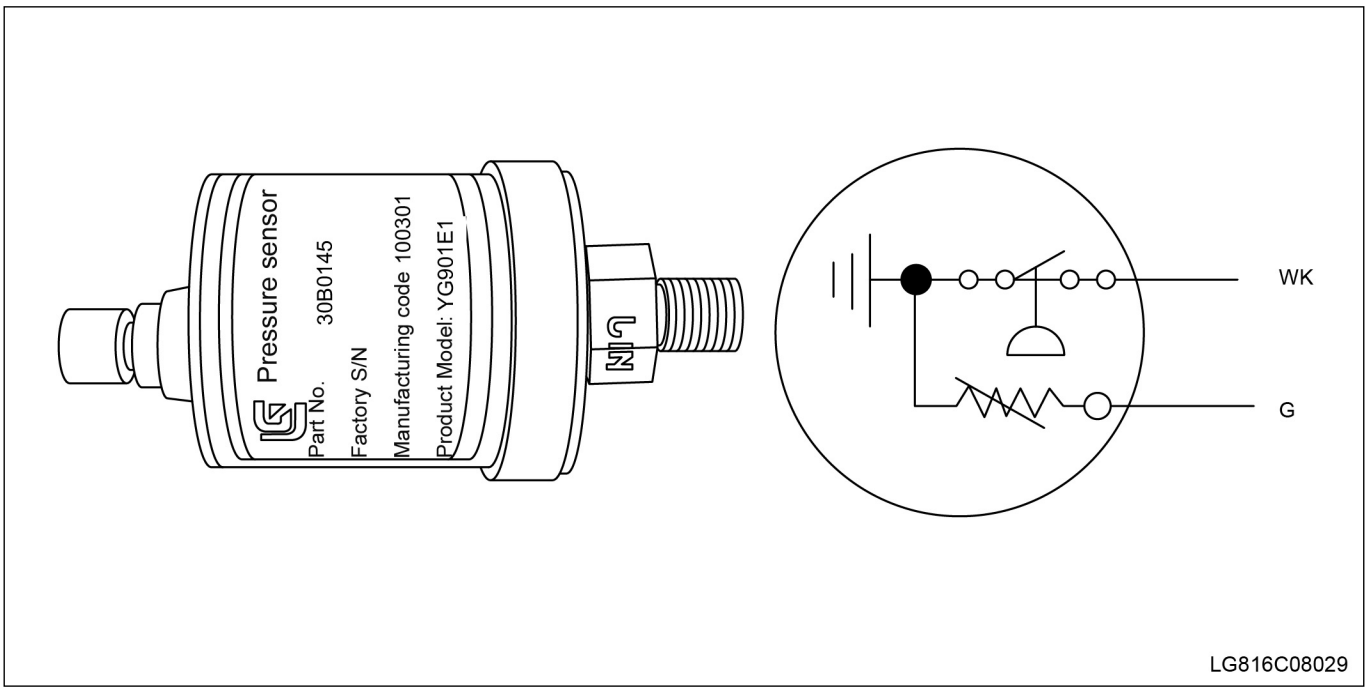
Intermediate relay type JQ202S-FIER, specification: DC24V, 20A/10A.

The structure principle and wiring of the above relays have been elaborated above, and there is no need to repeat them here.

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Air pressure sensor

The air pressure sensor is installed below the foot brake valve, fixed to the air pressure pipeline, its appearance is as illustrated in the figure below. The upper interior of sensor is equivalent to a variable resistor and a switch. The measuring pressure range is 0-1 MPa, when it is below 0.4 MPa, the switch gives an alarm, and the contact is closed. The load capacity of switch is not more than 3W.



The connection form of air pressure sensor: Threaded 1/8NPT.

The electric wiring of air pressure sensor uses M4 stud, WK outputs switch signals, connected with the warning indicator, terminal G outputs resistance signals, connected with the air pressure gauge.

Fault detection of air pressure sensor: Its housing is grounded. You can judge the condition of terminal by measuring the resistances of terminals G and WK with a multimeter.

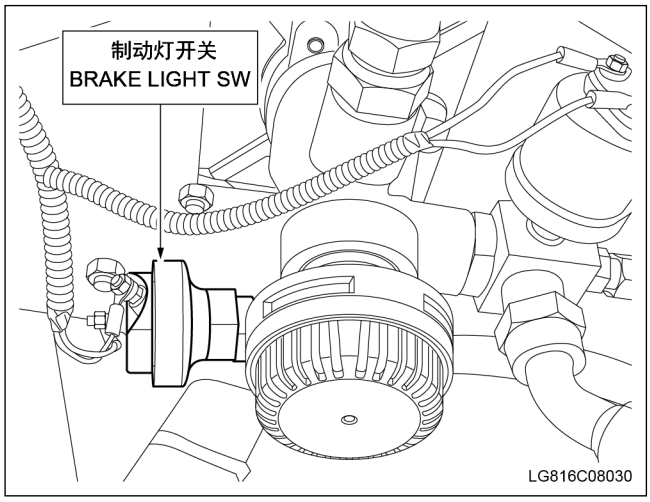
Normally, the resistance of terminal G increases with its internal pressure. The resistance value of terminal WK is zero when the internal switch is on.

Brake light switch

The brake light switch is installed to the pipeline under the foot brake valve, as shown in figure, after the brake pedal is depressed, the brake light switch is on. The braking relay is on, and the brake light comes on.

For fault inspection, you can short two wires on the switch or measure the resistance values of two terminals of the switch with the ohm range of multimeter after a switch fault is suspected. When the switch is on, the resistance value shall be zero, after the switch is off, the resistance value shall be infinitely great.

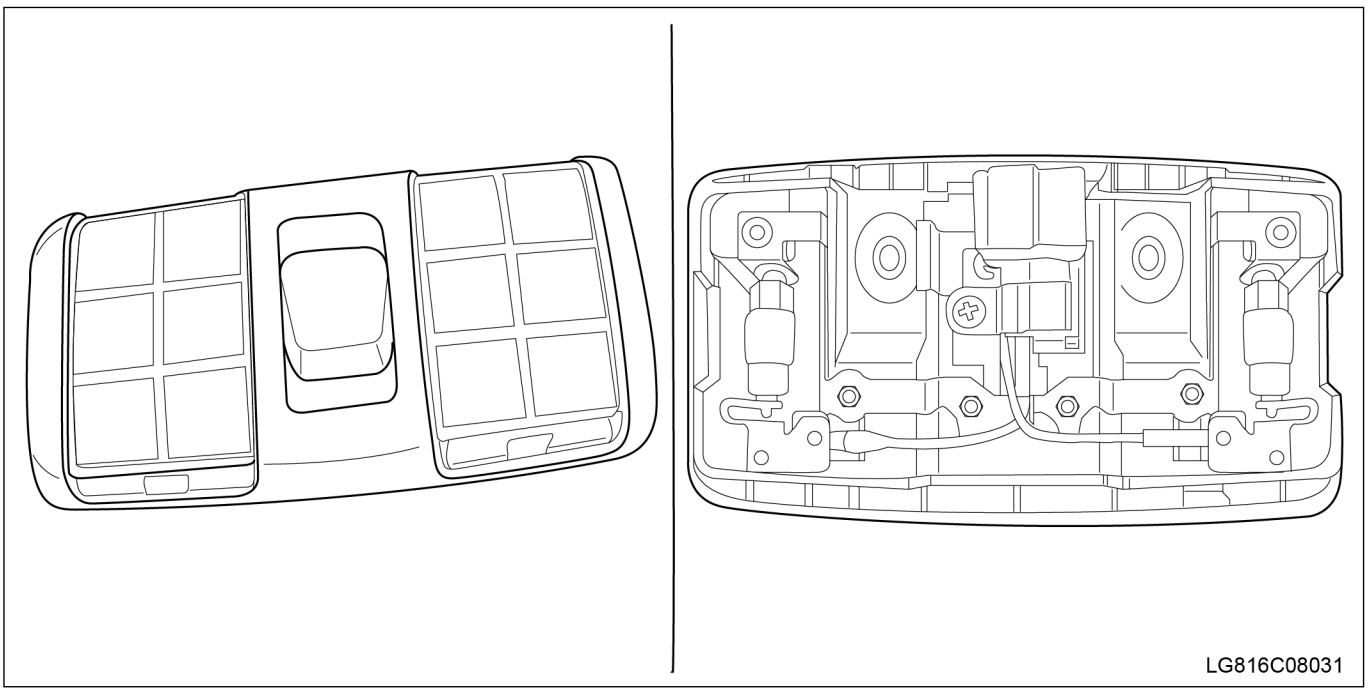
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Dome light

The dome light is installed at the internal top of the cab, with a switch in the middle of the light. Turn the switch, the lights on both sides of the switch simultaneously come on. No.114 wire of the fuse box supplies power to the dome light, and you can energize the light without turning on the electric lock.

Fault repair of dome light: Remove the dome light, observe the condition of its sliding contact, wipe out dirt on its surface as necessary, and correct its shape with a screwdriver.



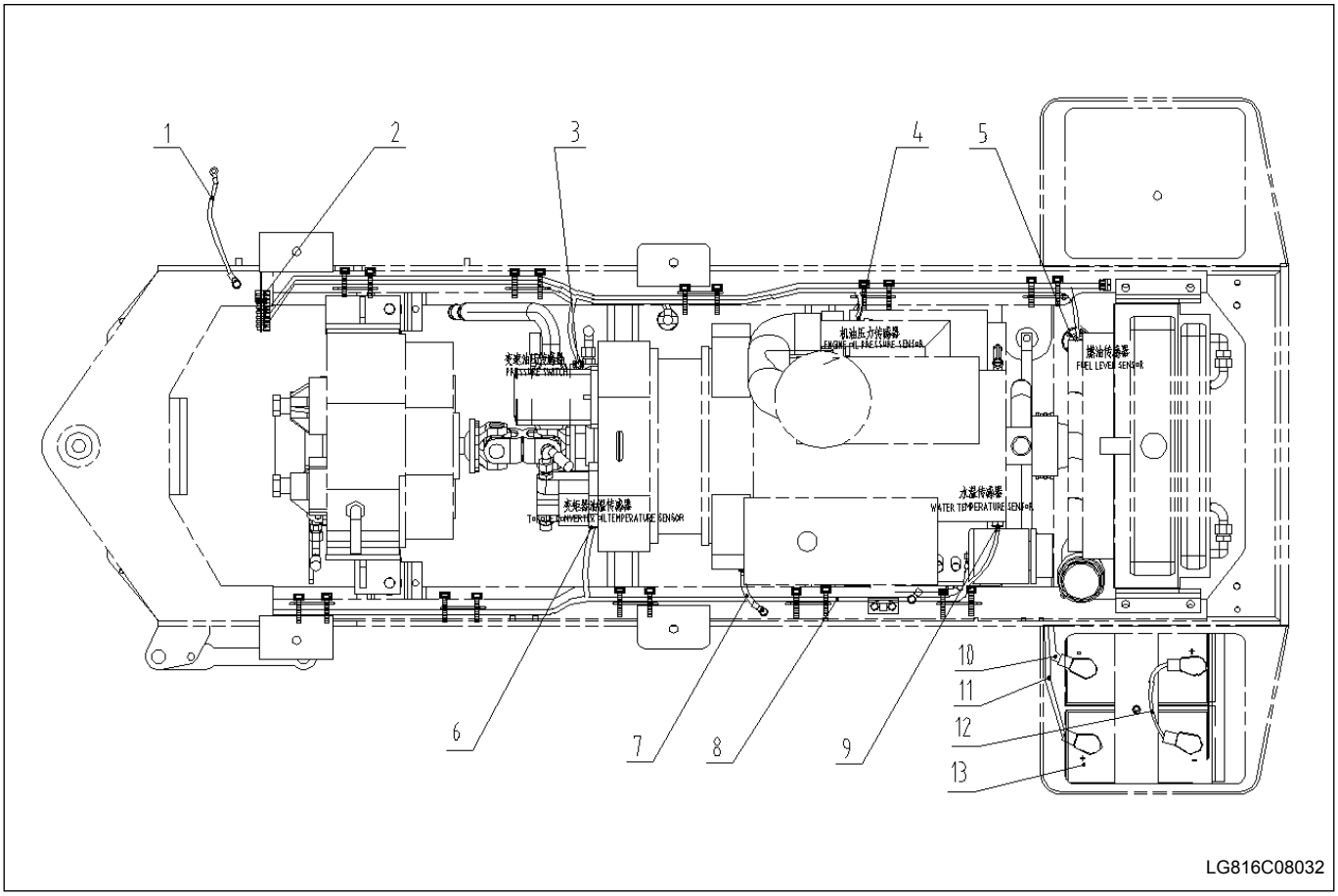
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Rear Frame Electrical Parts

Rear frame electrical location

The electric parts of rear frame include battery, main power switch, rear floodlight, fuel level sensor, torque converter, sensor installed to gearbox, sensor installed to diesel engine, harness, etc. The rear frame harness, cab harness and instrument desk harness are connected at the right front side of the cab outrigger. There is an earth wire between the diesel engine and frame, installed on the left side of the rear frame. The rear frame harness has an earth point at the right front outrigger of the cab, and an earth point at the main power switch. The main power switch is installed on the left side of the rear frame.

Top view of electric section of rear frame (with cab and engine hood removed)



LG816C08032

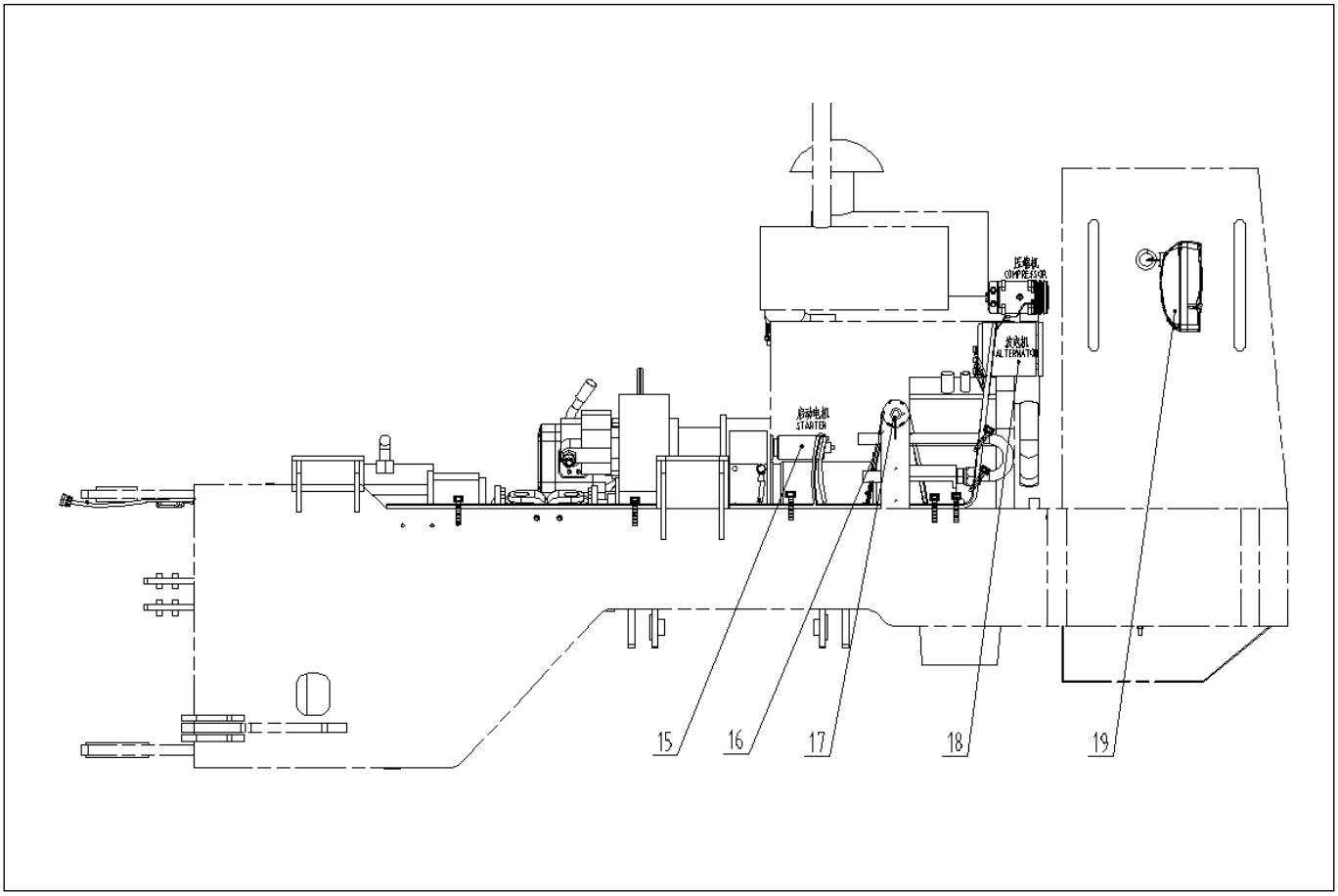
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Rear frame electrical location

1. Connecting cable between frame and cab
2. Connector between frame and cab
3. Torque converter oil pressure sensor
4. Diesel engine oil pressure sensor
5. Fuel level sensor
6. Torque converter oil temp sensor
7. Cable between diesel engine and frame
8. Frame harness
9. Water temp sensor
10. Cable from battery to disconnect switch
11. Cable from battery to diesel engine starter motor
12. Cable from battery (+) to battery (-)
13. Battery

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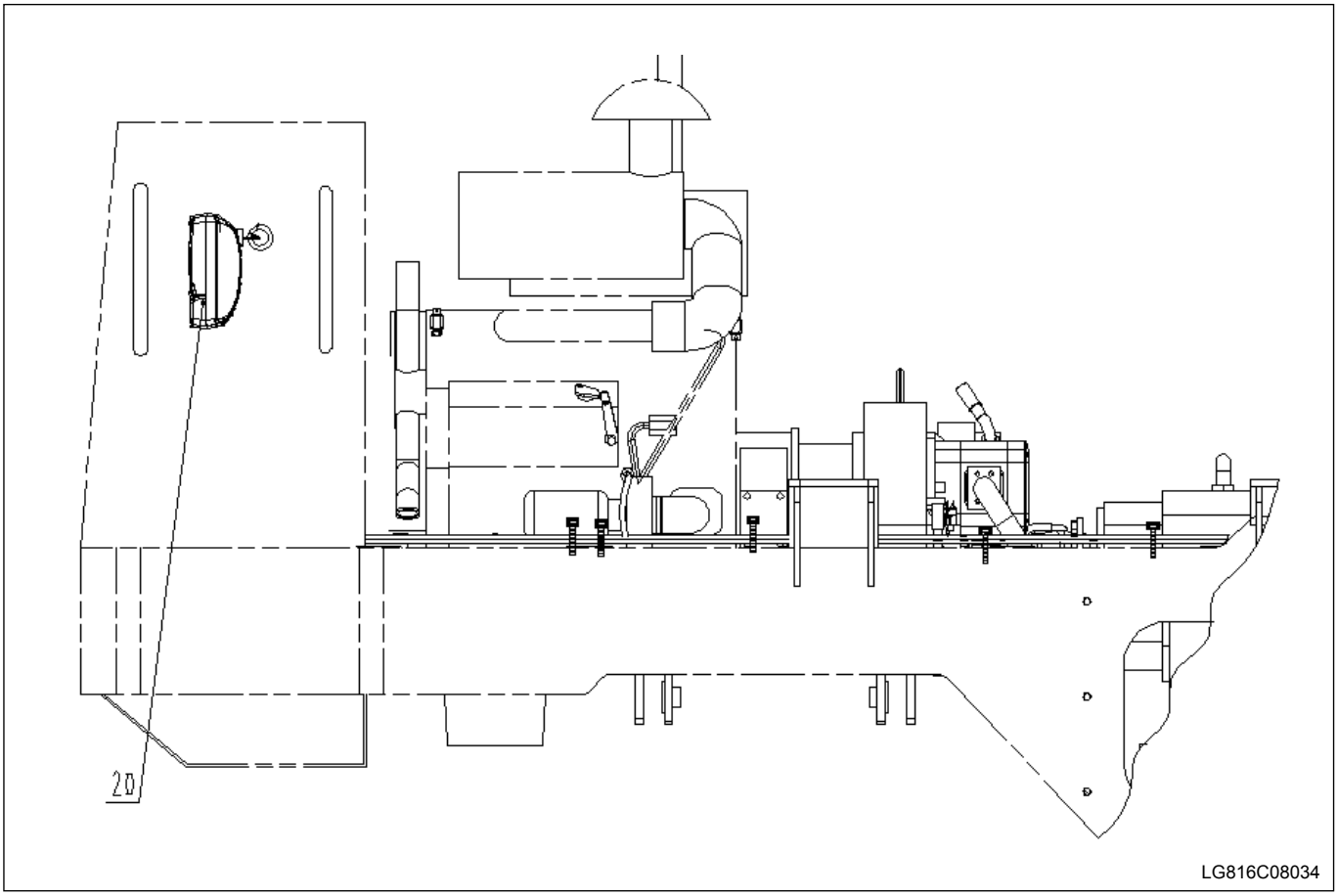
Left side view of electric section of rear frame (with cab and engine hood removed)



14. ---
15. Starter motor
16. Connecting cable between disconnect switch to frame
17. Disconnect switch (power supply master switch)
18. Alternator
19. Left combination light

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Right side view of electric section of rear frame (with cab and engine hood removed)



20. Right combination light

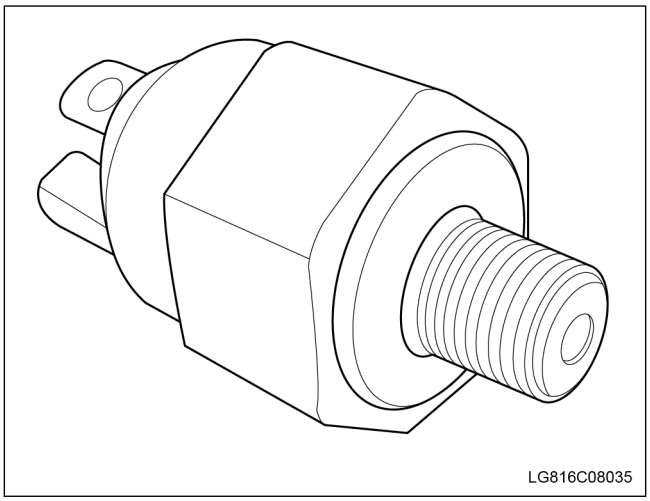
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Function introduction to rear frame electric components

Diesel engine oil pressure sensor

The appearance is as shown in the figure below, the connecting thread between it and machine body is 1/8NPT, and the electric connection is in the form of spade terminal.

Specification is 6.3X0.8 male tab. It is equivalent to a switch internally, its internal contact is closed at pressure below 0.88 Bar, and corresponding pressure indicator on the instrument panel comes on; the contact is off at pressure more than the set pressure value of 0.88 Bar, and corresponding pressure indicator on the instrument panel goes out.



Torque converter pressure sensor

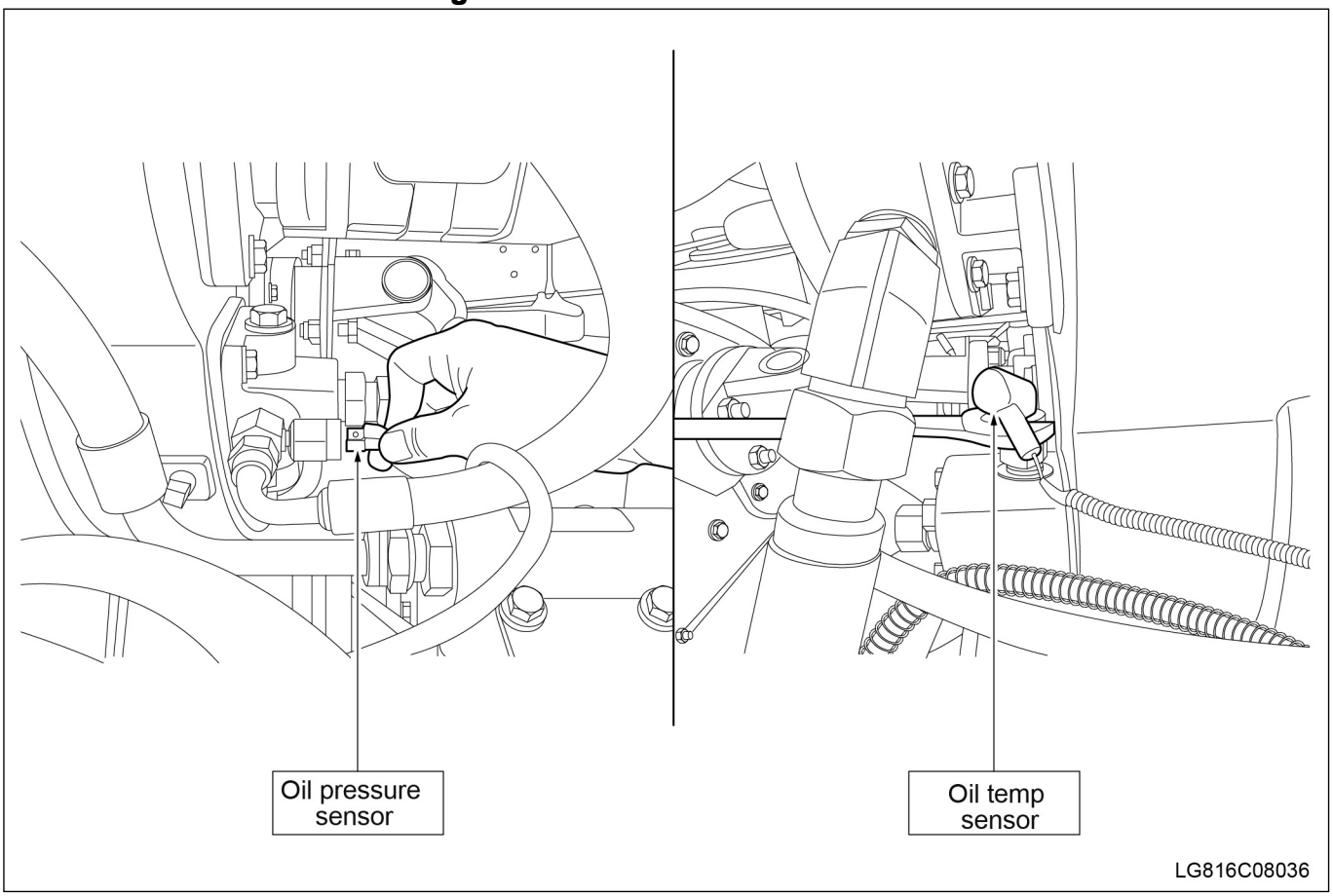
Its appearance and working principle are the same as those of oil pressure sensor.

Its set pressure is 9 Bar, its internal contact is closed at pressure below 9 Bar, and corresponding pressure indicator on the instrument panel comes on; the contact is off at pressure more than the set pressure value of 9 Bar, and corresponding pressure indicator on the instrument panel goes out.

The installation positions of the torque converter gearbox oil temp sensor and oil pres-

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sure sensor are as shown in figure



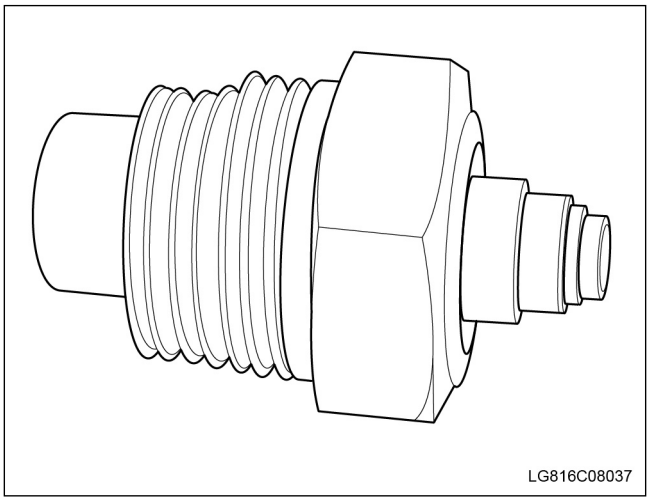
Pressure sensor on shifting valve

Its appearance is the same as that of the oil pressure sensor, its working principle have opposite effect to that of oil pressure sensor, its set pressure is 12 Bar, its internal contact is off at pressure below 12 Bar, and the contact is closed at pressure more than the set pressure value of 12 Bar. This sensor is used for backup light and backup alarm. Some models are not provided with this sensor.

Torque converter oil temp sensor and diesel engine coolant temp sensor

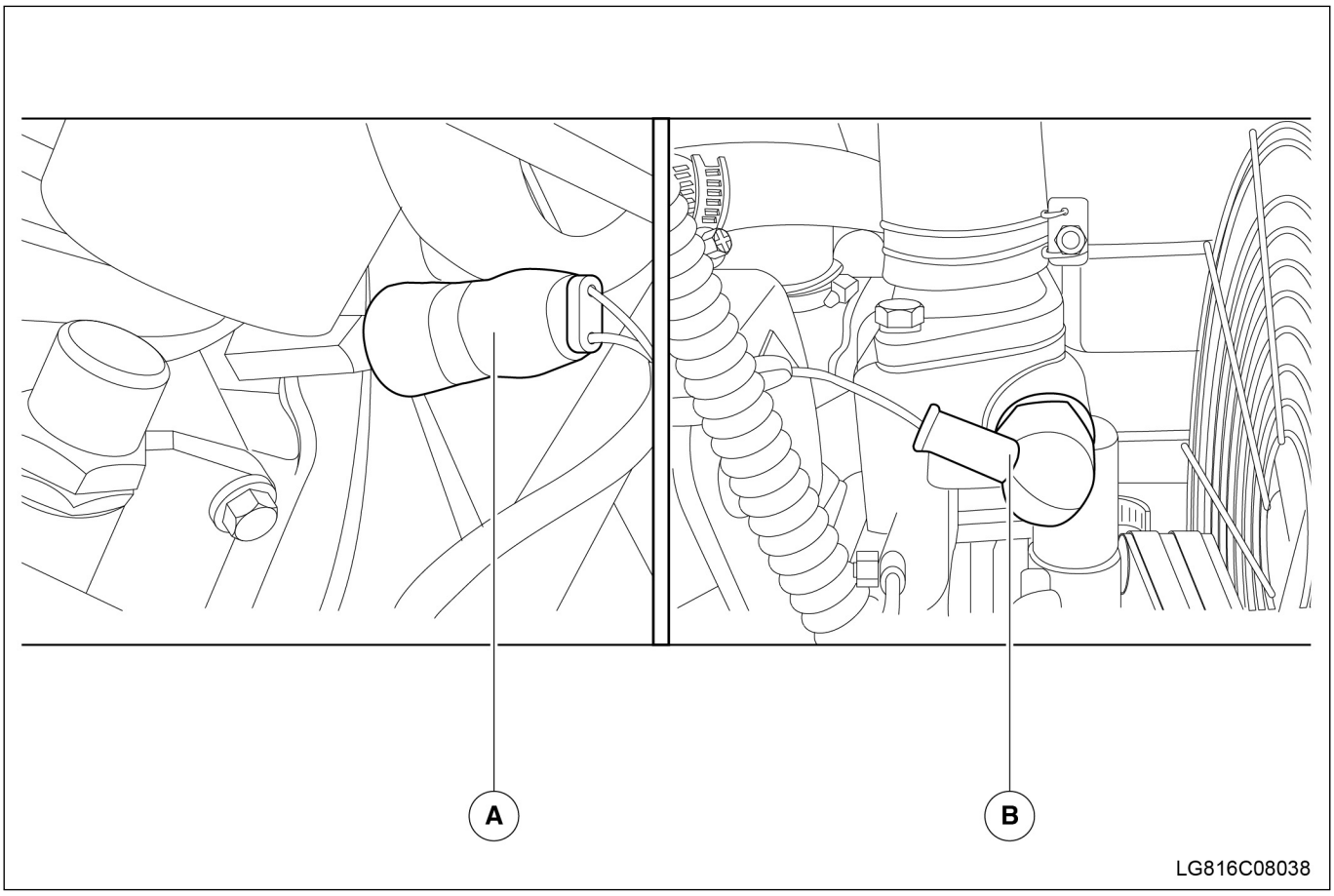
Both have the same specification and model, the appearances are as shown in the figure below, their connecting thread with the machine body is 1/2NPT, and the electric connection thread is M4.

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Each contains a thermistor internally, the resistance value decreases with temperature rise, and the oil temp gauge reading on the instrument panel increases; the resistance value increases with temperature reduction, and the reading on the instrument panel decreases.

The installation positions of oil pressure sensor A and coolant temp sensor B on the diesel engine are as shown in figure

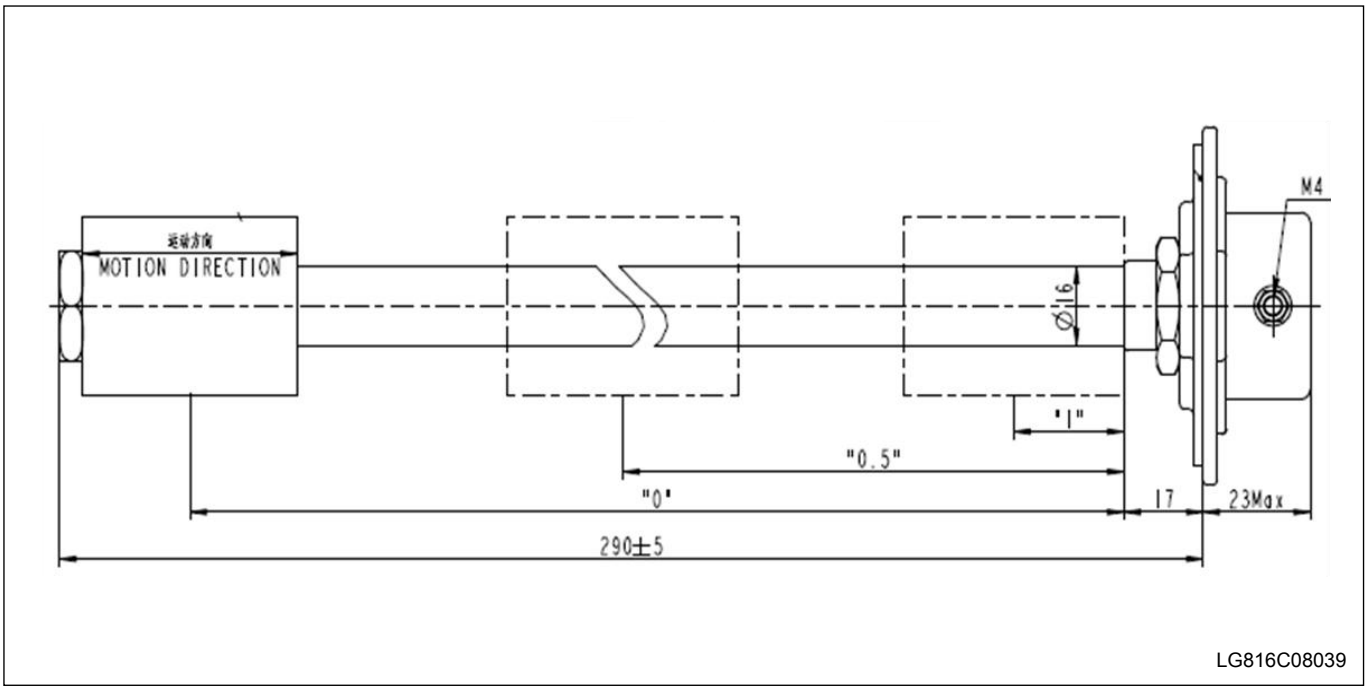


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Fuel level sensor

The appearance is as shown below, it is fixed to the fuel tank with 5 M5X16 screws, with electric connection thread M4. It is equivalent to a variable resistor internally, and the resistance value decreases with oil level rise.

The effective length of liquid measured with the fuel level sensor is 265 mm, the output resistance is about 190 Ω at the lowest level, about 82 Ω at middle level, and about 2 Ω at full level. The fuel level gauge on the instrument panel varies accordingly with the position of the fuel level sensor.



LG816C08039

Battery

It has a rate capacity of 90 AH per 20 hours, cold-starting current of 660 CCA, no load voltage of around 12.6 V at delivery, and single block weight of 23 kg. This machine uses 2 batteries connected in series. The first battery (-) is earthed via the power switch, the positive is connected to the second battery (-), and the second battery (+) is connected to the contact of starter motor.

1. Battery function:

(a) It can supply large starting current to the starter motor in a short period of time during engine starting to start the engine.

(b) When the engine is not running or at low speed or idle speed, the battery can supply power to electric equipment of the complete machine;

(c) When the power consumption of electrical equipment exceeds the output of power generation system of complete machine, the battery can supply power within a limited time;

(d) When the power consumption of electrical equipment is below the output of power generation system

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of complete machine, the alternator supplies power to the battery and electrical equipment;

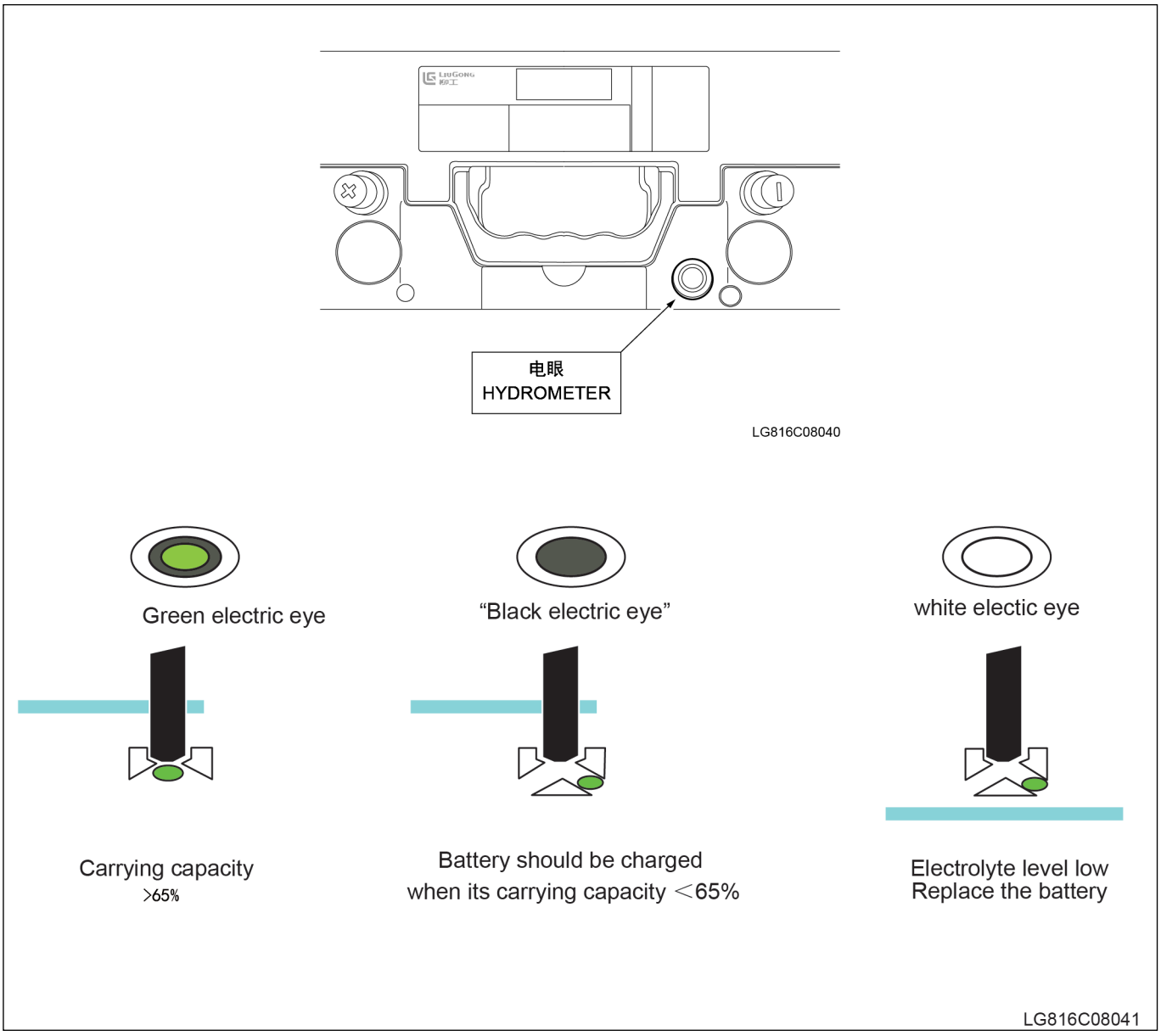
(e) When the battery supplies power to the electrical load, it is in a discharge condition. When the alternator supplies power to the battery, the battery is in a charged state.

(f) The battery is also equivalent to a bulk capacitor that can absorb overvoltage appearing in the circuit at any time, thus protecting electrical elements against breakdown.

2. The battery built-in charge state indicating gauge (hydrometer) used in this system is used to indicate the quantity of charges stored in the battery.

For a charged battery, the density indicator ball may produce error indication effected by bubbles produced during charging. If you find that the indicator shows white or black after charging, please tap the density indicator or gently shake the battery and then observe the condition of indicator.

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3. Detection method of battery terminal voltage

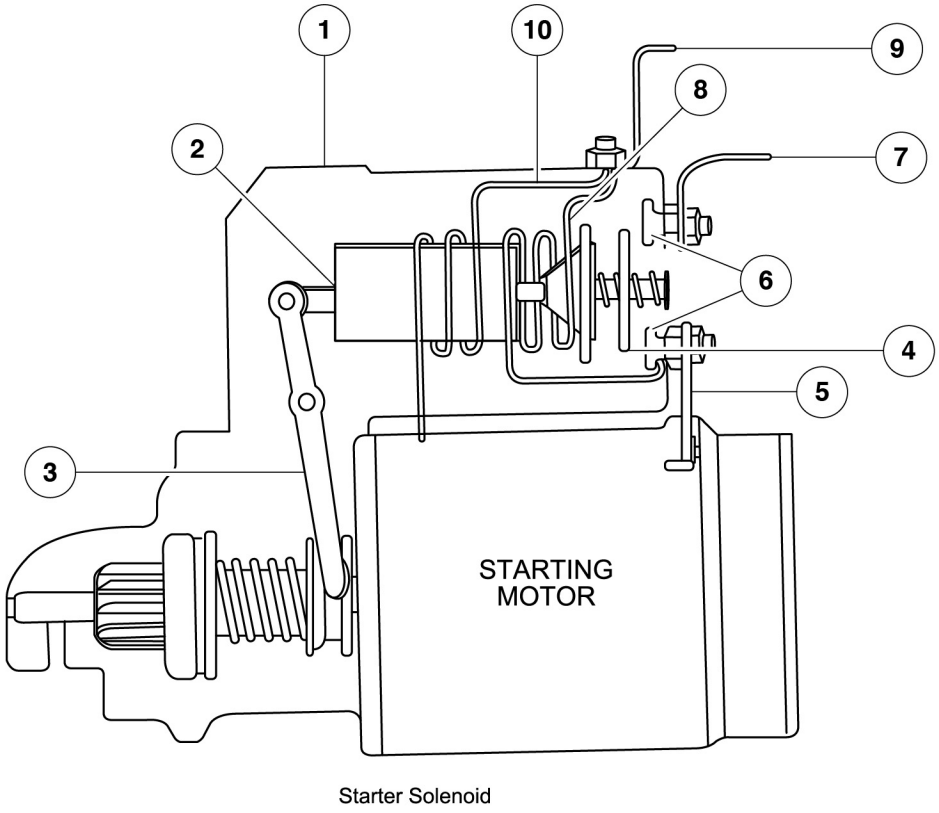
Detect with DC 200V of multimeter, connect the red pen to the battery (+) output cable post head, connect the black pen to the battery (-) head (connected to the disconnect switch post head), and the multimeter reading is the battery terminal voltage (typically between 24V and 27V).

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Starter motor

Mainly is made up of the electromagnetic switch, DC motor, fork, transmission gears. Starter motor transfers electric energy of battery to mechanical energy through DC motor; drive gear drives engine flywheel so as to start the engine.

Starter motor should be stopped immediately after starting the engine, otherwise, drive gear will be damaged, DC motor will be burnt down and shutdown electromagnet will be damaged to affect battery capacity and service life seriously.



Starter Solenoid

LG816C08042

1. Solenoid switch
2. Iron core
3. Fork
4. Moving contact plate
5. To motor coil
6. Contact 1 and contact 2
7. To battery (+)
8. Push-pull coil
9. To control wiring
10. Maintain

In the figure, after the coil is energized, the fork stretches out under the action of electromagnetic force, and is engaged with the big gear ring of diesel engine. The DC motor rotates and drives the bull gear to rotate. The atomized gas mixture of diesel and air is compressed, combusted, makes power and drives the diesel engine to continue to rotate. After it reaches the set speed, power supply to the coil shall be stopped.

⚠ Caution: It is forbidden to short the terminal with any screwdriver and other metal

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conductors to start the diesel engine! Especially it must ensure after the machine is in the severe vibration and runs long time, the fuel pipe passing near the starter motor and other metal objects do not contact or rub the terminal. Doing so may cause the machine be on fire!

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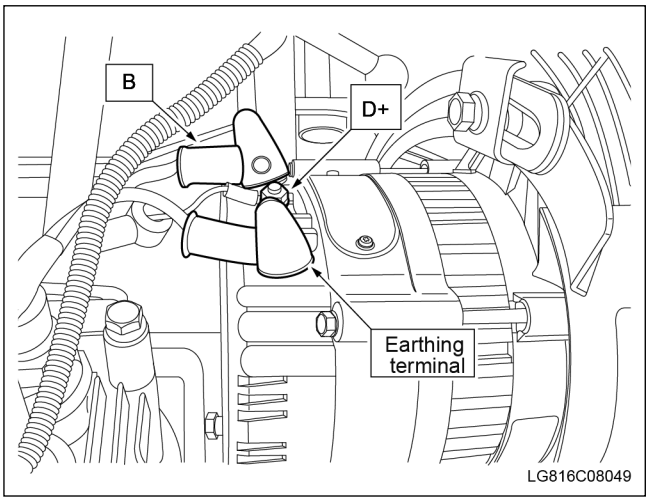
Alternator

Alternator is the matched elements of diesel engine with electronic voltage regulator and its working voltage is 28V, current js 27A.

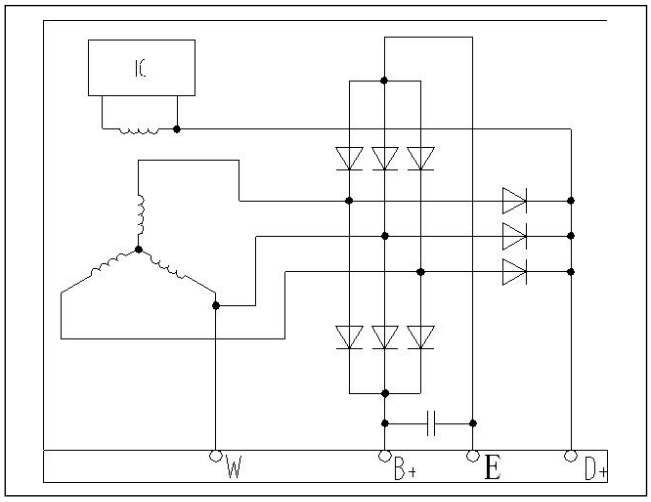
The alternator has 3 leading-out terminals, respectively:

B+: Alternator power output terminal, D+: Charging indication signal, W: speed signal (not used in the machine). All alternator terminals are marked, and do not make a mistake when replacing the harness or alternator.

Engine terminal diagram



The alternator consists of rotor, stator, belt pulley, fan, front and rear end caps, brush and other components. Its principle is shown in Fig. below:



The exciting winding is generally wound around the rotor in a Y-shaped linkage with the stator; the rectifier is a six-tube bridge full wave rectifier. When DC voltage acts on both ends of the exciting winding, current will create a magnetic field which will rotate with the rotor driven by the engine, the three-phase symmetrized winding of stator under the action of rotating magnetic field will create three phases of sine electromotive force with the same frequency, amplitude value and a difference of 120°. Use the unidirectional conductivity of silicon diode for rectification, only the positive diode connected with a phase of winding at the highest potential is conducted at any moment; similarly, only the negative diode connected with a phase of winding at the lowest potential is conducted; so recycle, 6 diodes are conducted in turn, and a steady pulsating DC voltage is obtained on either end of load.

The terminal voltage of alternator is in direct proportion to the alternator speed; since the variation range of engine speed is very large, the terminal voltage of alternator will also vary over a wide range, which cannot meet the requirement for application of constant voltage to electric equipment on the loader. So a constant voltage regulator must be provided.

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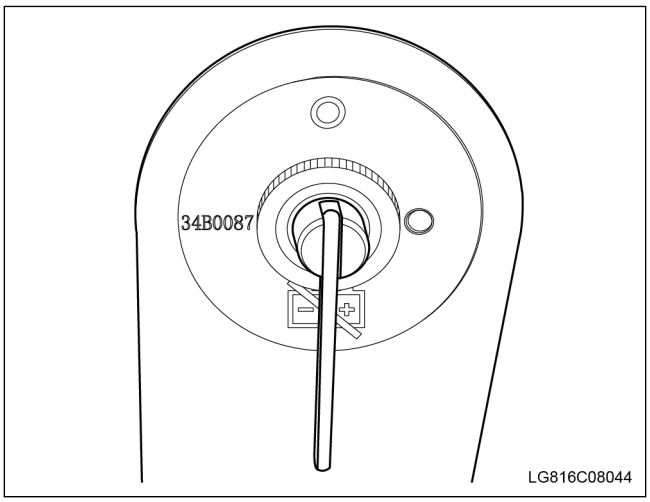
The constant voltage regulator changes the exciting current size by using the on-off of switch tube, thus changing the magnetic field strength to stabilize the alternator voltage. The filter capacitor mainly plays a part in filtering out the spike pulse and high-frequency interference produced by the alternator.

⚠ **Caution: Please check whether the alternator terminal wiring is reliably fasten on a regular basis, it will cause no normal operation of the electric system of complete machine, even cause a major fault regardless of whether "B+" or "earthing" cable is loose. Terminal -B+ is connected with No.117 wire, terminal -ground is connected with No.808 wire, be sure to remember and must not connect in a wrong way! Otherwise, the silicon rectifier diode will be burnt out, leading to a more serious fault.**

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Disconnect switch (main power switch)

Outline drawing is as below



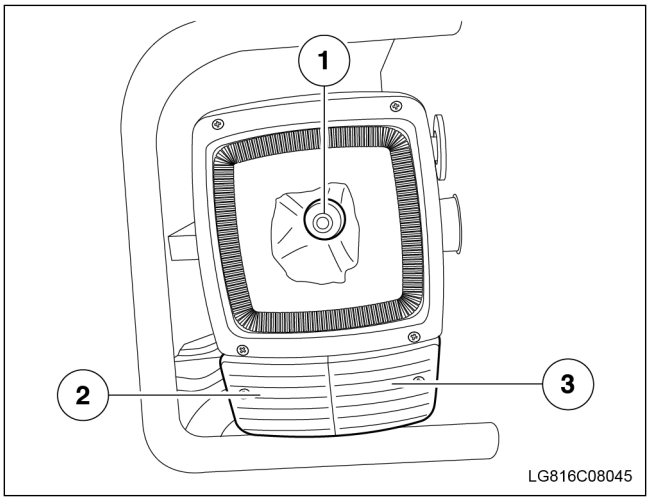
The main power switch is installed to the power negative circuit, so it is also known as the disconnect switch. This switch shall be disconnected for service or welding work on the electric part of the machine.

The cable on the disconnect switch must be connected firmly, poor contact will cause no starting of the starter or other line faults.

Rear combination light consists of left combination light and right combination light

including rear floodlight, turn signal light, position light and brake light.

Outline drawing of rear combination light



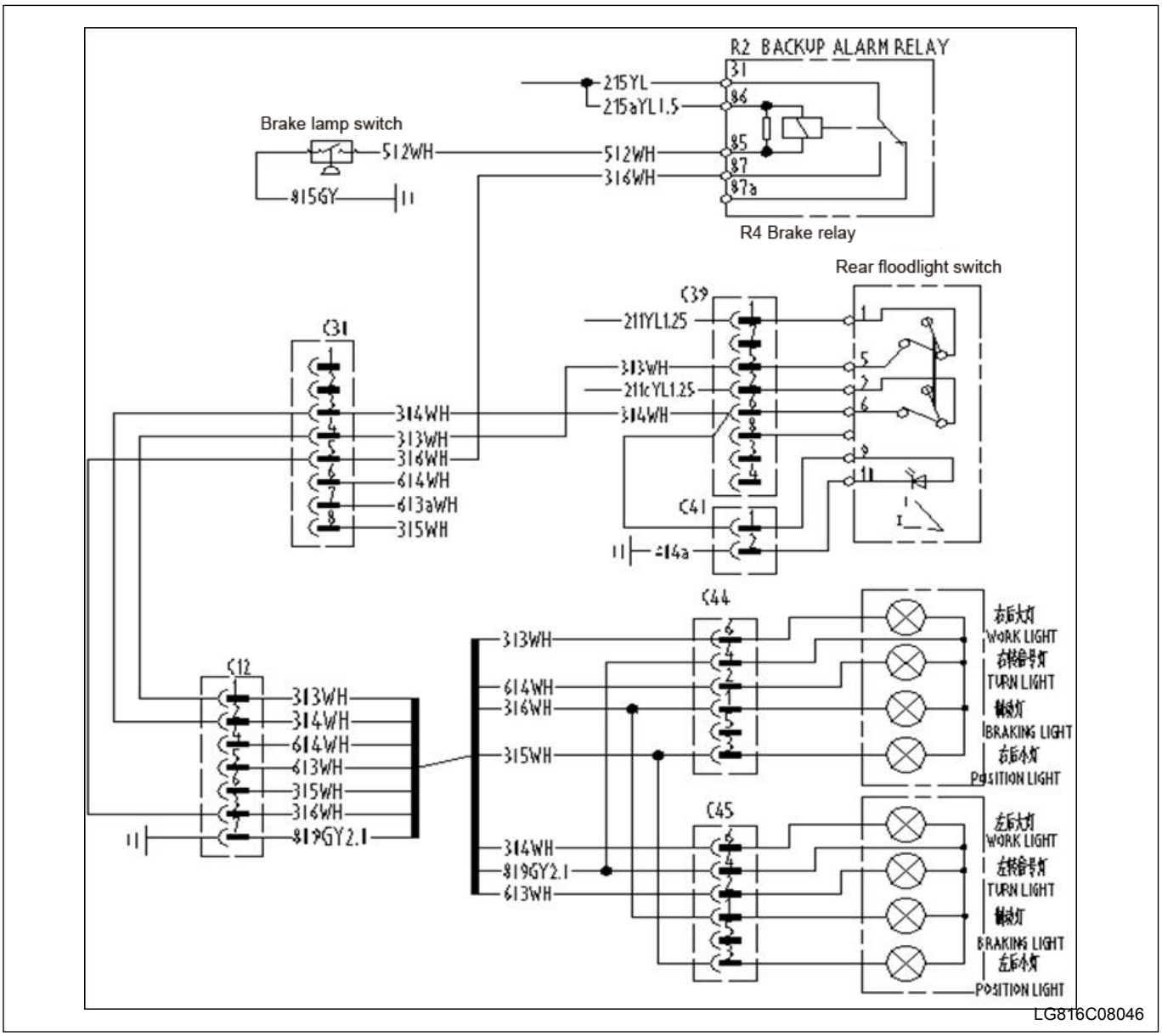
1. **Rear floodlight, bulb parameter is: floodlight 24 V /70 W.**
2. **Turn signal light 24 V / 21 W.**

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3. Brake light 24 V / 21 W.

4. And rear position light 24 V / 5 W.

Wiring diagram of rear combination light



Brake light: Depress the brake button, No.512 wire is connected with the earth wire, the brake relay is pulled in, No.215 wire from the fuse is connected with No.316, making the brake light come on through C30, C12, C44, C45. Rear floodlight: Press the rear floodlight switch, No.211 power cord from the fuse box connects No.303 and No.304 wires through the switch, making the rear floodlight come on through C30, C12, C44, C45. The principles of rear position light and turn signal light are the same as that of front combination light, and there is no need to tell here.

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Troubleshooting

Diesel engine can not be started.

Inspection method

1. **Check whether the main power switch is in ON position.**
2. **Whether the electric lock switch is in ON position.**
3. **Check whether there is any fuse on the fuse box in an open circuit state (indicator on fuse comes on after broken circuit occurs).**
4. **Put the red pen of multimeter on the fuse and the black pen on the body, measure the voltages on both ends of the fuse respectively.**
5. **Measure the terminal B+ on the starter motor and No.307 wire on the starting coil, and check for 24V voltage. Both have voltages, check the starter motor for damage. If there is no power at No.307 wire, check the voltage of No.155 of starter relay coil, and check the voltage of No.154 wire. Check voltage at No. 112 wire of electric lock.**

The fuel gauge reading is inaccurate or the pointer does not move.

Inspection method

1. **You shall remove the fuel sensor, and check the detection bar of sensor for deformation. Whether the floater on the bar slides freely. If sliding is blocked, it shall be repaired or replaced.**
2. **Slide the floater slowly, measure its resistance value with a multimeter, observe whether it varies evenly, if there is a sudden rise or reduction, it indicates that the sensor has a broken circuit or open circuit inside. The sensor should be replaced now.**
3. **After you check that the sensor is fault-free, you can replace the fuel gauge of inaccurate reading with a good one for a test.**

Inaccurate air pressure gauge reading or no pointer movement

Inspection methods are as below

1. **Measure the resistance value at the air pressure sensor terminal, start the diesel engine, and the resistance value of the sensor terminal shall vary evenly with the rise or fall of air pressure in the pipeline. If it does not vary or has a jump, you shall replace the air pressure sensor.**
2. **It is detected that the pressure sensor is verified to be good, and you can replace it with a good air pressure gauge for a test.**
3. **Both air pressure sensor and air pressure gauge are good, check the connection between the air pressure gauge and air pressure sensor. Check the connectors carefully.**

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Inaccurate readings or no pointer movement of diesel engine coolant temp gauge and torque converter oil temp gauge

Inspection methods are as below

1. **Check whether the sensor wiring is loose or falls off. Disconnect the gauge connector in the instrument panel, measure its resistance value, if it is zero or infinitely great, it has a short circuit or open circuit.**
2. **Connect the coolant temp gauge and oil temp gauge, and observe the changes in gauge readings.**
3. **Bad grounding of sensor negative circuit will cause inaccurate reading, check with a wire as necessary.**

Engine fault detection.

Method of judging whether alternator generates power normally and treatment measures

1. **Turn on the electric lock, carefully observe the voltmeter reading, start the machine, observe the voltmeter reading again, the latter reading shall be higher than the previous reading.**
2. **Alternatively, check with DC 200V range of multimeter, turn on the electric lock, measure the alternator terminal voltage (connect the red pen to alternator D+, ground the black pen), take down the multimeter reading (this reading is actually the battery terminal voltage, generally below 26V); start the machine, measure the alternator terminal voltage again, take down the multimeter reading (this reading is about 28V if the alternator generates power normally), compare both of them, the latter reading shall be higher than the previous reading.**
3. **If the alternator does not generate power, first check the alternator drive belt for looseness, turn off the electric lock, check whether the alternator terminal connection is correct, secure and reliable with a wrench. Check if engine is grounded firmly. If you still cannot solve the problem, contact the CLG or diesel engine manufacturer's service point.**

Fault detection of starter motor, no starting or difficult starting of starter

Test methods are as below

1. **Measure the terminal connected with the battery cable at the starting moment, if the voltage is lower than 24V, measure the voltage between both terminals of battery again, if it is also lower than 24V, it indicates that the battery is under charge. You need to start the diesel engine after charging or replacing the battery.**
2. **Measure the voltage of the starting coil on the starter motor at the starting moment. If there is no voltage or the voltage is below 22V, check the starting coil circuit.**

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3. An unnoticable fault is poor cable contact, poor contact at any point of disconnect switch, battery, starter motor and frame ground terminal will cause no smooth starting of diesel engine.

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Identification of Connector Pins

The cab harness, frame harness and steering gear box harness are in butt joint at the right front side of the cab, as shown in figure.

All connectors used in this machine are provided with written numbers, C16, C29, C30, C14, C43 are of the same type. They have the same terminal pin numbering method.

Naming rule in this company:

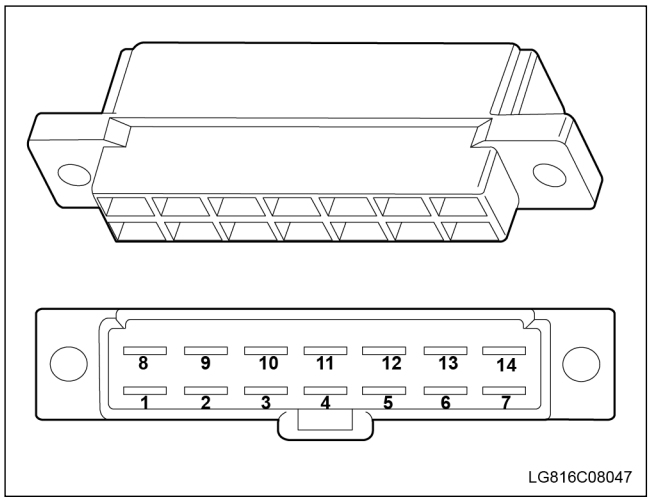
1) Plugs and sockets we mentioned are spoken for the connectors conductor instead of the plastic housing. This point may be different from some other companies.

2) Be subject to the No. of connectors for the connectors with No. on its housing.

Definition of C14 connectors

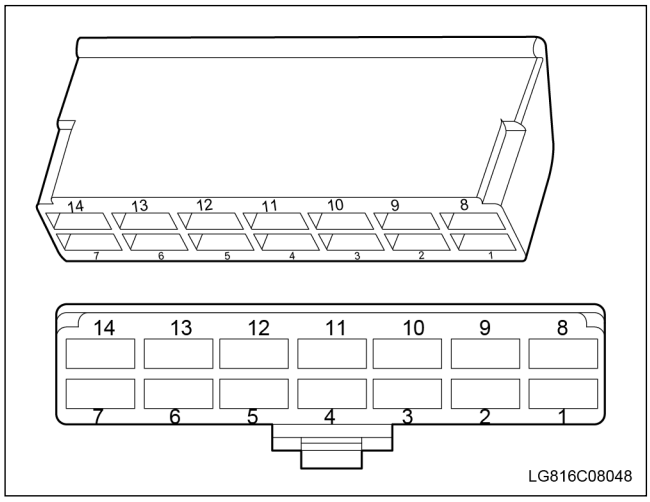
Connector between C14 steering gear box harness and frame harness is as below, total 14 pins.

The connector appearance and connector number of C14 steering gear box harness are as below, connector model: DJ7141A-6.3-10



The connector appearance and connector number of C14 frame harness are as below, connector model: DJ7141-6.3-20

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Definitions of C14 connectors pins

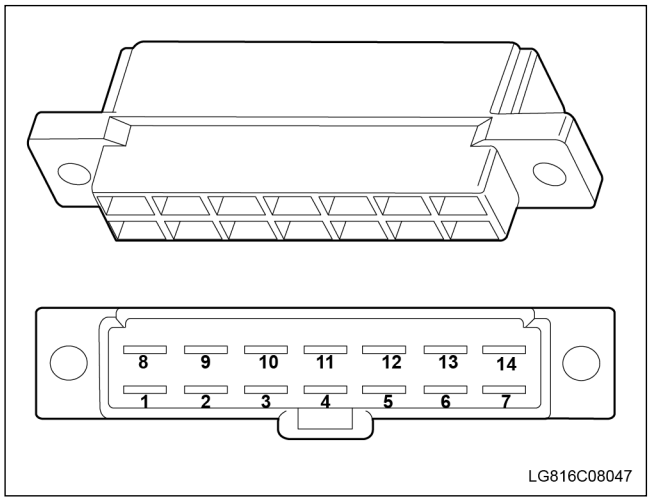
Wiring pin No.	Wire No.	Function	Wire specification	Color
1	612	Neutral start signal	0.85	White
2	613	Preheating indicator light	0.85	White
3	610	Transmission oil pressure indicator	0.85	White
4	611	Engine oil pressure indicator	0.85	White
5	503	Charge indicator	0.85	White
6	113a	Electric lock ON signal	0.85	White
7	608	Torque converter oil temp signal	0.85	White
8	609	Water temp sensor signal	0.85	White
9	607	Oil level sensor signal	0.85	White
10	603	Left turn signal light	0.85	White
11	604	Right turn signal light signal	0.85	White
12	601	Front floodlight low beam	1.25	White
13	600	Front floodlight high beam	1.25	White
14	118	Electric lock START signal	1.25	White

Definition of C16 connectors

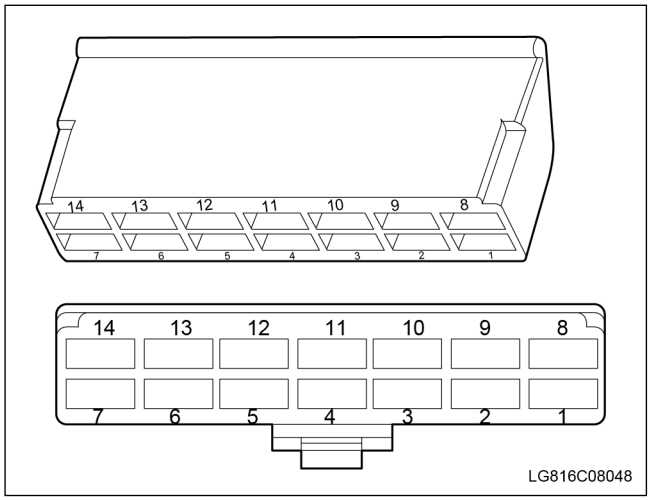
Connector between C14 steering gear harness and frame harness is as below, total 14 pins.

The connector appearance and connector number of C16 cab harness are as below, connector model: DJ7141A-6.3-10

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The connector appearance and connector number of C16 steering gear box harness are as below, connector model: DJ7141-6.3-20



Definitions of C16 connectors pins

Wiring pin No.	Wire No.	Function	Wire specification	Color
1	614	Brake air pressure alarm signal	0.85	White
2	606	Brake air pressure gauge signal	0.85	White
3	300	Instrument indicator	0.85	White
4	202	Instrument power supply	0.85	White
5	113	Electric lock ON signal output	0.85	Yellow
6	154	Electric lock START signal output	1.25	White

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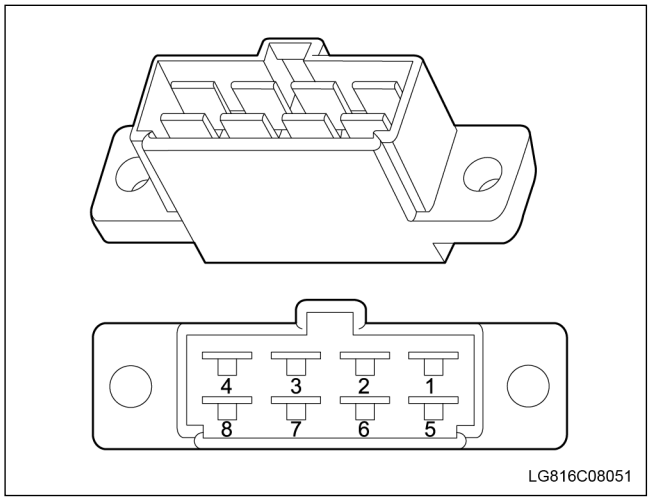
7	110	Electric lock power supply	2.0	Yellow
8	602	Turn signal light power supply	0.85	White
9	605	Horn signal line	0.85	White
10	230	Floodlight power	2.0	White
11	506	Combination switch washer output	0.85	White
12	108	Electric lock output preheating signal	0.85	White
13		Not used		
14	216	Wiper power supply	0.85	Yellow

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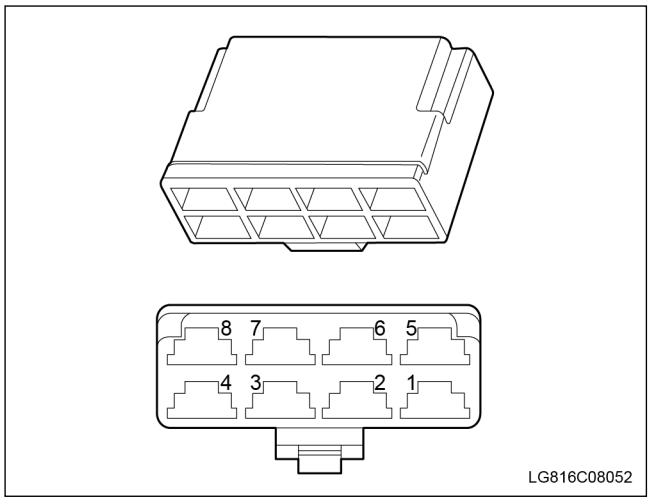
Definition of C30 connector

The connector between C30 frame harness and cab harness, total 8 wiring pins.

The connector appearance and connector number of C30 cab harness are as below, connector model: DJ70819-6.3-10



The connector appearance and connector number of C30 frame harness are as below, connector model: DJ7081-6.3-20



Pin definition of C30 connector

Wiring pin No.	Wire No.	Function	Wire specification	Color
1	620	Backup alarm switch	0.85	White
2	503	Engine D+ signal	0.85	White
3	304	To rear floodlight	0.85	White
4	303	To rear floodlight	0.85	White

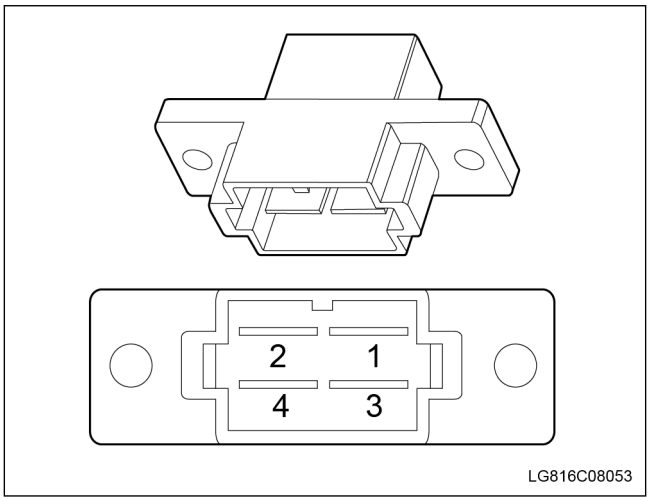
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5	306	To the brake light	0.85	White
6	604	To right turn signal light	0.85	White
7	603	To left turn signal light	0.85	White
8	305	To front and right position light	0.85	White

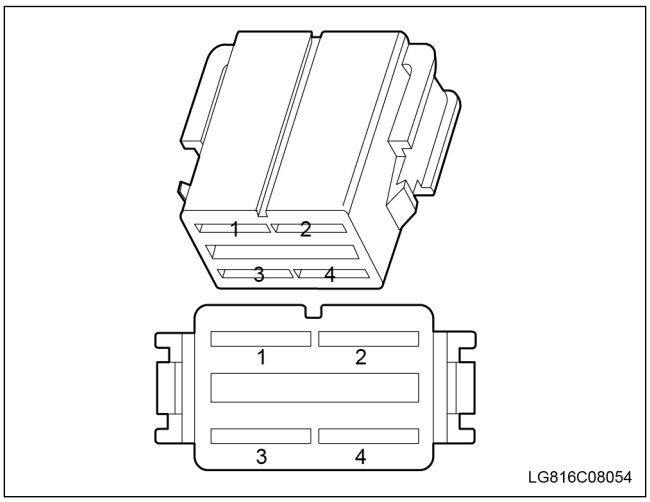
Definition of C29 connectors

C29 is the connector between frame harness and cab harness, total 4 wiring pins.

The connector appearance and connector number of C29 cab harness are as below, connector model: DJ7041-7.8-10



The connector appearance and connector number of C29 frame harness are as below, connector model: DJ7041-7.8-20



Pin definition of C29 connector

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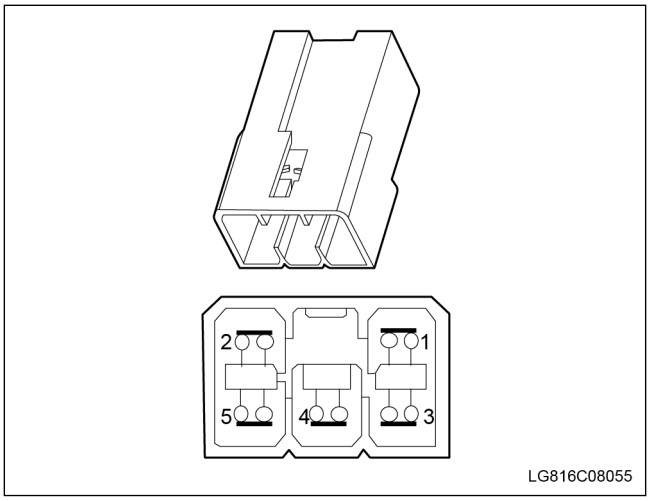
Wiring pin No.	Wire No.	Function	Wire specification	Color
1	307	Starter coil line	2.0	White
2	116	Master power supply line	5.0	Yellow
3		Not used		
4	117	Engine power supply line	5.0	Yellow

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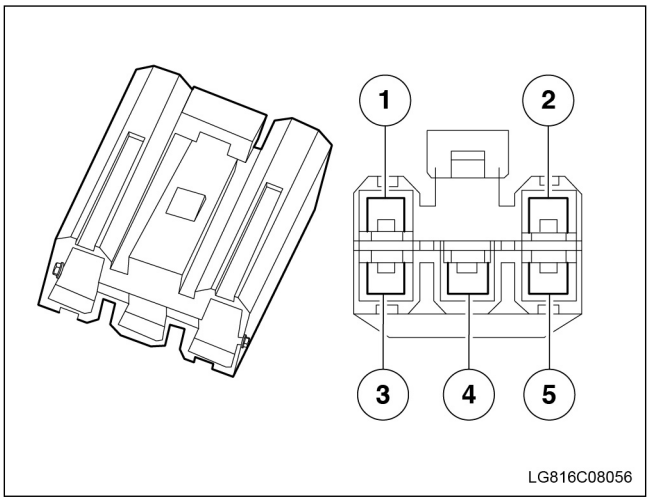
Definition of C22 connector

The connector between C22 plug work light harness and cab harness has a total of 5 pins.

The connector appearance and connector number of C22 cab harness are as below, connector model: DJ7051-3-10



The connector appearance and connector number of C22 work light harness, connector model: DJ7051-3-20



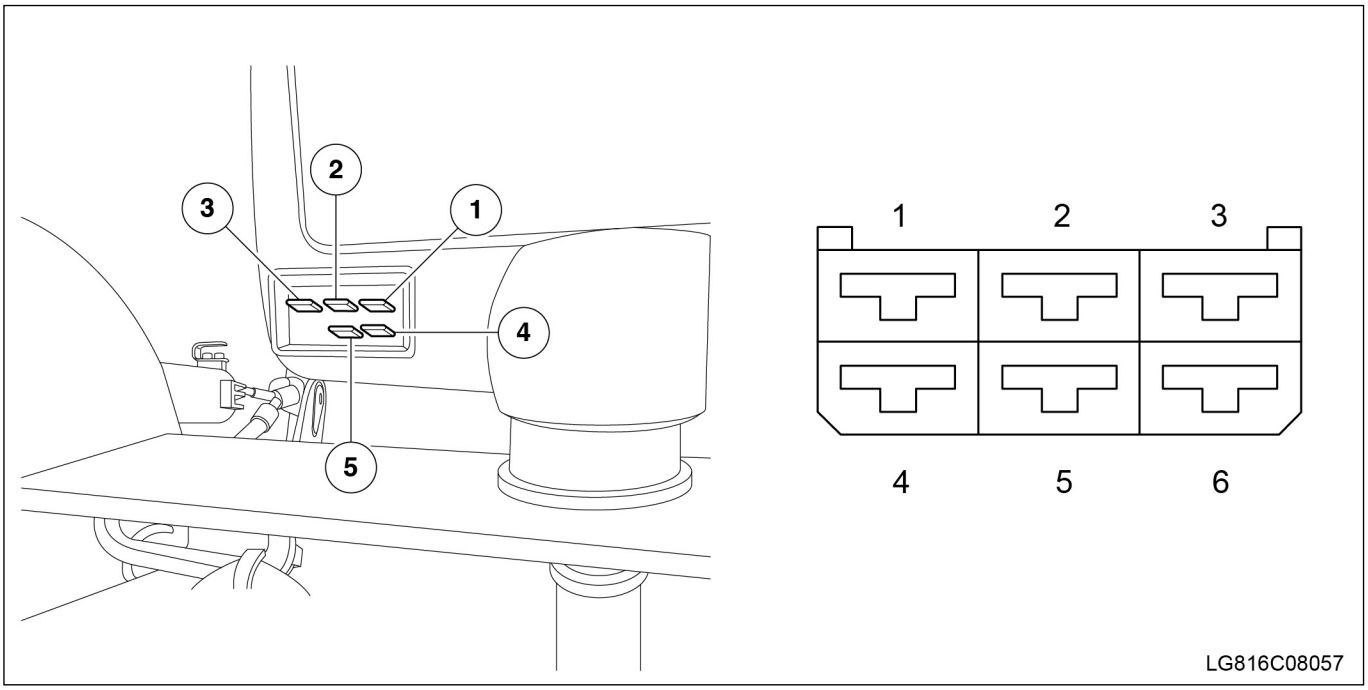
Pin definition of C22 connector

Wiring pin No.	Wire No.	Function	Wire specification	Color
1	803	Earthing cable	2.0	Grey
2	302	Right front work light	0.85	White
3	115	Dome light power supply	0.85	White
4	301	Front left work light	0.85	White
5	210	Electric fan power supply	0.85	White

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Identification of front combination light pin

The wiring of front floodlight-rh is as shown in figure, the plug on the front floodlight harness-rh is of type DJ7065-6.3-20, the end view of the plug is as below:



Pin definition of front right light

Wiring pin No.	Wire No.	Function	Wire specification	Color
1	600	High beam lamp	1.25	White
2	601	Low beam lamp	1.25	White
3	810	Earthing cable	2.0	Grey
4	305	Position light	0.85	White
5	604	Right turn signal light	0.85	White
6		Not used		

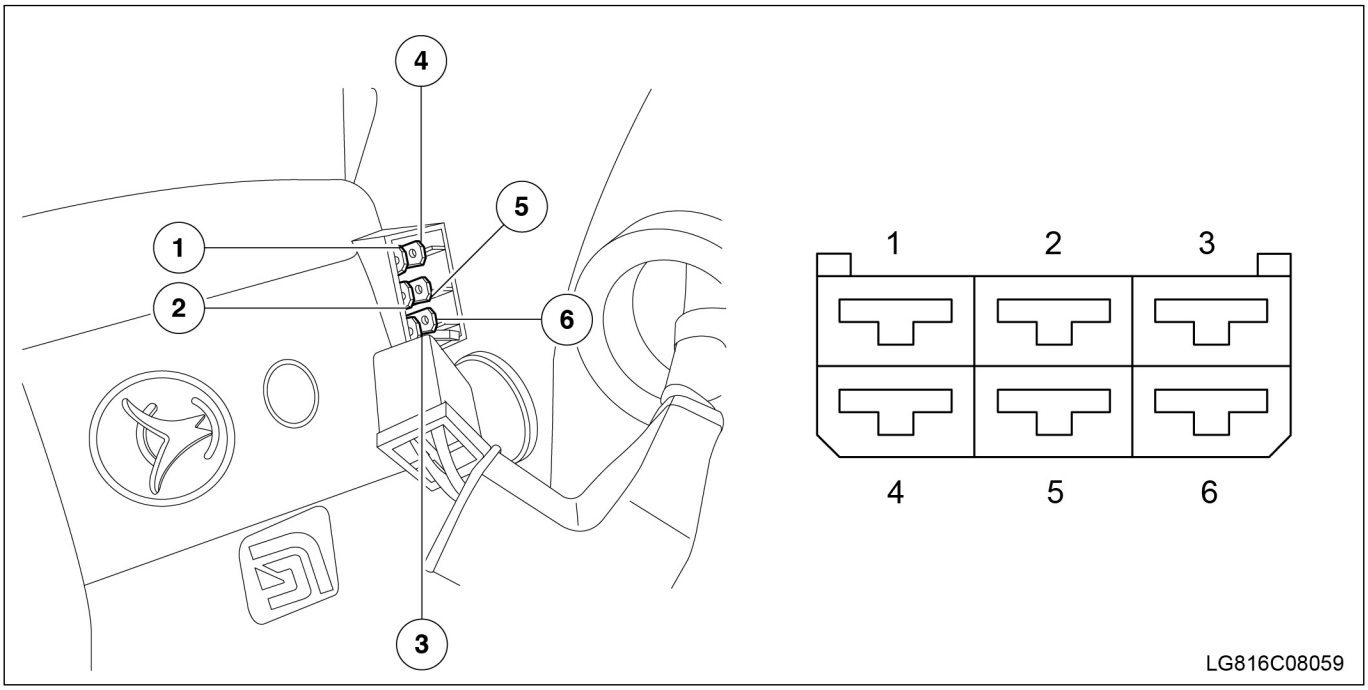
Pin definition of front left light

Wiring pin No.	Wire No.	Function	Wire specification	Color
1	600	High beam lamp	1.25	White
2	601	Low beam lamp	1.25	White
3	810	Earthing cable	2.0	Grey
4	305	Position light	0.85	White
5	603	Left turn signal light	0.85	White
6		Not used		

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Identification of rear combination light pin

The plug used on the rear light harness-lh is as shown below, the type is DJ7065-6.3-20. End view, rear light-lh wiring diagram:



Pin definition of rear left light

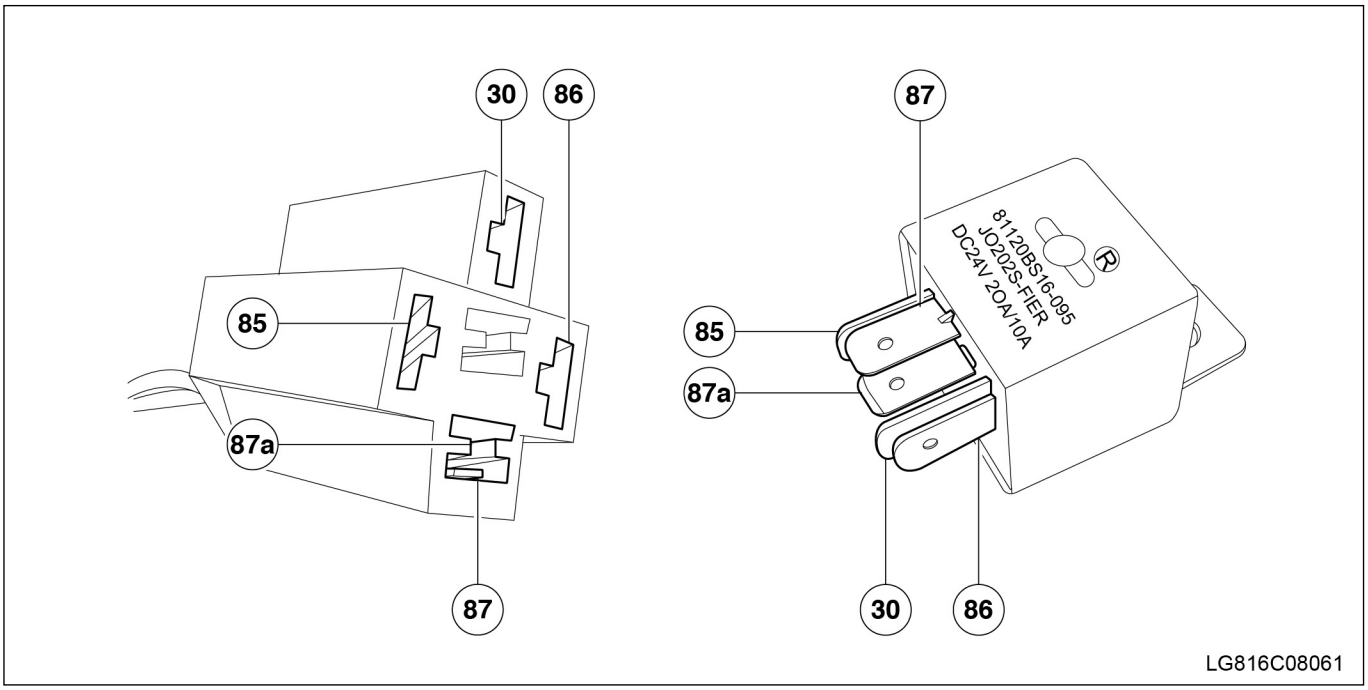
Wiring pin No.	Wire No.	Function	Wire specification	Color
1	306	Brake light	0.85	White
2	603	Left turn signal light	0.85	White
3	305	Position light	0.85	White
4	809	Earthing cable	2.0	Grey
5		Not used	0.85	
6	303	Rear floodlight	1.25	White

Pin definition of rear right light

Wiring pin No.	Wire No.	Function	Wire specification	Color
1	306	Brake light	0.85	White
2	604	Left turn signal light	0.85	White
3	305	Position light	0.85	White
4	809	Earthing cable	2.0	Grey
5		Not used	0.85	
6	304	Rear floodlight	1.25	White

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Identification of intermediate relay pin



The left figure in the figure above is the definition of the relay plug pin, the connector model is DJ7051-6.3-20, and the left figure is the definition of the relay pin.

Definition of R7 start-up protection relay pin

Wiring pin No.	Wire No.	Function	Wire specification	Color
85	503	Engine D+ signal	0.85	White
86	154	R9 receiving signal	0.85	White
30	154	Master output	0.85	White
87	155 155a	Output to R10 and diode gp	0.85	White
87a		Not used		

R5 pin definition of horn relay

Wiring pin No.	Wire No.	Function	Wire specification	Color
85	605	Signal from horn button	0.85	White
86	214	Power supply	0.85	Yellow
30	214	Power supply	0.85	Yellow
87	501	Output to horn	0.85	White
87a		Not used		

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R2 pin definition of backup alarm relay

Wiring pin No.	Wire No.	Function	Wire specification	Color
85	620	Signal from backup alarm sw	0.85	White
86	214	Power supply	0.85	Yellow
30	214	Power supply	0.85	Yellow
87	320	Output to backup alarm	0.85	White
87a		Not used		

R4 pin definition of brake light relay

Wiring pin No.	Wire No.	Function	Wire specification	Color
85	502	Signal from brake light sw	0.85	White
86	215	Power supply	0.85	Yellow
30	215	Power supply	0.85	Yellow
87	306	Output to brake light	0.85	White
87a		Not used		

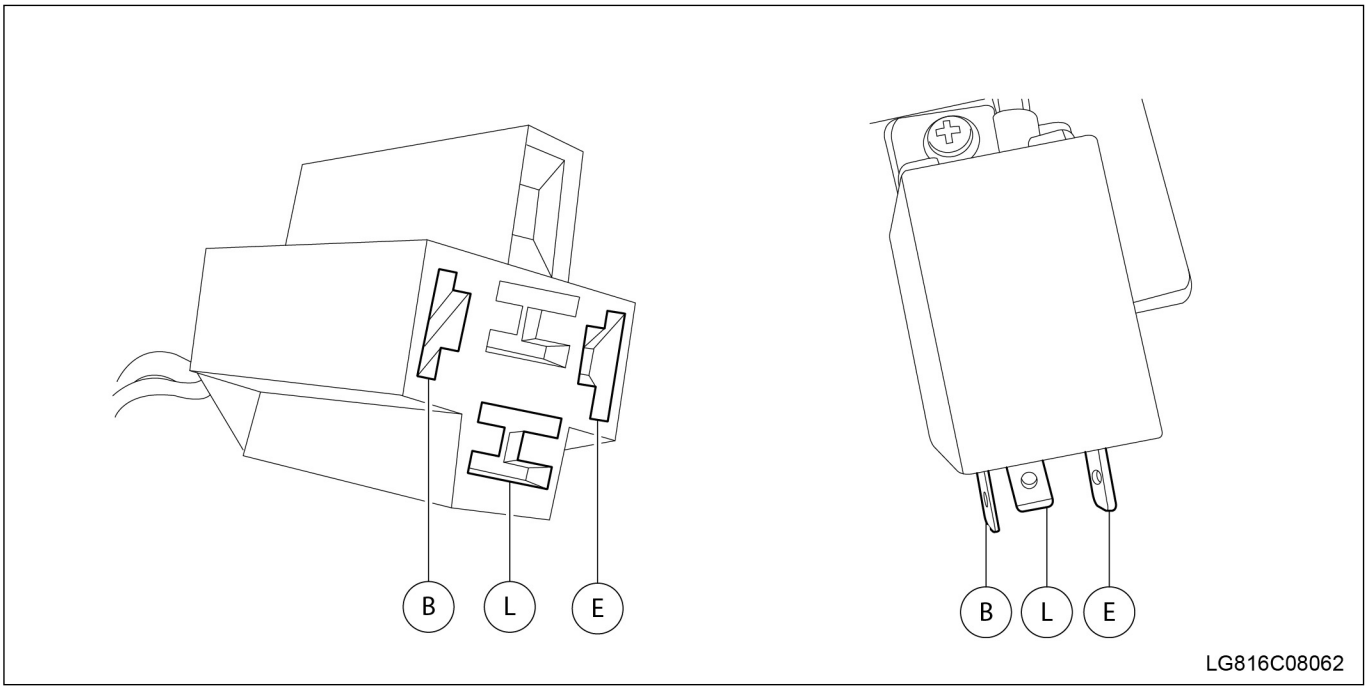
R8 pin definition of master light relay

Wiring pin No.	Wire No.	Function	Wire specification	Color
85	800	Earthing	0.85	Grey
86	621	Signal from combination light sw	0.85	White
30	230	Signal from main light switch	2.0	White
87	600	Output to floodlight high beam	1.25	White
87a	601	Output to floodlight low beam	1.25	White

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Identification of flash relay pin

Connector model is DJ7051-6.3-20



The left figure in the above figure is the definition of the flash relay plug pin, and the right figure is the definition of the flash relay pin.

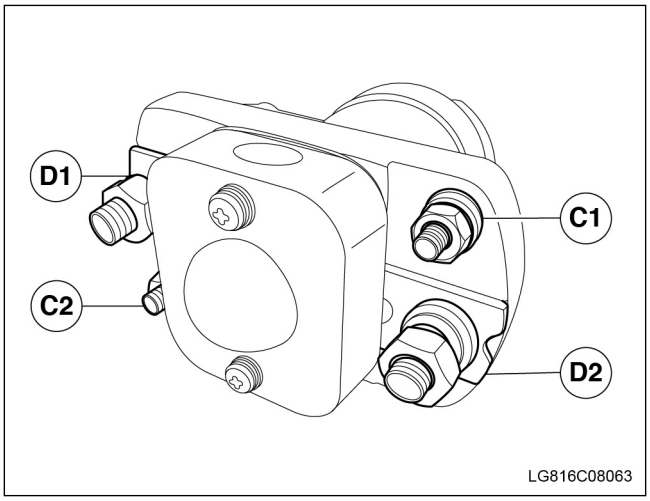
Definition of pin

Wiring pin No.	Wire No.	Function	Wire specification	Color
B	500	From hazard signal light switch	0.85	White
L	602	Output flicker signal	0.85	White
E	812	Earthing	0.85	Grey

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Identification of power supply relay pin

Model is MZJ100A/006, 24V



Wiring pin No.	Wire No.	Function	Wire specification	Color
D1	100	To fuse box	2.0	Yellow
	103	From 2-way fuse box	5.0	Yellow
	104	To engine fuse	5.0	Yellow
D2	101	To fuse box	5.0	Yellow
	203	To starter relay	3.0	Yellow
C1	113	From electric lock power supply	1.25	White
C2	807	Earthing	1.25	Grey

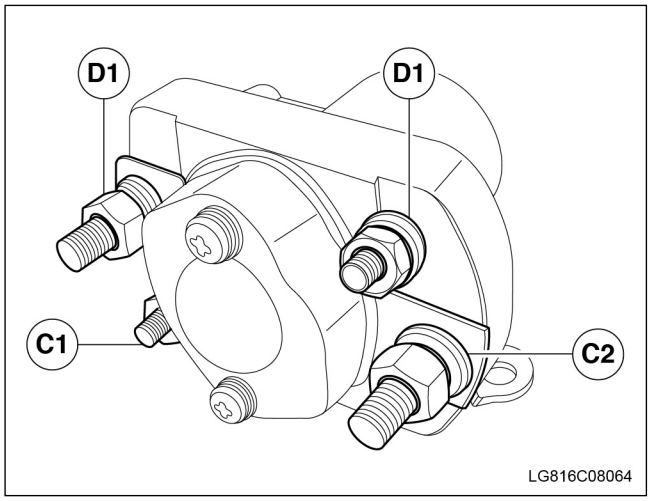
Note:

- C1 and C2 are two thin terminals having the same function, regardless of positive and negative.
- C1 and C2 are two thin terminals having the same function, regardless of positive and negative.

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Identification of starter relay pin

Model is MZJ50A/006, 24V



Wiring pin No.	Wire No.	Function	Wire specification	Color
D1	307	To start motor coil	2.0	White
D2	203	From power supply relay	3.0	Yellow
C1	155	Start protection relay	0.85	White
C2	808	Earthing	0.85	Grey

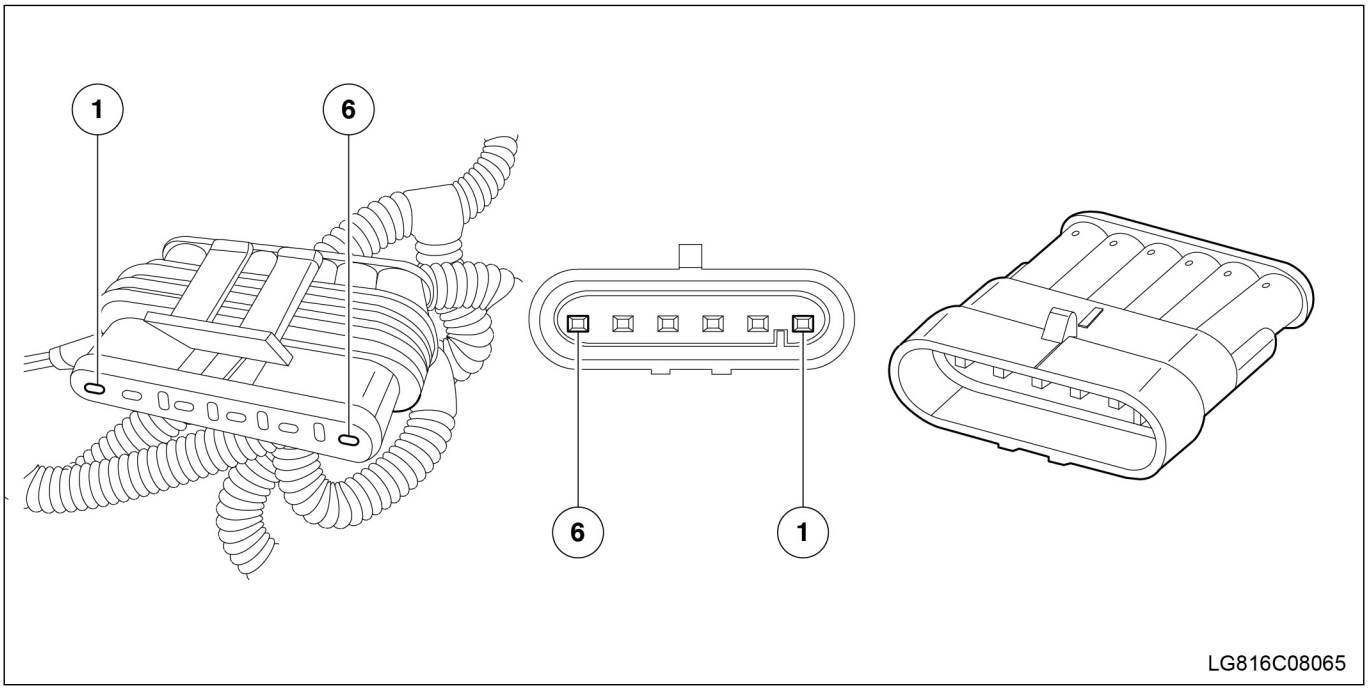
Note:

- D1 and D2 are two thin terminals having the same function, regardless of positive and negative.
- C1 and C2 are two thin terminals having the same function, regardless of positive and negative.

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Plug C11 connecting the front frame harness and rear frame harness

The figure below is the external view/view of socket C11 on the rear frame, its type is: DJ7061-1.5-20



Wiring pin No.	Wire No.	Function	Wire specification	Color
1	600	Front floodlight high beam	1.25	White
2	601	Front floodlight low beam	1.25	White
3	604	Right turn signal light	0.85	White
4	603	Left turn signal light	0.85	White
5	305	Position light	0.85	White
6	810	Earthing cable	1.25	Grey

Six-core connector C7 used on combination handle

Its type is DJ7065-603-11, this handle is negative controlled, its definition is as follows:

Wiring pin No.	Wire No.	Function	Wire specification	Color
1	401	Wiper low speed control	0.85	White
2	506	Washer control line	0.85	White
3	800	Earthing cable	2.0	Grey

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4	605	Horn control line	0.85	White
5	402	Wiper stop signal	0.85	White
6	400	Wiper high speed control	0.85	White

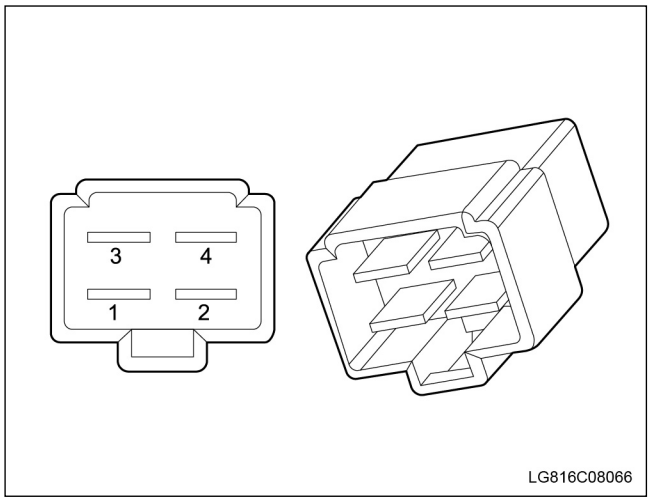
Combination lever 8th core connector C6

Its type is DJ7081B-6.3-21, this plug is positive controlled, low and high beams are output through intermediate relay R8 since the contact is easy to burn with the front floodlight directly controlled by the combination switch. Definition of connector C6 is as below:

Wiring pin No.	Wire No.	Function	Wire specification	Color
1	Not used	Wiper intermittent control		
2	604	Right turn signal output	0.85	White
3	602	Steering power supply	2.0	White
4	603	Left turn signal output	0.85	White
5	Not used	Overtaking signal output		
6	230	Lights power supply	2.0	Yellow
7	Not used	Low beam signal output		
8	621	High beam signal output	0.85	White

Wiper 4th core connector C15

Model: DJ7041-6.3-10, outline drawing is as below:



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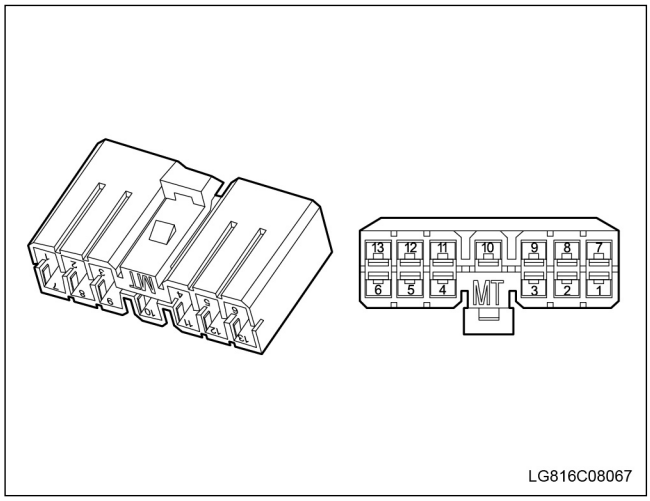
Its pin definition is as follow

Wiring pin No.	Wire No.	Function	Wire specification	Color
1	401	Wiper low speed control	0.85	White
2	400	Wiper high speed control	0.85	White
3	402	Wiper stop signal	0.85	White
4	216	Wiper power supply	0.85	Yellow

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13-core connector for steering gear box harness and alert indicator

Model: DJ7131-3-20, outline drawing of harness plug is as below:

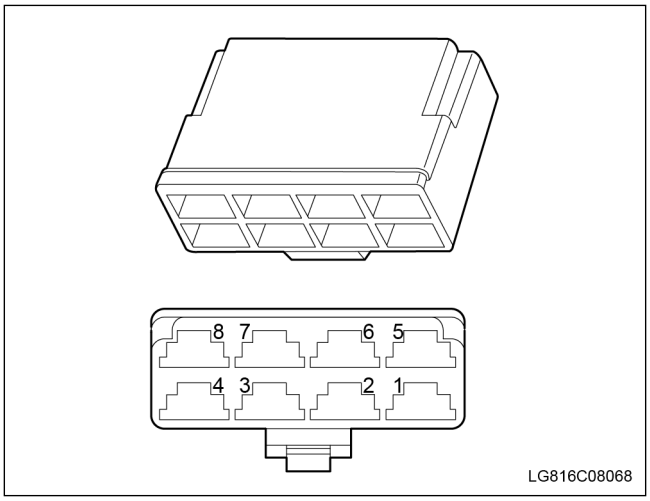


Wiring pin No.	Wire No.	Function	Wire specification	Color
1	603	Turn indicator-left	0.85	White
2	202	Power supply input	0.85	Yellow
3	621	High beam indicator	0.85	White
4	604	Turn indicator-rh	0.85	White
5	802	Earthing cable	0.85	Grey
6	614	Brake air pressure gauge	0.85	White
7	613	Preheating indicator	0.85	White
8	610	Transmission oil pressure indicator	0.85	White
9	611	Engine oil pressure indicator	0.85	White
10	503	Charge indicator	0.85	White

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8-core connector C43 for diode gp

Type: DJ7081-6.3-20, the exterior drawing of the socket on harness is as follows:



Wiring pin No.	Wire No.	Function	Wire specification	Color
1	113a	Absorb power supply relay interference	0.85	White
2	209a	Absorb fan interference	0.85	White
3	101a	Absorb electromagnetic interference in the line	0.85	White
4	154a	Absorb starter relay interference	0.85	White
5	812	Earthing cable	0.85	Grey
6	812	Earthing cable	0.85	Grey
7	812	Earthing cable	0.85	Grey
8	812	Earthing cable	0.85	Grey

Switch wiring

Master light switch, its model: JK939-087

Wiring pin No.	Wire No.	Function	Wire specification	Color
1	230	Output floodlight control signals	2.0	White
2	212	Fuse box from position light power supply	0.85	White
3	213	Fuse box from floodlight power supply	2.0	White

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6	305	Output of position light control signals	0.85	White
8	300a	Output to switch indicator	0.85	White
	300	Output to instrument light control signal	0.85	White
9	300a	Output to switch indicator	0.85	White
10	804	Earthing cable	0.85	Grey

Front work light switch, switch model: JK939-157

Wiring pin No.	Wire No.	Function	Wire specification	Color
1	211a	Front work light power supply	1.25	Yellow
2	211a	Front work light power supply	1.25	Yellow
5	301	To front left work light	0.85	White
6	302	To front right work light	0.85	White
9	300a	To switch indicator	0.85	White
10	804	Earthing cable	0.85	Grey

Rear floodlight switch, its model: JK939-157

Wiring pin No.	Wire No.	Function	Wire specification	Color
1	211	Front work light power supply	1.25	Yellow
2	211	Front work light power supply	1.25	Yellow
5	303	To rear left floodlight	0.85	White
6	304	To rear right floodlight	0.85	White
9	300a	To switch indicator	0.85	White
10	804	Earthing cable	0.85	Grey

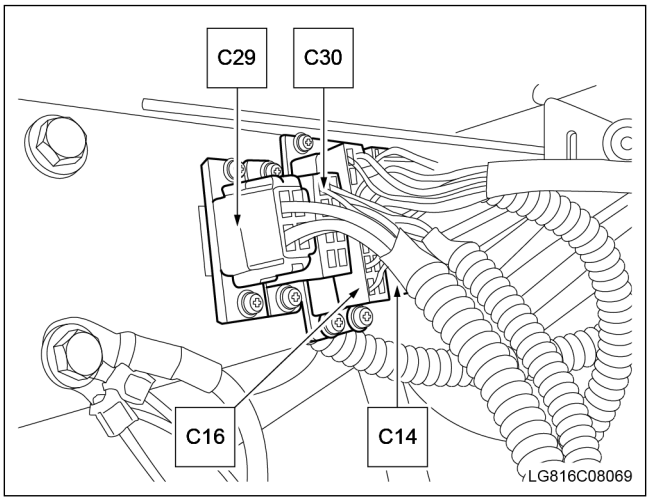
Hazard signal light switch, its model: JK939-193

Wiring pin No.	Wire No.	Function	Wire specification	Color
1	603a	Left turn signal light signal	0.85	White
2	114	Fuse box power supply (key has electricity)	0.85	Yellow
3	604a	Right turn light signal	0.85	White
5	602	From flash relay signal	0.85	White
6	500	Output to flash relay power supply	0.85	White
7	300a	To switch indicator	0.85	White
8	218	Fuse box from power supply (key ON, energized)	0.85	Yellow
9	604b	Output to switch indicator	0.85	White
10	804	Earthing cable	0.85	Grey

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Connection point of important harness connector

It is the connection of frame harness, cab harness and steering gear box harness below the right front side of the cab, it is an important detecting point for fault inspection, as shown below.



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Cable

Cable is an important part forming a conducting loop, and its terminal shall be reliably connected. Poor terminal contact is easy to cause terminal ablation, cable insulating layer melting when serious, affecting normal operation of the machine. Be sure to pay enough attention to repair of this machine.

Cable name	Guide wire sectional area	Terminal 1	Terminal 2	Cab length
Cable from frame to cab	15	10	10	250
Cable from frame to starter motor	35	10	12	300
Cable from disconnect switch to frame	35	10	12	300
Cable from battery (-) to disconnect switch	50	10	Battery negative terminal AS	1280
Cable from battery (+) to starter	35	Terminal as of battery cable (+)	10	1110
Battery connection cable	35	Terminal as of battery cable (+)	Battery (-) terminal as	150

The cable from frame to cab, fixed between the right front side of the cab and frame, is a negative circuit of electric parts of cab.

The cable from frame to starter motor, a negative circuit of the starter, is fixed between the starter and frame.

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Removal and Installation of Electrical Elements

Tool list

Name	Specification(Qty.)
Open-end wrench	8#、 13#、 18#、 19#、 24#、 27#、
Cross screwdriver	---
Screwdriver	---
Nipper plier	---
Scissor	---
⚠ Remark: removed standard parts should be placed with relevant material together to avoid mixing.	

⚠ **"Front" mentioned in this chapter refers to the forward direction after starting the machine; other directions are by this analogy.**

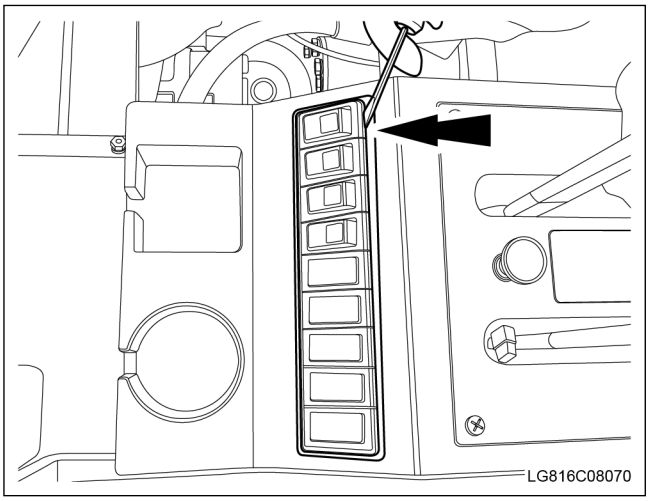
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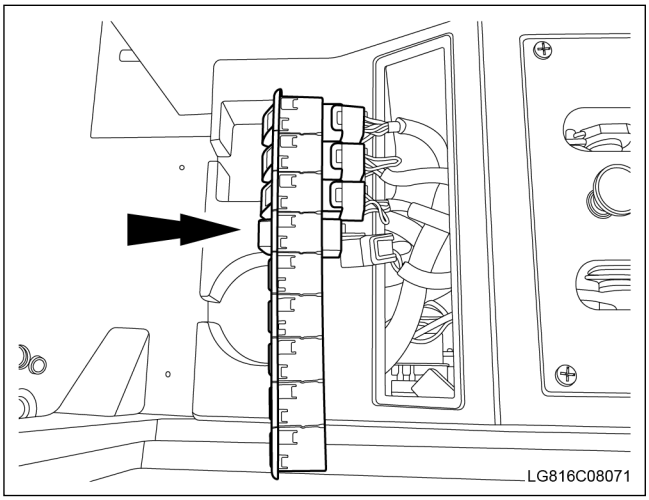
Combination switch

Removal

1. Remove combination switch

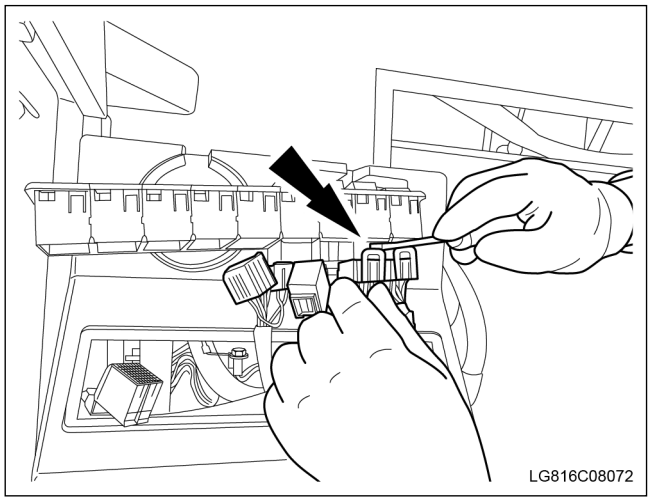
Pry off the combination switch with a screwdriver.





2. Disconnect the joint

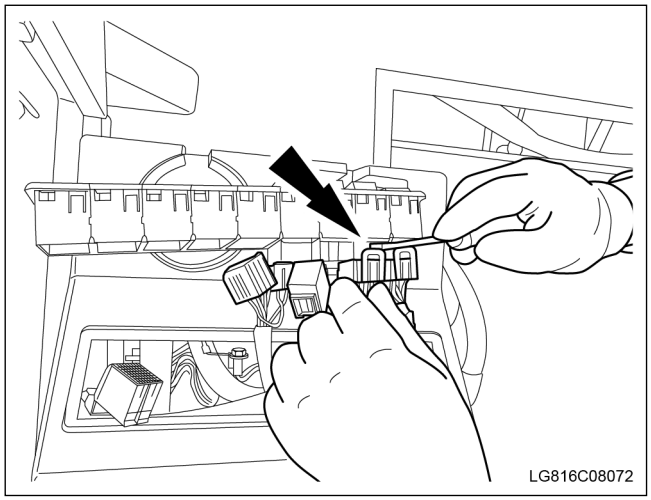
Remove the harness plugs on the switch.



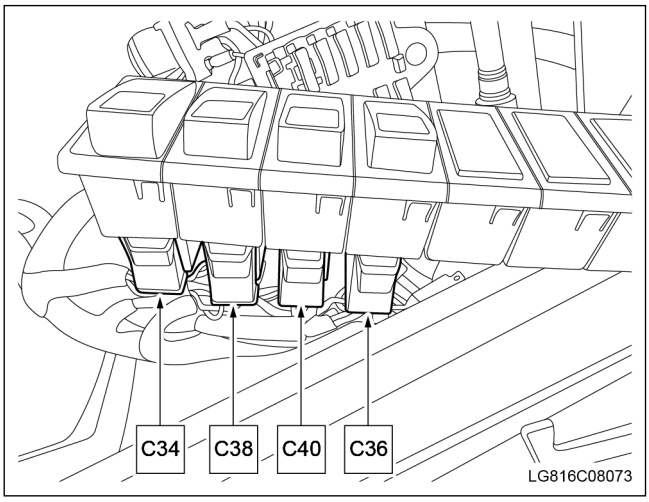
Installation

1. Connect the harness plugs

Connect the harness plug to the combination switch port in the position as illustrated.

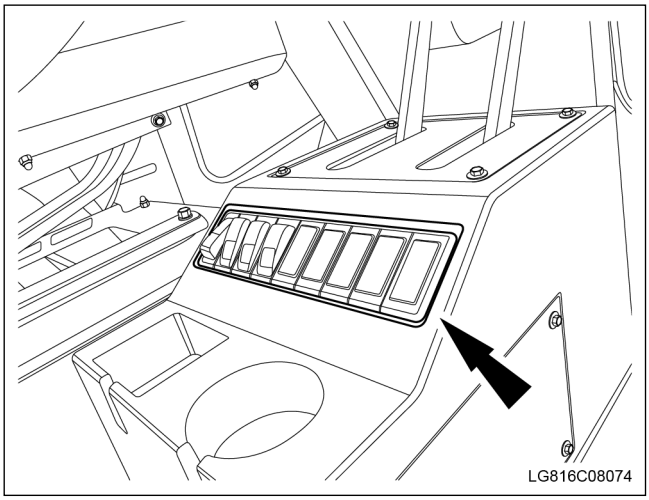


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2. Install rocker switch

Assemble the switch to corresponding hole in the operation box, with the side with green and red identification on the switch down.

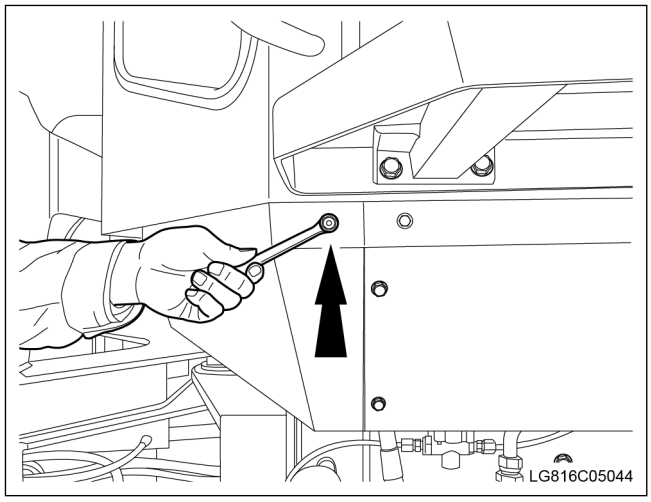


Relay and cab harness

Removal

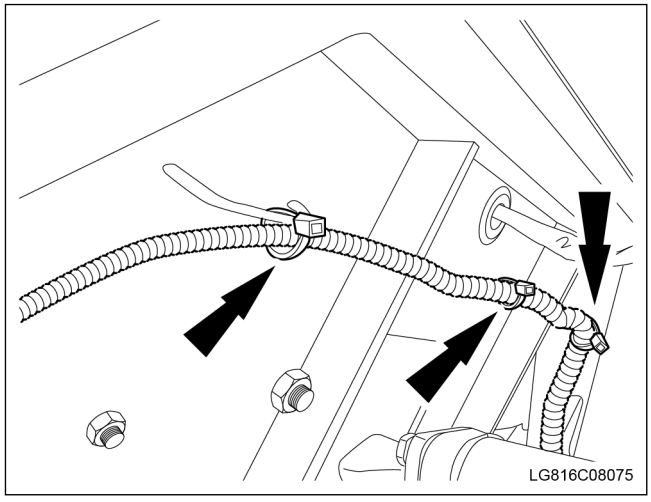
1. Remove plate

Remove plate bolts with a 13# wrench, remove 4 plates.



2. Remove the harness and ties

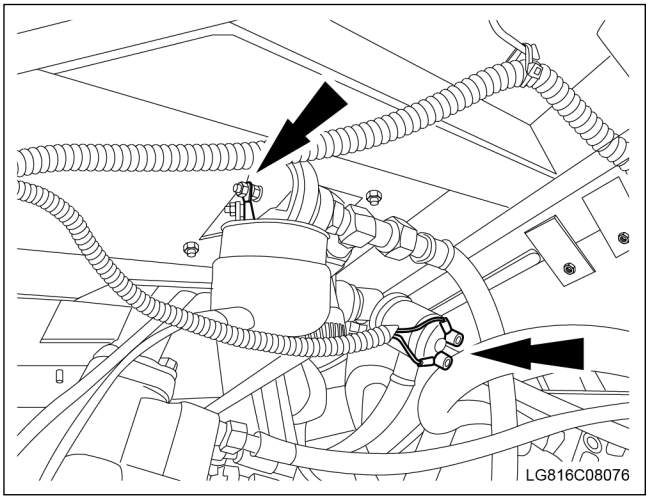
(a) Snip the fixing strap for the harness at the bottom of cab with scissors or pliers.



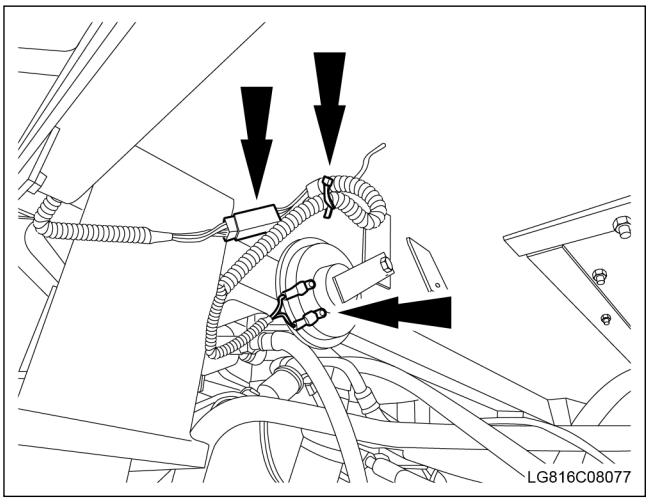
(b) Remove the fixing nut of pneumatic brake light switch harness with 8# wrench, remove the setscrew of air pressure sensor harness connector with a cross-screw-driver, remove the pneumatic brake light

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boot and harness and straighten out the harness.

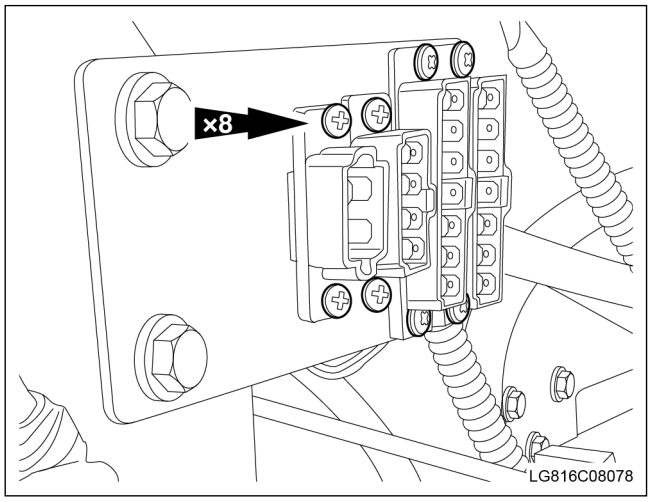


(c) Disconnect the work light harness and horn harness connector, and straighten out the harnesses.



3. Remove the harness connector from the connector mounting plate

Disconnect the harness connectors from the connector mounting plate, remove the cab harness connector fixed to the plate with a cross-screwdriver, and straighten out the harness.



4. Remove the combination switch

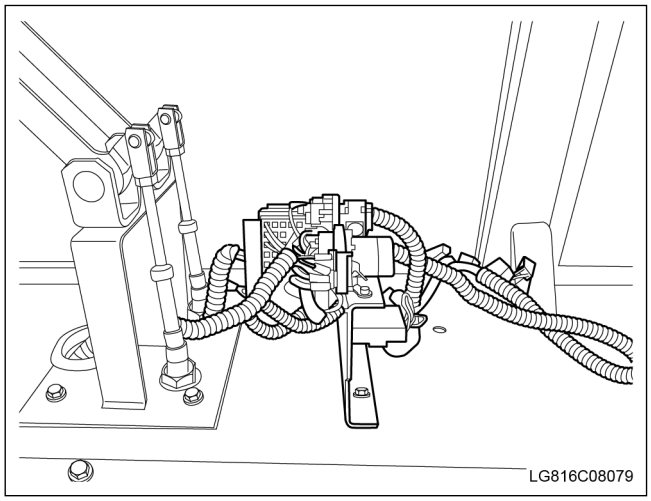
Refer to "**Combination switch**"(p. 8-78)the removal process, remove the combination switch.

5. Remove operation box

Remove the operation box refer to"**Operation box**"(p. 7-9) removal process.

6. Remove the relay and harness gp

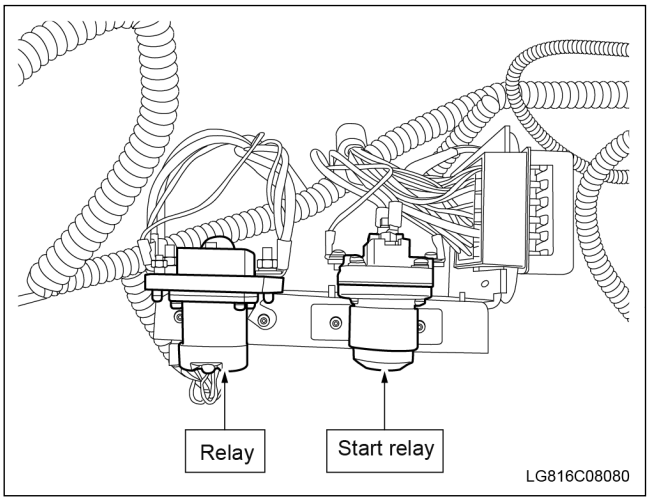
Remove 3 captive bolts from the relay AS mounting plate with 13# wrench, a harness captive bolt from the cab bottom plate, and remove the relay AS and harness.



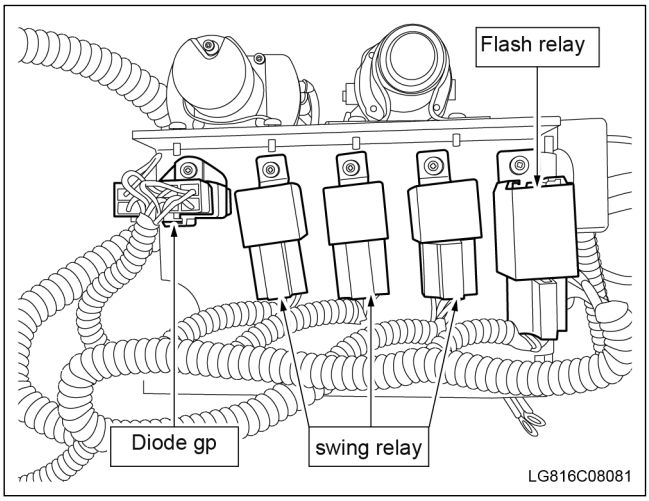
7. Remove relay

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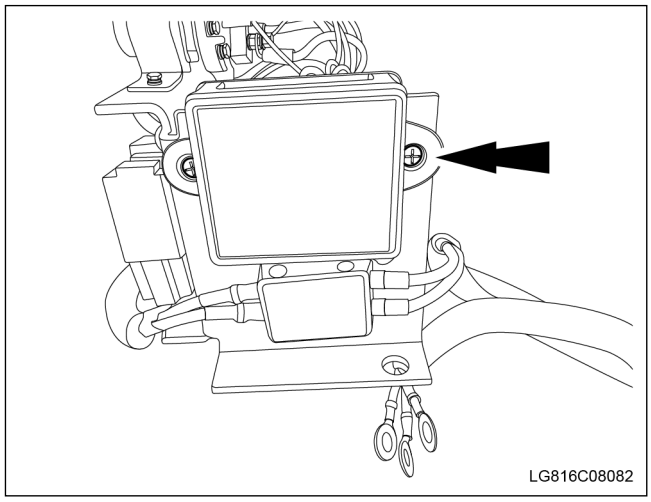
(a) Remove the harness setscrews from the left relay above and right starter relay in turn with a cross-screwdriver, then remove the relay setscrews, and remove the relay.



(b) Disconnect the harness connectors from the diode gp at the rear side, 3 switching relays and flash relay, remove the setscrews from the relays with a cross-screwdriver, and remove the relays.



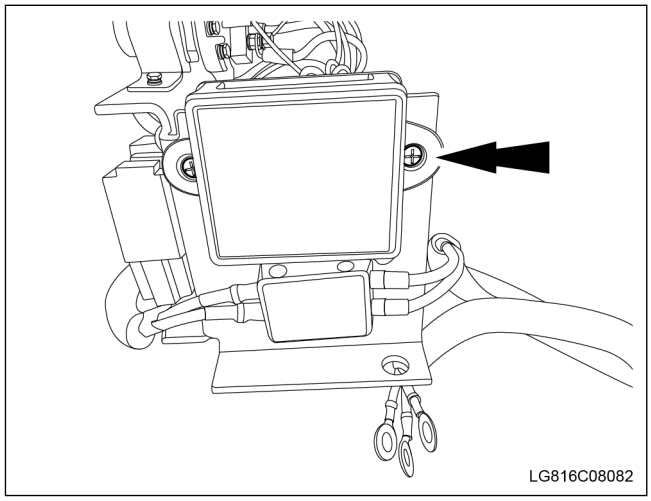
(c) Unscrew off the mounting screws of upper plate fuse box and lower 2-way fuse box at the right side with a cross-screwdriver, remove the rear frame harness, and then check, maintain or replace parts.



Installation

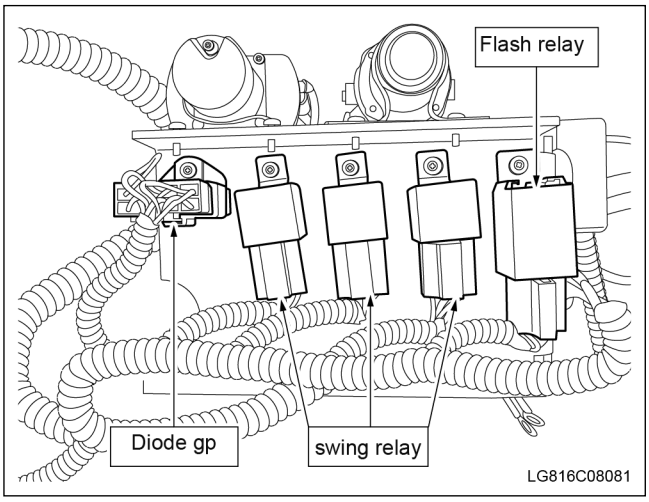
1. Install relay

(a) Fix the build-in 2-way fuse box and plate fuse box of the cab harness to the mounting plate in turn with screws, and screw down the screws with a cross-screwdriver.



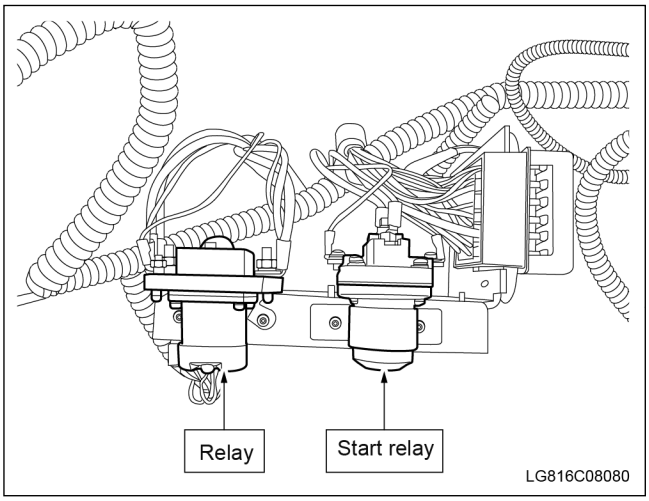
(b) Fix the diode gp, 3 switching relays and flash relay to the rear side of the relay mounting plate in turn with screws, screw down the screws with a cross-screwdriver, and then connect corresponding harnesses to the relay.

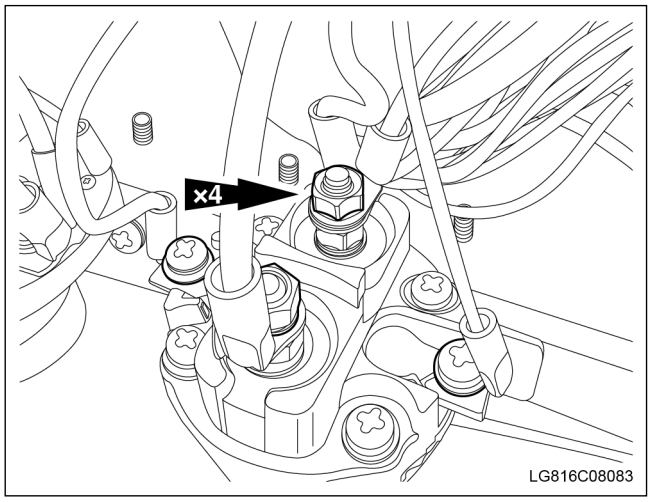
https://truckmanualshub.com/

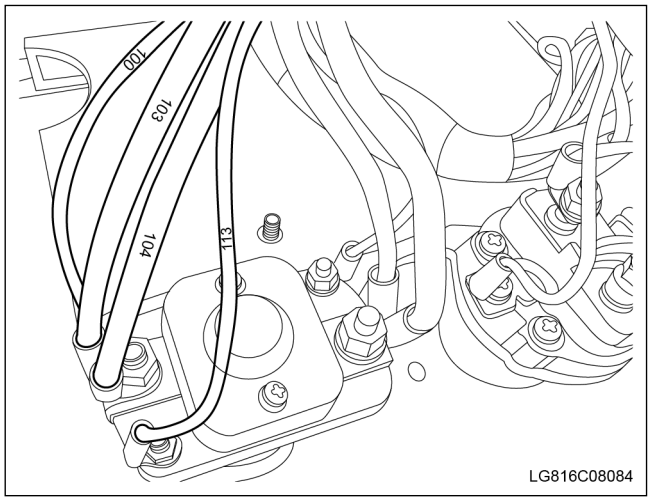


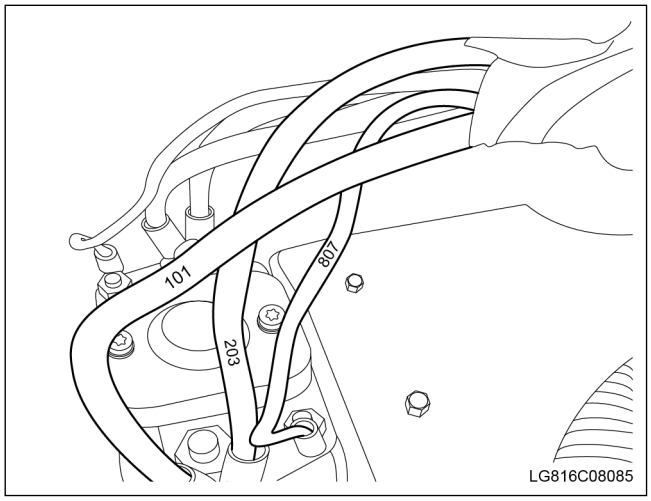
(c) Fix the relay and start relay to the point above the relay mounting plate in turn with screws, with the wiring harness position facing forwards, and screw down the relay setscrews with a cross-screwdriver.

(d) Then connect the relay harness to the relay with screws, screw down the screws with the cross-screwdriver, the connector wire sizes are as shown in figure.









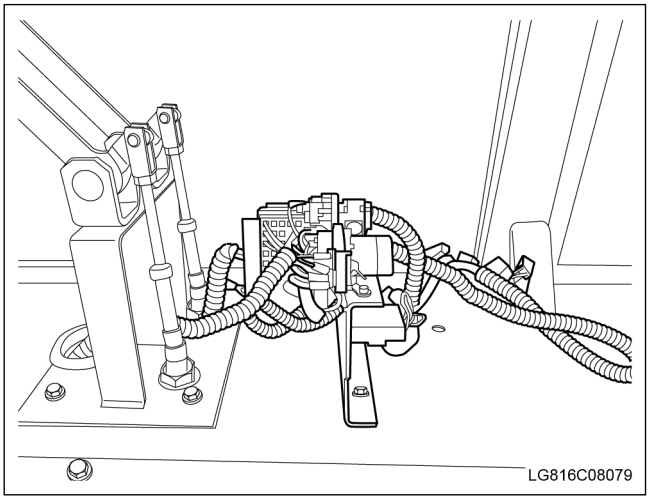
2. Install the relay and harness AS

(a) Fix the relay AS mounting plate and cab

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earthing harness to corresponding positions at the bottom of the cab with 4 removed bolts and washers.

(b) Screw down the bolts with 13# wrench, tightening torque 26±4 N•m. Pass the harness through the hole in the control lever bracket mounting plate.



3. Install operation box

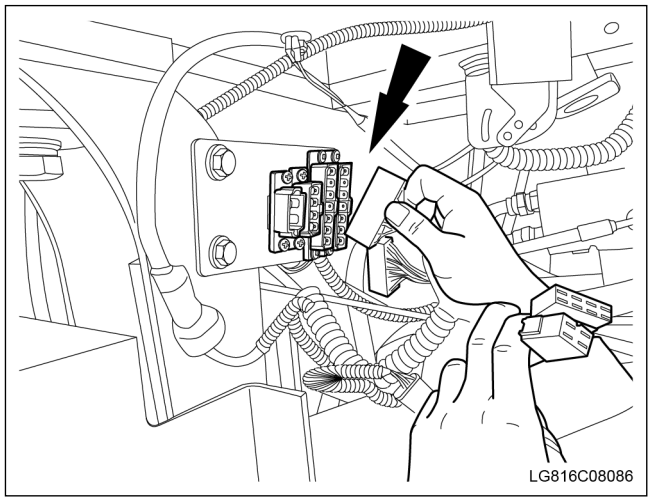
Refer to "**Operation box**"(p. 7-9) the installation process, assemble the operation box to the cab bottom plate.

4. Install the combination switch

Refer to "**Combination switch**"(p. 8-78)the installation process, connect the combination switch harness, and assemble it to the operation box.

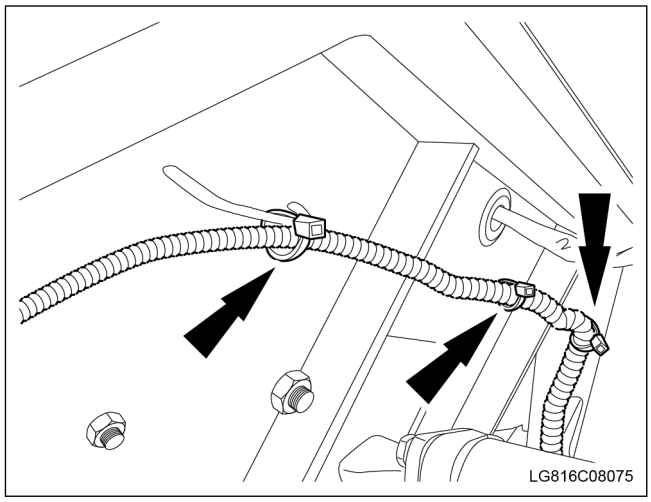
5. Install connector mounting wire harness

Assemble the cab harness connector to corresponding position on the connector mounting plate with removed screws, and screw down the screws with the cross-screwdriver. Then insert each harness connector into corresponding connector.



6. Tie the harness

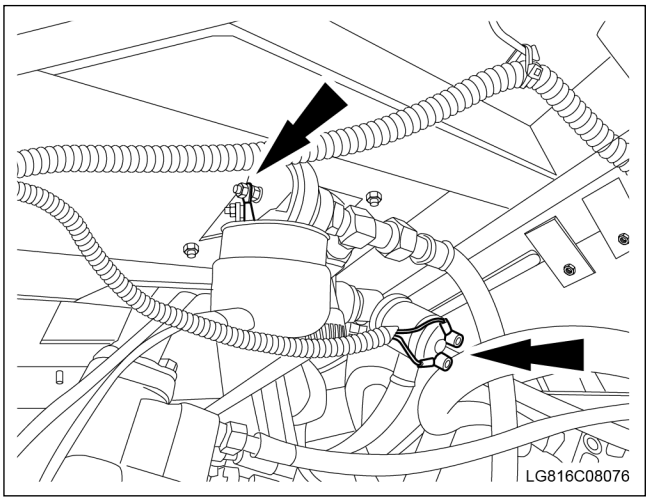
(a) After straightening out the cab harness, tie up the cables with ties in turn to the round steel at the bottom of the cab, and cut off long ties with tie pliers.

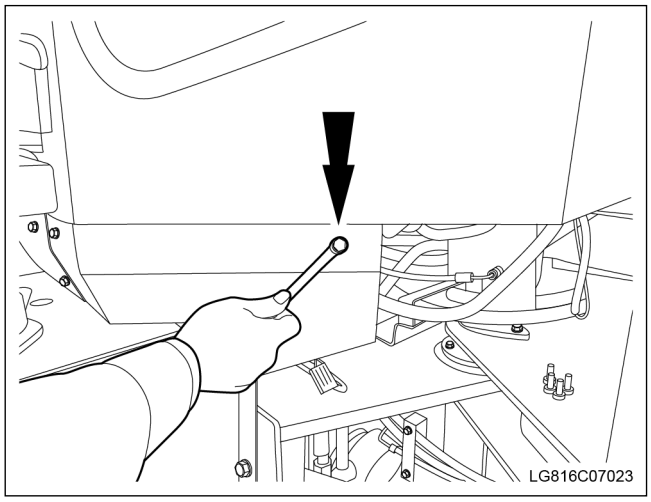


(b) Pass the pneumatic brake light boot through the harness, and fix the harness connector to the pneumatic brake light switch connector with a nut.

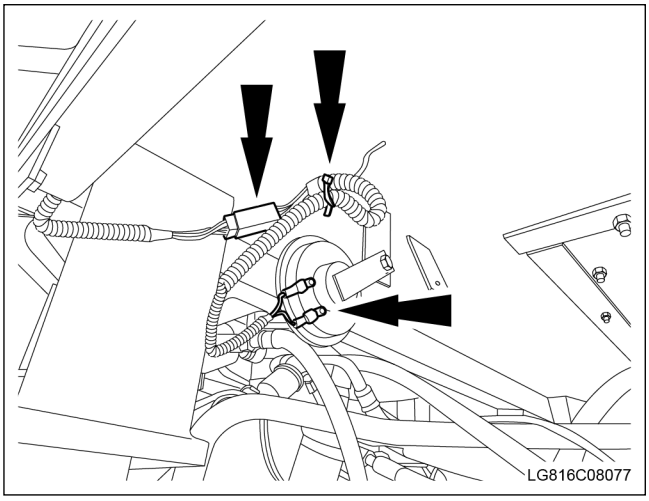
(c) Fix the pressure sensor harness to the sensor connector with a screw, tighten the nut and screw with 8# wrench and cross-screwdriver, respectively, and cover up the pneumatic brake light boot.

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(d) Connect the horn harness connector to the horn connector, insert the work light harness connector into corresponding connector of cab harness, tie up the suspended harnesses together with a tie to the round steel below the cab, and cut off long ties.



7. Install plate

Fix the four plates to the cab with bolts, tighten the bolts with a 13# wrench.

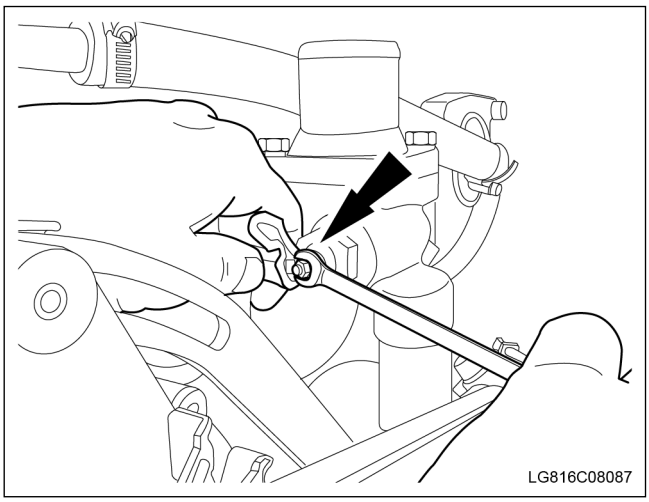
https://truckmanualshub.com/

Temperature, pressure, diesel tank sensors

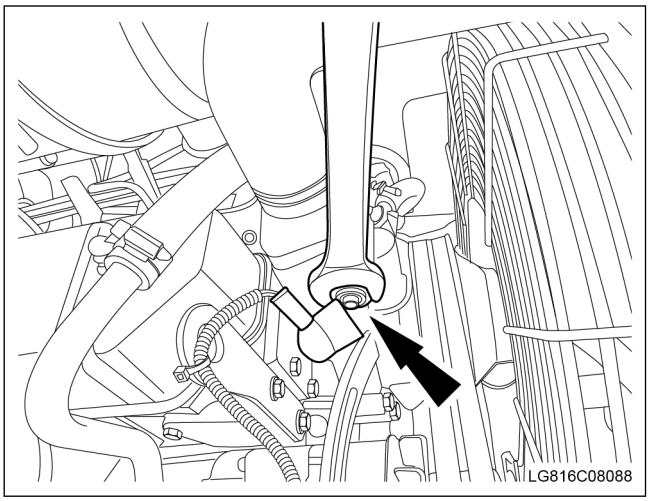
Removal

1. Remove the water temp sensor

(a) Pull out the wire harness connector sleeve of the water temperature sensor, remove the fixing nut of the wire harness connector with open wrench, remove wire harness.

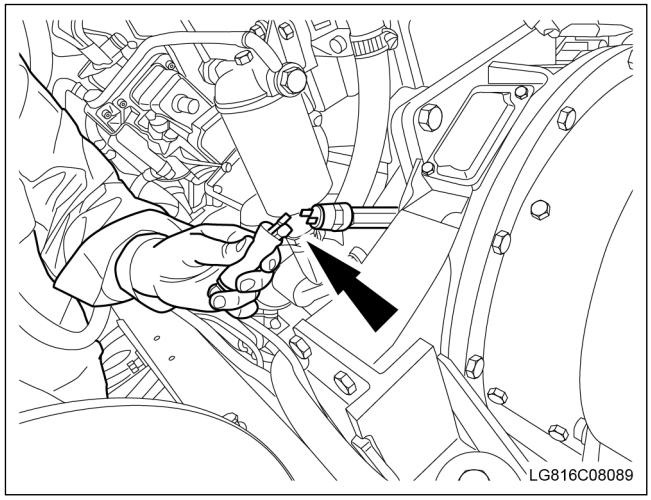


(b) Remove the water temp sensor with 24# wrench.

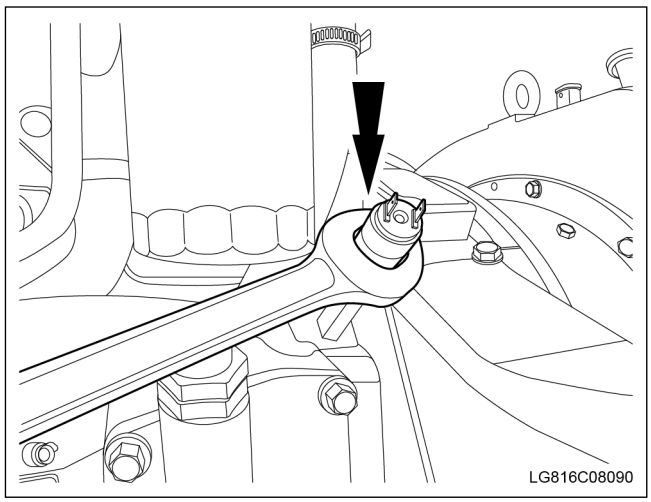


2. Remove engine oil pressure sensor

(a) Pull out the wire harness joint sleeve of the engine oil pressure sensor, pull out the joint.



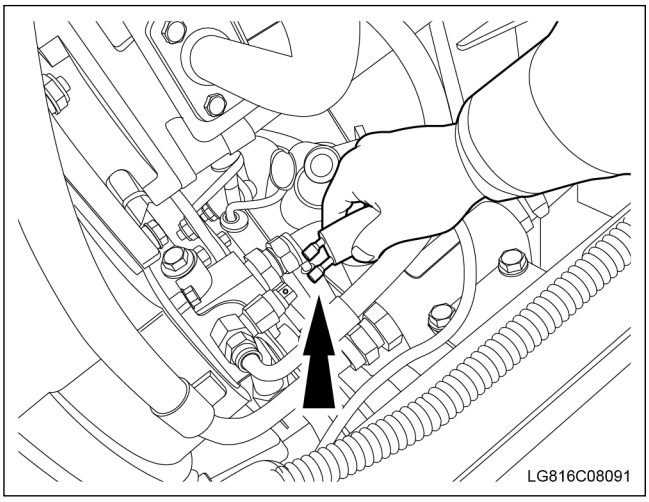
(b) Remove the engine oil pressure sensor with 24# wrench.



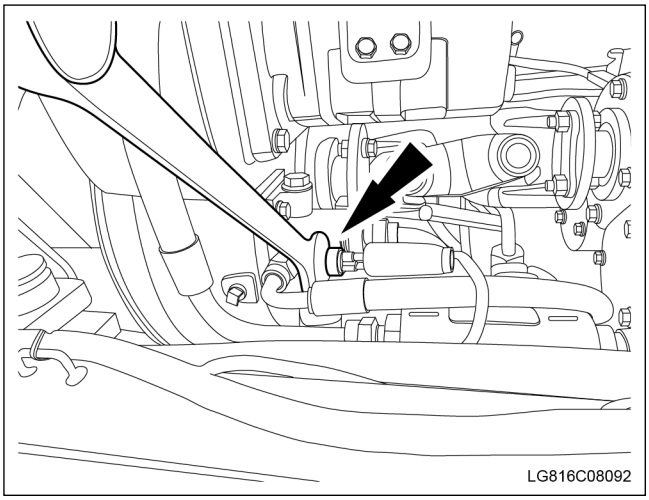
3. Remove the transmission oil pressure sensor

(a) Pull out the wire harness joint sleeve and joint of the transmission oil pressure sensor.

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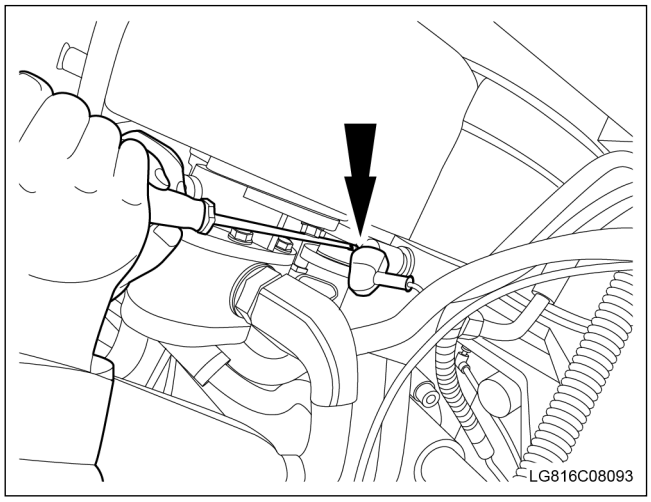


(b) Remove the transmission oil pressure sensor with 24# wrench.

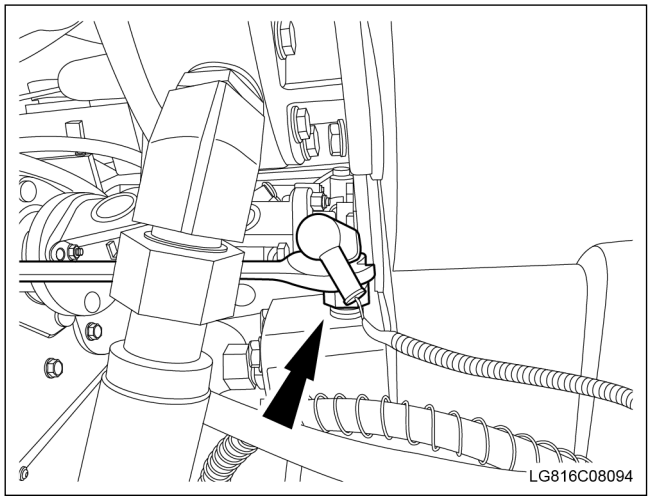


4. Remove torque converter oil temp sensor

(a) Pull out the wire harness joint sleeve of the torque converter oil temp sensor, remove the setscrew with a cross screw-driver, remove harness.



(b) Remove the torque converter oil temp sensor with 24# wrench.

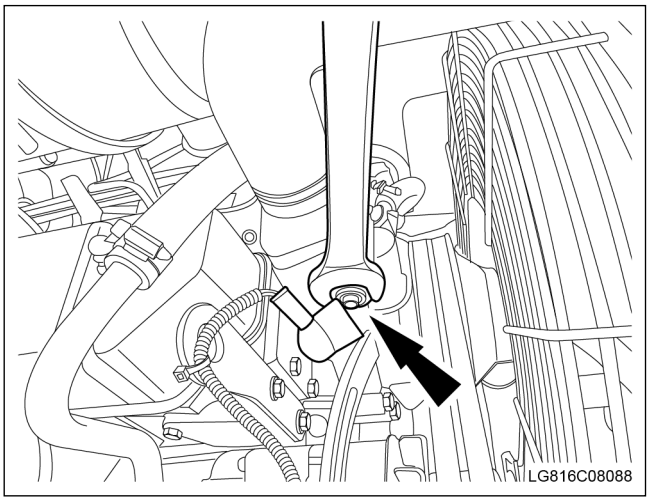


Installation

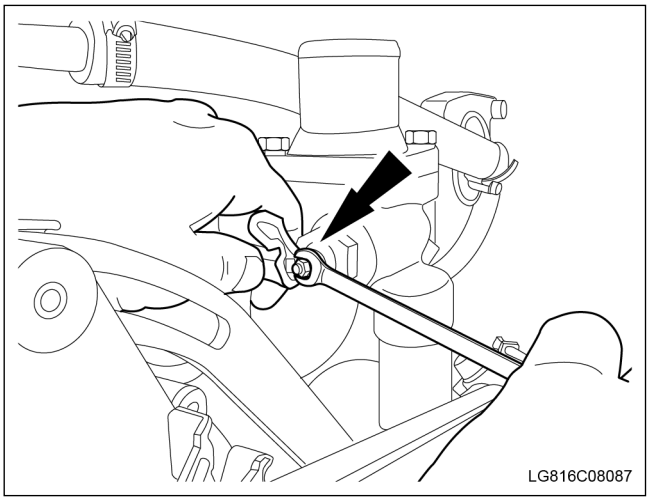
1. Install the coolant temp sensor

(a) Apply a circle of pipe thread sealant to the threaded end of the coolant temp sensor, then assemble it to corresponding interface on the diesel engine, and tighten the sensor with 24# wrench.

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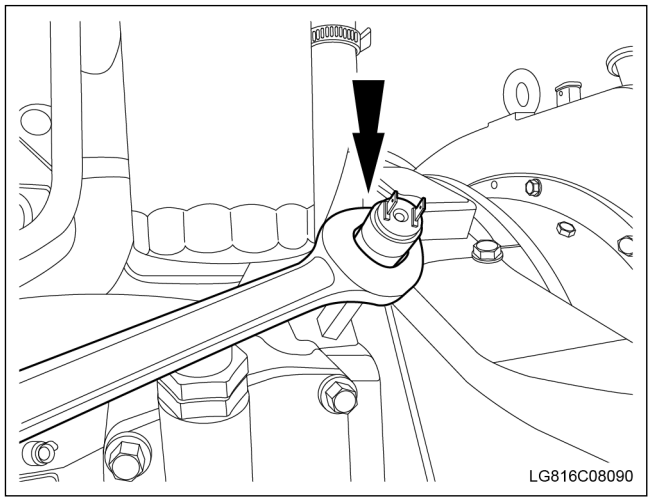


(b) Connect the harness connector to the sensor with a nut coming with the machine, tighten it with the cross-screwdriver, and cover up the boot.

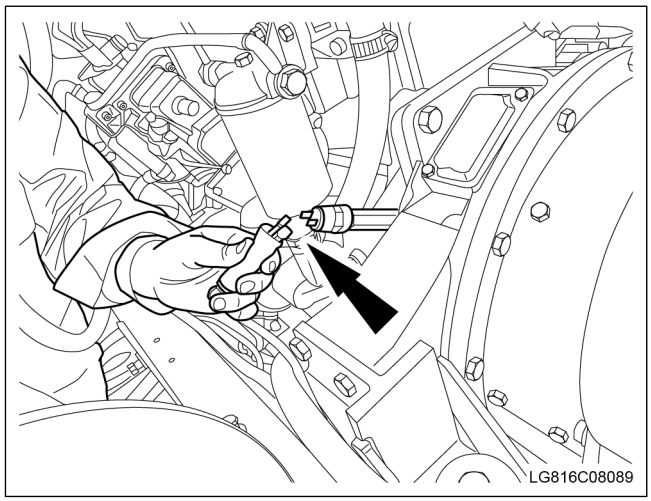


2. Install engine oil pressure sensor

(a) Apply a circle of pipe thread sealant to the threaded end of the oil pressure sensor, then assemble it to corresponding interface on the diesel engine, and tighten the sensor with 24# wrench.



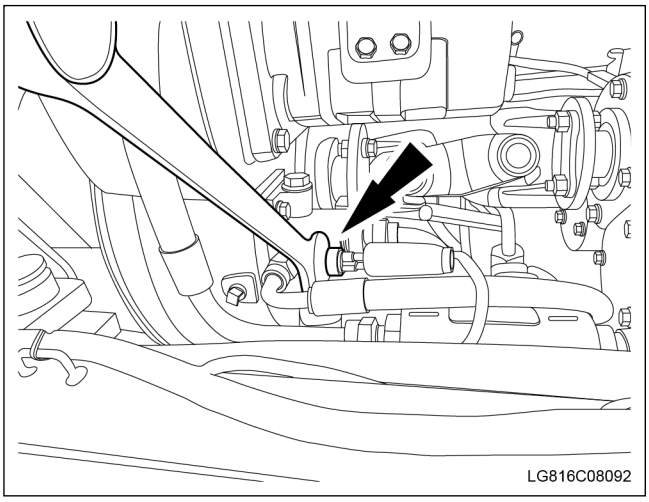
(b) Plug the engine oil pressure sensor wire harness joint to the sensor, cover harness sleeve.



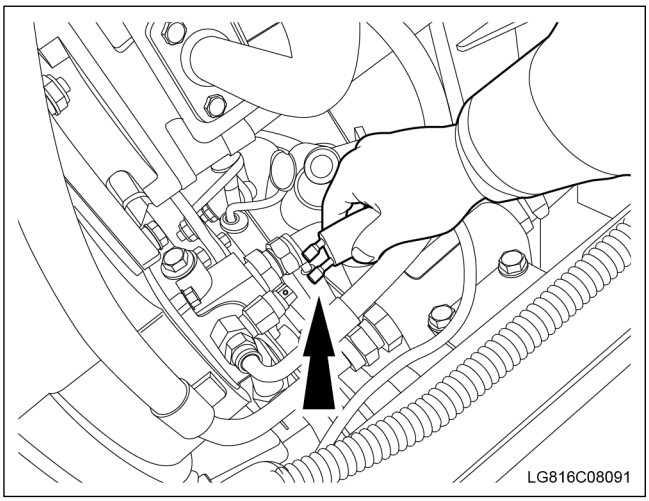
3. Install transmission oil pressure sensor

(a) Apply a circle of pipe thread sealant to the threaded end of the transmission oil pressure sensor, then assemble it to corresponding interface on the torque converter, and tighten the sensor with 24# wrench.

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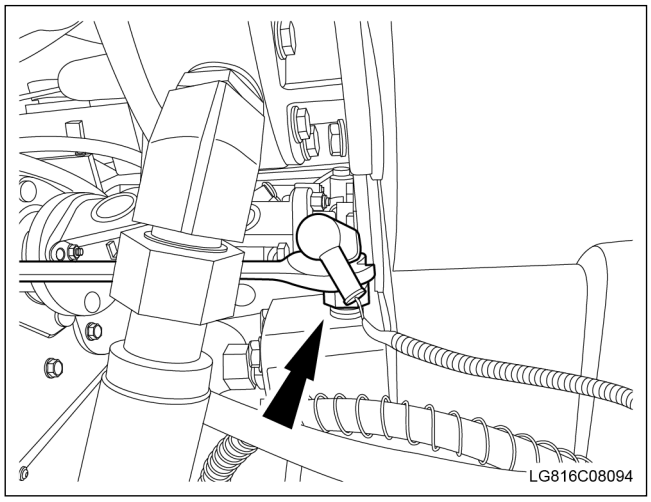


(b) Connect the gearbox oil pressure sensor harness to the sensor and cover the harness connector well.

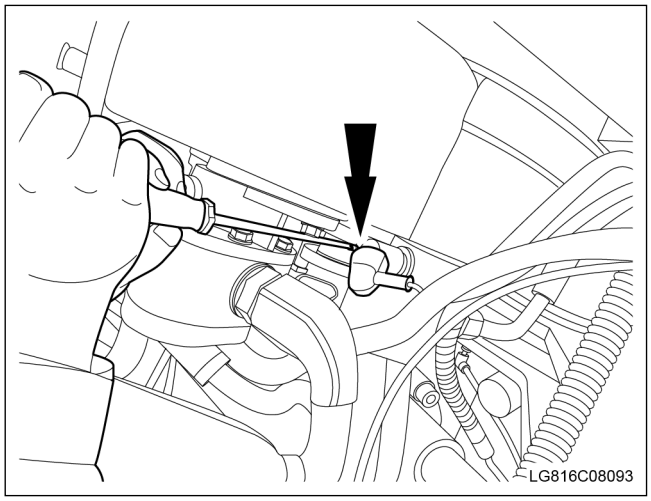


4. Install torque converter oil temp sensor

(a) Apply a circle of pipe thread sealant to the threaded end of the torque converter oil temp sensor, then assemble it to corresponding interface on the torque converter, and tighten the sensor with 24# wrench.



(b) Install the wire harness joint of the torque converter oil temperature sensor to the sensor with cross-screwdriver and self screw, cover the wire harness sleeve.



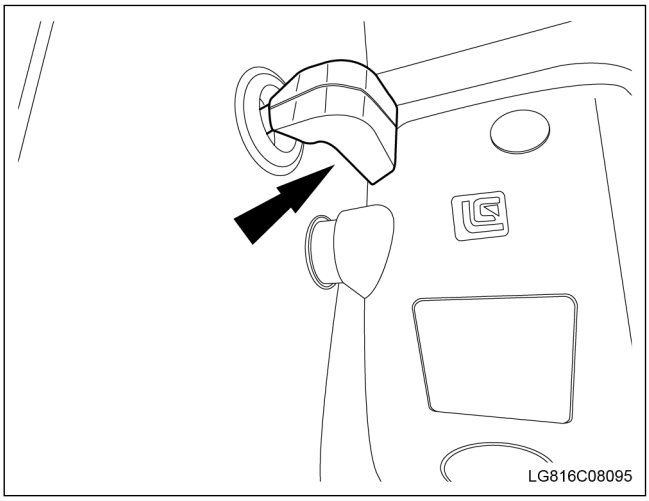
https://truckmanualshub.com/

Floodlight

Removal (rear work light)

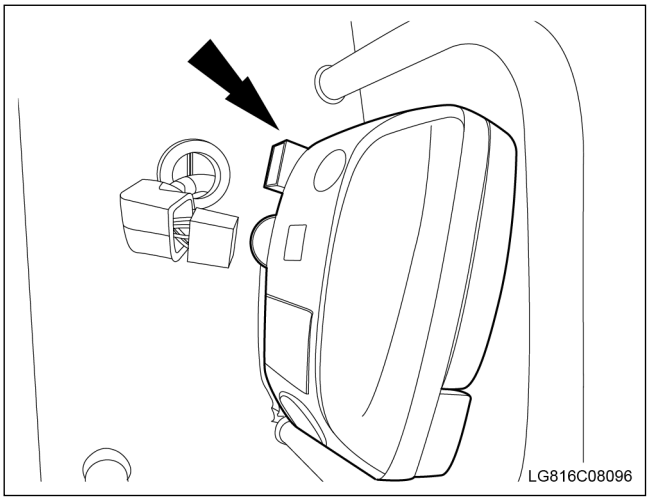
1. Remove the harness

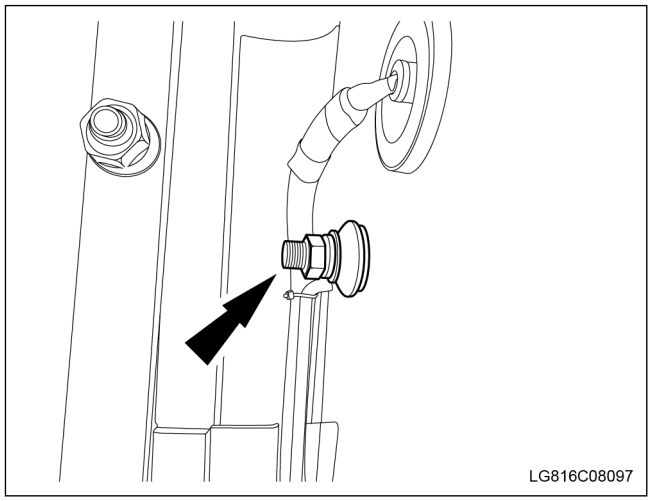
Remove the rear work light harness jacket, and then remove the harness connector.



2. Remove rear work lights

Open the guard door at the upside, remove the rear work light fixing nuts, washers and other attachments at the inner side of the hood with 18# wrench, remove the rear work light, repair or replace the rear work light.

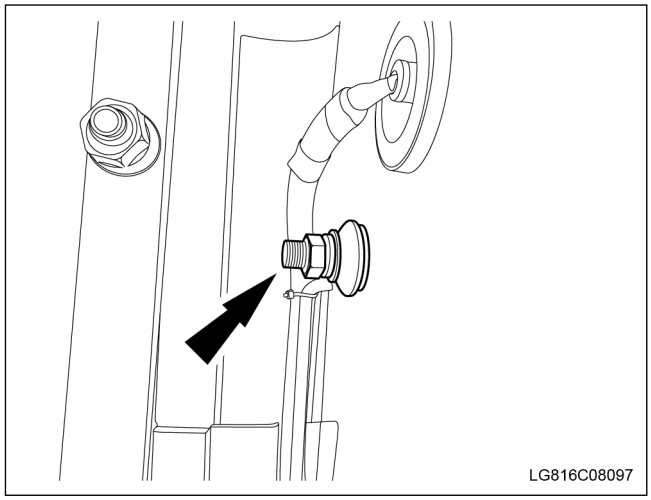




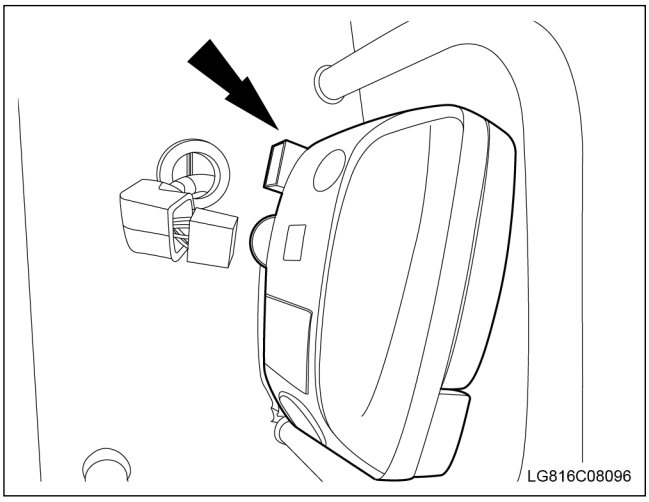
Installation (rear work light)

1. Install rear work lights

Assemble the rear work light-lh and rear work light-rh to both sides of the hood, fix with the nuts, washers and corresponding attachments coming with the rear work light at the inner side of the hood, adjust the work light to make its front side face backwards, slightly downwards, and tighten the nuts with 18# wrench.

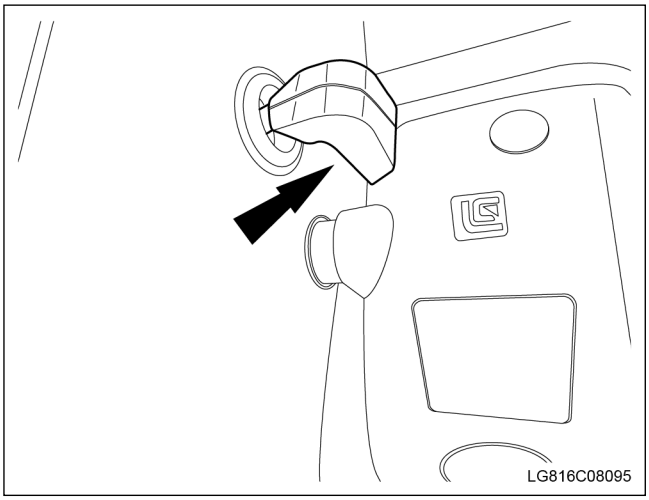


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2. Connect wire harness

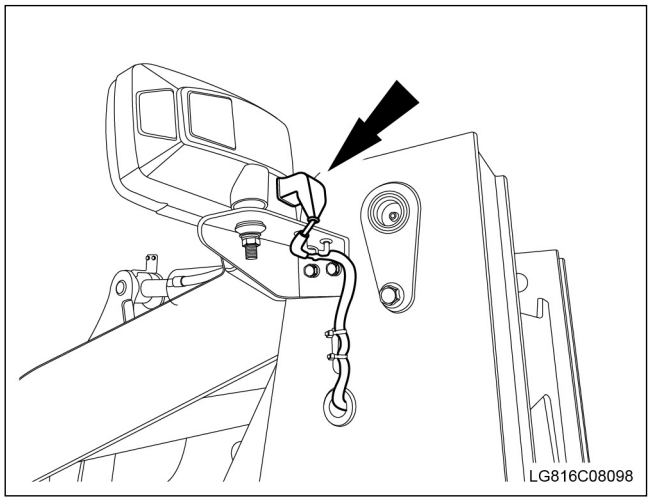
Connect the rear work light harness connector to the upper connector of work light, and cover up the harness boot.



Removal (Front work light)

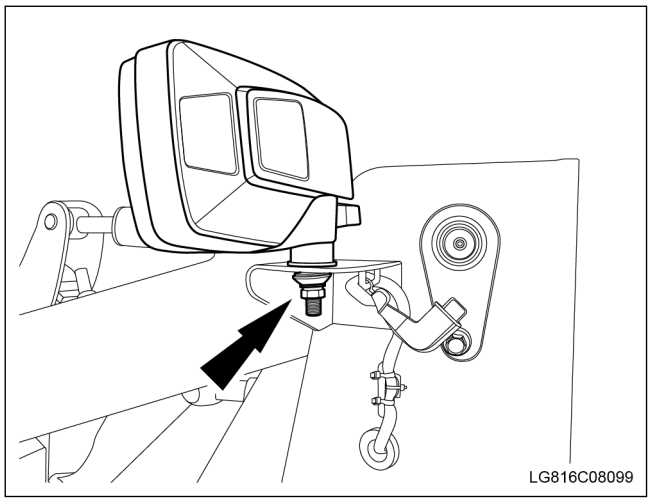
1. Remove the harness

Pull out front work light harness jacket, and then the harness joint.



2. Remove front work light

Remove the fixing nuts, washers and other attachments below the front work light mounting bracket with 18# wrench, remove the front work light, repair or replace it.



Installation (front work light)

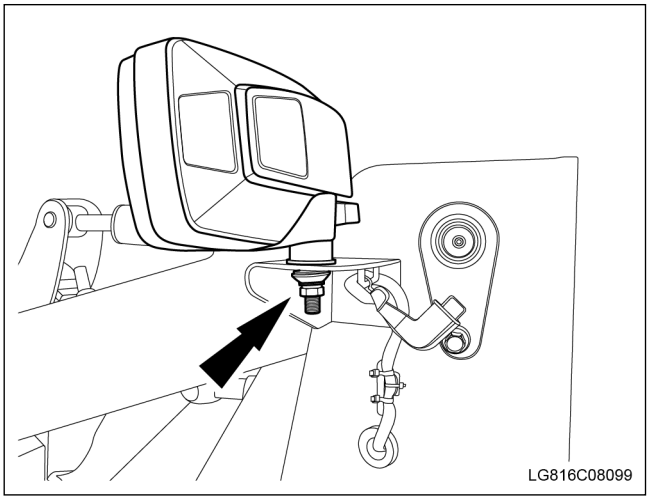
1. Install front work light

(a) Assemble the rear work light-lh and rear work light-rh to the work light mounting brackets on both sides of the front frame, respectively.

(b) Fix below the bracket with the nuts, washers and corresponding attachments coming

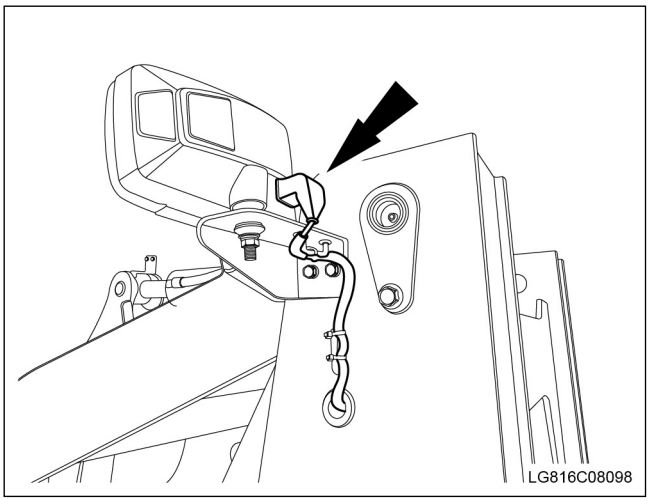
https://truckmanualshub.com/

with the front work light, adjust the work light to make its front side forwards, and tighten the nuts with 18# wrench.



2. Connect harness

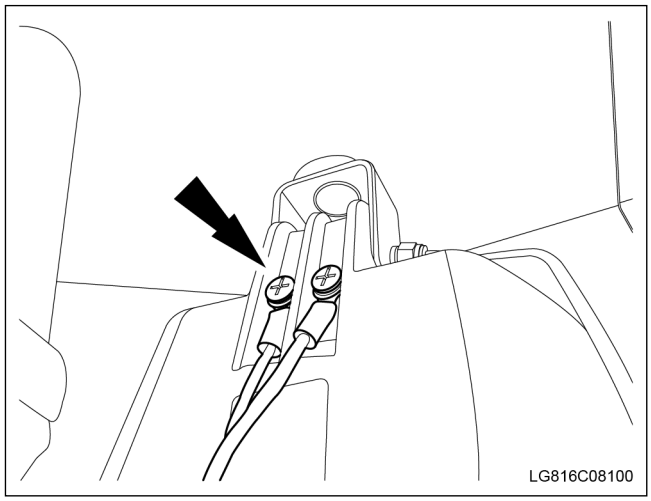
Connect the rear/front work light harness connector to the upper connector of work light, and cover up the harness boot.



Removal (cab front floodlight)

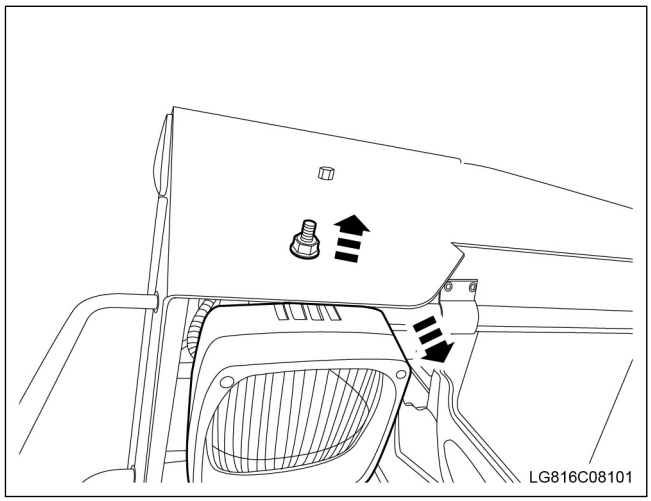
1. Remove the harness

Remove two harness setscrews from the cab front floodlight with the cross-screwdriver, and remove the harness.



2. Remove the cab front floodlight

Remove the front floodlight mounting nuts, washers and other attachments from the top of the cab with 19# wrench, remove the front floodlight, repair or replace it.



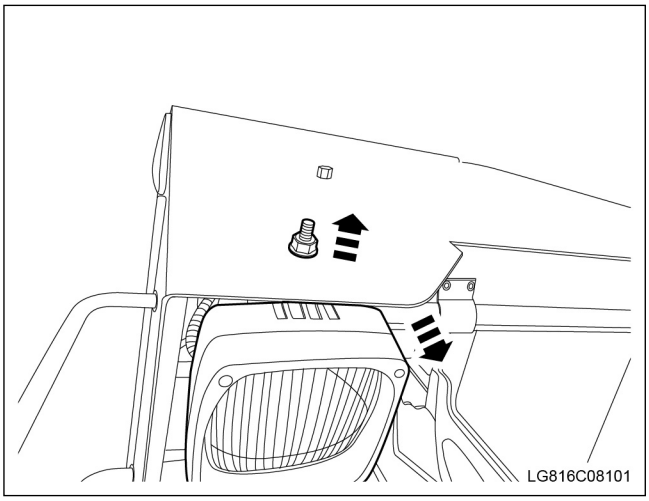
Installation (cab front floodlight)

1. Install cab front floodlight

Assemble the cab floodlight-lh and cab floodlight-rh into the cab plate mounting holes, respectively, fix them with nuts, washers and corresponding attachments coming with the floodlight, adjust the floodlight to make its front side face forwards, and tighten the setscrew

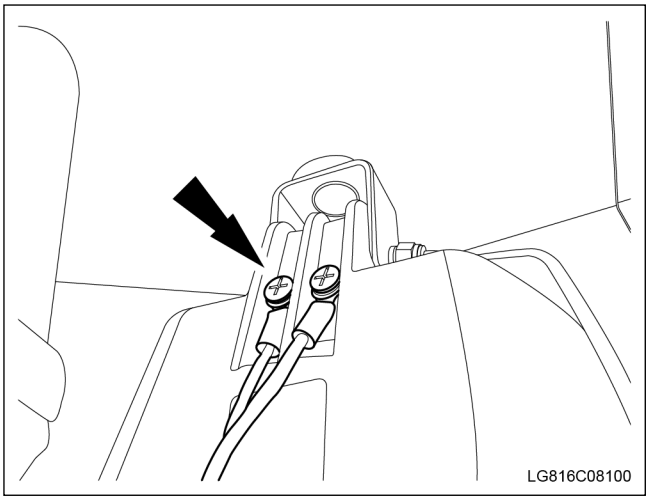
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nuts with 19# wrench.



2. Connect harness

Connect two harnesses to the connector at the rear of cab floodlight with screws coming with the machine. Tighten the screws with the cross-screwdriver.



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Precautions for Electric Fault Repair

Please obey the following precautions strictly during the service of electrical system. Otherwise, it may cause greater faults, greater economic losses, even major safety accidents.

Read and understand the circuit schematic

Schematic is a correlation diagram when components and parts in the electric system operate normally. You can understand the function of the components and parts in the circuit and the effect in the event of a fault only when you read and understand the schematic, so as to make the true judgment on symptoms correctly and quickly, avoid blind and large-scale removal to save service time.

During service, you shall cut off the machine power supply first in order to disconnect the wire and connector. Otherwise, harness will be damaged and the fuse will be blown; even fire will be caused because of short circuit of wires.

Proper identification of wire markers

On the harness, each wire corresponds to a wire marker with a 3-digit or 4-digit number (caution: the letter following the number is process identification), please pay special attention to distinguish between "3" and "8", "6" and "9", "5" and "6" and other numbers to avoid bringing unnecessary trouble to your service in case of an oversight.

Properly connect the connector: To connect connectors (especially when connectors are relatively concentrated), please observe the connector letter (1-digit or 2-digit capital letter) identification carefully to avoid incorrect insertion. Incorrect insertion of connector can cause a lot of unexpected faults, even may cause a fire of complete machine.

To unplug the connector, unplug grasp the connector itself, press the connector buckle and hold, separate it in two directions, and it is not allowed to unplug the connector forcibly while grasping the wire. To connect the connector, be sure to observe whether the buckle is fastened.

During service of waterproof connector, you must pay special attention to the fact that you cannot make oil or water flow into the connector; otherwise, it must not be reconnected until cleaned and dried.

Use the circuit detecting instrument correctly

1. **When you use a variety of circuit testing instruments, you shall first understand their working principles and service conditions, and unreasonable use is forbidden.**
2. **Please confirm whether the testing instrument that you are using is normal prior to measurement.**
3. **Appropriate measured range should be selected when measuring voltage and current to avoid damages to instruments.**
4. **It is prohibited to measure voltage on the current and resistance position.**

Correct understanding of the meaning of "ground" in the circuit schematic

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The battery negative is the "ground", negative ground is generally used for engineering machinery, namely that the battery negative is connected to the complete machine body (including frame, cab and other metallic conductors connected together), so the complete machine body is also the "ground". To measure the voltage to ground or resistance of a detecting point, connect a pen (red pen) of multimeter to the detecting point, and the other pen (black pen) to any position on the complete machine body

⚠ **Caution: There shall be no paint, oil stain, dirt, etc. at the detecting point.**

Correctly tie up harness and wire

1. **Avoid folding or bending the harness forcibly.**
2. **It shall be kept away from moving components as far as possible to prevent tensile failure and wear.**
3. **Avoid friction with sharp metal edges.**
4. **Try to keep far way from oil and water.**
5. **Keep away from high temperature parts (e.g. engine body) as far as possible.**

   If wire or harness are found to be worn, they should be replaced and wrapped immediately, and fix the harness in place not be worn.

   To replace components and parts, please use CLG attachments as far as possible.

Use the fuse correctly

To replace the fuse, be sure to use a fuse of the same specification, and it is not allowed to use a copper wire for emergency treatment. Flat fuses and plate fuses (60A) adopted by the product shall comply strictly to relevant provisions of QC / T 420 "automotive fuses". Therefore, if fuses need to be replaced during the service, please use the attachments provided by Liugong.

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System Safety Items

Please strictly observe the safety warning information listed in this section and appearing in the manual in the process of operation, service and repair of this machine; otherwise, major casualty accidents or serious damage to the machine may occur.

Prevent lightning stroke and lightning

To prevent casualties caused by lightning stroke when lightning stroke and lightning occur in the machine area, you must keep in mind that:

- If you are in the cab, please sit in the driver seat;
- If you are on the ground, please stay away from the machine area.

Non-explosion-proof design

The electric system of this machine is not an explosion-proof design, so the machine is strictly prohibited to operate in flammable and explosive areas.

Disconnect switch

After engine flameout, many places in the circuit are still live if you do not turn off the disconnect switch, and it can lead to an accidental fire or other damages to the machine!

Therefore, please be sure to disconnect the disconnect switch before one of the following occurs!

- The machine will be out of service for a long time;
- Welding on machine;
- Fastening the battery line;
- Maintain or replace battery:
- When a fire or other accidents occur;

Battery

For daily maintenance and service of battery, please read the information on the battery nameplate carefully; otherwise, it may cause a great injury to your body.

- **Incorrect battery cable connection could cause an explosion, and then cause personal injuries.**
- **When two or more batteries are connected, please do not mix batteries of different types, especially different brands.**
- **Batteries contain sulfuric acid which can cause blindness or severe burns.**
- **If you touch the acid liquor by accident, please rinse immediately with water, and seek medical advice as soon as possible.**
- **Children are forbidden to approach.**
- **Leaded, scrapped batteries should not be discarded at will, causing environmental pollution, and they shall be recycled.**
- **Lead is a toxic object, please carefully use and properly handle it.**
- **No tilting.**
- **Do not open the battery end cap.**

Sensor

High temperature and high pressure oil or water can cause personal injury! To replace the sensor, please shut down the engine first, wait until the engine and gearbox housing are sufficiently

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cooled.

Welding

Do not use the earth point of any electric component on the machine as the earth point of the welding machine!

For welding near the earth point of the electric appliance, you must not perform welding operation until you disconnect the earth point of the electric appliance and make sure that the welding circuit of the welding machine does not pass through the electric appliance. Otherwise, it will damage the components of the electric appliance, and even lead to a fire!

Other

See warning details in this manual.

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9 A/C System

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Precautions

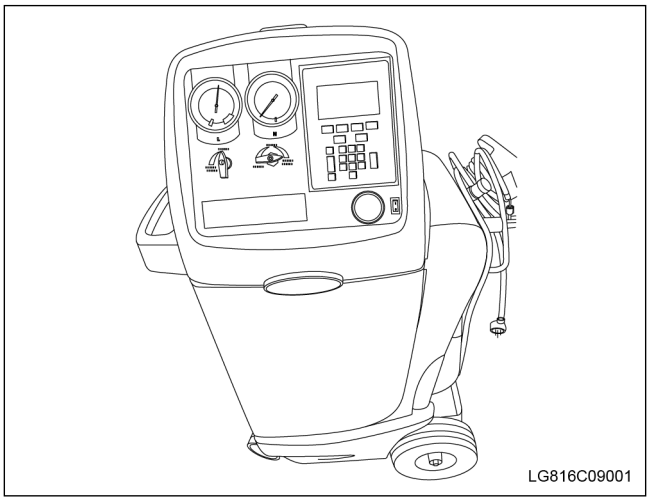
Only technical personnel, who have been professionally trained or certified by related institutions, will be allowed to provide services and repairs for the A/C system of engineering vehicles. When service the A/C system of the machine, be sure to reserve the refrigerant in the system for reuse after repair.

Currently refrigerant HFC-R134a, which is used in the A/C system, is quite stable chemically, and does not contain any CFC group with damage effect to atmospheric ozone layer.

In order to protect yourself safety, you must follow a few items when working in an environment with HFC-134a:

1. **When working near the A/C system, you must wear goggles. Because if there is liquid refrigerant splashed into the eyes, it can cause serious injury. When the refrigerant is splashed into or around your eyes, you should immediately follow these steps:**
   (a) Rinse the eyes with water for about 15 minutes.
   (b) Immediately go to hospital.
2. **If liquid refrigerant drops on the skin, it can cause skin frostbite. Therefore, when maintaining the A/C system, you should open the A/C equipment carefully and slowly. If the refrigerant accidentally stained on the skin, it doesn't need to find a doctor for treatment.**
3. **The container holding refrigerant must be placed upright, as well as avoid heat and sunlight. Refrigerant temperature rise will lead to increased pressure within the container.**
4. **When the need for welding or near the A/C system with steam cleaning, you must first recycling A/C system refrigerant.**
5. **In a test or recovery of refrigerant, first check the temperature and pressure of the A/C system.**
6. **When the refrigerant contacts with flame, they will react to form a toxic gas.**
7. **Experimental results show that mixture of compressed HFC-134a and the air will generate a flammable gas. Therefore, it is not allowed to compress air or smoke when detecting the system leakage.**
8. **Before removing any component of the A/C system, you should recycle refrigerants.**

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Refrigerant recovery, reuse and filling apparatus -SPX 347112K

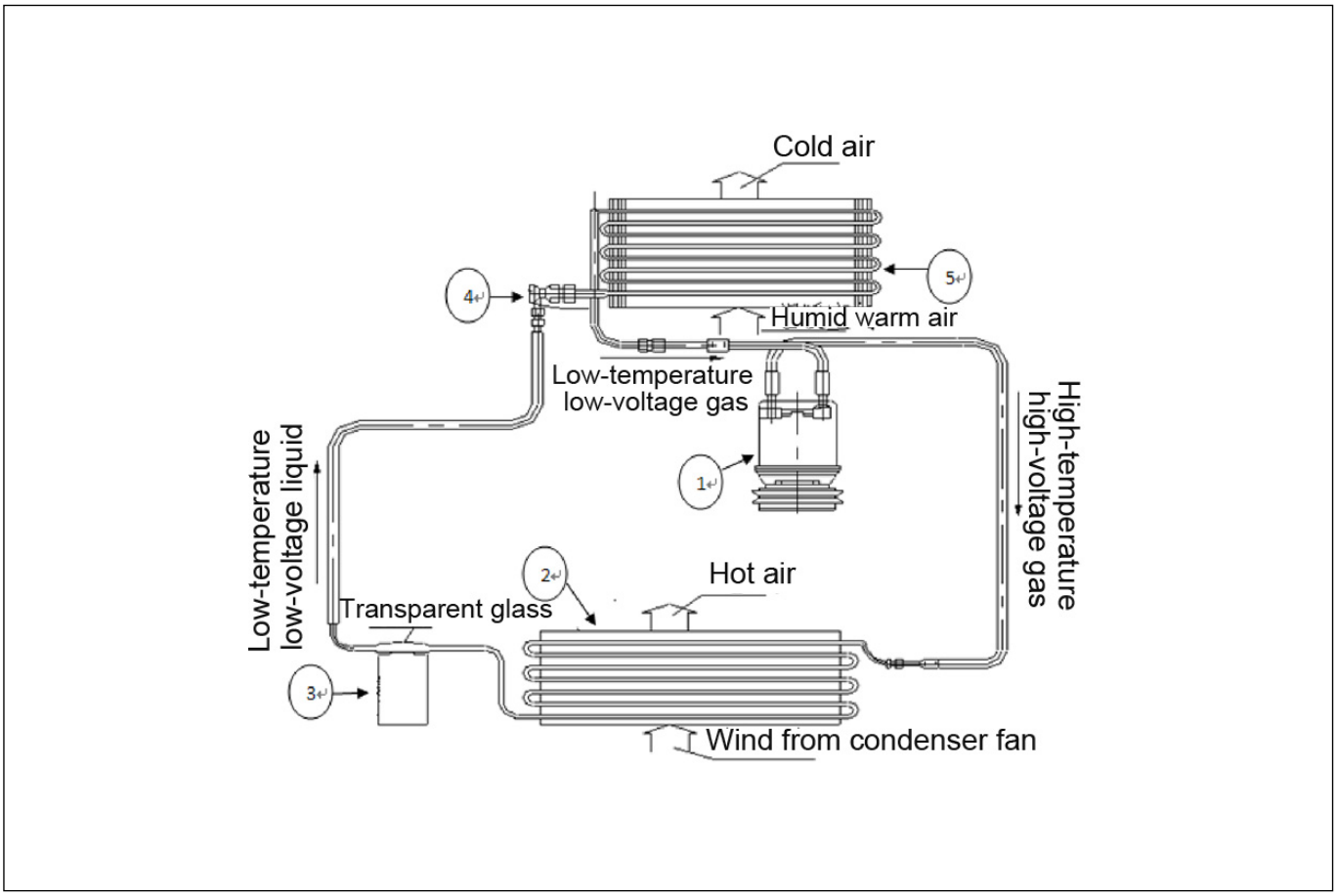
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Operation

A/C system refrigerant circuit consists of five main components: a compressor, a condenser, reservoir bottle, an expansion valve and an evaporator. These components are connected by pipelines to form a closed system. The refrigerant used in the A/C system is HFC-134a.

The refrigerant at the inlet of the compressor is gaseous in low pressure, and turns into high pressure gas after compressed by the compressor, then flows into the condenser. After the refrigerant flows through the condenser, most heat will be dissipated. Therefore, the refrigerant will be condensed into high pressure liquid.

The liquid refrigerant in high pressure then flows into the reservoir bottle after through the condenser. there is absorbent material Inside the reservoir bottle, which can absorb water in the A/C system, in order to prevent corrosion caused by water to the inside of the A/C system components.



1. Compressor *2. Condenser* *3. Reservoir bottle*

4. Expansion valve *5. Evaporator*

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The refrigerant flows to the expansion valve in high pressure liquid after passing through the reservoir bottle. Expansion valve will release pressure of the refrigerant to drop its pressure, and then flow into the evaporator core. The evaporator controls the expansion valve to release a suitable amount of refrigerant according to its own thermal load.

When the refrigerant flows through the evaporator core, it will absorb heat around the evaporator core and in the air to flow through the evaporator fins. The refrigerant will evaporate into a low pressure gas by the combined effect of heat rise and pressure drop, and drop down temperature of the air passing through the evaporator fins. Therefore, the air in low temperature will flow from the evaporator into the cab, and let the operator fell comfort.

Electrical components of the A/C system include a control panel, temperature sensors, fan motors, fan resistors, compressor electromagnetic clutches and pressure switches etc.

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Troubleshooting

First, observe the state of the machine carefully, check as the following and correct if necessary:

1. **View previous service records of the machine.**
2. **Check whether the compressor belt is tensioned.**
3. **Check whether fins, fan blades, condensers, filters or evaporators have been clogged.**
4. **Check whether the A/C lines have been excessively bent or knotted.**
5. **Check whether there are leaks on the components, which have a large accumulation of oil or oily dust.**
6. **Check whether the air ducts are intact, and seals are in right place.**
7. **Check whether the condensate drain lines and valves are blocked.**

Fault - no refrigeration

Whether the compressor runs or not	No →	Mechanical structure: please check “Overhaul of compressor mechanical structure”(p. 9-8). Electrical appliance: please check “Overhaul of electromagnetic clutches of fans and compressor”(p. 9-8)
Yes ↓		
System internal fault, please check “Pressure test”(p. 9-13)		

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Fault: insufficient refrigeration		Fault: cooling discontinuously
Heater Confirm heater control and the hot water valve are turned off, and no coolant flows through the heating core.	→	**Mechanical structure** Please refers to “Overhaul of compressor mechanical structure”(p. 9-8)
Seal Make sure the seals are installed correctly	→	**Electrical appliance** View “Overhaul of electromagnetic clutches of fans and compressor”(p. 9-8) service of the blower motor, fan switches and compressor electromagnetic clutches.
Mechanical structure Please refer to “Overhaul of compressor mechanical structure”(p. 9-8) Please refer to “Detection of core of the evaporator / heater”(p. 9-12)	→	**System internal fault** Please refers to “Pressure test”(p. 9-13)
Electrical appliance Please refers to “Overhaul of electromagnetic clutches of fans and compressor”(p. 9-8)	→	Fault: system abnormal noise
Refrigerant Please refers to “Cab temperature detection”(p. 9-9)	→	**Mechanical structure** Please refers to “Overhaul of compressor mechanical structure”(p. 9-8) Please refer to "Service of the Blower Motor" in “Overhaul of compressor mechanical structure”(p. 9-8)
System internal fault Please refers to “Pressure test”(p. 9-13)	→	**System internal fault** Please refers to “Pressure test”(p. 9-13)

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System Service

Service of compressor mechanical structure

Compressor and belt	1. Belt badly damaged - Replace worn belts, because use of worn belts can cause belt slippage.
Compressor installation bracket	1. Bracket bolts loose - tighten bolts to the specified torque 2. Bracket fractures or is damaged - replace the bracket
Compressor electromagnetic clutch	1. If the compressor itself is faulty, the compressor belt will skid at the compressor belt pulley. The compressor should be repaired or replaced at this time. 2. Detect installation clearance between the front plate of the compressor electromagnetic clutch and pulley, it must ensure 0.41 - 0.79mm. 3. Rotate slowly the compressor with a wrench in clockwise, the compressor should be able to rotate smoothly and does not require too much force.
Pulleys and belts are collinear	1. Collinearity degree of the compressor belt pulley and the drive belt pulley must be within 1.6mm. One straight edge can be used to detect collinear degree of the pulleys. If the collinear degree of the pulleys is not enough, the compressor mounting bracket can be adjusted to correct this.

Service of electromagnetic clutches of fans and compressor

Compressor electromagnetic clutch	⚠ **Note: detect voltage of the compressor connectors when the compressor is in the energized state. If no current flows, the voltage drop will be small.** 1. If there is voltage flowing through the electromagnetic clutch, and excessive voltage drop in the electromagnetic clutch ground loop is detected, please replace the compressor.
Pressure switch	1. Check if pressure switch is colsed
A/C system fuse	1. Check whether the A/C system fuse is burned.

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Fan speed switch	1. Check the switch function. The switch should have four shifts: off, low speed, medium speed and high speed. 2. Check whether wiring connectors are loose, or the harness is broken. If the foregoing condition exists, please make suitable amendment.
Fan motor	1. Detect whether the wire-speed of fan motor is correct, please promptly repair or replace if there are problems. 2. Detect the motor earthing cable. Confirm the motor earthing cable and bracket are contacted well.
Thermostat switch	1. Remain the key switch in the state of power, and turn on the temperature switch to the maximum refrigeration. The compressor electromagnetic clutch acts. ⚠ **Note: The fan must be in the working condition, because power of the temperature control switch is controlled by a fan switch.** 2. Shutdown fan switch. Cut off wiring of the temperature controller. Use Ohm range to detect continuity of two terminals of the temperature switch. When the cooling range is in the maximum position, if it detects to be blocked, the temperature switch needs to be replaced.

Cab temperature detection

Air inlet and outlet	1. In order to experience the most efficient A/C effect, make sure the outlet and return intake are both fully open. Defroster vents must be closed.
Pipeline temperature	⚠ **Note: conduits may be very hot, feel the temperature of conduits with caution. Approach slowly and briefly touch conduits several times with your fingers, and increase the duration each time.** 1. Feel conduits temperature. Generally, high-pressure conduits are more hot than the low-pressure ones. 2. If their temperature is no difference, it indicates that the system refrigerant is insufficient, or the compressor is not working.

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Air duct temperature	→	1. The thermometer is placed in the air duct, turn on refrigeration for about 5 minutes in order to let the temperature stabilize. 2. If the system is operating at maximum effectiveness, temperature of the air duct must be below 25 ℃ (72 ℉). ⚠ **NOTE: The ambient temperature must be between 27 ℃ and 43 ℃ (80 ℉ to 110 ℉).** 3. If the temperature is higher than 25 ℃ (72 ℉), it means that the system refrigerant is insufficient, somewhere in the system is blocked, and the compressor is not running normally, or conduits seal poor.
↓		↓
Temperature sensor detection	→	1. Turn off the engine, but turn on the machine power and the fan, as well as turn the temperature control switch to the maximum. 2. The temperature sensor is removed from the evaporator. 3. Put terminals of the temperature sensor in the mixture of ice and water. 4. When a sensor tube cools down, which is placed in the mixture of ice and water, the temperature control switch will cut off the current of the compressor, the compressor stops. Detect control switch wiring according to the previous introduction.

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Observation and detection of leakage

To compressor pipeline	→	1. Confirm that all conduit connections are sealed securely. 2. Detect whether conduits are error bent or broken. Replace all damaged conduits.
Leakage detection	→	1. Shutdown the engine. ⚠ **Warning: toxic gases will generate if refrigerant contacts with open flame, pay attention not to inhale the gas.** 2. Use electronic leak detectors to test all connections. Usage refers instrument manufacturers' user manual. ⚠ **Note:** • **When detect the compressor seal, the electromagnetic clutch should be rotated clockwise.** • **Remove tie at the expansion valve, and detect its tightness carefully.** 3. Repair all leaks, and then recharge the system with freon. “Vacuuming and charging the A/C system with refrigerant.”(p. 9-26)
Condenser	→	1. Confirm there is no matters clogged on the condenser surface, and with good seal. When the temperature switch is turned on, make sure the condenser fan is running.

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Detection of core of the evaporator / heater

Confirm heater water valve is closed.

Evaporator / heater core

Evaporator / heater core	→	1. See removal and installation of the evaporator / heater core in the removal and installation section. 2. Check the evaporator / heater core fins. All bent or damaged fins must be straightened. 3. Detect smoothness of the evaporator / heater core. If the core is dry, a brush or compressed air or vacuum cleaner may be used for clean. If the core is wet or covered with mud, rinse the core with a non- pressure waterpipe. Ensure that water can smoothly run through the evaporator / heater core. **Do not use steam.** ⚠ **WARNING: If the system is charged with freon, it is not allowed to clean any A/C system component by using steam. Because heat of the steam will cause pressure of the refrigerant to rise, which may cause the system to explode.**
↓		↓
Tightness of the evaporator / heater core	→	1. See removal and installation of the evaporator / heater core in the removal and installation section. 2. Confirm evaporator / heater core is well sealed, and wind blown out from the fan only passes through the evaporator / heater core, not through surrounding of the evaporator / heater core.
↓		↓
Filter	→	1. Confirm the filter is clean and without any blockage.

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Pressure test

Function test device

⚠ **NOTE: This measuring device can not optimize the system accurately, which has already charged with HFC-134a. Therefore, this device is better used to measure whether the system is charged with insufficient or excessive refrigerant, and then recycle refrigerant of the system, recharge HFC-134a according to the specified amount of refrigerant.**

Multifunctional measuring device is the most important tool for service services of the A/C system. As a troubleshooting tool for refrigerant charging, system diagnostics and operational effect, it can be used to measure the system pressure. Multi-function measuring device allows simultaneously to read high and low pressure values, so that diagnosis can be made by contrasting high and low pressure.

Low pressure measuring instrument - it has dual functions. Generally the low pressure measuring instrument is used to test exhaust effect of the measuring system. Degree of vacuum can indicate a system failure, therefore an instrument is important which can measure pressure and degree of vacuum.

Generally after the system operates 10-15 minutes, the Low pressure gage must show a pressure value of 10 to 35psi (0.7 to 2.4bar).

Hign pressure measuring instrument - it is generally used for measuring pressure on the high pressure side, its minimum range is from 0 to 400psi (0 to 27.6bar).

Generally, in normal system operation, pressure on the high pressure side is from 120 to 310psi (8.3 to 21.4bar). Refer to the ""Pressure-temperature table"(p. 9-13)".

Connection of pressure test

The multifunction measuring device is connected to the A/C system as shown in the drawing. Ensure that both valves are closed during the connection.

Pressure-temperature table			
Ambient temperature ℉ (℃)	**Normal low pressure value in psi (bar)**	**Normal high pressure value in psi (bar)**	**Air duct minimum temperature ℉ (℃)**
80(27)	9-12(0.62-0.83)	145-165(10-11.53)	55(14)
90(32)	11-15(0.76-1.04)	190-210(13.10-14.48)	61(18)
95(35)	16-18(1.10-1.24)	210-230(14.48--15.86)	63(20)
100(38)	17-19(1.17-1.31)	235-255(16.2-17.58)	66(22)
105(41)	20-21(1.38-1.45)	260-280(17.93-19.31)	68(23)
110(43)	22-24(1.93-2.14)	290-310(20-21.37)	72(25)

This pressure - temperature gauge is based on the following conditions:

⚠ **Note: it will cause the air duct temperature to increases if the air humidity is too**

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high, and pressure on the low pressure side rises. Therefore, adjust data appropriately in the table according to different geographical environment.

1. **The engine operates at the speed of 1500 rpm without any load, fan speed and temperature are both controlled at maximum setting. A/C switch is turned on, and all the vents are open.**
2. **Install well and close all fences and doors.**
3. **Install and clean filters in the cab.**
4. **Close the heater valve of the engine.**
5. **Measure after starting 15 minutes.**

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Connection of the multifunction measuring device in the A/C system

1. **Clear stains and moisture on the outer surface of the compressor and conduits, and remove the cap of the charging port.**

> **⚠ Warning**
>
> **If the system has been charged with refrigerant, it is forbidden to use any steam to clean A/C system components. Because heat of the steam will cause pressure of the refrigerant to rise, which may cause the system to explode.**

2. **Use the red terminal to connect the high pressure charging port of the A/C conduits.**
3. **Use the blue terminal to connect the low pressure charging port of the A/C conduits.**

> **⚠ Warning**
>
> **When there is liquid refrigerant during the operation, remember to wear protective glasses. Because if liquid refrigerant splashes in the eyes, it may cause blindness.**

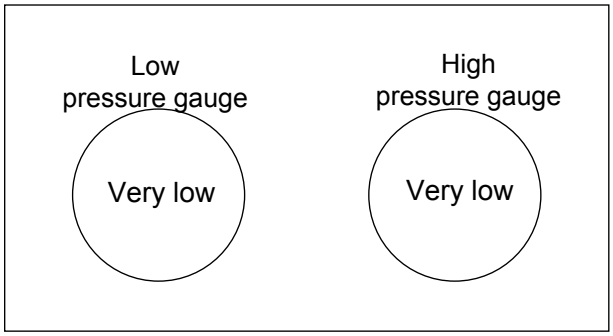
4. **Confirm the valve of the multifunctional measuring device is in the closed state.**
5. **Start the engine and let it run at a maximum speed of 1500rpm. Open the cab door, and switch the cooling function of the A/C system to the maximum, let the fan run at the fast speed for 15 minutes. Observe the tested pressure and in accordance with “Pressure-temperature table”(p. 9-13).**

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Fault features

No refrigeration

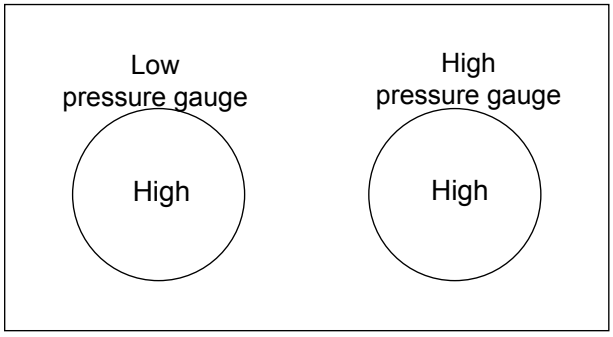
Refer to the “Pressure-temperature table”(p. 9-13).



Features of no or lack of refrigerant

• The air blown from the evaporator is hot. • The compressor is not running, or loops to be turned off frequently. (The green indicator of the A/C system in the cab turns on)	Yes →	1. Detect system leaks. It may need to increase the refrigerant. 2. Recover the residual refrigerant of the system. 3. If you find a leak, repair it. Refer to the provided repairing steps. 4. Check compressor lubricant level - compressor lubricant may be insufficient. 5. Extract air and moisture in the system. Replace the reservoir bottle 6. Fill the system with new refrigerant. 7. Keep detection, and check if any other faults.

Refer to the “Pressure-temperature table”(p. 9-13).



Feature of the system containing large amount of air

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The air blown from the evaporator is hot.	Yes →	1. Recover the residual refrigerant of the system. 2. Replace the reservoir bottle 3. Extract air and moisture in the system. Replace the reservoir bottle 4. Fill the system with new refrigerant.

Condenser fault feature

• Liquid refrigerant pipe (between the evaporator and the condenser) is very hot. • The air blown from the evaporator is hot.	Yes →	1. Check whether belts of the compressor and the engine fan are loose or damaged. 2. Check whether the condenser is clean and unblocked, fins have been bent. 3. Check system for excess refrigerant. Recycle and re- charge refrigerant until the pressure gauge shows normal. 4. Remove the condenser to check whether it is blocked by oil, or its cooling performance is reduced. (a) Return the refrigerant. (b) Use compressed air to blow oil stain from the condenser. (c) Replace the reservoir bottle. (d) Vacuum, charge refrigerant. 5. Continue to test, observe whether there are failures.

Expansion valve fault feature

1. The air blown from the evaporator is hot. 2. There is large amount of moisture condensed at the low pressure conduit of the compressor. 3. There is large amount of moisture condensed at the evaporator outlet.	Yes →	Replace the expansion valve

Refrigerant contamination

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Refrigerant contamination	Yes →	1. See the table below, and detect the stable saturation pressure of the refrigerant at a certain temperature, determine whether it is contaminated. (a) Measure its pressure with instrument recovery unit. (b) Measure temperature of the refrigerant recovery tank. If the refrigerant has been recovered in the recovery tank for some time, you can use the ambient temperature to replace. Values in the table represents the boiling point of HFC-134a. (c) The contaminated refrigerant pressure lower limit value Is given in the table. ⚠ **Note: Do not use contaminated or uncontaminated but mixed refrigerant. Please deal with the contaminated refrigerant according to local laws and regulations.**

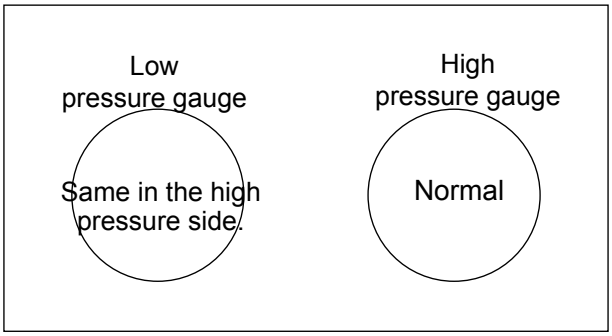
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HFC-134a stable saturation pressure / temperature gauge

Temperature ˚F (˚C)	Pressure psi(bar)	Temperature ˚F (˚C)	Pressure psi(bar)
50(10)	45(3.1)	102(39)	129(8.9)
55(13)	51(3.5)	104(40)	133(9.2)
60(16)	57(3.9)	106(41)	138(9.5)
65(18)	64(4.4)	108(42)	142(9.8)
70(21)	71(4.9)	110(43)	147(10.1)
75(24)	78(5.4)	112(44)	152(10.5)
80(27)	88(6.1)	114(46)	157(10.8)
85(29)	95(6.6)	116(47)	162(11.2)
90(32)	104(7.2)	118(48)	167(11.5)
95(35)	114(7.9)	120(49)	172(11.9)
100(38)	124(8.6)	---	---

Insufficient refrigeration

Refer to the “Pressure-temperature table”(p. 9-13).

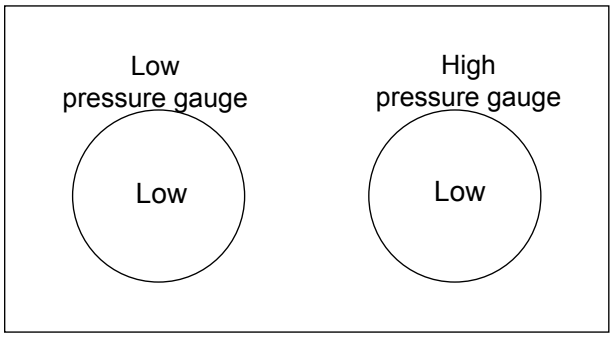


Features of the system containing air

• Feel the low pressure conduit by hands, it is a little hot. • Air discharged from the evaporator is only a little cold.	Yes →	1. Test the system for leakage. Check the compressor seal carefully for air leakage. 2. Drain the refrigerant from system. 3. If any leakage, repair it. 4. Replace the reservoir bottle. 5. Check amount of the compressor lubricant. 6. Vacuumizing. 7. Fill the system with new refrigerant.

Refer to the “Pressure-temperature table”(p. 9-13).

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Features of insufficient refrigerant

Air discharged from the evaporator isn't cold enough.	Yes →	1. Leak detection - system refrigerant leak. ⚠ **Note: Under normal circumstances, the system will leak refrigerants between 0.5 to 1ounce (14.7 - 29.5g) every quarter.** (a) If any leakage, then follow step 2. (b) If no leakage, then follow step 6. 2. Drain the refrigerant from system 3. Repair the leak. 4. Check amount of the compressor lubricant. 5. Vacuumizing, replace the reservoir bottle. 6. Fill the system with new refrigerant.

Features of blockage at the high pressure side

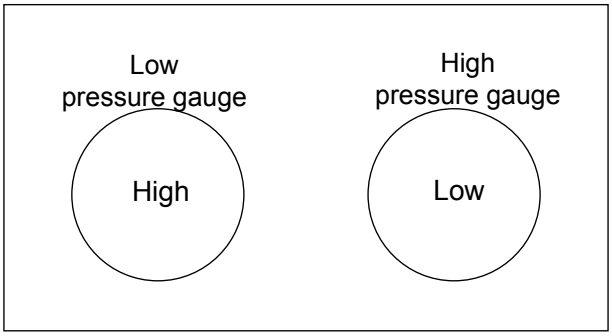
• Air discharged from the evaporator is only a little cold. • There is condensed water or frost in the reservoir bottle. • There is condensed water or frost in the liquid refrigerant pipe of the reservior tank. ⚠ **Note:** **Frost extends from blockages.**	Yes →	1. Drain the blocked refrigerant from the reservoir bottle and remove the liquid refrigerant pipe. 2. Remove and replace the blocked components. 3. Vacuumizing. 4. Fill the system with new refrigerant.

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Features of expansion valve not working

• Air discharged from the evaporator isn't cold enough. • Condensed water or frost at the outlet of the expansion valve • Terminal of the expansion valve inlet turns warm	Yes →	1. If there is condensed water or frost at the outlet of the expansion valve, it indicates expansion valve being blocked. Replace the expansion valve 2. If terminal of the expansion valve inlet turns warm (not hot), it indicates that expansion valve is not fully opened. If the expansion valve is stuck blocked, it will result in only a little or no refrigerant to pass through the expansion valve. Replace the expansion valve.

Refer to the “Pressure-temperature table”(p. 9-13).



Features of the compressor turning but not pumping refrigerant

• The system should be filled the refrigerant appropriately. • Air discharged from the evaporator is cool.	Yes →	1. Drain the refrigerant from system. 2. Remove compressor from the machine. 3. Because there is a leak inside the compressor, so replace the compressor. 4. Replace the compressor. 5. If any condition below occurs, replace the reservoir bottle: (a) System was previously opened. (b) The reservoir bottle has been used for two or more years. Refer to "Reservoir bottle replacement” 6. Charge the system with refrigerant.

The expansion valve is stuck after opening

• The expansion valve is stuck after openning.	Yes →	1. Replace the expansion valve

Refer to the “Pressure-temperature table”(p. 9-13).

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Features of the condenser not working

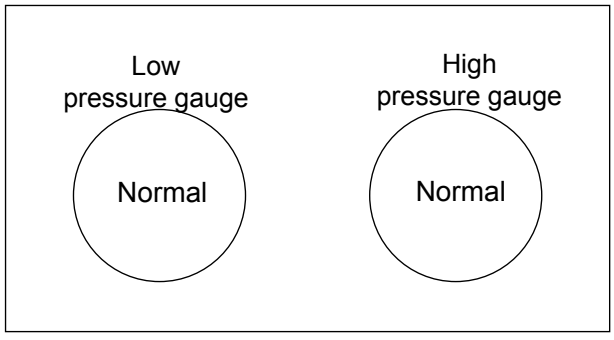
• liquid refrigerant pipe is very hot. • Air exhausted from the evaporator is hot.	Yes →	1. Check whether belts of the compressor and the fan are loose or broken. 2. Check whether the condenser is clean and unblocked, fins have been bent. 3. Check whether there is excessive refrigerant in the system. (a) Discharge refrigerant in the system until the pressure is lower than normal. (b) Add refrigerant until the pressure is the same with normal level. (c) If there are failures, then follow step 4. 4. Remove the condenser to check whether it is blocked by oil, or its cooling performance is reduced. (a) Return the refrigerant. (b) Use compressed air to blow oil stain from the condenser. (c) Replace the reservoir bottle

Features of the system containing air

• Air from evaporator is warm	Yes →	1. Drain the refrigerant from system. 2. Replace the reservoir bottle. 3. System vacuumizing. 4. Fill the system with new refrigerant.

Fault: cooling discontinuously

Refer to the “Pressure-temperature table”(p. 9-13).



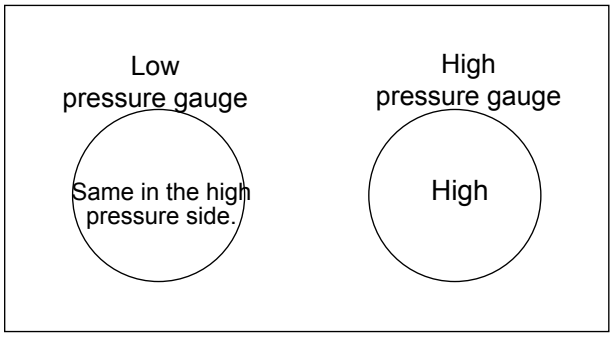
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Features of too much moisture in the system

• Refrigerate discontinuously, everything is normal when cooling.	Yes →	1. Drain the refrigerant from system. If too much moisture flows into holes of the expansion valve, moisture in the condenser will stop flowing if it is iced. 2. Replace the reservoir bottle. The absorbent material in the reservoir bottle may be saturated. 3. Vacuumize the system to remove moisture. ⚠ **Attention: it needs at least 2-3 hours to extract large amounts of moisture from the system in general.** 4. Fill the system with new refrigerant.

Fault: system has abnormal noise

Refer to the “Pressure-temperature table”(p. 9-13).



Features of excessive refrigerant in the system

• Air blown from the evaporator is cool • Compressor has abnormal sound	Yes →	1. Discharge the refrigerant from the system, until its pressure is lower than the normal. 2. Add new refrigerant until the pressure reaches normal levels.

Table of conduit connection torque

Hose dimension	3/8inch		1/2inch	5/8inch	
Thread size	M16-1.5	M22	3/4-18 or 3/4-16	7/8-18 or 7/8-14	M24
Copper & aluminum couplings	15-25N•m	20-25N•m	24-30N•m	30-37N•m	30-34N•m

⚠ **Note: When tighten connection devices of the compressor, condenser and evaporator, you must be very careful, because these components are easily deformed and distorted.**

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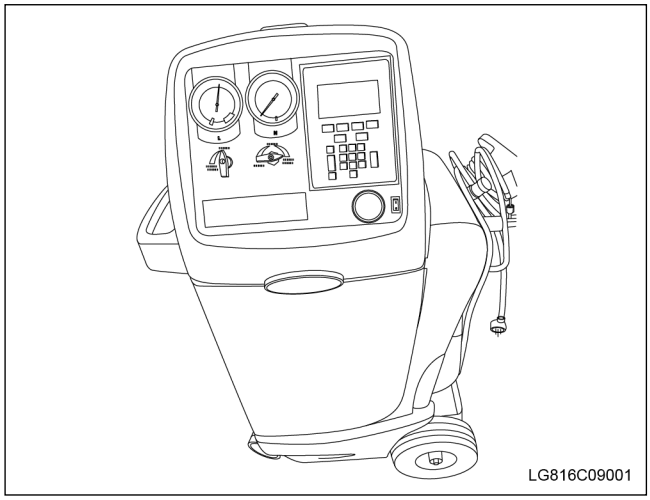
Service of A/C System

Specification

Air conditioner refrigerant quantity: 0.85kg (1.87lbs)

Special tools

Refrigerant recovery, reuse and filling apparatus -SPX 347112K



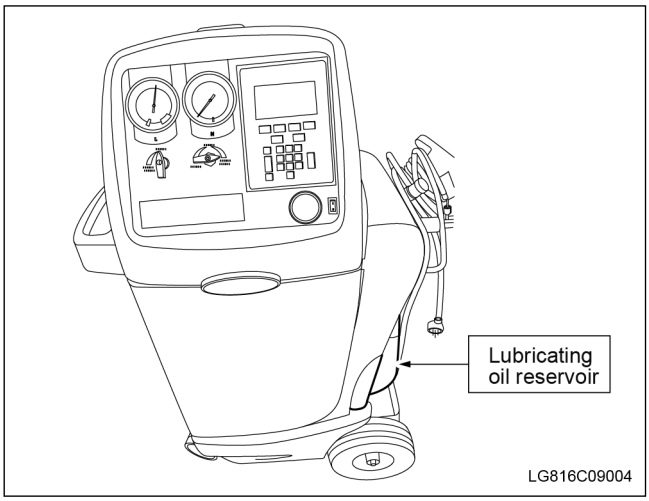
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Recycle of refrigerant in A/C system

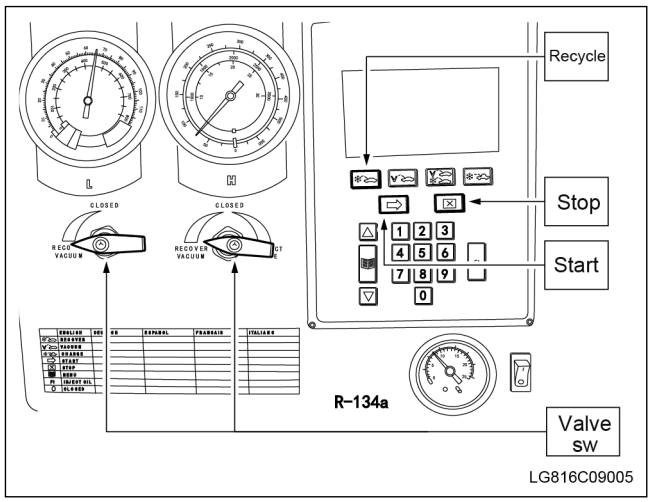
The recovered refrigerant will pass through the oil separator and the filter dryer in turn, and finally into the refrigerant tank. When the dried refrigerant flows through the humidity indicator, it will turn green.

If possible, it is better to run the A/C system for about 10 minutes before recycling the refrigerant. Then shut down the system to start recycling the refrigerant.

1. **Connect the power cord of multifunction devices to the 220V power supply.**
2. **Turn on the main power switch, and empty the refrigerant recovery tank on the right of the device.**



3. **Press the recycle switch.**
4. **If more than 150lb (68kg) refrigerant has been recovered since the last replacement dry filter, the instrument will display: filtered weight is xxx lb (xx kg). Press the start button.**
5. **Connect the high and low pressure conduits to the A/C system, and open the connection valves.**
6. **Rotate both the low and high pressure valves to the Recover / Vacuum location, and then press the Start button to continue.**



7. **If the system pressure is below 25psi (1.72bar), the instrument will display: The system pressure is low until the pressure rises or press the Start button. You can press the button to exit.**
8. **If there is refrigerant in the low pressure conduit of the device, the instrument will start cleaning program and display: being cleaned. If you want to skip or stop cleaning program, you can press the Start button again.**
9. **When amount of the system recovery reaches 13in.Hg. (0.44bar), the vacuum compressor will automatically shut down.**
10. **Next, the instrument will automatically recover lubricant, and the instrument will show: lubricant is being recycled. Oil recovery needs 90s or so.**
11. **After completion of the recovery of lubricant, check the lubricant recovery**

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tank, and write down amount of the lubricant recovered from the system. The system needs to be charged with more lubricant after being vacuumed.

12. In order to confirm whether the refrigerant is completely recovered, wait for 5 minutes and observe whether pressure of the multifunction instrument will rise higher than 0 in.Hg. (0bar) after the recovery. If the pressure is picked up, you need to press the start button again to repeat the recovery process until the system pressure can be maintained for 2 minutes, then press the stop button to exit the recovery.

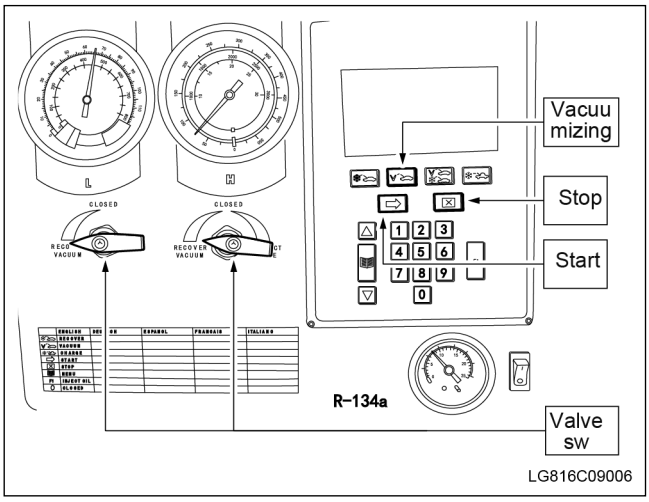
Vacuuming and charging the A/C system with refrigerant

⚠ **Note: Before vacuum and extract moisture, replace the reservoir bottle if one or more of the following conditions are satisfied.**

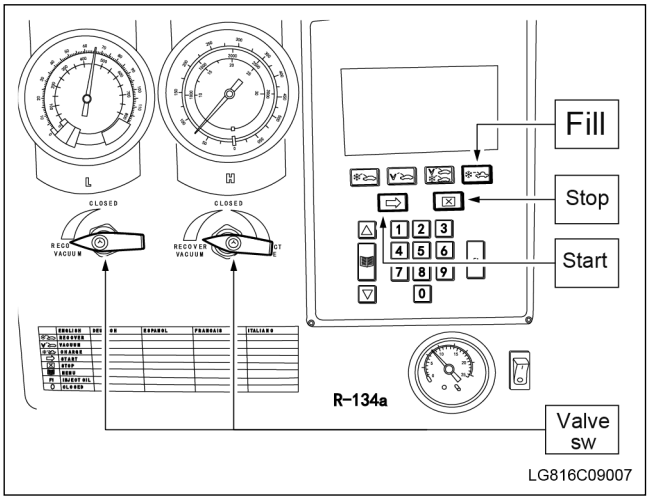
- **The system has been opened for several times.**
- **The reservoir bottle has been used for two or more years.**
- **Remove the compressor, and find out that the desiccant material has changed into small particles (golden or brown particles).**
- **The system has large amount of leak (the conduit is broken).**
- **The system contains too much air or moisture.**
- **The system is open up to 5 minutes when replacing the compressor.**

1. **Place valves of the multifunction device in the closed state, and connect the high and low pressure conduits to the A/C system, then open the connection valves.**
2. **Connect the main power of the multifunction device to 220V mains power, and then turn on the main power switch.**
3. **Press the vacuum button, and then press the start button.**

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4. **Press the start button again to confirm vacuuming for 15 minutes, or change time to vacuum by numeric buttons, and then press the Start button once more.**
5. **When the set time is up, the vacuuming will automatically stop. Press the stop button to exit the process. Press the start switch to resume continue vacuuming, or exit by pressing the stop button. Now it is ready to charge the system with refrigerant.**
6. **Press the charge system.**



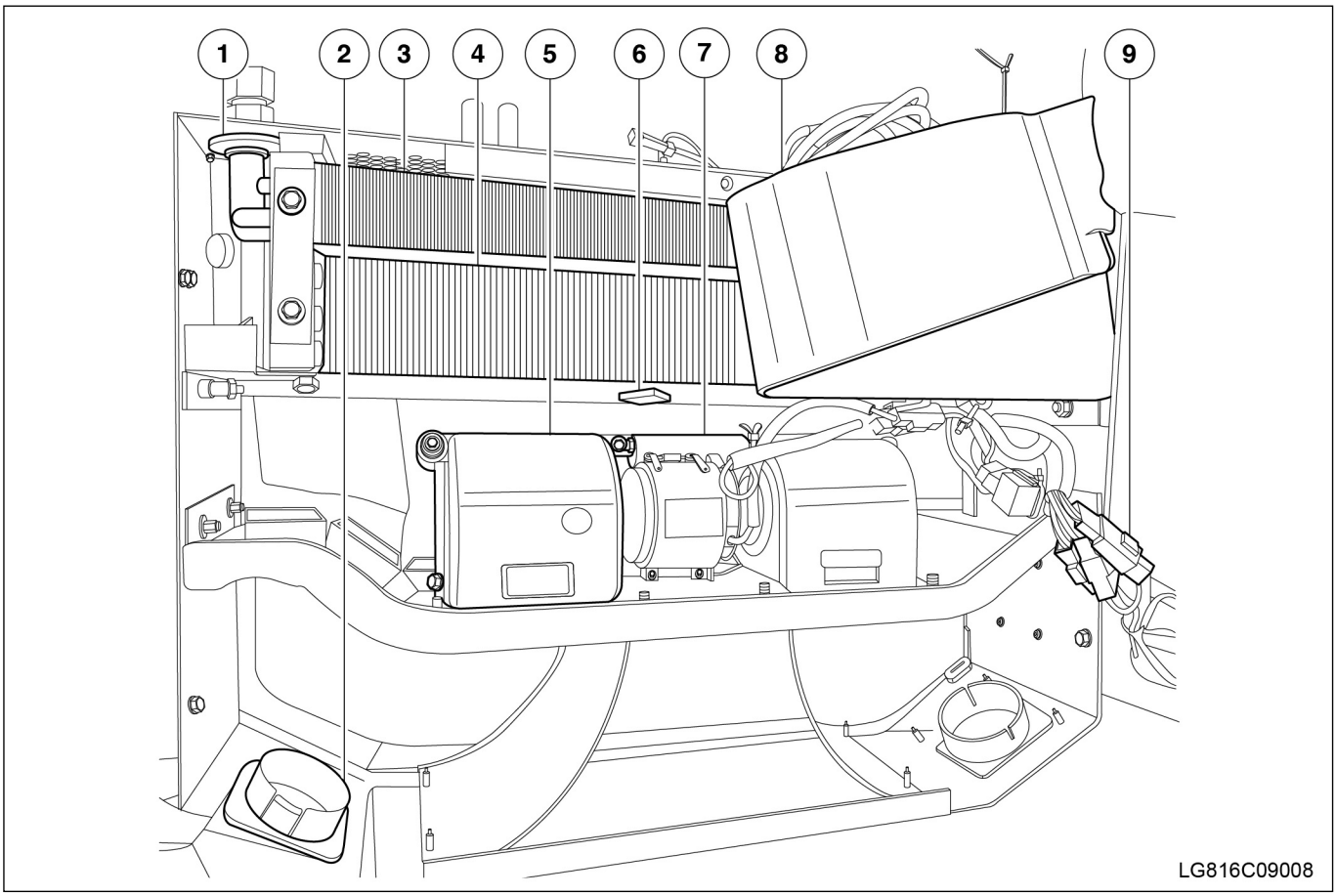
7. **Rotate the low pressure valve to the Closed position, and the high pressure valve to the Oil Inject / Charge position. Press the start button.**
8. **Enter the amount of refrigerant 0.81kg required to charge by number buttons, and then press the Start button again.**
9. **The instrument will show after filling: charge has completed, the amount of filling is x.xx lb (kg).**
10. **Close high and low pressure valves, and remove the filling conduits.**

⚠ Note: When the remaining refrigerant in the refrigerant storage tank is less than 3 lbs (1.36kg), it can't charge the system with refrigerant, the refrigerant storage tank should be supplied with refrigerant at this time.

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A/C System Components

View of the inner structure of the evaporator



1. Expansion valve
2. Closable outlet
3. Refrigeration core
4. Heating core
5. Evaparator motor
6. Temperature sensor
7. Fan speed control resistance
8. Upper sponge
9. A/c panel

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10 Frame and Work Implement System

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Installation 10-4
Removal and installation of linkage 10-5
Removal 10-5
Installation 10-5
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Removal 10-6
Installation 10-6
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Tool list

Name	Specification(Qty.)
Open-end wrench	10#、 13#、 16#、 18#、 21#、 24#、 27#、 36#
Torque wrench	20-100N•m， 90-300N•m， 160-680N•m
Traveling crane	2t
Lifting chain	2t
Iron hammer	---
Scissor	---
⚠ **Remark: removed standard parts should be placed with relevant material together to avoid mixing.**	

⚠ **"Front" mentioned in this chapter refers to the forward direction after starting the machine; other directions are by this analogy.**

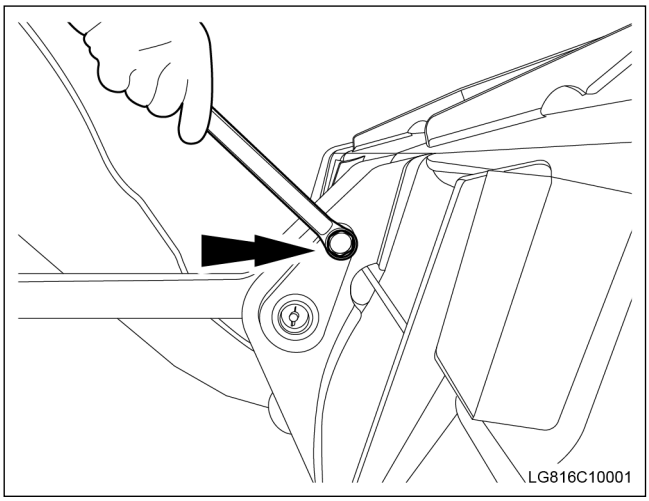
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Removal and Installation of Bucket

Removal

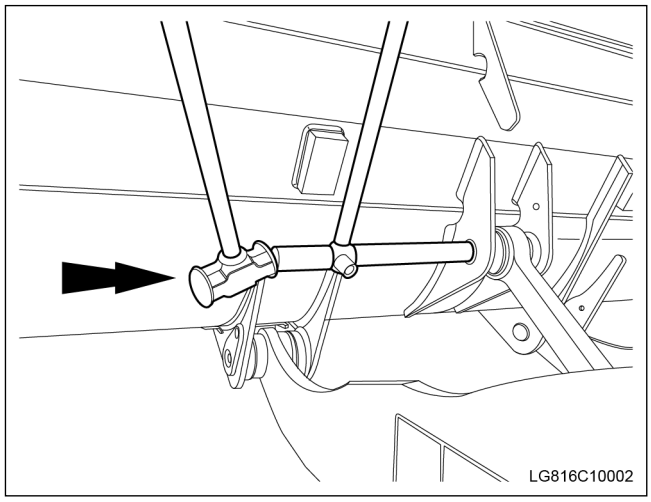
1. Remove linkage front pin

(a) Start the machine, push the control lever handle to put the boom in the lowest position; lay flat the bucket and then switch off. Use 24 # wrench to remove pin lug plate's captive bolts, which connect the bucket and linkage.



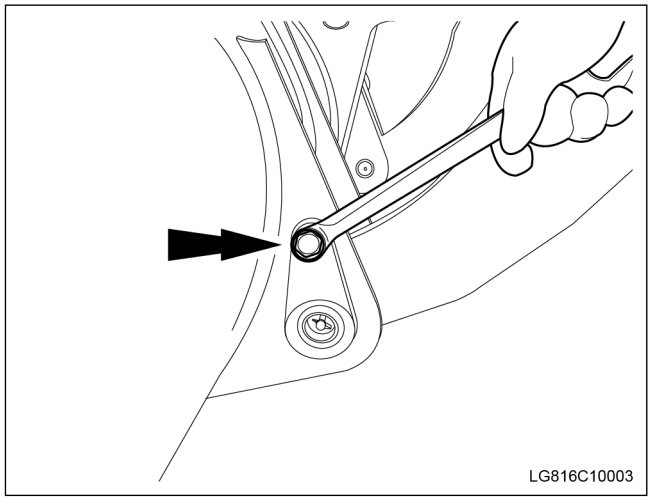
(b) Use the crane and spreader to lift the linkage tip, use a sledgehammer and pin to knock tooling till the pin is removed.

(c) Put the linkage tip gently into the ground, lay rubber pad or cardboard on contacts with the ground, pay attention to protect the surface paint.



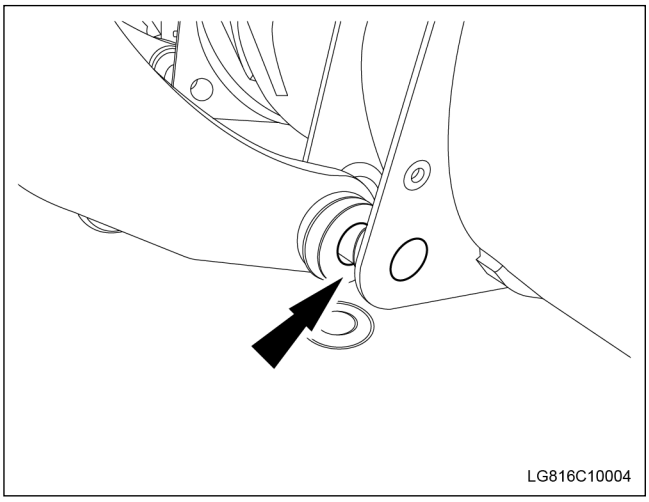
2. Remove the bucket pin

(a) Use the crane and spreader to lift both sides of the bucket, gently tighten the spreader, and use 24 # wrench to remove captive bolts of the bucket and the boom connecting pin.



(b) Use a sledgehammer and pin to knock tooling till the pin is removed, life the bucket to the flat ground and properly place, pay attention to protect its surface paint, waiting for repairing or replacement.

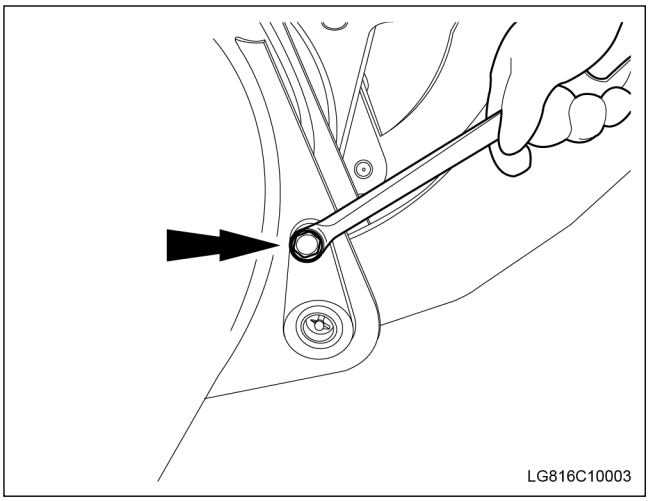
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Installation

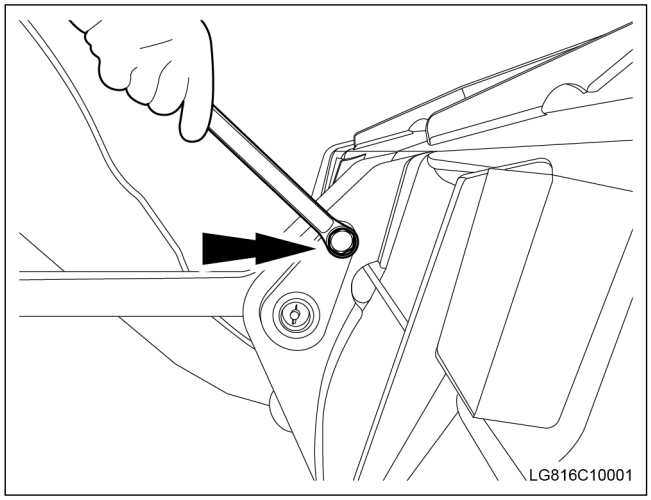
1. Load bucket pins

Use the crane and spreader to lift the bucket to the mounting location, let the boom tip into the bucket mounting support plate, align the mounting holes to install the adjustment pads and adjust their position. Wood cushion or rubber mat is mounted in the outside of the pin lug plate, and use a sledgehammer to knock it to fit into the bucket, screw mounting bolts to fix the pin lug plate to the boom, tighten them with 24 # wrench with the tightening torque 225±35N•m.



2. Install linkage front pin

Lift the linkage tip, load it into the bucket linkage mounting support plate, install the pin after align pin holes. Rubber mat is mounted under the pin lug plate, and use a sledgehammer to knock it to fit into the bucket bearing-plate. Use bolts to fix the pin, then use 27 # wrench to tighten, and the bolt tightening torque is 225 ± 35N•m.



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Removal and Installation of Linkage

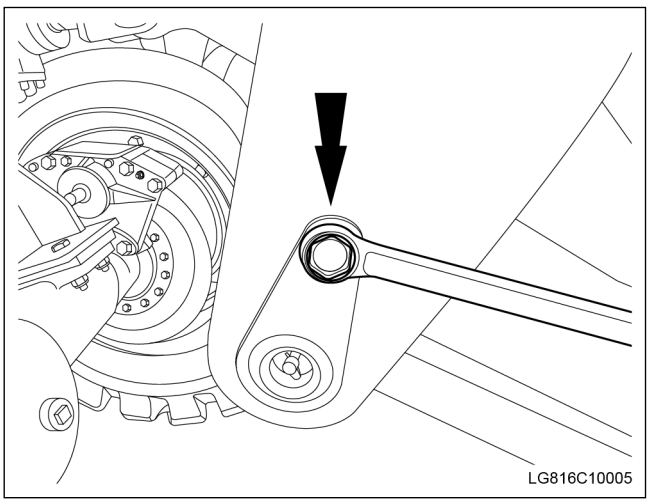
Removal

1. Remove linkage front pin

Remove the linkage front pin refer to “Removal and installation of bucket”(p. 10-3)step 1 in removal section.

2. Remove linkage rear pin

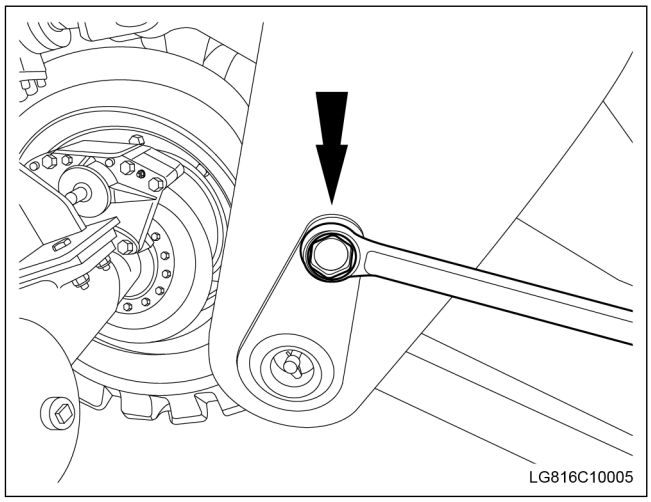
Use 24 # wrench to remove bolts on the pin lug plate, which connects the linkage and the rocker arm. Use the crane and spreader to lift the linkage, and use the pin to knock tooling till the pin is removed. Use the crane and spreader to lift the linkage to the flat ground and properly place, waiting for repairing or replacement, surface paint damage should be avoided during the lifting process.



Installation

1. Install the linkage rear pin

Use the crane and spreader to lift the linkage to the mounting position, let one end of the linkage into the position between 2 plates beneath the swing arm, and align the mounting pin holes. Install the pin from right to left. Wood or rubber mat is mounted under the pin lug plate, adjust the lug plate and install fixed bolts after align the screw holes, then use 24 # wrench to tighten with tightening torque 225±35N•m.



2. Install linkage front pin

Refer to “Removal and installation of bucket”(p. 10-3)step 2 for installation, install the linkage front pin.

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Removal and Installation Swing Arm

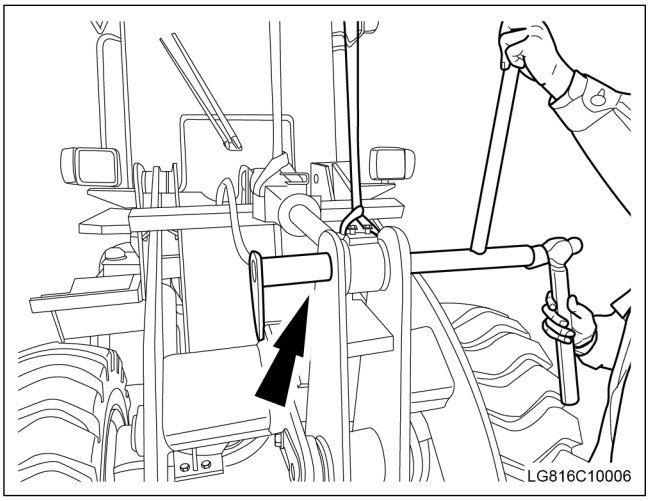
Removal

1. Remove linkage rear pin

Refer to“Removal and installation of linkage”(p. 10-5)Step 2 for removal, remove connecting pins of the rocker arm and linkage.

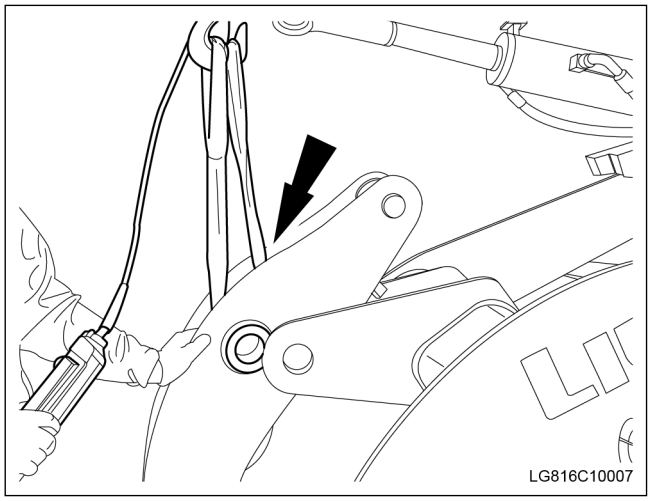
2. Remove the swing arm

Use the crane and spreader to lift the tilt cylinder, gently tighten the spreader, place wood above the boom and beneath the tilt cylinder. Use 24 # wrench to remove bolts on the pin lug plate, which connects the rocker arm and the tilt cylinder, use pin to knock tooling till the pin is out, then put down the tilt cylinder slowly on the wood.



3. Remove the rocker arm medium pin

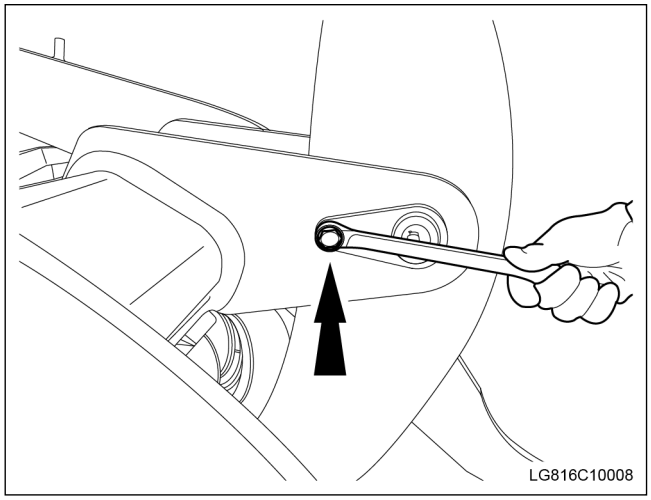
Use the crane and spreader to lift at the rocker arm’s medium position, and gently tighten the rocker arm to hold the rocker arm. Use 24 # wrench to remove the rocker arm medium pin lug plate’s mounting bolts. Use pin to knock tooling till the pin is out, life the rocker arm to the flat ground and properly place, pay attention to protect the surface paint.



Installation

1. Remove the middle pin of swing arm

Use the crane and spreader to lift the rocker arm to the boom mounting position, align the boom mounting holes and place the adjusting pad, install the pin from right to left, knock the pin lug plate to fit with the boom plate by using a hammer while wood is mounted. Fit into the mounting bolts and tighten them with 24 # wrench, tightening torque is 225±35N•m.

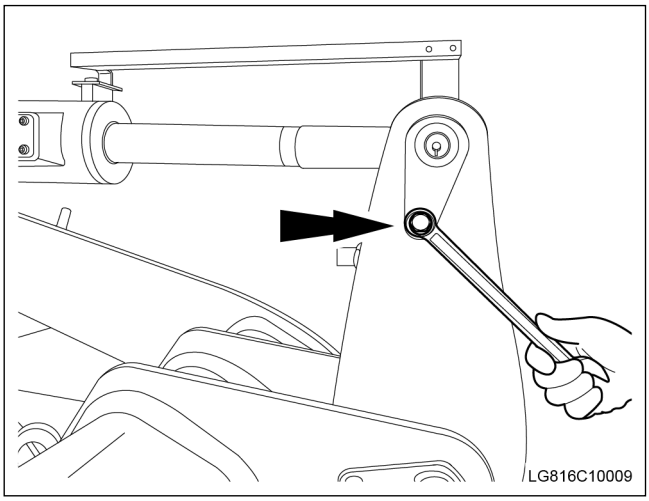


2. Install swing arm pin

Use the crane and spreader to lift the tilt

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cylinder, adjust the top of the rocker arm, let the front end of the tilt cylinder between two plates of the top rocker arm. Align the rocker arm's mounting holes and place adjustment pads, and then install the pin from right to left, knock the pin lug plate to fit with the boom plate by using a hammer while wood is mounted. Fit into the mounting bolts and tighten them with 24 # wrench, tightening torque is 225±35N•m.



3. Install the linkage rear pin

Refer to "Removal and installation of linkage"(p. 10-5)Step 1 for installation, connect the rocker arm and the linkage.

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Removal and Mounting of the Boom

Removal

1. Remove the bucket

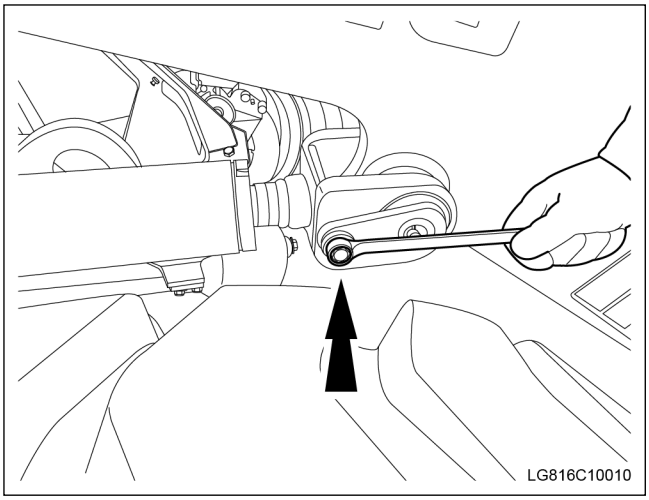
Remove “Removal and installation of bucket”(p. 10-3)the bucket refer to removal process.

2. Remove the rocker arm linkage gp

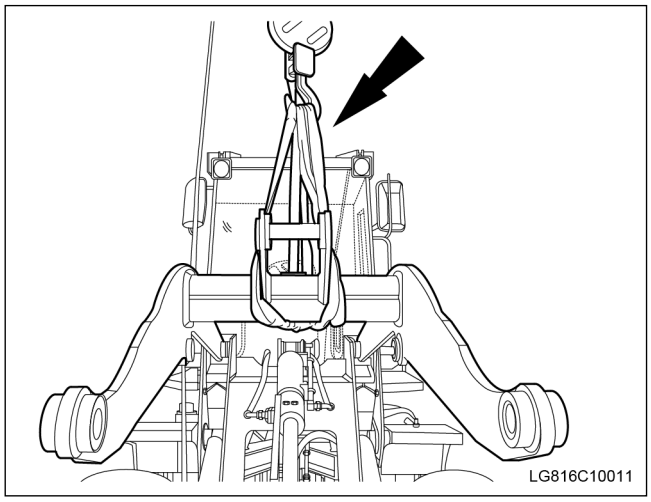
Refer to the removal process to“Removal and installation of linkage”(p. 10-5) and “Removal and installation swing arm”(p. 10-6), remove the rocker arm linkage gp from the boom.

3. Remove boom cylinder pin

(a) Use the crane and spreader to lift the boom in the medium position, and then tighten the spreader to hold the boom.

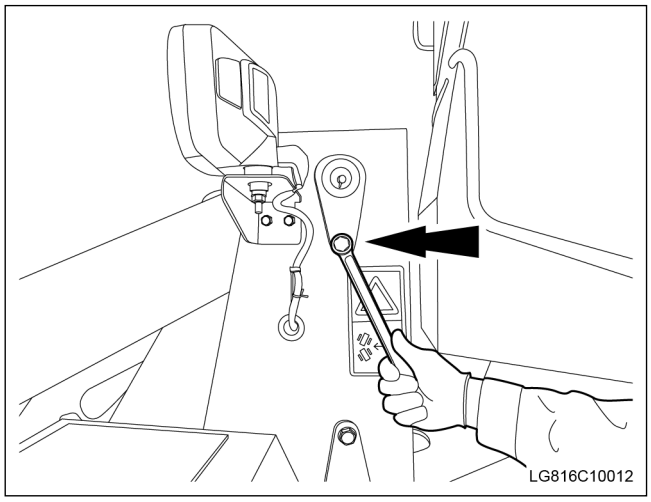


(b) Use 18 # wrench to remove the lug plate’s mounting bolts, which connects the boom cylinder and the boom connecting pin, use pin to knock tooling till the pin is out.

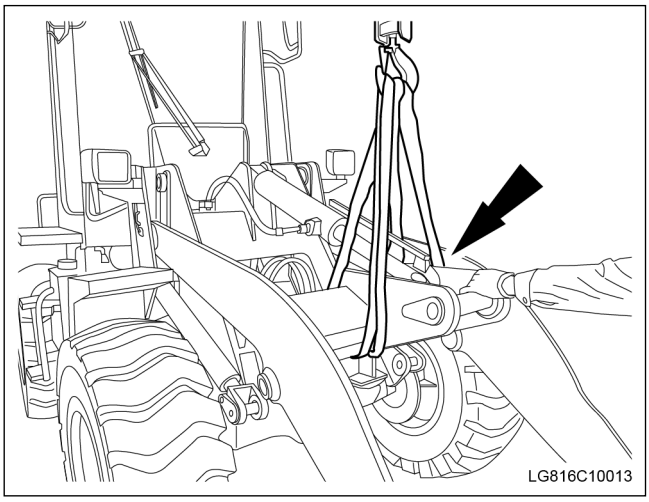


4. Remove the boom pin

Use 21# wrench to remove the lug plate’s mounting bolts, which connect the boom and the connection pin of the front frame. Use pin to knock tooling till the pin is out, life the rocker arm to the flat ground and properly place, pay attention to protect the surface paint.



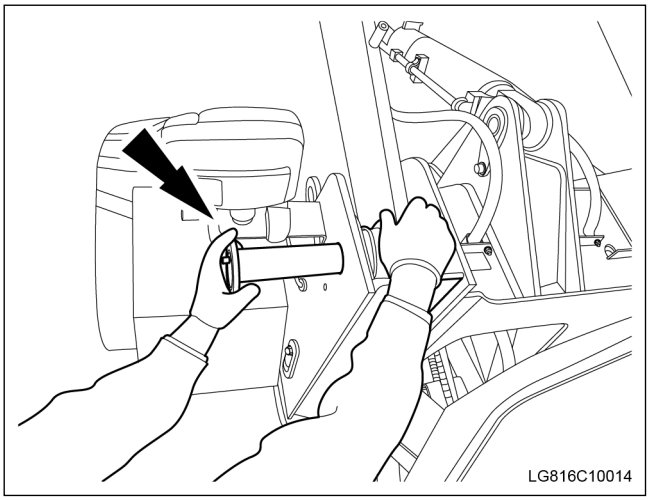
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Installation

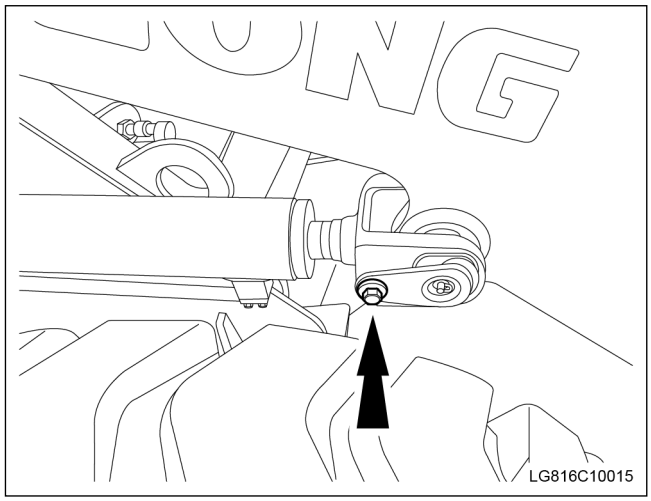
1. Install the boom

Use the crane and spreader to lift the boom to the mounting location at the upper side of front frame, adjust position to put boom rear end into front frame side wings, align it with front frame mounting hole, and install the pin from side to middle after placing the shims properly, then knock the pin lug plate to fit with the wing box plate, insert mounting bolts, tighten them with 21# wrench with the tightening torque 145±20 N•m.



2. Install boom cylinder pin

Operate the crane to lower down the boom, lift the boom cylinder so that the medium mounting holes enter between the cylinder mounting plates. Align the boom cylinder mounting holes and place mat, then insert the pin from both sides to the middle, knock the pin lug plate to fit with the cylinder plate by using a hammer while wood is mounted. Fit into the cushion covers and mounting bolts, and tighten them with 18 # wrench, tightening torque is 90±12N·m.



3. Mount the rocker arm linkage gp.

Refer to Steps 1 and 2 for “Removal and installation of linkage”(p. 10-5) and “Removal and installation swing arm”(p. 10-6) installation, connect the rocker arm linkage gp with the boom and the tilt cylinder.

4. Install the bucket

Install the bucket to the boom and linkage refer to the installation process of “Removal and installation of bucket”(p. 10-3).

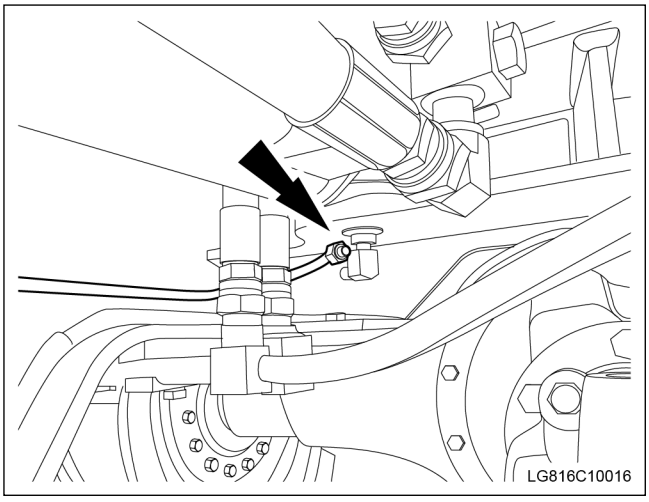
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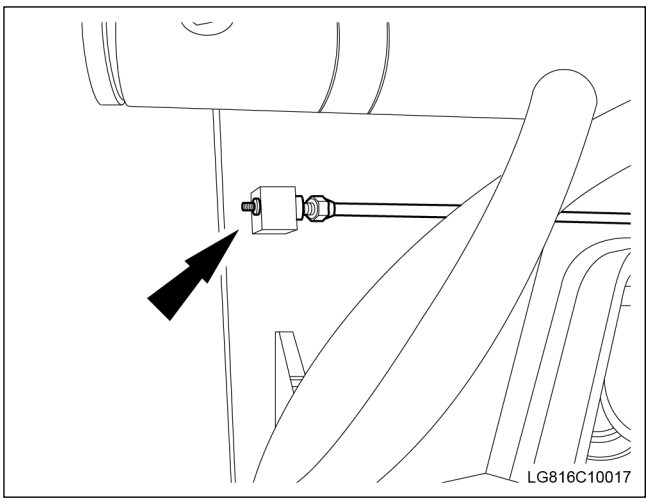
Removal and Mounting of Lubrication Oil Lines

Removal (the front steering pin grease lines)

1. Remove lubrication pipe

Use 16 # wrench to remove the grease line connecters beneath the steering front pin, grease line connectors on the front frame's rear nut block, and remove the grease lines.

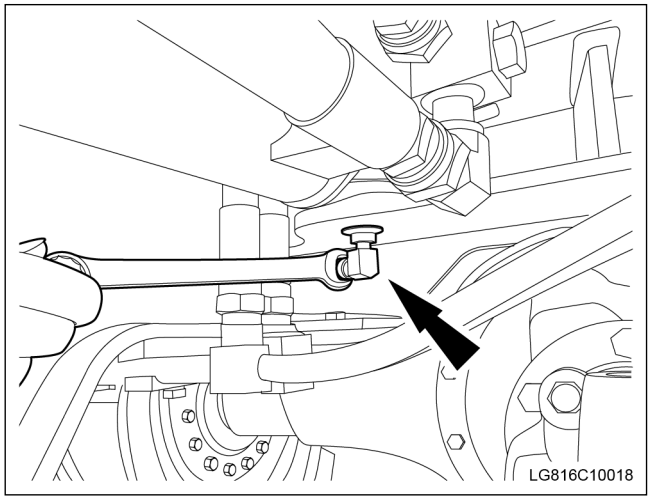


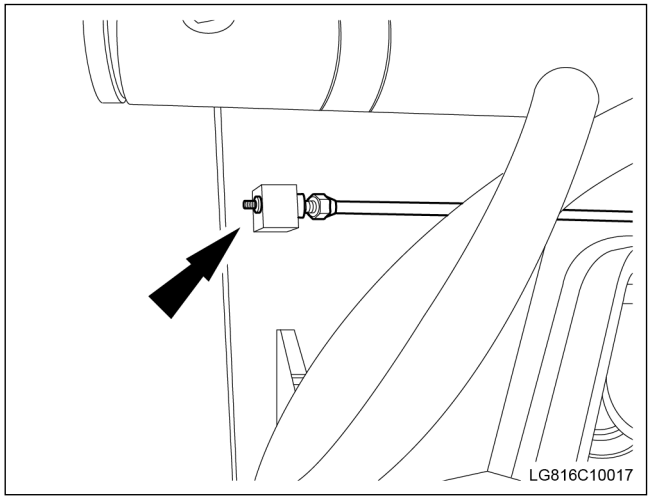


Installation (the front steering pin grease lines)

1. Install lubrication pipe

Connect the front frame lubricant grease lines 'elbows to connectors beneath the front steering pin, and then connect the straight-end connectors to the front frame's rear nut block, and tighten the connectors with 16 # wrench.



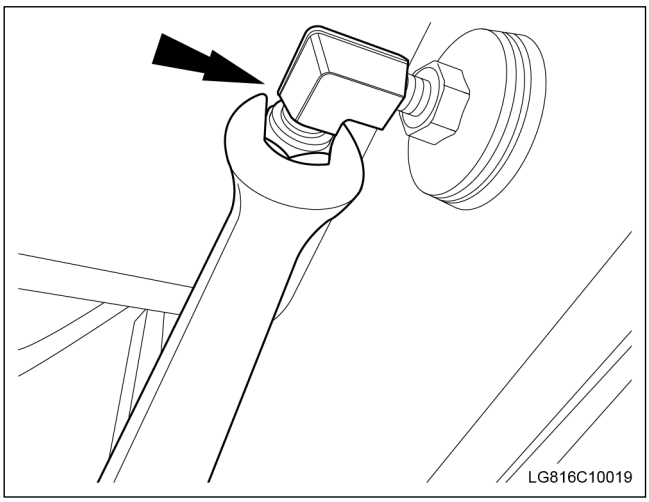


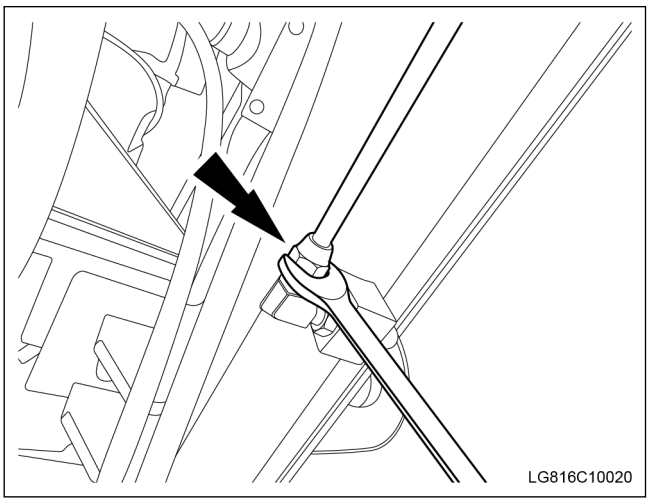
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Removal (sub-frame pin's grease lines)

1. **Remove the grease lines of sub-frame rear pin**

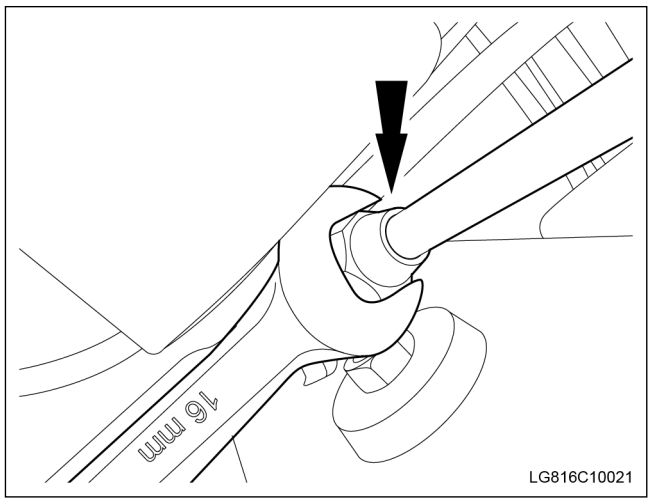
   Use 16 # wrench to remove the lubrication grease line connecters of the sub-frame rear pin connector, lubrication grease line connecters on the bottom left nut block of the rear frame, and remove the grease lines.

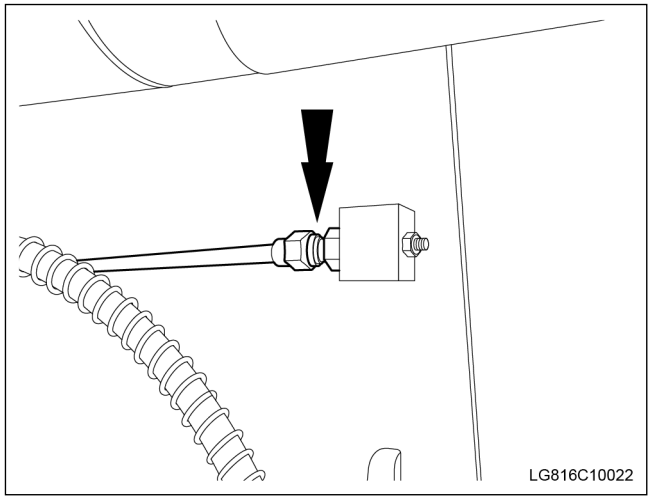




2. **Remove the sub-frame front pin grease lines.**

   Use 16# wrench to remove the lubrication grease line connecters of the sub-frame front pin connector, lubrication grease line connecters of front left nut block of the rear frame, and remove the grease lines.



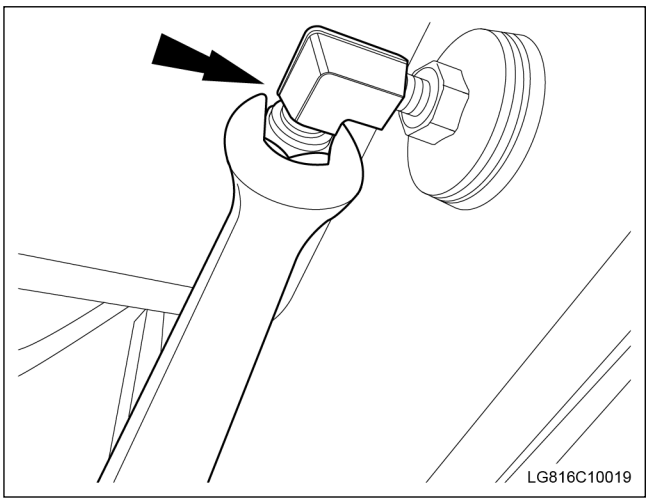


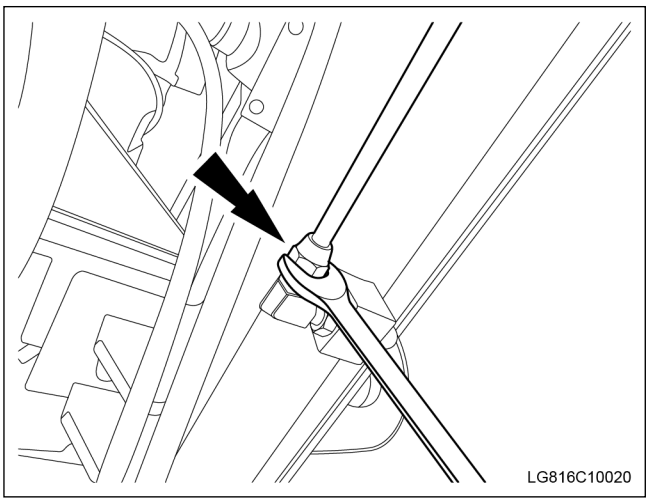
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Installation (sub-frame pin lubrication grease lines)

1. Install the sub-frame rear lubrication grease lines

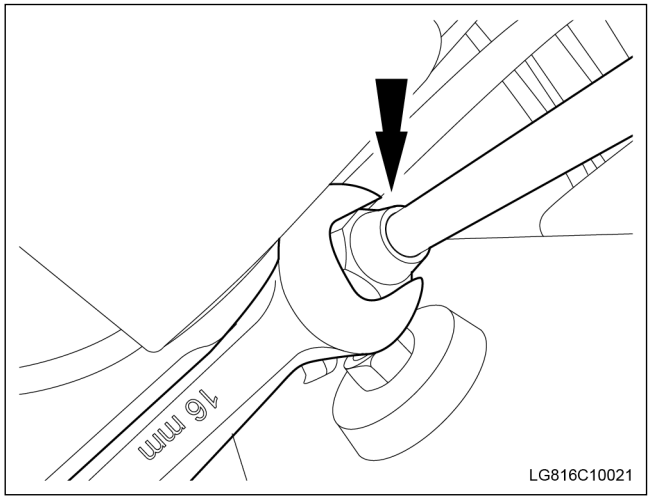
Connect the long-straight end connector of the sub-frame rear pin lubrication grease lines to the sub-frame rear pin connector, short-straight end connector to the bottom left nut block of the rear frame, use 16 # wrench to tighten.

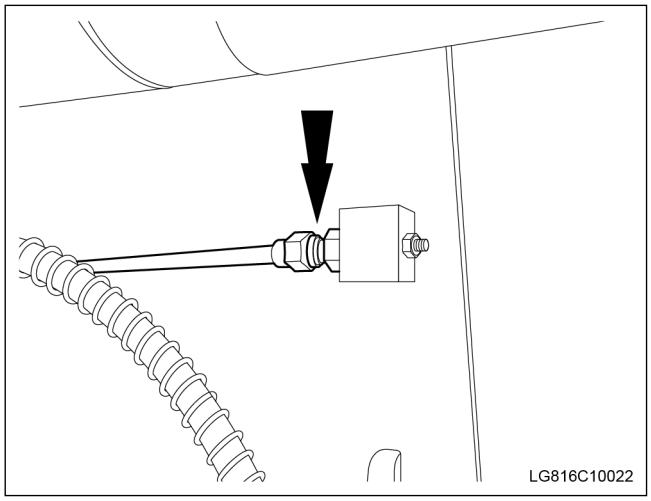




2. Install lubrication pipe

Connect the short-straight end of the sub-frame front pin lubrication grease lines to the pin connector, long-straight end to the left front nut block of the rear frame, use 16 # wrench to tighten.





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Removal and Installation of Front Frame

Removal

1. Remove work implement

Refer to the “Removal and installation of bucket”(p. 10-3) to “Removal and mounting of the boom”(p. 10-8)contents; remove the bucket, boom, rocker arm and linkage gp.

2. Remove boom cylinder

Refer“Boom oil cylinder”(p. 4-10), remove the boom cylinder.

3. Remove tilt cylinder

Refer “Bucket tilting cylinder”(p. 4-13), remove the tilt cylinder.

4. Remove control valve flexible shaft.

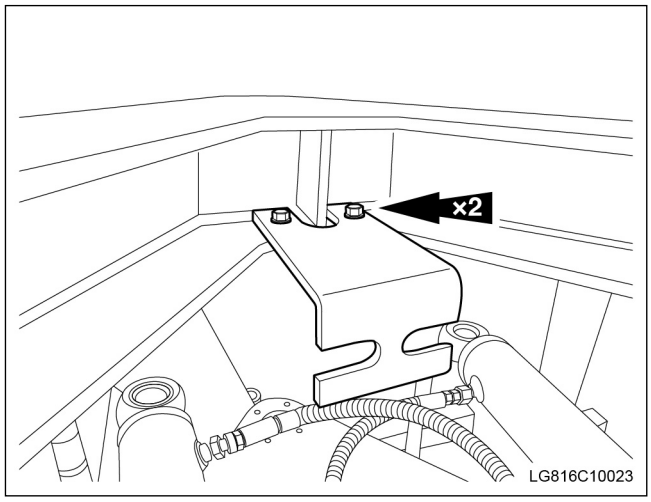
Refer 28, remove the flexible shaft from control valves and front frame.

5. Remove control valve

Refer “Control valve”(p. 4-3), remove hoses and control valves of the front seal plate and connection control valves from the front frame.

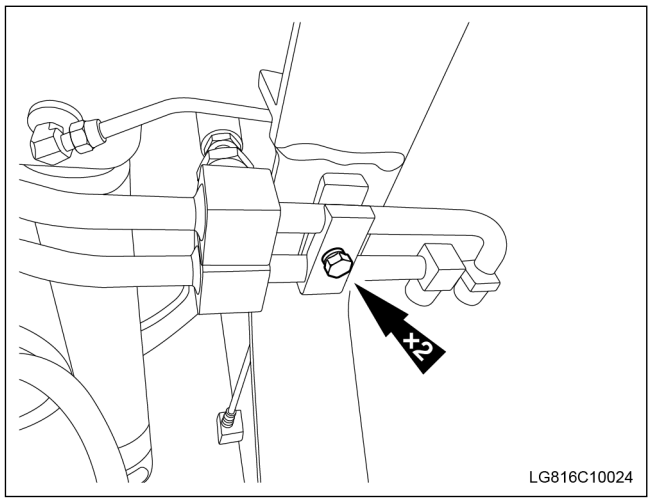
6. Remove flexible shaft bracket

Use 16 # wrench to remove two mounting bolts from the flexible shaft bracket, and remove the bracket from the front frame.



7. Remove the boom oil cylinder steel pipe

Use 16 # wrench to remove two mounting bolts on the fixed clamps of the boom cylinder’s steel pipe, and remove the steel pipe.



8. Remove lubrication grease pipe

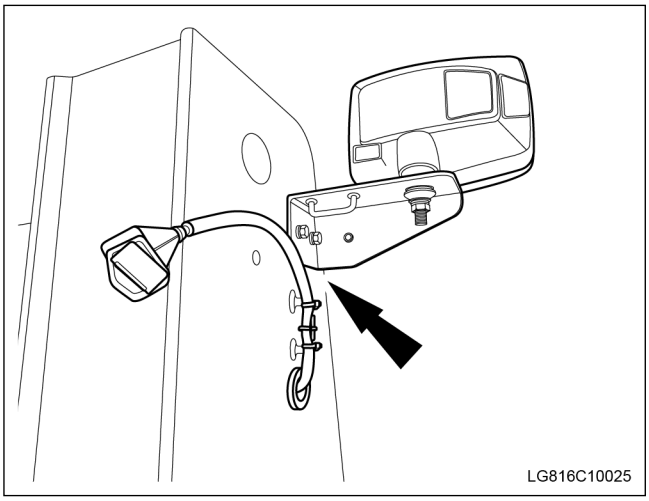
Refer“Removal (the front steering pin grease lines)”(p. 10-10), remove the former steering pin lubrication grease lines.

9. Remove (Front work light)

Disconnect the harness connector of the front work lights, use 16 # wrench to remove four mounting bolts on the left and right light holders, remove the work lamp holder gp and properly

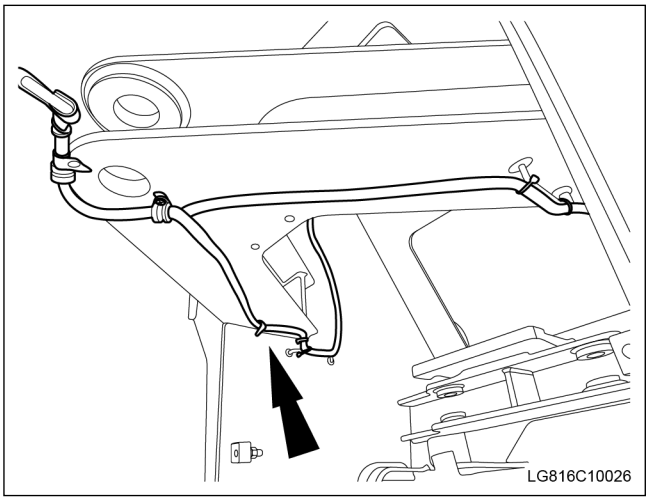
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place.



10.Remove the front frame wiring

Remove the front frame harness connectors beneath the top hinge pin, use 10# wrench to remove the wire clamp captive bolts. Use pliers or scissors to cut the front frame round steel's harness fixing ties, pay attention not to damage the wiring harness, remove harness.

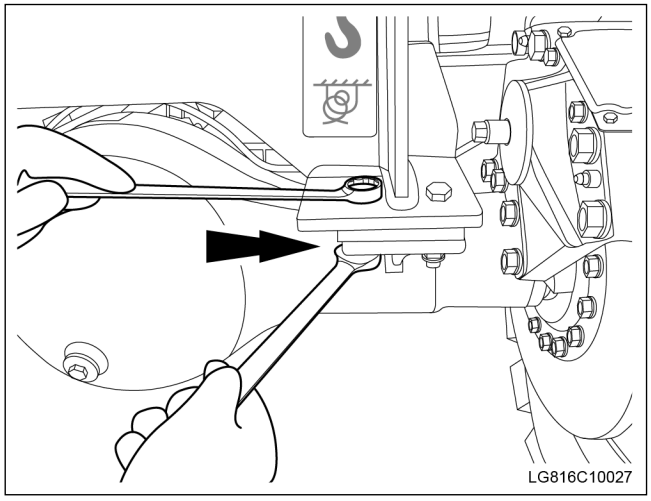


11.Remove steering cylinder

Remove the steering cylinder refer to"HYDRAULIC PUMP"(p. 5-3) removal process.

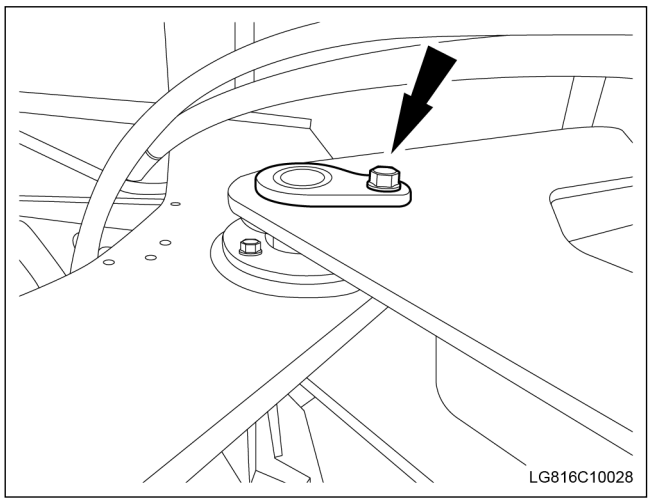
12.Remove the bolts of axle

Use the crane and spreader to lift the front frame, and tighten the spreader and hold the front frame, use two 24 # wrenches to remove the left and right 8 bridge bolts.



13.Remove upper articulate pin

Place stools in the proper height separately under the bottom hinge plates of the rear frame and front frame, use to support the front end of the rear frame and the back end of the front frame. Use a 21 # wrench to remove mounting bolts on the top hinge pin lug plate, use pin knock tooling to knock the hinge pin from the bottom up.

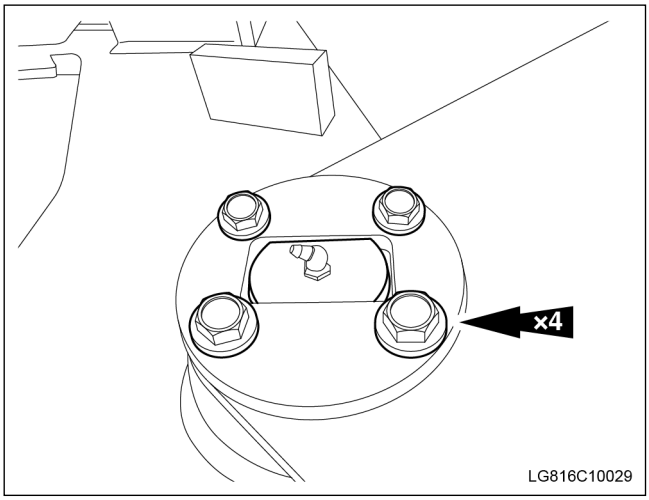


14.Remove the hinge pin, and lift the front frame.

Use 18 # wrench to remove plate mounting bolts

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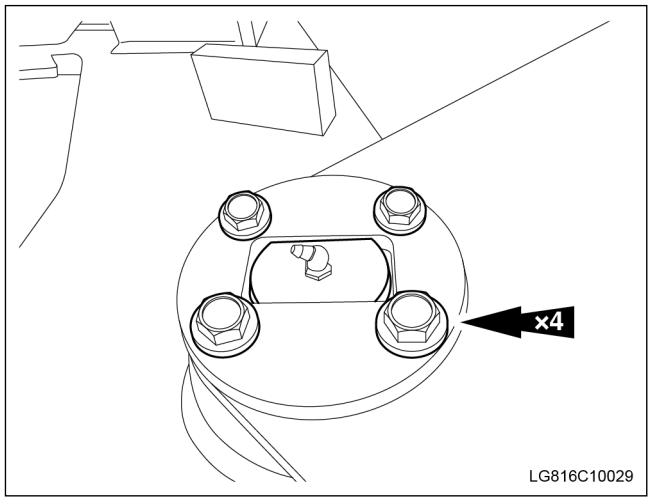
at the top of hinge pins and remove the plate; use 16 # wrench to remove lower plate mounting bolts beneath the low hinge pins. Use pin knock tooling to knock the hinge pin from the bottom up, lift the front frame to the flat ground, and properly place.



Installation

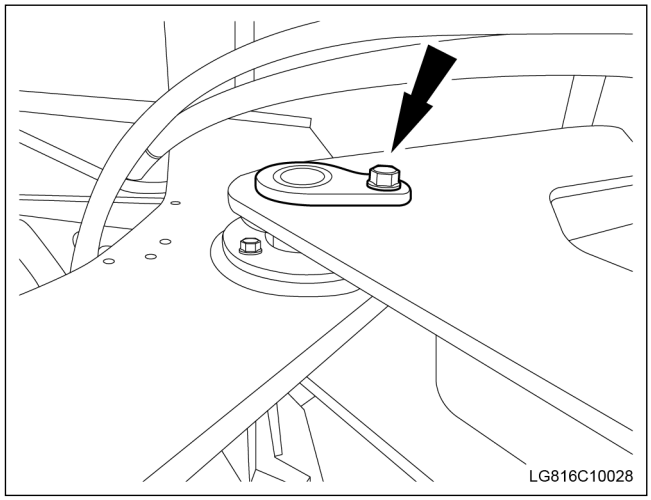
1. Remove lower pin

Lift the front frame to the right front of the rear frame, install the pad cover in the hanging in the low hinge holes of the front frame, and then adjust the position so that the rear frame's hinge plate enter into the place between two hinge plates of the front frame. Align hinge holes, then load hinge pins from the top down, use copper rod or hammer with wood to knock the pin to the bottom. Install the pressed plate and cover fixed with the corresponding bolts. Use 18 # bolts wrench to tighten bolts on the pressed plate with tightening torque of 90±12N•m; use 16 # wrench to tighten bolts on the cover with tightening torque of 52 ±7N•m.



2. Install upper articulate pin

Operate the crane to adjust the relative positions of the front and rear frame, so that the front and rear frames' hinge pin mounting holes are aligned, mount the upper hinge pin from the top down. After align the mounting holes, use a brass bar or hammer to knock the pin lug plate to fit with the top hinge plate of the front frame by mounting wood or rubber mat. Install the lug captive bolts, and tighten them with 21 # wrench, the tightening torque is 145±20N•m.

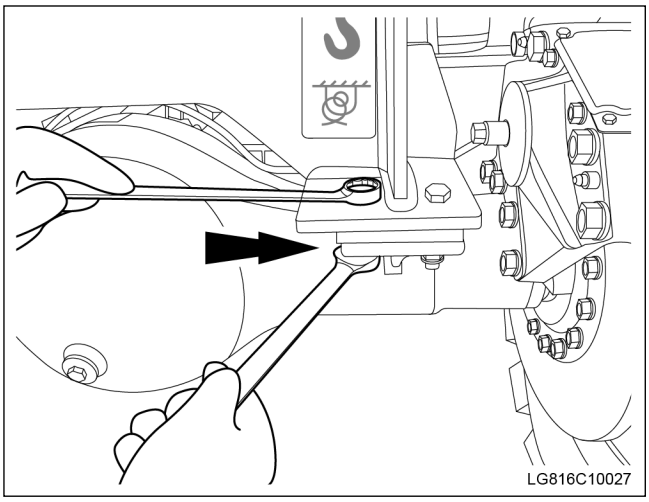


3. Install the bolts of axle

Operate the crane to adjust the relative position of the front frame and the front axle, after align

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the bridge bolts' mounting holes; mount the front bolts from the top down. Place the front frame to the front axle; mount the top axle nuts at the lower part. Use two 24 # wrench to tighten them, and the tightening torque is 225 ± 35N • m.

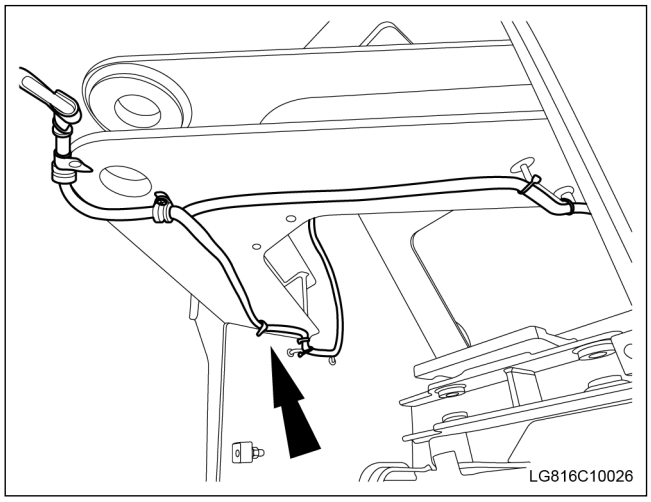


4. Install steering cylinder

Refer to the "HYDRAULIC PUMP"(p. 5-3)installation process, install the steering cylinder on to the front and rear frame.

5. Install the front frame wiring

Layout the front frame harness on the front frame, and fix one end to the corresponding location on the bottom of the top hinge plate, the end connects the harness with that of the rear frame with clamps. Use bolts to fix clamps, and tighten bolts with 10 # wrench, use ties to strap the harness on the round steel, and cut off the over-long ties.

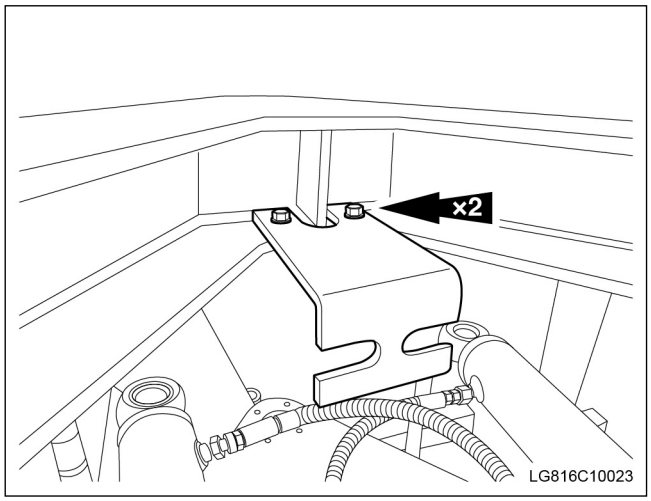


6. Installation of control valve

Install the control valve on to the front frame refer to"Installation (the front steering pin grease lines)"(p. 10-10) installation process.

7. Mount flexible shaft bracket

Use bolts to install the flexible shaft bracket to the front frame hinge plate, use 16 # wrench to tighten with tightening torque 52 ±7N•m.



8. Install control valve flexible shaft.

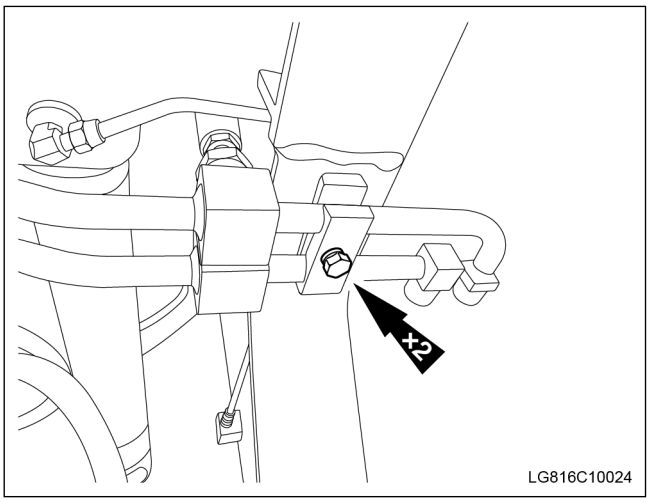
Refer"Control valve"(p. 4-3), connect the hose with control valve.

9. Install the boom oil cylinder steel pipe

Use two pipe clamps to fix a boom cylinder steel

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pipe to the bottom of the front frame, the steel pipe with bending on both sides is put in the front, the steel pipe without bending is put behind. Use bolts to fix the clamps. Adjust the steel pipe to let its left and right is symmetrical by the frame's central surface, and then use 16 # wrench to tighten the clamp bolts with tightening torque of 52±7N•m.



10.Install lubrication steel pipe

Refer"Installation (the front steering pin grease lines)"(p. 10-10), install the front steering pin lubrication grease lines to the pin and the front frame nut block.

11.Install boom cylinder

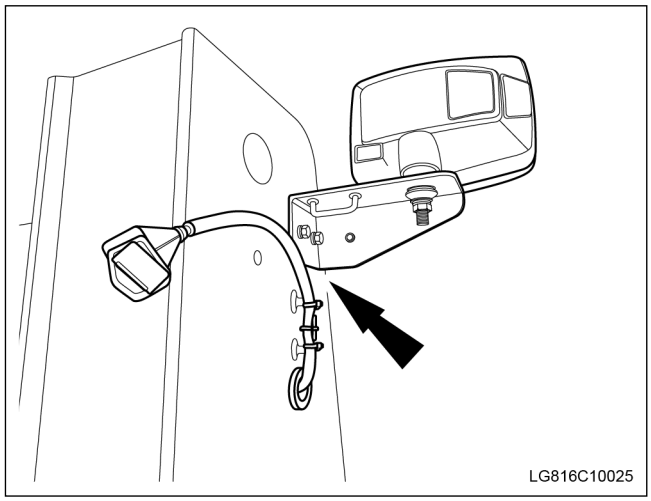
Refer to"Boom oil cylinder"(p. 4-10) installation process to install boom cylinder on to front frame.

12.Install work implement

Refer to"Removal and installation of bucket"(p. 10-3) to "Removal and mounting of the boom"(p. 10-8), install boom, swing arm, linkage and bucket on to front frame.

13.Install front work light

Use bolts to install the left and right front work lights to the corresponding positions on the left and right sides of the front frame. Use 16 # wrench to tighten bolts with tightening torque of 52±7N•m, and then plug the harness connectors and cover the jacket.



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Removal and Installation of Rear Frame

Removal

1. **Remove the covering parts and radiator**

   Refer “Disassembly of Radiator”(p. 2-3), remove the convering parts and radiator.

2. **Remove cab and diesel engine**

   Refer“Removal of engine”(p. 2-11), remove the cab gp, engine torque converter gp.

3. **Remove diesel oil tank**

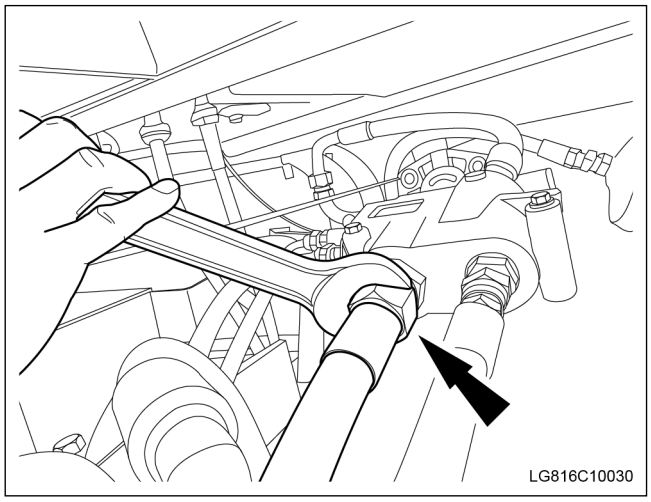
   Refer “Removal of diesel oil tank”(p. 2-35), remove the diesel box.

4. **Remove drive shaft**

   Refer“Front drive shaft”(p. 3-10), “Middle drive shaft”(p. 3-12) and “Rear drive shaft”(p. 3-14), remove the end, where the rear drive shaft, middle drive shaft and sleeve drive shaft connect with the gearbox.

5. **Remove the hose connected with the control valve on the priority valve.**

   Use 36 # wrench to remove the hose connector, which connects with the control valve on the priority valve. Use clean plastic bags and ties to wrap the hose and fittings for priority valve, so as to prevent foreign matter from entering.



6. **Remove the priority valve**

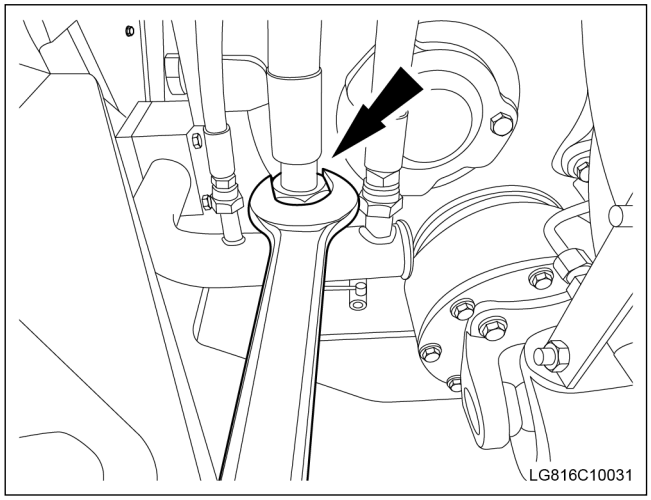
   Refer “Priority valve”(p. 5-6), remove the two mounting bolts on the priority valve, and remove the priority valve from the gearbox.

7. **Remove the transmission**

   Refer “Gearbox”(p. 3-23), remove the square claps on the hinge plate of the rear frame; remove the gearbox and properly place.

8. **Remove the control valve return hose.**

   Remove the hose joint between hydraulic tank and control valve with 36# wrench, use clean plastic seal bag and strap to bind up the hose joint and cylinder pipe joint to prevent hydraulic system from entering foreign matters.



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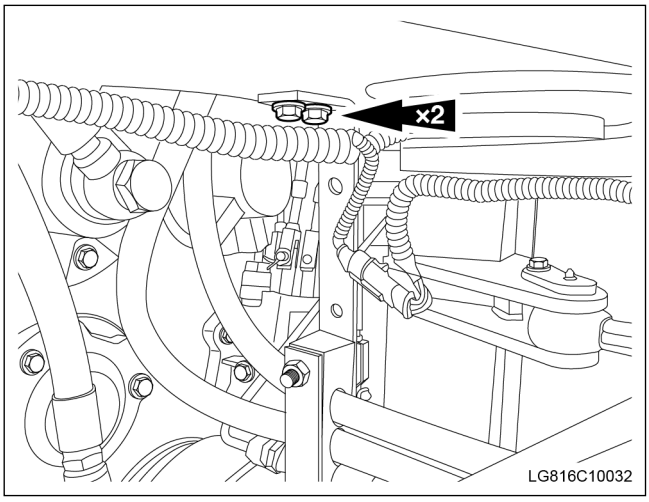
9. Remove hydraulic oil tank

Remove the hydraulic tank refer to “Hydraulic oil tank”(p. 5-19) removal process.

10.Remove the mounting plate from rear frame hose clamp

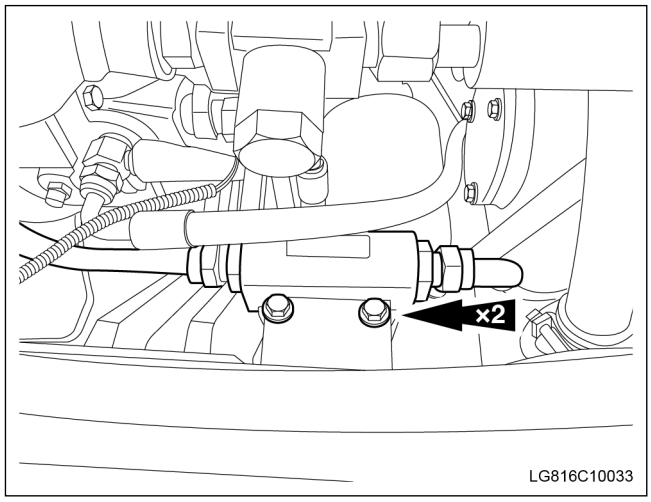
(a) Use 16 # wrench to remove the fixing bending mounting bolts on the clamps of hose from the steering gear to the steering cylinder beneath the rear frame’s hinge plate. Remove the entire clamps, move the steering gear, priority valve and its connecting hoses together to the low hinge plate of the front frame.

(b) Remove the control valve inlet and outlet hose clamp on the top of the hinge plate, install the plate captive bolts and remove the hose clamps.



11.Remove the oil filter

Remove two mounting boltss from oil filter with 16# wrench, take down the oil filter and place it properly.



12.Remove assistor

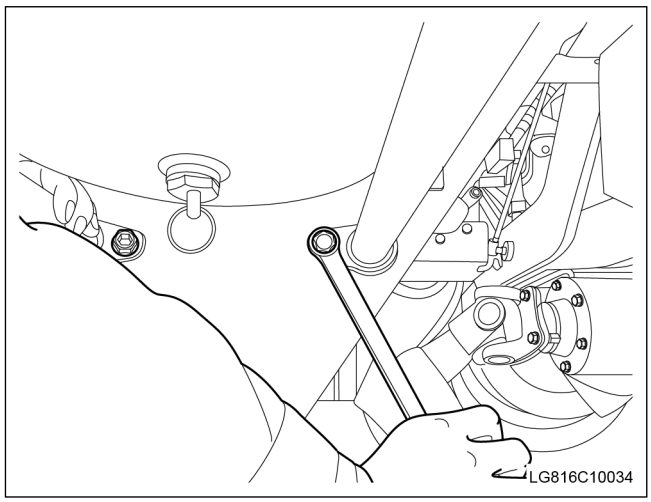
Refer to the “Assistor”(p. 6-11) remove process, remove the booster and properly place.

13.Remove the pressure regulating valve

Remove the regulating valve refer to “调压阀”(p. 6-18) removal process.

14.Remove air vessel

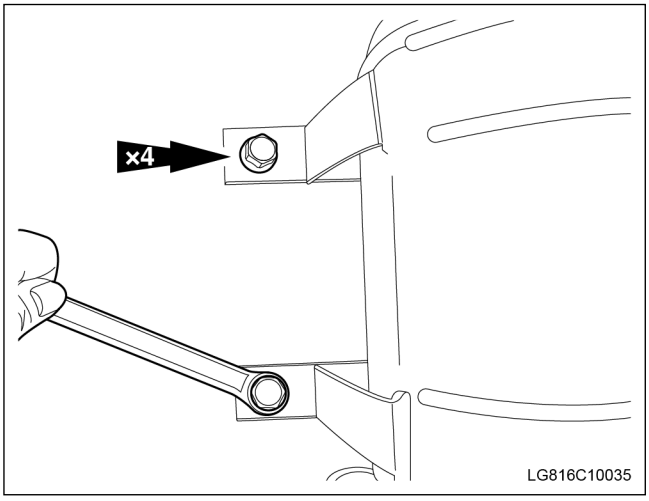
(a) Use 18 # wrench to remove the left escalator’s 4 mounting bolts, and remove the escalator and properly place, pay attention to protect the surface paint.



(b) Use 16 # wrench to remove the air vessel as’s 4 mounting bolts, and remove the gas

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vessel as and properly place, pay attention to protect the surface paint.

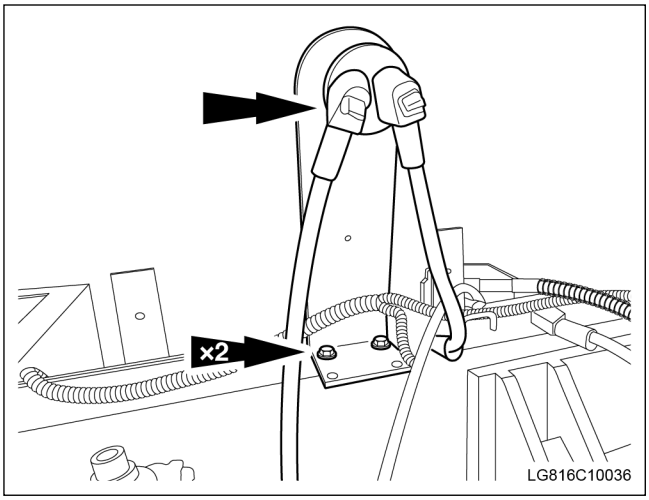


15.Remove lubrication pipe

Refer “Removal (sub-frame pin’s grease lines)”(p. 10-11), remove the sub-frame pin’s lubrication grease lines.

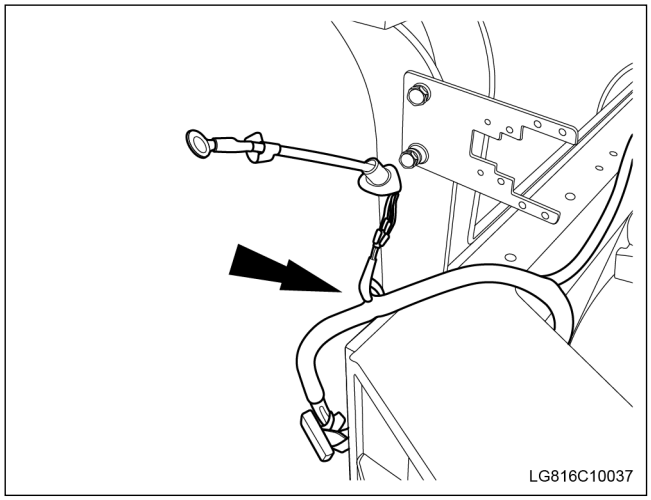
16.Remove negative switch

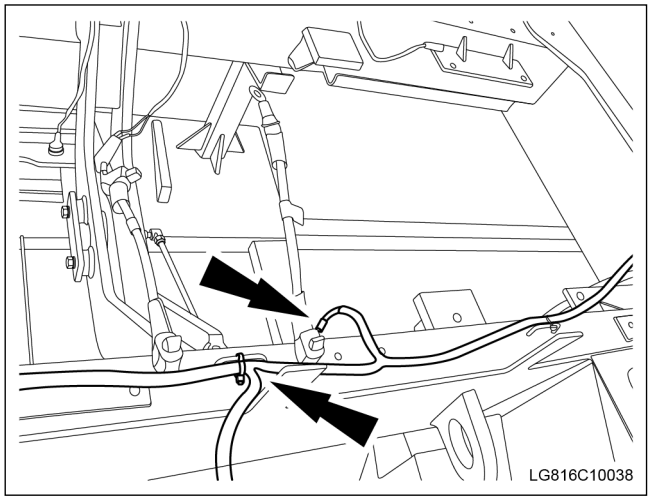
Use 16 # wrench to remove the harness nuts on the negative switches, which connect the rear frame and battery; use 16 # wrench to remove the negative switches’2 mounting bolts, and remove the negative switches.



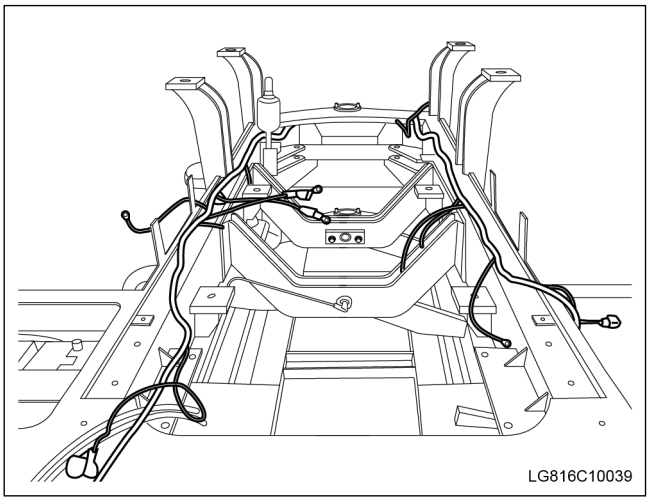
17.Remove the wiring harness

Use 16 # wrench to remove the captive bolts on the cables from the frame to the cab, the frame to the start motor and the negative switch to the frame. Remove the wiring harness, use pliers to cut fixing ties of the rear frame harness. Unplug the connection plugs of the rear and front frames, and remove the harness.





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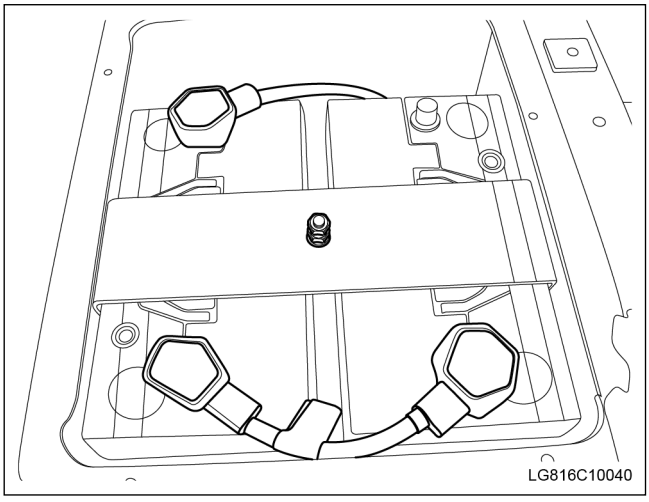


18.Remove battery

(a) Use 13 # wrench to remove the battery cover's 4 mounting bolts and remove the cover to place properly, unplug the battery harness sheath.

(b) Use 16 # wrench to remove the harness connector's fastening nuts, and remove the harness.

(c) Use 16 # wrench to remove the battery plate's 2 locknuts, remove the plate, battery fixing screws, two batteries and low pad of two batteries.



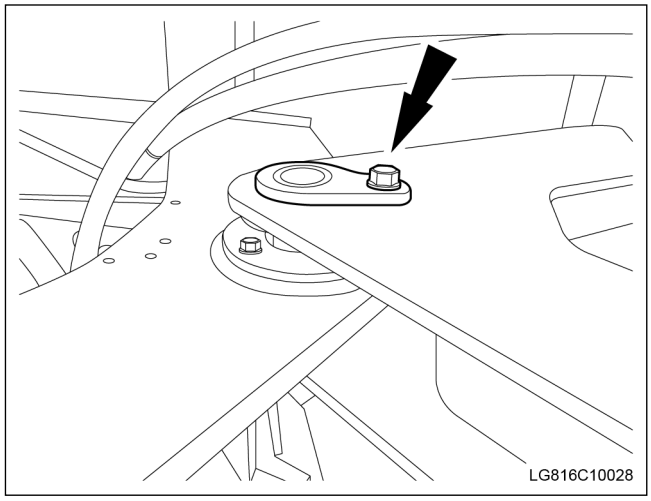
19.Remove the steering cylinder's rear pin.

Refer "STEERING CYLINDER"(p. 5-12), remove rear steering pin.

20.Remove upper articulate pin

(a) Place stools in the proper height under the lower hinge plate of the front and rear frames, to support the front and rear frames.

(b) Use 21 # wrench to remove the upper hinge pin lug plate's mounting bolts, use the pin knock tooling to knock the hinge pin out from the bottom up.

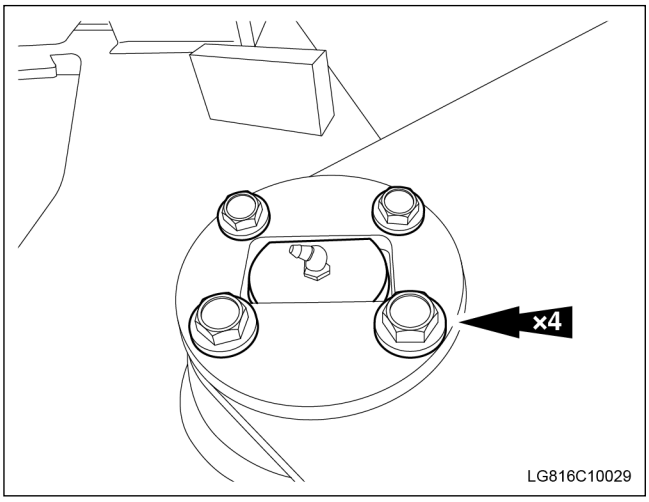


21.Remove lower pin

(a) Use 18 # wrench to remove the top cover mounting bolts of the lower hinge pin, and remove the plate.

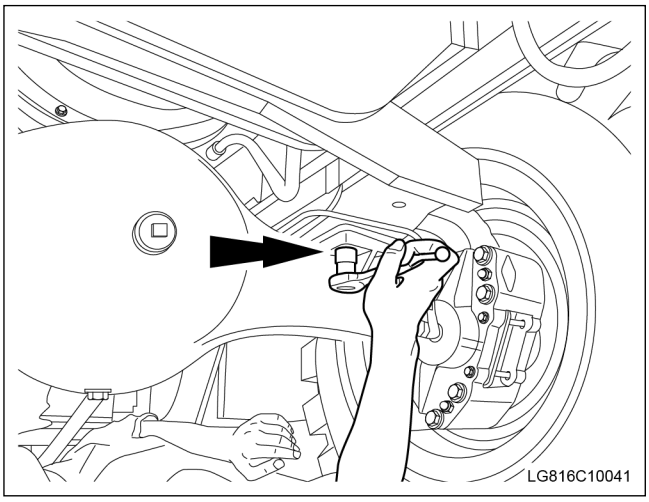
(b) Use 16 # wrench to remove the lower hinge pin bottom cover's mounting bolts and remove the cover, use the pin knock tooling to knock the lower hinge pin out from the bottom up.

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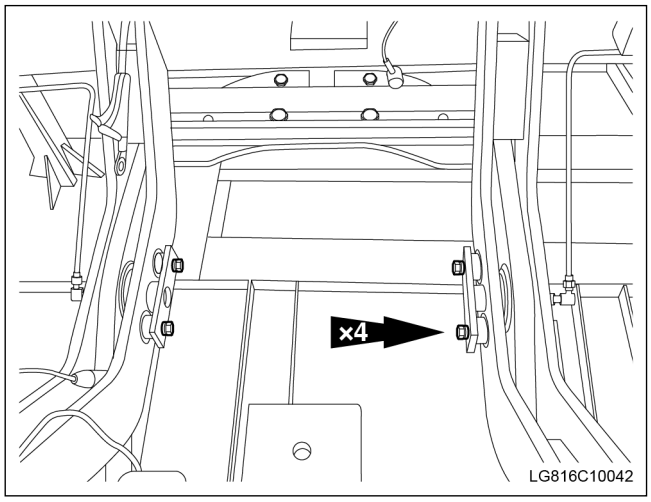
22.Remove rear axle bolt and lift rear frame

Refer to the “Rear axle”(p. 3-20) remove, use 24 # wrench, 24 # socket, ratchet wrench to remove the connection bolts and nuts between the sub-frame and rear axle, lift the rear frame to the tooling bench and properly place.



23.Remove sub-frame pin

Use the crane and spreader to lift the sub-frame, and tighten the spreader to hold the sub-frame. Use 18 # wrench to remove the two sub-frame pins’ four mounting bolts, use the pin knock tooling to knock the pin out, and lift the sub-frame to the flat ground and properly place.



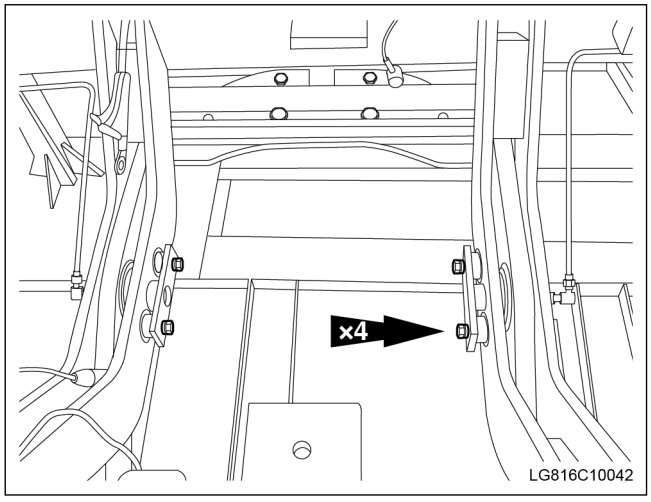
Installation

1. Install subsidiary frame

(a) Use the crane and spreader to lift the mounting location beneath the sub-frame.

(b) Operate the crane to adjust the sub-frame position, let it enter into the beam plate of the rear frame. Align the pin mounting holes, install adjusting pads and pin.

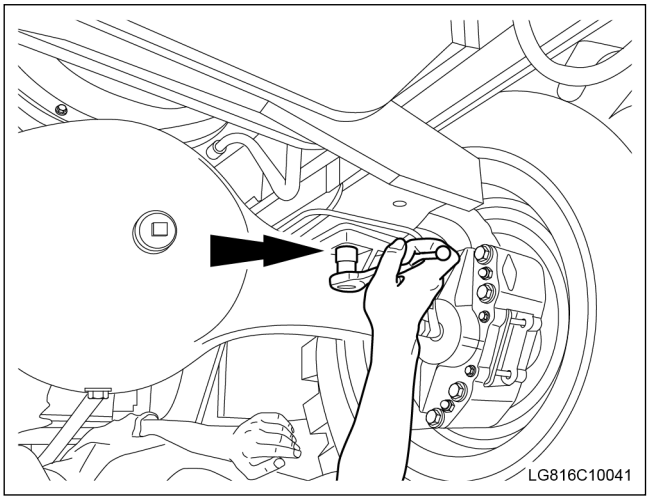
(c) Knock the pin to the end cushioned with the rubber mat or piece of wood. Install the mounting bolts, and tighten with a 18 # wrench with the tightening torque of 90±12N•m.



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2. Install the bolts of axle

Use the crane and spreader to lift the rear frame gp to the top of rear axle. Install the axle bolts and nuts after align the rear axle bolts' mounting holes from the top down. Use 24 # wrench, 24 # socket and ratchet wrench to tighten the axle bolts with tightening torque of 225±35N•m.

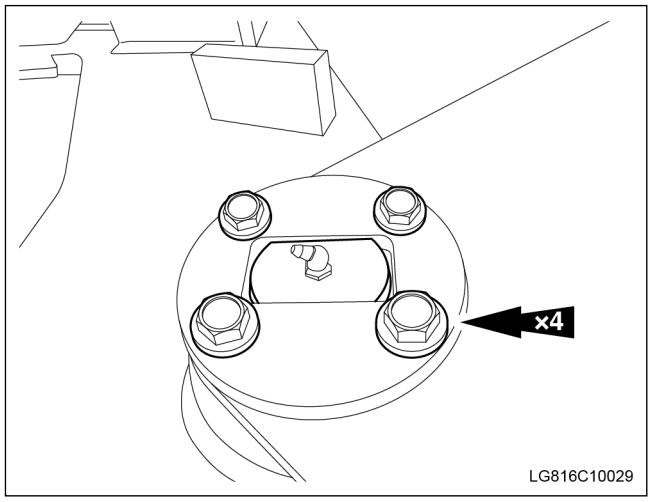


3. Remove lower pin

(a) Adjust the relative positions of the front and rear frame, rear frame hinge plate into the front frame hinge plate, and align the lower hinge holes.

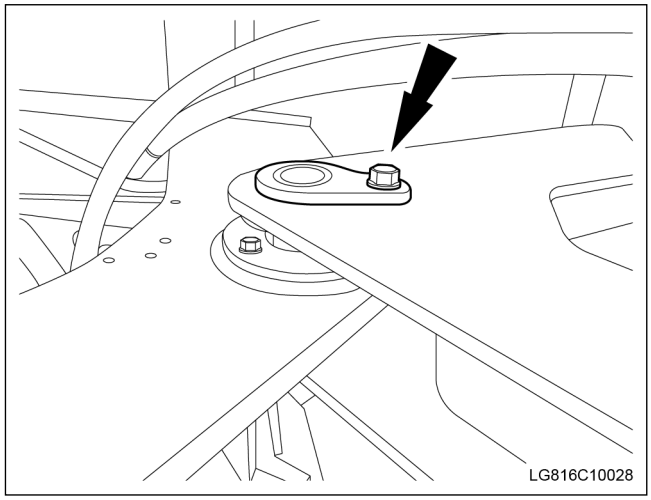
(b) Install the lower hinge pin from the top down; knock the pin to the end cushioned with rubber mat or wood block. Install plate and its mounting bolts, use 18# wrench to tighten with the tightening torque of 90±12N•m.

(c) Install the cover to the lower hinge plate under the pin with bolts, and tighten them with 16# wrench with the torque of 52±7N•m.



4. Install upper articulate pin

Adjust the relative position of the front and rear frame, align the rear and front frames 'hinge holes. Install the upper hinge pin from the top down. Knock the pin to the end cushioned rubber mats or wood block, install the lug plate's mounting bolts, use 21# wrench to tighten with tightening torque of 145 ± 20N•m.



5. Install steering cylinder rear pin

Refer "STEERING CYLINDER"(p. 5-12), install the left and right rear steering pins.

6. Install battery

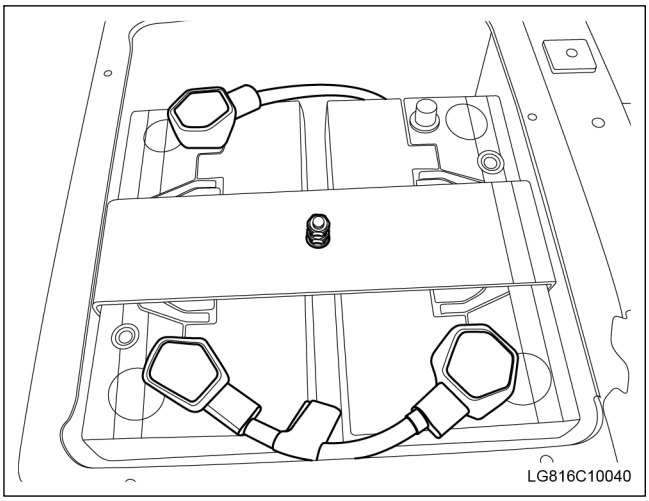
(a) Place two pads in the bottom panel of the battery box; place two batteries on the

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cushion plate, where the positive pole of the battery is in the front, the outer battery positive is in the rear, adjust their positions for no distortion.

(b) Mount fixed screws, plate and two nuts; use 16 # wrench to tighten the two nuts.

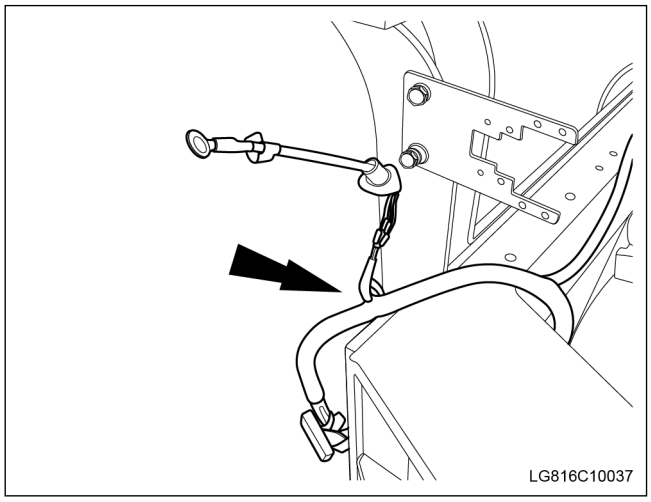
(c) Use harness to connect the inner battery negative with the outer battery positive, and then connect the negative switch harness to the battery negative on the outside. Connect harness from the starter to the battery to the inner battery positive, use 10 # wrench to tighten the coupling nuts.

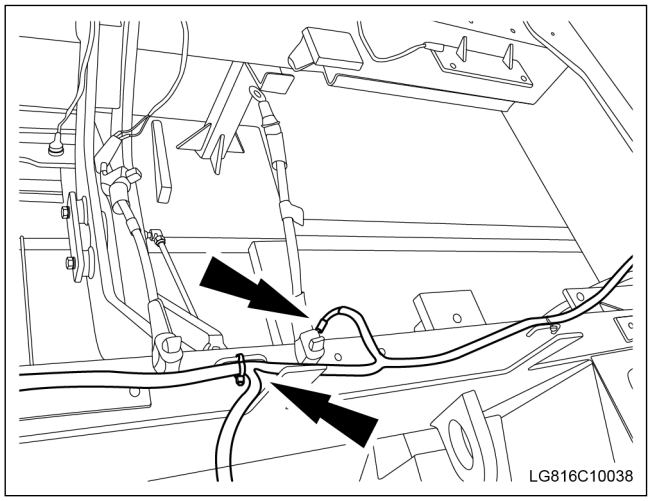


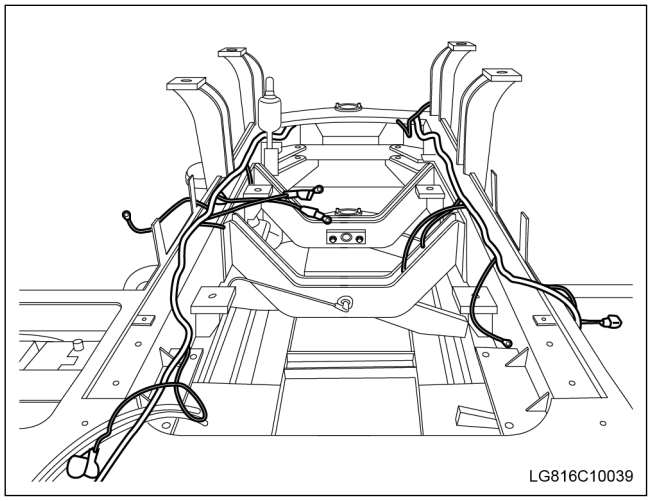
7. Install the rear frame wiring

(a) Use bolts to fix harness from the negative switch to the rear frame, the rear frame to the starter, the rear frame to the cab and connector mounting plate to the frame's corresponding positions. Use 16# wrench to tighten the bolts with tightening torque of 52 ±7N•m.

(b) Lay out of the rear frame harness to the rear frame, and then fix the harness to the rear frame bar by using ties, cut the overlong ties.





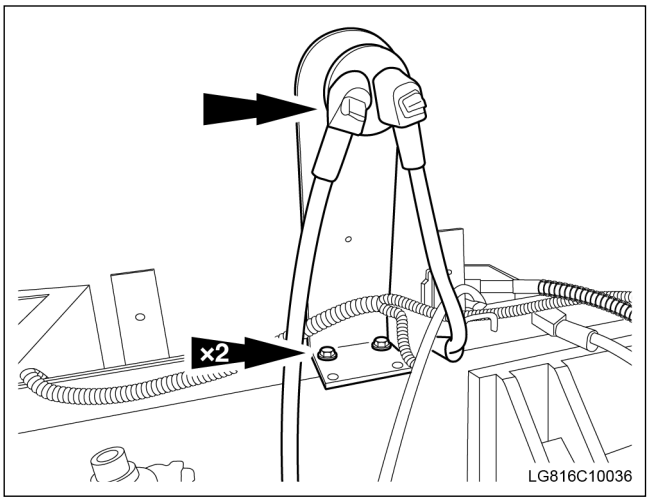


8. Install negative switch

Switch to disconnect the negative file, and then

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the nut to be fitted to the rear frame mounting plate with 24 # wrench to tighten the bolts, and then connected to the negative pole switch harness connector 2 with 16 # wrench to tighten the connection nut.

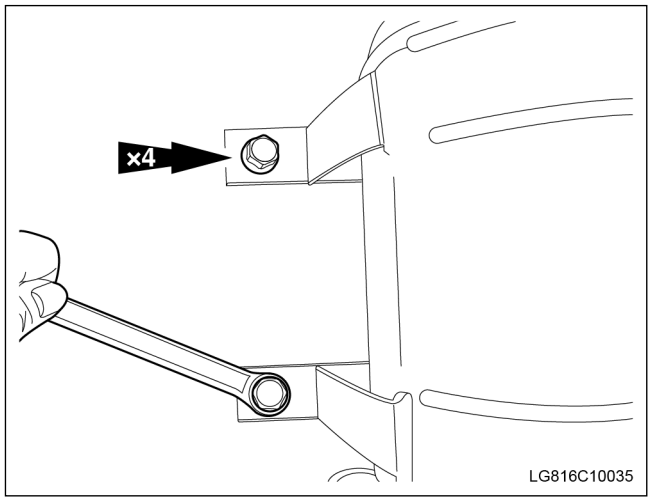


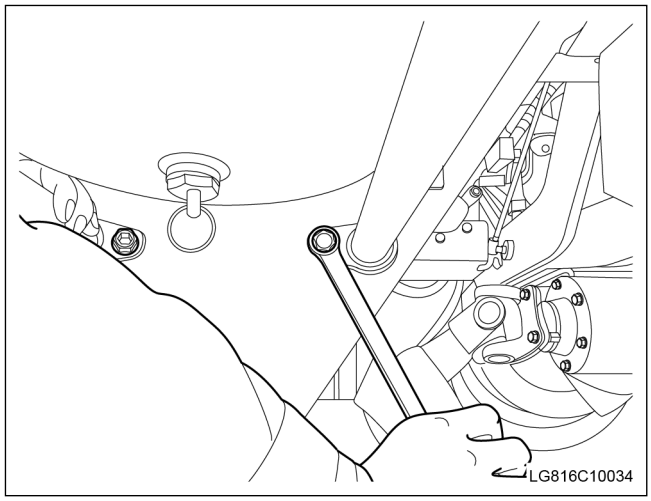
9. Install lubrication pipe

Refer “Install (sub-frame pin lubrication grease lines)”(p. 10-12), install the sub-frame pin’s lubrication grease lines to the sub-frame pin and the rear frame.

10.Install the air vessel

Use bolts to install the air vessel to the rear frame, use 16 # wrench to tighten with tightening torque of 52± 7N•m. Use bolt to install the escalator onto the rear frame, tighten with 18 # wrench with tightening torque of 90±12N•m.





11.Install the pressure regulating valve

Refer to the “Pressure regulator”(p. 6-20) installation process, install the regulator valve to the rear frame and connect the corresponding nylon tubes.

12.Install diesel tank

Install diesel tank on to rear frame refer to “Removal of diesel oil tank”(p. 2-35) installation process.

13.Mount the booster

Refer to the “Assistor”(p. 6-11) installation process, install the booster to the sub-frame and connect lines.

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14.Install the transmission

(a) Move the metering pump and priority valve on the front frame's hinge plate to the rear one, to avoid the hose twisting and interference.

(b) Refer "Transmission"(p. 3-23), install the gear box on to rear frame.

15.Install drive shaft

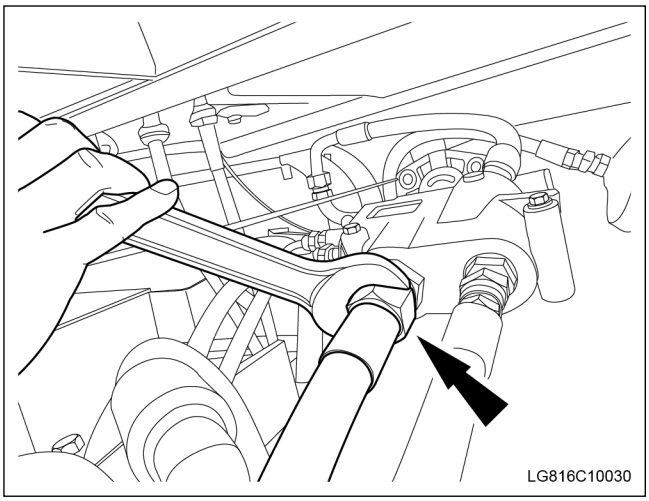
Refer "Middle drive shaft"(p. 3-12) and "Rear drive shaft"(p. 3-14), connect the middle shaft and rear shaft with the gearbox front and rear parts respectively.

16.Install the priority valve, and then connect the priority valve to the control valve hose.

(a) Refer to the "Priority valve"(p. 5-6) installation, install the priority valve to the gearbox.

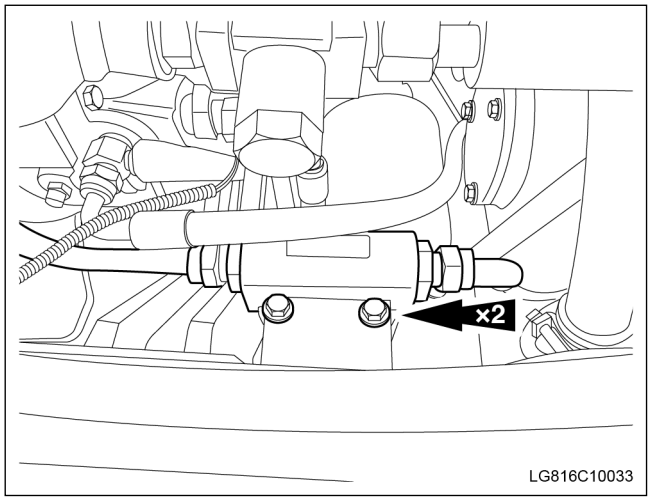
(b) Connect the priority valve control valve hose connectors to the front right side oil outlet port of the priority valve; adjust the position to let the hose without distortion and without interfering with other gp.

(c) Use 36 # wrench to tighten the hose connector with tightening torque of 120±15N•m.



17.Install oil filter

Use bolts to fix the filter to the rear frame's corresponding position; use 16 # wrench to tighten the bolts with tightening torque of 52 ± 7N•m.



18.Install hydraulic oil tank

Refer to the "Hydraulic oil tank"(p. 5-19) installation process, install the hydraulic oil tank and escalator to the right corresponding position of the rear frame.

19.Install engine gp, install radiator and cover.

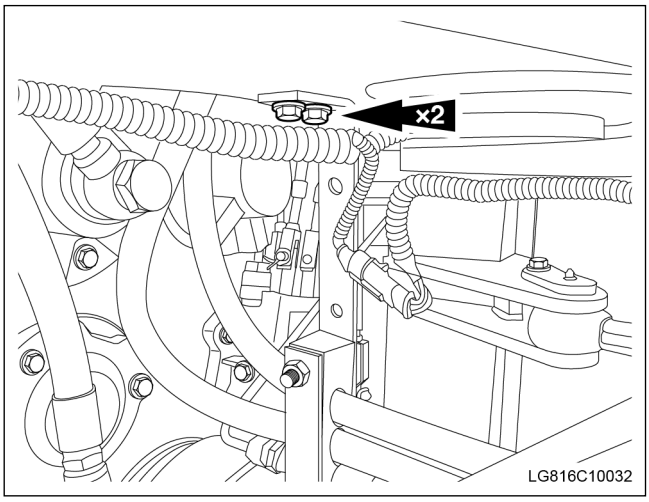
Refer "Installation of diesel oil tank"(p. 2-36), install the diesel gp, radiators and covering parts etc components to the rear frame. Connect and install the harness, lines and combination sets of drive shaft.

20.Install the mounting plate of pipe clamp

(a) Use bolts to fix the control valve's oil inlet and return hose clamp mounting plate to corresponding positions of the rear frame's top hinge plate, adjust the lines 'direction for no distortion and interference.

(b) Tighten bolt with a #16 wrench, torque to 52±7N•m.

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(c) Similarly, install the steering cylinder hose, brake hose clamp to the corresponding positions at the bottom of the rear frame's hinge plate.

21.Install Cab gp

Refer to "Heater AS"(p. 7-6), install the cab gp to the machine, and connect the lines, flexible shafts and harness etc components.

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