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KATO

SERVICE MANUAL

Applicable serial No. ··· HD820Ⅲ: 9379107－
HD820Ⅲ-LC: 9379107－

SUPER EXCEED

FULLY HYDRAULIC EXCAVATOR

HD820Ⅲ

⚠ WARNING

You must read and understand this manual and instruction manual before operating or servicing this machine.

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KATO

HD820Ⅲ

SERVICE MANUAL

30633-2

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Introduction (857S-0001-1E)

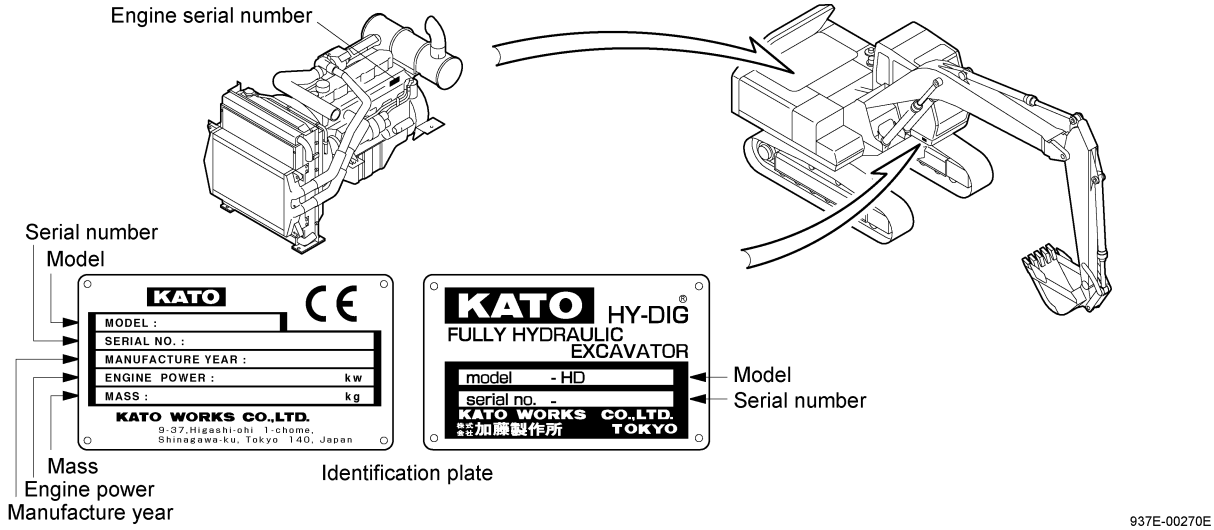
This manual gives a basic summary of KATO hydraulic excavator and explains the equipment making up the machine, and the structure, functions, disassembly and assembly, adjustment, maintenance etc. of hydraulic-related equipment. Improvement in the work rate and the lifetime of the machine are largely controlled by the standards of inspection and servicing. Refer not just to this manual but also to the separate instruction manual and parts list to gain an understanding of the structure of the machine and carry out service correctly.

As a general rule, the content of this manual is compiled according to the separate equipment which makes up the machine, but please understand that the equipment on your machine may differ to some extent for reasons such as technical improvement. In that case, use this manual as reference material.

This manual does not cover the engine or optional devices. Refer to the separate service manuals.

Serial number and engine serial number (857S-0002-0E)

The serial number and engine serial number will assist in smooth administrative processing of orders for parts and servicing from your authorised KATO dealer, so please provide these numbers when ordering.



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(937V-0002-1E)

A Summary

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1. How to use this manual (857S-0005-1E)

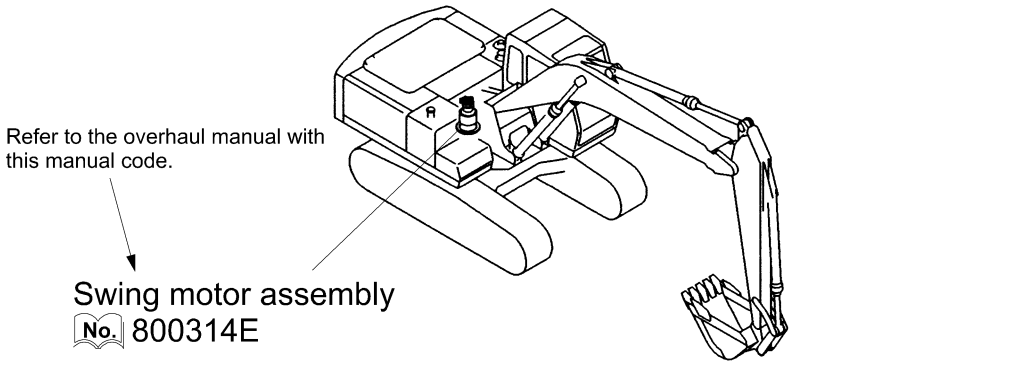
(1) Carry out preoperational checks before starting operation.
(2) Check each test item according to the testing schedule of monthly and yearly tests.

If a problem occurs

Refer to each equipment chapter and investigate the location of the problem.

C: Layout and circuit diagram of equipment
D: Engine unit
E: Hydraulic pump equipment
F: Control equipment
G: Front attachment
H: Superstructure
I: Lower structure
J: Electrical equipment
APC100: Refer to the separate manual.

- If disassembly of hydraulic units and other devices is required, refer to the "disassembly and assembly of equipment" section of each equipment chapter.
- The manual code of the "overhaul manual" of hydraulic units and other devices required for disassembly and assembly is printed, so refer to that procedure manual.



When you have repaired any malfunctioning parts, carry out the specified inspections and check that there is enough oil.
When replacing parts, always check them with reference to the relevant parts list.

Carry out preoperational checks and test-run the equipment unloaded to confirm its safety.

Start work.

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2. List of appendix overhaul manuals (937V-0003-1E)

Device name	Part number	Manual code
Hydraulic pump	609-79900012	800312E
Swing motor assembly	619-05434002	800314E
Plunger motor	619-76100002	
Swing motor reduction gear	619-88500001	
Control valve (HD820Ⅲ)	669-21600013	800315E
Lock valve	669-65400002	800317E
Control valve (HD820Ⅲ-LC)	669-24000013	800368E
Pilot valve (travel)	669-34200005	800379E
Rotary seal	689-79700002	800393E
Boom cylinder	329-14800022	805152E
	329-14900022	
Arm cylinder	329-18700021	805152E
Bucket cylinder	329-25900021	805152E
Traveling motor assembly	619-00336011	805161E
Hydraulic motor	619-61800011	
Traveling motor reduction gear	619-80100011	
Pilot valve	669-37100000	805171E
Air conditioner unit	709-82700003	805181E
Shockless valve	649-15600002	805801E
APC100		306554

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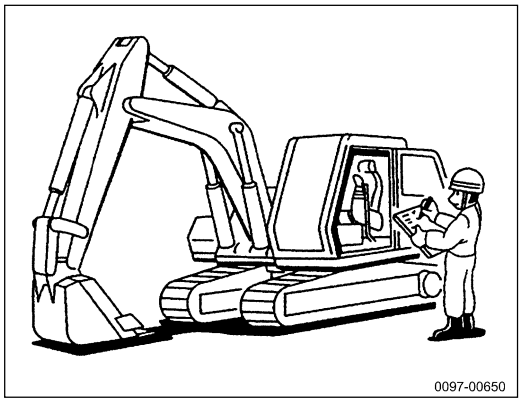
3. Precautions on inspection and servicing (0097-0013-6E)

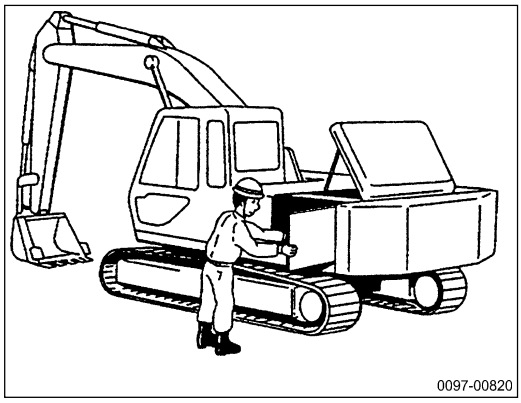
Inspection and servicing are as important as lubrication as they have a great influence on the lifespan of the machine and are highly significant in maintaining safety. Inspect and service the machine regularly to keep yourself aware of its condition and preserve its safety and economic performance.
Refer to the inspection and servicing points and methods described below and observe them correctly.

(1) Regular independent inspection
Draw up an inspection and servicing schedule and implement it.

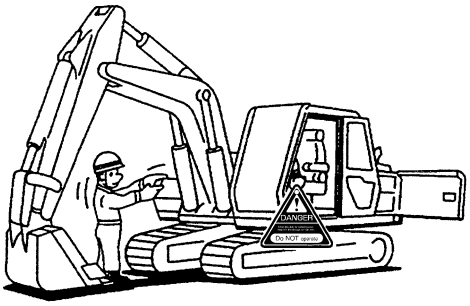


(2) Keeping independent inspection records
The regular independent inspection must be carried out, the results recorded and preserved.

(3) Repair of broken or malfunctioning parts
- If you discover a breakdown or malfunction during an independent inspection or preoperational check, it must be repaired immediately.
- Operation with such problems unrepaired is highly dangerous. Never start work before all repairs are complete.



(4) Park the machine on level ground for inspection and servicing
- Choose a work site which is firm, level and free of hazards.
- Always lower the bucket to rest on the ground.
- Stop the engine and remove the key.
- Put the warning tag.
- Place chocks to immobilize the track shoes.



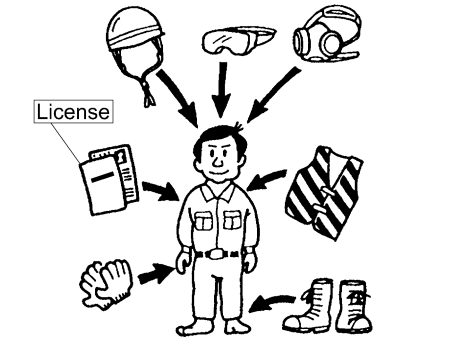
0097-00680E

(5) Each piece of equipment is rigorously tested and tuned before shipping. Tuning outside your authorised KATO dealer is forbidden.

(6) Repairs to the boom and arm require special techniques.
Contact your authorised KATO dealer.

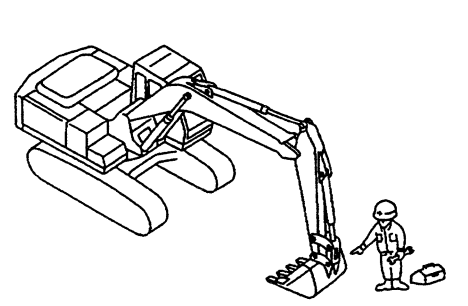
0097-00690E

(7) Wear protective clothing and equipment
- Wear a helmet, protective goggles, safety boots, gloves etc. when inspecting and servicing the machine.
- Metal splinters can fly off when you are using a hammer or grinder, so always wear proper protective clothing and equipment when using these tools.



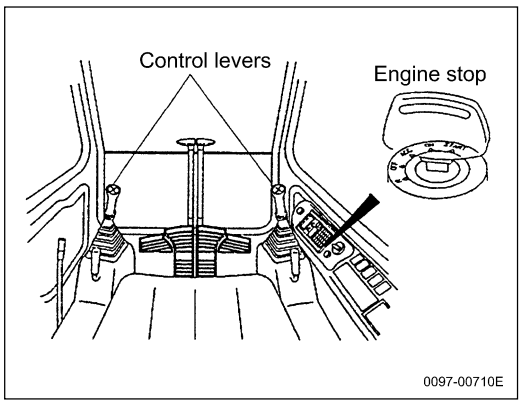
7070-00050E

(8) Supporting attachments
- Always rest the attachment on the ground during inspection and servicing.
- It is dangerous to replace or repair hydraulic hoses, joints or other hydraulic equipment while the attachment is raised in the air.
It must be lowered to the ground.


0097-00700

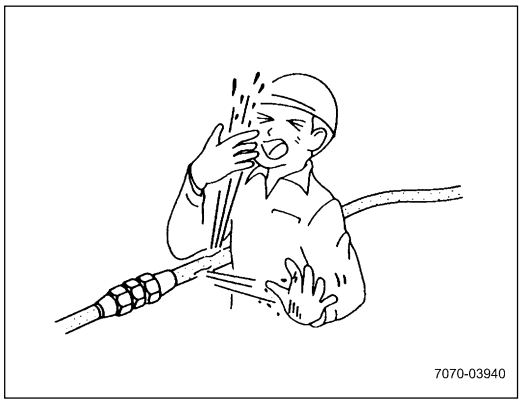
(9) Relieve hydraulic pressure

- Stop the engine and move the control levers for one or two minutes to relieve pressure.
- It is dangerous to replace or repair hydraulic hoses, joints and equipment without relieving pressure first.



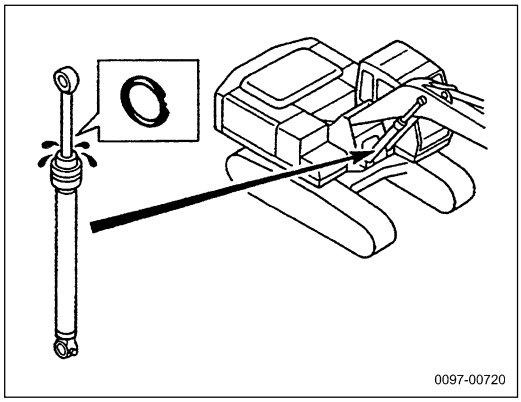
(10) Beware of highly pressurized oil

- Hydraulic oil or reduction gear oil at high pressure can cause serious skin and eye injuries.
  Before cutting or opening a hydraulic pipe, always relieve the pressure inside it.
- Oil leakage may not be visible to the eye, so check with thick paper or wood-shavings. Do not detect oil leakage by naked hand or finger.
- Wear protective goggles to protect your eyes.
- If oil penetrates your skin, consult a doctor well experienced immediately.



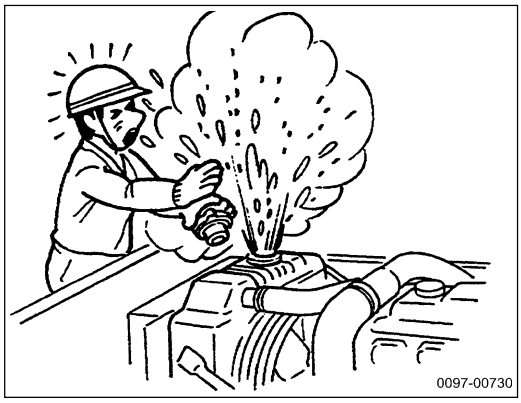
(11) Precautions on replacing seals etc.

- After you remove an O-ring or other seal, wash the surfaces on which it was fitted before you fit the replacement.
- Before you fit an O-ring or other seal, check that it is undamaged and cover it with a film of oil. If you find a defective seal of any kind, do not use it because it could cause oil leakage.



(12) Be careful when you open the radiator cap

- When the radiator coolant is hot, it could spray out dangerously when you take the radiator cap off, possibly causing burns.
- If you have to take the radiator cap off, wait until the coolant has had time to cool and slowly loosen the cap to allow pressure to dissipate before you remove it. Check the coolant level and top up with the coolant from the reserve tank.



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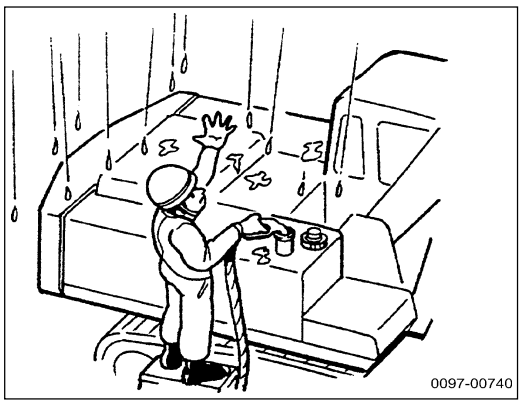
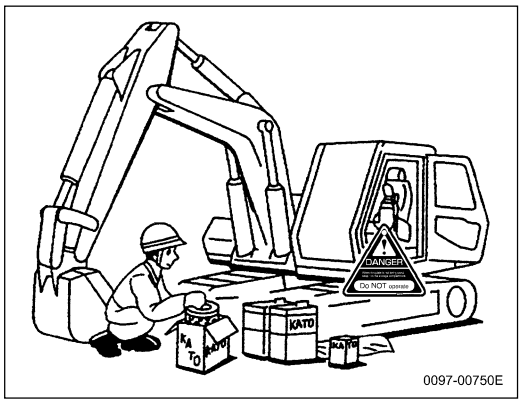
(13) Do not allow water to enter when you top up with oil

When you are topping up with fuel or hydraulic oil or replacing hydraulic oil, take care to avoid the entry of water or dust. If water gets in, it will cause corrosion and breakdowns.



(14) Use genuine KATO or KATO-approved lubricants and filters

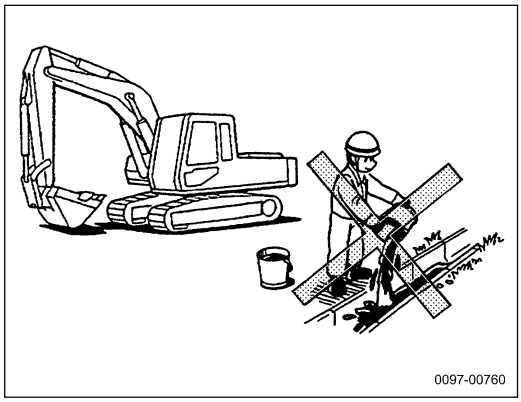
- When you top up or replace with lubricants or replace parts such as filters etc., always use genuine KATO or KATO-approved products.
- If you use any products which are not made or approved by KATO, we will not be in any way liable for resultant accidents or breakdowns.



(15) Dispose of waste oil carefully

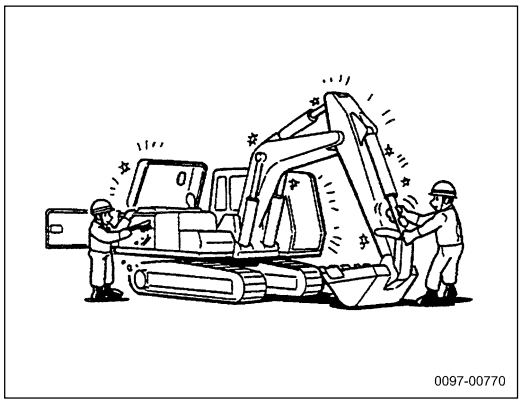
- If you dispose of waste oil, used filters and other waste products of the machine carelessly, you will cause environmental pollution.
- When you drain waste oil from the hydraulic equipment or oil reservoir, catch it in a proper container.

  Waste oil is environmentally harmful. Dispose of it thoughtfully.
- Never allow it to pour onto the ground or dump it in streams, rivers or wetlands.
- Follow the relevant regulations when you dispose of oil, fuel, coolant, brake fluid, solvents, filters, batteries or any other hazardous or potentially hazardous materials.



(16) Always keep cleanliness in mind when you handle the hydraulic equipment, engine or electrical parts.

The hydraulic equipment, engine and electrical parts are precisely adjusted. Always do your best to work cleanly.



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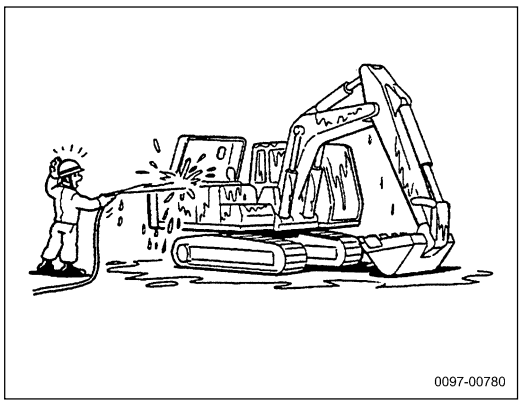
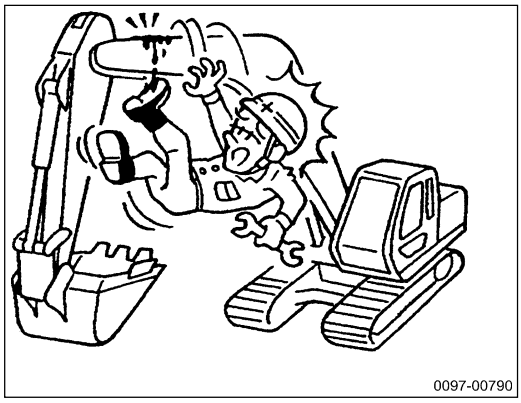
(17) Precautions when washing the machine

- While washing the machine, you may lose your footing and fall down, so wear slip-resistant boots while washing the machine. If you are using high-pressure steam for cleaning, the jet can cut your skin and mud etc. can splash back into your eyes. Wear all appropriate protective equipment when using high-pressure steam.
- If you spray water on electrical equipment during washing, it could break down or malfunction, so work carefully to avoid wetting the electrical equipment.

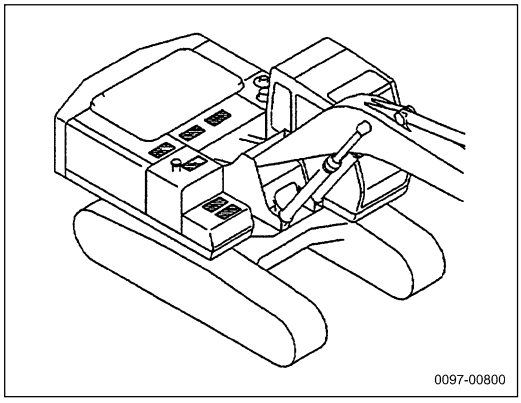


(18) Precautions when working in high places

- When you are working in high places, take precautions to avoid falling off.
  Keep the area you are standing on tidy (no tools scattered around) and clean (wipe off any spilled oil or grease), and walk carefully to avoid slipping.
- When climbing and descending, use the hand grips and platforms and always keep yourself adequately supported on at least three points at any time. Wear a safety harness and other safety equipment as necessary.

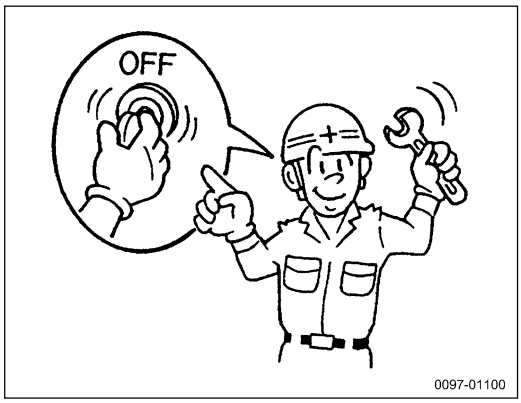


(19) Precaution when climbing on the machine
Always step on the areas with a non-slip treatment.



(20) Stop the engine before inspection and servicing

- It is dangerous to inspect and service the machine while it is moving.
- Always stop the engine before you start work unless the task you are about to perform needs the machine to be moving.



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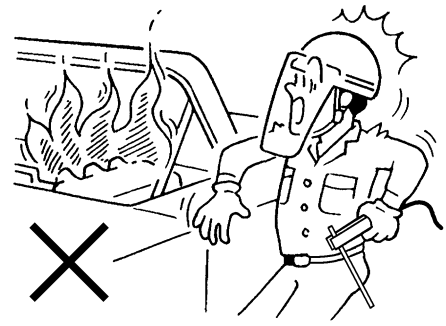
(21) Servicing with the engine running is a job for two people

- Avoid servicing the machine while it is working if at all possible.
- If it is unavoidable, work with at least two people. One of you must be in the operator's seat to be able to stop the engine at any time and all those involved must be in constant contact.
- If you work near rotating parts, take care not to be trapped or dragged in.

7070-03430

(22) Precautions when welding

- There is a risk of fire when welding due to possible damage to electrical equipment or generation of gas from hot paint.
- Employ a qualified welder for the job and carry it out in a properly equipped place.


7070-03442

The following are basic precautions before welding.

- Turn the starter switch to OFF.
- Disconnect the negative side of the battery cable from the terminal.
- Cut away the paint from the area to be welded so that it cannot produce gas.
- Attach an earth connection within one meter of the weld point with no O-rings or bearings between the weld and earth points.
- Always wear protective equipment and make sure the ventilation is adequate.
- Remove flammable materials and place a fire extinguisher nearby.

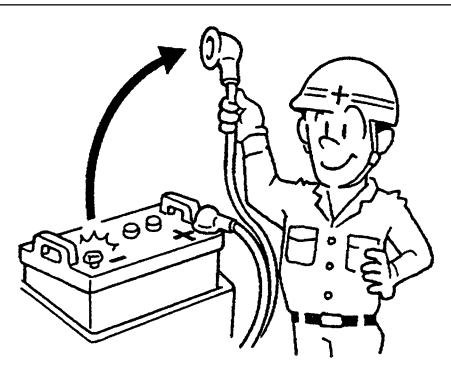
(8570-0081-1E)

⚠ CAUTION

If you don't turn the starter switch to OFF and disconnect the negative side of the battery cable from the terminal before welding, the electrical or electronic equipment could malfunction or the batteries could explode dangerously.

(23) Detach the battery cable

- When servicing any part of the electrical system or when welding, there is the risk that a short circuit could occur and place load on the batteries. The batteries generate flammable gas causing the risk of an explosion. The battery electrolyte is dilute sulfuric acid which will burn skin on contact.
- Damage to the batteries is extremely dangerous, so always remove either of the battery cables before servicing any part of the electrical system or welding. (Always disconnect the battery cable from the negative terminal.)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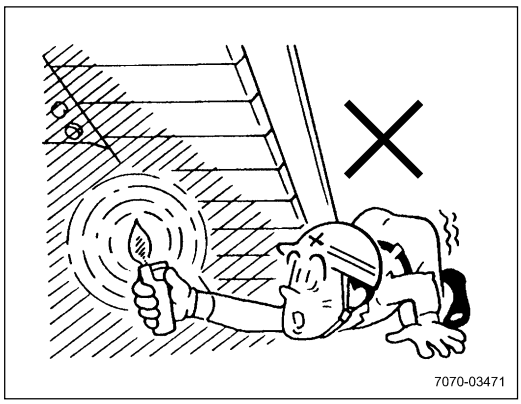
(24) The equipments are hot immediately after the engine stops

- The equipments are hot immediately after the engine stops, so you could be burned if you touch them. In particular the engine, silencer, oil reservoir, coolant, radiator, sliding parts, hydraulic equipment, pipes etc. will be very hot.
- Wait for all parts to cool before you begin inspection and servicing.

(25) Illumination

- If you are working in poor light, you cannot see well enough what you are doing, so you could injure yourself.
  Before operation, prepare illumination enough to light the working place.
- Do not use a lighter or other flame in place of a lamp to light dark places. You could start a fire or cause an explosion by igniting gas generated by the battery.
- Use an explosion-preventive type of lamp when looking at the battery or fuel.



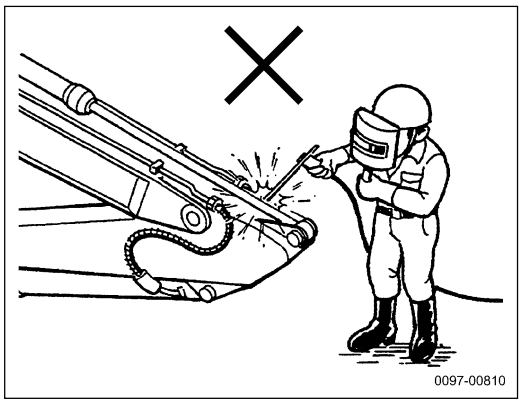
(8270-0160-1E)

⚠ CAUTION

The power socket for the lighter on the dashboard in the cab can be used as the 24V power source for up to 5A.

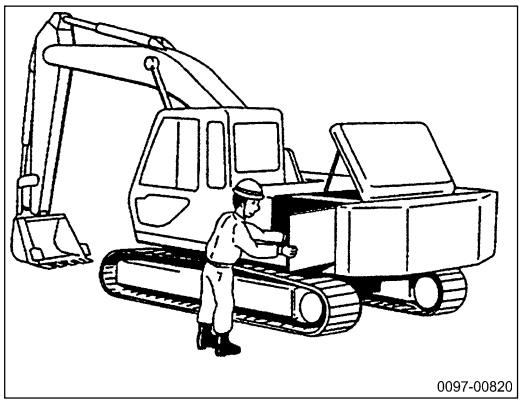
(26) Do not heat hydraulic equipment or pipes

- If you heat hydraulic equipment or pipes or areas near them, it could generate and ignite flammable vapour or smoke.
  Avoid welding, soldering or heating with a torch near hydraulic equipment or pipes.
- If you directly heat pressurized pipes or rubber hoses, they may rupture suddenly.



(27) Lock all inspection covers

- If you leave the inspection covers open, they can swing shut suddenly when the wind blows and trap fingers etc.
- When you open an inspection cover or cab door, always use the stopper to lock it securely in the fully open position.
  When there is a strong wind, do not open the door or covers.



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4. Safety parts for periodic replacement (9370-0001-1E)

For the long-term safe operation of the machine, we ask you to inspect and service it regularly. However it is difficult to evaluate the lifespan of parts by external visual inspection, so certain important parts such as the parts related to a fire should be replaced at set intervals regardless of their apparent condition. If inspection and servicing reveals any abnormality whatever in these parts, replace them even before their regulation time.
Ask your authorised KATO dealer to carry out the replacement of these safety parts.

Safety parts list
Fuel system: Every 2 years or 4000 hours of operation, whichever reaches sooner.
- Fuel hose (fuel tank－engine, fuel filter－injection pump, fuel pump related)

Hydraulic system: Every 2 years or 4000 hours of operation, whichever reaches sooner.
- Pump suction hose (oil reservoir－hydraulic pump)
- Pump discharge hose (hydraulic pump－control valve, tail hose)
- Line hose for swing motor (control valve－swing motor)
- Line hose for boom cylinder (control valve－boom cylinder)
- Line hose for arm cylinder (control valve－boom piping, boom piping－arm cylinder)
- Line hose for bucket cylinder (control valve－boom piping, boom piping－bucket cylinder)

Cooling system: Every 2 years or 4000 hours of operation, whichever reaches sooner.
- Heater hose (engine－heater)

Inside the engine compartment: Every 5 years
- Sound absorbing material (urethane)

Others: Every 3 years
- Seatbelt

You must also inspect hydraulic hoses and fuel hoses during the following regular inspections.

Inspection interval	Inspection item
Preoperational inspection	・ Oil leakage from the joints and caulked sections of fuel or hydraulic hoses
Monthly inspection	・ Oil leakage from the joints and caulked sections of fuel or hydraulic hoses ・ Damage to fuel or hydraulic hoses (cracks, wear, tearing)
Yearly inspection	・ Oil leakage from the joints and caulked sections of fuel or hydraulic hoses ・ Interference, collapse, deterioration, twisting, damage (cracks, wear, tearing) to fuel or hydraulic hoses

(857E-0001-0E)

⚠ CAUTION (8270-0064-1E)

1. Replace O-rings, gaskets etc. at the same time as you replace hoses.
2. If you find deformation or cracking of hose clamps when you inspect or replace hoses, you should also replace the affected clamps.

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5. Inspection and servicing table (947V-0004-3E)

Follow the "Inspection and servicing table" to carry out the correct inspection and appropriate servicing necessary for safe and efficient work.

⚠ CAUTION (8270-0161-2E)

- The intervals stated in the inspection and servicing table are based on the elapsed time indicated by the hour meter.
  Follow both the passage of dates and of hours of operation and carry out each inspection item when one of the times is reached, whichever occurs sooner.
- If you discover any damage, breakdown or malfunction, repair it immediately. Do not leave it for later and do not start work before it is repaired.
- For the inspection and replacement methods for the engine, refer to the separate engine manual.
- The inspection intervals for this machine are based on standard operations and working conditions.
  Under severe conditions, the inspection and replacement intervals should be shortened accordingly.
- If any method or interval of inspection and servicing is unclear, contact your authorised KATO dealer.

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☆ ····· First oiling/inspection/replacement after delivery of a new machine
○ ····· Normal operation
*1 ····· Every 2 years or 2000 hours of operation
*2 ····· When using KATO recommended hydraulic oil: Every 2000 hours of operation
When using NIPPON OIL HYRANDO WIDE KV32, KV46 or KV68: Every 5000 hours of operation
*3 ····· When replacing the hydraulic oil
*4 ····· Every 5 years

EO ····· Engine oil
GO ····· Gear oil
EG ····· Extreme-pressure bearing grease
SG ····· Chassis grease

	Part	Inspection location and service task	Task	When defective	Daily		Weekly or 60h	Monthly or 100h	Every 250h	Every 6 months or 500h	Yearly or 1000h	Oil Part to change	Reference section	
					Pre-operational	Post-operational							Instruction manual	Service manual
Engine-related	Engine and engine mounting	Does the engine start well?	Inspect		○							—	3-4 6-1	—
		Exhaust gas color	Inspect		○							—	5	—
		Abnormal noise on starting, running or stopping	Inspect		○							—	5	—
		Stopping behavior	Inspect			○						—	3-4 6-7	—
		Slack in the exhaust pipe or silencer	Inspect		○							—	5	D, 1-2-1
		Loose wires, short circuits, breakage	Inspect		○							—	5	—
		Loose or missing attachment bolts	Inspect		○							—	5	D, 1
		Cylinder head retightening	Inspect							○		—	Separate engine manual	
		Valve clearance adjustment	Inspect					☆			○	—	Separate engine manual	
		Measurement of compression pressure	Inspect								○	—	Separate engine manual	
		Fan belt slack	Inspect		○							—	5	D, 1-4
		Starter motor turning torque	Inspect								○	—	Separate engine manual	
		Alternator electricity generation	Inspect		○							—	Separate engine manual	
		Water pump	Grease							○		—	Separate engine manual	
		Sound absorbing material	Inspect		○							—	—	D, 1-2-4
			Replace								*4	—	—	D, 1-2-4
	Oil pan	Engine oil	Check oil level		○							—	5 4-1-2	D, 1-3
			Replace				☆			○		EO	Separate engine manual	
		Oil filter	Replace				☆			○		Filter element	Separate engine manual	
	Radiator	Radiator core, fin and tank	Inspect and clean					○				—	4-1-5	D, 1-2-3
		Coolant	Check coolant level		○							—	5 4-1-5	D, 1-2-3
			Replace								*1	Coolant	4-1-5	D, 1-2-3
		Cracks and damage to hoses of the cooling system	Inspect		○							—	5	D, 1-2-3

(947S-0046-3E)

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	Part		Inspection location and service task	Task	When defective	Daily: Pre-operational	Daily: Post-operational	Weekly or 60h	Monthly or 100h	Every 250h	Every 6 months or 500h	Yearly or 1000h	Oil Part to change	Reference section: Instruction manual	Reference section: Service manual
Engine-related	Air cleaner element			Clean						○			—	4-1-3	D, 1-2-2
				Replace								○	Element	4-1-3	D, 1-2-2
	Fuel system	Fuel tank		Check oil level		○							—	5	—
				Drain water and settled particles							○		—	4-1-6	H, 3-3-2
				Clean the cap strainer								○	—	1-6	—
		Water separator		Inspect		○							—	5 4-1-4	H, 3-3-4
				Drain water	○								—	4-1-4	H, 3-3-4
		Fuel filter		Replace				☆			○		Element	Separate engine manual	
Hydraulic system-related	Oil reservoir		Hydraulic oil	Check for contami-nation					○				—	4-2-1 4-2-3	—
				Check oil level		○							—	5 4-2-1 4-2-3	E, 4-2-1
				Drain water					○				—	——	
				Replace								*2	Hydraulic oil	4-2-3	E, 4-2-1
			Suction strainer	Clean								*3	—	4-2-5	E, 4-1-7
				Replace	○								Strainer, O-ring	4-2-5	E, 4-1-7
			Return filter	Replace					☆ 150h		○		Element	4-2-6	E, 4-1-8
	Pipe and hose		Oil leakage, swelling, perishing, injuries	Inspect		○							—	5 4-2-1	E, 4-1-1
	Drain filter			Replace					☆ 150h			○	Cartridge	4-2-7	E, 4-1-9
	Pilot line filter			Replace								○	Element	4-2-9	E, 4-1-11
	Air breather		Element	Replace								○	Element	4-2-4	E, 4-1-6
	Cylinder		Oil leakage	Inspect		○							—	5 4-2-1	Separate 805152E
			Responsivity	Inspect		○							—	5 4-2-1	Separate 805152E
			Internal leakage	Measure							○		—	4-2-1	Separate 805152E
	Hydraulic pump		Oil leakage	Inspect		○							—	5 4-2-1	E, 4-1-1
			Abnormal noise or heat	Inspect		○							—	5 4-2-1	E, 4-1-1
			Attachment bolt	Inspect				○					—	—	E, 4-1-2
			Air extraction		○								—	4-2-2	E, 4-1-3
	Oil cooler		Oil leakage	Inspect		○							—	5 4-2-1	E, 4-1-1
	Rotary seal		Oil leakage	Inspect		○							—	5 4-2-1	Separate 800393E

(937V-0013-1E)

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	Part	Inspection location and service task	Task	When defective	Daily		Weekly or 60h	Monthly or 100h	Every 250h	Every 6 months or 500h	Yearly or 1000h	Oil Part to change	Reference section	
					Pre-operational	Post-operational							Instruction manual	Service manual
Hydraulic system-related	Hydraulic valve	Oil leakage	Inspect		○							—	5 4-2-1	—
		Relief valve and brake valve function	Inspect					○				—	—	E, 3
		Control valve function	Inspect					○				—	—	E, 3
Travel-related	Carrier roller	Wear, deformation	Inspect					○				—	—	I, 2-2
		Attachment bolt	Inspect					○				—	—	I, 2-2
		Oil leakage	Inspect		○							—	5 4-3-2	I, 2-2
			Oil	○								EO	4-3-2	I, 2-2
	Track roller	Wear, deformation	Inspect					○				—	—	I, 2-3
		Attachment bolt	Inspect					○				—	—	I, 2-3
		Oil leakage	Inspect		○							—	5 4-3-1	I, 2-3
			Oil	○								EO	4-3-1	I, 2-3
	Driving tumbler	Wear, deformation	Inspect					○				—	—	I, 2-6
		Attachment bolt	Inspect					○				—	—	I, 2-6
	Track shoe	Tension	Inspect and adjust		○							SG	5 4-3-4	I, 2-1
		Cracked links	Inspect					○				—	—	I, 2-1
		Worn pins	Inspect					○				—	—	I, 2-1
		Loose bolts	Inspect					○				—	—	I, 2-1
	Traveling motor reduction gear	Abnormal noise on traveling	Inspect		○							—	5 4-2-1	E, 4-1-1
		Reduction gear oil	Check oil level						○			—	4-3-5	I, 2-6-4
			Replace							☆	○	GO	4-3-5	I, 2-6-4
	Front idler	Wear	Inspect					○				—	—	I, 2-4
		Oil leakage	Inspect		○							—	5 4-3-3	I, 2-4
			Oil	○								EO	4-3-3	I, 2-4
	Brake action	While traveling	Inspect		○							—	5	—
		While parked	Inspect		○							—	5	—
	Traveling frame	Cracks and damage	Inspect					○				—	——	

(857V-0014-3E)

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	Part		Inspection location and service task	Task	When defective	Daily		Weekly or 60h	Monthly or 100h	Every 250h	Every 6 months or 500h	Yearly or 1000h	Oil Part to change	Reference section	
						Pre-operational	Post-operational							Instruction manual	Service manual
Swing-related	Swing motor reduction gear			Check oil level						○			—	4-4-1	H, 2-5
				Replace						☆		○	GO	4-4-1	H, 2-5
				Grease						☆		○	EG	3-3-2	—
	Swing gear	Bearing	Abnormal noise on swinging	Inspect		○							—	5	H, 3-1
			Ball contact surface	Grease					○				EG	3-3	A, 6-3
		Gear tooth surface	Wear, damage	Inspect								○	—	3-3-1	H, 3-1
			Pinion	Grease							○		EG	3-3-1	A, 6-3
Front attachment-related	Swing brake action			Inspect		○							—	——	
	Bucket		Bucket pin	Grease		○							EG	5 3-3	A, 6-3
			Cylinder pin (rod and bottom ends)	Grease					○				EG	3-3	A, 6-3
			Deformation, cracks	Inspect		○							—	5	G, 2-1-2
			Worn points	Inspect or replace					○				Point	4-5-1	G, 2-1-7
			Wear and looseness of the side cutters	Inspect or replace		○							Side cutter	5 4-5-2	G, 2-1-8
	Boom		Bending, cracks	Inspect					○				—	5	G, 2-3
			Foot pin	Grease		○							EG	5 3-3	A, 6-3
			Cylinder pin (bottom end)	Grease		○							EG	5 3-3	A, 6-3
			Cylinder pin (rod end)	Grease					○				EG	3-3	A, 6-3
	Arm		Bending, cracks	Inspect					○				—	5	G, 2-2
			Boom and arm connection pin	Grease		○							EG	5 3-3	A, 6-3
			Cylinder pin (rod and bottom ends)	Grease					○				EG	3-3	A, 6-3
	Side link pin			Grease					○				EG	3-3	A, 6-3
	Damage or loss of the bolts and nuts which stop the pins			Inspect					○				—	—	G, 2-1 G, 2-2 G, 2-3

(937S-0004-2E)

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	Part	Inspection location and service task	Task	When defective	Daily: Pre-operational	Daily: Post-operational	Weekly or 60h	Monthly or 100h	Every 250h	Every 6 months or 500h	Yearly or 1000h	Oil Part to change	Reference section: Instruction manual	Reference section: Service manual
Electrical system-related	Battery		Check electrolyte volume		○							Battery electrolyte	5 4-6-1	J, 4
			Measure specific gravity						○			—	4-6-1	J, 4
			Clean terminals						○			—	4-6-1	J, 4
	Inside the cab	Horn	Check action		○							—	5	—
		Working lamp	Inspect		○							—	5	J, 5
			Replace	○								Bulb	4-6-3	J, 5
		Interior lamp	Inspect		○							—	5	J, 5
			Replace	○								Bulb	4-6-3	J, 5
		Wiper	Inspect		○							—	5	J, 8
			Replace	○								Blade	4-6-6	J, 8
	Electrical wiring	Condition of insulation and slack	Inspect		○							—	5	—
	Fuse		Replace	○								—	4-6-4	J, 6
	High current fuse		Replace	○								—	4-6-5	J, 7
Cab control system	Control lever and pedal	Actions, play, force for operation	Inspect		○							—	3-2 5	—
	Monitor display		Inspect		○							—	3-3 3-9 5	—
	Meter etc.		Check action		○							—	3-3 5	—
	Seatbelt		Inspect		○						Every 3 years	—	3-1 5	H, 3-5
	Washer fluid		Inspect		○							—	3-10 5	—
			Add	○								—	3-10	—
	Action of the door and cover locks		Inspect		○							—	3-1 5	—
Air conditioner and heater-related	Heater		Inspect		○								3-4 5	—
	Air conditioner	Refrigerant volume	Inspect							○		—	4-7-4	J, 3-3-4
		Belt tension	Inspect and adjust		○							—	5 4-7-5	J, 3-3-5
		Condenser	Inspect		○							—	5 4-7-6	J, 3-3-6
			Clean					○				—	4-7-6	J, 3-3-6
		Filter	Clean and inspect		○							—	5 4-7-3	J, 3-3-3

(947S-0049-3E)

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6. Lubrication (8170-0064-0E)

Lubrication is essential to ensure safety operation and to increase the lifespan of the machine.
Regular lubrication, done properly, preserves the safety and economic performance of hydraulic equipments, smooth operation of each part and reduces wear on rotating and sliding parts.

6-1 Precautions on lubrication (8170-0065-2E)

The value of lubrication is greatly reduced if it is not applied correctly. Observe the following precautions strictly and use correct procedure.

(1) Always follow KATO's instructions and specifications for lubrication. The interval for lubrication is based on the length of time the machine has been in use or the actual hours of operation as indicated by the hour meter inside the cab, whichever interval elapses sooner.
However, the lubrication interval specified by KATO is a guideline based on standard fully hydraulic excavator operating conditions. If the machine is used in harsh conditions, consult your authorised KATO dealer to determine a suitably-reduced lubrication interval.
(2) Correct lubrication requires application of the right lubricant in the right quantity for each point that requires lubrication. Choose the lubricant you are going to use from among the types and brands recommended by KATO for each point and make sure the oil number you select agrees with our selection criteria for the outside temperatures common in the operating region.
(3) Before filling/injecting with any lubricant, clean around the grease nipple, filler hole etc. to avoid the entry of dirt, moisture, etc. with the lubricant.
(4) Work in a clean, dry workplace so that dirt, moisture, etc. do not enter the machine during the lubrication process.
(5) If you use lubricants which have not been recommended by KATO or which do not match the selection criteria, or if you do not observe the lubrication intervals, KATO will not bear any responsibility whatsoever for any resulting failures.

6-1-1 Precautions on greasing (7670-0190-3E)

Greasing reduces wear to sliding and rotating parts, thus prolonging the lifespan of the machine, and it is also essential for their smooth action.
Correctly grease each point as necessary, following the precautions listed below.
Refer to the relevant instruction manuals for details of how to grease the engine-related and attachment-related parts.

(1) When greasing bushes and bearings, expel the old grease and fill completely with new grease.
(2) When greasing the boom foot pin and boom cylinder pins, alternate between the greasing position and the jacked up position and inject grease around each pin.
(3) After greasing the arm and bucket cylinder pin sections, operate each part several times to spread the grease evenly over the entire surface of the pins.
(4) Grease each part with the type of grease specified by KATO for that part.
(5) The specified greasing intervals only apply where the grease types specified by KATO are applied in the appropriate locations correctly. If you have no choice but to use a non-recommended grease, consult your authorised KATO dealer to determine a suitably-reduced greasing interval.

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6-1-2 Precautions on oiling (7670-0191-3E)

Observe the following precautions when oiling.

(1) Replace the oil in each device which requires oiling at the interval specified for each device.
The first oil replacement is particularly important when the machine is new and if this oil change is missed, the lifespan of the device will be drastically reduced. Even more serious consequences such as rapid breakdowns could also result.

(2) Check the oil level in each device which requires oiling at the interval specified by KATO.
If any oil level is too low, top it up with oil of the same type as that currently in use.

(3) When hydraulic oil has been replaced, extract the air from the pump and wait until all bubbles have disappeared from the oil reservoir then run the pump unladen at low speed to expel the air from inside the pipes. If there are air bubbles mixed with the hydraulic oil when you operate the machine, damage to the pump and various other problems will result.

(4) Replace the air breather element and clean the strainer of the suction strainer at the same time as you change the hydraulic oil. If the element or strainer is dirty, the hydraulic equipment will be damaged.

(5) When you have changed or added oil, always wipe away any spilled oil or other residues, then test run the engine and look for any fresh oil leakage.

(6) Order disposal of old oil from a reputable waste disposal company.

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6-2 Recommended lubricants table (817E-0022-2E)

To insure proper operation of this machine, all points which require lubrication must be serviced with the correct lubricants, at proper time interval. All points which require lubrication are shown in the "Greasing chart" and "Oiling chart".

Type \ Maker / Ambient Temp.			Shell	Esso	Mobil	BP	Caltex	NIPPON OIL
Hydraulic Oil (ISO No.)	32 –20°C — 20°C	HO	Tellus ST32	Nuto H32	D.T.E. 24	Energol HLP 32	Rando Oil HD 32	HYRANDO WIDE KV32
	46 –10°C — 30°C		Tellus ST46	Nuto H46	D.T.E. 25	Energol HLP 46	Rando Oil HD 46	HYRANDO WIDE KV46
	68 0°C — 40°C		Tellus ST68	Nuto H68	D.T.E. 26	Energol HLP 68	Rando Oil HD 68	HYRANDO WIDE KV68
	100 5°C — 50°C		Tellus 100	Nuto H100	D.T.E. 27	Energol HLP 100	Rando Oil HD 100	HYRANDO WIDE 100
Gear Oil GL-5 class (API No.)	–20°C — 30°C	GO	Spirax EP 75W-85	Gear Oil GX 80W-90	Mobilube HD 80W-90	Hypogear 80W-90	Multipurpose Thuban 80W-90	———
	0°C — 50°C		Spirax EP 140	Gear Oil GX 85W-140	Mobilube HD 85W-140	EPHypogear 85W-140	Multipurpose Thuban 85W-140	———
Grease	Extreme pressure bearing grease (NLG Ⅰ - Ⅱ)	EG	Alvania EP Grease 2	Beacon EP-2	Mobilux EP-2	EPEnegrease LS-EP2	Multifax EP2	———
	Chassis grease (NLG Ⅰ - Ⅰ)	SG	SAE Standard Grease					
Engine Oil CD, CE class (SAE No.)	–20°C — 20°C	EO	Rimura CT Oil 10W-30	Essolube XD-3 10W-30	Delvac Super 10W-30	Vanellus FE 10W-30	Delo 350 Multigrade 10W-30	Diesel CF/DH-1 10W-30
	–10°C — 40°C		Rimura CT Oil 15W-40	Essolube XD-3 15W-40	Delvac Super 15W-40	Vanellus C3 15W-40	Delo 600 Multigrade 15W-40	Diesel CF/DH-1 15W-40

(857E-0012-2E)

(827E-0039-0E)

⚠ CAUTION

- For replacement with the hydraulic oil which differs in brand from the one in use now, all the oil confined in the hydraulic circuit including the oil reservoir should be replaced.
- The oils and greases recommended above are subject to change due to oil company circumstances. If there is any difference in the above table, consult your authorised KATO dealer or oil dealer.

Note The machine is shipped from the factory with the hydraulic oil conforming to the specification based on the contract filled. Its brand and ISO VG No. are shown on the nameplate attached to the top of the oil reservoir.

Note As can be seen from the above table, hydraulic oil is shown as classified by ISO viscosity grade.

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(1) Selection of the hydraulic oil

Select the hydraulic oil with reference to the ambient air temperature where the machine will be used and the limit temperature for appropriate use of the hydraulic oil.

Namely, hydraulic oil is usable between its limit temperature for appropriate use and the lowest ambient air temperature.

ISO VG No.	32	46	68	100
Ambient air temperature (°C)	–20 — +20	–10 — +30	0 — +40	+5 — +50
Limit temperature for appropriate use (oil temperature °C)	+70	+80	+90	+100

(8270-0167-1E)

Even if the hydraulic oil is of ISO VG No. appropriate to the ambient air temperature, it can exceed the limit temperature for appropriate use (upper limit) depending on the operating conditions. In such cases use the one grade higher VG No. oil.

(2) Selection of the gear oil

Select the gear oil with reference to the ambient air temperature where the machine will be used.

SAE No.	90	140
Operating temperature range (ambient air temperature °C)	less than +30	+30 or more

(8270-0168-0E)

(3) Hydraulic oil operating temperature

The operating temperature has a great impact on hydraulic equipment, so if for example you are using hydraulic oil displaying an ISO viscosity grade number of VG46 listed in the "Recommended lubricants table", pay attention to the following temperature range.

Operating conditions	Temperature range (hydraulic oil)	Action
Hazardous start temperature	–10°C or less	Use oil for cold regions.
Starting and preparation temperature	–10°C — +10°C	Warm-up running
Appropriate operating temperature	30°C — 80°C	
Appropriate operating limit temperature	95°C	Stop the engine to cool it.

(8270-0169-1E)

(8270-0170-1E)

⚠ CAUTION

The hydraulic oil monitor displays a message if the oil temperature goes below 10°C or above 95°C.
If the oil temperature is low, carry out the enough warm-up running.

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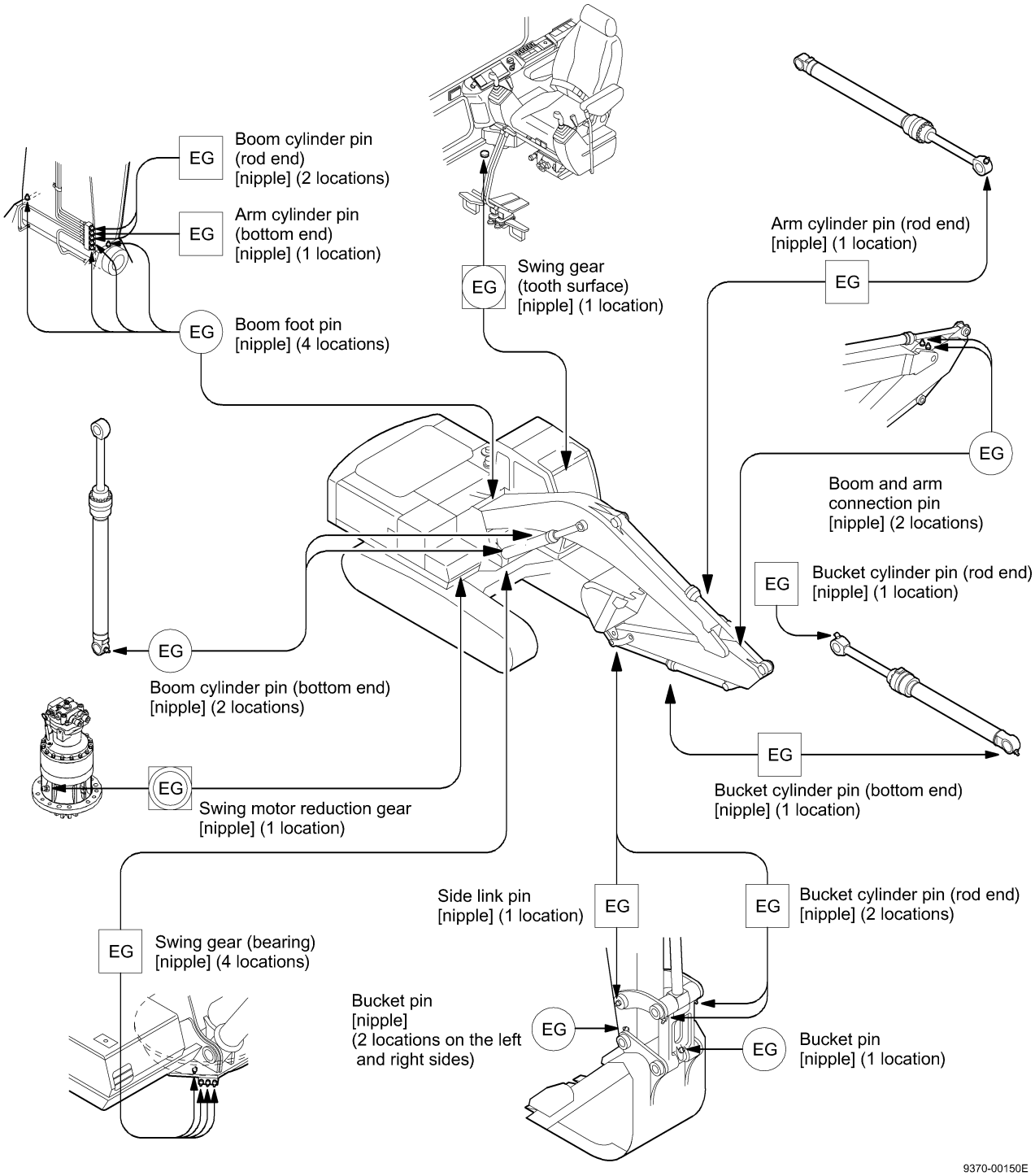
6-3 Greasing chart (8270-0044-0E)

○ ····· Daily
□ ····· Every 100 hours
◯ ····· Every 500 hours
◎ ····· Every 1000 hours

Symbol	Type
EG	Extreme-pressure grease (lithium type)



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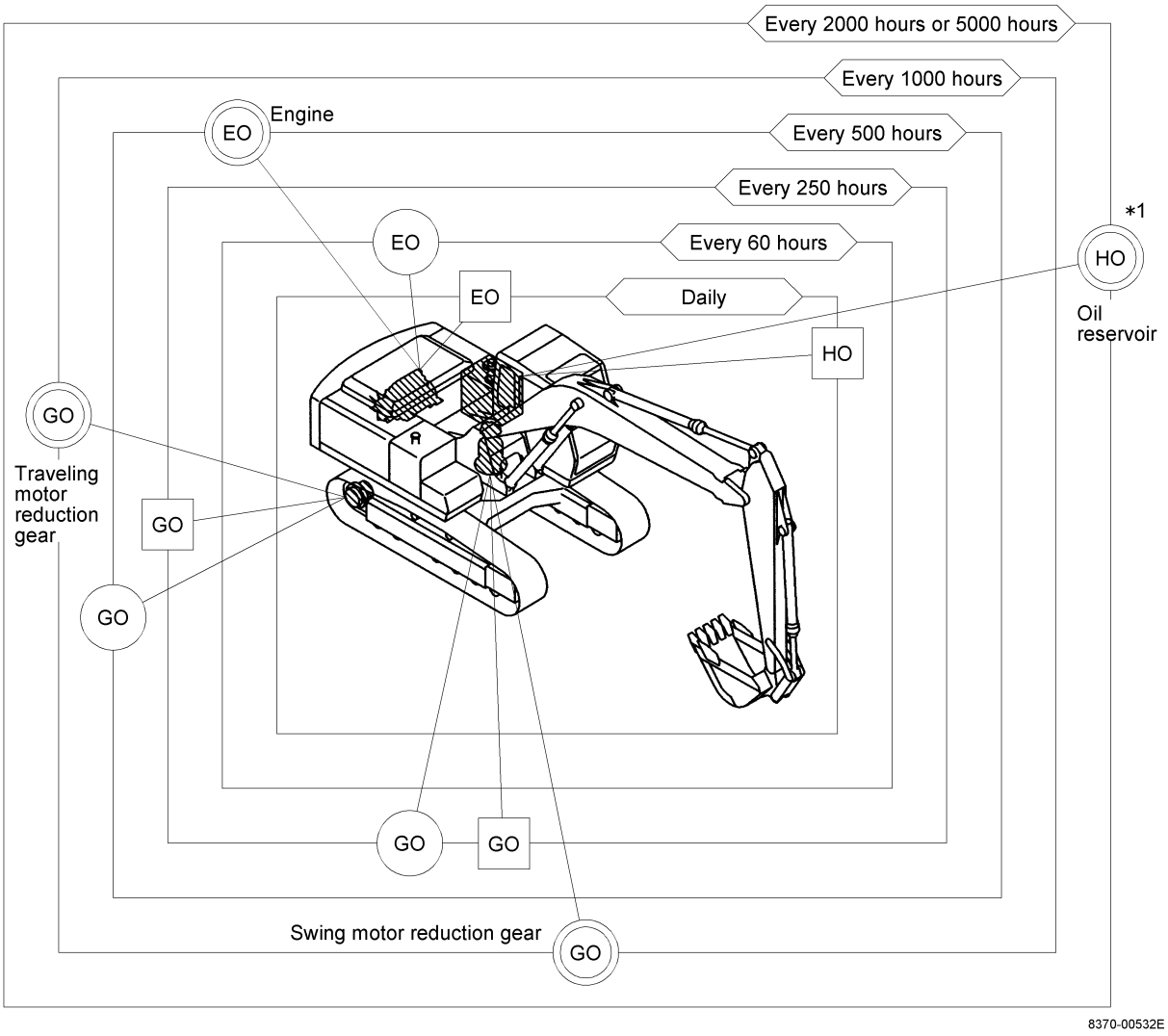
6-4 Oiling chart (7670-0128-1E)

GO	Gear oil
HO	Hydraulic oil
EO	Engine oil

□	Inspection and topping up
○	Replacement for a new machine
◎	Replacement



*1 When using KATO recommended hydraulic oil: Every 2000 hours of operation
When using NIPPON OIL HYRANDO WIDE KV32, KV46 or KV68:
Every 5000 hours of operation

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7. Tightening torque table (0097-0022-0E)

7-1 Tightening torque for meter screw standard bolt (0097-0023-0E)

[Standard] Units: N・m (kgf・m)

Nominal	Pitch	4.6	7T (reference)	8.8	10.9	12.9
M6	1.00	4 (0.4)	8 (0.8)	10 (1.0)	15 (1.5)	17 (1.7)
M8	1.25	9 (0.9)	18 (1.9)	24 (2.5)	35 (3.6)	41 (4.2)
M10	1.50	18 (1.8)	37 (3.7)	48 (4.9)	73 (7.5)	85 (8.7)
M12	1.75	31 (3.2)	67 (6.8)	87 (8.9)	127 (13.0)	149 (15.2)
M14	2.00	52 (5.3)	106 (10.9)	139 (14.2)	204 (20.8)	238 (24.3)
M16	2.00	81 (8.3)	166 (16.9)	217 (22.1)	318 (32.5)	371 (37.9)
—	—	—	—	—	—	—
M20	2.50	159 (16.2)	324 (33.0)	423 (43.2)	621 (63.4)	725 (74.0)
M24	3.00	274 (28.0)	560 (57.1)	731 (74.6)	1073 (109.5)	1254 (127.9)
—	—	—	—	—	—	—
M30	3.50	546 (55.8)	1116 (113.8)	1456 (148.6)	2139 (218.2)	2498 (254.9)

(541D-0152-0E)

[Fine] Units: N・m (kgf・m)

Nominal	Pitch	7T (reference)	8.8
—	—	—	—
M8	1.00	20 (2.0)	26 (2.7)
M10	1.25	42 (4.2)	54 (5.5)
M12	1.25	74 (7.5)	96 (9.8)
M14	1.50	116 (11.8)	151 (15.4)
M16	1.50	179 (18.2)	233 (23.8)
M18	1.50	260 (26.5)	339 (34.6)
M20	1.50	363 (37.1)	474 (48.4)
M24	2.00	617 (62.9)	805 (82.1)
M27	2.00	896 (91.3)	1169 (119.3)
M30	2.00	1248 (127.3)	1629 (166.3)

(541D-0176-0E)

7-2 Tightening torque for designated bolt (8570-0096-0E)

Regarding tightening torques for the bolts related to the track shoe, swing gear, engine mounting and counterweight, abide by the values shown below.

Track shoe	N・m (kgf・m)		843 (86)
Swing gear	N・m (kgf・m)		533 (54.4)
Engine mounting	N・m (kgf・m)	Front	373 (38)
		Rear	
Counterweight	N・m (kgf・m)		1289 (131.5)

(9370-0027-0E)

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7-3 Tightening torques for hydraulic and pneumatic related joints (0097-0024-1E)

(1) The tolerance for the torque values is ±10%.

(2) The unit for the torque values is N・m (kgf・m).

(3) Never allow oil to adhere on the threads or the rotating section of the nut.

(4) When tightening, secure the socket with a spanner so that it does not rotate along with the joint with the female threads.

(5) Joint with O-ring (made of steel) Units: N・m (kgf・m)

Screw size (G)			1/8	1/4	3/8	1/2	3/4	1	1 1/4	1 1/2	2
Width across faces (mm)			14	19	22	27	36	41	50	55 (60)	70
Tightening torque	Seating surface material	Steel	25 (2.5)	39 (4)	64 (6.5)	98 (10)	167 (17)	206 (21)	255 (26)	294 (30)	588 (60)
		Aluminum	15 (1.5)	25 (2.5)	49 (5)	59 (6)	118 (12)	137 (14)	153 (16)	176 (18)	352 (36)

(541D-0154-0E)

(6) Taper pipe screw (reference values) Units: N・m (kgf・m)

Screw size (R)			1/8	1/4	3/8	1/2	3/4	1	1 1/4	1 1/2
Width across faces (mm)			14	19	22	27	36	41	50	55 (60)
Tightening torque	Seating surface material	Steel	22 (2.2)	36 (3.6)	59 (6)	88 (9)	157 (16)	196 (20)	225 (23)	255 (26)
		Aluminum	15 (1.5)	25 (2.5)	49 (5)	59 (6)	118 (12)	137 (14)	146 (15)	165 (17)

(541D-0155-0E)

(7) Hose joint (Type C, R) Units: N・m (kgf・m)

Screw size (G)			1/8	1/4	3/8	1/2	3/4	1	1 1/4	1 1/2	2
Width across faces (mm)			14	19	22	27	36	41	50	55 (60)	70
Tightening torque	Seating surface material	Note 1	34.5MPa				27.5MPa	20.5MPa	17.0MPa	10.5MPa	
		Steel Note 2	15 (1.5)	25 (2.5)	34 (3.5) / 49 (5)	64 (6.5)	132 (13.5) / 157 (16)	196 (20)	225 (23)	255 (26)	316 (32) / 412 (42)
		Note 3	10.5MPa				—	—	—	—	—
		Brass	9 (0.9)	13 (1.3)	21 (2.1)	33 (3.4)					

(541D-0156-2E)

[Note 1] Indicates the application pressure (based on the maximum pressure used for the joint provided in JIS B 8363).

[Note 2] The values in the lower row indicate the torque values stipulated for HD models (corresponding to the maximum pressure used 34.5MPa).

[Note 3] Indicates the application pressure.

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(8) Adapterless piping (rolled screw type) Units: N·m (kgf·m)

Screw size (G)		1/4	3/8	1/2	3/4	1
Width across faces (mm)		12	15	19	24	30
Tightening torque	Schedule 80	25 (2.5)	49 (5)	59 (6)	118 (12)	137 (14)
	Schedule 40	23 (2.3)	44 (4.5)	54 (5.5)	108 (11)	137 (14)

(541D-0157-0E)

(9) Flare nut (made of steel) Units: N·m (kgf·m)

Outer diameter of tube (mm)			4.76	6.35	8.0	10.0	12.0
Screw size			M10×1.0	M12×1.0	M14×1.5	M16×1.5	M20×1.5
Width across faces (mm)			14	17	19	22	27
Tightening torque	Seating surface material	Steel	16 (1.6)	20 (2)	34 (3.5)	44 (4.5)	69 (7)
		Brass	9 (0.9)	12 (1.2)	25 (2.5)	33 (3.4)	52 (5.3)

(541D-0158-1E)

(10) Split flange (flange head joint)

1) SAE standard (Type I) Units: N·m (kgf·m)

Inner diameter indication		08	12	16	20	24	32
Hose size		1/2	3/4	1	1 1/4	1 1/2	2
Inner diameter of hose (mm)		12.7	19.0	25.4	31.8	38.1	50.8
Recommendable pressure used MPa (kgf/cm²)	Type I	34.5 (350)			24.0 (245)	20.5 (210)	
Tightening torque		23 (2.3)	34 (3.5)	41 (4.2)	54 (5.5)	70 (7.1)	80 (8.1)
Bolt used (001-105)		M8×1.25	M10×1.5	M10×1.5	M10×1.5	M12×1.75	M12×1.75

(857S-0105-0E)

2) SAE high pressure (Type Ⅱ, Ⅲ) Units: N·m (kgf·m)

Inner diameter indication		08	12	16	20	24	32
Hose size		1/2	3/4	1	1 1/4	1 1/2	2
Inner diameter of hose (mm)		12.7	19.0	25.4	31.8	38.1	50.8
Recommendable pressure used MPa (kgf/cm²)	Type Ⅱ	34.5 (350)			—	—	—
	Type Ⅲ				34.5 (350)		
Tightening torque		23 (2.3)	39 (4)	59 (6)	88 (9)	167 (17)	275 (28)
Bolt used (001-105)		M8×1.25	M10×1.5	M10×1.5	M12×1.75	M16×2.0	M18×2.5

(857S-0106-1E)

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(11) Piping flange Units: N・m (kgf・m)

Bolt used (001-105)			M8×1.25	M10×1.5	M12×1.75	M16×2.0
Tightening torque	Seating surface material	Steel	23 (2.3)	59 (6)	88 (9)	167 (17)
		Aluminum Note 1	—	—	34 (3.5)	—

(541D-0178-0E)

[Note 1] Refers to the attachment flange of the return filter.

(12) Attachment for hydraulic and pneumatic equipments Units: N・m (kgf・m)

Screw size	M6	M8	M10	M12	M14	M20
Tightening torque	10 (1)	23 (2.3)	59 (6)	78 (8)	167 (17)	275 (28)

(541D-0179-0E)

(8270-0231-0E)

⚠ CAUTION

- After the first 50 hours of use of a new machine and every month thereafter inspect and retighten the bolts.
- When tightening, clean off any corrosion, earth and debris.

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8. Judgement of the time for servicing (817S-0007-4E)

Judgement of the time for disassembly and servicing varies according to several factors and requires a high degree of technical judgment and observation. For example, for a given device the degree of wear undergone by the parts comprising the device varies widely according to such factors as the quality of daily servicing, skill of handling and nature of operation, suitability of lubricating oil and hydraulic oil used, frequency of replacement of the oils, and environmental conditions on site. In general the method we use to judge the time for servicing is to judge the degree of wear of hydraulic equipment on the basis of limit of use dimensions of each part drawn from past experience and records and the degree of deterioration of the hydraulic oil. An alternative method is to carry out servicing at fixed intervals based on the number of hours the machine is used. With either of the above methods, it is necessary to work with due consideration of the following points.

(1) Before you start to disassemble and service the machine, test it in operation and carefully inspect its external appearance. Record your observations in a book kept for the purpose.

(2) Make sure you fully understand the parts you are going to disassemble and what the work involves. Prepare all the necessary spare parts and tools.

(3) Evaluate hydraulic equipment from its surroundings and external appearance, and if nothing appears to be wrong with it, do not take it apart.

(4) The table below lists points to check in the visual inspection of hydraulic equipment.

Inspection item	Inspection method	Evaluation guidelines	Action
Externally visible abnormalities	Visual	There should be no dents or cracks. There should be no corrosion or peeling of paint or plating.	Repair immediately if the problem appears likely to affect performance. Otherwise repair when you carry out the regular inspection.
Externally visible dirt or oil leakage	Visual	Dirt buildup should not be excessive. There should be no oil leakage.	Clean away any excessive dirt buildup.
Level of oil in the oil reservoir	Visual	Should be within correct level range.	Replenish oil where necessary.
Oil contamination	Visual	Check for blockages in strainers and filters.	Investigate the nature of any contamination and replace oil where necessary.
Vibration, noise or abnormal sounds	By eye, touch and hearing	Should be as normal.	If vibration or noise is greater than usual or there is an abnormal sound, find the cause and repair it.
Excessive temperature rise	Touch cautiously with your hand or use a thermometer.	Should be as normal.	If temperature is higher than usual, find the cause and repair it.
Pressure maintenance	From the dial of the pressure gauge	The needles of every pressure gauge should be indicating normal pressure. There should be no major fluctuations in pressure.	Repair if pressure variations are larger than usual.

(767S-0230-1E)

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8-1 On-site method for hydraulic oil evaluation (817S-0008-4E)

Evaluate the condition of hydraulic oil by examining the amount and type of material in the filters during regular inspections, and in the oil reservoir, drained oil etc. in the event of a breakdown.

(1) Discoloration of hydraulic oil

Sample oil regularly in the same way as for evaluation of oil deterioration and leave it undisturbed for a long time to settle.

1) If you can see precipitates at the bottom of the oil, contamination is severe and the oil should be replaced or filtered.
2) If there is discoloration other than darkening or browning, i.e. if the transparency of the oil has changed, investigate for contaminants in a testing laboratory.

(2) Filter blockage

1) If filters blockages occur frequently, you may assume that the oil is heavily contaminated.
2) Take oil from inside the filter case (drain oil) in a transparent container and check for precipitates after allowing a long time for them to settle.

(3) When you disassemble equipment

1) When you have discovered dirt inside disassembled valves, you may assume that the oil is heavily contaminated. However, in the first six months of use of a new machine, this is often due to inadequate flushing and does not necessarily indicate contamination of the entire volume of hydraulic oil.
2) If any pump is seized or abnormally worn, it is possible that the oil is contaminated with a large quantity of abrasive particles. Investigate the oil using filtration and magnetic analysis etc.
3) If you find any material which could have been produced by corrosion in valves and pipes, investigate it using magnetic analysis.
4) If you discover any point where contaminants could have entered the hydraulic oil, for example where the top of the oil reservoir or the filler cap has been left open or a gasket is defective, investigate the oil. Do the same if the air breather element (the ventilation hole filter) is deformed.

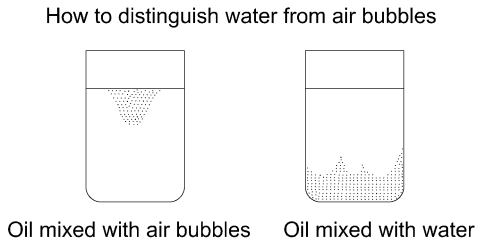
(4) Oil reservoir drain

Open the flange in the top of the oil reservoir and draw some oil from the center of the reservoir. Place it in a transparent container. If the quantity of precipitates is high, clean the inside of the oil reservoir or filter the oil.

(5) If the oil in the reservoir is turbid (a milky appearance), evaluate using the following method.

1) Place the hydraulic oil in a long, narrow transparent container and leave it undisturbed to settle.
2) Evaluation

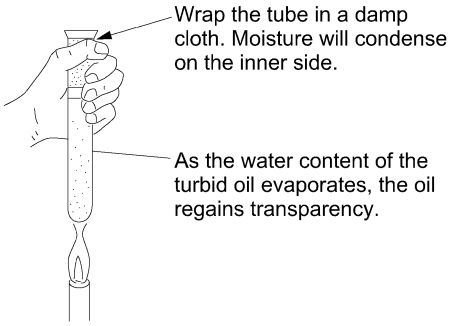
・ If the milkiness is due to air bubbles, it will clear gradually from the bottom up over a period of 1－2 hours.



707S-00011E

https://truckmanualshub.com/

- If the oil is contaminated with water, it will only clear to a few percent of its depth from the top down over a period of 24 hours. If the milkiness is due to water, replace it immediately.



How to test for turbidity in oil due to water
707S-00021E

8-2 When to disassemble hydraulic equipment (817S-0009-0E)

8-2-1 Hydraulic pump (767S-0205-0E)

(1) When the pump gets hot abnormally quickly in use.
(2) When abnormal noises are generated inside the pump.
(3) When the pump's flow rate is reduced.

8-2-2 Hydraulic cylinder (767S-0206-0E)

(1) When a considerable quantity of oil is leaking from the head section.
(2) When operation is hampered by slow response speed.
(3) When stick slip occurs frequently.

8-2-3 Valves etc. (767S-0207-0E)

(1) When the volume of oil leakage becomes large.
(2) When abnormal noise occurs when the valves are operated and the temperature rises.
(3) When the spool does not move correctly.

8-2-4 Hydraulic motor (767S-0208-1E)

(1) When the efficiency of the motor falls.
(2) When the motor casing becomes unusually hot.
(3) When the oil leaks from the motor output shaft.

The above are guidelines for judging when disassembly and servicing is required, but the causes of abnormal noise, heat generation etc. could lie in other parts of the hydraulic circuit (cavitation etc.). There could even be multiple causes (oil contamination, air mixture, filter blockage etc.) and a comprehensive evaluation is required to understand the symptoms.

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8-3 Judgement of the time for servicing each part (817S-0010-2E)

8-3-1 Slewing table (767S-0209-0E)

(1) When an inspection of the parts with the boom foot bearing sections, welded joints, etc. on the slewing table reveals any cracks, deformation or other damage.

8-3-2 Traveling frame (767S-0210-1E)

(1) When the degree of wear on the teeth of the driving tumbler exceeds the allowable limit, when the degree of deddendum wear exceeds the allowable limit, or when overall wear is extreme. Also when there is a crack or deformation.

(2) When wear on the outer surface of the front idler, wear in the clearance between the shaft and the bush, between the shaft and the bearing or in the bearing itself exceeds the allowable limit. Also when there is a crack or deformation.

(3) When wear on the outer surfaces of the carrier and track rollers, in the clearance between the shaft and the bush or elsewhere exceeds the allowable limit. Also when there is a crack or deformation.

(4) In the track shoe system, when there is wear to the shoes, wear to the links, wear in the clearance between bushes and links, wear between pins and links or elsewhere which exceeds allowable limits. Also when there is a crack or deformation.

(5) When an inspection of the parts with bearing attachment sections, welded joints, etc. on the traveling frame reveals any cracks, deformation or other damage.

8-3-3 Front attachment and related parts (767S-0211-1E)

(1) When the clearance between the pin and the bearing surface exceeds the allowable limit.

(2) When an inspection of the parts with bearing sections, welded joints, etc. on the boom, arm and bucket reveals any cracks, deformation or other damage.

8-3-4 General precautions concerning servicing (767S-0212-1E)

(1) Premature wear of the engine, hydraulic equipment and units is mainly due to the penetration of dust and grit. The key to preventing the entry of dust and grit and other foreign bodies to these parts is of course daily servicing with attention to the air cleaner, fuel filter and oil filter but detached parts and tools must also be kept clean.

(2) Correct daily inspection and servicing coupled with prompt and appropriate treatment of any problems as they arise will prevent the occurrence of major accidents and breakdowns, prolong the life of the machine and reduce running costs.

(3) When disassembly and inspection is necessary, decide before you start which parts must be taken apart and what tools will be required.

(4) Key points of safe repair work

You must have a good idea of the weight of the parts and units you are going to dismount. It is dangerous to carelessly dismount a heavy part or place it unsteadily. When you lift a heavy object with a jack or crane, you should quickly support it with a stand or trestle. Use crane sling ropes with care.

You must also use the right tools for the parts you have to disassemble.

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(937V-0004-1E)

B Specifications

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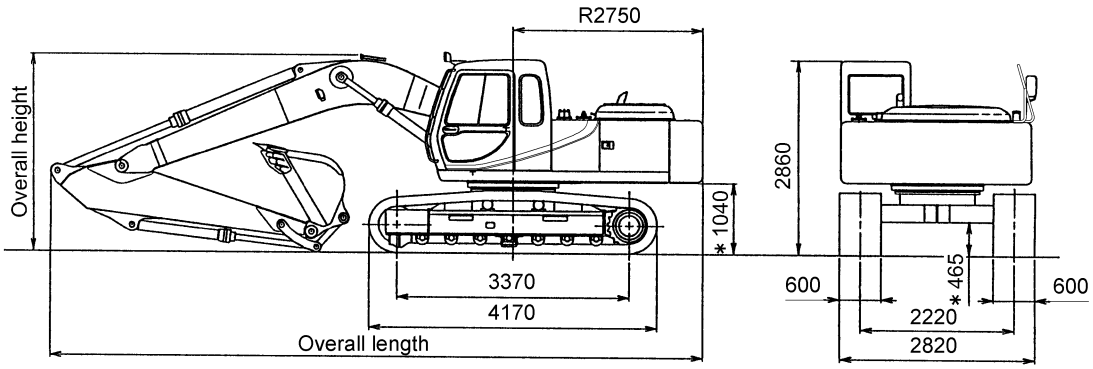
1. External views (9370-0002-0E)

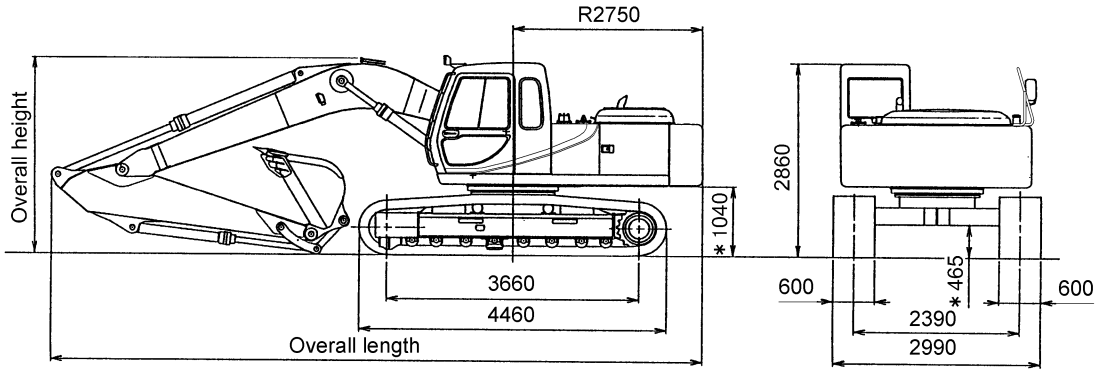
HD820Ⅲ



∗ These dimensions do not include the projection of shoe plates.

9370-00431E

HD820Ⅲ-LC



∗ These dimensions do not include the projection of shoe plates.

9370-00441E

	Short arm		Standard arm		Long arm	
	STD	LC	STD	LC	STD	LC
Overall height (mm)	2950	2950	2910	2910	3110	3110
Overall length (mm)	9510	9510	9500	9500	9530	9530

(8370-0059-0E)

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2. General data (8270-0002-0E)

Name		KATO HY-DIG Fully Hydraulic Excavator	
Model		HD820Ⅲ	HD820Ⅲ-LC
Operating weight		19500kg	20300kg
Dimensions	Overall length (in transport position)	9500mm	
	Overall height (in transport position)	2910mm	
	Overall width	2820mm	2990mm
	Minimum ground clearance	465mm	
	Tail swing radius	2750mm	
	Track shoe width	600mm	
Engine	Name	Mitsubishi 6D34-TLE2A, diesel engine	
	Type	4-cycle, water cooled, inline, direct injection, exhaust turbocharged with intercooler	
	Number of cylinders- bore × stroke	6-104mm×115mm	
	Total displacement	5.86L	
	Rated output	110kW/2050min^{-1} (150PS/2050rpm)	
	Maximum torque	580N･m/1400min^{-1} (59kgf･m/1400rpm)	
Hydraulic system	Hydraulic pump	Variable piston pump×2 + gear pump	
	Swing motor	Fixed displacement piston motor	
	Traveling motor	Variable piston motor×2	
Hydraulic cylinders	Boom cylinder	2	
	Arm cylinder	1	
	Bucket cylinder	1	
Hydraulic oil	Total oil volume	260L	
Fuel tank	Capacity	320L	
Operation performance	Swing speed	13.5min^{-1} (13.5rpm)	
	Traveling speed	5.5/3.6/2.5km/h	
	Grade ability	70%	

(9370-0003-1E)

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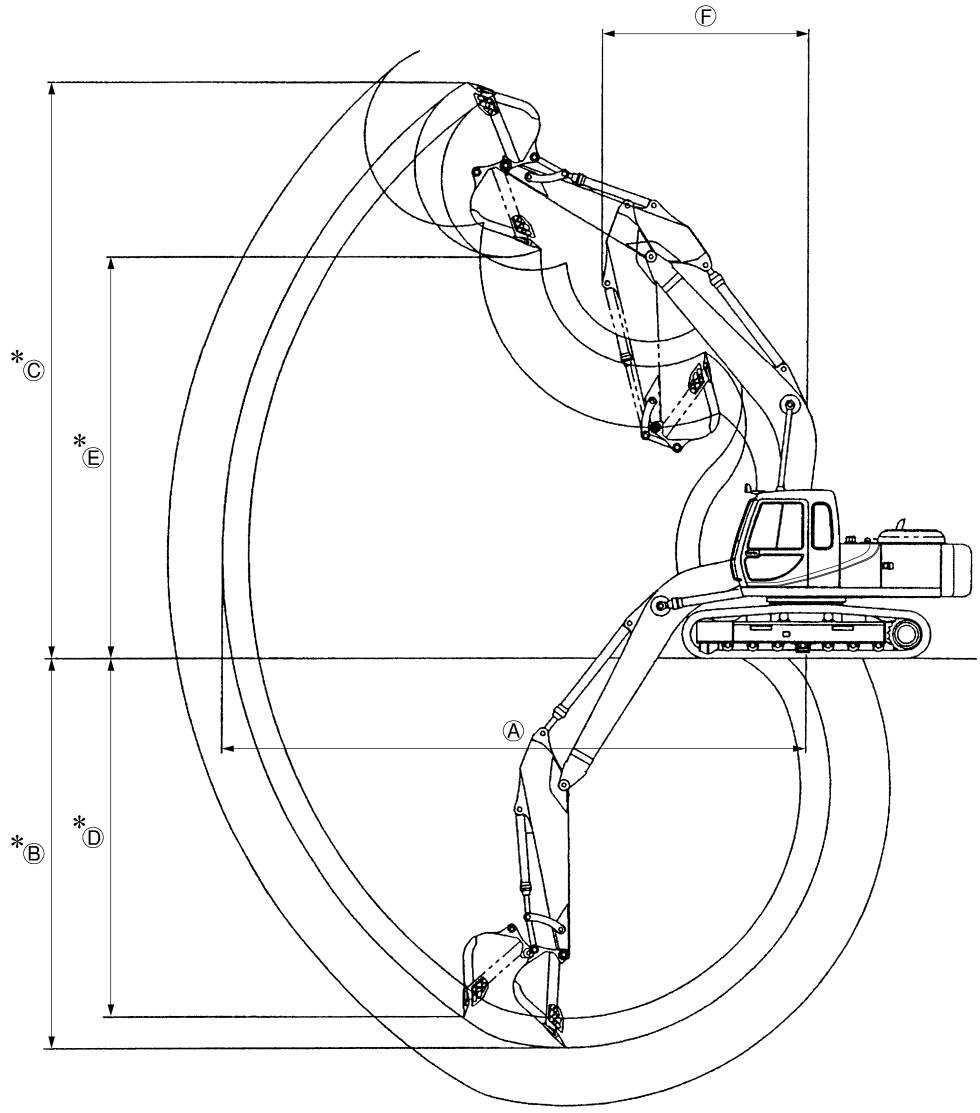
3. Working range (847V-0018-0E)

3-1 Standard back-hoeing (847V-0019-0E)



* These dimensions do not include the projection of shoe plates.

9370-00450E

	Short arm	Standard arm	Long arm
A. Maximum digging radius (mm)	9470	9910	10840
B. Maximum digging depth (mm)	6210	6700	7700
C. Maximum digging height (mm)	9550	9760	10300
D. Maximum vertical wall (mm)	5640	6120	7150
E. Maximum dumping height (mm)	6620	6830	7340
F. Minimum swing radius (mm)	3590	3460	3400

(8370-0061-2E)

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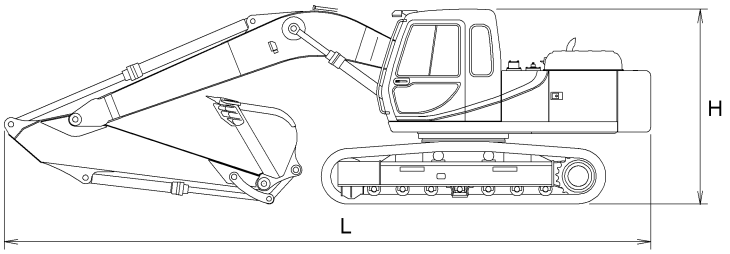
4. Dimensions and weight (937S-0104-0E)

(1) Machine body

	STD	LC
Overall length (L) × overall height (H) × overall width (W) (mm)	9500×2910×2820	9500×2910×2990
Weight (ton)	19.5	20.3

(8370-0068-2E)

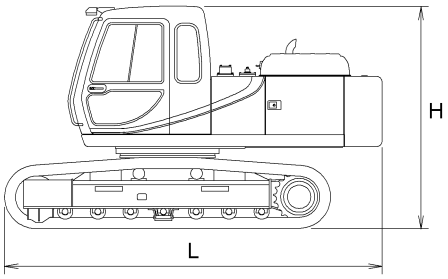


937S-00901

(2) Superstructure + lower structure

	STD	LC
Overall length (L) × overall height (H) × overall width (W) (mm)	4840×2860×2820	4980×2860×2990
Weight (ton)	15.7	16.5

(937S-0141-2E)

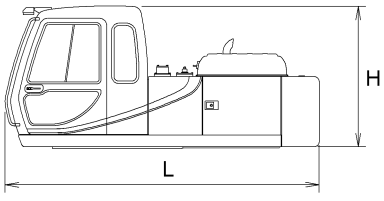


937S-00882

(3) Superstructure

Overall length (L) × overall height (H) × overall width (W) (mm)	4030×1830×2780
Weight (ton)	8.5

(937S-0140-1E)



937S-00871

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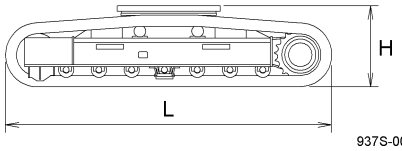
(4) Lower structure

	STD	LC
Overall length (L) × overall height (H) × overall width (W) (mm)	4170×1040×2820	4460×1040×2990
Weight (ton)	7.2	7.9

(937S-0142-1E)

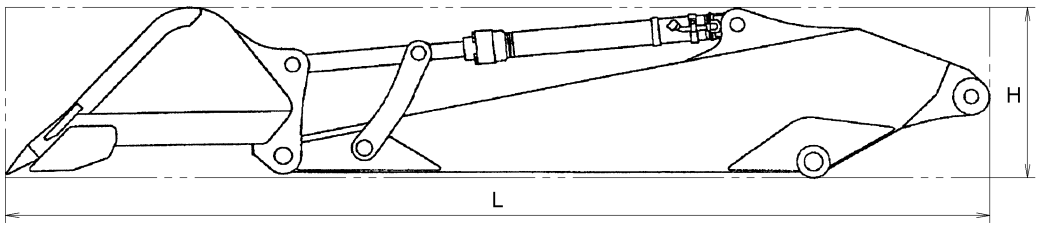


937S-00891

(5) Arm + bucket dimensions and weight

Combination	2.43m arm + 0.9m³ bucket	2.93m arm + 0.8m³ bucket	3.92m arm + 0.55m³ bucket
Overall length (L) × overall height (H) × overall width (W) (m)	4.94×1.04×1.30	5.44×0.93×1.13	6.43×0.93×0.91
Weight (kg)	1710	1700	1790

(9370-0028-0E)

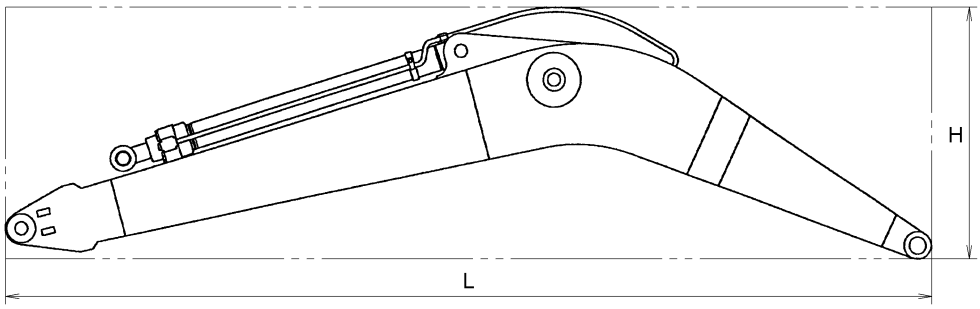


7070-02461

(6) Boom dimensions and weight

	5.63m boom
Overall length (L) × overall height (H) × overall width (W) (m)	5.82×1.51×0.62
Weight (kg)	1630

(9370-0036-0E)



7070-02471

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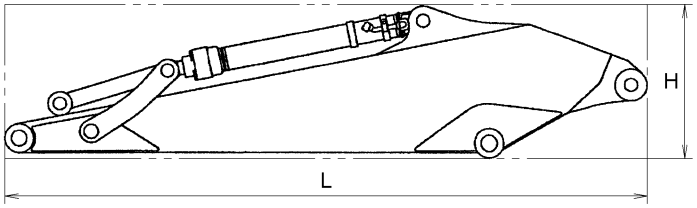
(7) Arm dimensions and weight

Arm length	2.43m	2.93m	3.92m
Overall length (L) × overall height (H) × overall width (W) (m)	3.49×1.04×0.44	3.99×0.93×0.44	4.98×0.85×0.44
Weight (kg)	950	1010	1170

(9370-0037-0E)



7070-02481

(8) Dimensions and weight of optional attachments

[ ]: Reinforced type

Type	Backhoe bucket			
Overall length (L) × overall height (H) × overall width (W) (m)	1.60×1.22×0.76	1.60×1.22×0.91	1.60×1.22×1.13	1.60×1.22×1.30
Weight (kg)	520	570	640 [740]	710 [790]
Bucket capacity (m^3)	0.45	0.55	0.8	0.9

(9370-0038-2E)

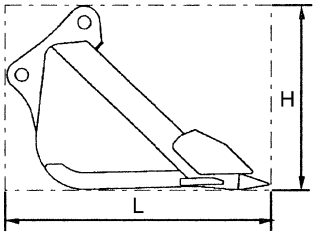
Type	Backhoe bucket		Dredging bucket	Skeleton bucket
Overall length (L) × overall height (H) × overall width (W) (m)	1.60×1.22×1.38	1.60×1.22×1.40	1.10×1.12×2.40	1.60×1.23×1.40
Weight (kg)	760	760	770	920
Bucket capacity (m^3)	1.0	1.1	0.65	—

(9370-0039-2E)

Type	Rock bucket	Ripper	Slope-forming bucket
Overall length (L) × overall height (H) × overall width (W) (m)	1.75×1.53×0.76	1.24×0.75×0.51	1.25×1.09×2.0
Weight (kg)	1080	440	980
Bucket capacity (m^3)	0.7	—	—

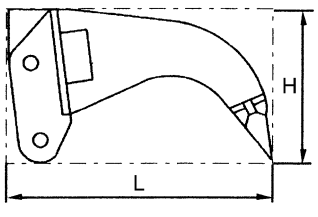
(9370-0040-1E)

・Backhoe bucket
・Dredging bucket
・Skeleton bucket
・Rock bucket



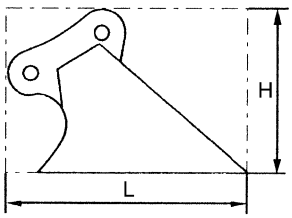
7070-02491

・Ripper



7070-02501

・Slope-forming bucket



7070-02511

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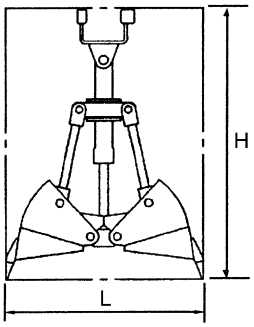
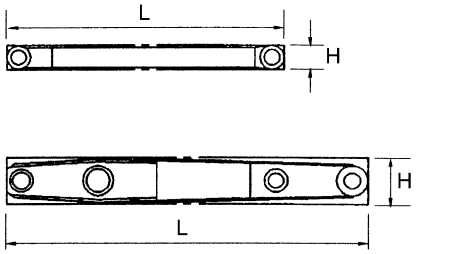
Type	Clamshell bucket	Extension arm
Overall length (L) × overall height (H) × overall width (W) (m)	1.84×2.58×0.79	Body 2.125×0.280×0.632 Extension bar 1.635×0.160×0.305
Weight (kg)	1070	520
Bucket capacity (m^3)	0.5	—

(8370-0082-0E)



7070-04160



7070-04170

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MEMO

https://truckmanualshub.com/

C Layout and circuit diagram of equipment

1. Part names ····· 39
1-1 Exterior ····· 39

2. Hydraulic circuit diagram ····· 43

3. Electrical circuit diagram ····· 45

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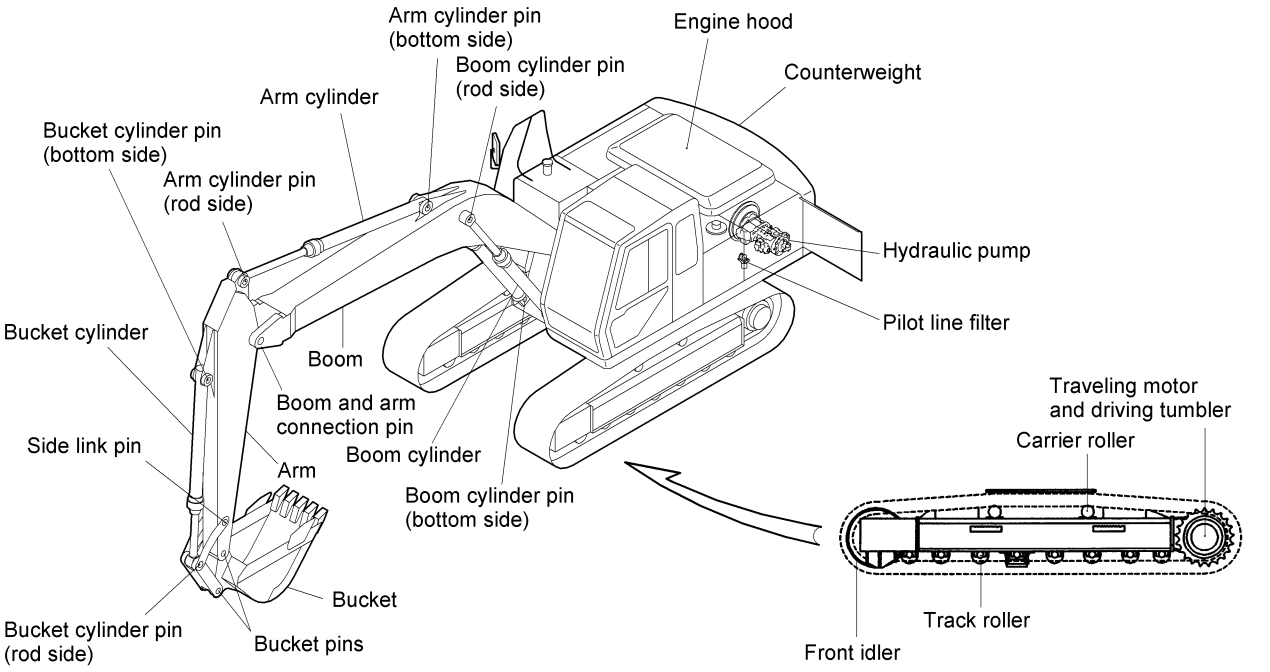
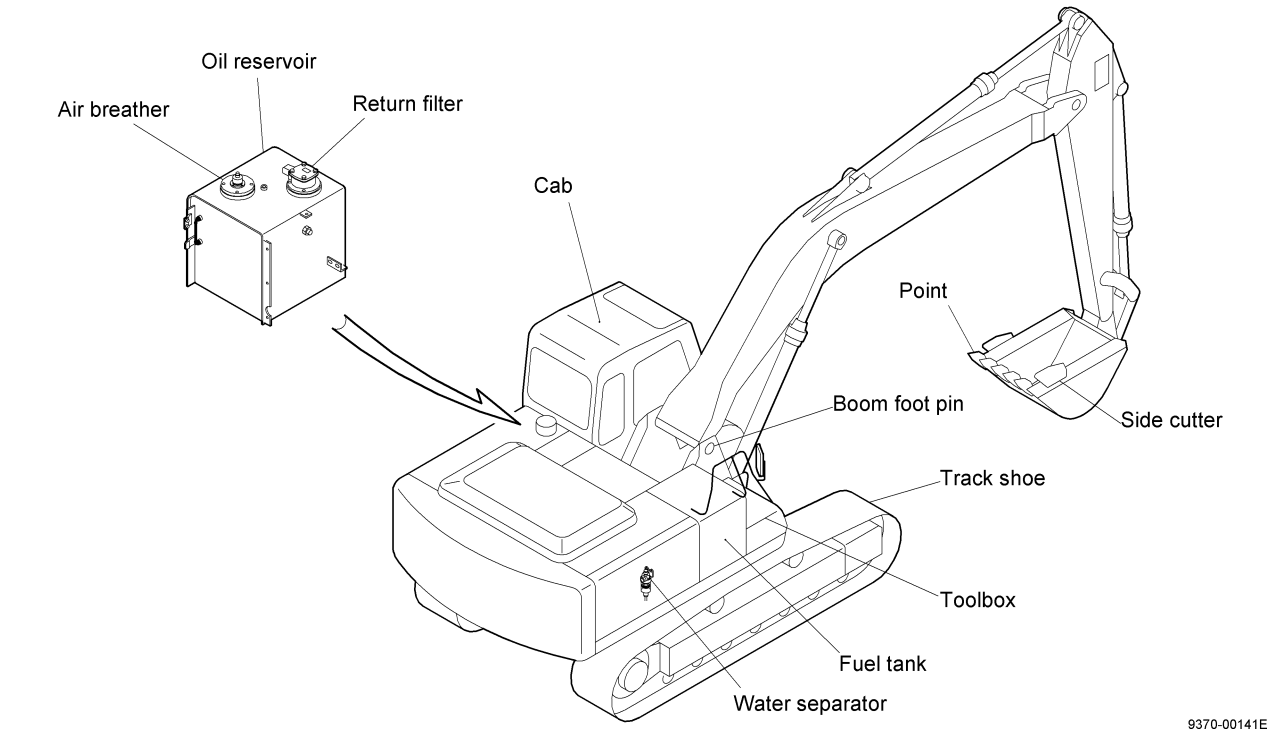
1. Part names (7670-0097-1E)

1-1 Exterior (7670-0165-0E)





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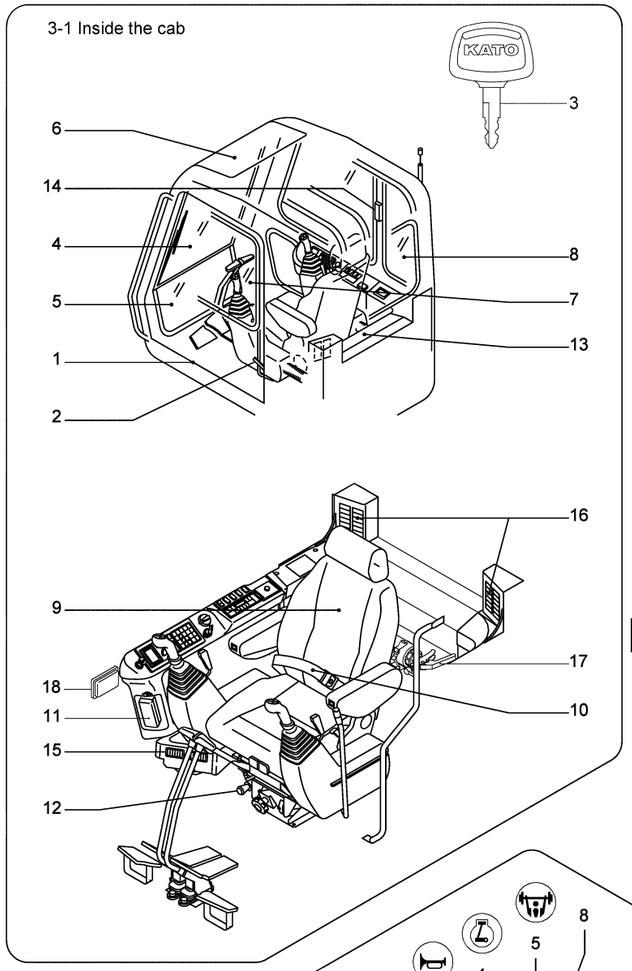
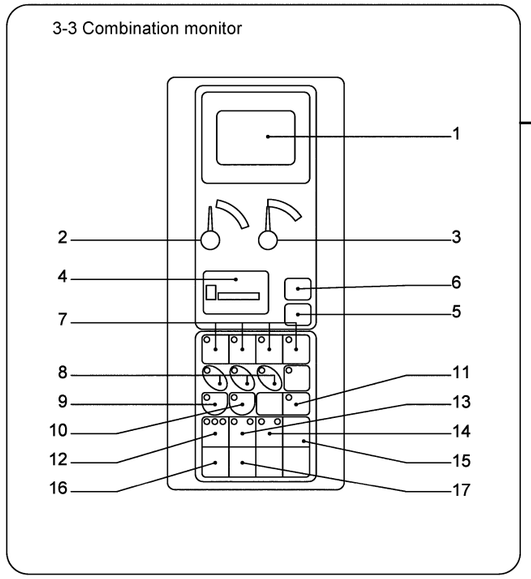
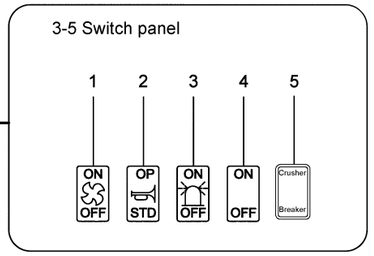
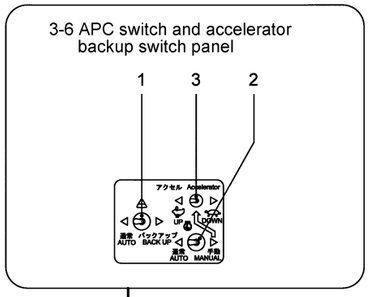
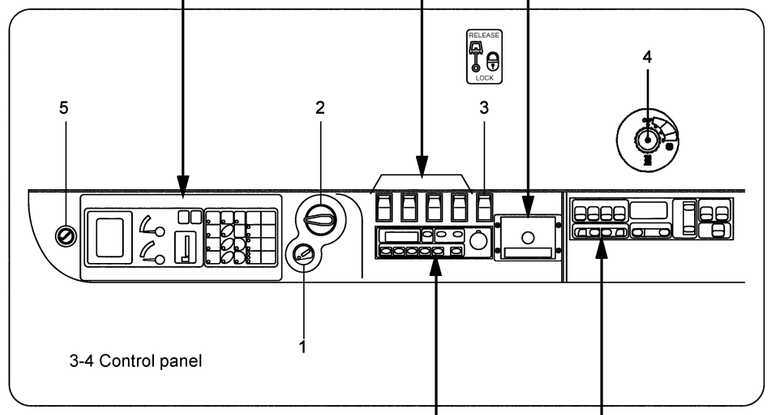
1-1-1 Inside the cab (937S-0008-3E)

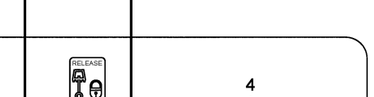












917E-00950E

3-1 Inside the cab
1. Door
2. Door lock release lever
3. Key
4. Front window
5. Front lower window
6. Roof window
7. Left window
8. Rear window
9. Operator's seat
10. Seatbelt
11. Fuse box
12. Engine stop button
13. Hot & cool box/glove box (optional)
14. Interior lamp
15. Grille (for defroster)
16. Grille (for air conditioner)
17. Fire extinguisher (optional)
18. Ash tray

3-2 Control levers
1. Safety lock lever
2. Console lock levers
3. Horn switch
4. Quick accelerator switch
5. High power switch
6. Traveling control levers
7. Left control lever
8. Right control lever

3-3 Combination monitor
1. Monitor display
2. Engine water temperature gauge
3. Fuel gauge
4. Hour meter
5. Engine preheater indicator lamp
6. Caution lamp
7. Work mode selection switch
8. APC mode selection switch
9. Auto-slow switch
10. Econo mode switch
11. Buzzer stop switch
12. Traveling mode selection switch
13. Working lamp switch
14. Windscreen wiper switch
15. Windscreen washer switch
16. Monitor brightness control switch
17. Monitor selection switch

3-4 Control panel
1. Starter switch
2. Accelerator dial
3. Swing lock release switch
4. Heater switch (optional)
5. Lighter

3-5 Switch panel
1. Cab fan switch (optional)
2. Horn selection switch (optional)
3. Swing warning lamp switch (optional)
4. Travel link alarm switch (optional)
5. Breaker/crusher selection switch (optional)

3-6 APC switch and accelerator backup switch panel
1. APC switch
2. Accelerator backup switch
3. Manual accelerator switch

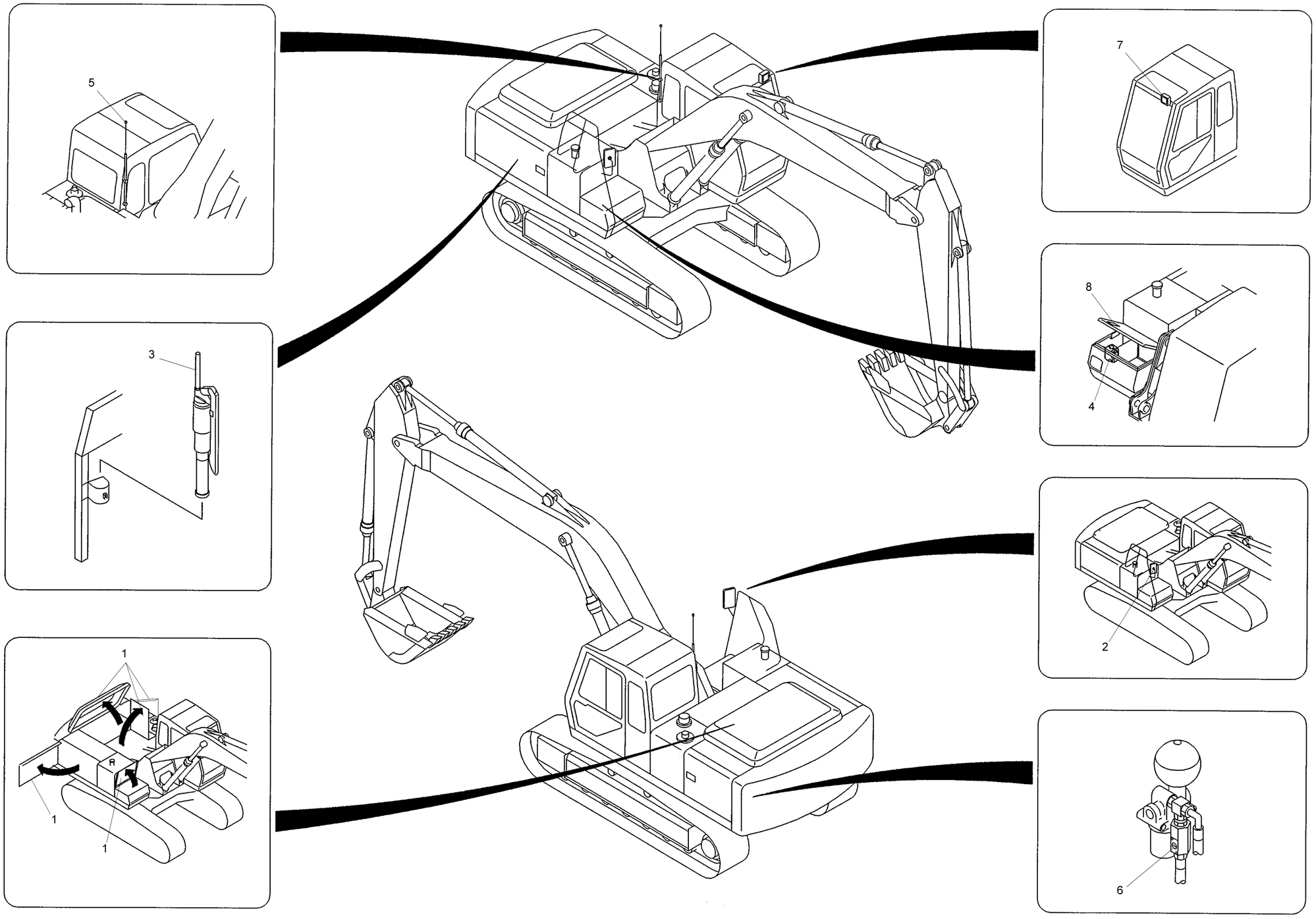
3-7 Radio

3-8 Air conditioner control panel

For details of this page	
☞	Refer to the instruction manual.

https://truckmanualshub.com/

1-1-2 Outside the cab (937S-0141-0E)



3-10 Outside the cab
1. Cover/hood
2. Mirror
3. Grease pump
4. Washer tank
5. Aerial
6. Shockless valve adjustment screw
7. Working lamp
8. Toolbox

9370-00332

For details of this page	
☞	Refer to the instruction manual.

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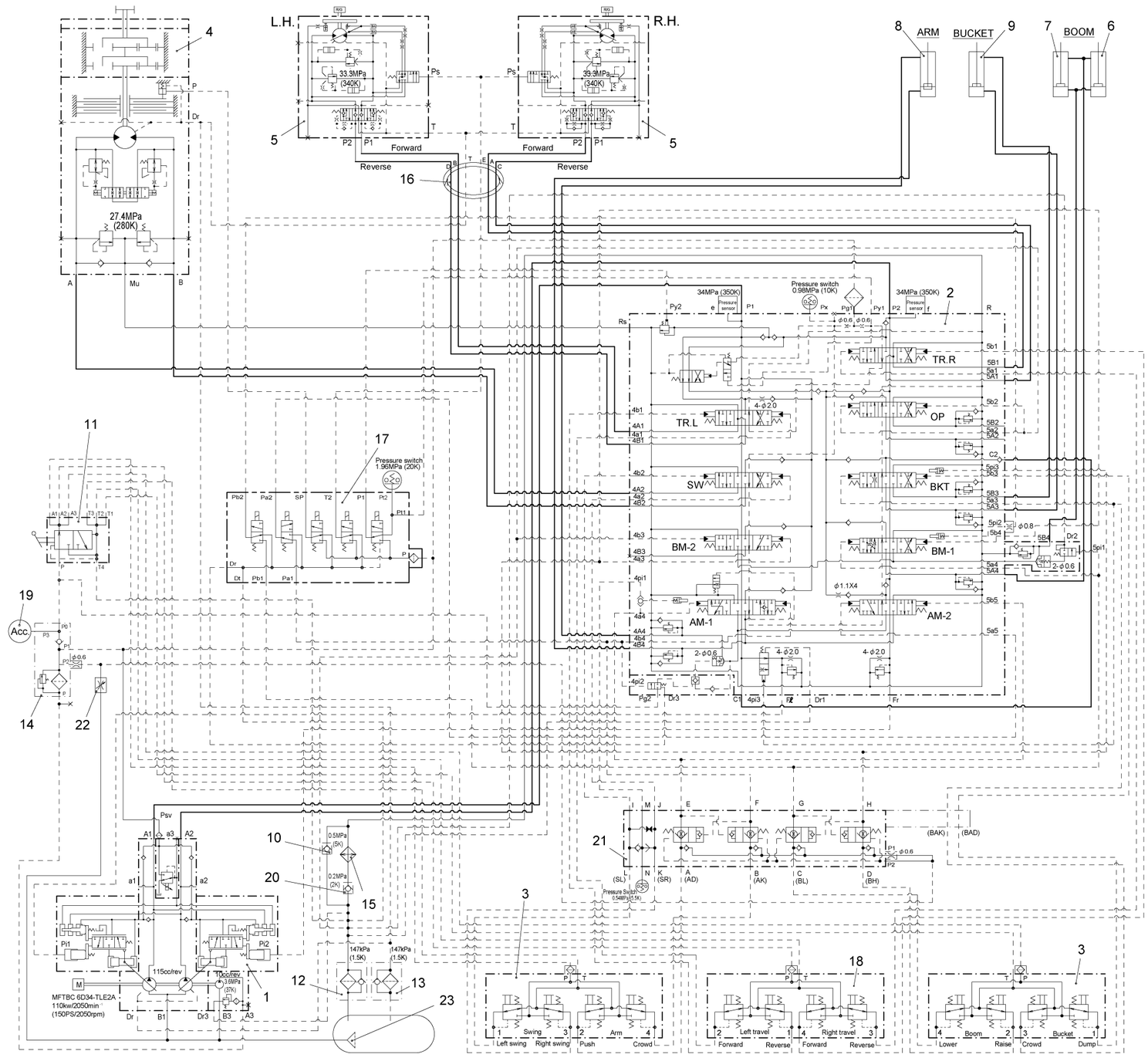
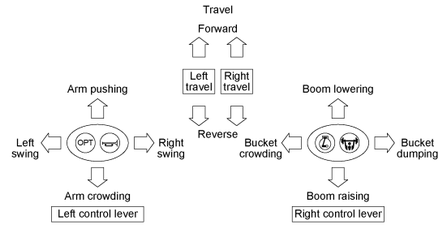
2. Hydraulic circuit diagram (937E-0013-0E)

(1) HD820Ⅲ



937-60100000



Control levers operation

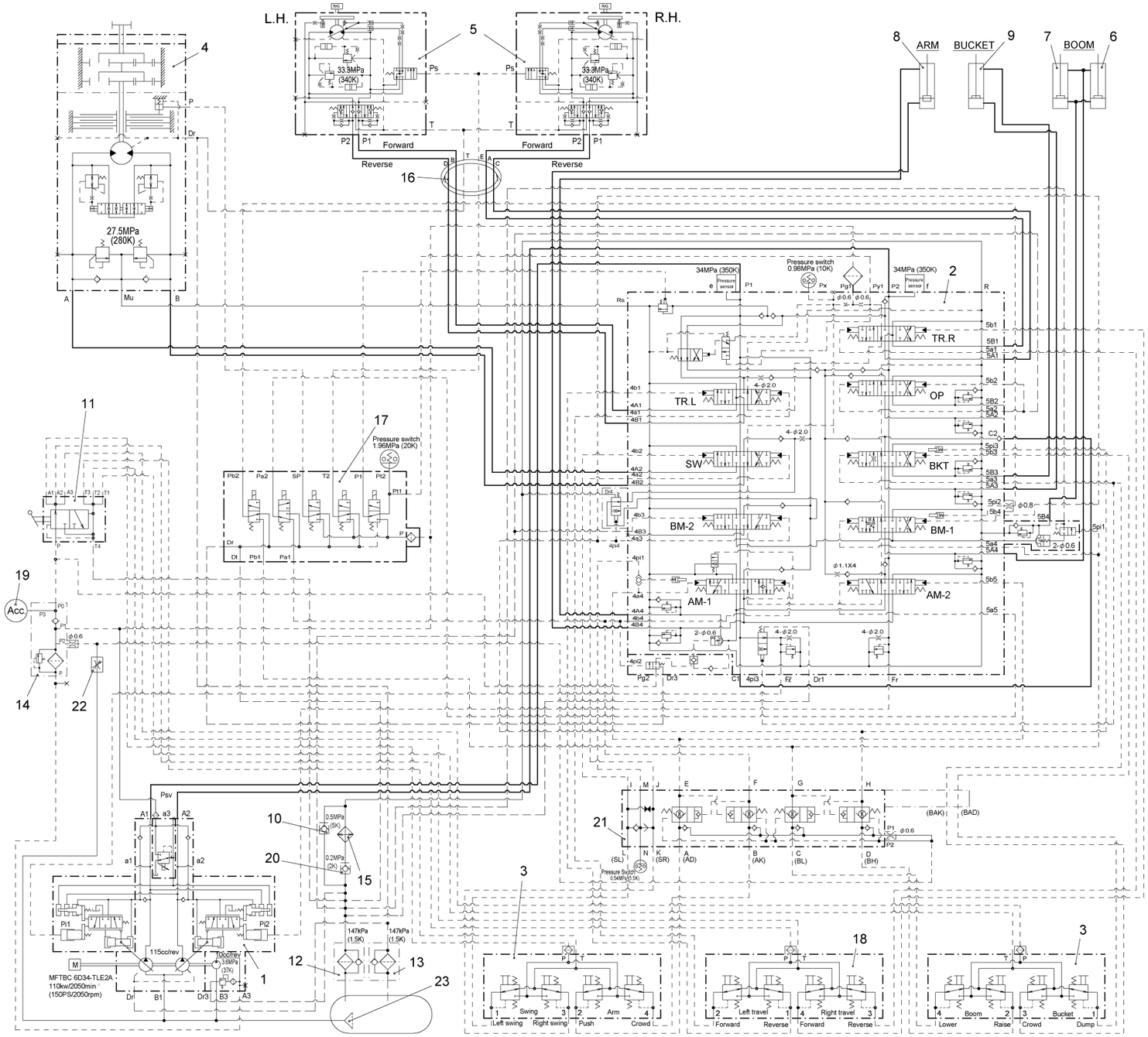
Main relief valve set pressure	High pressure	32.8 $^{+0.5}_{0}$MPa (335 $^{+5}_{0}$kgf/cm^2) at 150L/min
	Low pressure	31.4 $^{+0.5}_{0}$MPa (320 $^{+5}_{0}$kgf/cm^2) at 160L/min
Overload relief valve set pressure	AM (4B4), BM BKT, OPT	34.3 $^{+0.5}_{0}$MPa (350 $^{+5}_{0}$kgf/cm^2) at 15L/min
	AM (4A4)	36.3 $^{+0.5}_{0}$MPa (370 $^{+5}_{0}$kgf/cm^2) at 15L/min
Foot relief valve set pressure		2.9±0.25MPa (30±2.5kgf/cm^2) at 38L/min
		3.9±0.25MPa (40±2.5kgf/cm^2) at 60L/min

Ref. No.	Part name	Q'ty
1	Pump	1
2	Control valve	1
3	Pilot valve	2
4	Swing motor	1
5	Traveling motor	2
6	Boom cylinder (R)	1
7	Boom cylinder (L)	1
8	Arm cylinder	1
9	Bucket cylinder	1
10	Check valve	1
11	Lock valve	1
12	Return filter	1
13	Drain filter	1
14	Pilot filter	1
15	Oil cooler	1
16	Rotary seal	1
17	Solenoid valve	1
18	Pilot valve	1
19	Accumulator	1
20	Check valve	1
21	Shockless valve	1
22	Throttle valve	1
23	Suction strainer	1

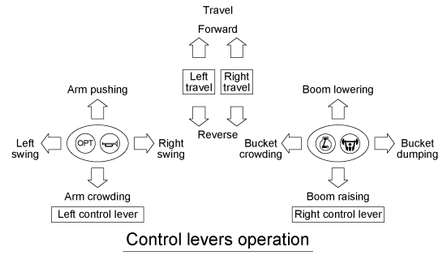
937E-00053E

https://truckmanualshub.com/

(2) HD820Ⅲ-LC



937-60200000



Control levers operation

Main relief valve set pressure	High pressure	32.8 $^{+0.5}_{0}$MPa (335 $^{+5}_{0}$kgf/cm^2) at 150L/min
	Low pressure	31.4 $^{+0.5}_{0}$MPa (320 $^{+5}_{0}$kgf/cm^2) at 160L/min
Overload relief valve set pressure	AM (4B4), BM BKT, OPT	34.3 $^{+0.5}_{0}$MPa (350 $^{+5}_{0}$kgf/cm^2) at 15L/min
	AM (4A4)	36.3 $^{+0.5}_{0}$MPa (370 $^{+5}_{0}$kgf/cm^2) at 15L/min
Foot relief valve set pressure		2.9±0.25MPa (30±2.5kgf/cm^2) at 38L/min
		3.9±0.25MPa (40±2.5kgf/cm^2) at 60L/min

Ref. No.	Part name	Q'ty
1	Pump	1
2	Control valve	1
3	Pilot valve	2
4	Swing motor	1
5	Traveling motor	2
6	Boom cylinder (R)	1
7	Boom cylinder (L)	1
8	Arm cylinder	1
9	Bucket cylinder	1
10	Check valve	1
11	Lock valve	1
12	Return filter	1
13	Drain filter	1
14	Pilot filter	1
15	Oil cooler	1
16	Rotary seal	1
17	Solenoid valve	1
18	Pilot valve	1
19	Accumulator	1
20	Check valve	1
21	Shockless valve	1
22	Throttle valve	1
23	Suction strainer	1

937E-00063E

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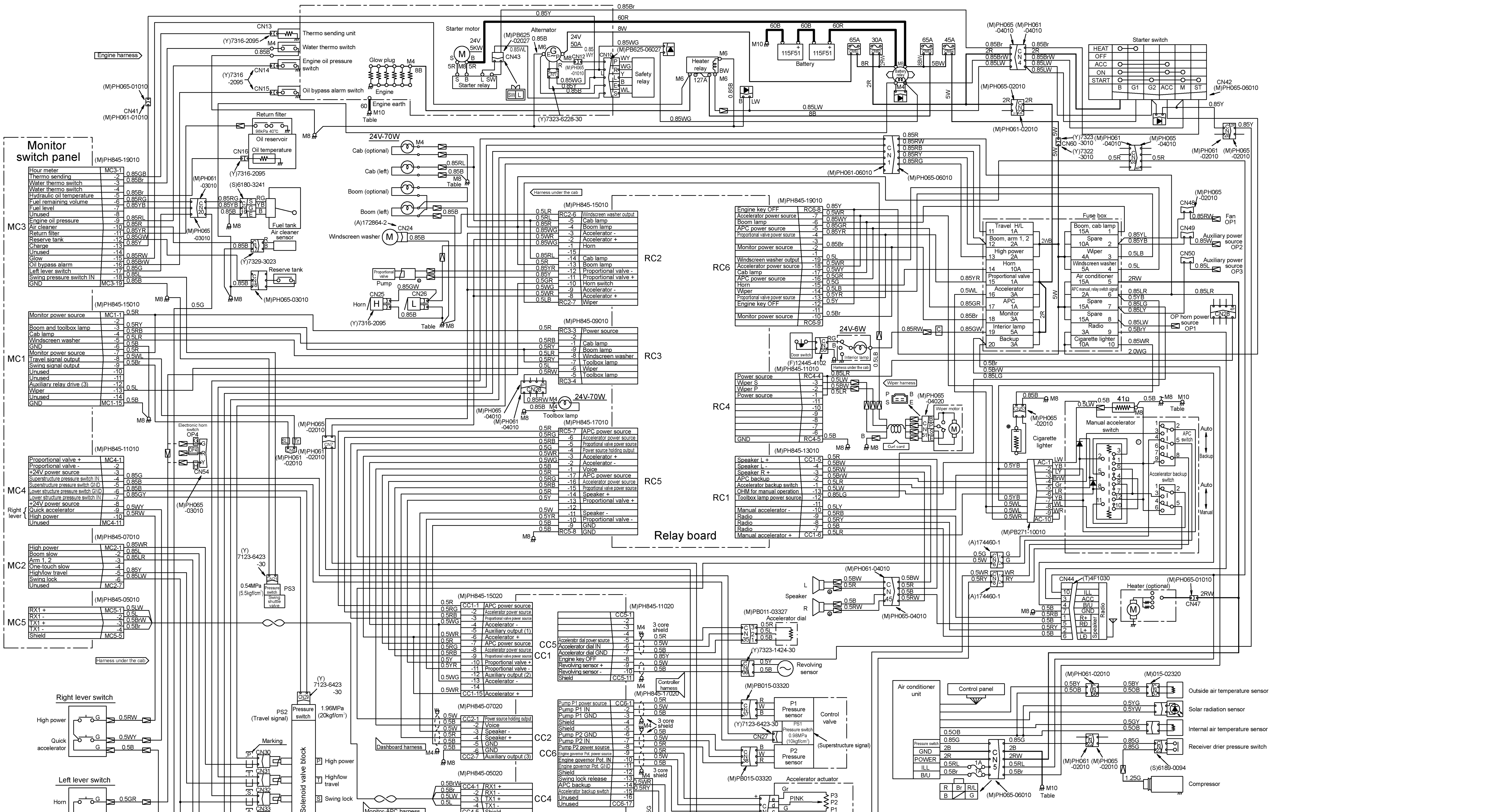
3. Electrical circuit diagram (837E-0026-1E)



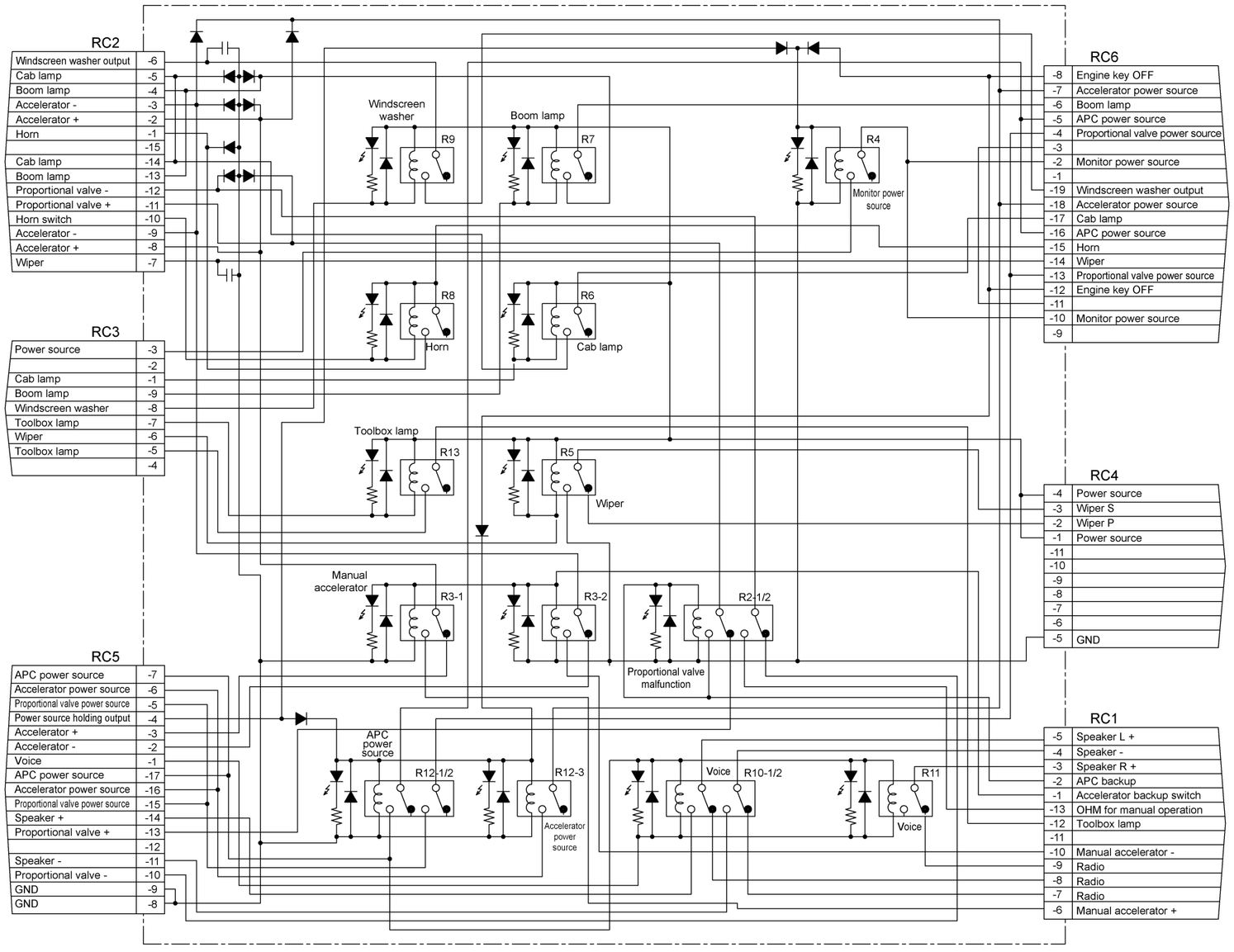
Connector manufacturers
(A) AMP
(Y) Yazaki
(M) Mitsubishi Cable
(S) Sumitomo Cable
(F) Furukawa Electric
(T) Tokai Rika

Symbol of wire color

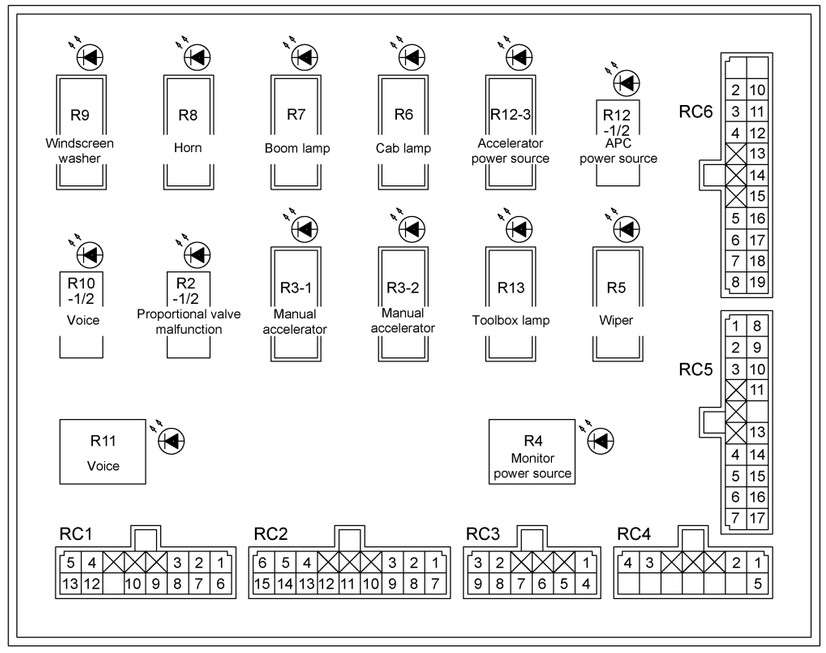
B: Black	RL: Red/Blue	LG: Blue/Green	GB: Green/Black
W: White	RY: Red/Yellow	LB: Blue/Black	GR: Green/Red
R: Red	RW: Red/White	WB: White/Black	BrW: Brown/White
G: Green	RB: Red/Black	WL: White/Blue	BrY: Brown/Yellow
Y: Yellow	RG: Red/Green	WY: White/Yellow	YR: Yellow/Red
Br: Brown	LW: Blue/White	WG: White/Green	YB: Yellow/Black
L: Blue	LY: Blue/Yellow	GY: Green/Yellow	YL: Yellow/Blue
WR: White/Red	LR: Blue/Red	GW: Green/White	

947-77100002A

947E-00062E



Relay board wiring diagram



Relay board arrangement

947-77100002B

947E-00071E

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(937V-0006-1E)

D Engine unit

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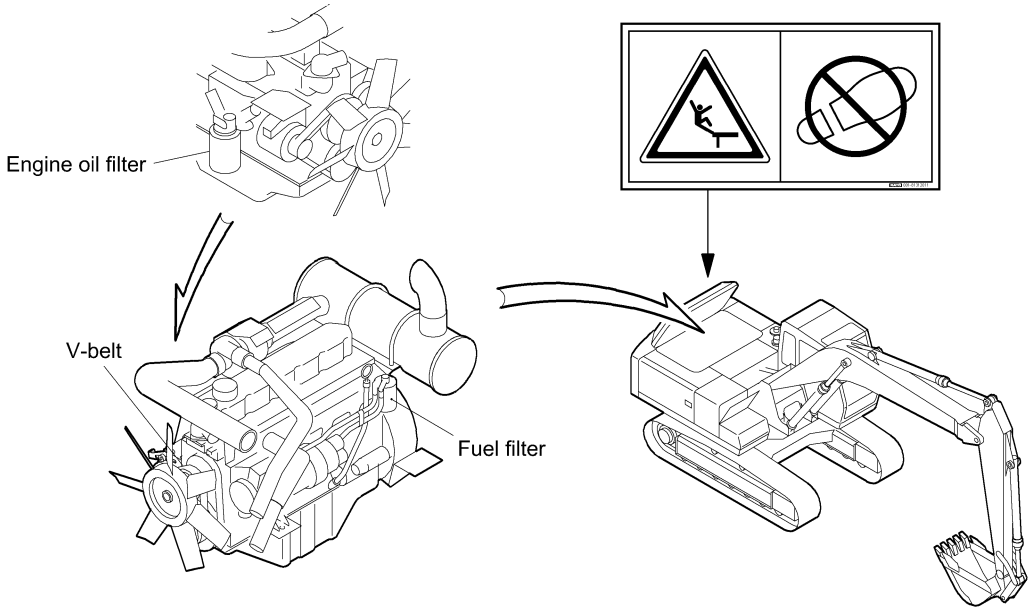
1. Engine-related equipment (937S-0110-0E)

1-1 Engine inspection and servicing (937S-0105-0E)

- Take the engine inspection points from the "Inspection and servicing table".
- Take the engine inspection methods from the separate engine manual.
- Refer to the separate service manual for APC.

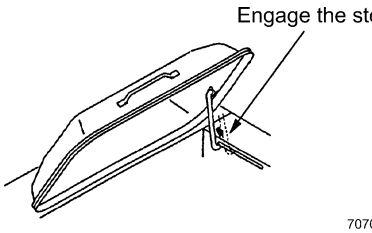


937E-00200E

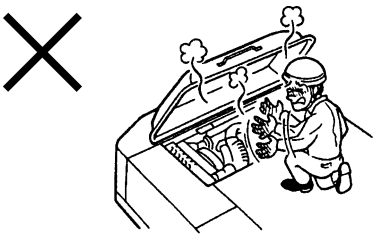
(8270-0172-2E)

⚠ WARNING

- Always stop the engine before inspecting it.
  If you inspect and service the engine while it is running, you risk severe injury by trapping your hands etc. in the cooling fan or fan belt.
- When you open the engine hood, always engage the stopper.
- Immediately after the engine stops each part will be very hot and you risk burns if you touch it. If you are going to open the engine hood to inspect the engine, check that it has cooled sufficiently.
- The sound absorbing material in the engine compartment is designated as a safety part for periodic replacement.
  Inspect it at regular intervals and if any damaged is discovered, then replace it even if it is before the scheduled replacement time. If it falls off, it could cause a fire.



7070-02601E



7070-02612

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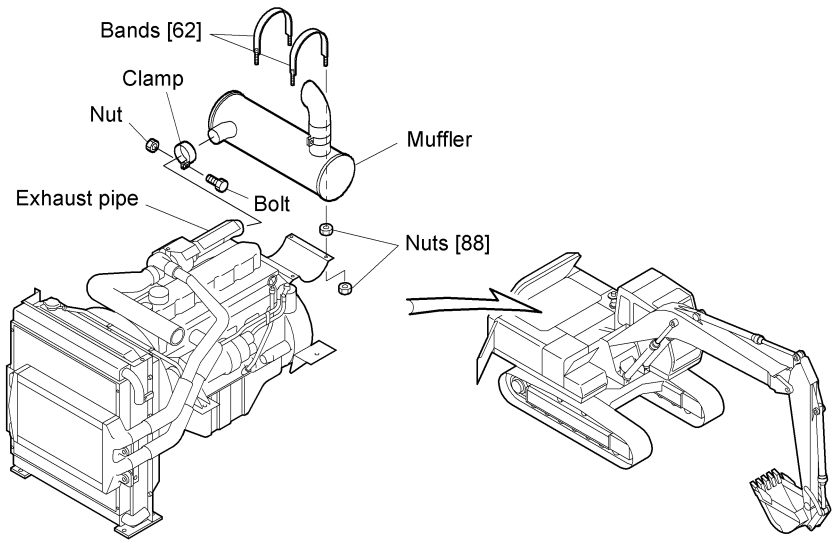
1-2 Removal and mounting of engine accessories (917S-0035-0E)

Remove the cover and any other components which may obstruct your work.
Refer to the section J, 3-3 for the handling of the air conditioner-related parts.

1-2-1 Muffler and exhaust pipe (937S-0012-3E)

(1) Removal

1) Remove the bolt and loosen the clamp which joins the exhaust pipe to the muffler.
2) Remove nuts [88] and bands [62] and lift the muffler off.



(2) Inspection and mounting

1) Inspection

① Check for rust, corrosion etc. on the muffler and exhaust pipe. Brush any away with a wire brush and repaint the affected area with heat resisting paint.
② Check for cracks, scratches, dents etc. on the muffler and exhaust pipe. Make a welded repair where necessary.
③ Check whether the gasket is cracked or broken and whether there is gas leakage. (If it is removed, replace with new.)
④ Check for wear and stripped threads on the bands and other threaded parts.

2) Mounting

Reverse the removal procedure to remount the muffler and then check the following point.

① Check that the water drain hole and joint section on the muffler are not blocked.

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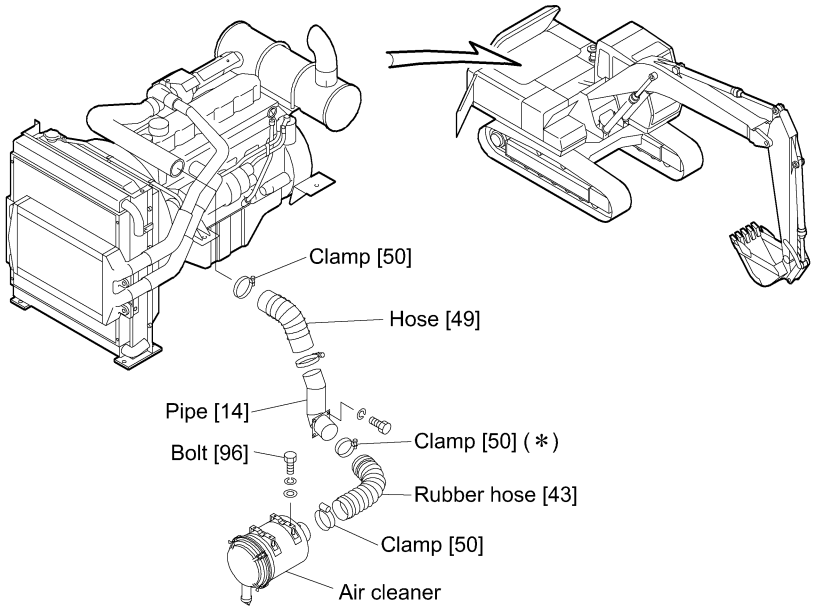
1-2-2 Air cleaner (937S-0012-2E)

(1) Removal

1) Loosen clamp [50] (marked with *) of pipe [14] and disconnect the pipe from rubber hose [43].

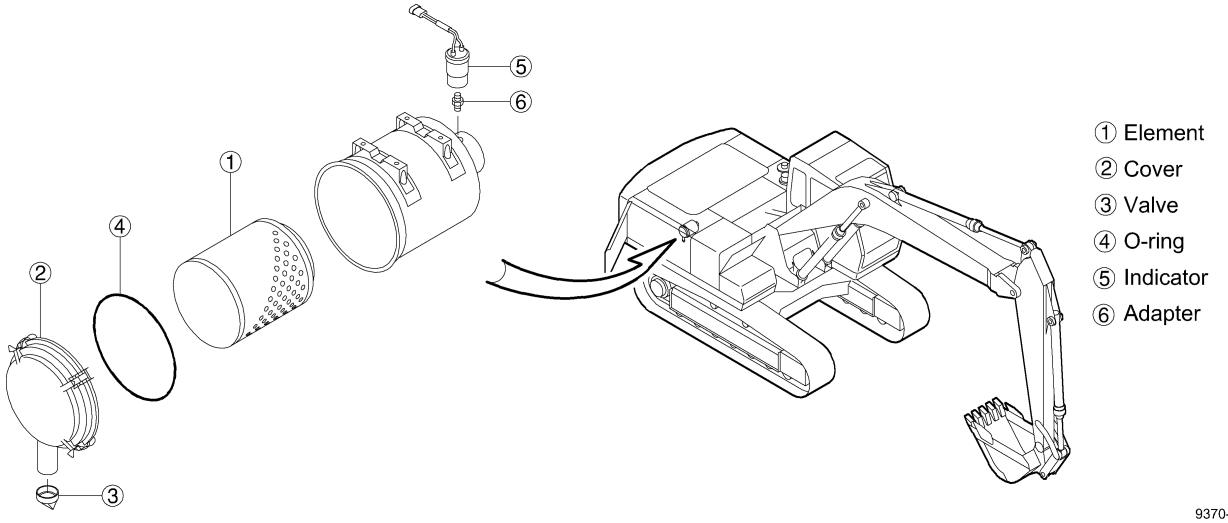
2) Remove bolts [96] and detach the air cleaner.

Note Loosen clamps [50] (except the clamp marked with *) and detach rubber hose [43] and hose [49], if necessary.



937S-00021E

(2) Cleaning and replacement



9370-00111E

1) Cleaning the filter element ①

Remove the cover ② and take the filter element ① out and clean it using the method described below.

Blow clean, dry compressed air from the inside of the element to the outside along the folds up and down to blow dust off. Keep the nozzle away from the element 50mm or more and keep the pressure at the nozzle below 0.2MPa (2kgf/cm^2).

Inspect the filter paper lighting it from the inner side of the element. Replace the element if there is any damage, pinholes or extremely thinner part is observed on the paper. Also replace it when the packing is damaged.

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2) After cleaning, put the element ① back in place and attach the cover ② so that the valve ③ is just under the cover.

(8270-0174-3E)

⚠ CAUTION

- Wear protective goggles when using compressed air.
- When using this machine under severe conditions, shorten the cleaning and replacement intervals accordingly.
- If the message indicating air cleaner blockage is displayed on the monitor, you should clean the element even if it is not yet the scheduled time.
- Always stop the engine before cleaning and replacing the element, otherwise foreign bodies could be drawn in, causing a breakdown or damage.
- Always use a genuine KATO or KATO-approved element.

(3) Cleaning and replacement intervals

Cleaning interval ····· Every 250 hours of operation or when called for by the monitor display

Replacement interval ····· Every 1000 hours of operation or yearly

(4) Consumable part number

Refer to the "Consumable parts guide".

(5) Inspection and mounting

1) Inspection

① Check for rust, corrosion etc. on the air cleaner.

② Check for cracks and deterioration on the rubber hose.

③ Check for wear and stripped threads on the threaded parts.

2) Mounting

① Reverse the removal procedure to remount the air cleaner.

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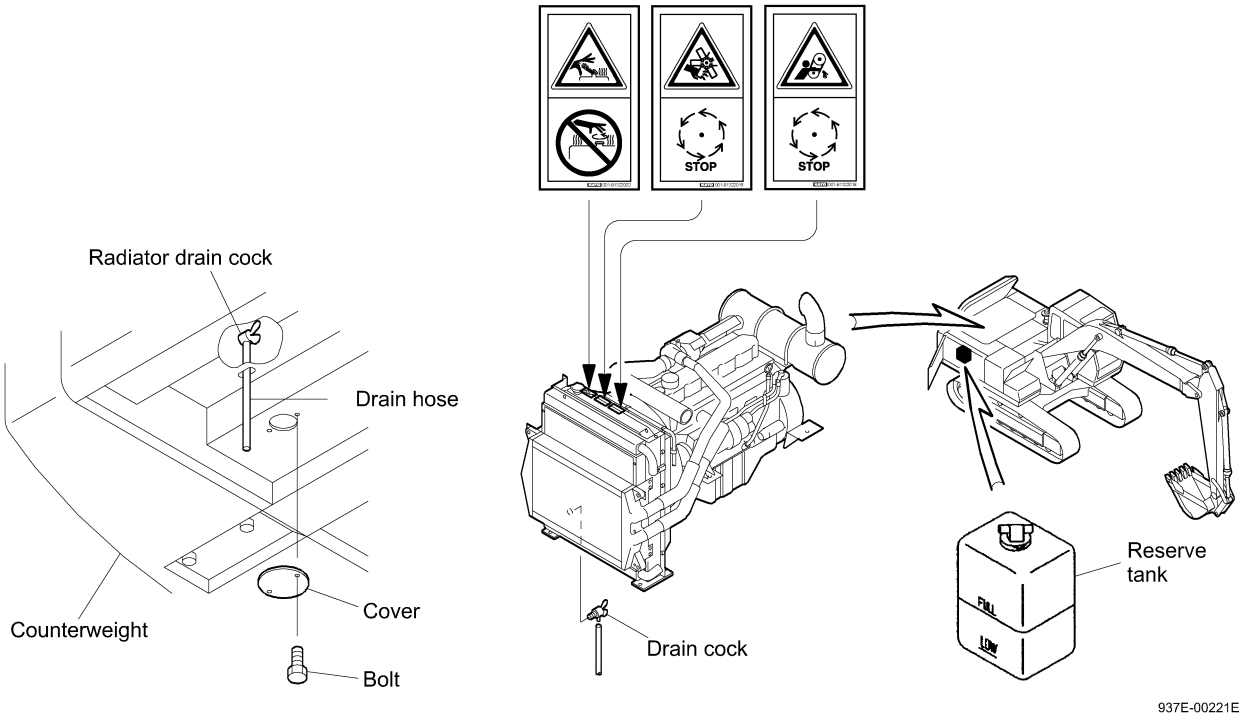
1-2-3 Cooling system (937V-0013-0E)

As the engine runs, corrosion and water scale build up in the water jacket and the radiator, reducing their cooling efficiency and leading to overheating problems etc. It can also reduce the antifreeze effect of the Long Life Coolant added to the coolant, risking engine damage due to freezing. It is very important to regularly clean the cooling system and replace the coolant using the procedure described below.



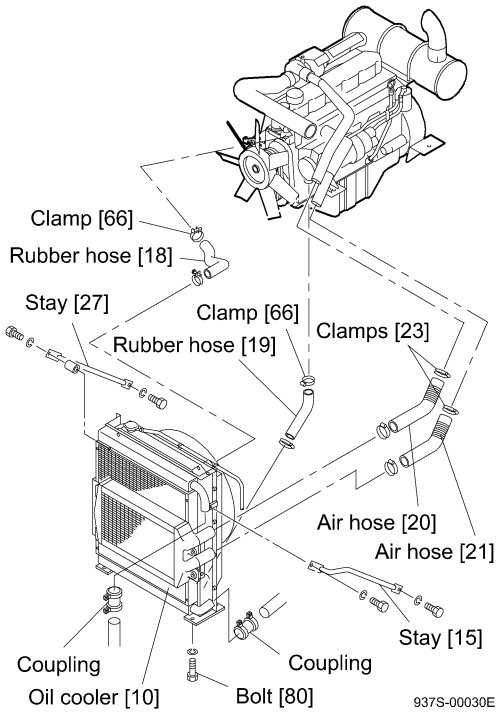
(1) Intervals for inspection and cleaning of the cooling system and replacement of the coolant

1) Coolant level inspection	·····	At the time of preoperational checks
2) Coolant replacement	·····	Every 2 years or 2000 hours of operation
3) Cooling system cleaning	·····	Every time the coolant is replaced.
4) Long Life Coolant	·····	KATO Diesel Long Life Coolant (non-amine)
5) Long Life Coolant addition volume	···	Set the coolant freezing temperature 5°C below the lowest recorded temperature in the operating region and use that temperature to determine the Long Life Coolant volume to add.
6) Coolant adding	·····	Add the coolant through the filler cap on the top of the reserve tank.
7) Water for coolant	·····	Use tap water (soft water).
8) Radiator core cleaning	·····	Monthly or every 100 hours of operation

(2) Removal of the radiator, oil cooler and intercooler

Drain coolant from the radiator and hydraulic oil from the oil reservoir before you start work.

1) Remove the hose from the reserve tank and detach the condenser and receiver drier of the air conditioner.
2) Loosen the couplings and disconnect the piping which is connected to oil cooler [10].
3) Loosen clamps [66] and detach rubber hoses [18] and [19] from the engine.
4) Loosen clamps [23] and detach air hoses [20] and [21] from the engine.
5) Remove stays [15] and [27] from the radiator.
6) Arrange the sling wire rope to the radiator and support it with a crane then remove bolts [80] and lift off the radiator, oil cooler and intercooler as an assembly.



(3) Inspection and mounting

1) Inspection

① Clean the inside of the radiator.
② Check whether any part of the radiator is cracked or broken and whether there is coolant leakage.
③ Check for splits and deterioration of the rubber hoses and air hoses.
④ Check for wear and stripped threads on the threaded parts of the bolts.

2) Mounting

Reverse the removal procedure to remount the radiator, oil cooler and intercooler and then check the following points.

① Are any of the radiator mounting bolts loose? Are the couplings of any of the water hoses loose?
② Are any of the oil cooler and intercooler mounting bolts loose?
③ Are the couplings of the oil cooler piping correctly fastened? If the pipe end is not inserted far enough into the coupling, or if the coupling is not tightly fastened, the pipe can come out of the coupling when in use.
④ Check for splits and deterioration of the intercooler hoses.
⑤ Check that the intercooler hoses are inserted far enough and that the clamps aren't loose.

(4) Adding the coolant

Always check the coolant volume before starting the engine and check that the volume exceeds the "LOW" level of the reserve tank. Add the coolant if the level is low.

KATO Diesel Long Life Coolant is used in this machine. When adding the coolant, use KATO Diesel Long Life Coolant and avoid using plain water.

(8570-0099-0E)

⚠ WARNING

When you add the coolant, check that it has cooled sufficiently.

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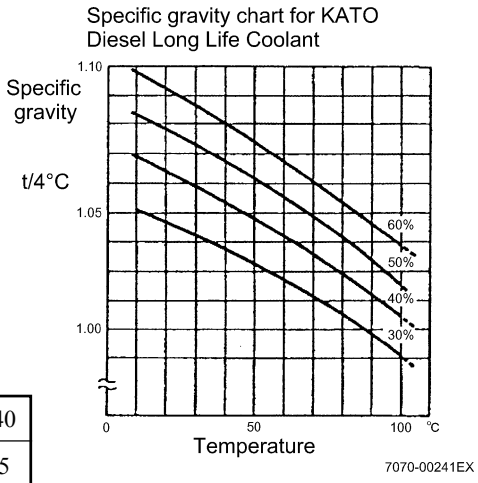
(5) Addition of Long Life Coolant and calculation of its concentration

1) The freezing temperature of the coolant varies greatly with the concentration of the Long Life Coolant it contains. Set the coolant freezing temperature 5°C below the lowest recorded temperature in the operating region and use that temperature to determine the required concentration of the Long Life Coolant and therefore the Long Life Coolant volume to add.



Coolant freezing temperature against addition volume of the Long Life Coolant

Freezing temperature (°C)	–15	–20	–25	–30	–40
Long Life Coolant concentration (%)	30	35	40	45	55
Long Life Coolant addition volume (L)	6.9	8.1	9.2	10.4	12.7
Water volume (L)	16.1	14.9	13.8	12.6	10.3
Total coolant volume (L)	23				

(Using KATO Diesel Long Life Coolant)
(8270-0246-2E)

2) If it is possible that the temperature may be about to drop below the freezing temperature of the coolant currently in use, add the Long Life Coolant.
Once you have finished adjusting the Long Life Coolant concentration, start the engine and allow it to mix the coolant fully, then use a hydrometer or concentration gauge to check the actual concentration.

(8570-0083-0E)

⚠ CAUTION

- Use only genuine KATO Diesel Long Life Coolant. Other brands could cause corrosion of copper and aluminum components and reduce their lifespan. The freezing temperature might be different, leaving the risk of freezing and engine damage.
- Use the Long Life Coolant within the concentration range between 30—60%. If the concentration is below 30%, anti-corrosion effect is reduced. If it is 60% or more, the freezing temperature becomes higher.
- If you top up the coolant level with water or repair coolant leakage, always recheck the Long Life Coolant concentration. If you do not check and adjust the concentration as necessary, the reduced Long Life Coolant concentration could allow freezing of the coolant which would damage the engine.

(6) Precautions on handling Long Life Coolant

1) No fire near Long Life Coolant
Long Life Coolant is a hazardous substance and must not be handled near fire or other source of ignition.

(8270-0178-1E)

⚠ CAUTION

Long Life Coolant is flammable, so beware of fire.

2) Do not drink Long Life Coolant
Long Life Coolant is poisonous. Never allow it into your mouth even when diluted. If you drink it by accident, make yourself vomit immediately and consult a doctor.

3) Never leave Long Life Coolant unattended or improperly stored

If you decant Long Life Coolant into smaller containers for storage, seal the container and clearly label the lid "COOLANT" respectively. Store them out of direct sunlight and out of the reach of children.

(8570-0106-0E)

⚠ WARNING

- If you accidentally get Long Life Coolant in your eye, wash the affected area immediately in large amounts of clean water and consult a doctor.
- When you add or replace the coolant, check that it has cooled sufficiently.

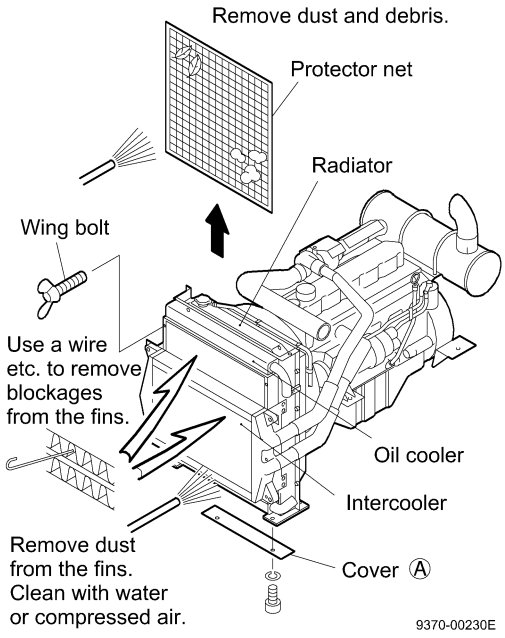
(7) Consumable part number

Refer to the "Consumable parts guide".

(8) Radiator core cleaning procedure

If dust or dead plants build up on the radiator core, oil cooler core or intercooler core, their cooling effect is drastically reduced and this can cause overheating.

1) Remove the cover Ⓐ that is between the radiator and the oil cooler.
2) Detach the protector net to clean any dust from the front side of it using 0.2MPa (2kgf/cm^2) or less of water or compressed air, from a distance of 20—30mm away, and keeping it as perpendicular as possible.
3) If dead plants etc. are wedged between the fins of the core, use a thin wire to remove them, taking care not to damage the fins. Also clean dust or debris off the protector net.
4) Reattach each cover to their original positions.



(8270-0180-1E)

⚠ CAUTION

- Always wear protective goggles when cleaning.
- If you clean using water or compressed air at high pressure, the radiator fins can be deformed, blocking the flow of air and defeating the object of cooling. Keep an adequate distance between the nozzle and the core.

(9) Procedure for cleaning the cooling system

When replacing the coolant because its antifreeze performance has declined, always clean the cooling system at the same time.

Refer to the separate engine manual for the method of cleaning the cooling system.

(8270-0181-2E)

⚠ WARNING

- When the radiator coolant is hot, it could spray out dangerously when you take the radiator cap off, possibly causing burns.
- If you have to take the radiator cap off, wait until the coolant has had time to cool and slowly loosen the cap to allow pressure to dissipate before you remove it. Check the coolant level and top up with the coolant from the reserve tank.

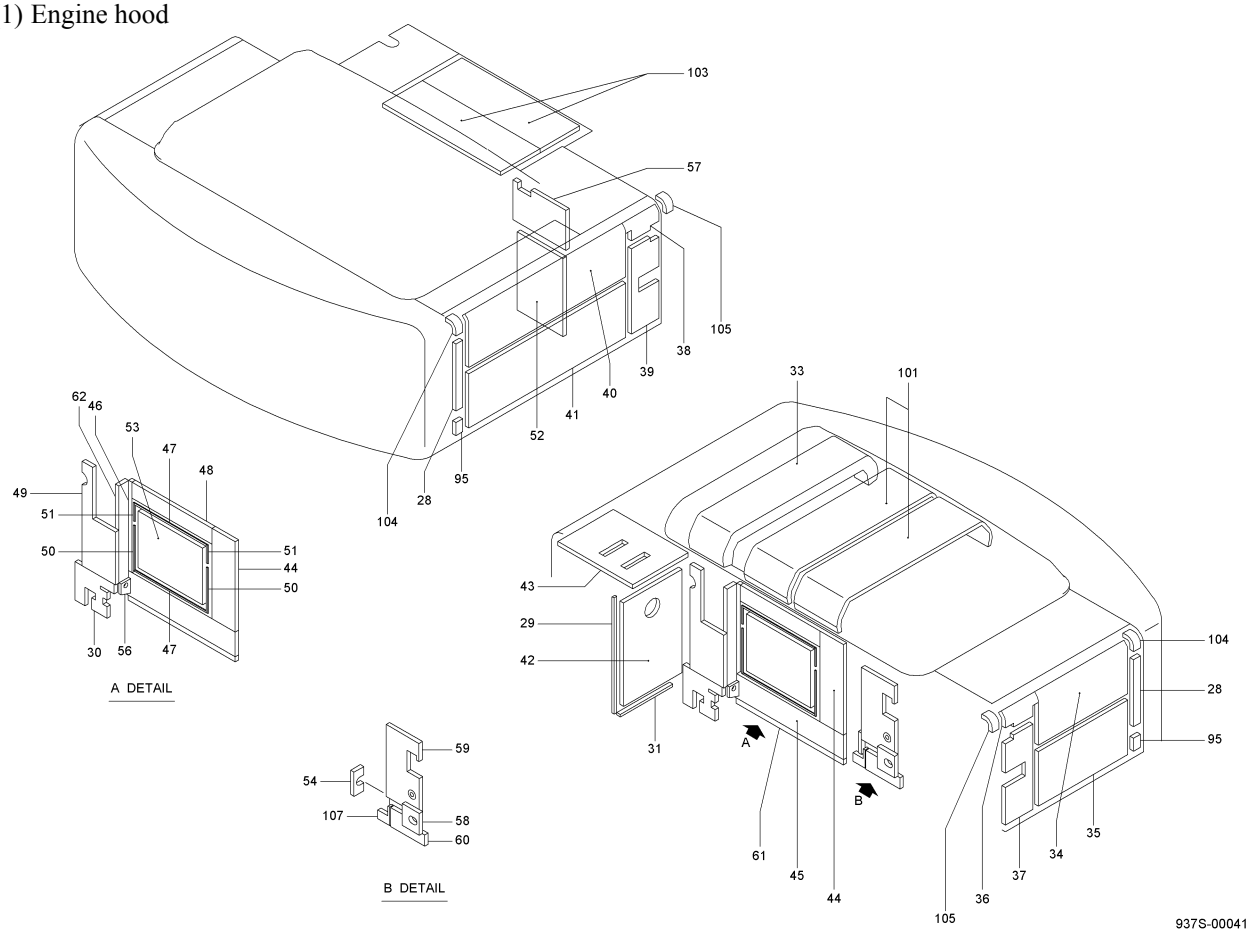
1-2-4 Inspection and replacement of the sound absorbing material (urethane) (937S-0136-1E)

(8270-0216-0E)

⚠ CAUTION

The sound absorbing material (urethane) is designated as a safety part for periodic replacement and as such it must be replaced every 5 years.
If the material is peeling, falling off or being deteriorated, replace or repair it immediately, even if it is not yet the scheduled time.

(1) Engine hood



Ref. No.	Part name	Q'ty
28	Lining (sound absorbing material: urethane)	2
29	Lining (sound absorbing material: urethane)	1
30	Lining (sound absorbing material: urethane)	1
31	Lining (sound absorbing material: urethane)	1
33	Lining (sound absorbing material: urethane)	1
34	Lining (sound absorbing material: urethane)	1
35	Lining (sound absorbing material: urethane)	1
36	Lining (sound absorbing material: urethane)	1
37	Lining (sound absorbing material: urethane)	1
38	Lining (sound absorbing material: urethane)	1
39	Lining (sound absorbing material: urethane)	1
40	Lining (sound absorbing material: urethane)	1
41	Lining (sound absorbing material: urethane)	1
42	Lining (sound absorbing material: urethane)	1
43	Lining (sound absorbing material: urethane)	1
44	Lining (sound absorbing material: urethane)	1
45	Lining (sound absorbing material: urethane)	1
46	Lining (sound absorbing material: urethane)	1
47	Lining (sound absorbing material: urethane)	2
48	Lining (sound absorbing material: urethane)	1

Ref. No.	Part name	Q'ty
49	Lining (sound absorbing material: urethane)	1
50	Lining (sound absorbing material: urethane)	2
51	Lining (sound absorbing material: urethane)	2
52	Lining (sound absorbing material: urethane)	1
53	Lining (sound absorbing material: urethane)	1
54	Lining (sound absorbing material: urethane)	1
56	Lining (sound absorbing material: urethane)	1
57	Lining (sound absorbing material: urethane)	1
58	Lining (sound absorbing material: urethane)	1
59	Lining (sound absorbing material: urethane)	1
60	Lining (sound absorbing material: urethane)	1
61	Lining (sound absorbing material: urethane)	1
62	Lining (sound absorbing material: urethane)	1
95	Lining (sound absorbing material: urethane)	2
101	Lining (sound absorbing material: urethane)	2
103	Lining (sound absorbing material: urethane)	2
104	Lining (sound absorbing material: urethane)	2
105	Lining (sound absorbing material: urethane)	2
107	Lining (sound absorbing material: urethane)	1

(937S-0014-0E)

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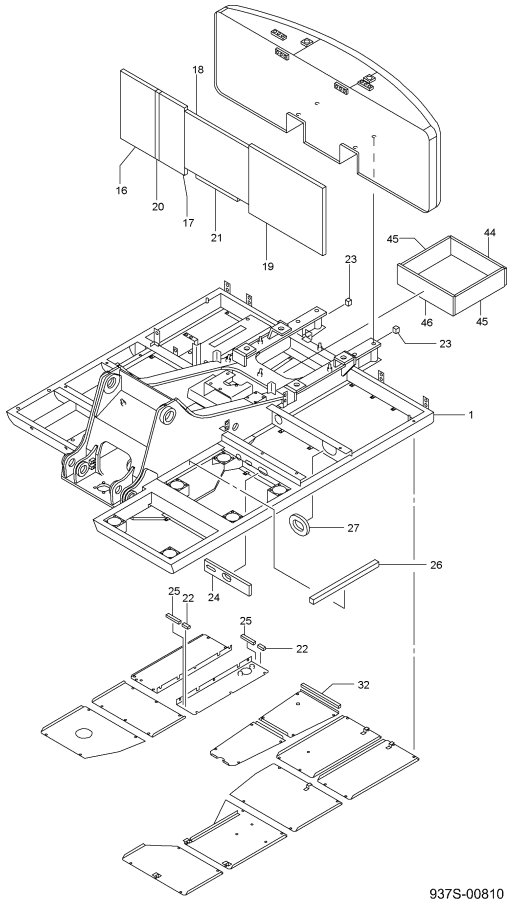
(2) Slewing table

Ref. No.	Part name	Q'ty
16	Urethane (sound absorbing material: urethane)	1
17	Urethane (sound absorbing material: urethane)	1
18	Urethane (sound absorbing material: urethane)	1
19	Urethane (sound absorbing material: urethane)	1
20	Urethane (sound absorbing material: urethane)	1
21	Urethane (sound absorbing material: urethane)	1
22	Urethane (sound absorbing material: urethane)	2
23	Urethane (sound absorbing material: urethane)	2
24	Urethane (sound absorbing material: urethane)	1
25	Urethane (sound absorbing material: urethane)	2
26	Urethane (sound absorbing material: urethane)	1
27	Urethane (sound absorbing material: urethane)	1
32	Urethane (sound absorbing material: urethane)	1
44	Urethane (sound absorbing material: urethane)	1
45	Urethane (sound absorbing material: urethane)	2
46	Urethane (sound absorbing material: urethane)	1

(937S-0118-1E)

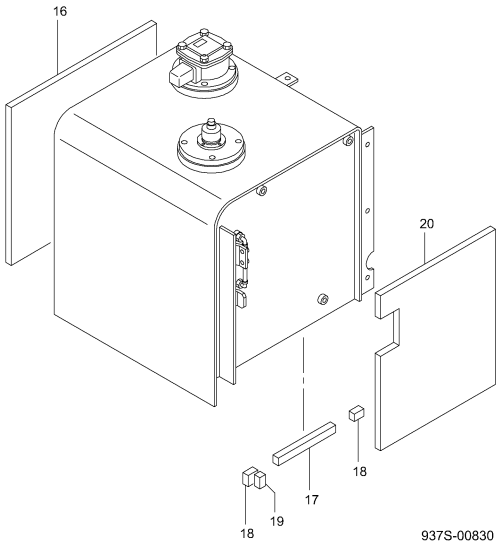


937S-00810

(3) Oil reservoir

Ref. No.	Part name	Q'ty
16	Urethane (sound absorbing material: urethane)	1
17	Urethane (sound absorbing material: urethane)	1
18	Urethane (sound absorbing material: urethane)	2
19	Urethane (sound absorbing material: urethane)	1
20	Urethane (sound absorbing material: urethane)	1

(937S-0120-1E)



937S-00830

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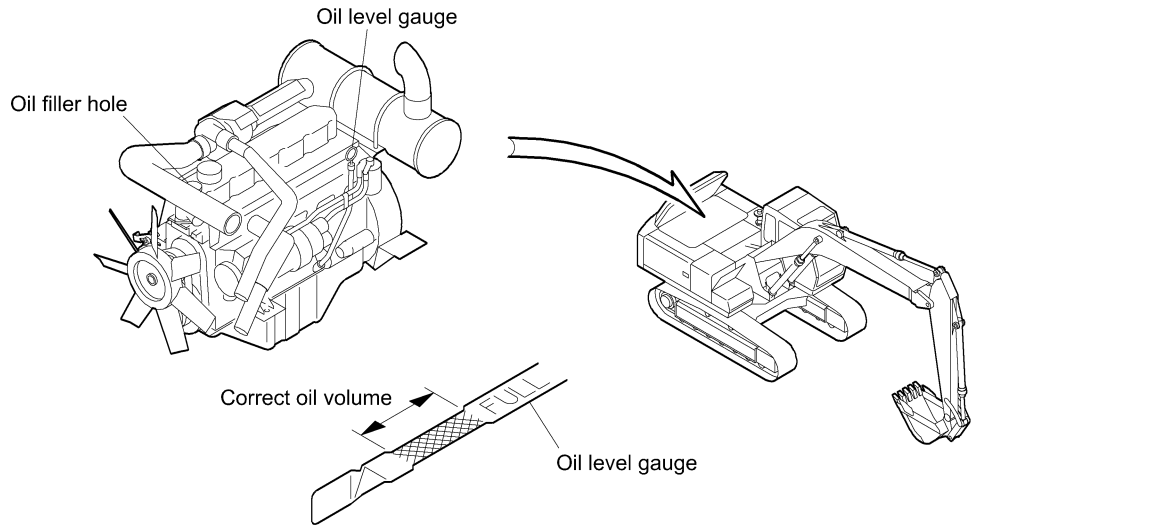
1-3 Inspection and replacement of the engine oil (9370-0016-1E)



9370-00210E

(1) Inspection procedure

If the position of the oil film on the oil level gauge is below the proper oil level range as shown in the diagram above, top up with the engine oil.

Take care not to fill with oil beyond the FULL level.

⚠ WARNING (8670-0078-0E)

After the engine has been running for a long time, the engine oil will be extremely hot, so allow the engine to cool adequately.

⚠ CAUTION (8570-0082-0E)

- If the engine oil is extremely dirty or if the machine is working under severe conditions, shorten the oil replacement interval appropriately.
- The machine should be on level ground when you check the oil level.
- Clean around the oil filler hole before you add oil so that no dirt etc. will enter with the oil.
- Choose the right engine oil for the outside air temperature in the region.
- After adding oil, wait for five or six minutes before checking the oil level. If you check the oil level immediately after adding, it may show a misleadingly low level, leading to overfilling.
- Spilled engine oil can cause fire, so wipe it away immediately.

(2) Inspection and replacement intervals

Inspection interval ····· At the time of preoperational checks

Replacement interval ····· Every 500 hours of operation

After delivery of a new machine, the engine oil should be replaced after 60 hours of operation.

Note Refer to the separate engine manual for oil replacement and topping up procedures.

Note Engine oil volume ····· 22L

Oil pan 18L

Oil filter and others 4L

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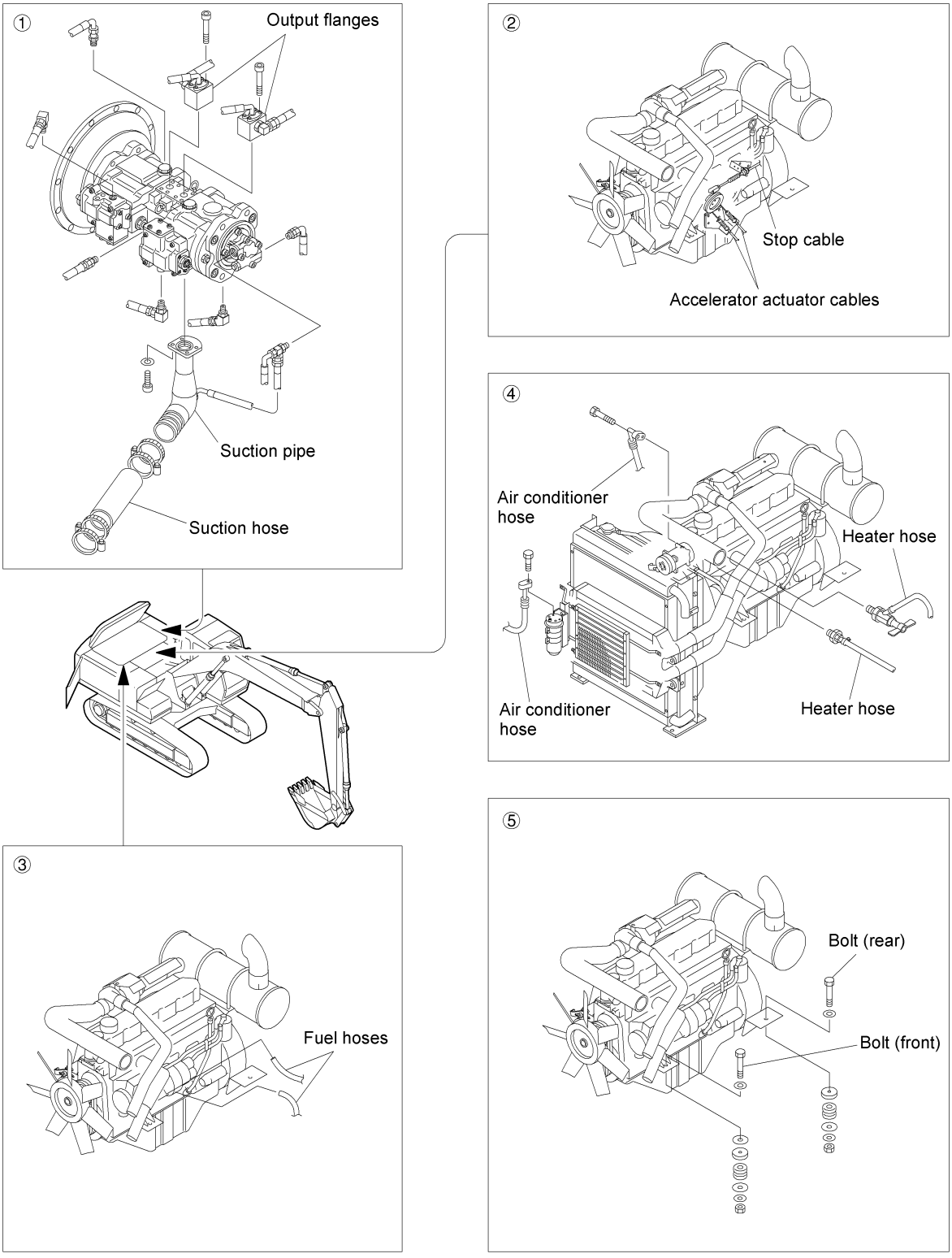
1-4 Removal of the engine and hydraulic pump (937S-0015-2E)



937S-00052E

(1) Removal

1) Disconnect all hoses etc. from the pump. (Fig. ①)

Note Drain all hydraulic oil from the oil reservoir before you disconnect the suction hose.

2) Detach the engine control cables (accelerator actuator cable and stop cable) from the engine. (Fig. ②)

3) Disconnect the fuel hoses from the engine. (Fig. ③)

Note Drain all fuel before you detach the fuel hose.

4) Disconnect the air conditioner hoses from the engine. (Fig. ④)

5) Remove the bolts which fasten the engine to the slewing table, attach the sling wire rope to the engine and lift it with a crane clear of the slewing table. (Fig. ⑤)

Note 1. Electrical wiring to the engine must be disconnected.

2. Mass

① Engine mass: 520kg (dry mass)

② Hydraulic pump mass: 126kg

(2) Inspection and mounting

1) Inspection

Refer to the engine service manual for inspection and repair procedures for the engine.

2) Mounting

Reverse the removal procedure to remount the engine and then check the following points.

① Tightening torque for engine mounting bolts: 372N・m (38kgf・m)

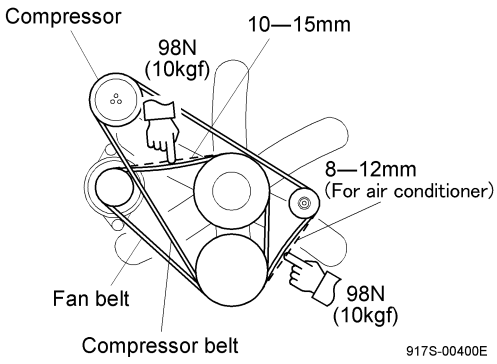
② Thoroughly wipe away all traces of oil and grease from the threaded parts of the bolts and always apply screw-lock compound to them before tightening them.

3) After mounting it, check the following points.

① Confirm that the engine control devices are correctly attached to the engine. (Refer to the section 2-2 for the method of mounting and adjusting the accelerator actuator cable and stop cable.)

② Confirm that the oil pan drain plug on the underside of the engine is not loose and that the washer is in the place.

③ Confirm for the tension of the fan belt. Confirm that fan belt pulley is not bent and that the belt is not chafed.



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2. Replacement and adjustment of the accelerator actuator (817S-0029-0E)

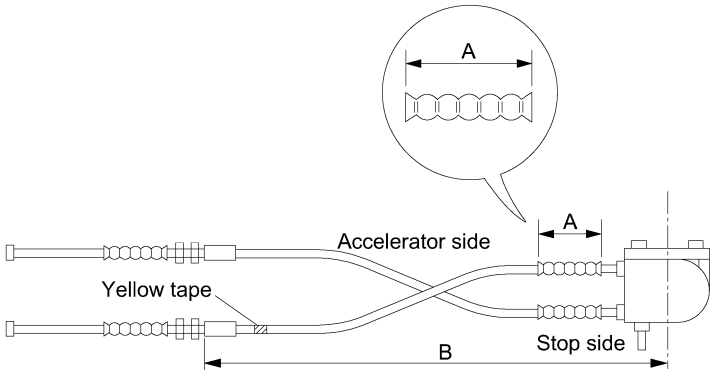
2-1 Accelerator actuator specifications (817S-0030-1E)

Color mark (tape)	Yellow
Dimension A when mounted	170 — 180mm
Dimension B	Approx. 1000mm
Attachment direction for the accelerator-side cable	Wind the cable onto the pulley in the counterclockwise direction.
Pulley rotation direction (acceleration direction)	Counterclockwise
Part number	709-45000006

(847S-0018-1E)

Dimension A: Loose spring length on the accelerator side

Dimension B: Cable attachment length on the accelerator side



707A-00870E

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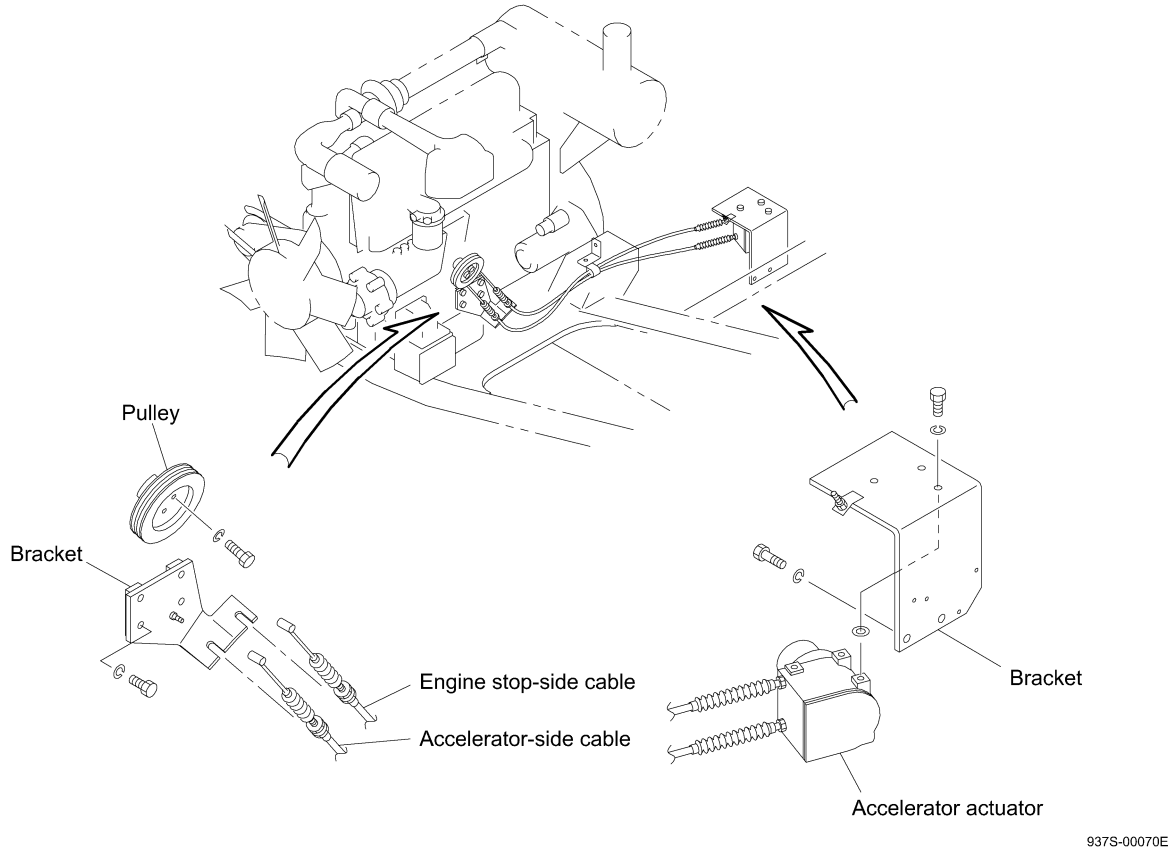
2-2 Mounting and adjustment of the accelerator actuator (837S-0016-3E)

Follow the procedure below to mount the accelerator actuator.



(1) Precautions on mounting the accelerator actuator

1) The winding direction of the accelerator cable on the pulley varies with the type of machine it is mounted on, so two models of accelerator actuator are specified. When you are going to replace the accelerator actuator, always ready a compatible replacement.

⚠ CAUTION (847S-0019-1E)

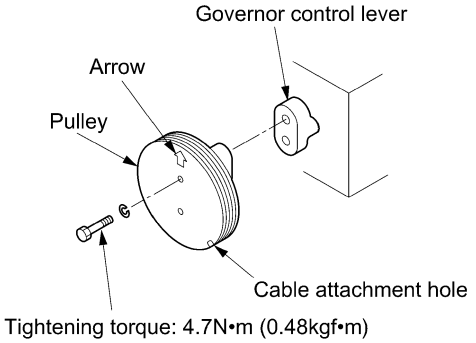
Always use a compatible accelerator actuator. If you use one that is incompatible, failures could occur. The APC100 system will not work correctly and the motor could burn out.

2) When connecting the cables of the accelerator actuator, the starter switch must be in the "OFF" position with the engine stopped.

3) Disconnect the negative terminal side of the battery cable.

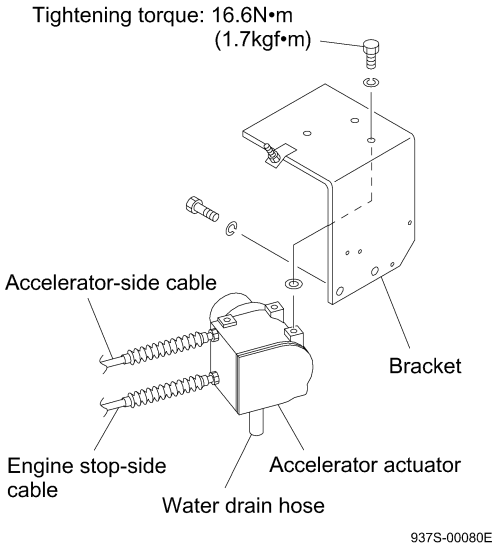
(2) Attaching the pulley to the engine injection pump

Attach the pulley to the governor control lever of the engine injection pump so that the arrow on the side of the pulley points upwards.



(3) Mounting the accelerator actuator

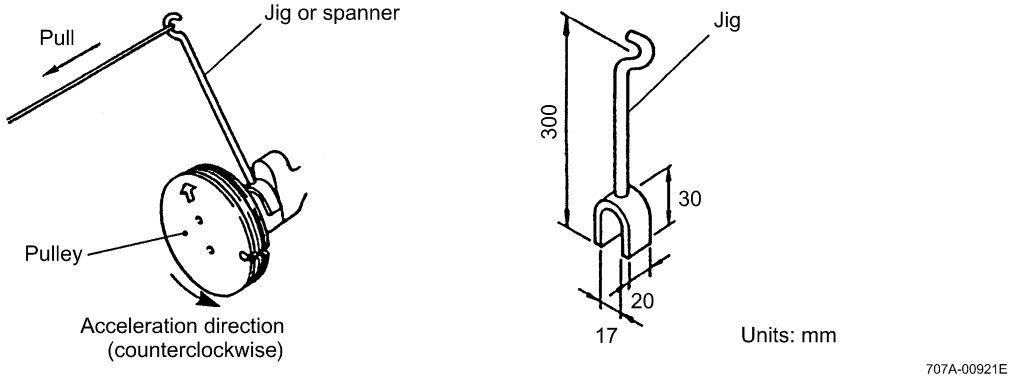
Mount the accelerator actuator onto the bracket so that the water drain hose points downwards.



(4) Adjusting the pulley's high idling position

Turn the pulley counterclockwise until the governor control lever reaches the stopper on the high idling side.

Note To fix the pulley in the high idling position, use a jig such as the one shown in the following diagram or a spanner.



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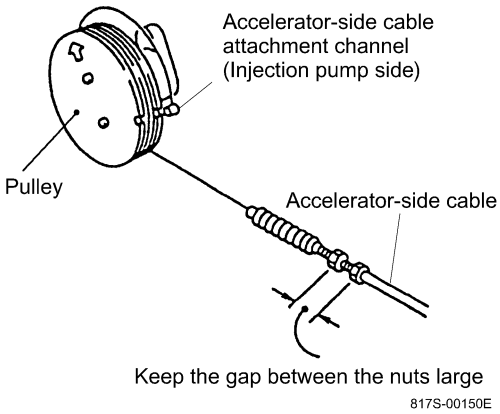
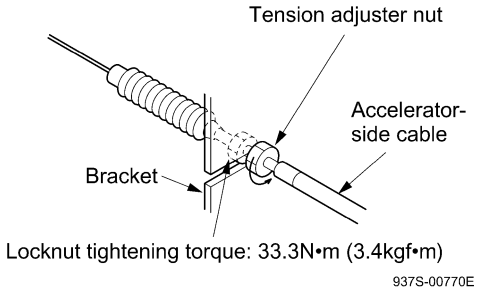
(5) Attaching the accelerator-side cable to the pulley

Fix the pulley in the high idling position then attach the accelerator-side cable to the cable attachment channel on the injection pump side of the pulley.



(6) Fastening the accelerator-side cable

1) Lightly fasten the accelerator-side cable to the bracket. Take care to adjust the cable so that it is not too slack or too tight and does not pull the pulley diagonally.
2) Detach the pulley fastening jig (or spanner). If the pulley winds back in the low idling direction, tighten the tension adjuster nut to adjust the pulley position (angle of rotation) until the governor control lever lightly touches the stopper. Then turn the tension adjuster nut one turn further to increase the tension of the cable then tighten the locknut to the regulation tightening torque 33.3N・m (3.4kgf・m) to fasten the cable securely to the bracket.



⚠ CAUTION (847S-0020-1E)

When you attach the accelerator-side cable, do not give it more than the regulation amount of tension. Mistaken overtightening could cause the following failures.

- During manual accelerator control (accelerator backup switch in the manual position, manual accelerator switch in the UP/DOWN position), the drive motor of the accelerator actuator could overrun and burn out.
- Even if the APC100 system is normal, various engine speed control functions will not work.

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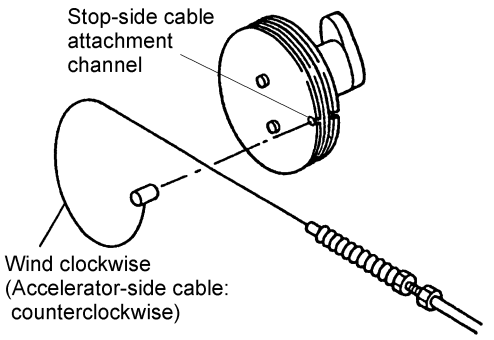
(7) Attaching the engine stop-side cable

Attach the engine stop-side cable to the designated point on the pulley. Then wind the engine stop-side cable onto the pulley in the opposite direction from that of the accelerator-side cable.

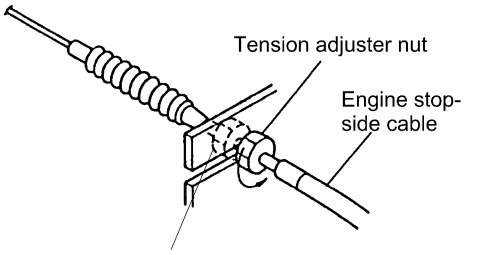


817S-00172E

(8) Fastening the engine stop-side cable

Lightly fasten the engine stop-side cable to the bracket. Take care to adjust the cable so that it is not too slack or too tight and does not pull the pulley diagonally.

Unscrew the adjuster nut by 1.5 turns then tighten the locknut to the regulation tightening torque 33.3N・m (3.4kgf・m) to fasten the cable to the bracket.



817S-00181E

(847S-0021-1E)

⚠ CAUTION

Fix the engine stop-side cable with an appropriate tension. If it is incorrectly tensioned, the following failures could occur.

- Cable is overtaut: In the low idling position (on the accelerator dial), the engine speed is unstable or the engine stops.
- Cable is not taut enough: The engine will not stop.

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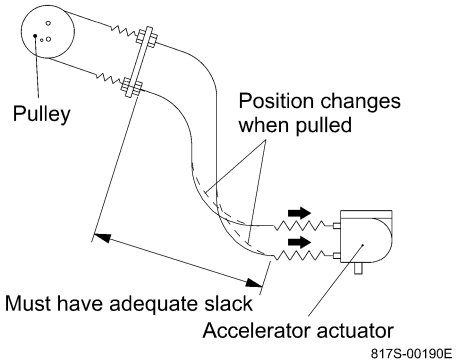
2-3 Checks before supplying power to the APC100 system (817S-0032-2E)

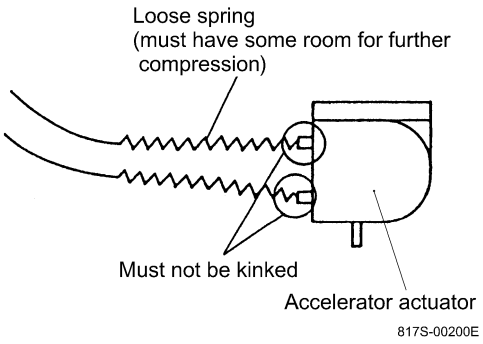
After you have mounted the accelerator actuator, check the items below before you supply power to the APC100 system.

(1) Check that there is adequate slack in the cables between the bracket and the accelerator actuator. When the accelerator actuator operates, the accelerator-side cable moves through a maximum stroke of 15mm while the stop-side cable moves through a maximum stroke of 30mm. When this happens, the cables themselves deflect, so they must have adequate slack between the bracket and the accelerator actuator.



(2) Checking the state of the loose springs on the accelerator actuator end

Check that the loose springs on the junctions with the accelerator actuator are not kinked or completely compressed. If they are kinked or have no room for further compression, the engine speed will not be able to match the position of the accelerator dial.



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2-4 Checking the status of the APC100 system (817S-0033-2E)

After you have completed the pre-power-up inspection, check the status of the APC100 system as described below.

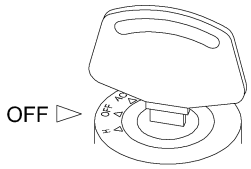
(847S-0022-1E)

⚠ CAUTION

You must confirm that the accelerator actuator is mounted correctly before you switch on the APC100 system. If you do not do this, the engine speed will be unable to match the position of the accelerator dial or the drive motor of the accelerator actuator could overrun and burn out.

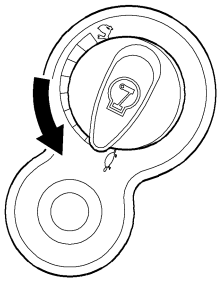
(1) Checking all switch and dial positions

1) Starter switch: "OFF" position



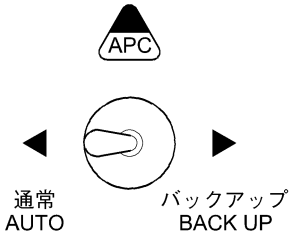
817S-00211

2) Accelerator dial: "Low idling ( )" position



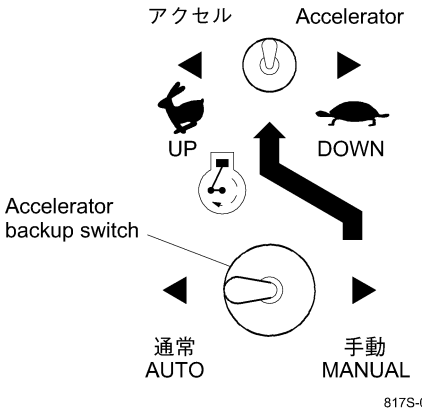
817S-00221

3) APC switch: "Normal (AUTO)" position



817S-00230

4) Accelerator backup switch: "Normal (AUTO)" position



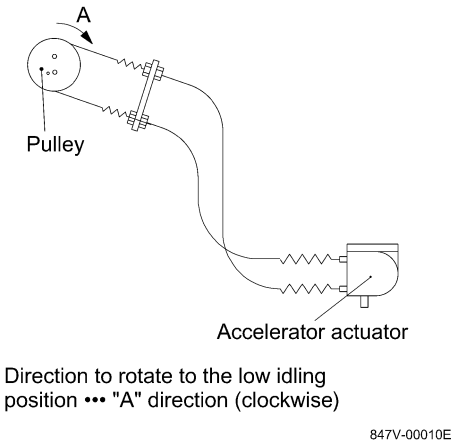
817S-00240E

(2) Checking the wiring connectors of the accelerator actuator

Connect up the wiring connectors of the accelerator actuator and check that they are normal.

(3) Checking that the accelerator actuator works in the low idling direction

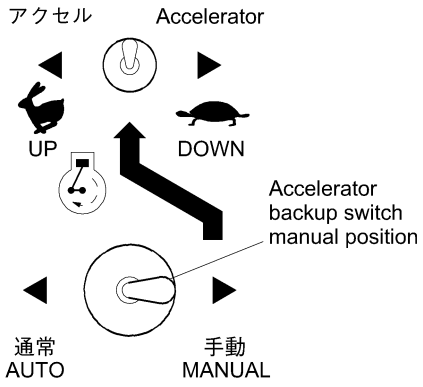
Switch the starter switch to the "ON" position (the engine does not start) and supply power to the APC100 system. Check that when you do so the accelerator actuator moves in the low idling direction (the pulley rotates) and comes to rest after approximately two seconds in the region of the low idling position. When the temperature of the hydraulic oil is below 30°C, the automatic warm-up function will engage, so the engine speed will come to rest at around 1250min^{-1} (rpm). If this happens, press the quick accelerator switch on top of the knob of the right control lever (boom/bucket) to cancel the automatic warming-up.



847V-00010E

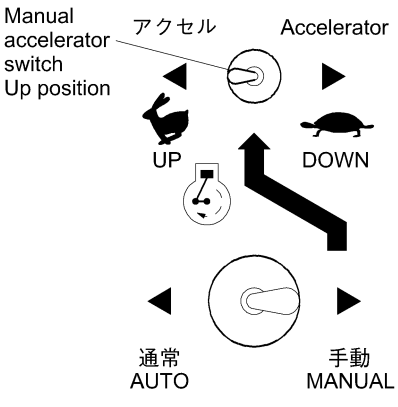
(4) Checking manual operation of the accelerator actuator

Switch the accelerator backup switch to the manual position and check manual operation of the accelerator actuator as described below.



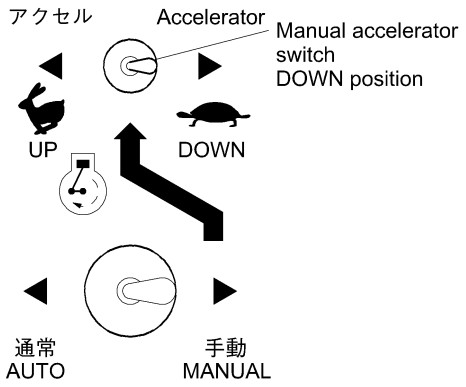
817S-00260E

1) Switch the manual accelerator switch to the "UP" ( ) position and check that after about three seconds the governor control lever of the injection pump touches the high idling stopper and then the drive motor of the accelerator actuator stops. After that, with the motor stopped, pull back the cover of the loose spring on the accelerator-side cable and check that the spring still has some margin and is not completely compressed.



817S-00271E

2) Switch the manual accelerator switch to the "DOWN" (🐢) position and check that the pulley rotates in the low idling direction for about three seconds and then the drive motor of the accelerator actuator stops. After that, with the motor stopped, pull back the cover of the loose spring on the engine stop-side cable and check that the spring still has some margin and is not completely compressed.



817S-00280E

(847S-0023-1E)

⚠ CAUTION

After you have kept the manual accelerator switch to the "DOWN" (🐢) side until the accelerator actuator drive motor stops, you will not be able to start the engine. In this situation move the manual accelerator switch to the "UP" (🐇) position for a moment and then start the engine.

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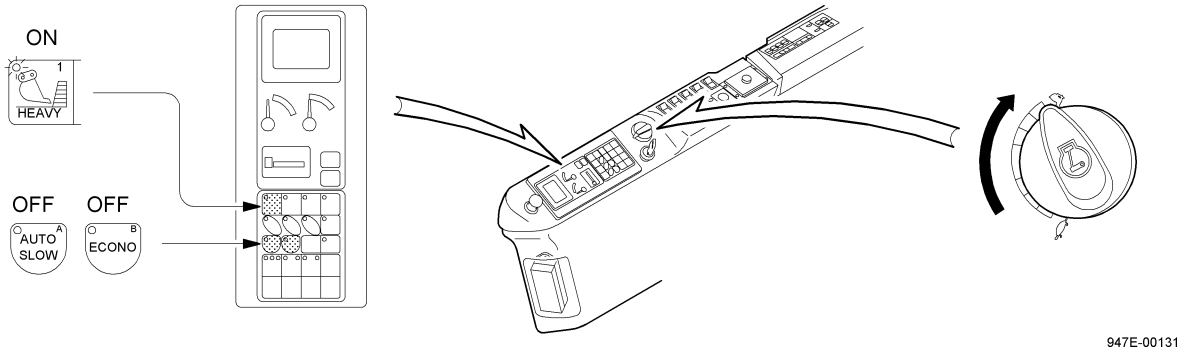
2-5 Automatic correction operation for the accelerator actuator cable (9470-0027-0E)

"APC100" which is mounted on this machine has the function of correcting the accelerator actuator cable automatically. When you have finished work, perform the following automatic correction operation more than once a week for 1－2 months after delivery of a new machine, and more than once a month thereafter.

Set the heavy duty operation mode "ON", econo mode "OFF" and auto-slow mode "OFF", and turn the accelerator dial to the "🐇" position not to put any load on the machine (with each control lever in the neutral position) for 5 seconds or more.



⚠ CAUTION (9470-0037-0E)

If the accelerator actuator cable is not corrected automatically, the engine speed may not reach the maximum speed even if the accelerator dial is set to the maximum speed position.

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2-6 Adjusting the engine control system (837S-0017-1E)

Switch the accelerator backup switch to the "AUTO" position to adjust the engine speed according to the following procedure.

<table>
<tr><th>No.</th><th>Subject</th><th>Working details</th><th>Adjustment</th><th>Data name</th><th>Rated value</th></tr>
<tr><td>1</td><td>Preparation - 1
Only applicable when the accelerator actuator has been replaced.</td><td>After the accelerator actuator has been replaced, check that it is correctly attached.
Caution
・ Replace the accelerator actuator with the starter switch "OFF".
・ When you replace the accelerator actuator, check that the supplied replacement is set for high idling. When you attach the new accelerator actuator cable, push the governor control lever of the engine injection pump fully to the high idling side.</td><td></td><td></td><td></td></tr>
<tr><td>2</td><td>Preparation - 2
Only applicable when the accelerator dial has been replaced.</td><td>After the accelerator dial has been replaced, follow the procedure below to attach the dial.
① Loosen the setscrew and detach the dial.
② Turn the shaft of the accelerator dial clockwise until it reaches the stopper.
③ Fit the dial onto the shaft so that the dial pointer mark points to the high idling position then turn the dial clockwise until it reaches the stopper.
④ Tighten the setscrew to fasten the dial securely onto the shaft.
⑤ Turn the accelerator dial fully back counterclockwise.</td><td></td><td></td><td></td></tr>
<tr><td>3</td><td>Power supply</td><td>Turn the starter switch to the "ON" position. When you do so, the accelerator actuator will move to the low idling position.</td><td></td><td></td><td></td></tr>
<tr><td>4</td><td>Switch and mode settings</td><td>Set each mode and switch as listed below.
<table>
<tr><th>Switch or mode name</th><th>Setting</th></tr>
<tr><td>Work mode</td><td>Heavy duty</td></tr>
<tr><td>Auto-slow mode</td><td>OFF</td></tr>
<tr><td>Econo mode</td><td>OFF</td></tr>
<tr><td>Accelerator backup switch</td><td>AUTO</td></tr>
<tr><td>APC mode</td><td>H</td></tr>
</table>
(937S-0069-0E)</td><td></td><td></td><td></td></tr>
</table>

(847S-0024-1E)

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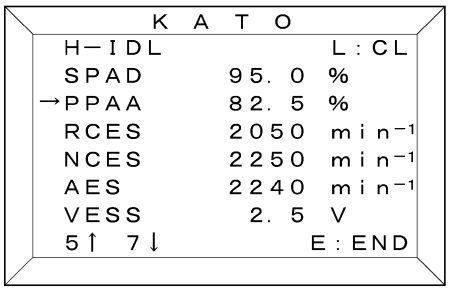
No.	Subject	Working details	Adjustment	Data name	Rated value
5	H-IDL menu display	① Switch to the ADJUST MODE. ② Select the 5. H-IDL menu.  937S-00300	K-L A D J 5		
6	Engine start	Start the engine and allow it adequate time to warm up.			
7	Delete the high idling correction value for automatic adjustment	Press switch "L" until you hear a "pip" sound which indicates that the high idling correction value for automatic adjustment has been deleted.	L	PPAA	
8	High idling speed adjustment	① Turn the accelerator dial fully clockwise until it reaches the stopper. When you do so, the accelerator actuator will move to the high idling position. ② Read the data item which is marked with the arrow on the display and confirm that it is the rated value.		SPAD PPAA	Approx. 95% 81.0 − 84.0%
		[IF NOT] ・ Use switches "5" and "7" to set the rated value.	5 / 7	PPAA	82.5%
		③ Check that the control lever (driven by the accelerator actuator) of the engine injection pump is lightly resting on the high idling stopper. ④ Check that the displayed Actual Engine Speed (AES) value is correct.		AES	Approx. 2250min^{-1} (rpm)
		[IF NOT] ・ Readjust the cables on the accelerator side and the engine stop side of the accelerator actuator.			

(937S-0070-0E)

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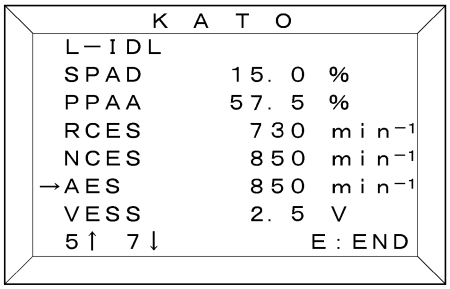
No.	Subject	Working details	Adjustment	Data name	Rated value
9	L-IDL menu display	① Press switch "E" to return to the ADJUST MODE. ② Select the 7. L-IDL menu.  937S-00310	E 7		
10	Low idling speed adjustment	① Turn the accelerator dial fully counterclockwise until it reaches the stopper. ② Read the data item which is marked with the arrow on the display and confirm that it is the rated value.		AES	850^{+50}_{0} min^{-1} (rpm)
		[IF NOT] ・ Use switches "5" and "7" to set the rated value.	5 / 7		
11	Recheck high idling speed	Turn the accelerator dial to the position of the stopper on the high idling side and confirm that the potentiometer position signal value (PPAA) and the Actual Engine Speed (AES) have their rated values.		PPAA AES	81.0 — 84.0% Approx. 2250min^{-1} (rpm)
		[IF NOT] ・ Readjust according to section No. 8 for high idling speed adjustment.			
12	Recheck low idling speed	Turn the accelerator dial to the position of the stopper on the low idling side and confirm that the potentiometer position signal value (PPAA) and the Actual Engine Speed (AES) have their rated values.		PPAA AES	51.6 ± 7% 850^{+50}_{0} min^{-1} (rpm)
		[IF NOT] ・ Readjust according to section No.10 for low idling speed adjustment, then adjust repeatedly according to section No.10 until you reach the rated values.			
13	Complete adjustment	① Press switch "E" to return to the ADJUST MODE. ② Press switch "E" again to return to the normal mode.	E E		

(937S-0071-0E)

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3. Data file (817S-0055-0E)

3-1 Engine (937S-0072-1E)

(1) Primary changes

Item	HD820Ⅲ	HD820Ⅱ
1) Engine name	Mitsubishi 6D34-TLE2A diesel engine	Mitsubishi 6D34-TE1 diesel engine
2) Rated output kW (PS)/min^{-1}	110 (150) /2050	107 (145) /2050
3) Engine dimensions (mm)	1365×790×995	1365×751×995
4) Engine dry mass (kg)	520	500
5) Cooling fan	ϕ 620×9 (speed increasing ratio 0.85)	ϕ 620×9 (speed increasing ratio 0.90)
6) V-belt length (mm)	1220	1195
7) Muffler, tail pipe	Low noise type	Standard type
8) Muffler fastening U-bolt	Band type	U-bolt
9) Air cleaner	Plastic type	Sheet metal type
10) Intercooler	○	×

(937S-0073-1E)

(2) Performance curves

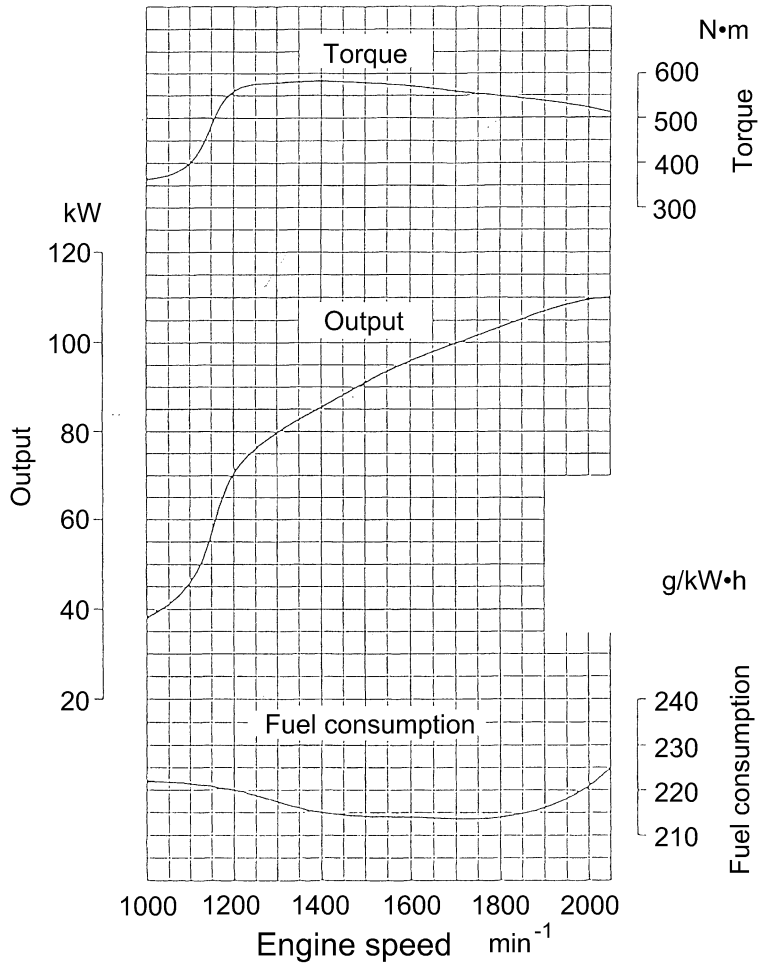
Standard JIS D0006-1994

Ambient condition: Temperature 298K

Dry barometric pressure 99kPa

(Total barometric pressure 100kPa, vapor pressure 1kPa)

Accessories: Fan, air cleaner, generator, without exhaust silencer



937S-00321

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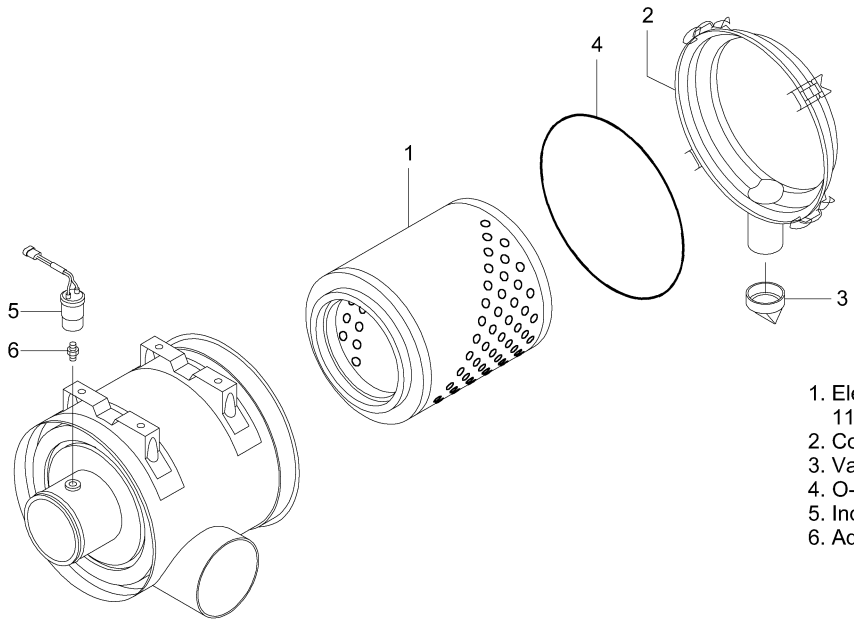
3-2 Consumable parts guide (937S-0017-0E)

Refer to the engine parts list for engine consumable parts such as an element etc.

[Consumable part name] Air cleaner element

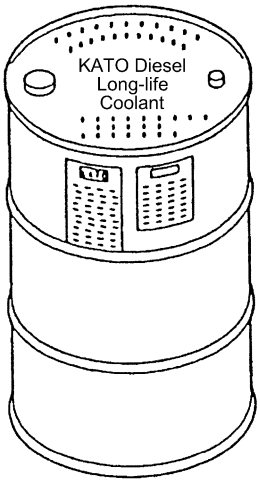


1. Element
   119-71201001
2. Cover
3. Valve
4. O-ring
5. Indicator
6. Adapter

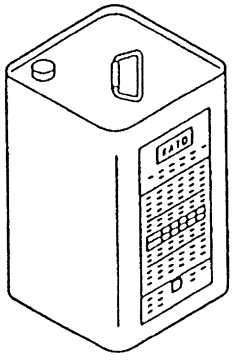
9370-00420E

Air cleaner assembly: 119-71200001

[Consumable part name] Long Life Coolant



200L
999-32053020



18L
999-32053010

7070-02543E

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E Hydraulic pump equipment

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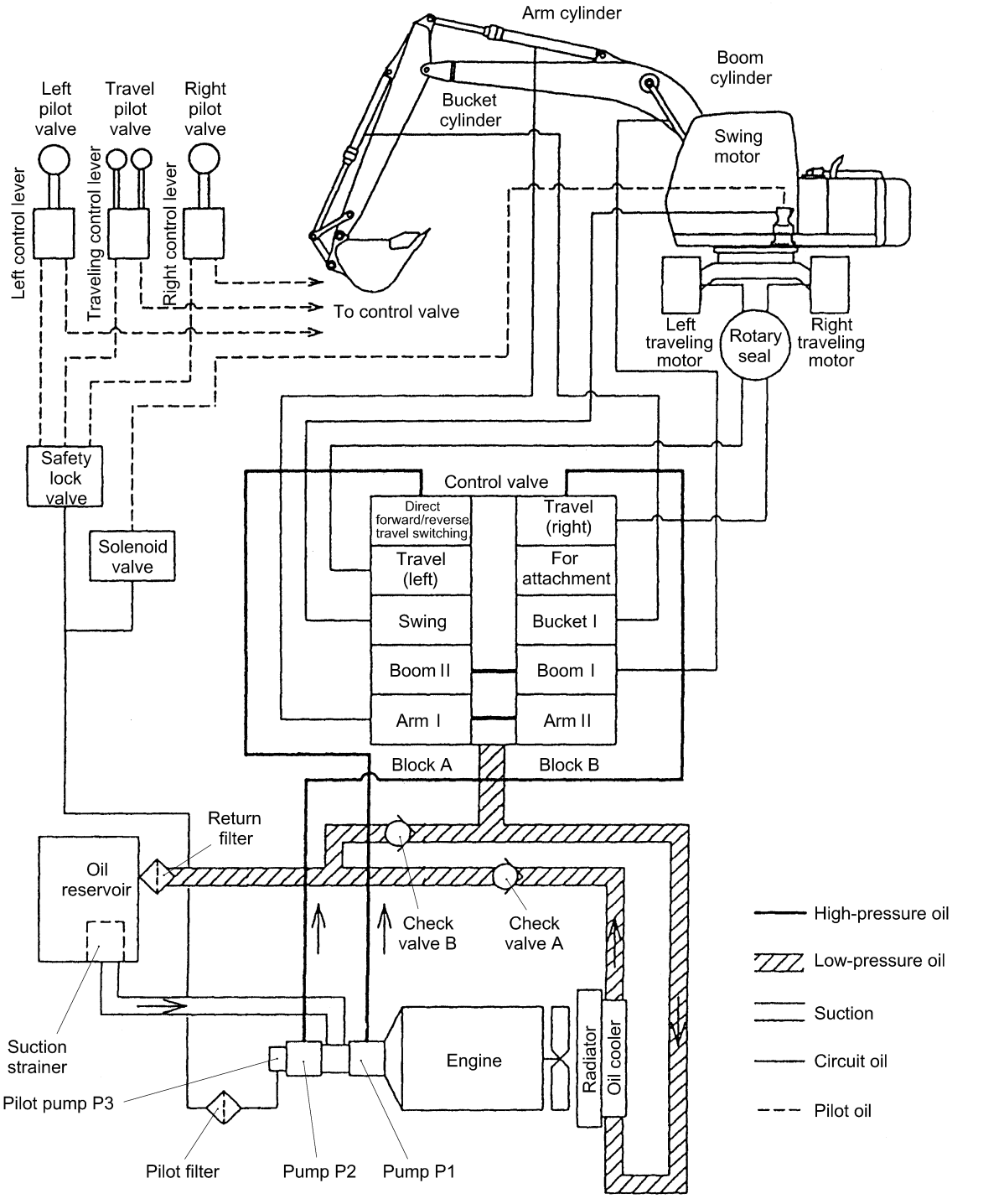
1. Main mechanism (837S-0012-3E)

This machine is equipped with a diesel engine as power source which drives hydraulic pumps to generate high hydraulic pressure. The pressurised oil produced passes through a circuit as detailed below to operate hydraulic motors and cylinders which are used for excavation, travel and swing in this fully hydraulic excavator.



The main components of this machine are the crawler-type lower structure, superstructure which carries the engine, pumps, operator's seat etc., and front attachment comprising the boom, arm and bucket.
Each part is operated by pressurised oil sent from two engine-driven pumps P1 and P2. Pressurised oil from pump P1 passes to the control valve in block A and pressurised oil from pump P2 passes to the control valve in block B. The right control lever controls the boom and bucket cylinders while the left control lever controls the arm cylinder and the swing motor. The central traveling control levers operate the right and left traveling motors respectively.
The hydraulic circuit of this machine is equipped with the following safety devices to ensure smooth work and safeguard the hydraulic circuit.

- Travel brake valve and parking brake
  When the machine is stopped, this automatic braking device operates to prevent the machine moving off down slopes or slipping on inclined roads, and the mechanical brake works securely when the machine is stopped and parked.
- Swing brake valve
  Maintains an appropriate amount of speed reduction of the superstructure to prevent motor damage caused by the shocks when swinging stops.
- Swing parking brake
  When swinging stops, this brake operates automatically to prevent the superstructure from swinging spontaneously on slopes.
- Anti-drift valve
  Built into the boom cylinder bottom and arm cylinder rod sides of the control valve to reduce spontaneous fall of the attachments.
- Main relief valve
  Built into the control valve to prevent damage to hydraulic equipment under overloads and to limit the working pressure of the hydraulic circuit.
- Overload relief valve
  Built into the cylinder ports of the control valve to restrict abnormally high pressures inside the cylinders generated by overloading and protect the cylinders, boom, arm and bucket.

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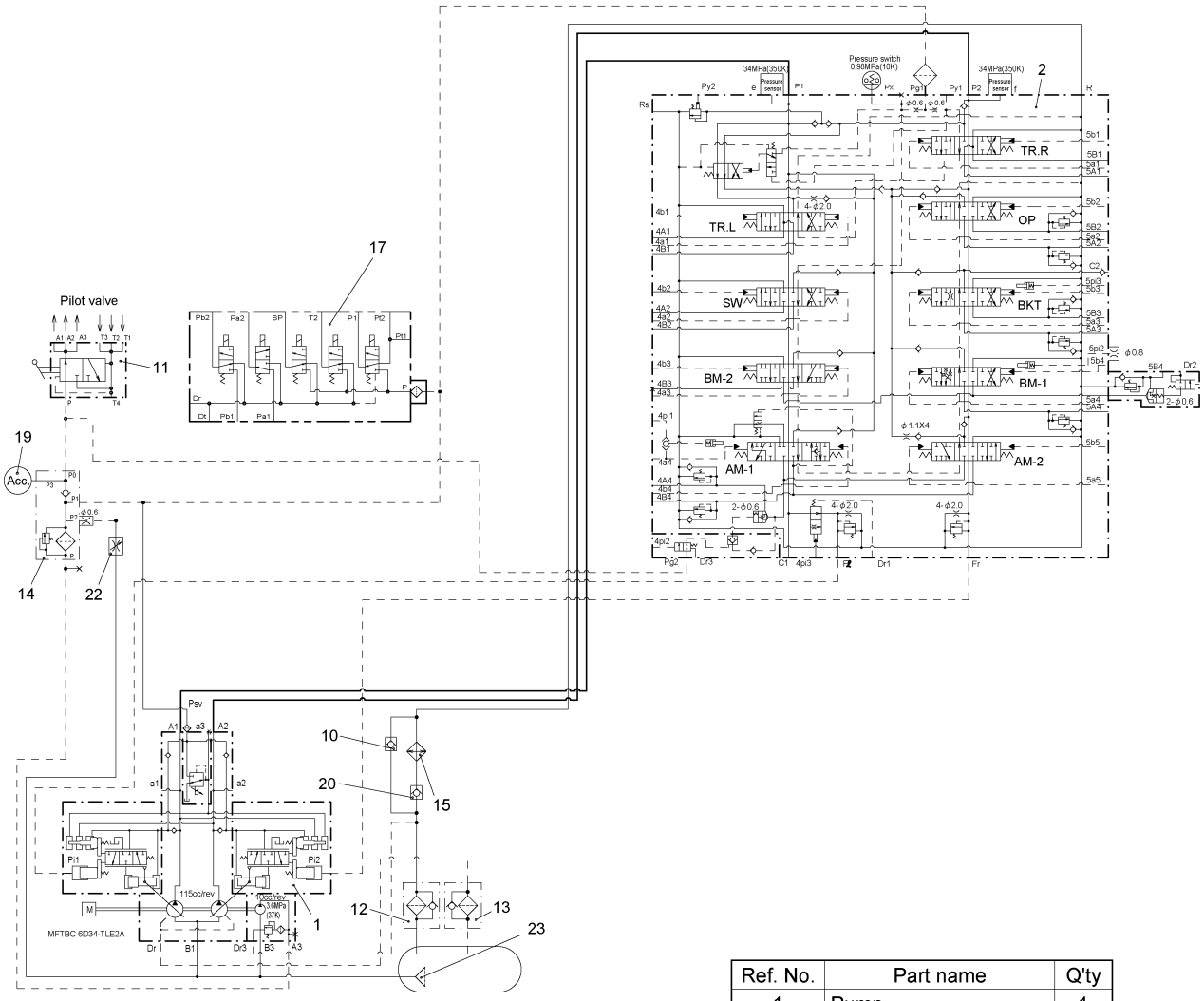
2. Hydraulic pump equipment (857S-0115-1E)

2-1 Pump circuit (837S-0020-0E)

2-1-1 Hydraulic circuit diagram (857S-0030-0E)



Ref. No.	Part name	Q'ty
1	Pump	1
2	Control valve	1
10	Check valve	1
11	Lock valve	1
12	Return filter	1
13	Drain filter	1
14	Pilot filter	1
15	Oil cooler	1
17	Solenoid valve	1
19	Accumulator	1
20	Check valve	1
22	Throttle valve	1
23	Suction strainer	1

937S-00092E

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2-1-2 Description of the pump circuit (837S-0020-3E)

This pump comprises two identical variable piston pumps, pumps P1 and P2, which are connected in line on a single input shaft. A pilot gear pump P3 is also attached. They generate three lines of high pressure.

The pressurised oil from pump P1 flows to block A of the control valve and is used for the left traveling motor, swing motor, speed increase of the boom cylinder extension side and arm cylinder.

The pressurised oil from pump P2 flows to block B of the control valve and is used for the right traveling motor, option, bucket cylinder, boom cylinders and speed increase of the arm cylinder.

The pressurised oil from pump P3 is reduced in pressure by an internal relief valve. It then passes through the safety lock valve to the pilot valves (right), (left) and (travel) for use as pilot pressure for switching the spools of the control valve.

The pressurised oil from pump P3 also flows to the solenoid block or control valve to operate various controls.

When the spools of the control valve are in the neutral positions, the pressurised oil from pumps P1 and P2 passes through the central bypass circuit of the control valve, turns the foot relief valve to "on-load" and flows from port R through the return filter to the oil reservoir. The foot relief valve creates a pressure in the central bypass circuit of the control valve. By sending this pilot pressure to the pump, the output volume of the pump is minimised when the spools of the control valve are in the neutral positions.

The return circuit incorporates an oil cooler which prevents excessive temperature rise in the oil flowing in the circuit. When the oil temperature is low, check valve [10] opens to restrict the oil to bypass the oil cooler, allowing the oil to flow directly back into the oil reservoir.

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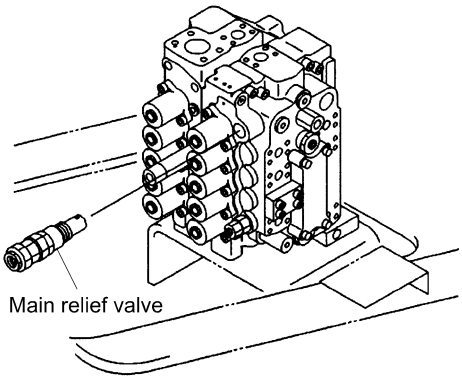
3. Measurement and adjustment of the pressure of pressurised oil (817S-0045-1E)

To ensure the safety of operation and of the hydraulic circuits themselves, the main circuit is fitted with a two-step main relief valve and the swing circuit is fitted with a swing relief valve. The pilot circuit is fitted with a pilot relief valve.

3-1 Two-step main relief valve (827S-0038-0E)

This is a single main relief valve built into the control valve which determines the lower pressure setting for use of the front attachment and the higher pressure setting for use of the traveling motors and high-power front attachment use.



837S-00630E

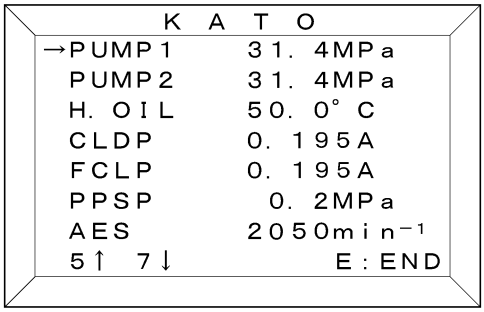
3-1-1 Pressure measurement method (847S-0028-1E)

(1) Turn the starter switch from "ON" to "START" to "ON" to start the engine.

(2) Set the work mode to "Heavy duty", the APC mode to "H", the auto-slow mode to OFF and the econo mode to OFF.

(3) Display the A PUMP1 or B PUMP2 data on the adjust mode menu screen.

(4) Warm up the engine following the instruction manual until the hydraulic oil temperature rises to 50 ± 5°C.



937S-00340

Note Hydraulic oil temperature is indicated as H.OIL on the adjust mode screen.

(5) Turn the accelerator dial fully clockwise to the high idling stopper position.

(6) Lift the boom or move the arm lever to full stroke and take readings of the relief pressures P1 and P2. (Low-pressure measurement)

(7) In this condition, press the high power switch ( ) on the right control lever and take readings of P1 and P2 during the following ten seconds. (High-pressure measurement)

Indicated pressures

MPa (kgf/cm^2)

	When no lever is moved	Relief when boom lifted or arm operated (low pressure)	With the high power switch activated in the condition on the left. (high pressure)
PUMP1	2.9 − 4.4 (30 − 45)	$31.4^{+0.98}_{0}$ (320^{+10}_{0})	$32.9^{+0.98}_{0}$ (335^{+10}_{0})
PUMP2	2.9 − 4.4 (30 − 45)	$31.4^{+0.98}_{0}$ (320^{+10}_{0})	$32.9^{+0.98}_{0}$ (335^{+10}_{0})

(857S-0156-0E)

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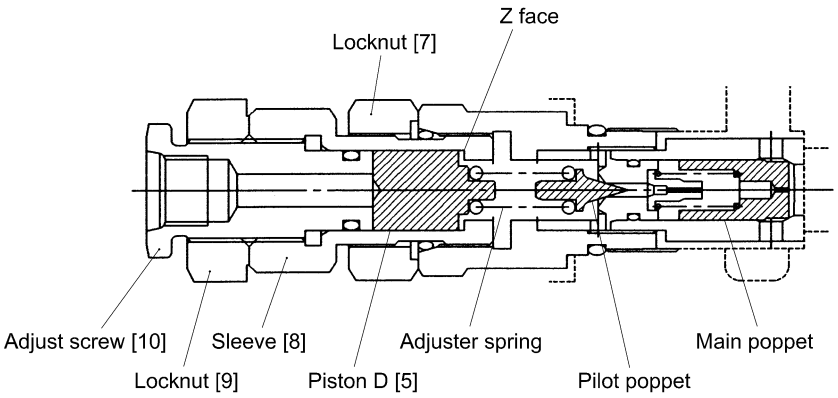
3-1-2 Main relief valve adjustment method (847S-0030-2E)

If high pressure adjustment is necessary, adjust 1) and 2). If low pressure adjustment is necessary, adjust 2) only.

(1) Main relief valve



837S-00641E

Note When you turn sleeve [8] and adjust screw [10], turn them reversely and so on to avoid applying excessive force on the adapter and hose attached to adjust screw [10].

1) High-pressure adjustment

- Unscrew locknut [7] and tighten adjust screw [10] until piston D [5] comes into contact with the Z face.
- Adjust sleeve [8] to adjust the high-pressure side pressure. After that, lock the position by tightening locknut [7].

2) Low-pressure adjustment

- Unscrew locknut [9] and loosen adjust screw [10] after high pressure adjustment to adjust the low-pressure side pressure. After that, lock the position by tightening locknut [9].
  One quarter turn of the adjust screw ≒ 10MPa (102kgf/cm^2)

3) After adjustment, return the adapter and hose attached to adjust screw [10] to their original positions.

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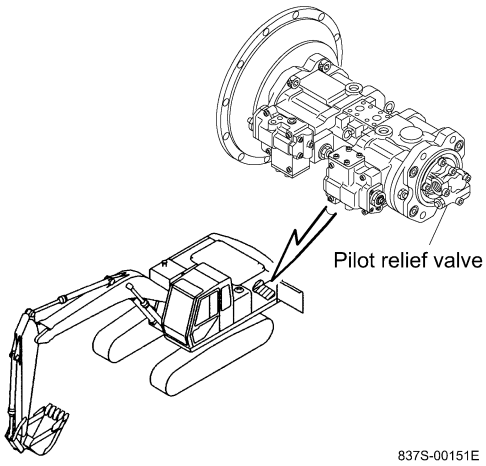
3-2 Pilot relief valve for the pilot hydraulic system (837S-0028-5E)

The pilot relief valve is built into the pilot gear pump which is connected in tandem to the main double pump. This hydraulic system is constantly pressurised to provide the hydraulic pressure for various switching functions.

1. Hydraulic pressure supply for the left and right control pilot valves and travel pilot valve
2. Hydraulic pressure supply through the solenoid valve for the swing parking brake, high power function and travel transmission switching etc.
3. Hydraulic pressure supply for the direct forward/reverse travel and travel pressure rise signals
4. Hydraulic pressure supply for the boom and arm holding valve release signals
5. Hydraulic pressure supply for the superstructure and travel pressure switches
6. APC proportional electromagnetic valve

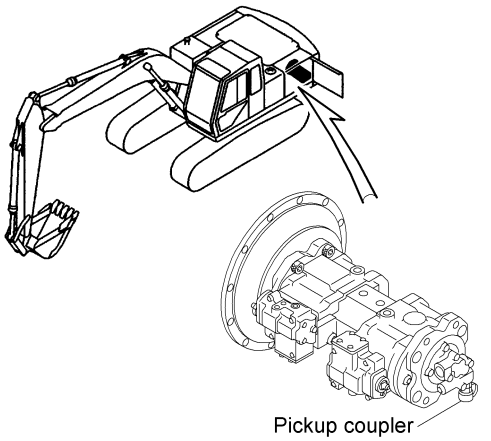


837S-00151E

Therefore if the pressure in this hydraulic system is too low or too high, it could cause problems.

3-2-1 Pressure measurement method (927S-0028-0E)

(1) Stop the engine and press on the air breather rubber cap on the oil reservoir to relieve air pressure in the reservoir.
(2) Connect the pressure gauge (0 － 9.8MPa) (0 － 100kgf/cm^2) to the pickup coupler on the outlet of the pilot gear pump.
(3) Turn the starter switch from "ON" to "STRAT" to "ON" to start the engine.
(4) Comfirm that there is no oil leakage from the gauge connection.
(5) Set the work mode to "Heavy duty", the APC mode to "H", the auto-slow mode to OFF and the econo mode to OFF.
(6) Warm up the engine following the instruction manual until the hydraulic oil temperature rises to 50 ± 5°C.



937S-00910E

(7) Turn the accelerator dial fully to the low idling and high idling stopper positions and read the each pressure indicated on the pressure gauge.

Note Pilot relief valve pressure at low idling: 3.14 － 3.43MPa (32 － 35kgf/cm^2)

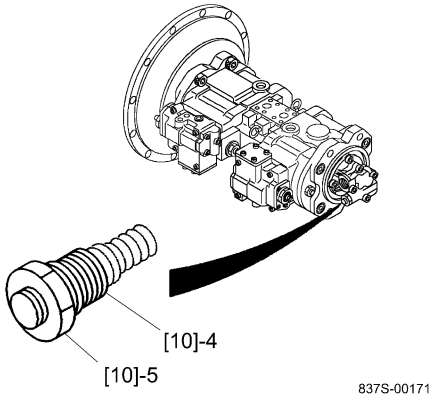
Note Pilot relief valve pressure at high idling: 3.43 － 4.22MPa (35 － 43kgf/cm^2)

3-2-2 Relief valve adjustment method and its adjustment amount (837S-0034-2E)

Use the relief valve which is built into the pilot gear pump to adjust the pressure.

(1) Loosen locknut ([10]-5) and turn adjust screw ([10]-4) to adjust the pressure then lock the screw position with locknut ([10]-5).

Note 1. Tightening torque: 29.4N･m (300kgf･cm)
2. One turn of the adjust screw ≒ 1.7MPa (17.4kgf/cm^2)



837S-00171

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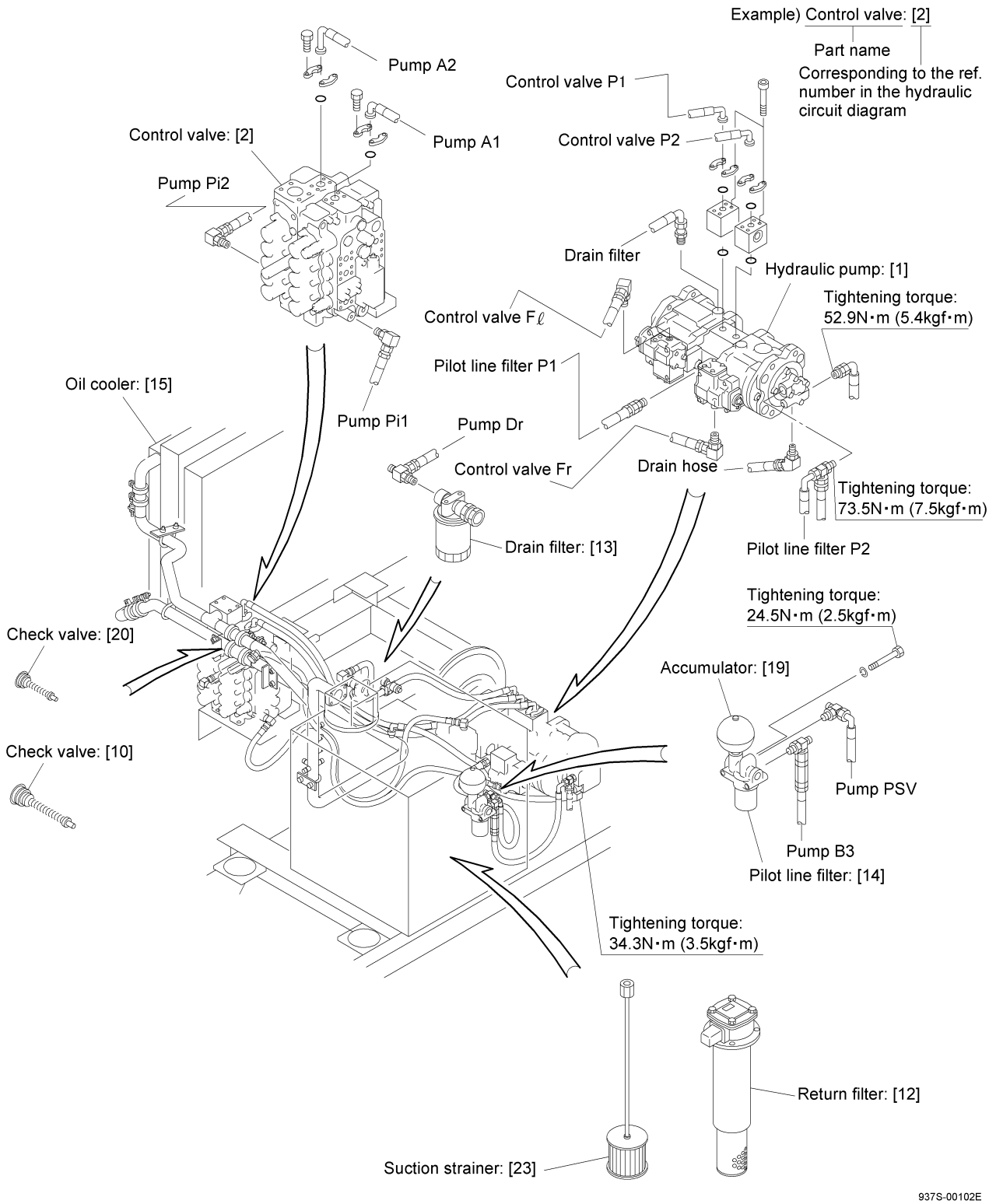
4. Equipment related to the hydraulic pump (937S-0111-0E)

4-1 Removal and mounting of the equipment related to the hydraulic pump

(937S-0112-0E)



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4-1-1 Maintenance of hydraulic devices (7670-0202-1E)

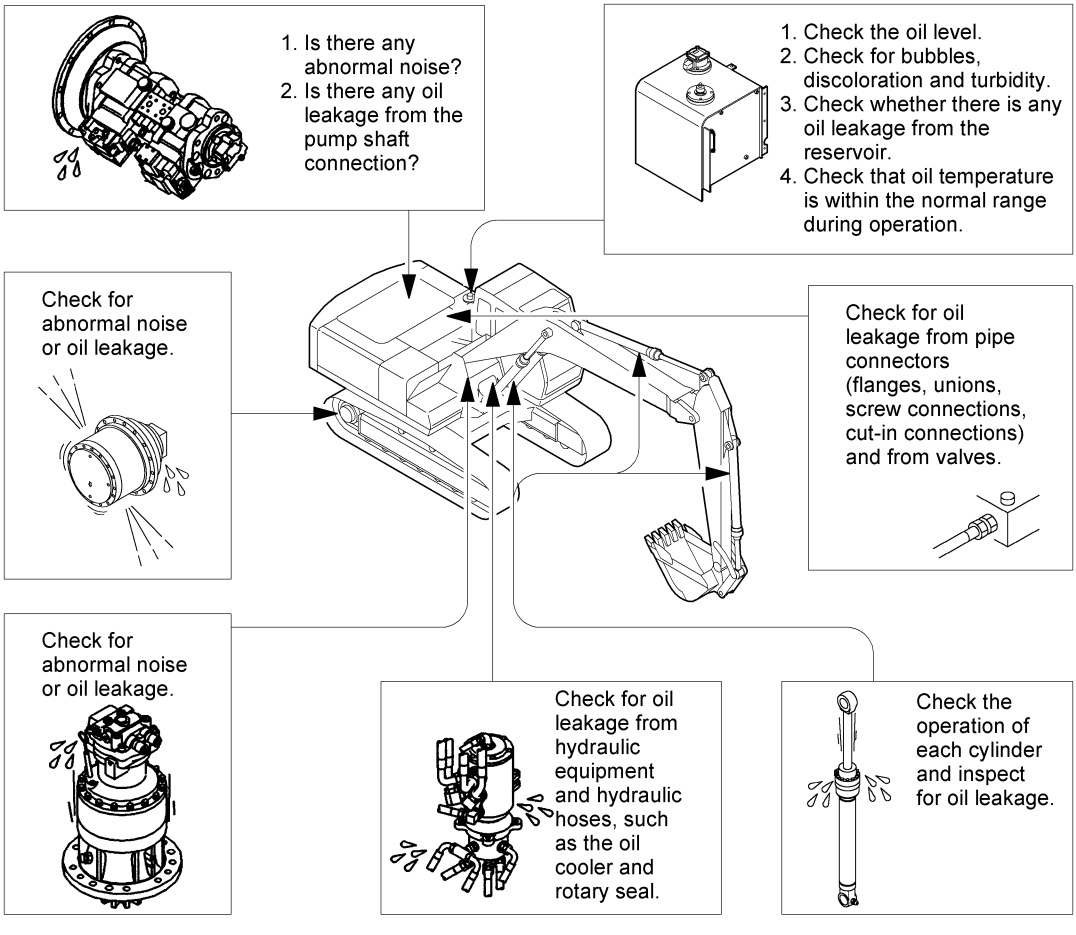
This machine is hydraulically powered and uses high-precision hydraulic equipment. Therefore if it is not operated and maintained correctly, its performance will be reduced and its lifespan shortened with an increased risk of malfunction. Always carry out the following daily inspections.

(8570-0084-1E)

⚠ WARNING

- Always relieve pressure on the oil reservoir before you inspect or service any hydraulic part or system.
- Never interfere with the pump regulator setting and relief settings of the control valve and brake valve.
- The bolts holding hydraulic equipment in place are under an extremely high force, so they are tightened to the right torque. In case of trouble, contact your authorised KATO dealer.
  Special bolts are used for attachment of hydraulic equipment, so you should not use normal commercially available ones which might cause breakdowns.
- If the hydraulic oil is hot, wait for it to cool before carrying out inspection and servicing.
  If you start work while the oil is hot, you risk severe burns.
- When you have replaced the hydraulic device, return filter or hydraulic oil, you should allow a running-in period of approximately 10 minutes at engine low speed with the control levers in their neutral positions (with no load applied).

(1) Daily inspection of hydraulic devices



9370-00242E

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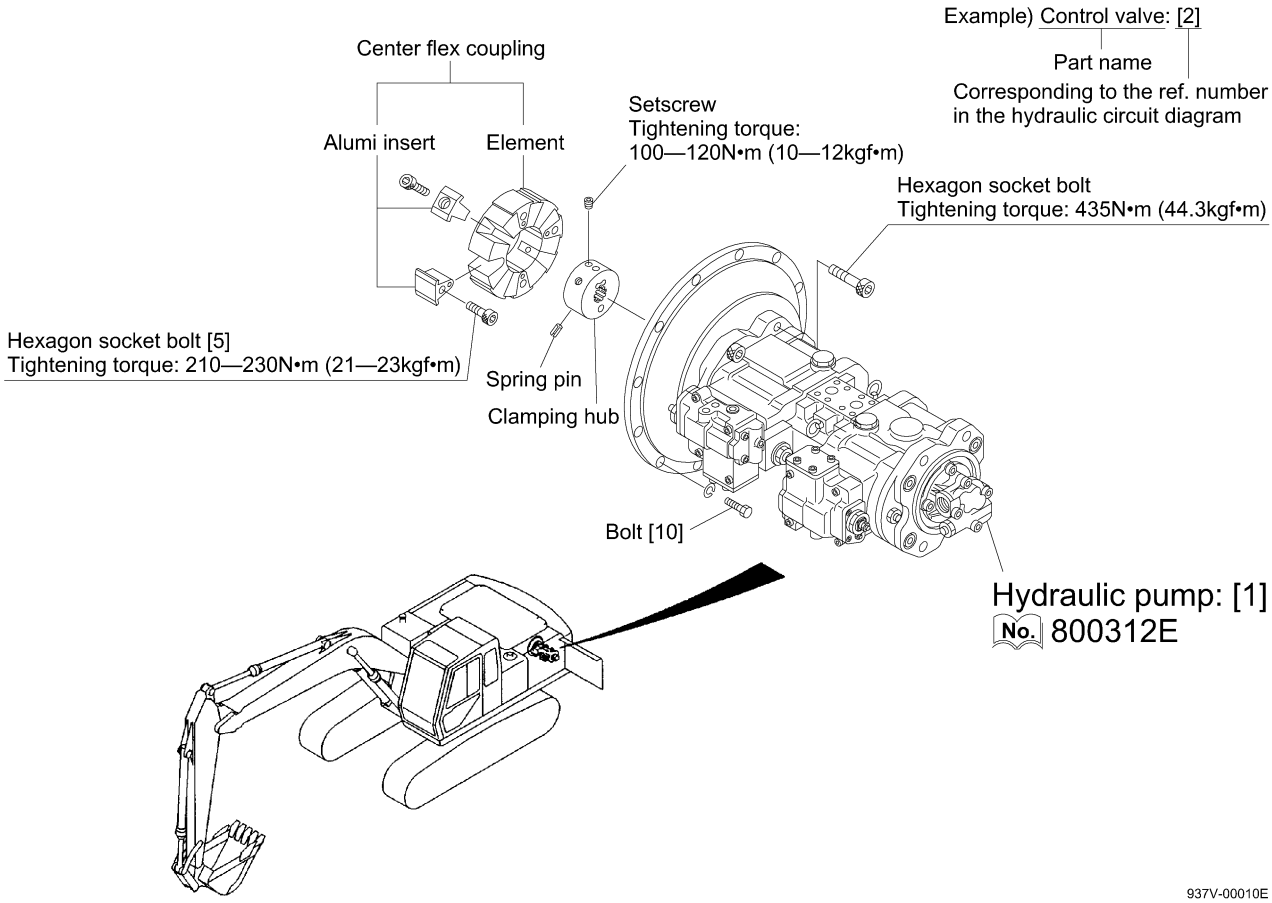
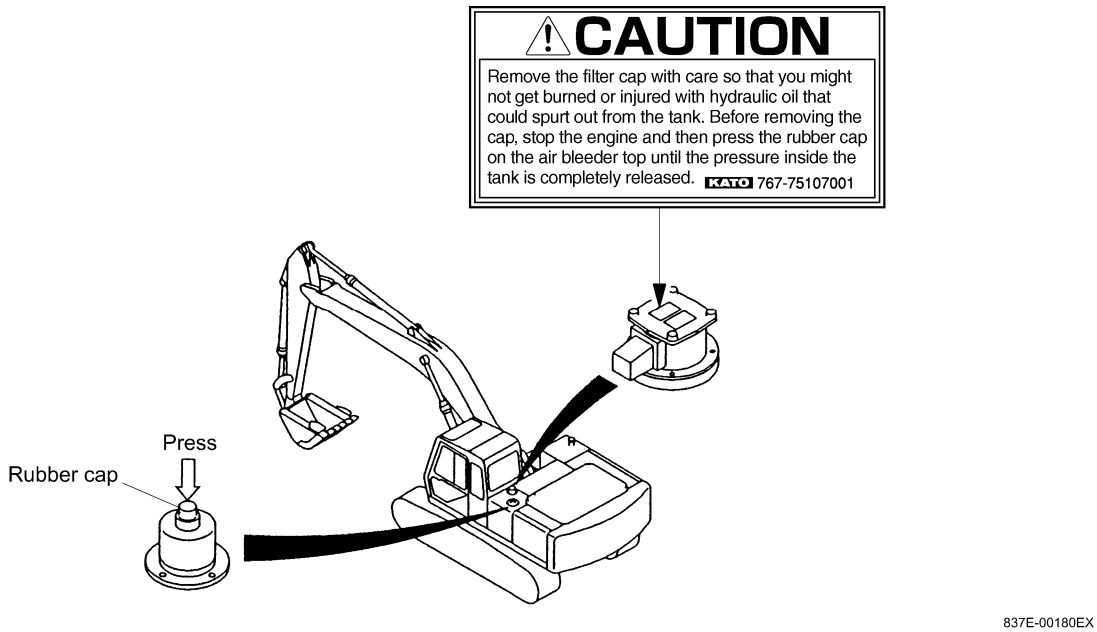
4-1-2 Pump and pump drive (937S-0020-0E)



(1) Reduction of pressure in the oil reservoir

When taking apart hydraulic piping or changing hydraulic oil, stop the engine and press on the air breather rubber cap. Start work after pressure has been completely relieved. When you refill with hydraulic oil, remove the cover from the return filter.



https://truckmanualshub.com/

(2) Removal

1) Disconnect all pipes and hoses from the pump.

Note 1. Mark each hose with the name of the corresponding port to prevent mistakes in reassembly.

2. Drain the hydraulic oil from the oil reservoir before you disconnect any hoses.

2) Arrange the sling wire rope to the pump and support it with a crane then undo bolts [10] to detach the pump from the engine. (Pump assembly mass: 126kg＋Pump cover mass: 15kg)

3) Remove hexagon socket bolts [5] and remove the coupling from the engine.

(3) Inspection and repair

1) Check that there are no cracks or other damage to the coupling.

(4) Mounting

Reverse the removal procedure to mount the pump with particular attention to the following points.

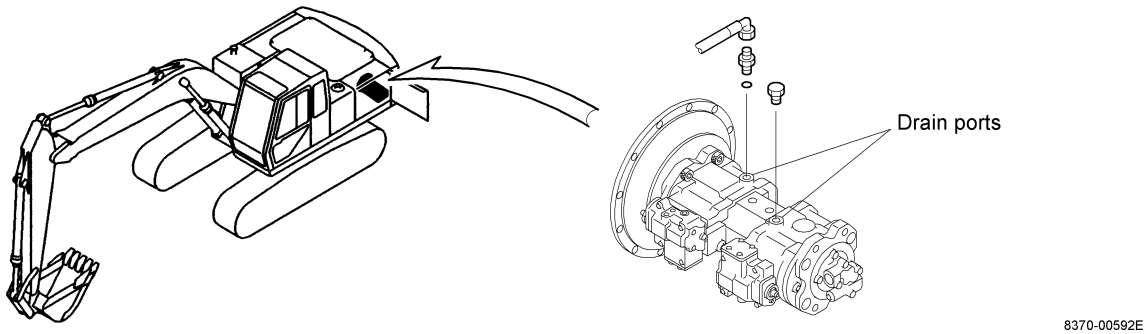
1) Tightening torque for bolts [5]: 210－230N･m (21－23kgf･m)

Always check that you have applied screw-lock compound.

2) Thoroughly wipe away all traces of oil and grease from the threaded parts of the bolts and always apply screw-lock compound to them before tightening them.

4-1-3 Extraction of air from the hydraulic pump (7270-0107-4E)

If you have replaced hydraulic oil or the hydraulic pump itself or removed the pump suction hose, you must go through the following air extraction procedure to extract air from the pump casing before starting the engine.



(1) Air extraction procedure

1) Fill the oil reservoir with hydraulic oil to the regulation level.

2) Open the drain ports on the top of the pump.

3) Pour hydraulic oil in through both ports to fill the pump casing.

4) Tighten both joints and hoses, and run the pump unloaded at engine low speed.

5) Loosen both joints and hoses a little and extract the air from the pump casing.

6) After confirming that the air is out, tighten both joints and hoses.

(8270-0184-1E)

⚠ CAUTION

- The pump will be damaged if it is run with air inside the casing. If you have replaced hydraulic oil or the pump itself or removed the pump suction hose, you must extract air from the pump casing.
- Air extraction from the pump casing and hydraulic circuits must always be done with the pump unloaded at engine low speed. At engine medium speed or more or with the pump under load, air can enter the pump and damage it.

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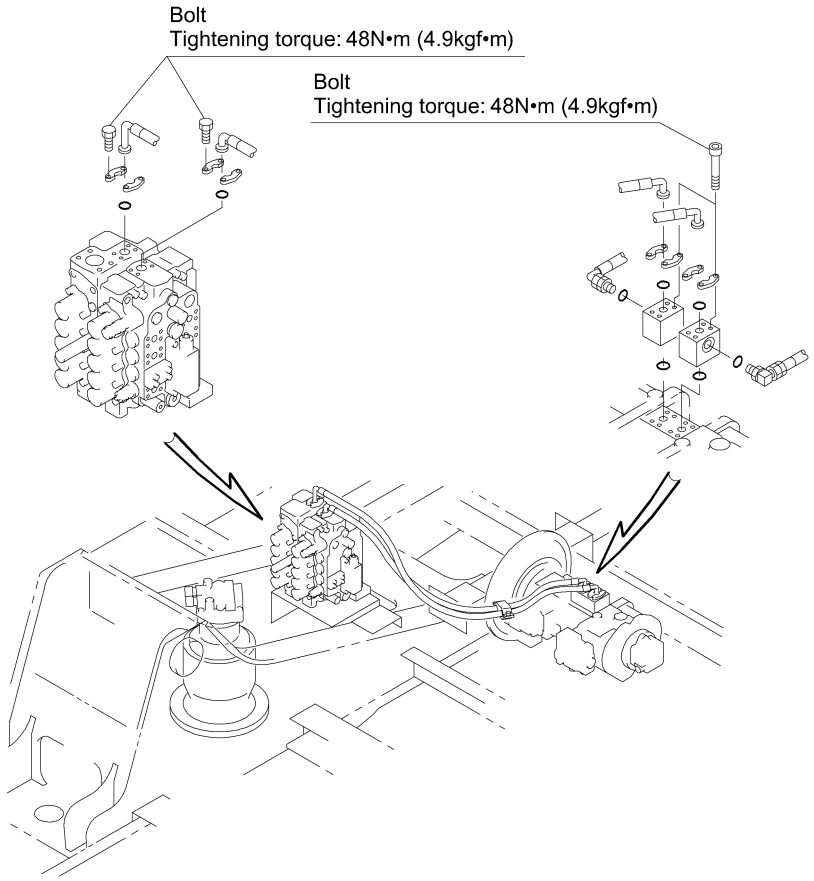
4-1-4 Replacement of the pump discharge hose (767S-0224-0E)



937S-00131E

⚠ CAUTION (937S-0122-0E)

The pump discharge hose and tail hose are designated as safety parts for periodic replacement and as such they must be replaced every 2 years or every 4000 hours of use, whichever occurs sooner.

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4-1-5 Control valve (937S-0021-1E)

(1) Removal

1) Disconnect all pipes, hoses and harnesses that are connected to the control valve.

Note 1. Mark each hose with the name of the corresponding port to prevent mistakes in reassembly.

2. Drain the hydraulic oil from the oil reservoir before you disconnect any hoses or pipes.

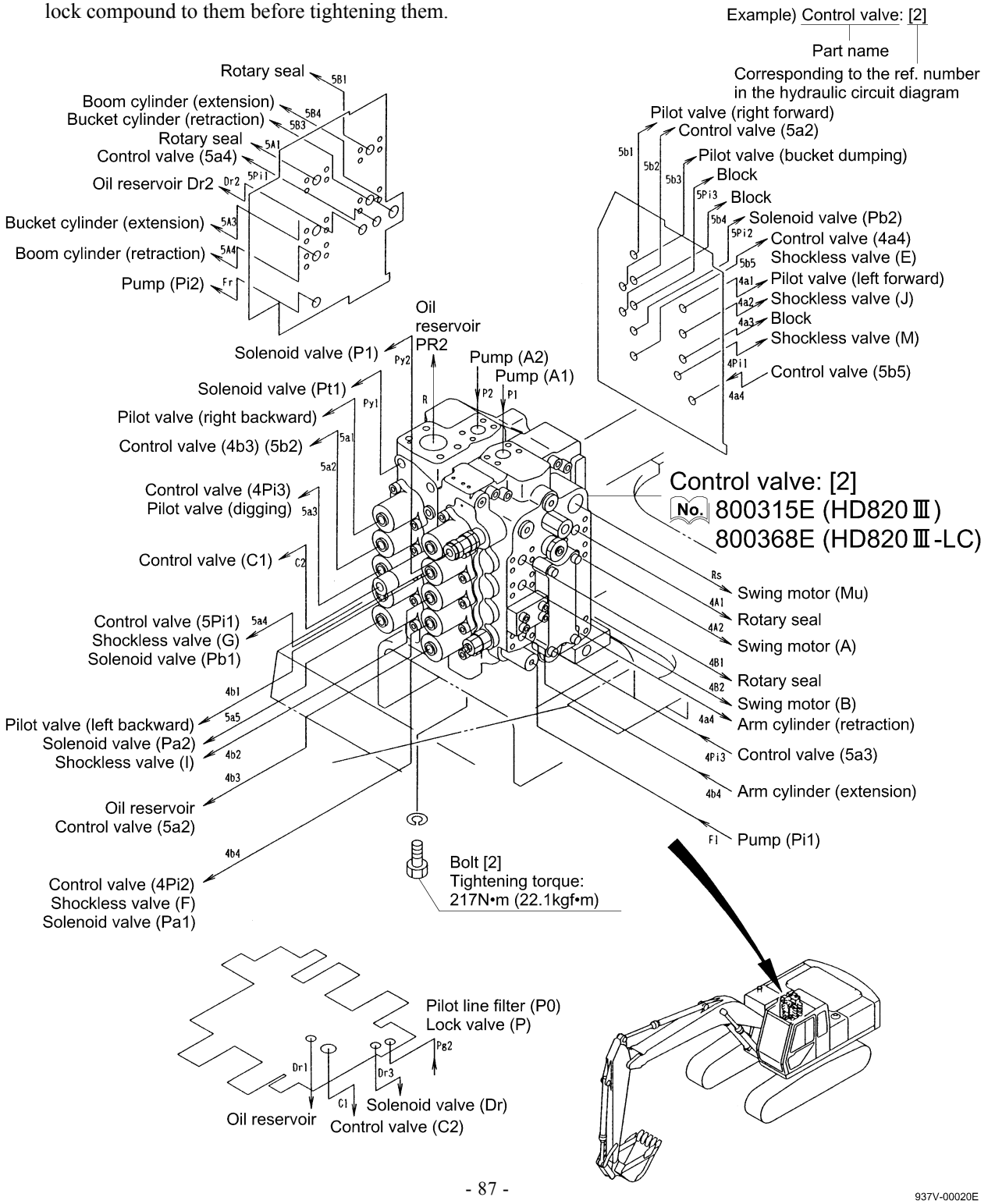
2) Attach the sling wire rope to the control valve and support it with a crane. Then remove bolts [2] and remove the valve from the slewing table. (Mass of the valve: 181kg)

(2) Mounting

Reverse the removal procedure to mount the control valve with particular attention to the following points.

1) Tightening torque for control valve mounting bolts [2]: 217N・m (22.1kgf・m)

2) Thoroughly wipe away all traces of oil and grease from the threaded parts of the bolts and always apply screw-lock compound to them before tightening them.



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4-1-6 Replacement of the air breather element (7670-0205-1E)

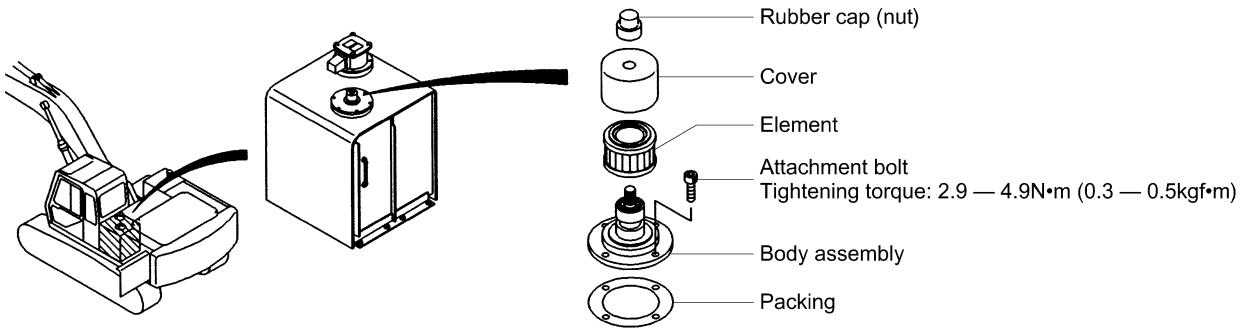
(8270-0188-1E)

⚠ WARNING

- Relieve pressure in the oil reservoir before you start to replace the air breather element.
- The hydraulic oil will be hot immediately after the engine stops, so wait until it cools to 40°C and less before you start work.

(1) Replacement procedure

1) Press on the rubber cap to extract the pressurised air inside the reservoir.
2) Turn the cover about 90° clockwise and remove the cap turning counterclockwise.
   Then turn the cover counterclockwise to remove and detach the element.
3) Place a new element and fasten the cover turning clockwise until it touches the element inside. Further turn the cover 90° to fasten.
4) Finally fasten the cap tightly by hand.



(2) Replacement interval

Replacement interval …… At the time of hydraulic oil change and every 1000 hours of operation or yearly

(3) Consumable part number

Refer to the "Consumable parts guide".

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4-1-7 Cleaning and replacement of the suction strainer (7670-0206-1E)

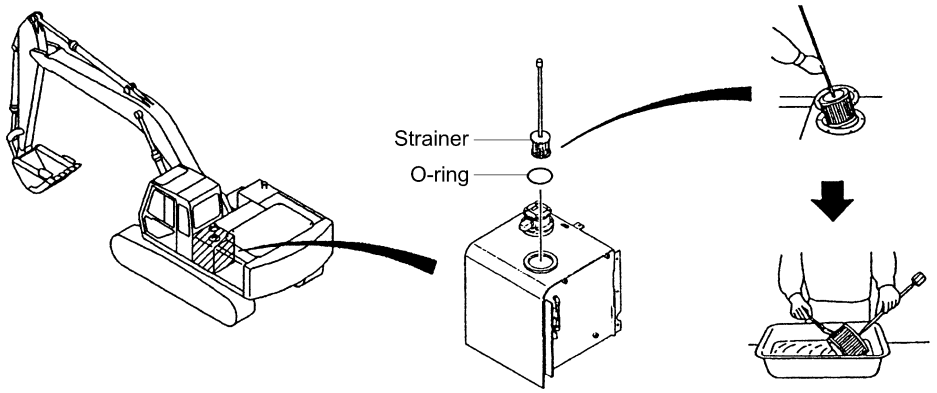
(1) Cleaning and replacement procedure

1) Relieve pressure from the oil reservoir.

2) Remove the strainer from inside the oil reservoir.

3) Clean the strainer with a clean, non-flammable solvent and dry it thoroughly.

4) Inspect the strainer and O-ring and replace them if they are damaged.



8370-00641E

(2) Cleaning and replacement intervals

Cleaning interval ····· When you change the hydraulic oil

Replacement interval ····· When defective

(3) Consumable part number

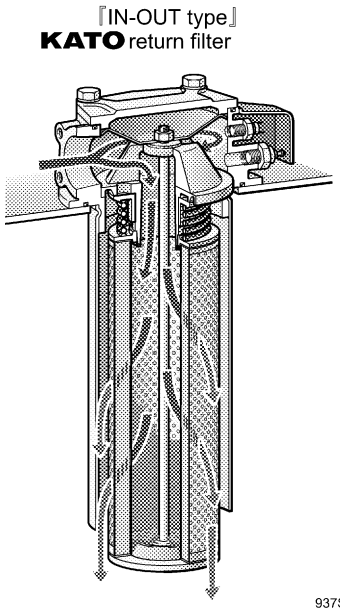
Refer to the "Consumable parts guide".

4-1-8 Replacement of the return filter element (937S-0076-4E)

(1) Structure of the KATO return filter

The structure of the KATO return filter is as shown in the diagram to the right. The hydraulic oil flows from the inside to the outside of the element to collect the captured dirt into the element, so the dirt does not flow into the oil reservoir structurally when the element is replaced to remove the dirt.

If the element is replaced carelessly, the dirt may get in the hydraulic circuit. Follow the correct procedure and replace the element with care.



937S-00350E

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(2) Preparation

Prepare the following for element replacement.

1) Genuine KATO elements

(937S-0077-2E)

⚠ CAUTION

The size and number of the filter vary with the type of the machine. If you use the breaker, be sure to use the high-performance filter. Always use the genuine KATO filter elements. An imitation element is not guaranteed for performance and durability. If the worst comes to the worst, it could be damaged early and have an adverse effect on the hydraulic equipment. If an imitation filter is used, the hydraulic equipment is not guaranteed.

2) Clean tray which is already washed: (300mm × 450mm or equivalent)

3) Clean paper or cloth: with no nap

4) Hydraulic oil (cleaning fluid): the same new hydraulic oil as the machine is using

5) Ratchet wrench

6) 19mm box wrench

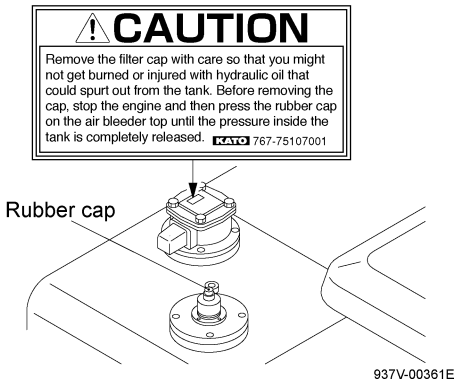
7) O-ring (for the cover)

(3) Operation before replacement

Before replacing the elements, run the engine at medium speed (1000 – 1200min^{-1}) and perform traveling, swing, bucket, arm and boom operation in that order for two minutes respectively to collect the dirt into the return filters from the hydraulic circuit. Then stop the engine.

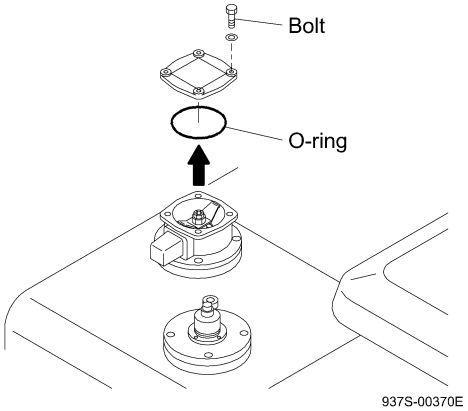
(4) Reduction of pressure in the oil reservoir

Press the top of the rubber cap to relieve pressurized air in the reservoir.

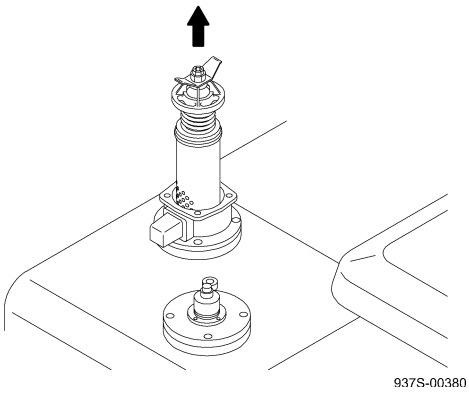


(5) Disassembly procedure

1) Unscrew the four bolts on the filter cover to remove the cover and O-ring from the filter case.



2) Pull the element assembly out of the filter case.



(937S-0079-0E)

⚠ CAUTION

Hold the spring and put the underside of the element on the inside flange of the filter case for about ten minutes to drain the oil from the filter assembly.

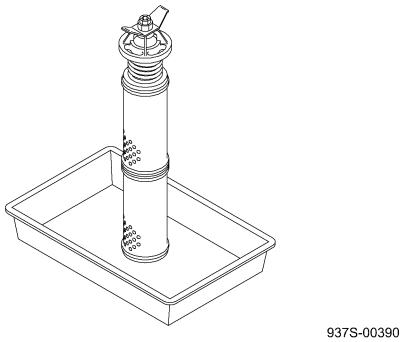
3) After pulling out the element assembly, put the removed cover onto the filter case to prevent entry of dirt or dust into the reservoir.

(937S-0080-0E)

⚠ CAUTION

Do not replace the elements in a dusty workplace.
The wind contains dust, so take an appropriate action for protection against the wind in a windy workplace before replacing the elements.

4) Put the element assembly from which the oil is drained onto the tray.



(937S-0081-0E)

⚠ CAUTION

Use the washed tray. If the tray is dirty, it makes the lower part of the center bolt of the element assembly dirty. If the tray is not washed thoroughly, the hydraulic oil could be contaminated by the dirt, so caution is required.

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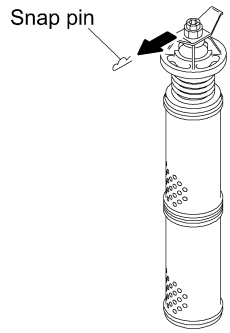
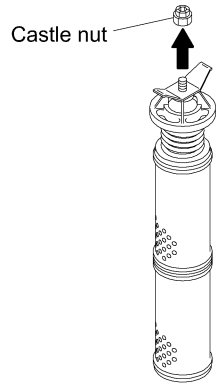
5) Extract the snap pin from the center bolt on the top of the element assembly.



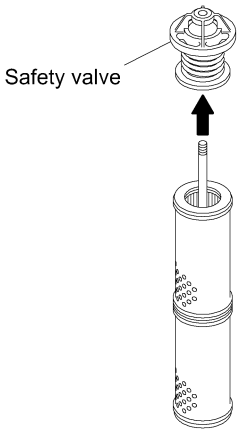
937S-00400E

6) Unscrew the castle nut to remove the spring from the center bolt.



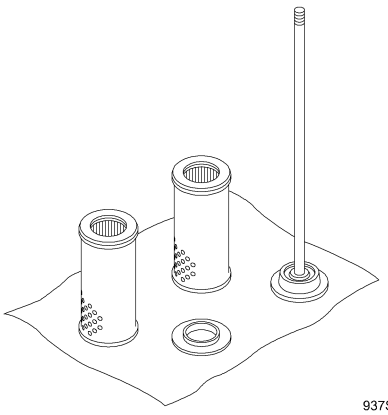
937S-00410E

7) Extract the safety valve from the center bolt.



937S-00420E

8) Remove the center bolt from the elements, and separate the two elements and the retainer.



937S-00430

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(6) Cleaning and inspection

1) Thoroughly clean the component parts of the element assembly except the elements using the new hydraulic oil which is prepared in advance.

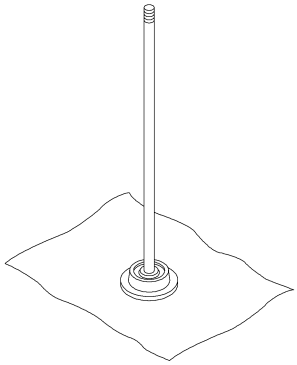
2) Cover the washed parts with a cloth etc. which is prepared in advance to prevent dirt adhesion.

3) Check the O-ring. If it is damaged or stretched, replace it with new one.

(7) Assembly of the element assembly

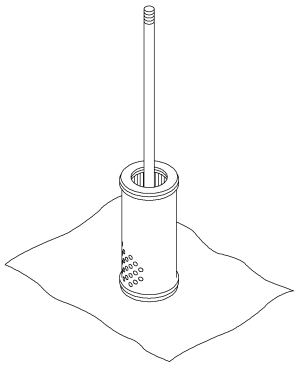
Follow the procedure below to assemble the new elements.

1) Prepare the clean paper or cloth for element assembly.



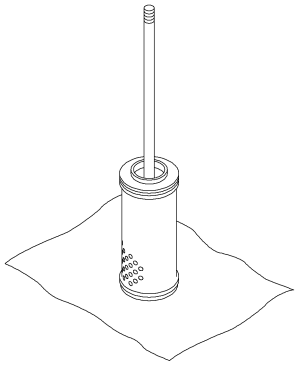
937S-00440

2) Assemble one element to the center bolt.



937S-00450

3) Attach the retainer onto the assembled element.



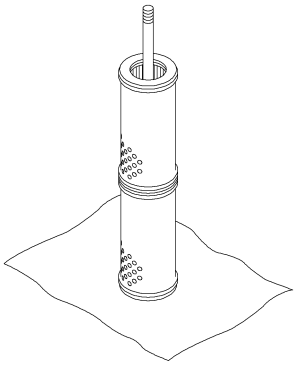
937S-00460

(937S-0082-1E)

⚠ CAUTION

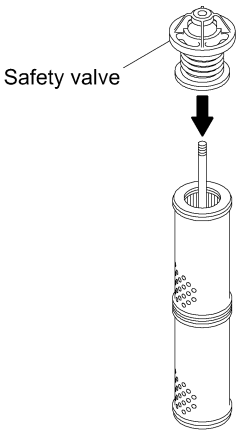
Do not forget to attach the retainer.

4) Assemble the other element onto the retainer.



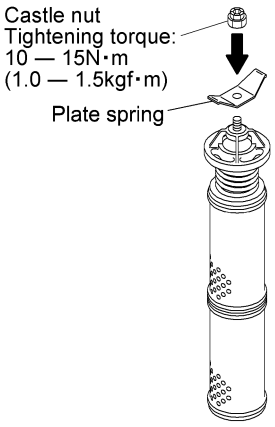
937S-00470

5) Attach the safety valve to the elements.



937S-00480E

6) Attach the plate spring onto the safety valve. Tighten the castle nut to the center bolt to the regulation torque.
Tightening torque: 10－15N･m (1.0－1.5kgf･m)



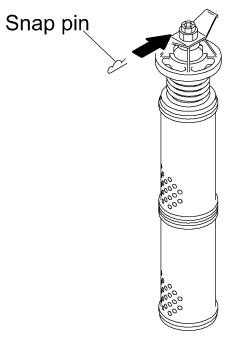
937S-00491E

(8270-0189-1E)

⚠ CAUTION

If the tightening force on the castle nut is insufficient, the filter can not work efficiently. Tighten it to the regulation torque.

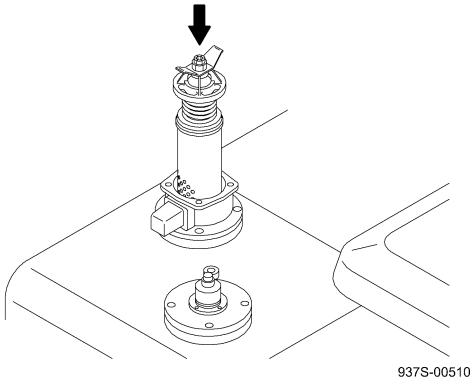
7) Insert the snap pin into the center bolt.



937S-00500E

https://truckmanualshub.com/

8) Hold the plate spring and store the element assembly into the filter case.



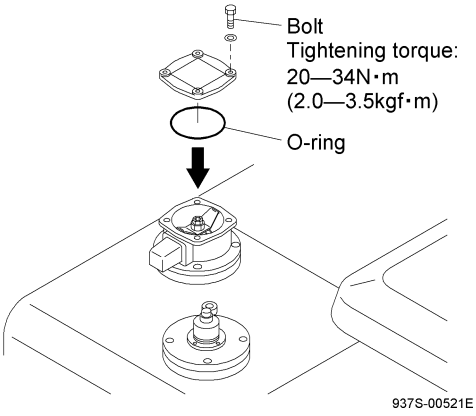
(937S-0106-0E)

⚠ CAUTION

When storing the element assembly into the filter case, keep the elements not to come into contact with the other parts so that the elements do not get dirty.

9) Check the O-ring for damage again. Then attach the O-ring in place and put the cover onto the filter case.

10) Attach the washers to the four bolts and tighten the cover to the filter case to the regulation torque.
Tightening torque: 20－34N･m (2.0－3.5kgf･m)



(8) Element replacement interval

Replacement interval …… Every 500 hours of operation or six months
After delivery of a new machine or right after the hydraulic oil is changed, the elements should be replaced after 150 hours of operation. Also when you change the hydraulic oil, they should be replaced.

(9) Consumable part number

Refer to the "Consumable parts guide".

(937V-0018-0E)

⚠ CAUTION

- You cannot wash the return filter element and reuse it. Always use a new, genuine KATO, filter element.
- If you are using the hydraulic breaker, replace the standard filter element with a high-performance type.
- When you have replaced the return filter, you should allow a running-in period of approximately 10 minutes at engine low speed with the control levers in their neutral positions (with no load applied).

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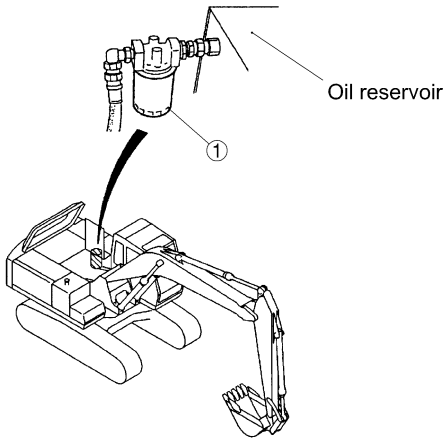
4-1-9 Replacement of the drain filter cartridge (7770-0099-3E)

(1) Cartridge replacement procedure

1) Relieve air pressure in the reservoir.
2) Use the specified wrench to remove the cartridge ①.
3) When fitting a new cartridge, coat the packing surface with clean hydraulic oil and turn the cartridge through approximately 2/3 of a turn after the packing contacts the seal surface.
4) Start the engine and check that no oil leaks through the seal surface.



8370-00660E

(2) Cartridge replacement interval

Replacement interval ····· Every 1000 hours of operation or yearly

After delivery of a new machine, the cartridge should be replaced after 150 hours of operation.

(3) Consumable part number

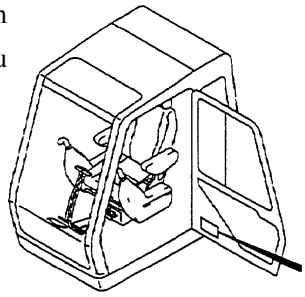
Refer to the "Consumable parts guide".

⚠ CAUTION (8270-0191-0E)

- You cannot wash the cartridge and reuse it.
- Always use a new, genuine KATO, filter cartridge.

4-1-10 Recording when replacing the return filter element (7670-0209-2E)

There is a label stuck to the inside of the cab door for you to record when you replace the filter element. Be sure to stick the sticker when you change the filter element.



There are stickers inside the box of the return filter element. Stick the stickers here corresponding to the replacement date when you replace the filter element.

7670-00951E

Replacement of Return Filter Element

- Replace paper element of the filter in 150 operating hours for the first time and then, every 500 hours.
- Replace paper element of the filter at the replacement of hydraulic oil and also in 150 hours after the replacement of hydraulic oil.
- Put the sticker for year and month of replacement on following space.

150h	500h	1000h	1500h	2000h	2500h	3000h	3500h	4000h	4500h
Y / M									
5000h	5500h	6000h	6500h	7000h	7500h	8000h	8500h	9000h	9500h

CAUTION

- Replace cartridge after first 150 hours-run and then every 1000 hours.
- Remove old cartridge with special wrench. For replacement with new cartridge, apply oil to packing seal and tighten 2/3 turn by hand after packing contacts base.
- Start engine and check for leaks, be sure to fill oil up to level.

KATO 837-75104002

837-75104002a

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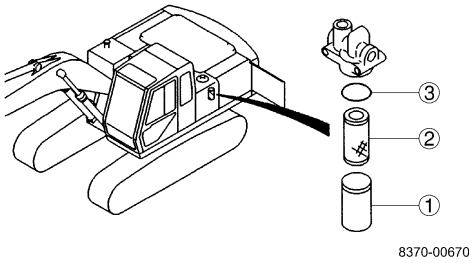
4-1-11 Replacement of the pilot line filter element (7770-0100-3E)

(1) Replacement procedure

Follow this procedure to replace the element.

1) Relieve air pressure in the reservoir.
2) Unscrew the filter case ① and pull it off downward then turn the filter element ② while pulling it off downward.
3) When reassembling, replace the element ② and O-ring ③ with new ones.
4) Tighten the filter case ① to the head assembly at the regulation torque.

Case ① tightening torque: 78.4 ± 4.9N·m (8 ± 0.5kgf·m)



8370-00670

(8270-0192-1E)

⚠ CAUTION

- You cannot wash the filter element and reuse it.
- Always replace with a new, genuine KATO, filter element.
- When replacing the element, take care that the hydraulic oil will not splash onto the accelerator actuator.

(2) Element replacement interval

Replacement interval ····· Every 1000 hours of operation or yearly

(3) Consumable part number

Refer to the "Consumable parts guide".

4-1-12 Accumulator handling (7670-0212-2E)

(8270-0193-1E)

⚠ WARNING

In this machine fitted with an accumulator, the front attachment will fall under its own weight if the control lever is moved for the attachment to lower within a few minutes after the engine has stopped.

After the engine has stopped, move the safety lock lever to the lock position and lock the optional attachment control pedal with its lock pin.

High-pressure nitrogen gas is sealed into the accumulator, so any inappropriate handling is potentially highly dangerous. Strictly observe the following points.

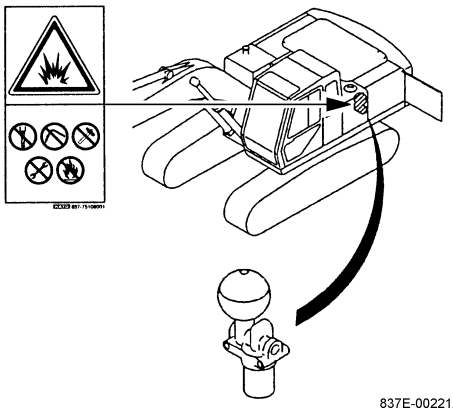
- Never pierce the accumulator or bring it near a fire or other source of heat.
- Do not weld a boss etc. onto the accumulator.
- When disposing of the accumulator, the enclosed gas must be released. Contact your authorised KATO dealer.

An accumulator is fitted in the control circuit as a pressure-accumulation device. It allows the control circuit to go on functioning for one or two minutes after the engine stops.

Therefore if you move the control lever to lower the front attachment, it is able to move down under its own weight.

You can also release residual pressure in each circuit (boom, bucket, arm) by moving the control levers in this condition.

The accumulator is fitted as shown in the diagram on the right.


837E-00221X

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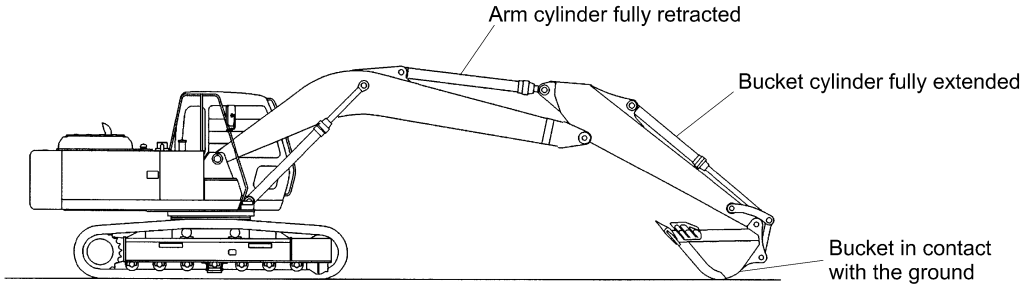
4-2 Hydraulic oil replacement and flushing (857S-0112-0E)

4-2-1 Hydraulic oil replacement (8470-0044-4E)

(1) Oil level check

Check the level of hydraulic oil every day.

The level of oil in the oil reservoir varies with the extension and retraction of the cylinders, so to check the oil level, first fully retract the arm cylinder and fully extend the bucket cylinder as shown in the diagram and place the bucket on level ground.



Hydraulic oil level inspection and filling position

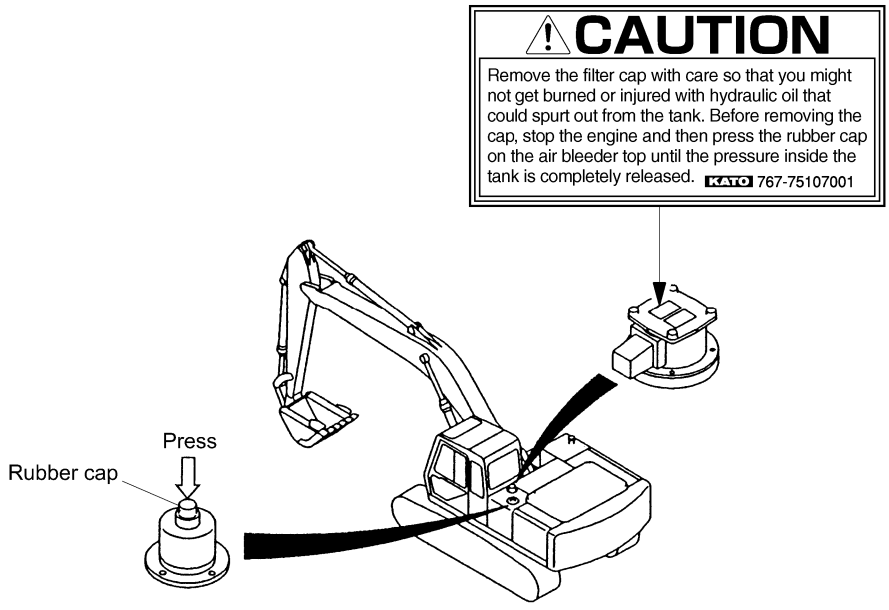
9370-00370E

⚠ CAUTION (8270-0185-1E)

If you overfill with hydraulic oil, there will be insufficient air space in the oil reservoir, so when the oil level rises, the pressure in the oil reservoir will rise excessively, possibly causing breakage in the pipe system. Keep to the regulation volume.

(2) Reduction of pressure in the oil reservoir

When taking apart hydraulic piping or changing hydraulic oil, stop the engine and press on the air breather rubber cap. Start work after pressure has been completely relieved. When you refill with hydraulic oil, remove the cover from the return filter.



837E-00180EX

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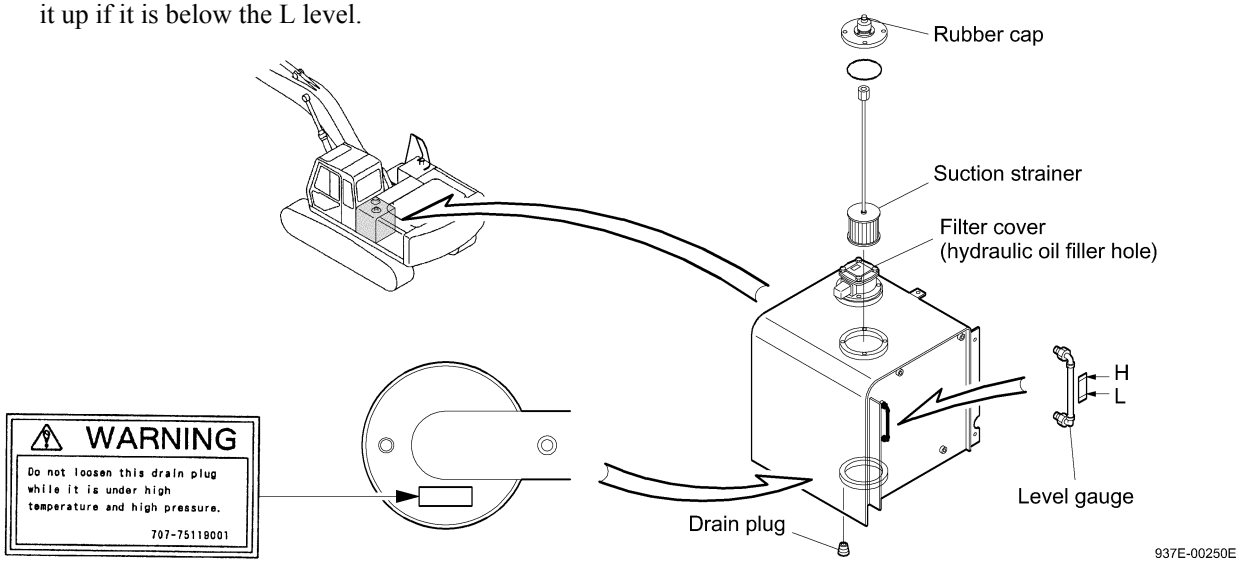
(3) Hydraulic oil replacement procedure

1) Park the machine on firm, level ground in the hydraulic oil filling position and relieve pressure in the oil reservoir.
2) Drain hydraulic oil through the drain plug and clean the suction strainer before closing the drain plug.
3) Remove the return filter cover and fill with hydraulic oil to the regulation level on the level gauge while pressing on the air breather rubber cap.
4) Fit the return filter cover.
5) Extract air from the pump.
6) The oil contains air, so run the engine at idling speed and operate the machine gently for 10－15 minutes, moving the cylinders evenly, then put the machine in hydraulic oil filling position and recheck the level.
   The oil level should lie between the H and L lines on the level gauge. Do not top it up beyond the H level. Do top it up if it is below the L level.



(8270-0186-1E)

⚠ CAUTION

- Always top up with new oil of the exact same brand and name. Do not mix with other oil products.
- Always extract air from the pump after changing hydraulic oil.
- When you have replaced hydraulic oil, you should allow a running-in period of approximately 10 minutes at engine low speed with the control levers in their neutral positions (with no load applied).

(4) Inspection and replacement intervals

Inspection interval …… At the time of preoperational checks

Replacement interval … When using KATO recommended hydraulic oil: Every 2000 hours of operation or yearly

When using NIPPON OIL HYRANDO WIDE KV32, KV46 or KV68: Every 5000 hours of operation

Oil filling volume …… 165L

Total oil volume …… 260L

(8270-0187-0E)

⚠ CAUTION

Hydraulic oil will deteriorate naturally even if the machine is not being operated, so if the machine is stored for a long period, thoroughly inspect the condition of the hydraulic oil, and replace it if necessary, before starting to work.

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4-2-2 Flushing (937S-0083-1E)

(1) Precautions when changing hydraulic oil

Flushing when you change hydraulic oil is very important. Hydraulic oil is replaced when the periodic replacement interval has expired, when it has deteriorated extremely, when it is contaminated with water or different type of oil, or when it contains large quantities of metal fragments, debris or other foreign bodies. In special cases it may also be changed when the machine is to be left unused for prolonged periods.

In any case flushing is an absolutely necessary part of the oil changing procedure. Its purpose is to eliminate decomposed oil, corrosion, anti-corrosion paint, insoluble impurities and other materials which may be clinging to the inner surfaces of pumps, valves and pipes, as well as foreign bodies which may have sunk to the bottom of the oil reservoir. The oil in the system must also be eliminated to remove water and different oil types which have mixed with the oil. These foreign substances cause foaming of the oil and corrosion of metal parts. Occasionally they can also cause gaskets to expand, causing severe damage to hydraulic equipment.

Furthermore if decomposed oil is left in the system, the lifespan of new oil is greatly reduced and residual moisture causes clouding and corrosion. To avoid such problems, take great care to drain all oil from the pipes and hydraulic equipment.

(2) Flushing after replacing the return filter elements

Be sure to flush (wash) after replacing the elements. Even if the elements are replaced carefully, dirt can get in the oil reservoir. Flush to filter the dirt through the return filters.

Follow the procedure below to perform the flushing process.

1) Start the engine and run it at low speed for about one or two minutes.

Wait until the return filters are filled with hydraulic oil. Flush at engine medium speed for about ten minutes.

⚠ CAUTION (937S-0084-0E)

Never move the levers during the flushing process.
If any lever is moved, dirt could get in the hydraulic circuit.

(3) After replacing hydraulic equipment

1) After replacing the hydraulic pump or control valve, perform the flushing process in the same way as "(2) Flushing after replacing the return filter elements" above.
2) After replacing the hydraulic cylinder, start the engine and move the replaced cylinder through five strokes or more without reaching the stroke end at engine medium speed.
3) After replacing the hydraulic motor (swing or travel), start the engine, lock the motor and operate the levers halfway at engine low speed to relieve pressure for about one minute. Then move the replaced motor at engine medium speed with the least possible load in either direction respectively for ten seconds at least three times.

(4) After attaching the additional optional hydraulic pipes

1) Bypass the connection hose to the attachment to flush the additional pipes.
From the status above, start the engine and move the lever at engine medium speed so that the hydraulic oil can flow to the additional pipes to perform flushing process for about one minute.

2) Connect the bypass hose to the hydraulic equipment of the attachment and perform the flushing process as indicated in "(3) After replacing hydraulic equipment".

(5) After replacing the optional hydraulic attachment

1) If the hydraulic breaker is mounted, never move the boom, arm and bucket cylinders simultaneously. If you use the hydraulic breaker, use the high-performance filter to filter fine dirt. If you do not do so, the lifespans of the hydraulic pump or other hydraulic devices will be shortened.

2) If the cylinder attachment such as a hydraulic crusher is mounted, move the machine to the place the attachment can be moved sufficiently before operating the attachment.
Move the attachment cylinder through full stroke at least five times to perform the flushing process. At this time, never move the boom, arm and bucket cylinders simultaneously.

3) If the motor attachment such as a hydraulic piler is mounted, move the machine to the place the attachment can be moved sufficiently before operating the attachment.
Then move the attachment motor for one minute or more to perform the flushing process. At this time, never move the boom, arm and bucket cylinders simultaneously.

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5. Data file (817S-0055-0E)

5-1 Compatibility of main equipment (937S-0085-1J)

Classification	Device	Compatibility HD820Ⅲ←→HD820Ⅱ	Notes (Requirements for compatibility)
Superstructure	Engine	←×→	
	Pump coupling	←○→	
	Radiator	←×→	
	Oil cooler	←×→	
	Swing gear	←○→	
	Battery	←○→	
	Cab	←○→	
	Operator's seat	←○→	
	Water separator	←○→	
Lower structure	Sprocket	←○→	
	Front idler	←○→	
	Adjuster cylinder	←○→	
	Track roller	←○→	
	Carrier roller	←○→	
	Track shoe	←○→	
	Track link	←○→	
Hydraulic equipment	Suction hose	←○→	
	Pump	←×→	
	Control valve	←○→	
	Swing motor	←○→	
	Traveling motor	←○→	
	Boom cylinder	←○→	
	Arm cylinder	←○→	
	Bucket cylinder	←○→	
	Rotary seal	←○→	
	Pilot valve (upper)	←△→	Lever operation feeling will be heavy if an old type with decrease in operation force is attached.
	Pilot valve (travel)	←○→	
	Solenoid block	←○→	
	Lock valve	←○→	
	Pressure switch	←○→	
	Shockless valve	←○→	
	Accumulator	←○→	
	Check valve (back pressure)	←○→	
	Check valve (bypass)	←○→	
	Air breather	←○→	
	Throttle valve	←○→	

＜Abbreviations＞ ←○→ : Mutually compatible ←×→ : Mutually incompatible (937S-0086-3E)

←△→ : Conditionally compatible ×←→○ : Compatible in one direction

Classification	Device	Compatibility HD820Ⅲ←→HD820Ⅱ	Notes (Requirements for compatibility)
Front	Boom	←○→	
	Arm	←○→	
	Bucket	←○→	
	Side link	←○→	
	Tipping link	←○→	
Element	Return filter	←○→	
	Drain filter	←○→	
	Fuel filter	←○→	
	Suction strainer	←○→	
	Pilot line filter	←○→	
	Engine oil filter	←○→	

＜Abbreviations＞ ←○→ : Mutually compatible ←×→ : Mutually incompatible (937S-0087-1E)
←△→ : Conditionally compatible ×←→○ : Compatible in one direction

5-2 Hydraulic pump (937S-0126-0E)

Part No.		609-79900012
Main pump	Rated pressure	32.8MPa (335kgf/cm^2)
	Delivery	115cm^3/rev × 2
	Maximum flow	255L/min × 2
	Direction of rotation	Clockwise (as viewed from shaft end)
Gear pump	Rated pressure	3.6MPa (37kgf/cm^2)
	Delivery	10cm^3/rev
	Maximum flow	20.5L/min
	Direction of rotation	Clockwise (as viewed from shaft end)
Mass		126kg

(937S-0127-1E)

5-3 Check valve (937S-0128-0E)

	Back pressure	Bypass
Part No.	669-53800001	669-50700001
Cracking pressure	0.20 ± 0.03MPa (2.0 $^{\pm 0.3}$kgf/cm^2)	0.49 ± 0.05MPa (5.0 $^{\pm 0.5}$kgf/cm^2)
Mass	Approx. 0.16kg	Approx. 0.16kg

(937S-0129-2E)

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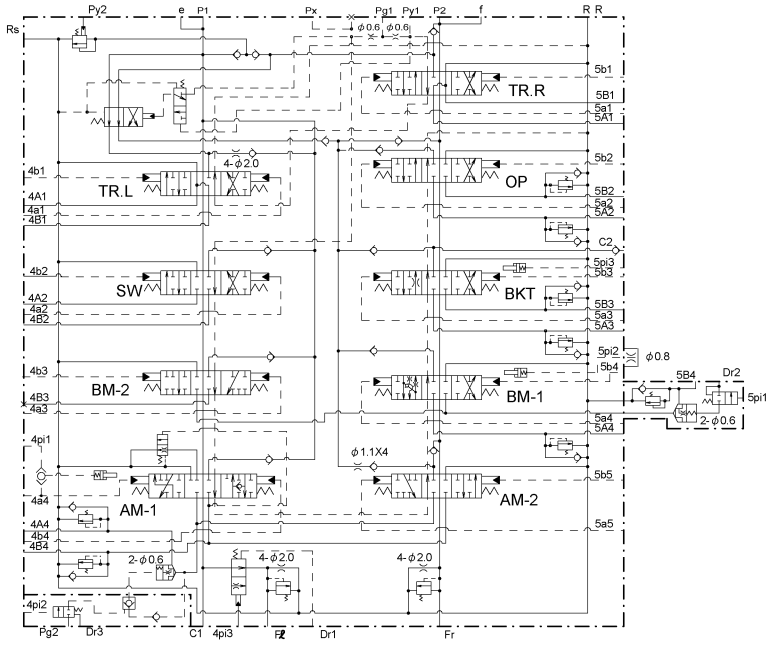
5-4 Control valve (937S-0089-0E)

Type		UKX28-32 (HD820Ⅲ), UKX28-33 (HD820Ⅲ -LC)	
Rated pressure	Main relief	Boom, Arm, Bucket	31.4MPa (320kgf/cm²)
		When traveling and pressurising	32.9MPa (335kgf/cm²)
	Port relief	Bottom side of arm, Boom, Bucket	34.3MPa (350kgf/cm²)
		Rod side of arm	36.3MPa (370kgf/cm²)
Mass		Approx. 181kg	

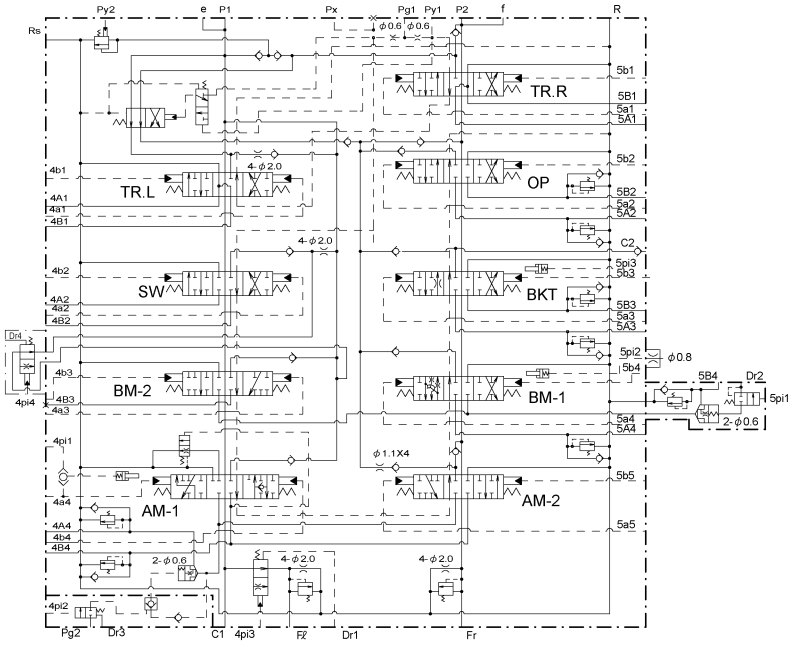
(937S-0019-2E)

HD820Ⅲ: 669-21600013



937S-00851

HD820Ⅲ-LC: 669-24000013



937S-00541

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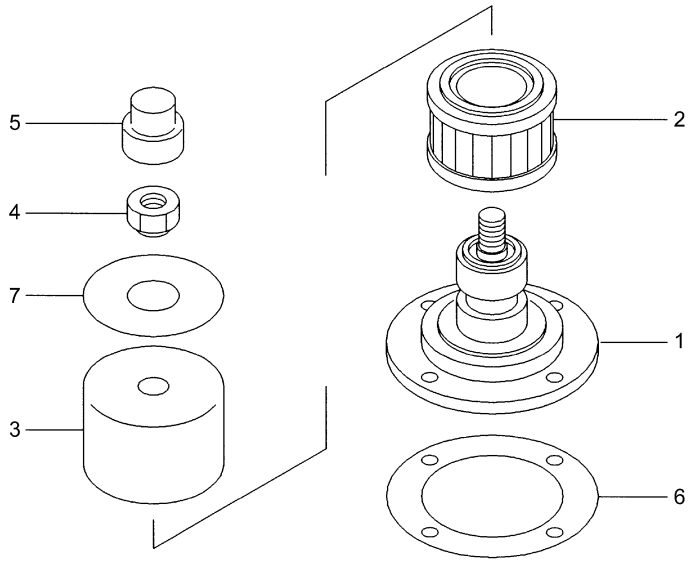
5-5 Consumable parts guide (937S-0022-1E)

[Consumable part name] Air breather element

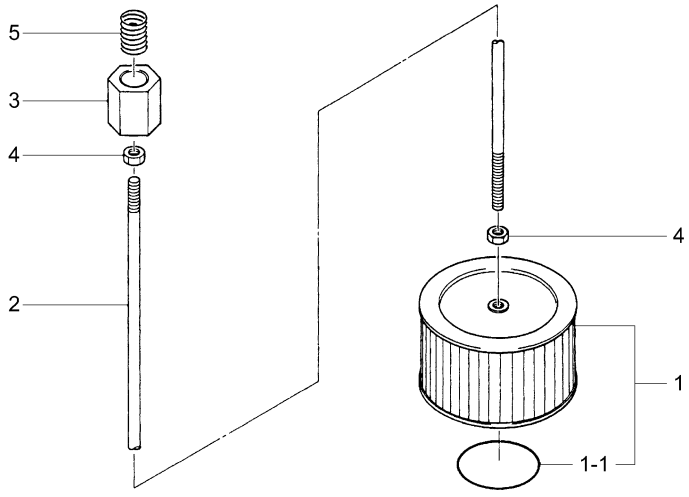


1. Body
2. Element
   689-17602011
3. Cover
4. Locknut
5. Cap
6. Packing
7. Caution plate

8170-00710E

Air breather assembly: 689-17600012

[Consumable part name] Suction strainer



1. Strainer
   689-12600103
1-1 O-ring
   009-46301044
2. Center bolt
3. Holder guide
4. Nut
5. Spring

9370-00290E

Suction strainer assembly: 689-12600003

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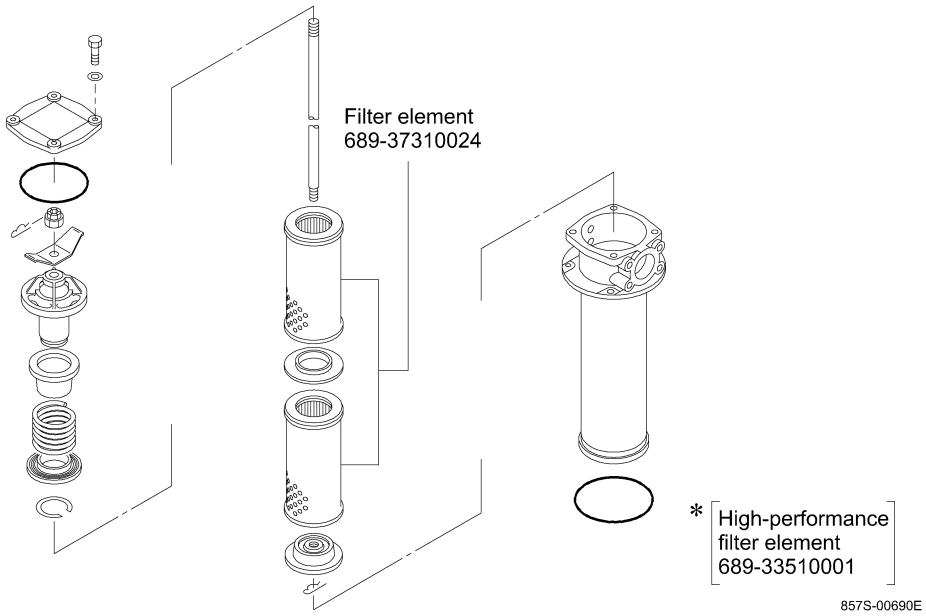
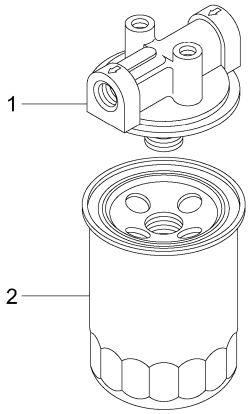
[Consumable part name] Return filter element



Return filter assembly: 689-31200004

[Consumable part name] Drain filter cartridge



1. Head
2. Cartridge
   689-35703032

7070-02570E

Drain filter assembly: 689-25100001

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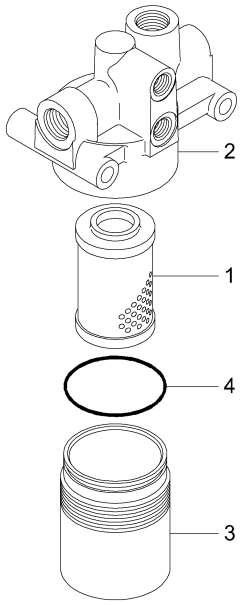
[Consumable part name] Pilot line filter element



1. Element assembly
   689-29300102
2. Head assembly
3. Case
4. O-ring
   009-46002060

8670-02070E

Pilot line filter assembly: 689-29300004

MEMO

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(937V-0008-1E)

F Control equipment

1. Control equipment ····· 109
1-1 Control equipment circuit ····· 109

2. Equipment related to control devices ····· 110
2-1 Pilot valves (boom, arm, bucket, swing) ····· 112

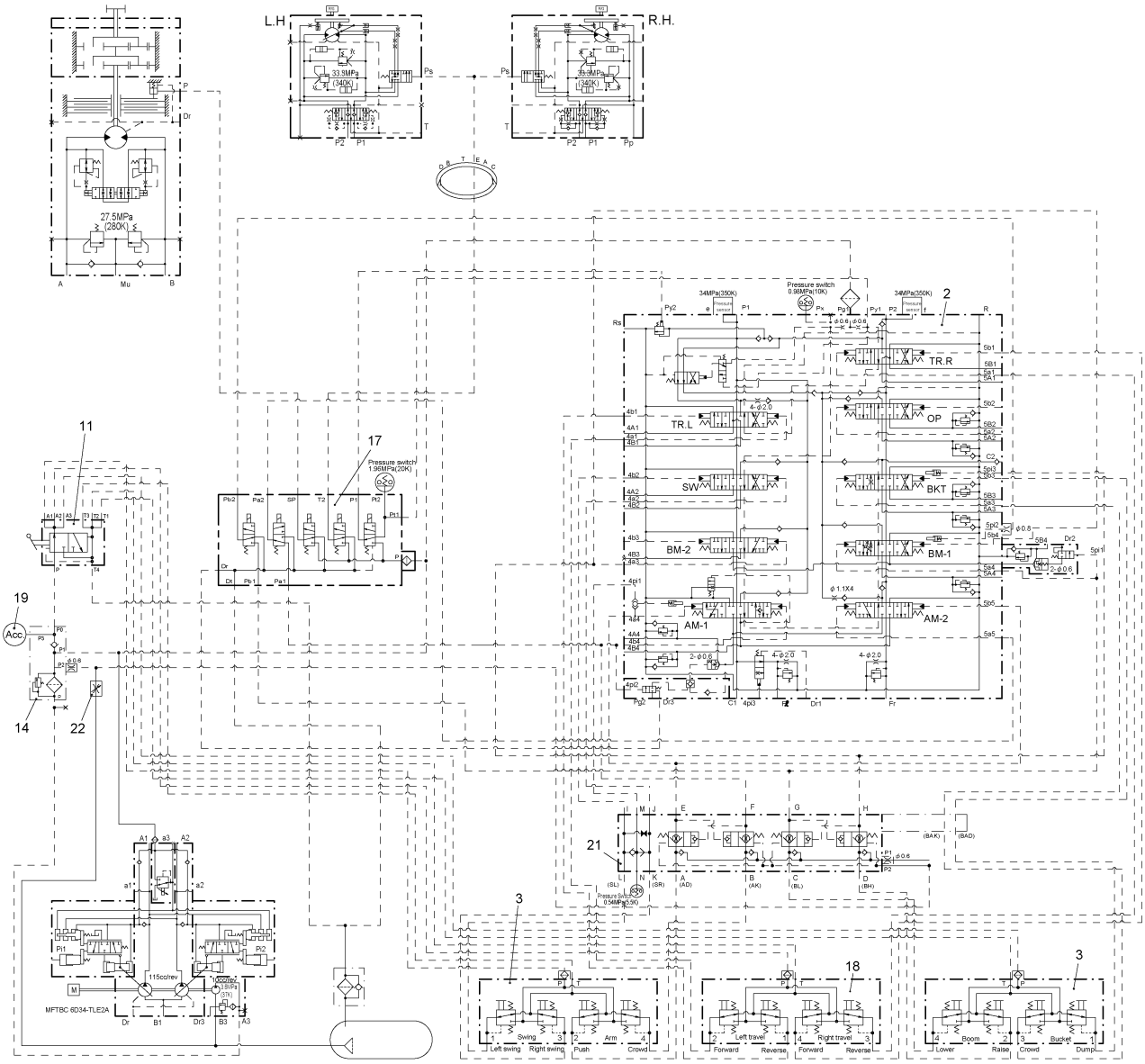
3. Changing procedure for control lever configuration ····· 113

1. Control equipment (837S-0033-2E)

Control devices are located in the cab, under the floor and on the slewing table and are connected by pilot hoses. They comprise the pilot valve, solenoid valve, lock valve, shockless valve etc.

1-1 Control equipment circuit (857S-0029-0E)

1-1-1 Hydraulic circuit diagram (857S-0020-0E)



Ref. No.	Part name	Q'ty
2	Control valve	1
3	Pilot valve	2
11	Lock valve	1
14	Pilot filter	1
17	Solenoid valve	1
18	Pilot valve	1
19	Accumulator	1
21	Shockless valve	1
22	Throttle valve	1

937S-00152E

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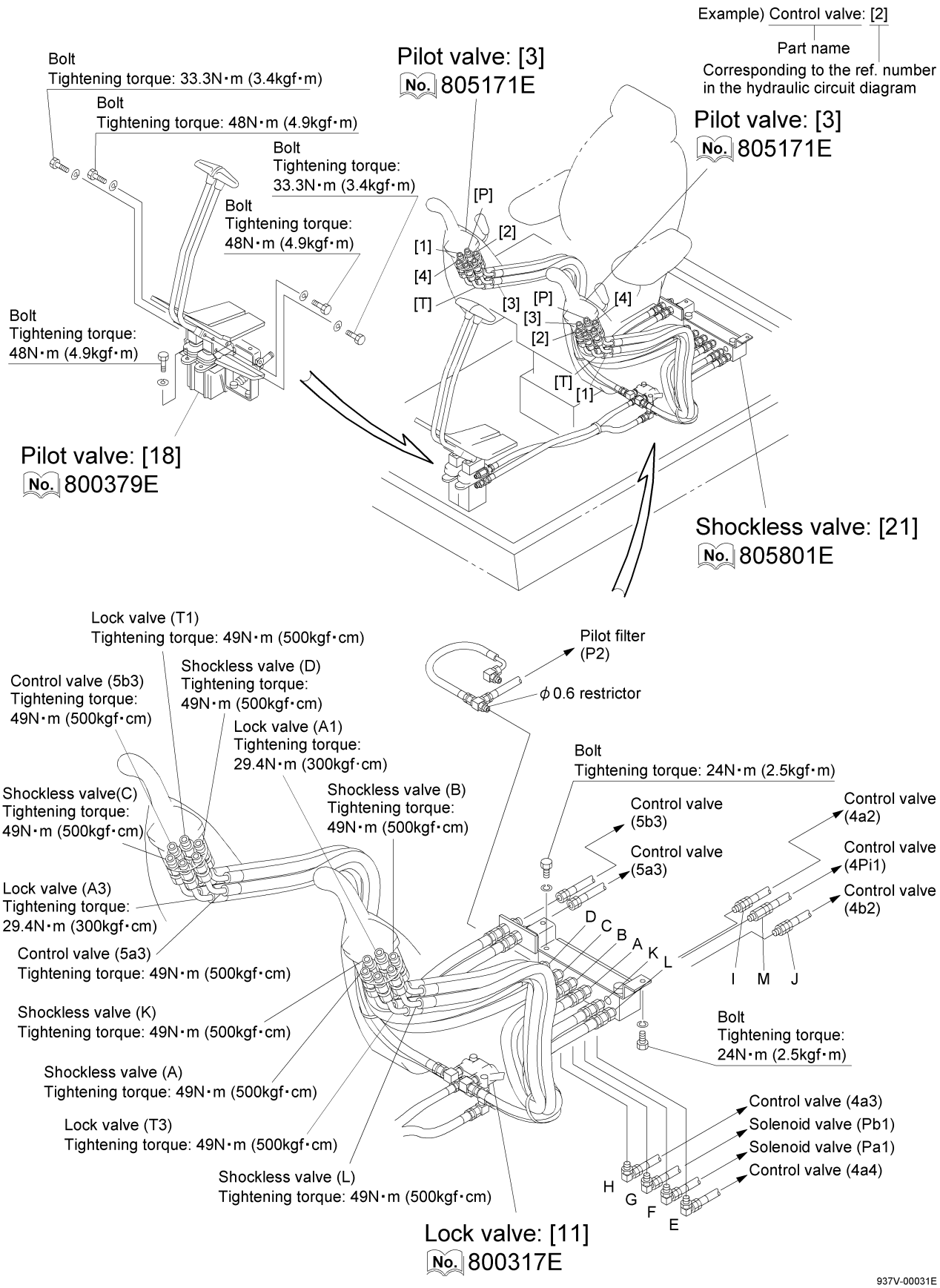
2. Equipment related to control devices (857S-0031-1E)



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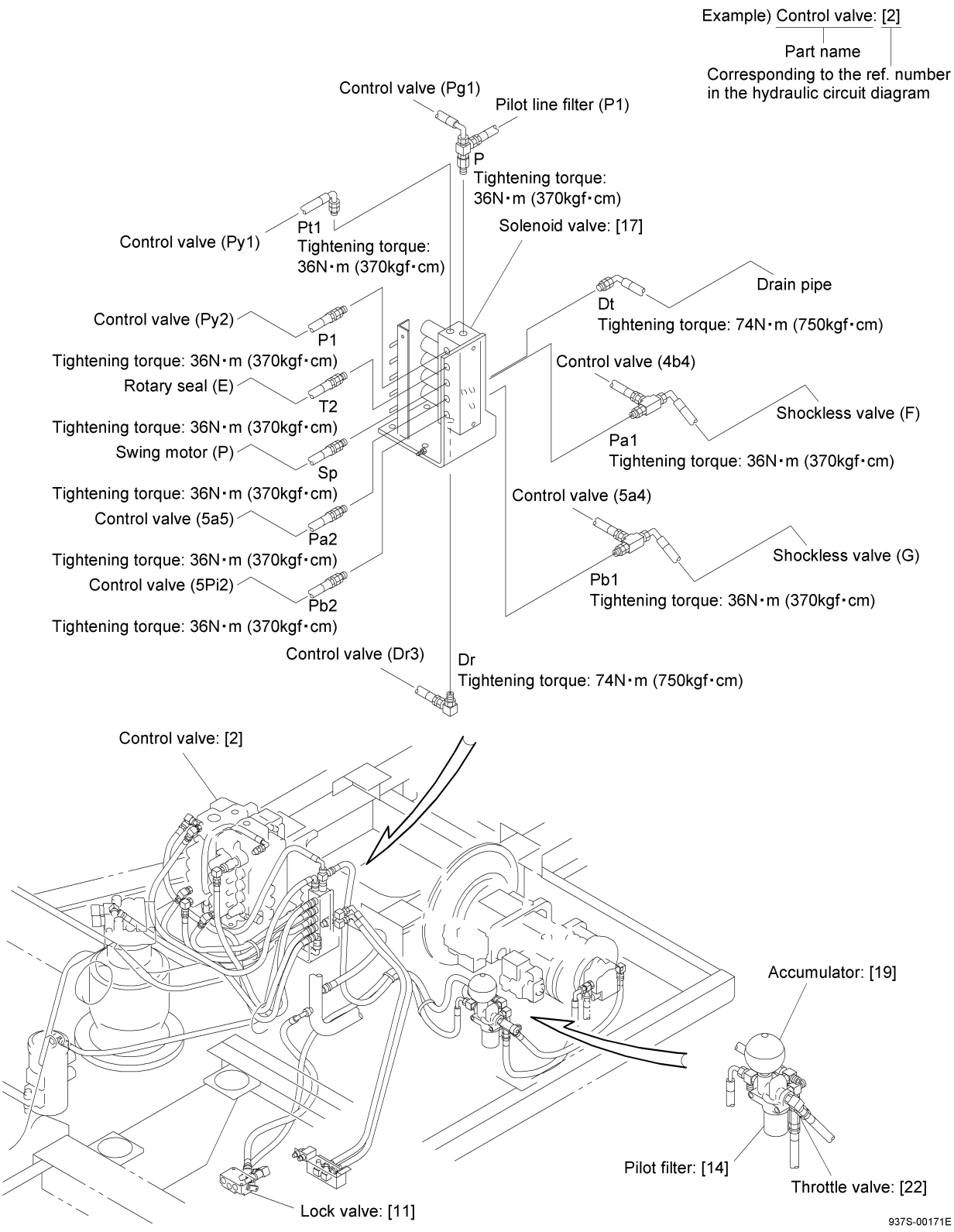

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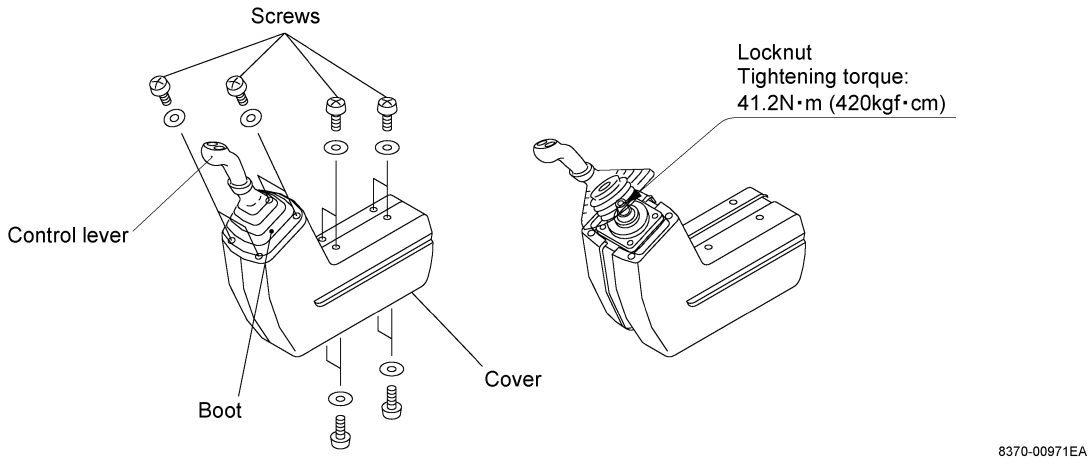
2-1 Pilot valves (boom, arm, bucket, swing) (777S-0080-1E)

(1) Removal

1) Remove 12 screws (left and right) from the cover and lift the boot to unscrew the locknut of the control lever.
2) Disconnect the wiring cord from the control lever and detach the control lever from the pilot valve while turning it.
3) Remove the pilot valve attachment bolts and disconnect the hoses connected to the pilot valve with the pilot valve slightly raised.

Note Mark each hose with the name of the corresponding port to prevent mistakes in reassembly.



(2) Attachment

Reverse the removal procedure to attach the pilot valve with particular attention to the following points.

1) Tightening torque for the locknut of the control lever: 41.2N·m (420kgf·cm)
2) Secure the boot by using the cover to clamp it from the side.
3) Tighten the screws to the tightening torque about 0.39N·m (4kgf·cm). Do not over tighten the screws as this may crack the cover.
4) Put a bundle of wires into the "U" groove of the valve to press it down using the boot.

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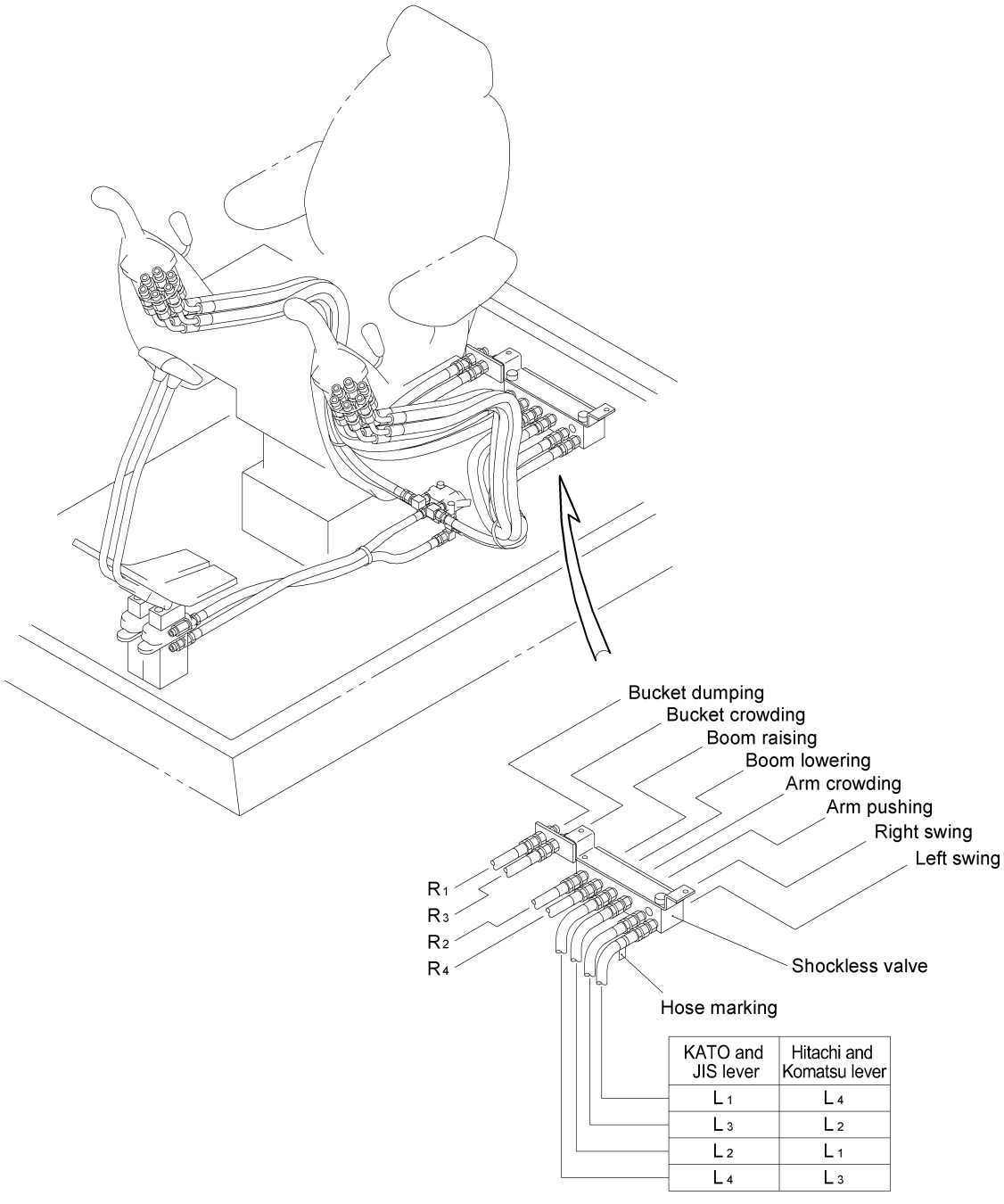
3. Changing procedure for control lever configuration (937S-0090-0E)

Switch the hoses at the shockless valve hose connections located under the operator's seat.

⚠ CAUTION (937S-0091-0E)

Be careful of the swing pressure switch, located forward of the shockless valve, and the swing control pressure signal hose, located toward the rear.



KATO and JIS lever	Hitachi and Komatsu lever
L1	L4
L3	L2
L2	L1
L4	L3

937S-00550E

https://truckmanualshub.com/

MEMO

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(937V-0009-1E)

G Front attachment

1. Front attachment ····· 115
1-1 Boom circuit ····· 115
1-2 Arm circuit ····· 117
1-3 Bucket circuit ····· 119

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2-1 Bucket ····· 122
2-2 Arm ····· 131
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3. Data file ····· 141
3-1 Data for front attachment mounting ····· 141
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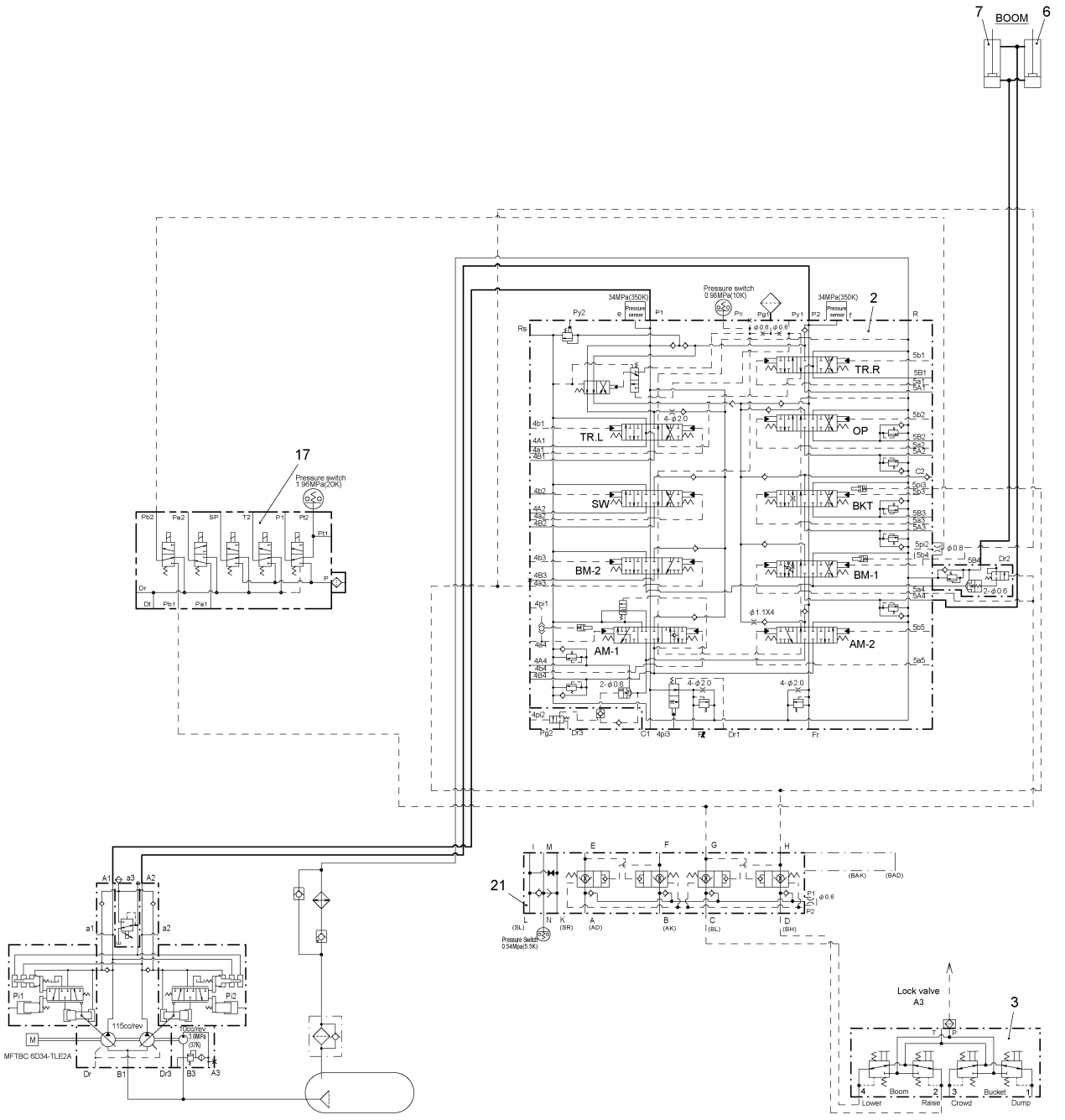
1. Front attachment (857S-0033-1E)

1-1 Boom circuit (837S-0021-0E)

1-1-1 Hydraulic circuit diagram (857S-0030-0E)



Ref. No.	Part name	Q'ty
2	Control valve	1
3	Pilot valve	1
6	Boom cylinder (R)	1
7	Boom cylinder (L)	1
17	Solenoid valve	1
21	Shockless valve	1

937S-00181E

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1-1-2 Description of the boom circuit (837S-0021-3E)

The two boom cylinders are operated by No. 4 spool of the control valve (block B) and No. 3 spool of the control valve (block A). When the boom spools are in the neutral positions, the boom cylinders are at rest. When the boom lever is moved forward or backward, the boom cylinders extend or retract to raise or lower the boom.

Each port of the boom 1 spool houses the cavitation prevention makeup valve and overload relief valve that prevents outside pressure causing abnormal high pressure in the circuit when the spool is in the neutral position. When the boom spools are switched to the extension side, the pressurised oil from pump P1 and P2 merges inside the control valve to flow to the boom cylinder bottom side.

If the boom spools are switched to the retraction side, the boom 2 spool is in neutral and the only pressurised oil from pump P2 flows to the boom cylinder rod side.

(1) Boom recycling circuit

The retraction side of the boom 1 spool is equipped with a recycling mechanism so that the returning oil from the cylinder bottom side flows to the rod side again.

(2) Boom raising priority circuit

① When boom raised and bucket crowded

The pressurised oil from pump P1 passes through the parallel channel in the control valve (block A) to the boom cylinder bottom side.

The pressurised oil from pump P2 is supplied to the boom and bucket spools of the control valve (block B), but a pilot pressure (5pi3) acts to regulate the stroke of the bucket spool so that it does not move to full stroke. Thus the channel is constricted and pressure is maintained for the boom raising operation.

② When boom and swing operations are performed simultaneously

The pressurised oil from pump P2 passes through the parallel channel in the control valve (block B) to the boom cylinder bottom side.

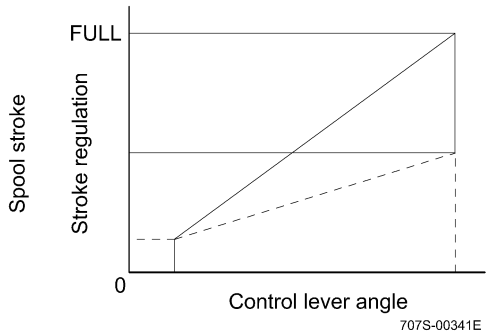
The pressurised oil from pump P1 is supplied to the boom and swing spools through the parallel channel in the control valve (block A), but a pilot pressure of boom 2 acts on the boom raising priority valve at the same time which constricts the swing oil channel to supply oil to the boom in priority.

(3) Boom anti-drift valve

There is an anti-drift valve on the boom cylinder bottom side to minimize leakage from the boom cylinders and reduce boom gravity lowering.

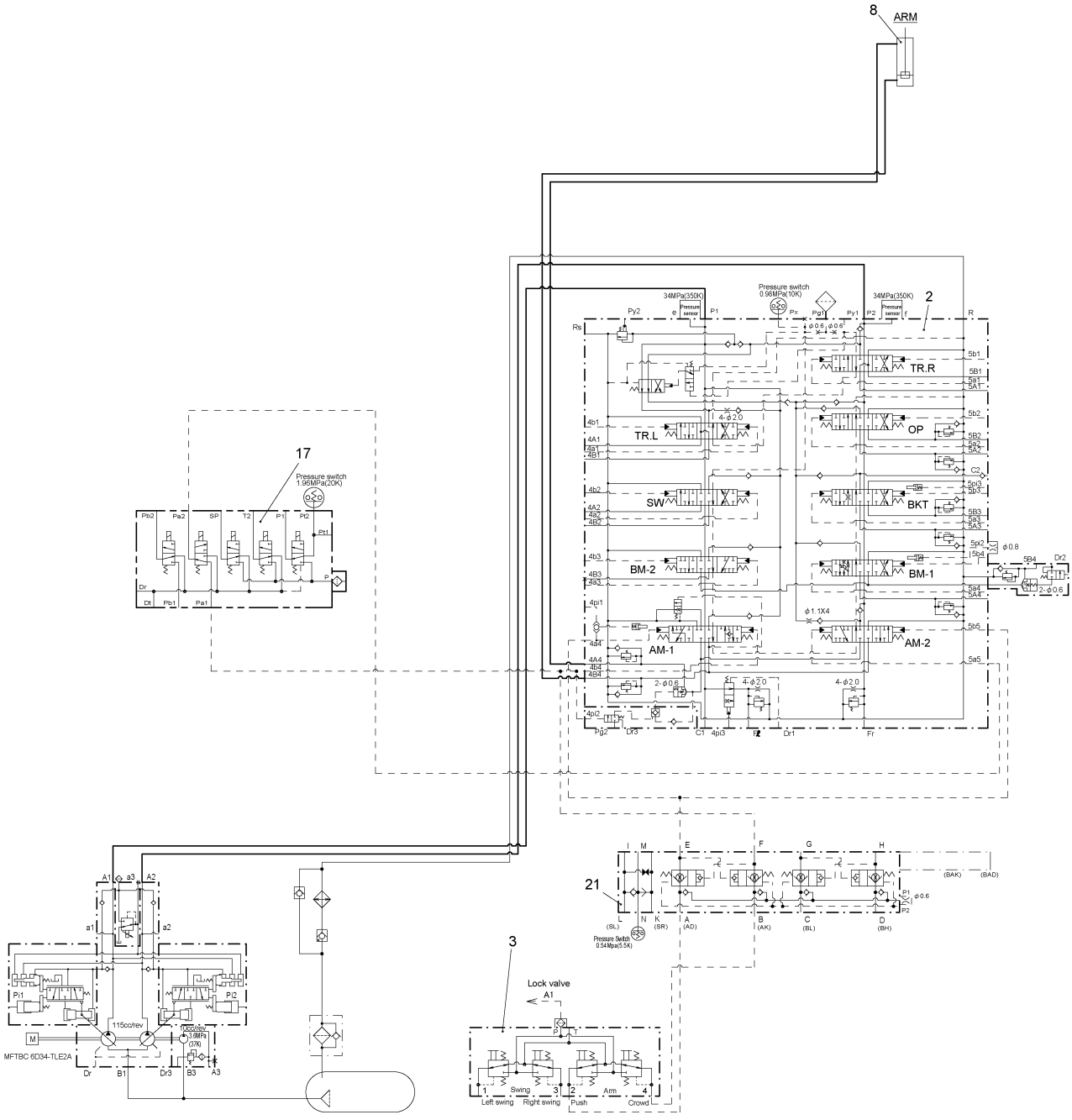
(4) Slow operation mode

When the work mode is switched to the slow operation mode, the lowering pilot pressure acts on (5pi2) through the solenoid block. This restricts the spool stroke and maintains the range of slow operation to improve the lowering operation.



1-2 Arm circuit (837S-0022-0E)

1-2-1 Hydraulic circuit diagram (857S-0030-0E)



Ref. No.	Part name	Q'ty
2	Control valve	1
3	Pilot valve	1
8	Arm cylinder	1
17	Solenoid valve	1
21	Shockless valve	1

937S-00191E

https://truckmanualshub.com/

1-2-2 Description of the arm circuit (857S-0037-2E)

The arm cylinder is operated by No. 4 spool of the control valve (block A) and No. 5 spool of the control valve (block B). When the arm spools are in the neutral positions, the arm cylinder is at rest. When the arm lever is moved forward or backward, the arm cylinder extends or retracts. Each port of the arm 1 spool houses the makeup valve and overload relief valve.

When the arm is operated, the pressurised oil from pump P1 flows through the arm 1 of the control valve (block A) to the arm cylinder.

The pressurised oil from pump P2 passes through the arm 2 of the control valve (block B) and merges with the pressurised oil from the arm 1 inside the control valve to flow to the arm cylinder. The arm 2 is connected in tandem, but in one section inside the control valve it is in parallel connection to improve ease of control during simultaneous operation.

When the arm is operated to the crowding side, the returning oil from the arm cylinder rod side passes only through the arm 1 to the oil reservoir.

When the mode is switched to the fine control mode, the pilot pressure acting on the control valve (block B) is blocked by the solenoid block. At this time the pressurised oil only from pump P1 flows to the arm cylinder bottom side to improve the arm operation.

(1) Arm recycling circuit

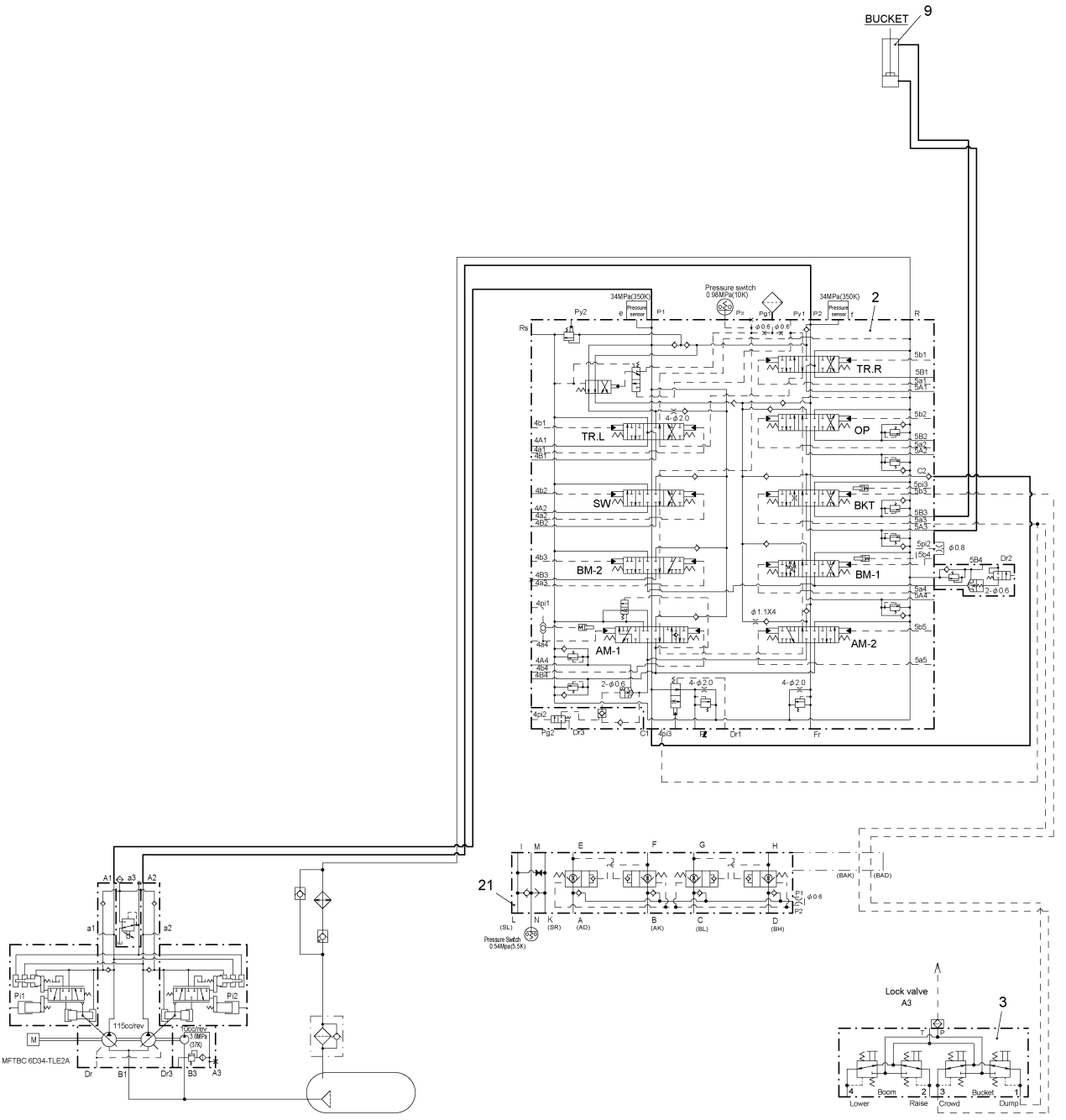
The arm 1 is equipped with a recycling mechanism so that the returning oil from the arm cylinder rod side flows to the bottom side again.

(2) Arm anti-drift valve

There is an anti-drift valve on the arm cylinder rod side to minimize leakage from the cylinder and reduce for the cylinder to extend with load.

1-3 Bucket circuit (837S-0023-0E)

1-3-1 Hydraulic circuit diagram (857S-0030-0E)



Ref. No.	Part name	Q'ty
2	Control valve	1
3	Pilot valve	1
9	Bucket cylinder	1
21	Shockless valve	1

937S-00201E

https://truckmanualshub.com/

1-3-2 Description of the bucket circuit (837S-0023-2E)

The bucket cylinder is operated by No. 3 spool of the control valve (block B). When the bucket spool is in the neutral position, the bucket cylinder is at rest. When the bucket lever is moved left or right, the bucket cylinder extends or retracts. Each port of the bucket spool houses the makeup valve and overload relief valve.

When the bucket spool is switched, the pressurised oil from pump P2 flows to the bucket cylinder. The bucket spool is fitted with an orifice to regulate the fall of the bucket to an appropriate speed.

(1) Bucket merging circuit

When the bucket is operated to the crowding side, the pilot pressure is simultaneously applied to the bucket merging spool of the control valve (block A).

The pressurised oil from pump P1 passes through the central bypass channel of the control valve (block A) and through external piping to join the flow from pump P2 at port C2 of the control valve (block B).

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2. Removal and mounting of the front attachment (857S-0041-0E)

(777S-0083-0E)

⚠ WARNING

- When you hit a pin with a hammer, metal splinters can fly off which could cause severe eye injuries.
  Before you start work, always put on protective goggles, helmet, gloves etc.
- Store each detached attachment so that it cannot fall over and place barriers so that no unauthorised personnel can approach it.
- Carry out the process in a workplace with secure footing.
- When carrying out team operations such as pin insertion and cylinder extension/retraction, take care to work safely with good exchange of signals and communication between all those concerned.

(1) Preparations for disassembly

When you remove the hydraulic cylinder, do the followings before detaching the connected hoses. Rest the attachment on the ground, turn the engine off and work each pilot valve within the next 1 － 2 minutes to relieve pressure from each hose. Relieve all excess air pressure in the oil reservoir completely and remove the air breather cap.

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2-1 Bucket (767S-0150-0E)

2-1-1 Removal (8570-0075-2E)

(1) Rest the bucket to be replaced on firm, level ground. (Fig. ①)

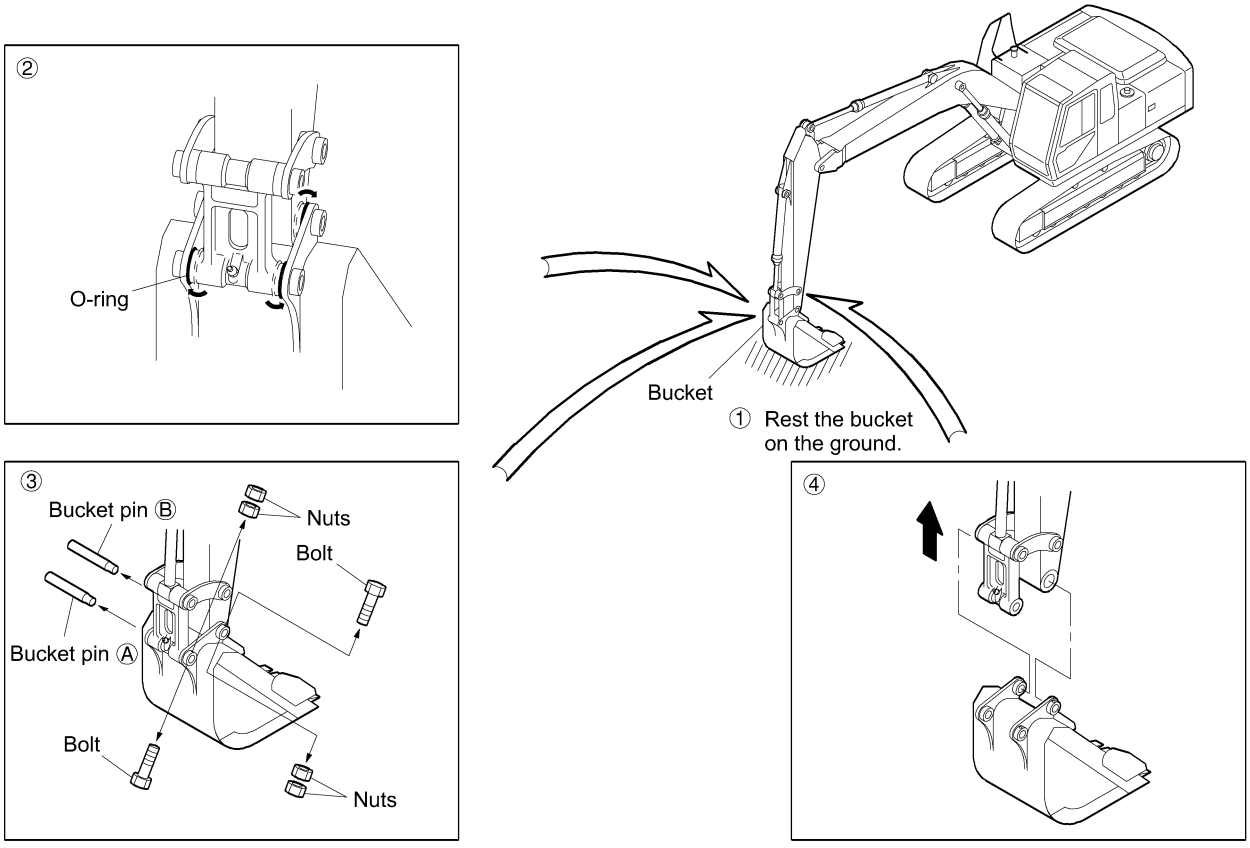
Note When you are extracting the pins, make sure that the bucket is only resting lightly on the ground. If it is pressed strongly against the ground, the resistance on the pins will be increased making them harder to extract.

(2) Roll the pin seal O-rings onto the bosses of the bucket. (Fig. ②)

(3) Remove the retaining nuts and bolts and extract bucket pins Ⓐ and Ⓑ. (Fig. ③)

(4) Raise the boom slightly and separate the bucket from the arm. (Fig. ④)

(5) Remove the pin seal O-rings.



2-1-2 Inspection and repair (857S-0043-1E)

After disassembly, inspect the following points and make repairs as necessary.

(1) Check for cracks, damage, deformation, corrosion etc. in each part of the bucket and repair cracks and damage by welding where necessary. Remove corrosion with a wire brush and repaint the affected areas.

(2) Check for worn or missing bucket teeth. Use calipers to measure wear to the inner diameters of pin holes and bushes, bending, damage and wear to pins etc. and replace any which exceeds wear limits. (Refer to "Service standards".)

https://truckmanualshub.com/

(8270-0143-4E)

⚠ CAUTION

- Take care not to get grit or mud on the extracted pins.
- Thoroughly wipe the grease, grit and mud off the extracted O-rings. If any O-ring is damaged, deformed or hardened, replace it.
- The arm tip and tipping link have dust seals fitted on both ends, so take care not to damage them.

2-1-3 Mounting (9370-0012-3E)

(1) Ready the bucket for mounting

(2) Clean and grease all pins and holes.

(3) Start the engine and leave it at idling speed.

(4) Fit the pin seal O-rings onto the inside of the bosses of bucket holes ⓑ, and insert the steel bushes into the holes. Line the arm tip holes up with the bucket holes ⓑ which have the steel bushes inside and insert bucket pin Ⓑ. (Fig. ①)

Note The fit is good enough to ensure that the pin can be inserted as long as the centers of the holes are aligned, so do not hit the pin or otherwise apply excessive force.

Note Line the pin up with the rotation stopper hole and check the pin's orientation before you insert it.

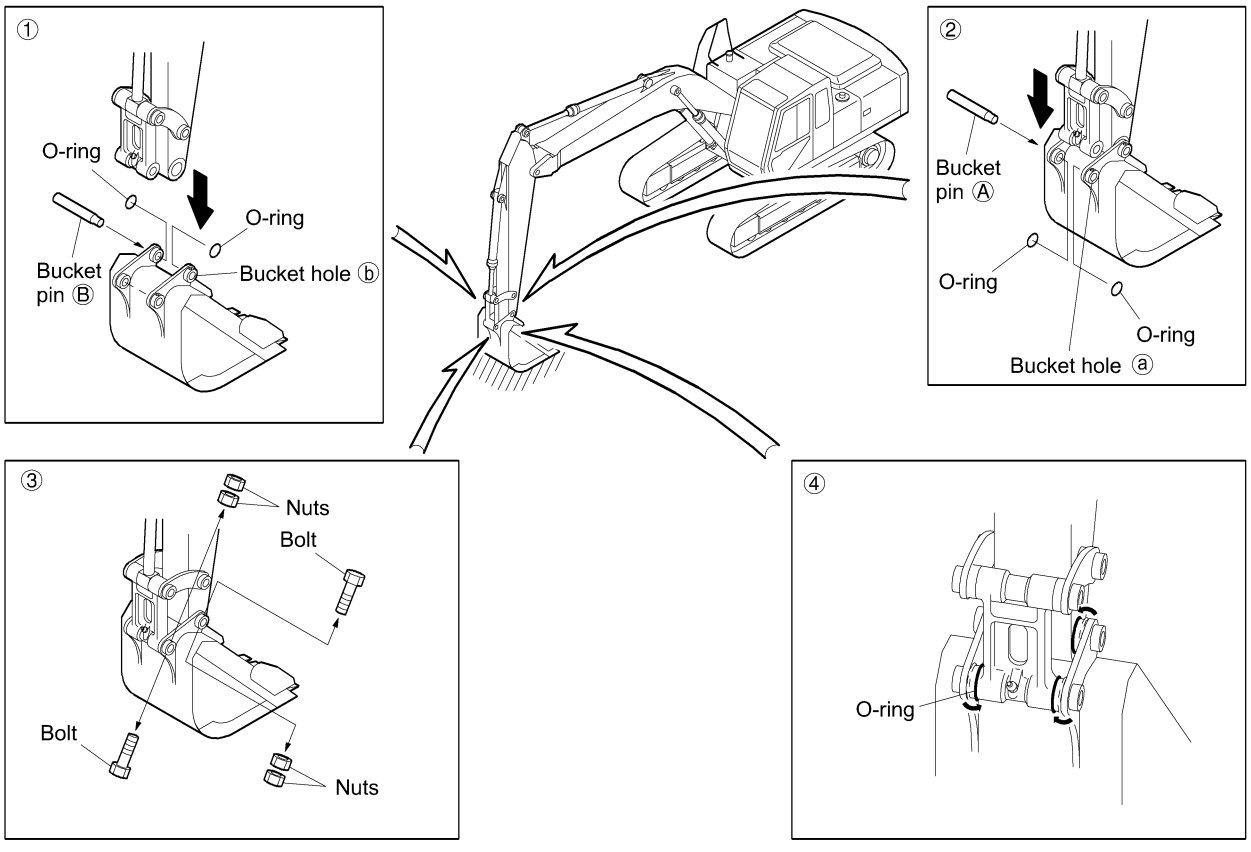
(5) Fit the pin seal O-rings onto the inside of the bosses of bucket holes ⓐ, and raise the boom or the arm to lift the bucket. Then adjust the cylinders so that bucket pin Ⓐ can be easily inserted into the bucket holes ⓐ. (Fig. ②)

(6) After inserting each pin, line them up with their rotation stopper holes and fasten the bolts in place. (Fig. ③)

(7) Set the pin seal O-rings in the "V" grooves. (Fig. ④)

(8) Adjust the play on the bucket.

(9) Grease each pin and stop the engine. Bucket attachment is complete.



9370-00071E

https://truckmanualshub.com/

(8270-0145-1E)

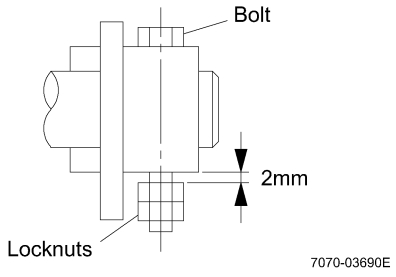
⚠ WARNING

When aligning the pin holes, do not put your hand or fingers into the holes. If the bucket moves, your hand or finger could be severed.

(777S-0084-1E)

⚠ CAUTION

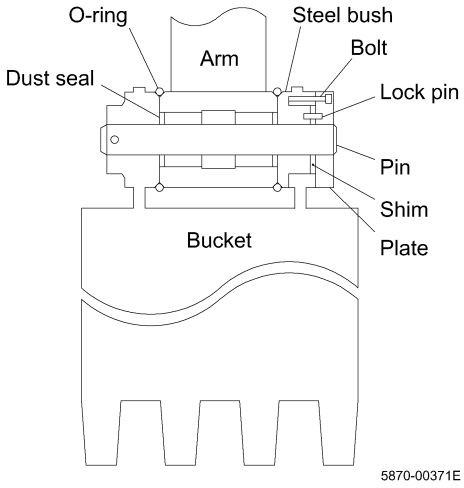
- When attaching the bucket, check to ensure that the steel bushes are fitted in place.
- The arm tip and tipping link have dust seals fitted on both ends, so take care not to damage them when inserting the pin.
- When attaching the locknuts, leave a gap of 2mm.



2-1-4 Adjustment method of bucket play (8170-0048-2E)

This machine is equipped with a mechanism for adjusting play on the bucket. (This mechanism uses the successive insertion of shims to eliminate the play in the connection between the arm and the bucket which builds up due to wear.)

This has the multiple effect of maintaining the sealing condition of the O-rings and delaying the advance of wear, increasing the longevity of bushes, pins etc.



(1) Adjustment method

Unscrew the bolt and remove the plate. Insert shim(s) to equal the amount of play (the amount of wear) in the connection and fix the plate back into place using the bolt.

Note Inserting shim(s) pushes on the steel bushes and reduces the amount of play in the connection.

Note Play of 0.5 － 1.0mm is suitable.

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2-1-5 Removal and attachment of the link (937S-0028-1E)

(1) Removal

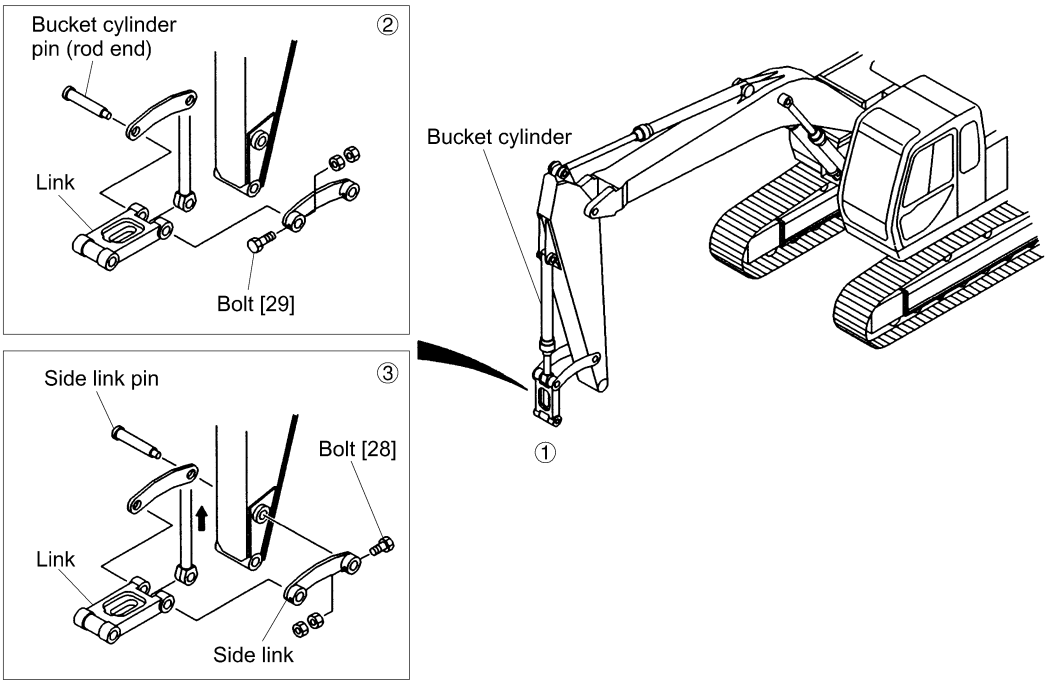
1) Angle the bucket cylinder to be perpendicular to the ground. (Fig. ①)

Note When you are working with the arm raised, place a block of wood between the bucket cylinder and the arm or arrange the sling wire rope to the bucket cylinder to support it with a crane.

2) Arrange the sling wire rope to the link to support it with a crane then remove bolt [29] and extract the bucket cylinder pin (rod end). (Fig. ②)

3) Remove bolt [28] and extract the side link pin. (Fig. ③)

After you finish work, fully retract the bucket cylinder.



937S-00560E

(2) Inspection and repair

After disassembly, inspect the following points and make repairs as necessary.

1) Check for cracks, damage, deformation, corrosion etc. in each part of the link and repair cracks and damage by welding where necessary. Remove corrosion with a wire brush and repaint the affected areas.

2) Use calipers to measure wear to the inner diameters of pin holes and bushes, bending, damage and wear to pins etc. and replace any which exceeds wear limits. (Refer to "Service standards".)

3) Inspect all pipes and hoses for damage, cracks, dents, bending, crumbling, deformation and wear of the screw threads. Replace any worn or defective parts.

4) Replace all O-rings and seals with new ones.

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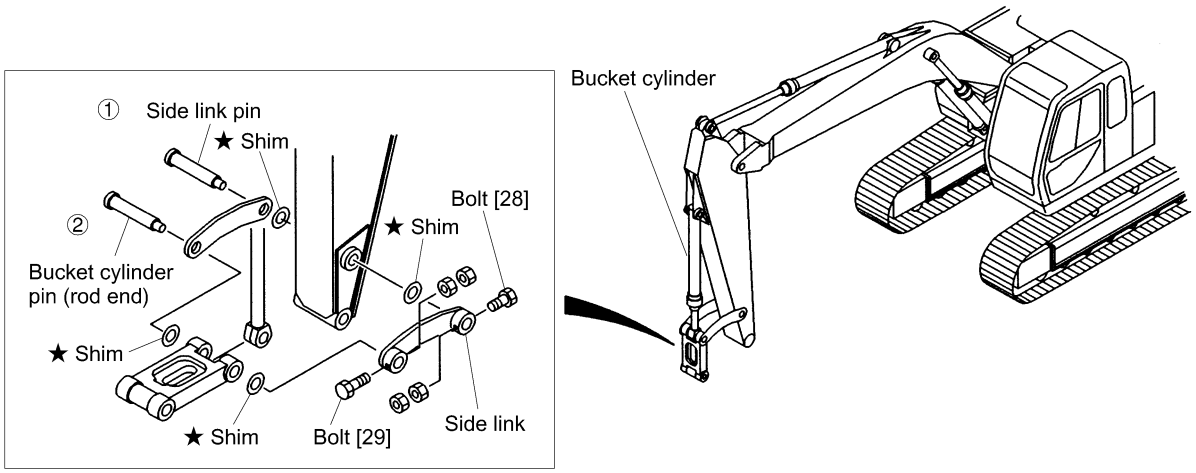
(3) Attachment

1) Use the side link pin to fasten the side links to the arm. After inserting the pin, attach bolt [28] to prevent the pin from rotating. (Fig. ①)
2) Arrange the sling wire rope to the link to support it with a crane and align the centers of the attachment holes. Use the bucket cylinder pin (rod end) to attach the link and side links to the rod hole of the bucket cylinder. (Fig. ②) After inserting the pin, attach bolt [29] to prevent the pin from rotating.



937S-00570E

(777S-0085-1E)

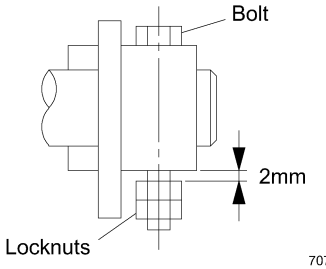
⚠ WARNING

When aligning the pin holes, do not put your hand or fingers into the holes. If the cylinder moves, your hand or finger could be severed.

(777S-0086-1E)

⚠ CAUTION

- Insert an appropriate thickness of shims (those marked ★ in the diagram) to reduce the lateral clearance in each boss to 1.0mm or less. Place the shims carefully, locating them so as to avoid applying excessive force to the cylinder.
- The arm tip and tipping link have dust seals fitted on both ends, so take care not to damage them when inserting the pin.
- When you attach the locknuts, leave a gap of 2mm.



7070-03690E

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2-1-6 Removal and mounting of the bucket cylinder and hoses (937S-0029-1E)

(1) Removal

1) Disconnect the hoses connected to the cylinder. (Fig. ①)

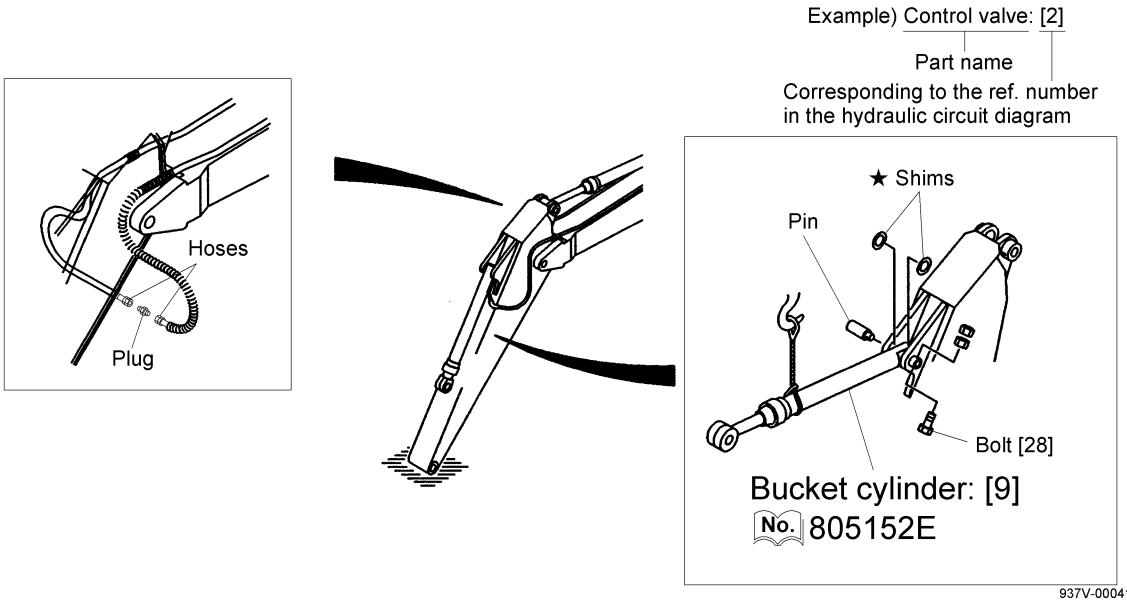
(767S-0309-0E)

⚠ CAUTION

The bucket cylinder line hose is designated as a safety part for periodic replacement and as such it must be replaced every 2 years or every 4000 hours of use, whichever occurs sooner.

Note Attach the plug to the openings exposed by hose disconnection to prevent hydraulic oil leakage.

2) Arrange the sling wire rope around the center of gravity of the cylinder to support it with a crane then remove bolt [28] and extract the pin. (Fig. ②)



(2) Inspection and repair

After disassembly, inspect the following points and make repairs as necessary.

1) Check for cracks, damage, deformation, corrosion etc. in each part of the bucket cylinder and repair cracks and damage by welding where necessary. Remove corrosion with a wire brush and repaint the affected areas.
2) Inspect all pipes and hoses for damage, cracks, dents, bending, crumbling, deformation and wear of the screw threads. Replace any worn or defective parts.
3) Replace all O-rings and seals with new ones.

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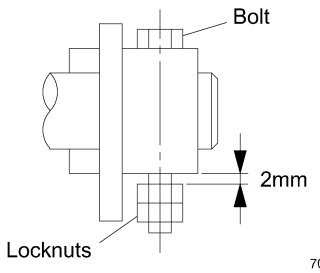
(3) Mounting

1) Arrange the sling wire rope around the center of gravity of the cylinder and support it with a crane. Align the centers of the attachment holes and insert the pin into the bottom end of the cylinder. After inserting the pin, fix it with bolt [28].

(847V-0012-2E)

⚠ CAUTION

- Insert an appropriate thickness of shims (those marked ★ in the diagram) to reduce the lateral clearance in each boss to 1.0mm or less. Place the shims carefully, locating them so as to avoid applying excessive force to the cylinder.
- The cylinder is fitted with the dust seal. Insert the pin carefully to avoid damaging the seal.
- When you attach the locknuts, leave a gap of 2mm.



7070-03690E

2) Connect the hoses to the cylinder.

3) Raise the boom and arm until the cylinder is approximately horizontal and gradually supply pressurised oil. Move the cylinder between its stroke ends several times to drive air out.

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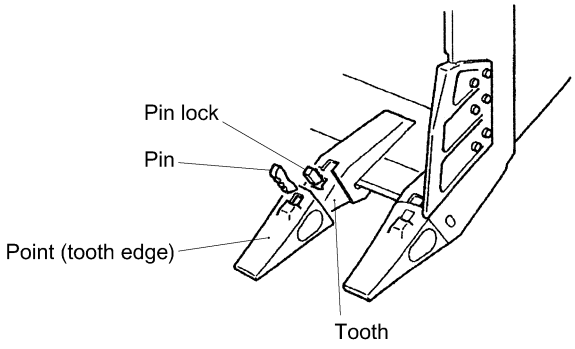
2-1-7 Bucket point inspection and replacement procedure (7670-0220-1E)

(8270-0203-1E)

⚠ CAUTION

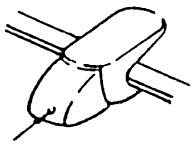
Metal fragments can fly off and cause injuries, so always wear protective clothing including protective goggles and a helmet.



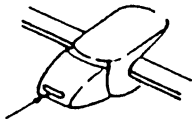
5470-00080E

(1) Inspection procedure

The diagrams below show the limit of wear. The limit is reached when a small hole appears in the point.



State of wear (limit of use)



State of wear (beyond limit of use)

5870-00450E

(2) Replacement procedure

Use a punch or similar tool to push the pin out, then remove the point and clean the tooth.

Then insert the pin lock into the tooth, fit the new point and insert the pin to complete fitting.

(8270-0204-0E)

⚠ CAUTION

The pin lock is made of rubber so replace it each time. If you use the same one repeatedly the point may drop off.

Note The pin can be inserted easily from above or below.

After inserting the pin, knock the point up, down, left and right several times with a hammer. If the pin is not properly in place, it will drop out, so reinsert it properly.

Note If the point is worn on one side, you can change it from left to right or its orientation between up and down. This makes wear even and improves digging efficiency.

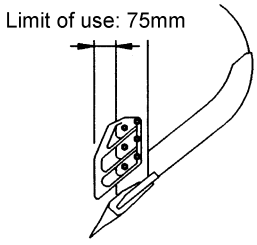
Note If the points do not wear equally, you can improve digging efficiency by selecting points which are equally worn for use.

https://truckmanualshub.com/

2-1-8 Inspection and replacement of the side cutters (9370-0017-0E)

(1) Inspection procedure

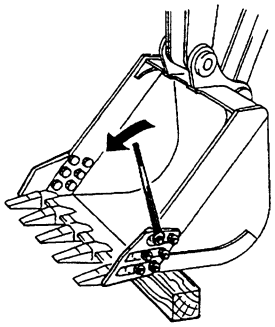
The limit of use is as shown in the diagram.



8170-01013E

(2) Replacement procedure

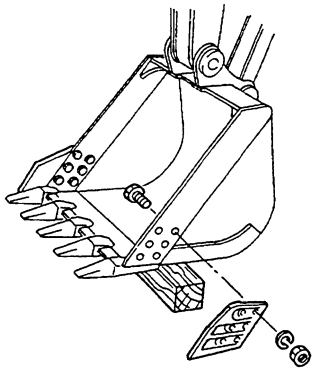
1) Clean away any earth etc. which is stuck around the attachment bolts.
2) Unscrew the attachment bolts and remove the side cutters. If the bolts are corroded in place and cannot be removed, melt them away to cut down.



7070-03560

3) Clean and smooth the attachment surfaces and attach new side cutters. Use new bolts, nuts and spring washers.

Note Side cutter attachment bolt tightening torque:
621N·m (63.4kgf·m) ±3%

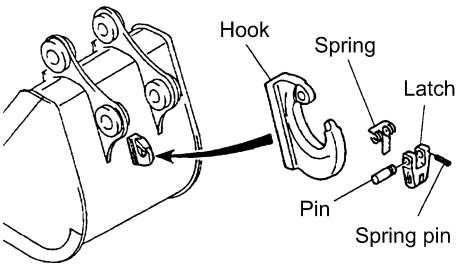


7070-03570

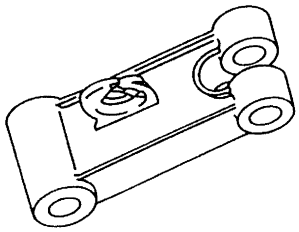
2-1-9 Lifting hook inspection (optional) (7670-0222A1E)

Inspect the hook for wear, cracks and deformation, the hook mounting for cracks, the rope retainer (latch, spring, pin, spring pin) for damage, and check the overall function.

If the hook has any problem, repair or replace it.



7070-03580E



7070-04250

2-2 Arm (767S-0199-0E)

2-2-1 Removal (937S-0030-1E)

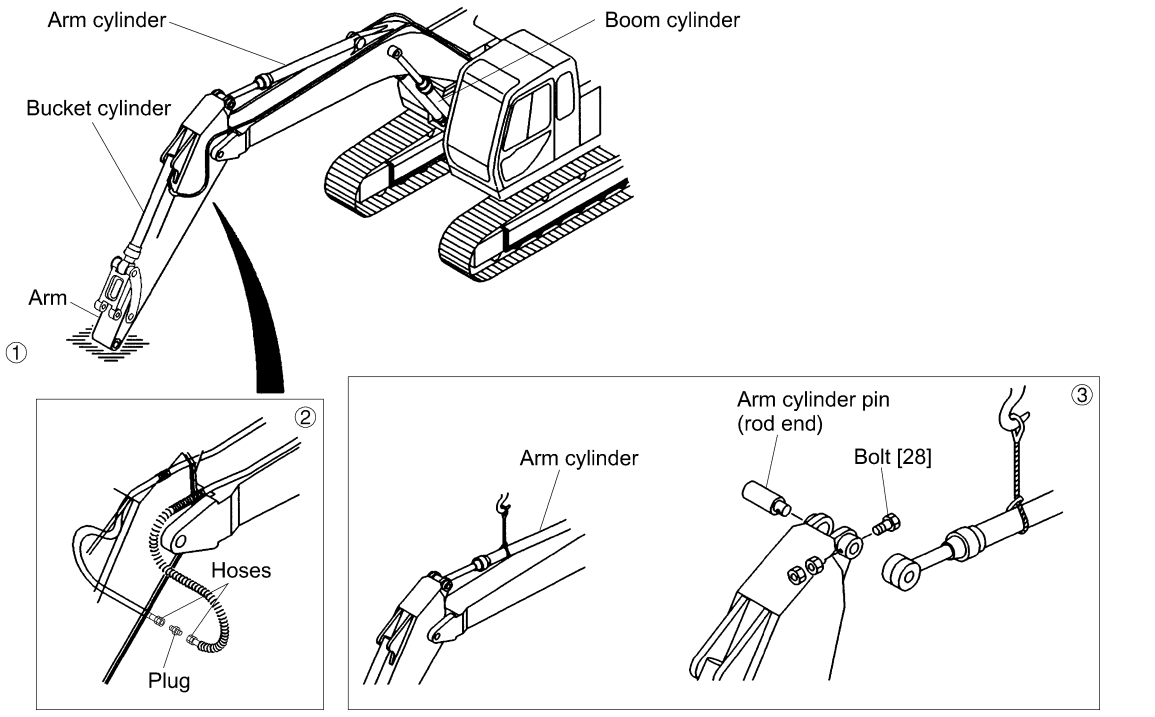
(1) Retract the arm and boom cylinders to bring the arm tip close to the ground. (Fig. ①)

(2) Disconnect the hoses connected to the bucket cylinder.

Note Attach the plug to the openings exposed by hose disconnection to prevent hydraulic oil leakage. (Fig. ②)

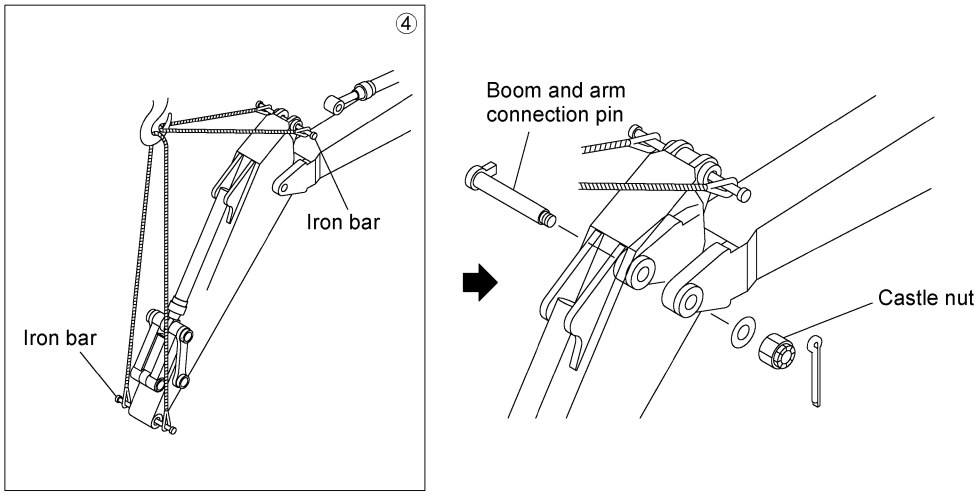
(3) Arrange the sling wire rope to the arm cylinder and support it with a crane to remove bolt [28] and extract the arm cylinder pin (rod end). (Fig. ③)

Lower the arm cylinder on the back of the boom and fully retract it.



937S-00590E

(4) Pass iron bars etc. of adequate strength through the bucket attachment hole and cylinder attachment holes of the arm and attach the sling wire ropes to the iron bars. Support the arm with a crane then undo the castle nut and extract the boom and arm connection pin. (Fig. ④)



7770-01294E

https://truckmanualshub.com/

2-2-2 Inspection and repair (857S-0036-1E)

After disassembly, inspect the following points and make repairs as necessary.

(1) Check for cracks, damage, deformation, corrosion etc. in each part of the arm and repair cracks and damage by welding where necessary. Remove corrosion with a wire brush and repaint the affected areas.

(2) Use calipers to measure wear to the inner diameters of pin holes and bushes, bending, damage and wear to pins etc. and replace any which exceeds wear limits. (Refer to "Service standards".)

(3) Inspect all pipes and hoses for damage, cracks, dents, bending, crumbling, deformation and wear of the screw threads. Replace any worn or defective parts.

(4) Replace all O-rings and seals with new ones.

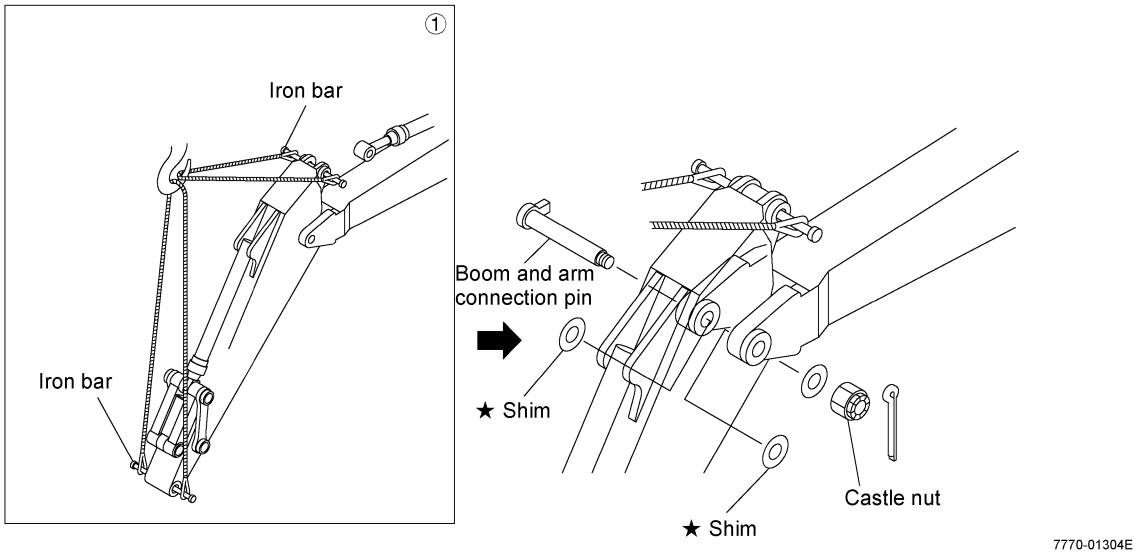
2-2-3 Mounting (937S-0031-1E)

(1) Pass iron bars etc. of adequate strength through the bucket attachment hole and cylinder attachment holes of the arm and attach the sling wire ropes to the iron bars. Support the arm with a crane and align the centers of the attachment holes then use the boom and arm connection pin to attach the arm to the boom. After inserting the pin, attach the castle nut. (Fig. ①)

⚠ CAUTION (777S-0088-1E)

- Insert an appropriate thickness of shims (those marked ★ in the diagram) to reduce the lateral clearance in each boss to 1.0mm or less. Place the shims carefully, locating them so as to avoid applying excessive force to the cylinder.
- The boom and arm connecting section has dust seals fitted on both ends, so take care not to damage them when inserting the pin.

Note After you have tightened the castle nut by hand without using any tools, unscrew it one groove to you and insert a split pin to prevent rotation.

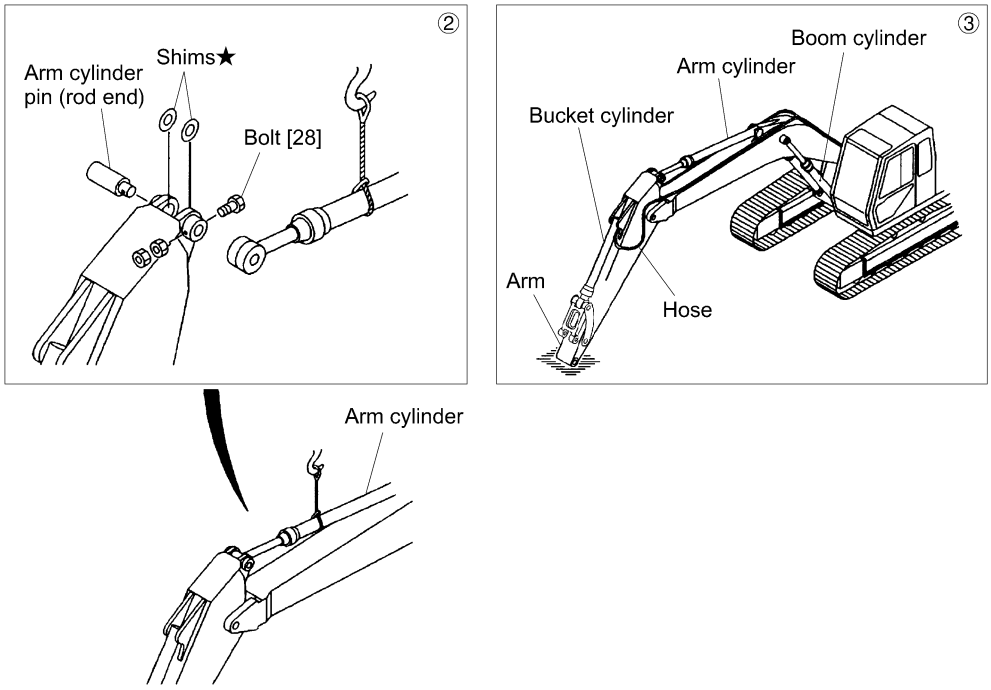


https://truckmanualshub.com/

(2) Arrange the sling wire rope to the arm cylinder and support it with a crane. Align the centers of the attachment holes and insert the arm cylinder pin (rod end) to join the rod end of the cylinder to the arm. After inserting the pin, fix it with bolt [28] to prevent rotation. (Fig. ②)

(3) Connect the hoses to the bucket cylinder. (Fig. ③)

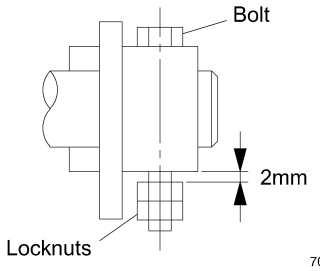
(4) Raise the boom and arm until the bucket cylinder is approximately horizontal and gradually supply pressurised oil. Move the cylinder between its stroke ends several times to drive air out.



937S-00601E

⚠ CAUTION (847V-0012-2E)

- Insert an appropriate thickness of shims (those marked ★ in the diagram) to reduce the lateral clearance in each boss to 1.0mm or less. Place the shims carefully, locating them so as to avoid applying excessive force to the cylinder.
- The cylinder is fitted with the dust seal. Insert the pin carefully to avoid damaging the seal.
- When you attach the locknuts, leave a gap of 2mm.



7070-03690E

2-2-4 Removal and mounting of the arm cylinder and hoses (937S-0032-1E)

(1) Removal

1) Disconnect the arm cylinder piping from the control valve (Fig. ①) and the hoses connected to the cylinder. (Fig. ②)

(767S-0310-0E)

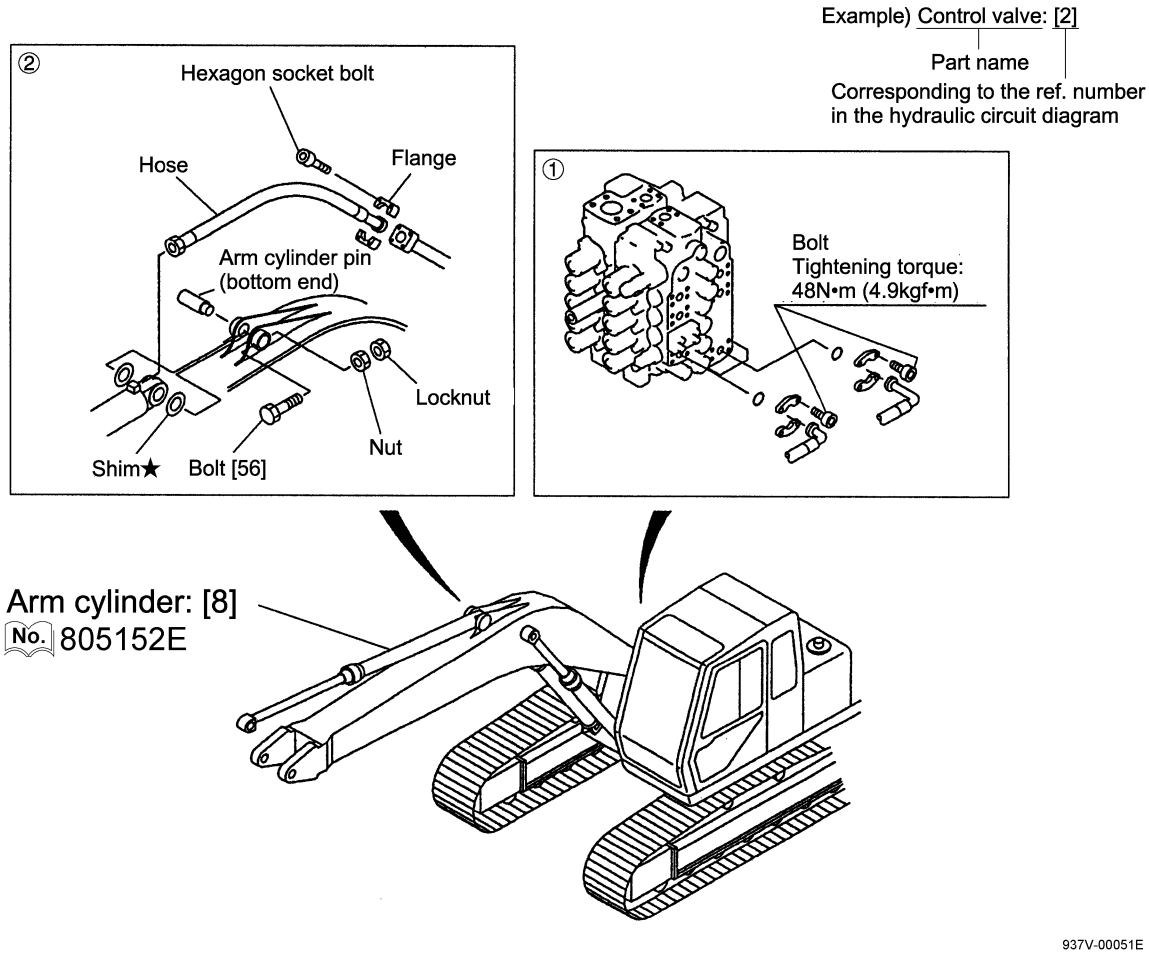
⚠ CAUTION

The arm cylinder hose is designated as a safety part for periodic replacement and as such it must be replaced every 2 years or every 4000 hours of use, whichever occurs sooner.

Note 1. Attach the flanges to the openings from which you have disconnected the piping and hoses to prevent hydraulic oil leakage.

2. If the grease supply hose is connected to the cylinder, remove it in advance.

2) Arrange the sling wire rope around the center of gravity of the cylinder and support it with a crane then remove bolt [56] and extract the arm cylinder pin (bottom end).



(2) Inspection and repair

After disassembly, inspect the following points and repair as necessary.

1) Check for cracks, damage, deformation, corrosion etc. in each part of the arm cylinder and repair cracks and damage by welding where necessary. Remove corrosion with a wire brush and repaint the affected area.

2) Inspect all pipes and hoses for damage, cracks, dents, bending, crumbling, deformation and wear of the screw threads. Replace any worn or defective parts.

3) Replace all O-rings and seals with new ones.

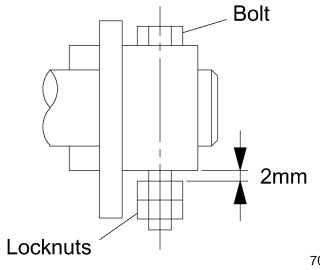
(3) Mounting

1) Arrange the sling wire rope around the center of gravity of the cylinder and support it with a crane. Align the centers of the attachment holes and insert the arm cylinder pin (bottom end) into the bottom end of the cylinder. After inserting the pin, fix it with bolt [56].

(847V-0012-2E)

⚠ CAUTION

- Insert an appropriate thickness of shims (those marked ★ in the diagram) to reduce the lateral clearance in each boss to 1.0mm or less. Place the shims carefully, locating them so as to avoid applying excessive force to the cylinder.
- The cylinder is fitted with the dust seal. Insert the pin carefully to avoid damaging the seal.
- When you attach the locknuts, leave a gap of 2mm.

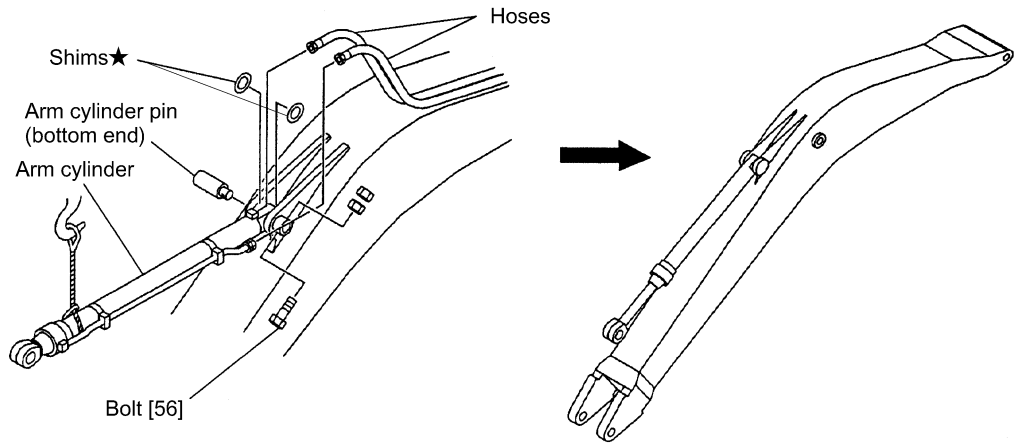


7070-03690E

2) Connect the hoses to the cylinder and the arm cylinder piping to the control valve.

Note If the grease supply hose needs connecting to the cylinder, connect the hose.

3) Raise the boom so that the cylinder is approximately horizontal. Gradually supply pressurised oil to move the cylinder between its stroke ends several times to drive air out.



937S-00620E

https://truckmanualshub.com/

2-3 Boom (767S-0151-0E)

2-3-1 Removal (937S-0033-1E)

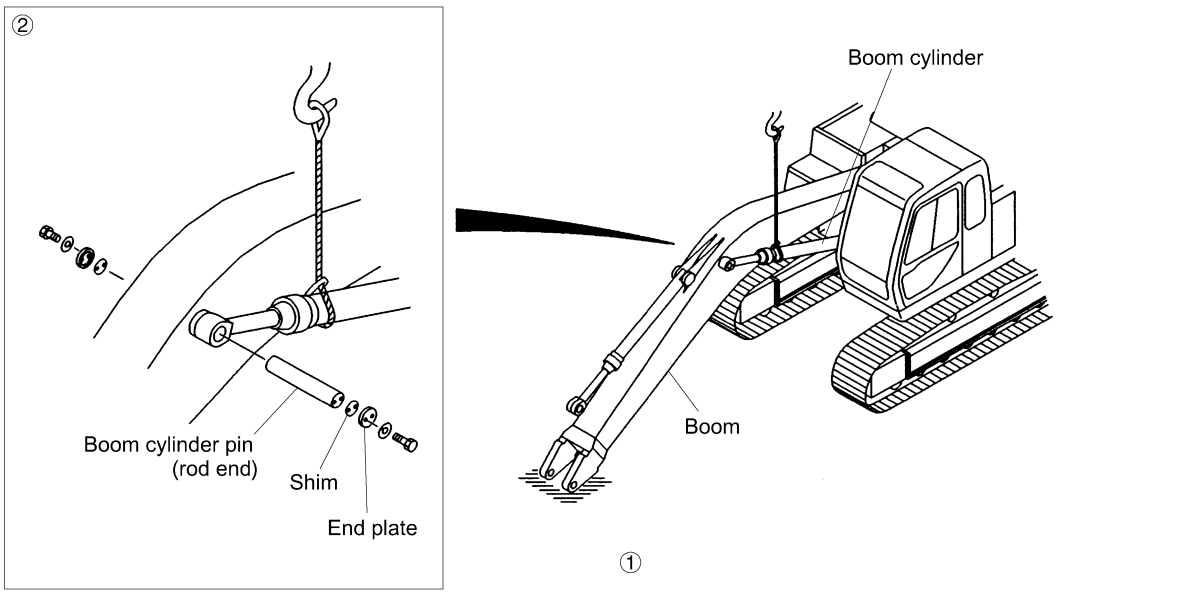
(1) Place the boom top onto the ground. (Fig. ①)

⚠ CAUTION (767S-0311-1E)

Be sure to mark the shims (detached when removing the pin) left and right to avoid mistakes in reassembly.

(2) Arrange the sling wire rope to the boom cylinder and support it with a crane then remove the end plates and extract the boom cylinder pin (rod end). (Fig. ②)

Note If the grease supply hose is connected to the rod end of the cylinder, remove it in advance.



817S-00833E

(3) Fully retract the boom cylinders and lower them slowly onto the bench so that the rod ends are approximately horizontal. (Fig. ③)

(4) Pass iron bars etc. of adequate strength through the boom cylinder attachment hole and the arm attachment holes. Attach the sling wire ropes to the iron bars and support the boom with a crane. (Fig. ④)

(5) Disconnect the hoses at the boom foot. (Fig. ⑤)

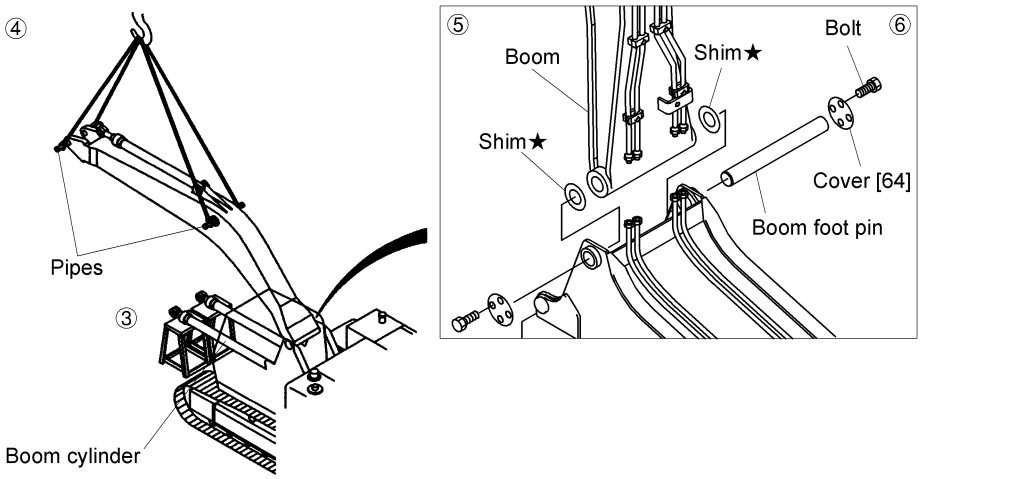
Note 1. Attach the flanges to the openings exposed by hose disconnection to prevent hydraulic oil leakage.
2. Also disconnect the wires for the working lamp.

(6) Remove covers [64] and extract the boom foot pin. (Fig. ⑥)

(767S-0311-1E)

⚠ CAUTION

Be sure to mark the shims (detached when removing the pin) left and right to avoid mistakes in reassembly.



937S-00631E

2-3-2 Inspection and repair (857S-0120-1E)

After disassembly, inspect the following points and make repairs as necessary.

(1) Check for cracks, damage, deformation, corrosion etc. in each part of the boom and repair cracks and damage by welding where necessary. Remove corrosion with a wire brush and repaint the affected areas.

(2) Use calipers to measure wear to the inner diameters of pin holes and bushes, bending, damage and wear to pins etc. and replace any which exceeds wear limits. (Refer to "Service standards".)

(3) Inspect all pipes and hoses for damage, cracks, dents, bending, crumbling, deformation and wear of the screw threads. Replace any worn or defective parts.

(4) Replace all O-rings and seals with new ones.

2-3-3 Mounting (937S-0107-1E)

(1) Pass iron bars etc. of adequate strength through the boom cylinder attachment hole and the arm attachment holes. Attach the sling wire ropes to the iron bars and support the boom with a crane. Align the centers of the attachment holes and insert the boom foot pin to join the boom foot to the slewing table. After inserting the pin, attach covers [64]. (Fig. ①)

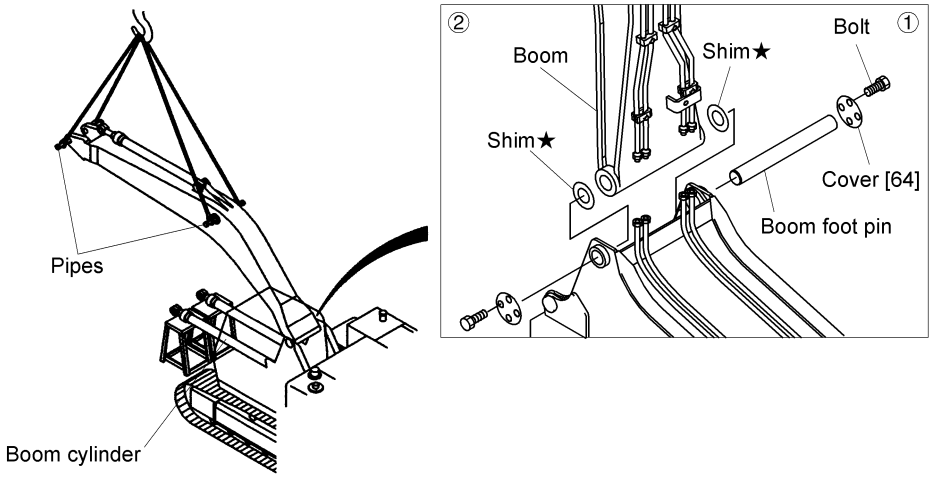
(777S-0091-1E)

⚠ CAUTION

- Be sure to attach the shims (detached when removing the pin) left and right correctly in reassembly.
- Insert an appropriate thickness of shims (those marked ★ in the diagram) to reduce the lateral clearance in the boom boss to 2.0mm. Place the shims carefully, locating them so as to avoid applying excessive force to the cylinders etc.
- The boom foot section has dust seals fitted on both ends, so take care not to damage them when inserting the pin.

(2) Reconnect the hoses at the boom foot. (Fig. ②)

Note Before you attach the boom cylinders to the boom, supply pressurised oil to the cylinders while they are horizontal or with the head ends lowered and extract air through the bottom of the cylinders.



937S-00641E

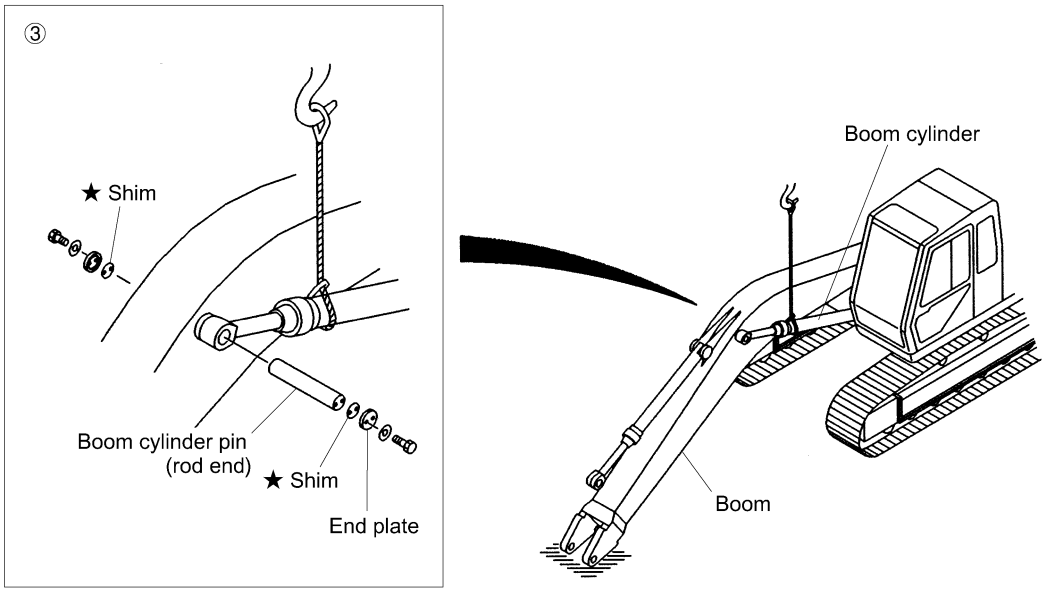
(3) Transfer the sling wire rope to the boom cylinder to support it with a crane and align the centers of the attachment holes then insert the boom cylinder pin (rod end) to attach the rod ends of the cylinders to the boom. After inserting the pin, attach the end plates. (Fig. ③)

(777S-0092-1E)

⚠ CAUTION

- Be sure to attach the shims (detached when removing the pin) left and right correctly in reassembly.
- Insert an appropriate thickness of shims (those marked ★ in the diagram) to reduce the lateral clearance in each boss to 1.0mm or less. Place the shims carefully, locating them so as to avoid applying excessive force to the cylinders.
- The cylinder is fitted with the dust seal. Insert the pin carefully to avoid damaging the seal.

Note If the grease supply hose needs connecting to the rod end of the cylinder, connect the hose.



837S-00472E

https://truckmanualshub.com/

2-3-4 Removal and mounting of the boom cylinders and hoses (857S-0122-1E)

(1) Removal

1) Disconnect all hoses from the cylinders. (Fig. ①)

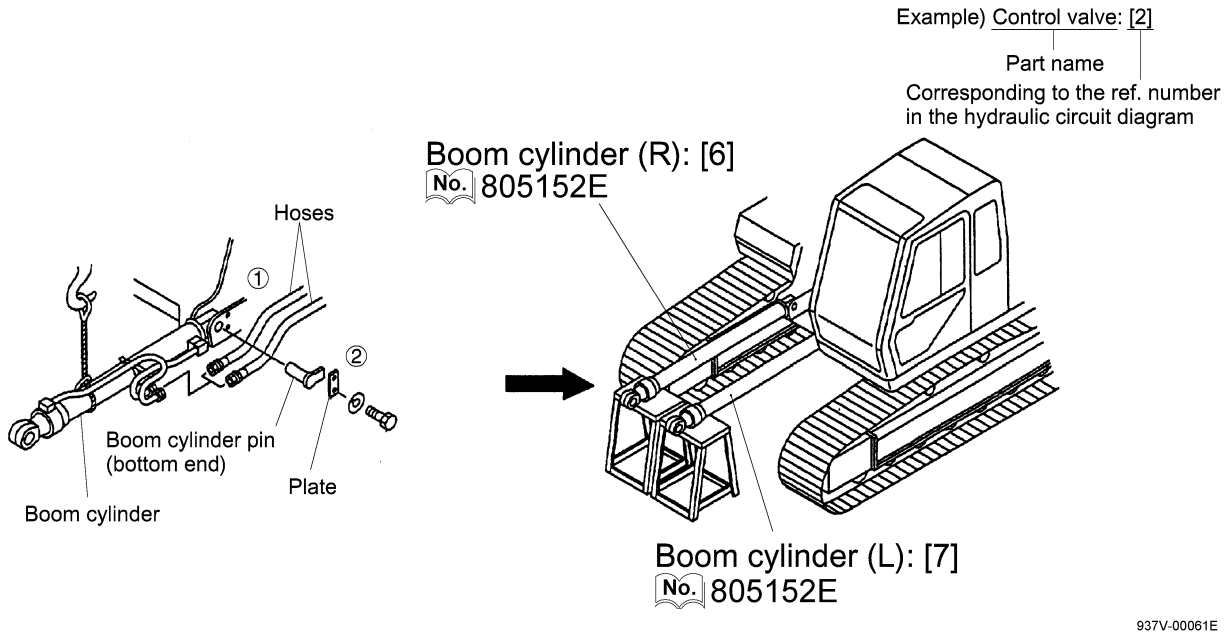
(767S-0313-0E)

⚠ CAUTION

The boom cylinder hose is designated as a safety part for periodic replacement and as such it must be replaced every 2 years or every 4000 hours of use, whichever occurs sooner.

Note Attach the flanges to the openings exposed by hose disconnection to prevent hydraulic oil leakage.

2) Arrange the sling wire rope around the center of gravity of the cylinder and support it with a crane then remove the plate and extract the boom cylinder pin (bottom end). (Fig. ②)



(2) Inspection and repair

After disassembly, inspect the following points and repair as necessary.

1) Check for cracks, damage, deformation, corrosion etc. in each part of the boom cylinders and repair cracks and damage by welding where necessary. Remove corrosion with a wire brush and repaint the affected area.

2) Inspect all pipes and hoses for damage, cracks, dents, bending, crumbling, deformation and wear of the screw threads. Replace any worn or defective parts.

3) Replace all O-rings and seals with new ones.

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(3) Mounting

1) Arrange the sling wire rope around the center of gravity of the cylinder and support it with a crane. Align the centers of the attachment holes and insert the boom cylinder pin (bottom end) into the bottom end of the cylinder. After inserting the pin, attach the plate.

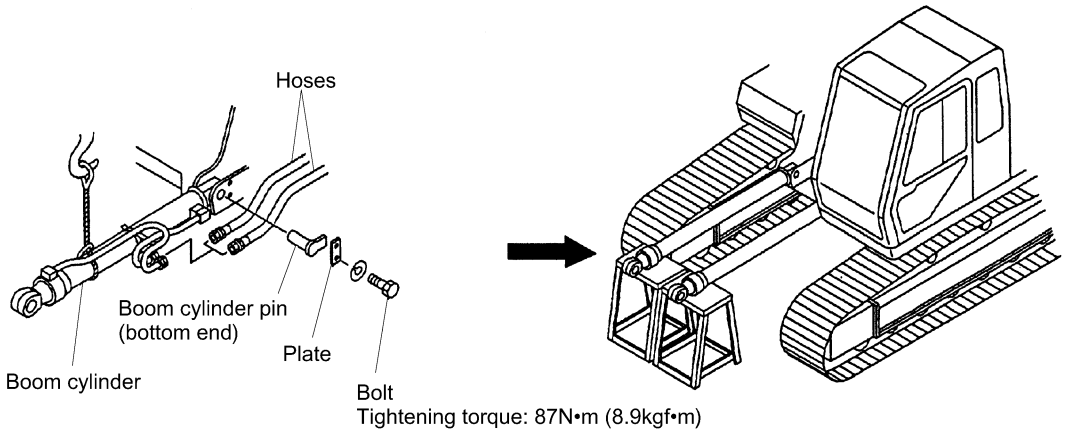
(777S-0094-1E)

⚠ CAUTION

- Never fit the clearance adjuster shim on the bottom end of the cylinders.
- The cylinder is fitted with the dust seal. Insert the pin carefully to avoid damaging the seal.

2) Connect the hoses to the cylinders.

3) Set the cylinders horizontal. Gradually supply pressurised oil to move the cylinders between the stroke ends several times to drive air out.



937S-00651EA

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3. Data file (817S-0055-0E)

3-1 Data for front attachment mounting (937S-0093-0E)

① Rated pressure 31.4MPa (320kgf/cm^2)

② Maximum output flow 235L/min

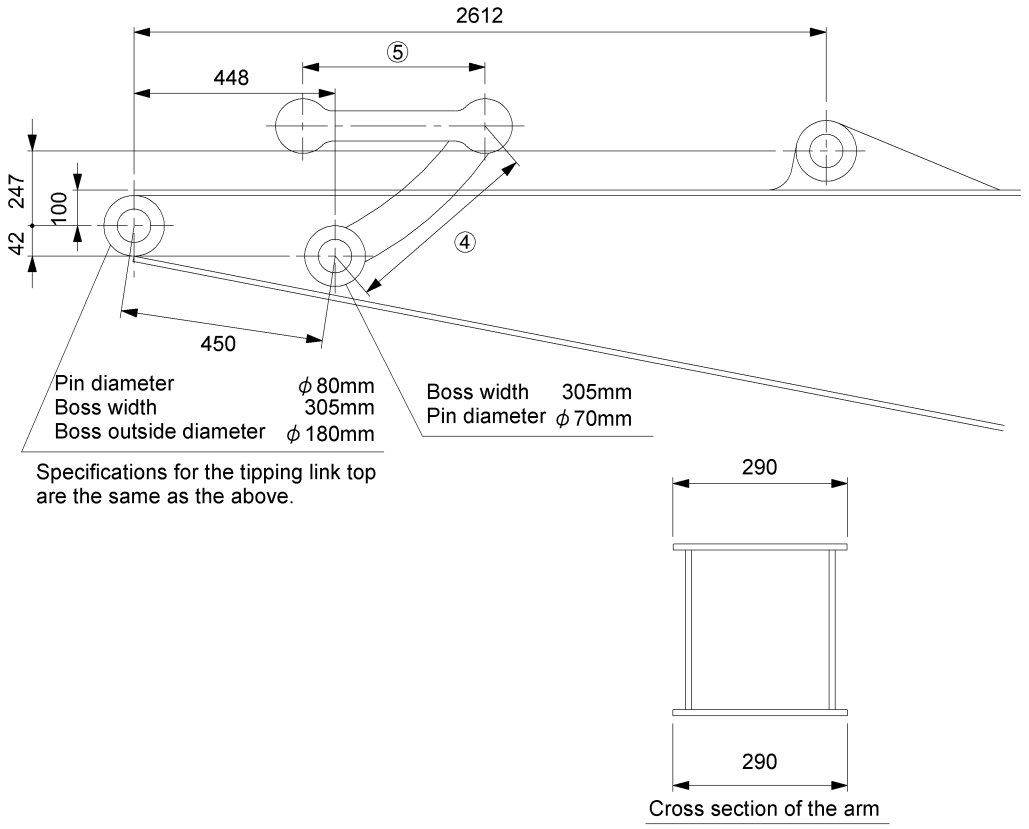
③ Bucket cylinder

Bore diameter	ϕ 120mm	Rod diameter	ϕ 80mm
Full retraction length	1623mm	Stroke	1090mm
Rod pin diameter	ϕ 80mm	Rod boss width	103mm
Rod boss outside diameter	ϕ 140mm		

④ Side link length 605mm

⑤ Tipping link length 580mm

⑥ Dimensions for each location

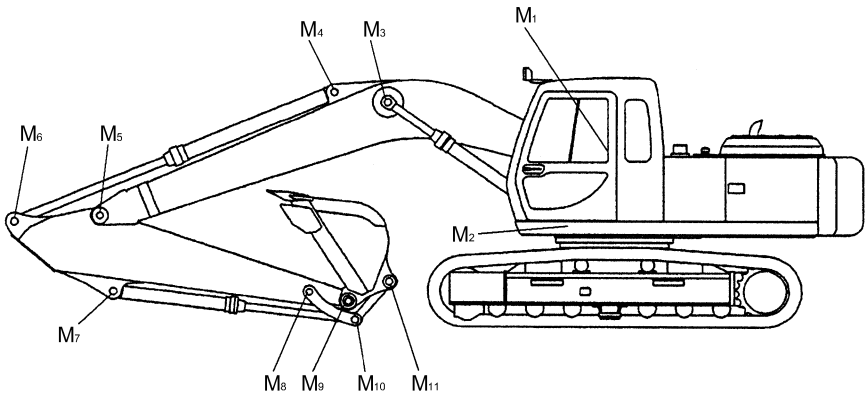


937S-00672E

https://truckmanualshub.com/

3-2 Service standards (937S-0034-0E)

3-2-1 Front attachment shaft and bush (937S-0137-1E)



707S-00571

(1) Boom, arm, bucket and link

Units: mm

Alphabet in the figure	Standard dimensions	Shaft		Hole					Clearance			Action
		Part No.	Standard tolerance	Part No.	Type	Standard tolerance	Recommended replacement	Limit of use	Standard tolerance	Recommended replacement	Limit of use	
M1	90	837-41604000	−0.072 −0.159	707-41612000	Boom bush	+0.200 +0.150	91	91.5	+0.359 +0.222	1	1.5	Replace bush
				707-40215000	Table bush	+0.150 +0.100	91	91.5	+0.309 +0.150	1	1.5	Replace bush
M2	80	607-41612000	−0.060 −0.134		Table hole	+0.150 +0.100	81	81.5	+0.284 +0.160	1	1.5	Build up metal
				329-11622001	Cylinder bush	+0.250 +0.050	80.5	81	+0.384 +0.110	1	1.5	Replace bush
M3	80	817-41611000	−0.060 −0.134		Boom hole	+0.150 +0.120	81	81.5	+0.284 +0.160	1	1.5	Build up metal
				329-11622001	Cylinder bush	+0.250 +0.050	80.5	81	+0.384 +0.110	1	1.5	Replace bush
M4	80	837-41608000	−0.060 −0.134		Boom hole	+0.150 +0.100	81	81.5	+0.284 +0.160	1	1.5	Build up metal
				329-17122001	Cylinder bush	+0.250 +0.050	80.5	81	+0.384 +0.110	1	1.5	Replace bush
M5	80	707-42302000	−0.060 −0.134		Boom hole	+0.150 +0.100	81	81.5	+0.284 +0.160	1	1.5	Build up metal
				837-42005000	Arm bush	+0.160 +0.060	81	81.5	+0.294 +0.120	1	1.5	Replace bush
M6	80	837-41608000	−0.060 −0.134		Arm hole	+0.150 +0.100	81	81.5	+0.384 +0.160	1	1.5	Build up metal
				329-17122001	Cylinder bush	+0.250 +0.050	80.5	81	+0.384 +0.110	1	1.5	Replace bush
M7	80	837-41608000	−0.060 −0.134		Arm hole	+0.150 +0.100	81	81.5	+0.284 +0.160	1	1.5	Build up metal
				309-70131001	Cylinder bush	+0.250 +0.050	80.5	81	+0.384 +0.110	1	1.5	Replace bush
M8	70	707-42006000	−0.060 −0.134		Side link hole	+0.150 +0.100	71	71.5	+0.284 +0.160	1	1.5	Build up metal
				309-41725000	Arm bush	+0.200 +0.100	71	71.5	+0.334 +0.160	1	1.5	Replace bush
M9	80	837-42003000	−0.060 −0.134		Bucket hole	+0.150 0	81	81.5	+0.284 +0.060	1	1.5	Build up metal
				707-85003000	Bucket bush	+0.150 +0.100	81	81.5	+0.284 +0.160	1	1.5	Replace bush
				837-42007000	Arm bush	+0.200 +0.100	81	81.5	+0.334 +0.160	1	1.5	Replace bush
M10	80	707-42005000	−0.060 −0.134		Side link hole	+0.150 +0.100	81	81.5	+0.284 +0.160	1	1.5	Build up metal
				707-42011000	Link bush	+0.200 +0.100	81	81.5	+0.334 +0.160	1	1.5	Replace bush
				309-70131001	Cylinder bush	+0.250 +0.050	80.5	81	+0.384 +0.110	1	1.5	Replace bush
M11	90	837-42003000	−0.060 −0.134		Bucket hole	+0.150 +0.100	81	81.5	+0.284 +0.060	1	1.5	Build up metal
				707-42009000	Link bush	+0.200 +0.100	81	81.5	+0.334 +0.160	1	1.5	Replace bush

(937S-0035-1E)

Note 1. The limit of use dimension for shafts indicates wear amounting to 5% of shaft diameter. Beyond this limit replace with a new shaft.

2. The tolerance for the bush is the dimension after it has been pressed into place.

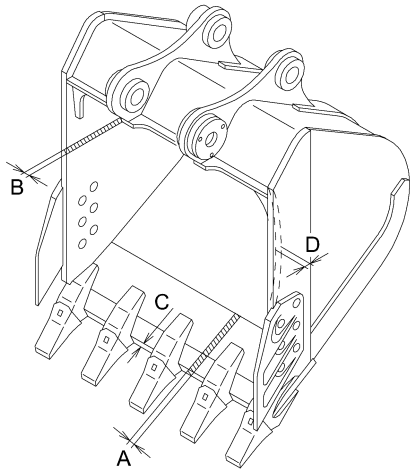
3-2-2 Bucket: 707-85000011 (937S-0138-0E)

(1) Lip: 707-85002000

Units: mm

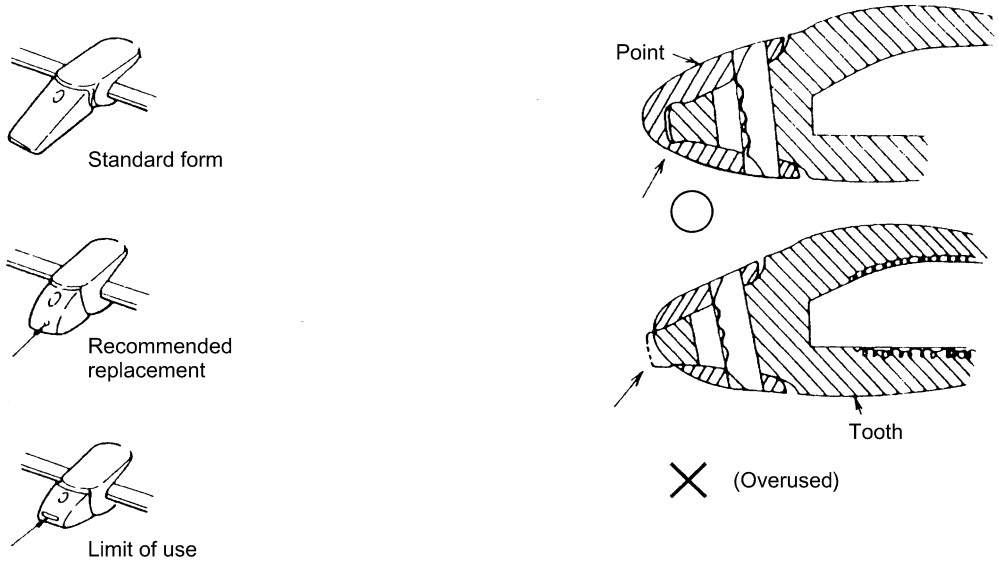
Alphabet in the figure	Standard dimensions	Recommended replacement		Limit of use	
			Action		Action
A	38	24	Metal buildup by welding	20	Replace
B	25	20	Metal buildup by welding	15	Replace
C	0	35	Metal buildup by welding	45	Replace
D	0	35	Metal buildup by welding	50	Replace

(937S-0036-0E)



937S-00860

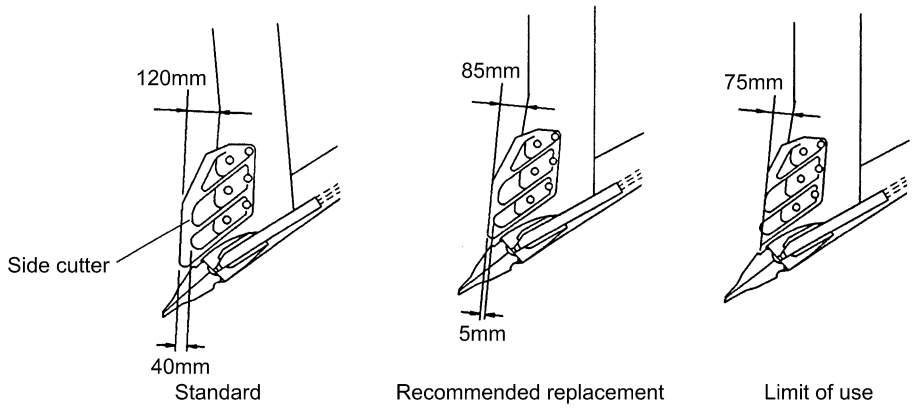
(2) Point: 134-88403000, 134-88450000, 304-88403000



707S-00591E

Note If the point is overused to the extent of wearing, a hole in the point wear will proceed to the tooth and it will become impossible to fit a new point onto the worn tooth.

(3) Side cutter: 144-85006000 (R), 144-85007000 (L)



747S-00600E

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3-2-3 Cylinder (937S-0139-2E)

(1) KCH5-type cylinder (major change points in comparison with KCH3-type)

1) Cylinder tube
   - Electric resistance welded steel tube

2) Piston rod assembly
   - The nut retaining point and screw thread pitch are changed to improve durability of the screw section.
     Due to the above change points, a small percentage of the tightening torque value is increased.

3) Cylinder head
   - Change of material (FCD600→FCD500)
   - Change of form→KCH3-type is not interchangeable with KCH5-type, so the form of the flange is changed.

4) Buffer ring
   - Change of form and structure→The 3-piece type is changed to the 1-piece U-ring type.

5) Pipe assembly
   - TIG welding

6) Floating cushion seal
   - The form is changed to prevent incorrect attachment.

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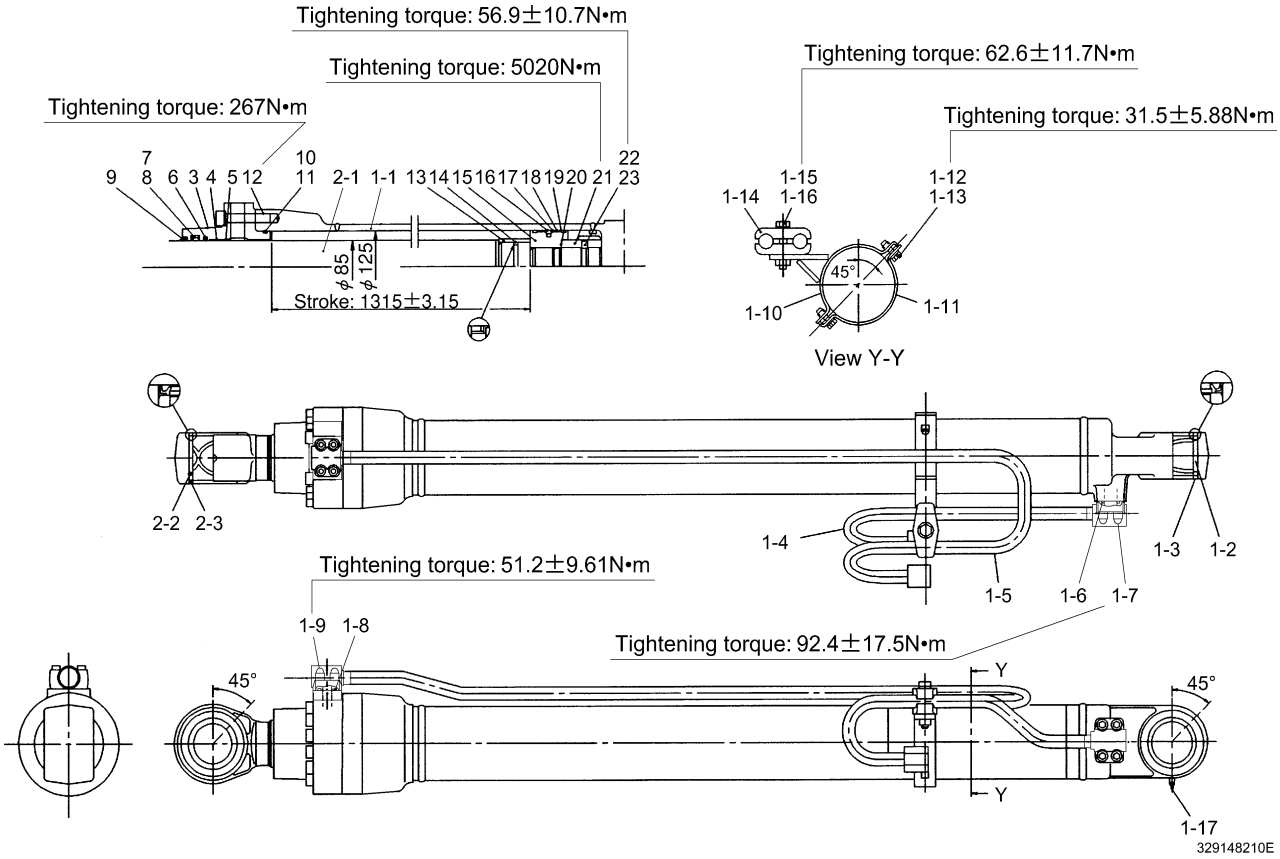
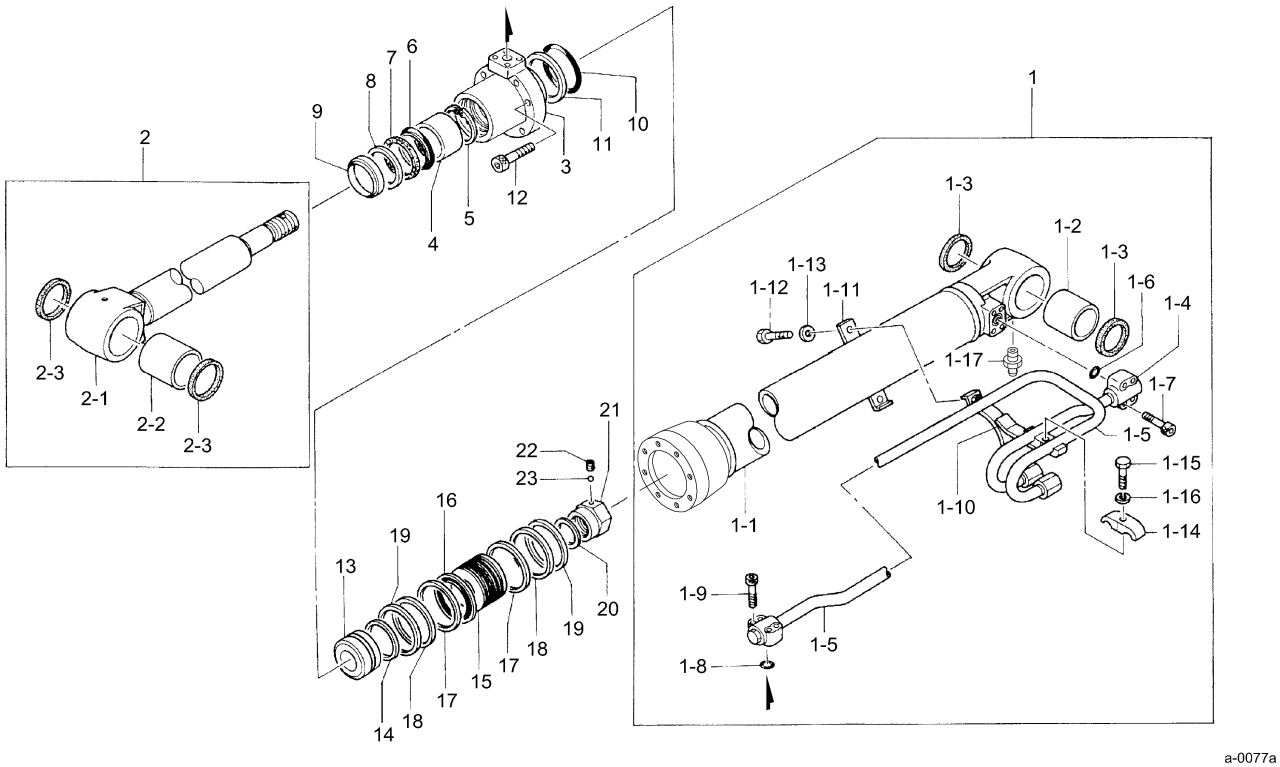
(2) Boom cylinder

(R): 329-14800022

(L): 329-14900022





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Ref. No.	Part name	Q'ty	Ref. No.	Part name	Q'ty
1	Cylinder tube kit	1	3	Cylinder head	1
1-1	Cylinder tube	1	4	Bush	1
1-2	Pin bush	1	5	Snap ring	1
1-3	Wiper ring	2	6	Buffer ring	1
1-4	Pipe	1	7	U-ring	1
1-5	Pipe	1	8	Backup ring	1
1-6	O-ring	1	9	Wiper ring	1
1-7	Hexagon socket bolt	4	10	O-ring	1
1-8	O-ring	1	11	Backup ring	1
1-9	Hexagon socket bolt	4	12	Hexagon socket bolt	12
1-10	Band	1	13	Cushion bearing	1
1-11	Band	1	14	Cushion seal	1
1-12	Bolt	2	15	Piston	1
1-13	Washer	2	16	Seal ring	1
1-14	Pipe holder	2	17	Backup ring	2
1-15	Bolt	1	18	Slide ring	2
1-16	Spring washer	1	19	Slide ring	2
1-17	Grease nipple	1	20	Shim	1
2	Piston rod kit	1	21	Nut	1
2-1	Piston rod	1	22	Setscrew	1
2-2	Pin bush	1	23	Steel ball	1
2-3	Wiper ring	2			

(937S-0037-0E)

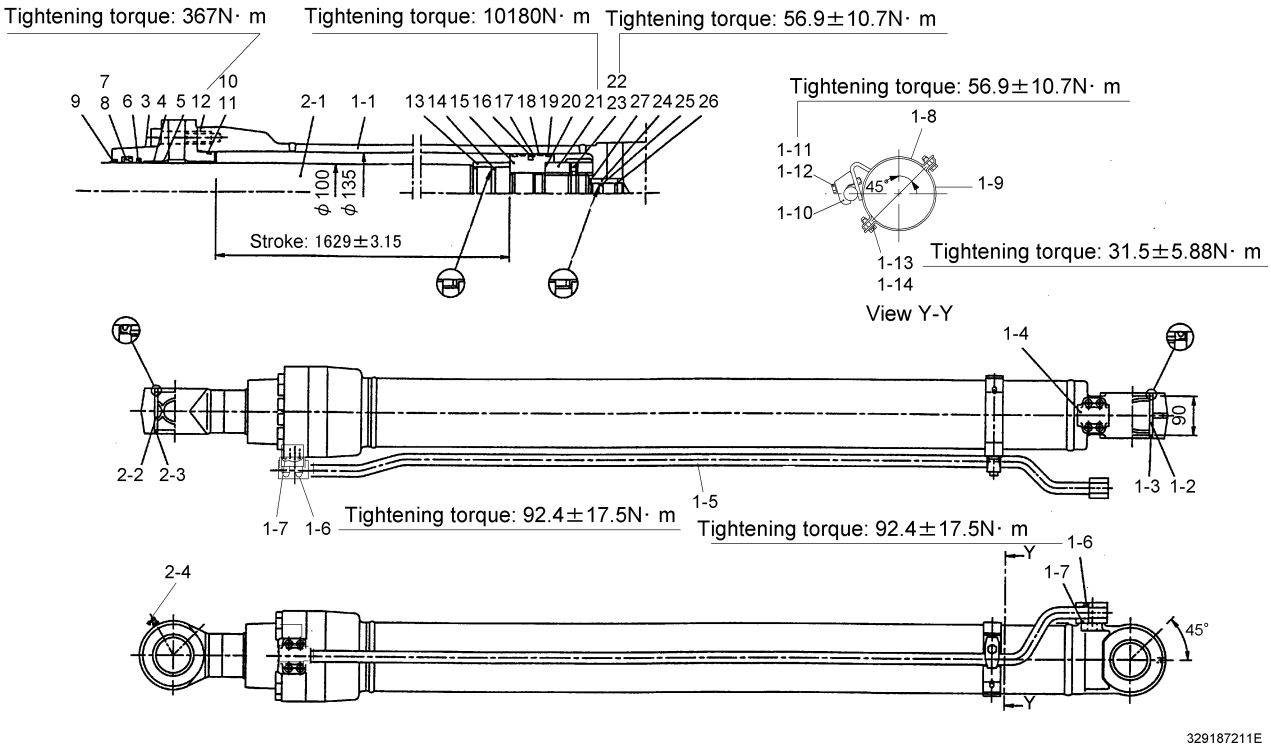
Dimensions	Cylinder bore	125mm
	Rod diameter	85mm
	Stroke	1315mm
Output	Extension side	385kN/31.4MPa (39200kgf/320kgf/cm^2)
	Retraction side	207kN/31.4MPa (21100kgf/320kgf/cm^2)
Mass		184kg

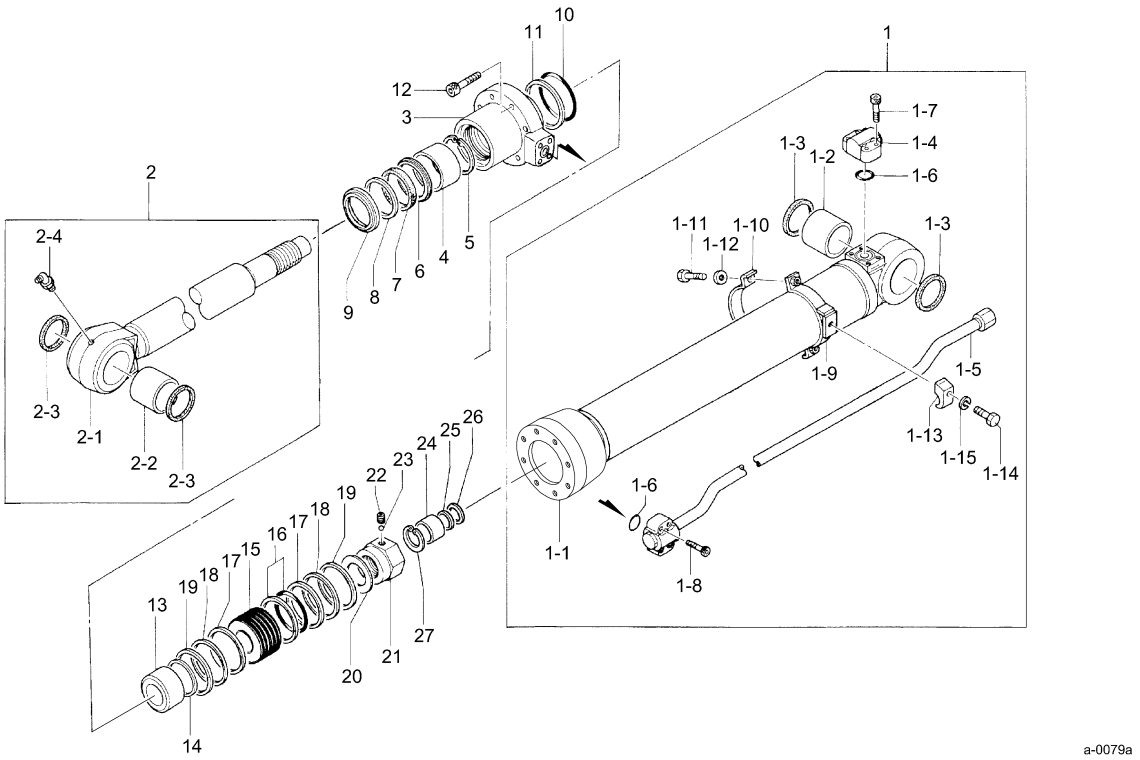
(937S-0130-0E)

https://truckmanualshub.com/

(3) Arm cylinder

329-18700021





https://truckmanualshub.com/

Ref. No.	Part name	Q'ty	Ref. No.	Part name	Q'ty
1	Cylinder tube kit	1	5	Snap ring	1
1-1	Cylinder tube	1	6	Buffer ring	1
1-2	Pin bush	1	7	U-ring	1
1-3	Wiper ring	2	8	Backup ring	1
1-4	Joint	1	9	Wiper ring	1
1-5	Pipe	1	10	O-ring	1
1-6	O-ring	2	11	Backup ring	1
1-7	Hexagon socket bolt	4	12	Hexagon socket bolt	12
1-8	Hexagon socket bolt	4	13	Cushion bearing	1
1-9	Band	1	14	Cushion seal	1
1-10	Band	1	15	Piston	1
1-11	Bolt	2	16	Seal ring	1
1-12	Washer	2	17	Backup ring	2
1-13	Pipe holder	1	18	Slide ring	2
1-14	Bolt	1	19	Slide ring	2
1-15	Spring washer	1	20	Shim	1
2	Piston rod kit	1	21	Nut	1
2-1	Piston rod	1	22	Setscrew	1
2-2	Pin bush	1	23	Steel ball	1
2-3	Wiper ring	2	24	Cushion bearing	1
2-4	Grease nipple	1	25	Cushion seal	1
3	Cylinder head	1	26	Stopper	2
4	Bush	1	27	Snap ring	1

(937S-0038-0E)

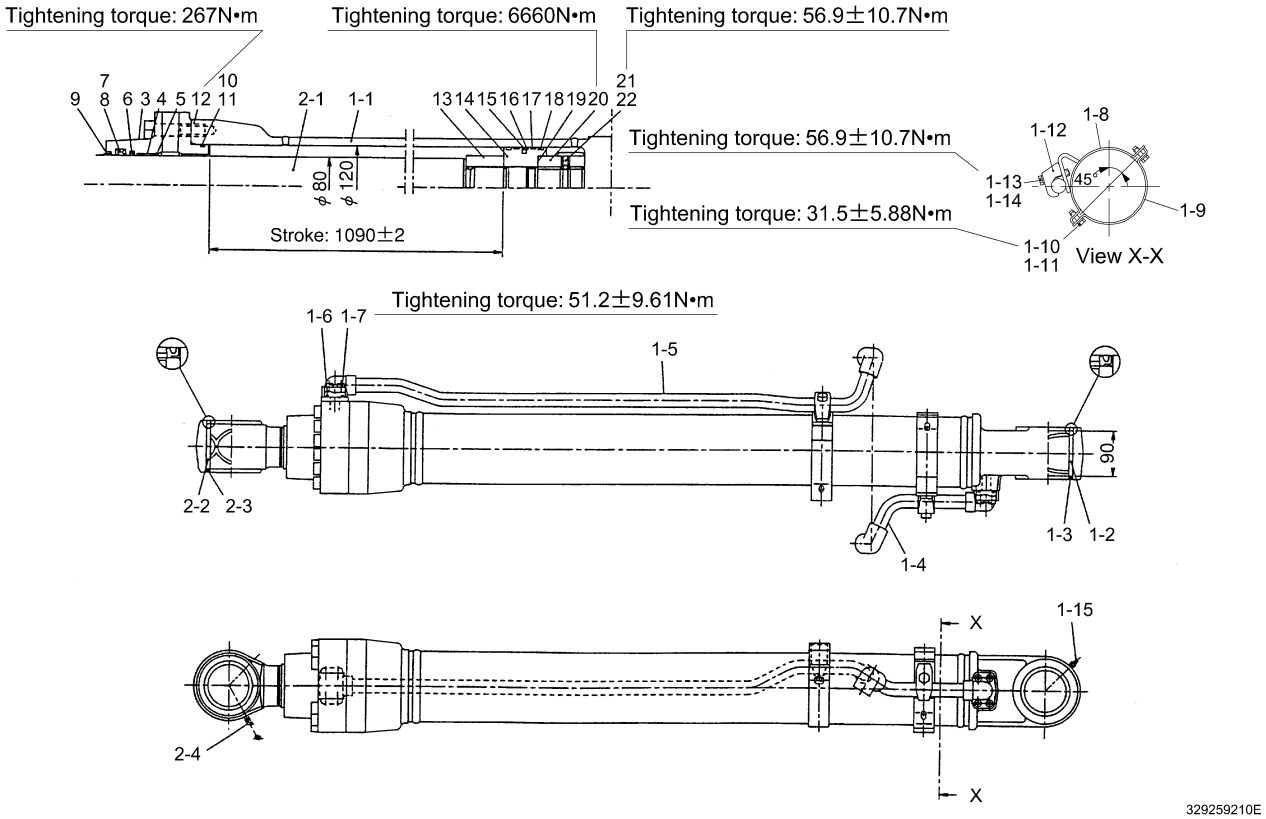
Dimensions	Cylinder bore	135mm
	Rod diameter	100mm
	Stroke	1629mm
Output	Extension side	449kN/31.4MPa (45800kgf/320kgf/cm^2)
	Retraction side	202kN/31.4MPa (20600kgf/320kgf/cm^2)
Mass		280kg

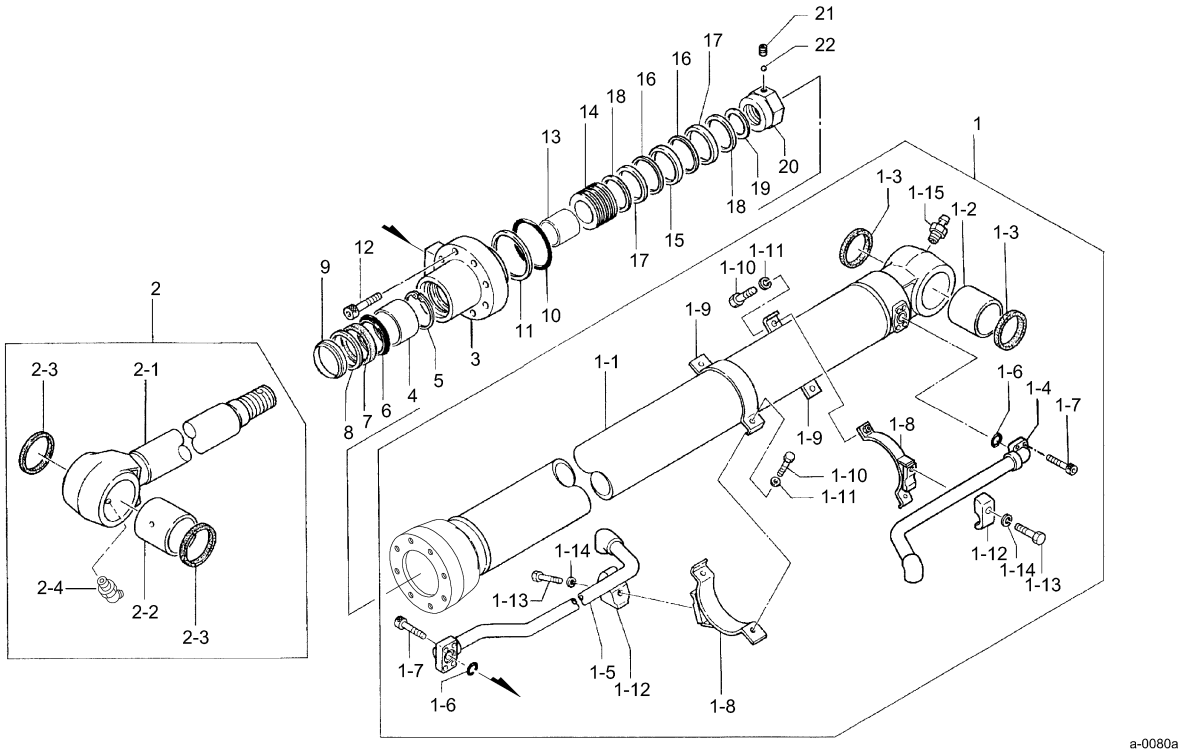
(937S-0133-0E)

https://truckmanualshub.com/

(4) Bucket cylinder

329-25900021





https://truckmanualshub.com/

Ref. No.	Part name	Q'ty	Ref. No.	Part name	Q'ty
1	Cylinder tube kit	1	3	Cylinder head	1
1-1	Cylinder tube	1	4	Bush	1
1-2	Pin bush	1	5	Snap ring	1
1-3	Wiper ring	2	6	Buffer ring	1
1-4	Pipe	1	7	U-ring	1
1-5	Pipe	1	8	Backup ring	1
1-6	O-ring	2	9	Wiper ring	1
1-7	Hexagon socket bolt	8	10	O-ring	1
1-8	Band	2	11	Backup ring	1
1-9	Band	2	12	Hexagon socket bolt	12
1-10	Bolt	4	13	Cushion bearing	1
1-11	Washer	4	14	Piston	1
1-12	Pipe holder	2	15	Seal ring	1
1-13	Bolt	2	16	Backup ring	2
1-14	Spring washer	2	17	Slide ring	2
1-15	Grease nipple	1	18	Slide ring	2
2	Piston rod kit	1	19	Shim	1
2-1	Piston rod	1	20	Nut	1
2-2	Pin bush	1	21	Setscrew	1
2-3	Wiper ring	2	22	Steel ball	1
2-4	Grease nipple	1			

(937S-0039-0E)

Dimensions	Cylinder bore	120mm
	Rod diameter	80mm
	Stroke	1090mm
Output	Extension side	354kN/31.4MPa (36100kgf/320kgf/cm^2)
	Retraction side	197kN/31.4MPa (20100kgf/320kgf/cm^2)
Mass		155kg

(937S-0026-0E)

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(937V-0010-1E)

H Superstructure

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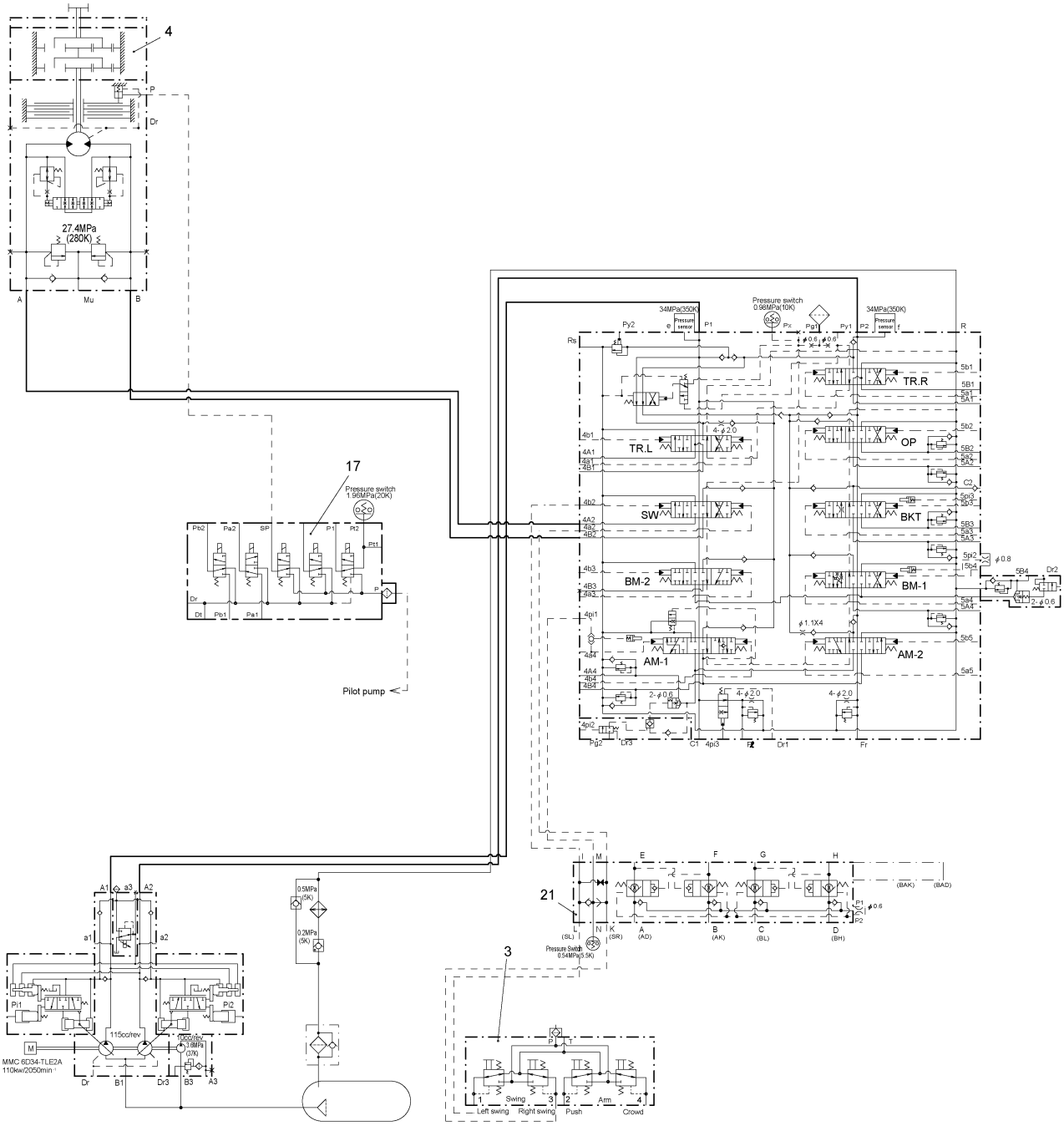
1. Swing equipment (767S-0142-2E)

The swing mechanism, which is mounted between the traveling frame and the slewing table, includes a swing bearing including an internal gear and a swing motor equipped with a pinion gear.

1-1 Swing circuit (747S-0031-0E)

1-1-1 Hydraulic circuit diagram (857S-0020-0E)



Ref. No.	Part name	Q'ty
3	Pilot valve	1
4	Swing motor	1
17	Solenoid valve	1
21	Shockless valve	1

937S-00221E

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1-1-2 Description of the swing circuit (837S-0024-2E)

The swing motor is driven by No. 2 spool of the control valve (block A).

Pressure in the circuit is regulated by the relief valves built into the swing motor.

When the swing spool is in the neutral position, the swing motor is at rest. When the swing lever is moved left or right, the swing motor runs forward or in reverse to swing the superstructure left or right respectively.

A relief valve for cushioning, a cavitation prevention makeup valve and an anti-reversal valve to prevent lateral swing when swing operation stops are all built into the cover above the motor.

(1) Swing priority circuit

When swinging occurs simultaneously with arm excavation operation, the circuit gives priority of oil supply to the swing motor.

The pressurised oil from pump P2 passes through the central bypass circuit of the control valve (block B) to flow to the arm 2.

The pressurised oil from pump P1 flows to the swing and arm spools of the control valve (block A), but the pilot pressure acting on the arm 1 spool restricts the stroke to less than full stroke. This constricts the channel to maintain pressure for driving the swing motor.

(2) Swing parking brake

When the lever is in the neutral position, the swing parking brake automatically acts. Operation of non-traveling levers applies a pilot pressure through the solenoid block to release the brake.

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2. Removal and mounting of swing equipment (857S-0123-0E)

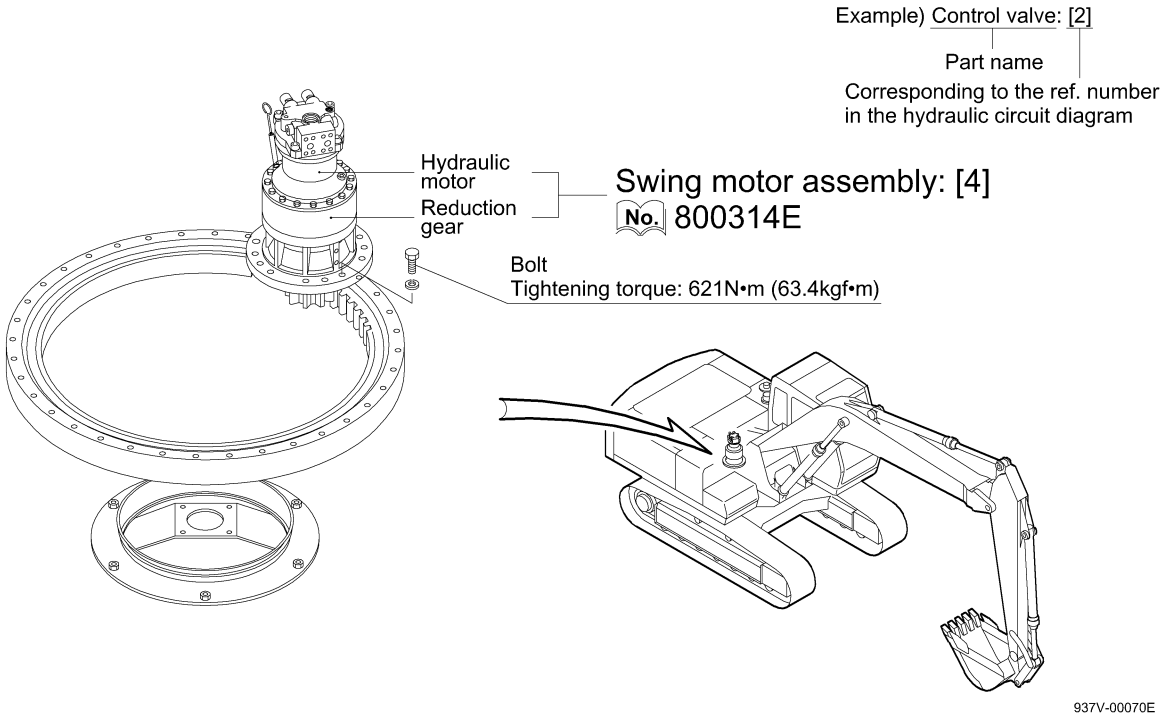
2-1 Swing motor (857S-0050-0E)

2-1-1 Removal (857S-0051-0E)

(1) Disconnect all hoses from above the swing motor before you remove the motor.

(2) Disconnect all hoses from the swing motor before you remove the motor.

(3) Remove the bolts then attach the sling wire rope to the swing motor and lift it off the slewing table using a crane.



2-1-2 Inspection and repair (857S-0052-0E)

(1) Inspect the meshing of the pinion gear, which should exhibit no severe pitching. Check that the gear is not cracked or damaged.

(2) Inspect all parts of the pinion for wear with reference to the service standards.

2-1-3 Mounting (937S-0042-0E)

Reverse the removal procedure to remount the swing motor with particular attention to the following points.

(1) Bolt tightening torque: 621N・m (63.4kgf・m)

(2) Thoroughly wipe away all traces of oil and grease from the threaded parts of the bolts and always apply screw-lock compound to them before tightening them.

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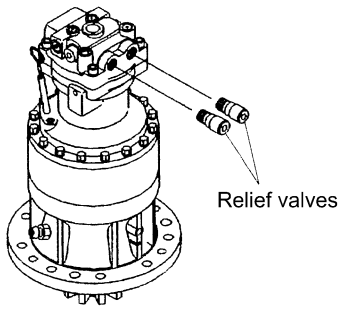
2-2 Swing motor relief valve (837S-0027-0E)

Two relief valves for right swing and left swing are built into the swing motor.

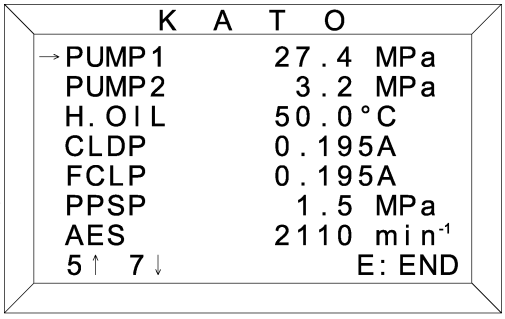


707S-00201E

2-2-1 Pressure adjustment method (937S-0043-0E)

(1) Turn the starter switch from "ON" to "START" to "ON" to start the engine.
(2) Set the work mode to "Heavy duty", the APC mode to "H", the auto-slow mode to OFF and the econo mode to OFF.
(3) Display the A PUMP1 or B PUMP2 data on the adjust mode menu screen.
(4) Warm up the engine following the instruction manual until the hydraulic oil temperature rises to 50 ± 5°C.

Note Hydraulic oil temperature is indicated as H.OIL on the adjust mode screen.



937S-00720

(5) Turn the accelerator dial fully clockwise to the high idling stopper position.
(6) With the machine in the maximum reach position, place the side of the bucket against a wall and gradually move the swing control lever until it reaches the end. Follow this procedure for both right and left swing and note the P1 pressure reading in each case.

PUMP 1 ·····27.5MPa (280kgf/cm^2)

2-2-2 Cross-relief valve adjustment method (937S-0044-0E)

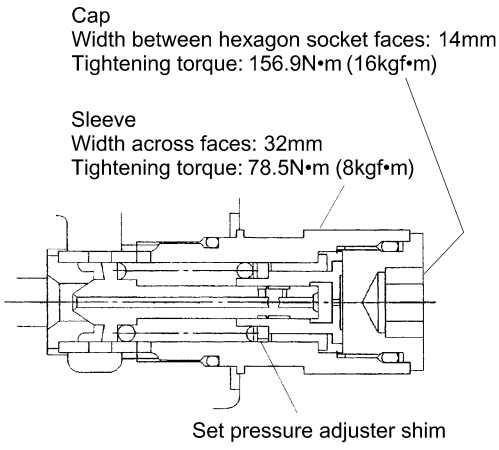
(1) Remove the cap from the sleeve.
(2) Add or remove the relief set pressure adjuster shim depending on the set pressure.

Shim thicknesses

0.1mm
0.3mm
0.5mm
1.0mm
— Fit a thicker shim into the spring side.

The amount of pressure adjustment is about 0.59MPa (6kgf/cm^2) per 0.1mm.

(3) After reassembly, tighten the cap to the regulation torque.



707S-01181E

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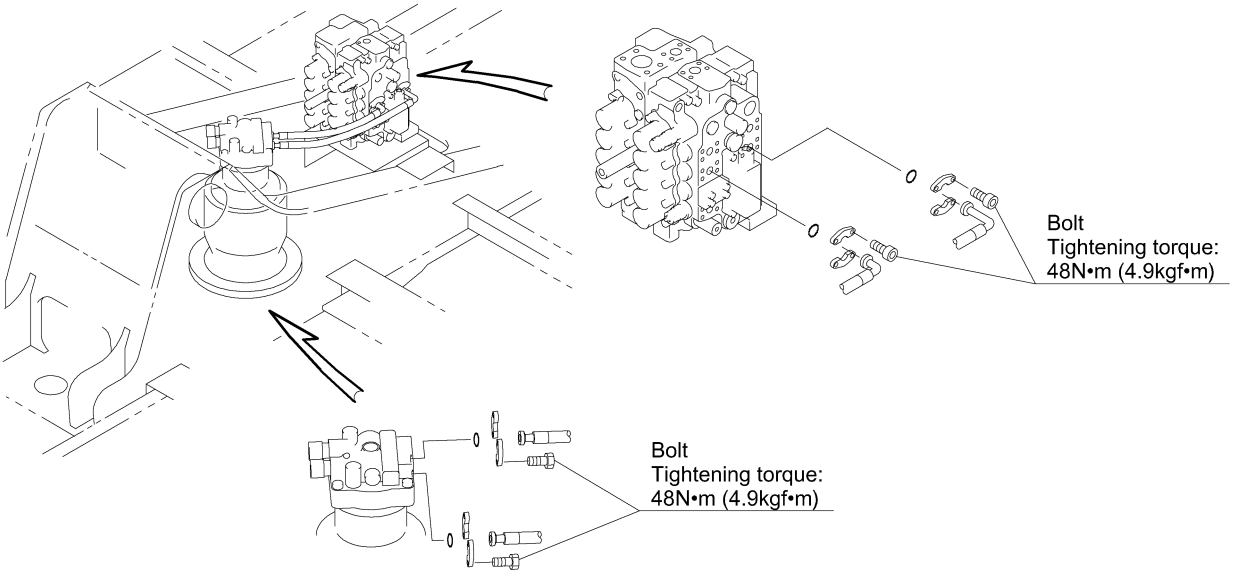
2-3 Replacement of the swing motor line hose (767S-0231-0E)



(767S-0303-0E)

⚠ CAUTION

The swing motor line hose is designated as a safety part for periodic replacement and as such it must be replaced every 2 years or every 4000 hours of use, whichever occurs sooner.

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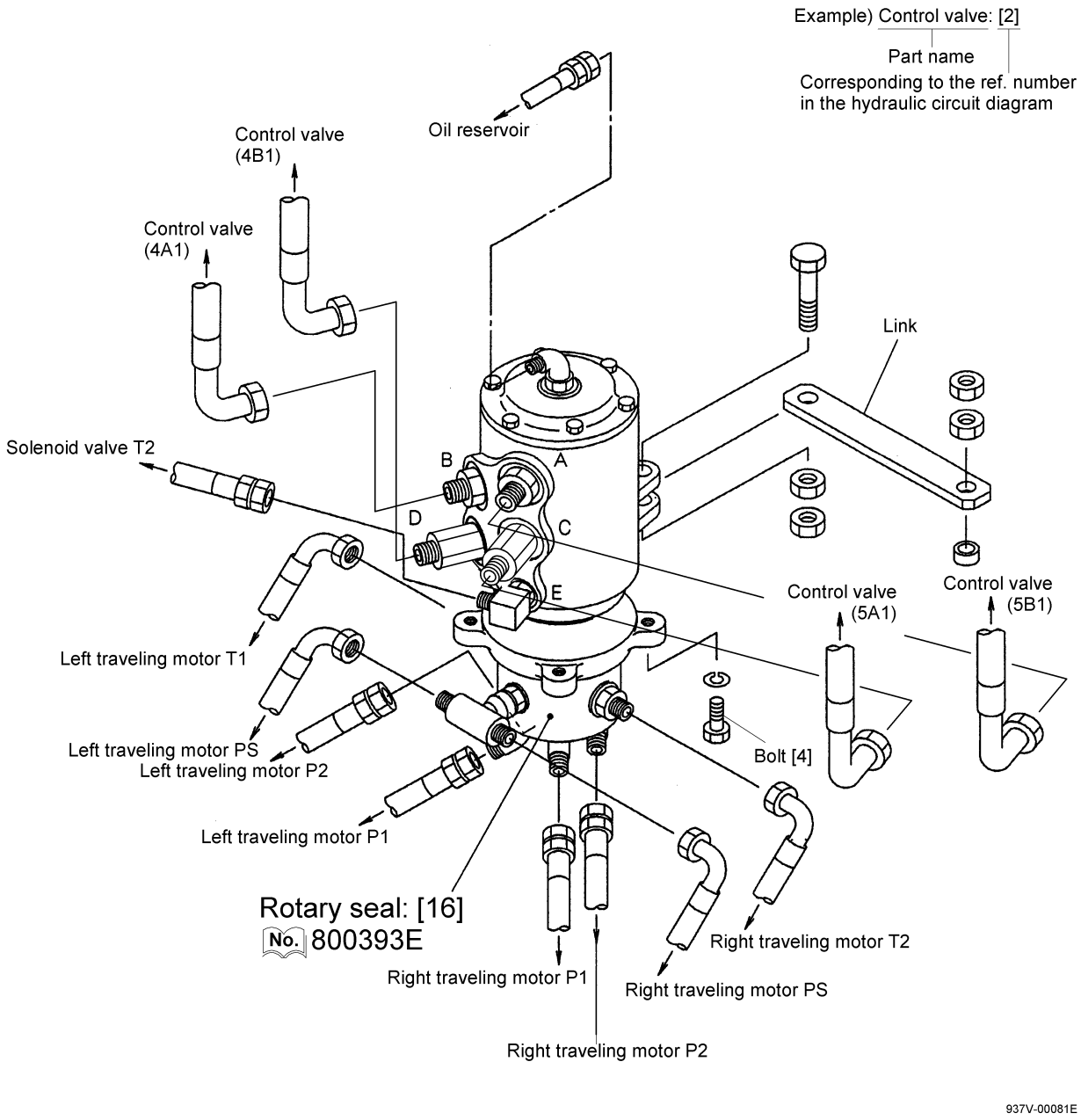
2-4 Rotary seal (857S-0124-0E)

(1) Removal

1) Disconnect all piping from the rotary seal.

Note Mark each hose with the name of the corresponding port to prevent mistakes in reassembly.

2) After removing the link, remove bolts [4] and lift the rotary seal from the traveling frame.



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2-5 Oiling the swing motor reduction gear (8370-0070-3E)

(8270-0202-0E)

⚠ WARNING

Immediately after operating the machine, the swing motor, reduction gear and other parts are hot, so do not start to work before all parts have cooled sufficiently.

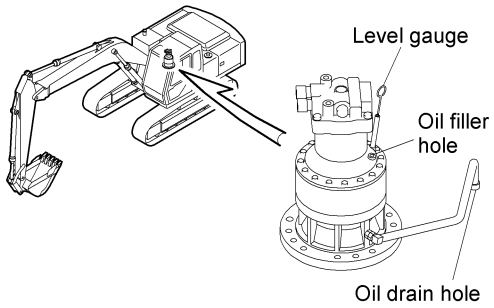
(8570-0090-1E)

⚠ CAUTION

If you replace the swing motor reduction gear oil and the drained oil contains the metal dust etc., the reduction gear may need to be overhauled. Contact your authorised KATO dealer.

(1) Oiling method

1) Remove the level gauge, pour gear oil in through the oil filler hole and use the level gauge to check that oil is at the regulation level.



9370-00381E

Note Refer to the recommended lubricants table for the brand of gear oil.

Note You may use any brand of gear oil, but you should use one brand consistently and avoid mixing different brands.

(2) Inspection and replacement intervals

Inspection interval ····· Every 250 hours of operation

Replacement interval ····· Every 1000 hours of operation or yearly

After delivery of a new machine, the gear oil should be replaced after 250 hours of operation.

Oil volume ····· 5.0L

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3. Removal and mounting of equipment in the superstructure

(817S-0069-0E)

3-1 Superstructure and swing gear (767S-0155-0E)

3-1-1 Removal (937S-0045-0E)

(1) Remove the front attachment.

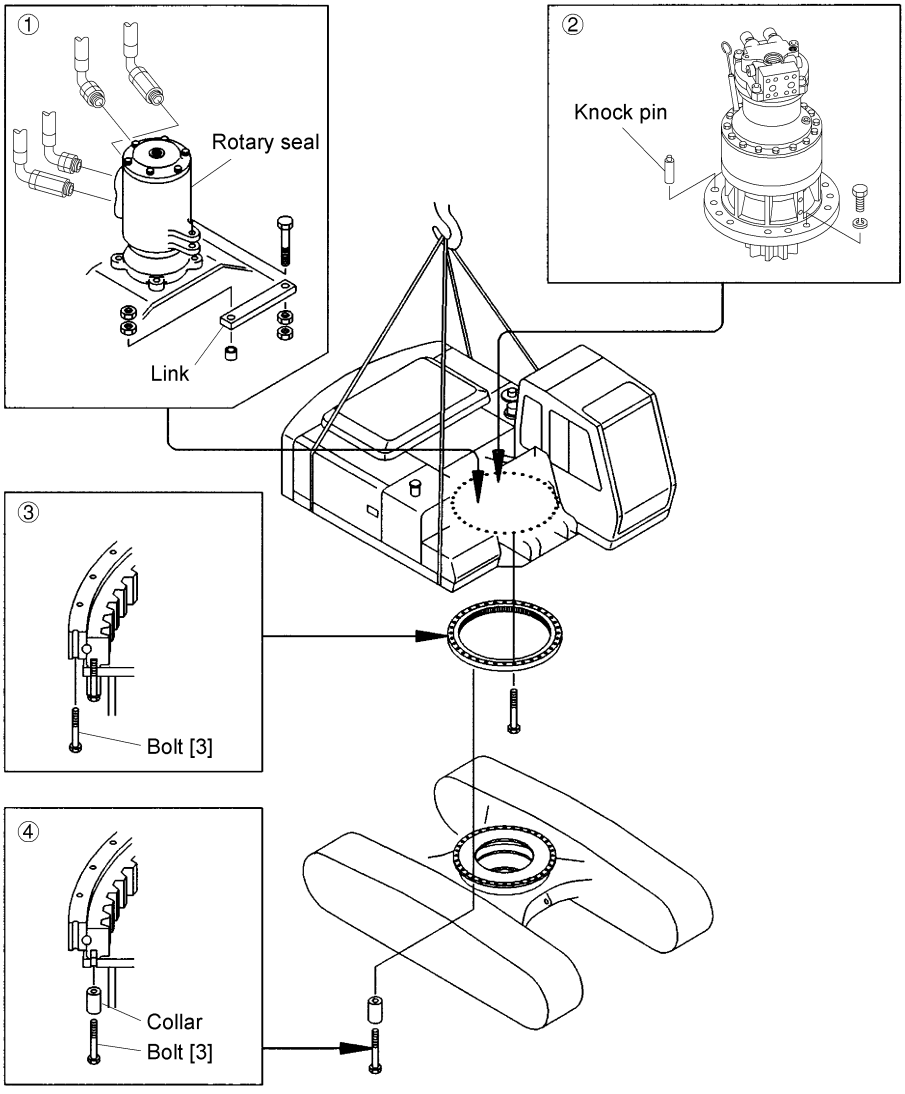
(2) Disconnect the hoses and link from the casing of the rotary seal. (Fig. ①)

(3) Remove the swing motor. (Fig. ②)

(4) Arrange the sling wire ropes to the superstructure and support it with a crane.
Remove bolts [3] which attach the superstructure to the outer race of the swing gear bearing and lift the superstructure off the lower structure. (Fig. ③)

(5) Remove bolts [3] which attach the inner race of the swing gear bearing to the lower structure and remove the swing gear from the lower structure. (Fig. ④)

Note Mass of the superstructure: approx. 8000kg (excluding the hydraulic oil and fuel)



837S-00662E

https://truckmanualshub.com/

3-1-2 Inspection and repair (767S-0297-1E)

Replace the internal gear if it shows signs of damage or deterioration. Measure the displacement over a given number of the internal gear teeth and replace it if the limit of use is exceeded. (Refer to "Service standards".)

3-1-3 Mounting (937S-0046-0E)

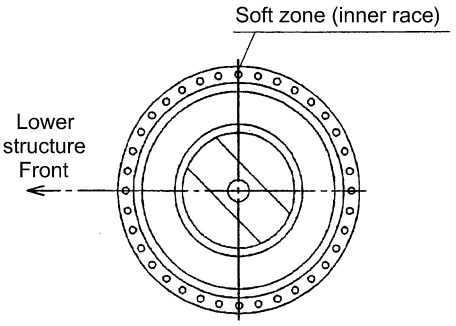
(1) After cleaning the swing gear bearing, degrease and wash the screw threads of all the bolts and dry it with compressed air.

(2) Arrange the wire rope slings to the swing gear, lift it with a crane and lower it into position for remounting on the lower structure.

(847S-0054-0E)

⚠ CAUTION

- When remounting the swing gear onto the lower structure, position it so that the soft zone (marked "S") on the inner race of the swing gear bearing is positioned as shown in the diagram relative to the lower structure.
- If the surface, the swing gear is to be bolted onto, is rough or scarred, you must grind it smooth before mounting the swing gear.

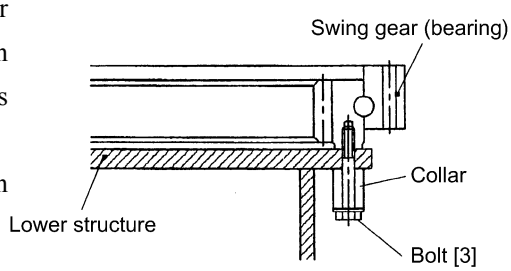


707S-00722E

(3) First provisionally bolt the swing gear bearing to the lower structure with four bolts [3] at diagonally opposite positions. Then fasten all the bolts provisionally on diagonally-opposite pairs before finally tightening them evenly to the correct torque.

Note 1. Bolts must be degreased, washed, dried and coated with screw-lock compound.

2. Tightening torque for bolts [3]: 533N・m (54.4kgf・m)



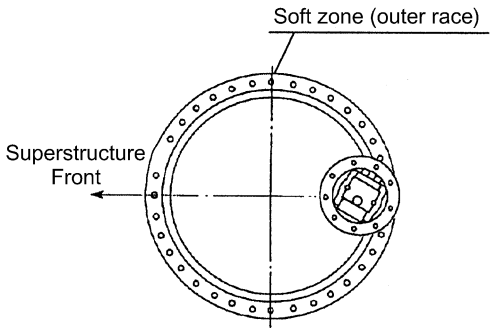
707S-00733EB

(4) Arrange the sling wire ropes to the superstructure and use a crane to lift and support it in the correct position for mounting on the lower structure.

(767S-0321-0E)

⚠ CAUTION

When remounting the superstructure onto the swing gear, position it so that the soft zone (marked "S") on the outer race of the swing gear bearing is positioned as shown in the diagram relative to the superstructure.

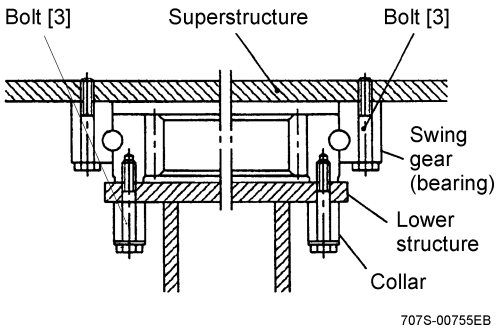


707S-00743E

Note At this stage if you insert two metal bars into bolt attachment holes on the swing gear bearing, it will be easier to position the superstructure correctly.

(5) First provisionally bolt the swing gear bearing to the superstructure with four bolts [3] at diagonally opposite positions. Then fasten all the bolts provisionally on diagonally-opposite pairs before finally tightening them evenly to the correct torque.

Note 1. Bolts must be degreased, washed, dried and coated with screw-lock compound.
2. Tightening torque for bolts [3]: 533N・m (54.4kgf・m)



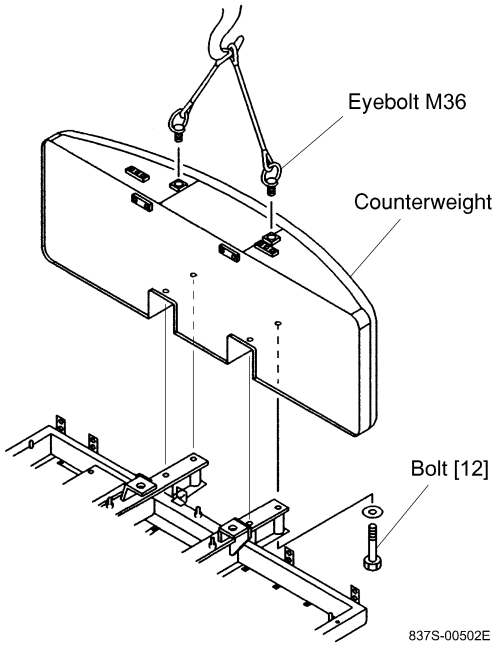
(6) Mount the swing motor.
(7) Connect the hoses and link to the rotary seal.
(8) Mount the front attachment.

3-2 Counterweight (777S-0047-0E)

3-2-1 Removal (937S-0047-0E)

(1) Attach the sling wire ropes to the counterweight with the eyebolts (M36) screwd in and support it with a crane then remove bolts [12] and lift the counterweight off the slewing table.

Note Mass of the counterweight: 4000kg



3-2-2 Inspection and repair (937S-0114-0E)

(1) Check that the counterweight mounting bolts [12] are not bent, damaged or abnormally worn and replace any defective bolts.

3-2-3 Mounting (937S-0048-0E)

Reverse the removal procedure to mount the counterweight with particular attention to the following points.

(1) Thoroughly wipe away all traces of oil and grease from the threaded parts of bolts [12] and always apply screw-lock compound to them before tightening them.
Tightening torque for bolts [12]: 1289N・m (131.5kgf・m)
(2) Tighten bolts [12] at the rear end first.

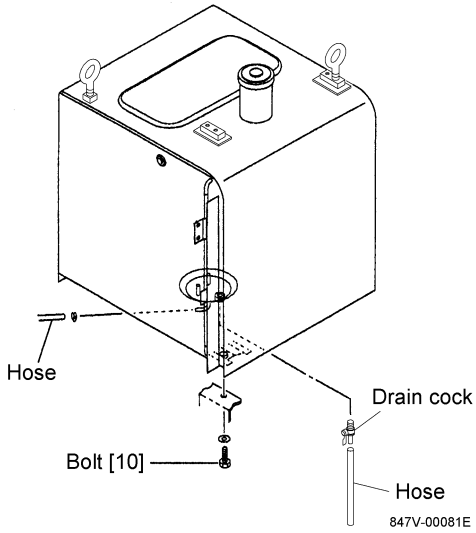
https://truckmanualshub.com/

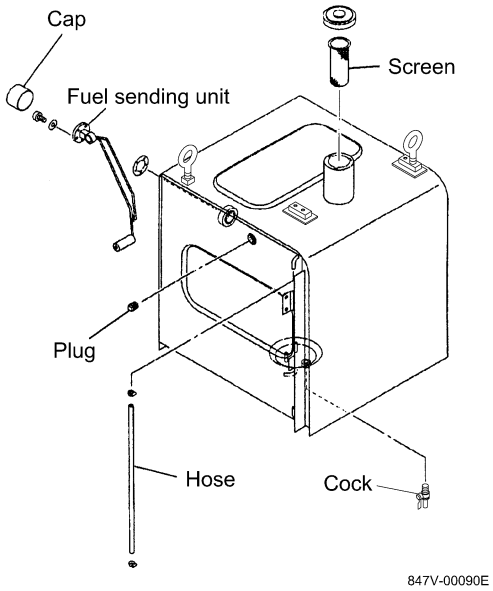
3-3 Disassembly and assembly of fuel system (837S-0045-0E)

3-3-1 Fuel tank (847S-0057-4E)

(1) Removal

1) Open the drain cock on the underside of the fuel tank and drain all fuel out.
2) Disconnect all hoses from the fuel tank, then remove bolts [10].
3) Arrange the sling wire rope to the fuel tank with the hoisting bolts (M12) screwed in and lift it off the slewing table with a crane.
4) Remove the fuel sending unit, screen etc.





(2) Inspection and repair

1) Clean the inside of the tank and dry it with compressed air.
2) Check for rust and corrosion in each part of the tank. Brush any away with a wire brush and repaint the affected area.
3) Check that there are no cracks in the welded parts of the tank and no damage or breakage in any part. Make welded repairs where necessary.

Note If you make a welded repair, treat the inside of the tank against corrosion.

4) Replace any defective parts with new ones.

(3) Mounting

Reverse the removal procedure to remount the fuel tank.

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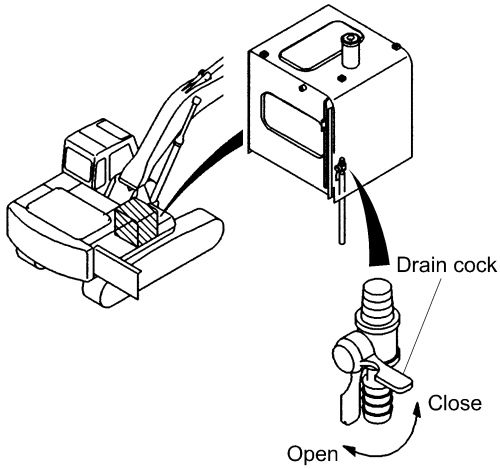
3-3-2 Draining water from the fuel tank (7670-0201-1E)

(1) Water drainage procedure

Loosen the drain cock in the bottom of the fuel tank to drain water out.

Close the drain cock after draining the water.



8370-00570E

(2) Water drainage interval

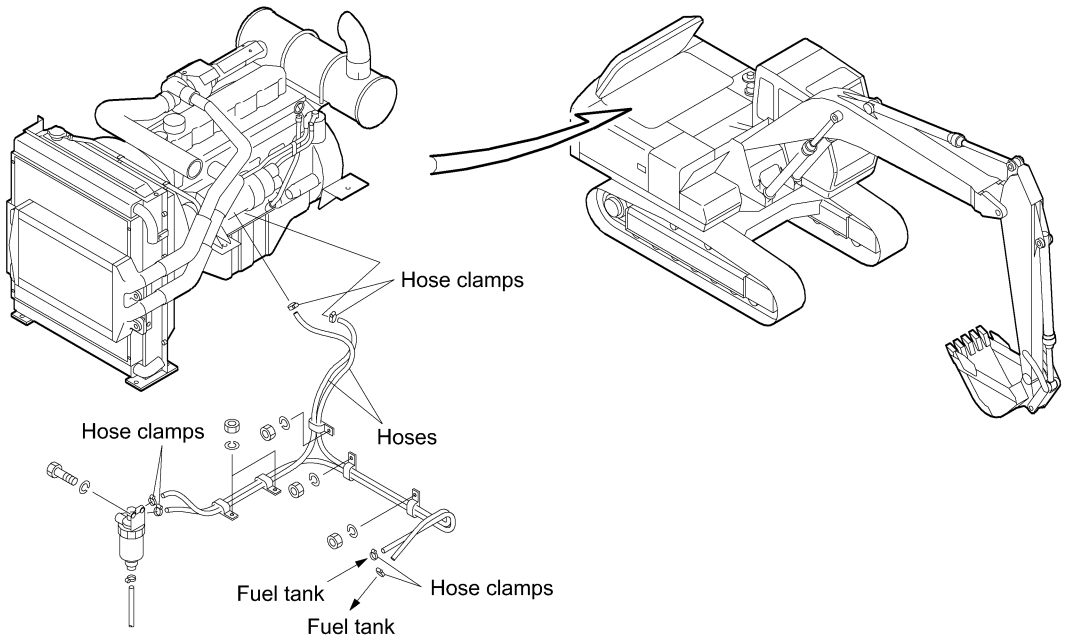
Water drainage interval ⋯ Every 500 hours of operation or 6 months

(8270-0182-0E)

⚠ WARNING

Diesel fuel is used in this machine as fuel. It is highly flammable and therefore very dangerous, so handle with care.

3-3-3 Fuel hose (767S-0383-0E)



937S-00240E

(767S-0324-0E)

⚠ CAUTION

The fuel hose is designated as a safety part for periodic replacement and as such it must be replaced every 2 years or every 4000 hours of use, whichever occurs sooner.

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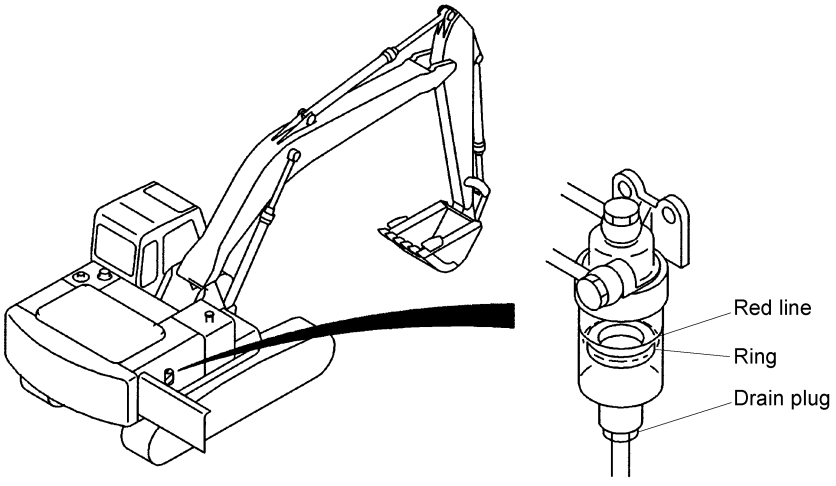
3-3-4 Water separator inspection (827E-0014-3E)

(1) Inspection procedure

Check whether the ring has reached the red line. If water has accumulated inside the separator, drain it through the drain plug.



8370-00551E

(2) Water drainage procedure

1) Unscrew the drain plug to drain out accumulated water.
2) Once all water has been drained out, tighten the plug again.
3) Check that there is no fuel leakage.

(8270-0175-2E)

⚠ WARNING

- When the ring has reached the red line, you must drain water out immediately.
- Handle the fuel with care.
- If the fuel is leaking, a fire could result.

(3) Intervals for inspection and water drainage

Inspection interval …… Daily before starting the engine

Water drainage interval … When the ring has reached the red line

(4) Consumable part number

Refer to the "Consumable parts guide".

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3-4 Oil reservoir (857S-0086-0E)

3-4-1 Removal (847S-0059-2E)

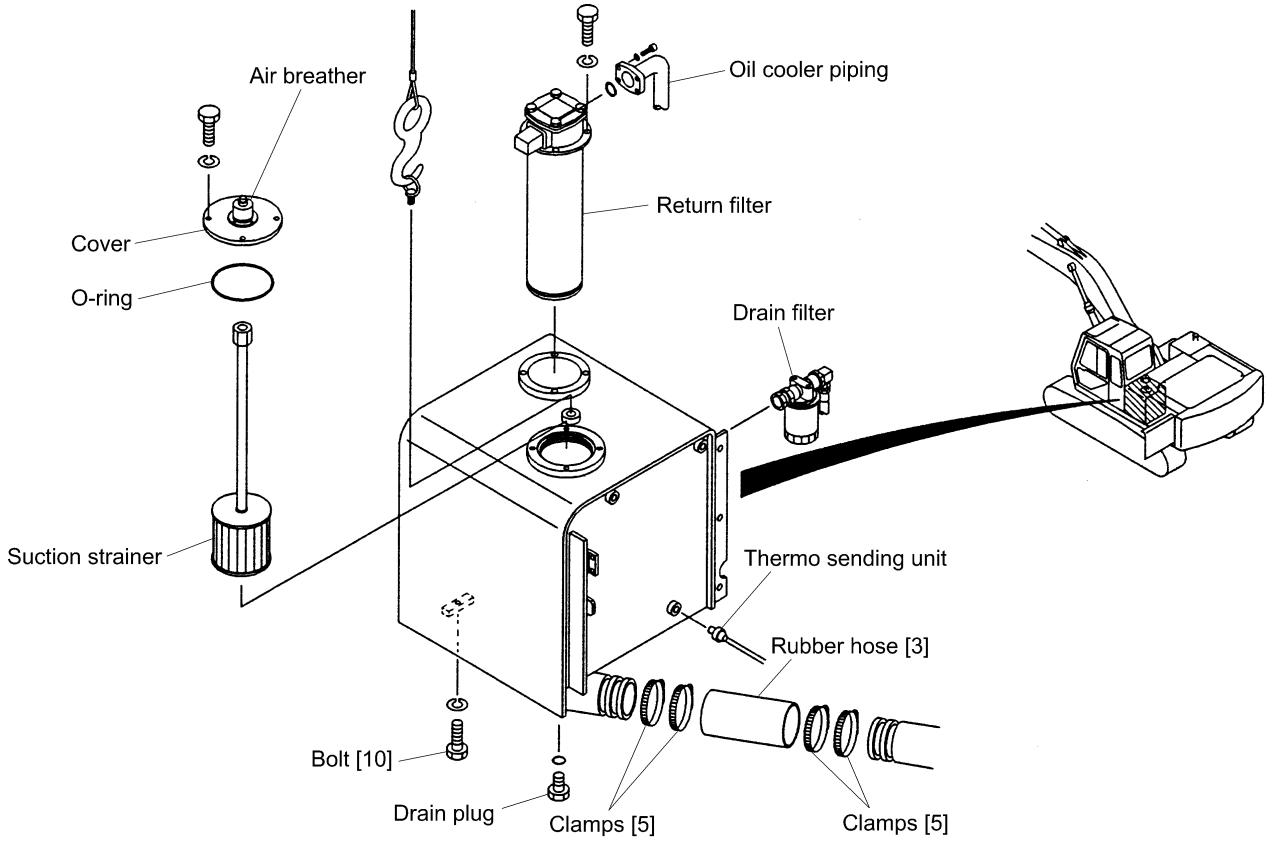
1) Press on the air breather cap on the oil reservoir to extract the pressurised air inside the oil reservoir. Then remove the drain plug from the underside of the oil reservoir to drain the hydraulic oil.

Units: L

Oil reservoir capacity	Hydraulic oil replacement volume	Total hydraulic oil volume
165	170	260

(937S-0115-0E)

2) Disconnect all the rubber hose [3] and pipes from the oil reservoir then remove bolts [10].
3) Attach the sling wire rope to the oil reservoir with the hoisting bolt (M16) screwed in and lift it off the slewing table with a crane.
4) Remove the return filter, air breather, suction strainer, cover etc.



837S-00521EA

⚠ CAUTION (937S-0049-0E)

Rubber hose [3] is designated as a safety part for periodic replacement and as such it must be replaced every 2 years or every 4000 hours of use, whichever occurs sooner.

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3-4-2 Inspection and repair (857S-0126-1E)

(1) Clean the inside of the reservoir and dry it with compressed air.

(2) Check for rust and corrosion in each part of the reservoir. Brush any away with a wire brush and repaint the affected area.

(3) Check that there are no cracks in the welded parts of the reservoir and no damage or breakage in any part. Make welded repairs where necessary.

Note If you make a welded repair, treat the inside of the reservoir against corrosion.

(4) Replace any defective parts and all O-rings with new ones.

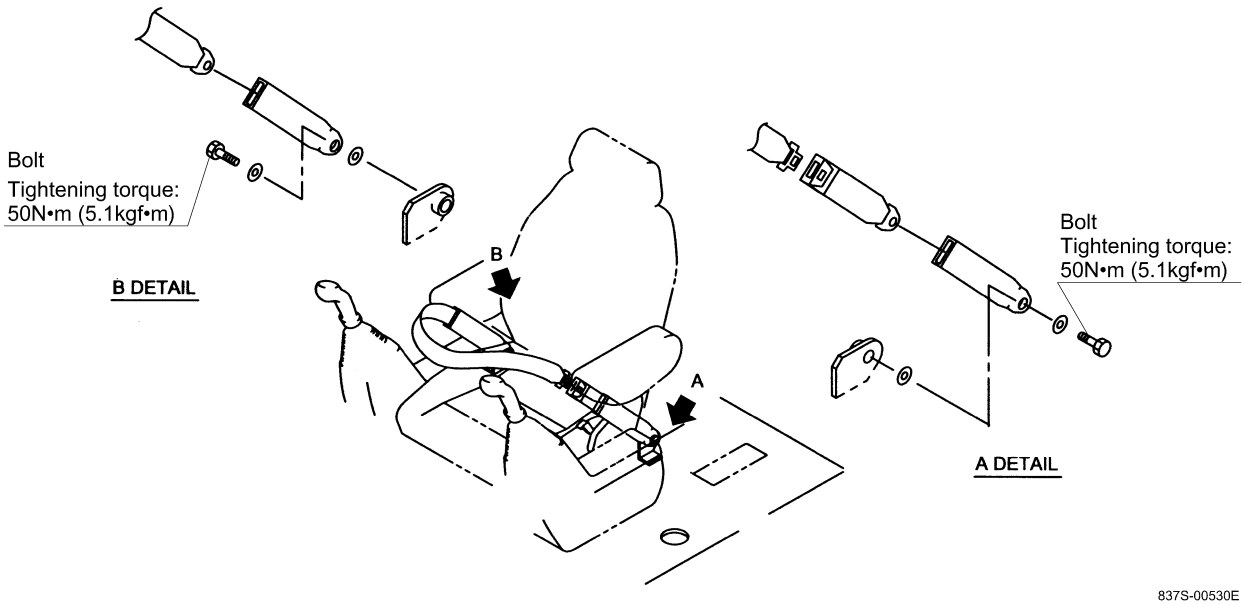
3-4-3 Mounting (937S-0050-1E)

Reverse the removal procedure to remount the reservoir with particular attention to the following points.

(1) Tightening torque for bolts [10]: 217N・m (22.1kgf・m)
Thoroughly wipe away all traces of oil and grease from the threaded parts of bolts [10] and always apply screw-lock compound to them before tightening them.

(2) Tightening torque for clamps [5]: 5.7N・m (58kgf・cm)

3-5 Seatbelt (767S-0159-0E)



(767S-0326-0E)

⚠ CAUTION

The seatbelt is designated as a safety part for periodic replacement and as such it must be replaced every 3 years.

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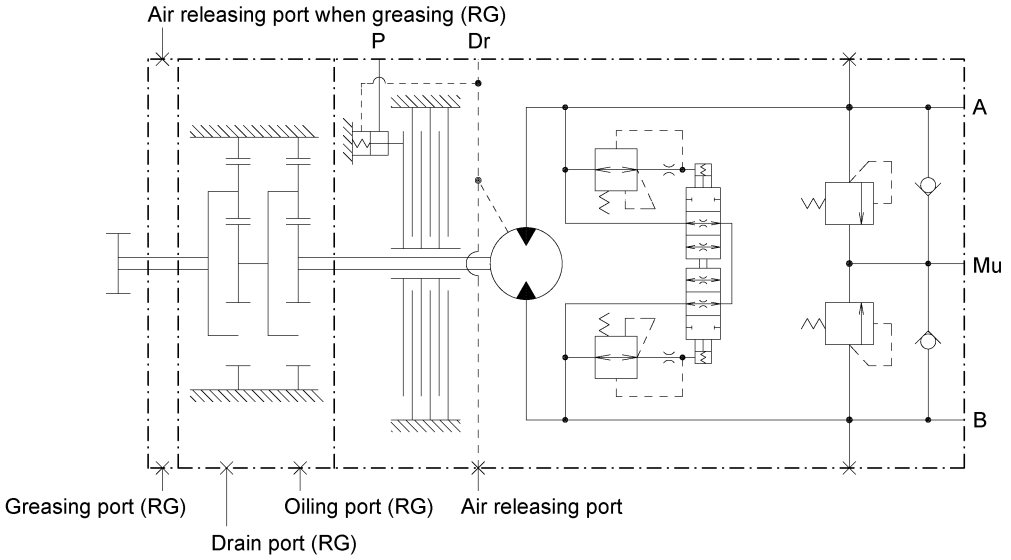
4. Data file (817S-0055-0E)

4-1 Swing motor (937S-0097-0E)

Part No.	619-05434002
Type	SG08E-153 (in common with HD823MR and HD820Ⅱ)
Rated pressure	27.5MPa (280kgf/cm^2)
Capacity	151cm^3/rev
Maximum torque	7.44N･m (758kgf･m)
Brake torque	739.4N･m (75.4kgf･m)
Brake release pressure	2.9MPa (30kgf/cm^2)
Reduction gear ratio	13.338
Reactionless valve	Attached
Mass	230kg

(937S-0041-0E)



937S-00790E

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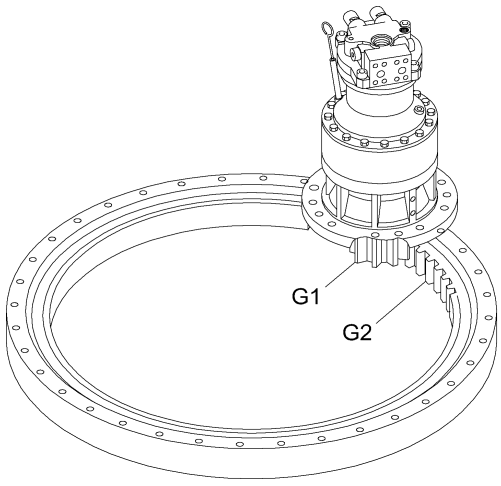
4-2 Service standards (767S-0160-0E)

(1) Gear



937S-00250

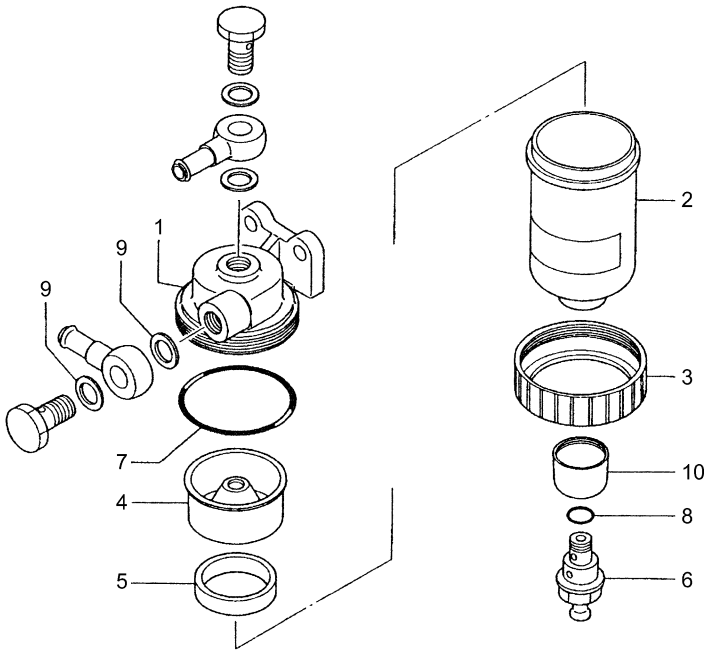
Units: mm

Alphabet in the figure	Part No.	Tooth form	Dimensions				Displacement over a given number of teeth			Action
			Module	The number of teeth	Tooth width	The given number of teeth	Standard dimensions	Recommended replacement	Limit of use	
G_1	619-88501001	Spur gear	12	11	86	2	58.681	56.85	56.3	Replace
G_2	607-20201010	Spur gear	12	92	80	11	387.43	385.33	384.93	Replace

(937S-0051-0E)

4-3 Consumable parts guide (937S-0052-0E)

[Consumable part name] Water separator



1. Cover
2. Case
3. Ring nut
4. Baffle plate
5. Water level ring
6. Drain plug 119-50308001
7. O-ring 009-46002060
8. O-ring 001-36110100
9. Gasket
10. Drain

7070-02530E

Water separator assembly: 119-50100002

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MEMO

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(937V-0011-1E)

I Lower structure

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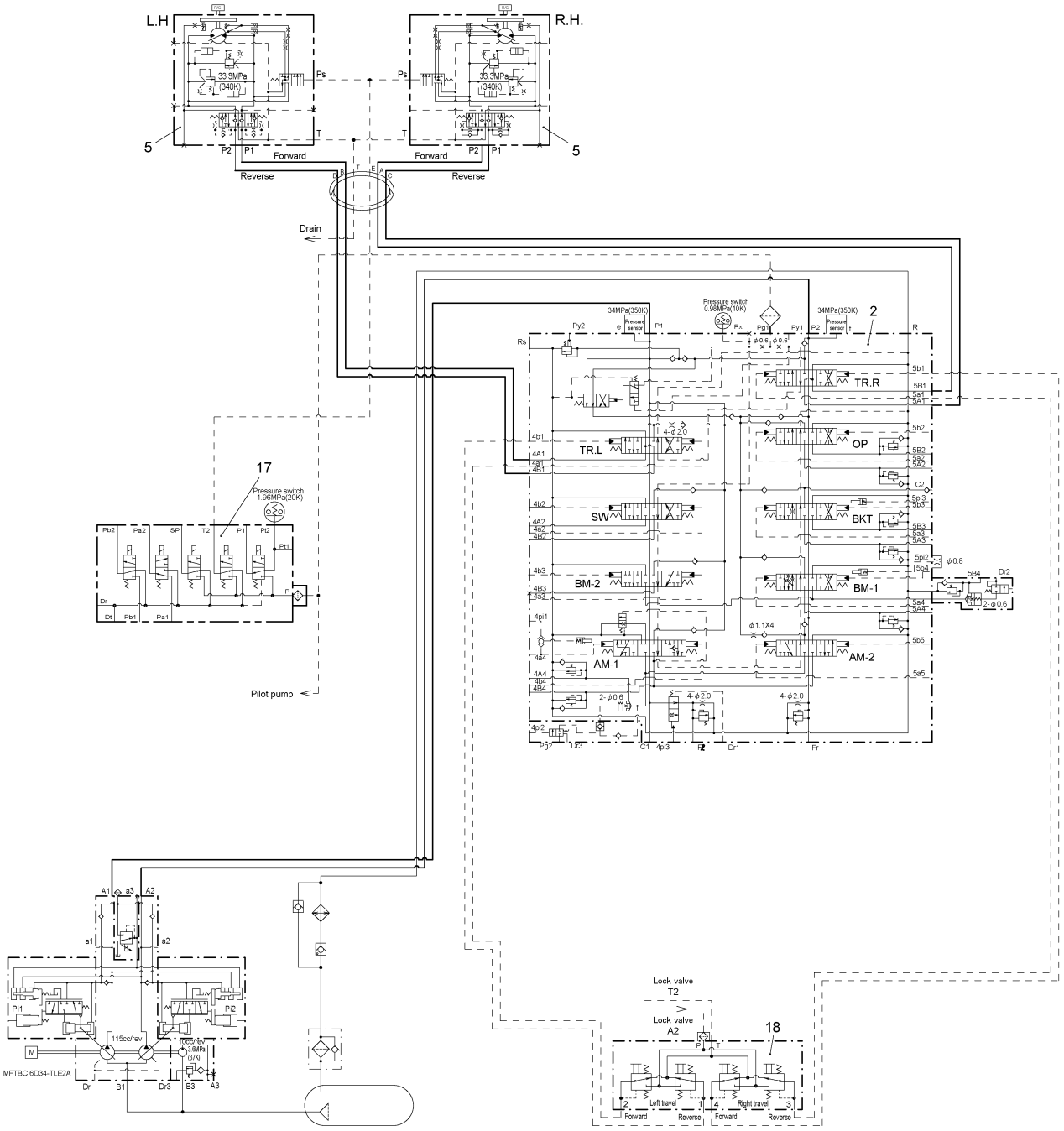
1. Lower structure-related equipment (857S-0128-0E)

1-1 Travel circuit (747S-0032-0E)

1-1-1 Hydraulic circuit diagram (857S-0030-0E)



Ref. No.	Part name	Q'ty
5	Traveling motor	2
17	Solenoid valve	1
18	Pilot valve	1

937S-00263E

https://truckmanualshub.com/

1-1-2 Description of the travel circuit (837S-0025-2E)

The pressurised oil from pump P1 passes through No. 1 spool of the control valve (block A) to drive the left traveling motor while the pressurised oil from pump P2 passes through No. 1 spool of the control valve (block B) to drive the right traveling motor.

When the travel spools are in the neutral positions, the traveling motors are at rest while moving the traveling levers (pedals) forward or backward causes the traveling motors to turn forward or in reverse for forward or reverse travel. At this time, the travel pilot signal channel is blocked to generate a pressure which acts as a pilot pressure, raising pressure at the main relief valve.

(1) Direct forward/reverse travel function

When only the travel spools are operating, the pressurised oil from pumps P1 and P2 passes to the left and right traveling motors respectively for direct forward or reverse travel.

When spools other than the travel spools are used, for example the swing and travel spools, simultaneously, the pilot signal channel for travel and superstructure in the control valve is blocked to generate a pilot pressure which switches the direct forward/reverse travel switching valve.

The pressurised oil from pump P1 is supplied with priority for swinging while the pressurised oil from pump P2 flows to the left and right traveling motors to allow multiple operations with direct forward or reverse travel. (The same applies for other operations than swinging.)

(2) High speed, medium speed and low speed

You can choose between three traveling speeds by pressing the traveling mode selection switch on the combination monitor.

By switching the solenoid valve to apply pilot pressure, the inclination of the variable swash plates in the traveling motors is altered to vary the traveling speed between medium and high. For low speed, the flow volume of pressurised oil to the traveling motors is altered to change the traveling speed. When the switch is set for high speed, the pressures of pumps P1 and P2 are reported to the APC100 controller by pressure sensors. If travel operation pressure exceeds the rated value, the solenoid valve switches to OFF, pilot pressure is lost and traveling speed switches to medium speed to generate high torque. When it drops below rated pressure, the solenoid valve switches to ON to generate pilot pressure which causes the speed to revert to high speed.

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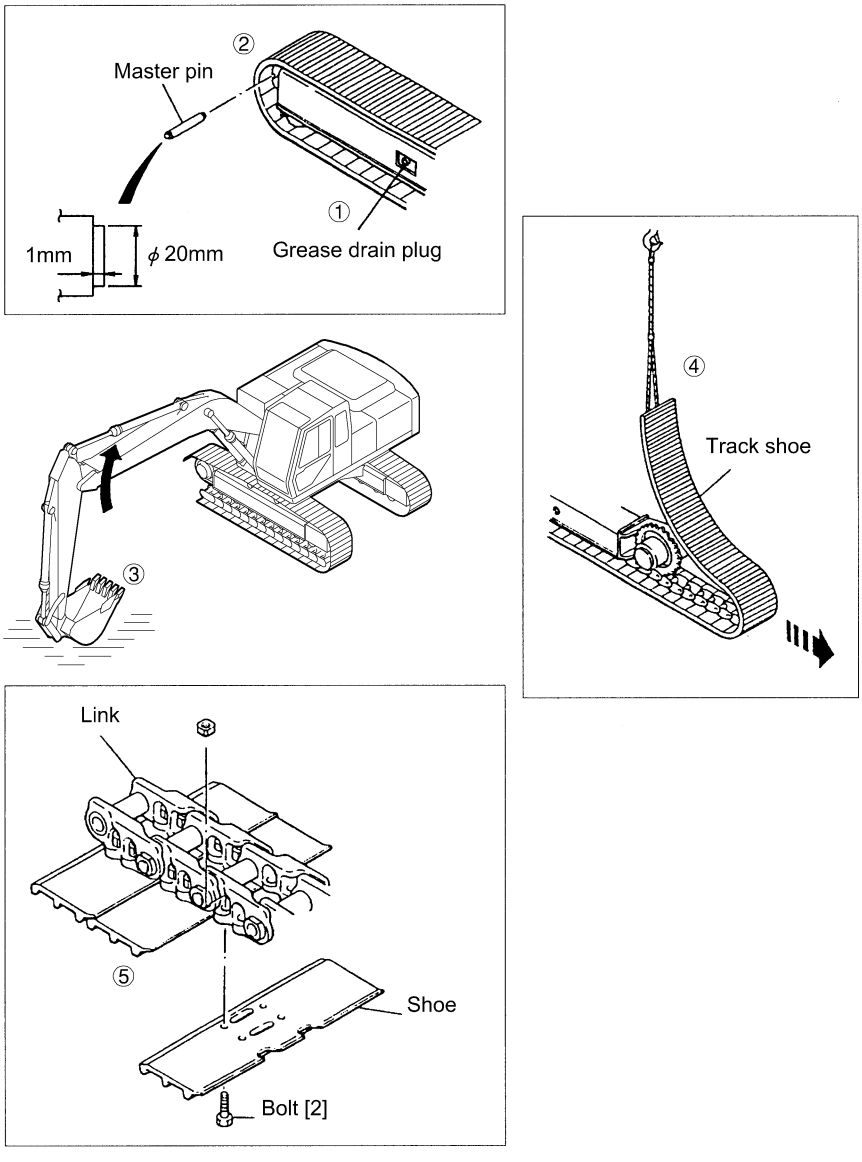
2. Travel equipment (767S-0162-1E)

The swing gear is mounted in the upper part of the traveling frame and the rotary seal is located at the center of rotation of the superstructure. Two hydraulic traveling motors with reduction gears drive the right and left track shoes. Torque is transmitted from the motors to the track shoes through reduction gears and driving tumblers.

2-1 Track shoe (767S-0163-0E)

2-1-1 Removal (937S-0055-0E)

(1) The grease drain plug of the adjustment window is located on the outside front of the lower structure. Loosen it by turning it to the left (do not unscrew it by more than one turn) to loosen the track shoe. (Fig. ①)
(2) Move the master pin to the side of the front idler then extract it to open the track link. (Fig. ②)
(3) Turn the superstructure to face the side on which the track shoe is to be removed and use the front attachment to lift that side of the machine. (Fig. ③)
(4) Run the traveling motor until one end of the track shoe is above the driving tumbler then attach the sling wire rope to the track shoe and lift it with a crane to pull it off the underside of the machine. (Fig. ④)
(5) If necessary, remove bolts [2] to remove the shoe from the link. (Fig. ⑤)



707S-01254E

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2-1-2 Inspection and repair (777S-0100-1E)

(1) Inspect for cracks and breakages on the track shoe and link.
(2) Measure wear on each part of the track shoe. (Refer to "Service standards".)
(3) Measure the inner diameters of the link pin holes. (Refer to "Service standards".)
(4) Inspect the master pin and master bush for abnormal wear, bending, damage etc.
(5) Measure the outer diameters of the track pins and master pin. Any which are worn beyond the limit of use should be replaced with oversize pins. (Refer to "Service standards".)

2-1-3 Mounting (777S-0101-2E)

Reverse the removal procedure to return the track shoe to its position.
After you have mounted the track shoe in position, you must follow the procedure below to adjust its tension.

2-1-4 Tension inspection and adjustment (847S-0064-0E)

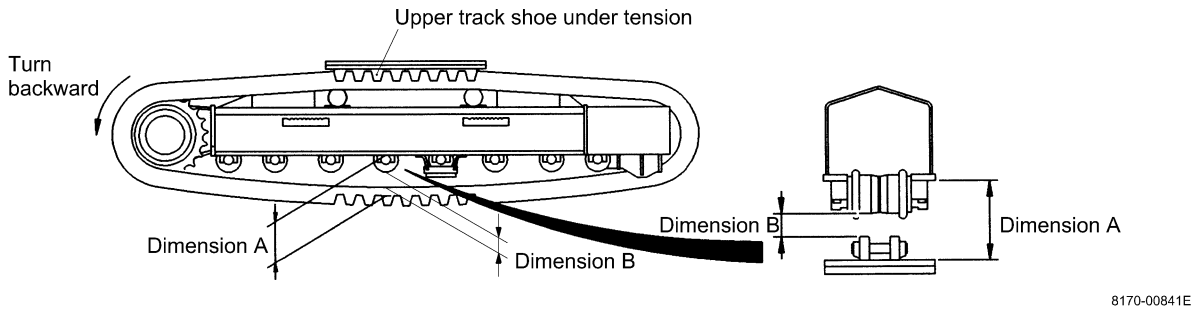
Track shoes are adjusted by using the adjuster cylinders to move the front idlers backward or forward.

(1) Measuring the amount of slack

When you are adjusting track shoe tension, jack up each side separately and slightly drive the jacked up side shoe to measure the amount of slack. Adjust so that the amount of dimension A between the underside of the traveling frame and the top of the track shoes is 300mm (or dimension B between the track link top and the underside of the track rollers is 80mm).

If you are working on ground which is likely to clog around the track links and pins, make the volume of slack slightly greater so that there is no tension on the track links.

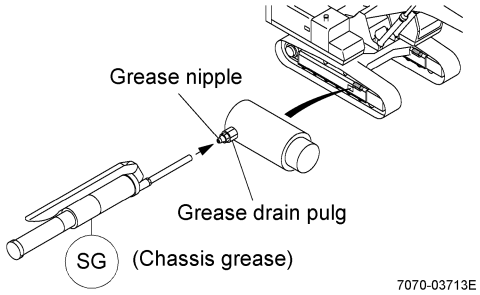
Note Turn the track links backward and measure with the upper track shoes under tension.



(2) Adjustment procedure

1) To increase track shoe tension

Use a high-pressure grease pump to inject grease into the adjuster cylinder through the grease nipple in the adjustment window on the outside front of the lower structure.



2) To reduce track shoe tension

Unscrew the grease drain plug of the adjustment window by turning it to the left. Grease will escape under its own pressure, increasing slack on the track shoe. After adjustment, screw the drain plug in. (Tightening torque: 196N·m (20kgf·m))

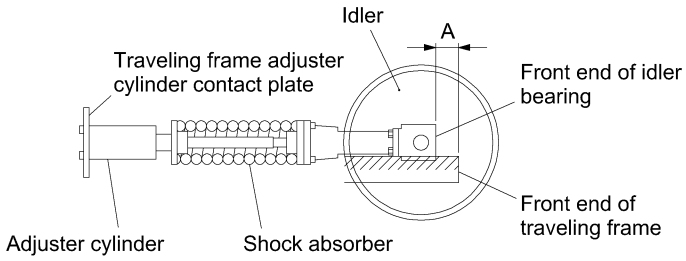
⚠ WARNING (8270-0195-2E)

- If you loosen the plug too much, it could fly under the high pressure of the grease inside. Do not unscrew the plug by more than one turn.
- Do not face towards the plug as you fit it.
- If the track shoe did not loosen, order a repair from your authorised KATO dealer.

(3) To check whether the track shoe tension is correct, travel the machine forward and backward and then re-inspect the track link tension.

⚠ CAUTION (8470-0067-1E)

When dimension A falls below the limit of use, the length of adjuster cylinder rod remaining inside the cylinder becomes too short, risking damage to the seal of the adjuster cylinder.



Unit: mm

Dimension A on new machine	Dimension A at limit of use
95	0

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2-2 Carrier roller (767S-0165-0E)

2-2-1 Removal and disassembly (847S-0065-3E)

(1) Remove bolts [2] to remove the carrier roller from the traveling frame. (Fig. ①)

(2) If it is necessary to disassemble the carrier roller, follow the procedure below. (Fig. ②)

1) Remove plug [1-11].

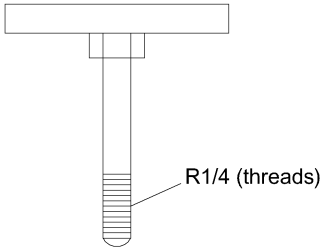
2) Remove snap ring [1-10].

3) Pull out cover [1-4].

Screw a jig such as the one on the right into the Rc1/4 hole in the center of the cover to pull it out.

4) Turn the cover side of the roller downward to remove oil.

5) Remove hexagon socket bolts [1-14] to remove thrust plate [1-13].



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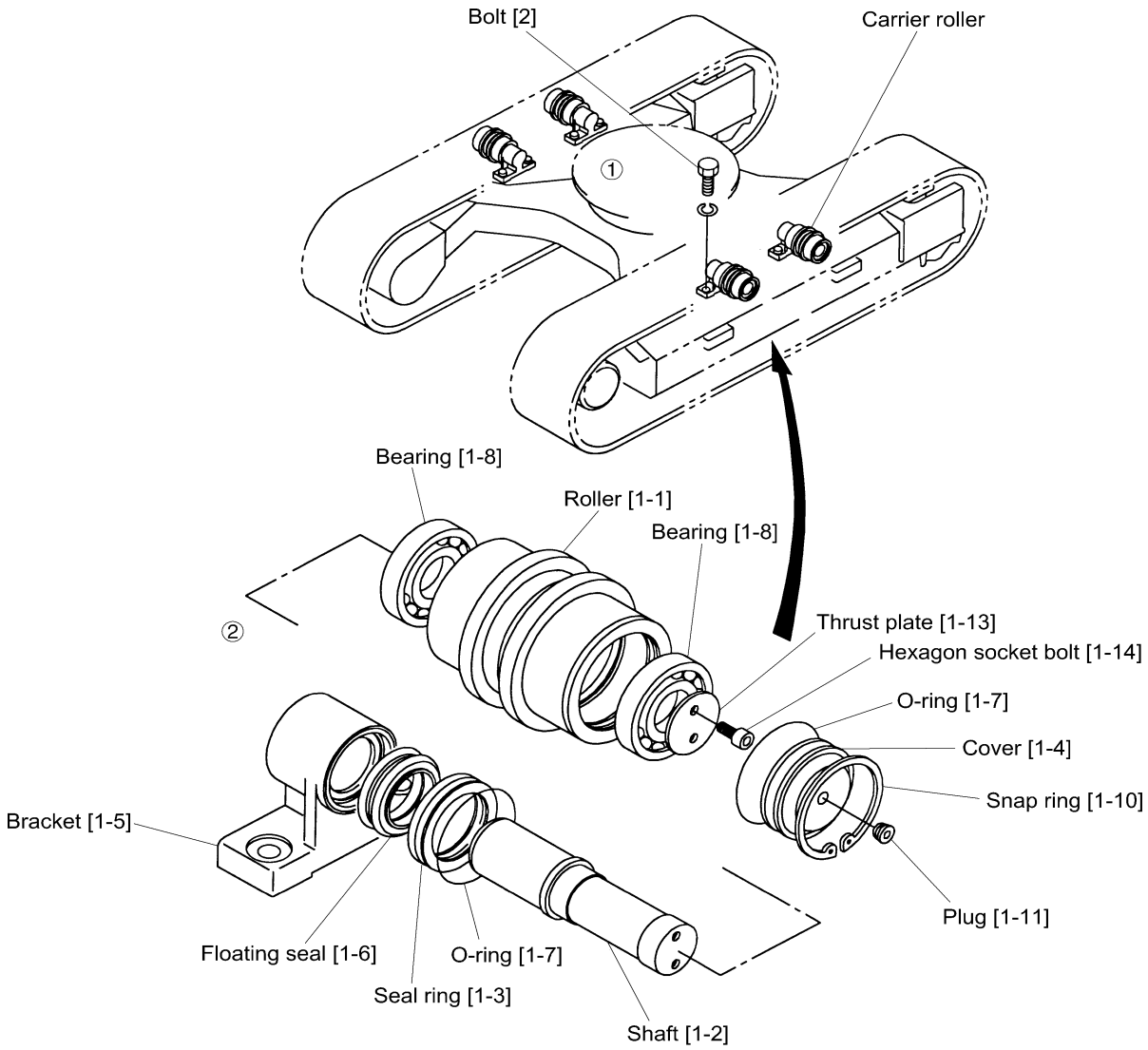
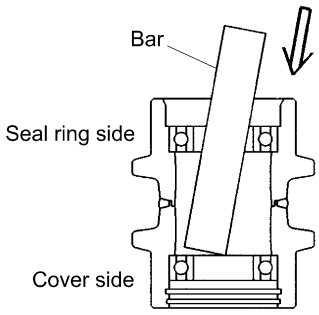


817S-00982E

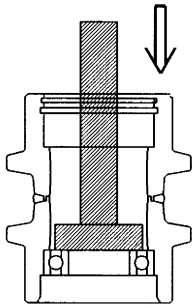
https://truckmanualshub.com/

6) Turn the cover side of the roller upward and clamp the roller in a vise. Place a narrow bar against the center of shaft [1-2] and tap it gently to push it down. Take care not to damage the shaft tip in doing so.
7) Remove floating seal [1-6] from seal ring [1-3] and the bracket.
8) Remove the ball bearing from the cover side.
As shown in the diagram on the right, once you have set the roller with cover side ball bearing [1-8] downward, insert a bar with a diameter 5mm shorter than the ball bearing [1-8] inner race of the seal ring side and tap lightly against the inner race of the bearing to tap it gently down and out.



847S-00270E

9) Remove seal ring [1-3] and ball bearing [1-8] from the bracket side. Use a jig as shown in the diagram on the right to tap or push with a hydraulic press to push the components out.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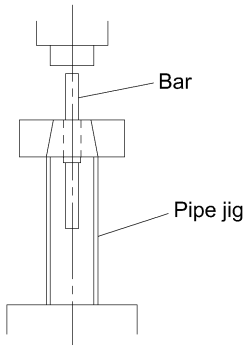
10) Remove shaft [1-2] from bracket [1-5] by pressing it down with a hydraulic press.



707S-00891E

2-2-2 Inspection and repair (777S-0057-1E)

(1) Measure wear on each part of the carrier roller. (Refer to "Service standards".)
(2) Measure the inner diameters of the bushes. (Refer to "Service standards".)
(3) Check that there is no abnormal wear, seizure marks or other damage on the shaft.
(4) Check that there is no abnormal wear, damage, crack or other defect on the floating seal. Also check the O-rings.
(5) Replace any parts which are defective or worn beyond the limit of use.

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2-2-3 Assembly and mounting (847S-0066-3E)

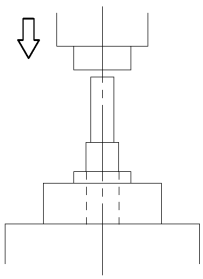
Reverse the removal procedure to mount the carrier roller. If you have disassembled the carrier roller, follow the procedure below to reassemble it before mounting.

(1) Clean the parts (roller body, shaft, bracket, seal ring, cover).

(2) Press shaft [1-2] into bracket [1-5].

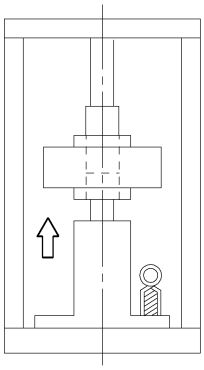
Apply a thin coating of oil to the parts of the bracket and shaft that push together. Use a hydraulic press or hydraulic jack to press them together.

・ If a hydraulic press is used



707S-00900

・ Use of a hydraulic jack requires use of a jig as shown in the diagram.



707S-00910

(3) Use a jig to press or beat ball bearing [1-8] on the seal ring side into the roller body.

(4) Insert an O-ring into the roller body seal ring and press or beat it into place with a jig.

(5) Use a jig to press or beat ball bearing [1-8] on the cover side into place in the roller body.

(6) Insert floating seal [1-6] into seal ring [1-3] and bracket [1-5].

(857S-0065-0E)

⚠ CAUTION

Refer to "2-2-4 Assembly method of the floating seal" for the reassembly procedure for the floating seal.

(7) Fit the roller body and shaft [1-2] together.

(8) Press the roller body down to fit thrust plate [1-13] and tighten hexagon socket bolts [1-14].

(9) Fit O-ring [1-7] into the roller body.

(10) Fit cover [1-4] onto the body.

(11) Fit snap ring [1-10].

(12) Pour engine oil in. (0.19L)

(13) Insert plug [1-11].

(937S-0116-1E)

⚠ CAUTION

Thoroughly wipe away all traces of oil and grease from the threaded parts of bolts [1-14] and always apply screw-lock compound to them before tightening them.

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2-2-4 Assembly method of the floating seal (777S-0104-2E)

(1) Points to inspect before assembly

1) Separate the O-rings from the floating seal and check that there are no cracks or scratches in any part.
2) If there are any significant irregularities inside the housing, these should be smoothed out with a file or sandpaper.
3) Make sure that there is no cloth, loose fibers, grit, metal filings, paint flakes or other foreign materials inside the housing. Ideally you should blow out the inside with compressed air to expel such materials. If no compressed air is available, wipe the inside with a cloth soaked in lubricating or cleaning oil and then with a dry cloth.

(2) Assembly method

1) Fit the O-rings into their positions on the floating seal. Take care not to twist the O-rings as you fit them.
2) Fit the floating seal with O-rings attached into place. At this stage, it is very important that the end face of the seal cover (A), the O-ring (B) and the sliding face of the floating seal (C) should all be fitted to lie parallel to each other as shown in Fig. 1.
   If (A) and (C) are parallel but (B) alone is not, an eccentric load on the periphery will cause abnormal wear or deformation and break the O-ring, considerably shortening the lifetime of the seal. Always take care in fitting the floating seal and O-ring into the seal cover and check after assembly that all parts are properly arranged.

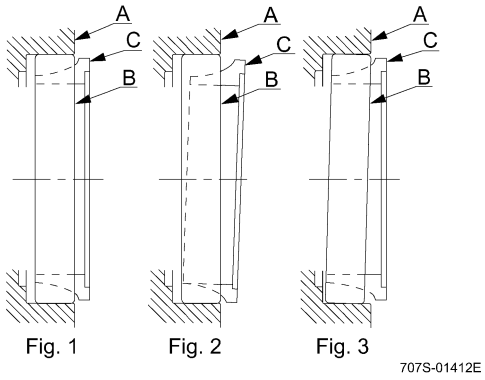

Fig. 1 Fig. 2 Fig. 3
707S-01412E

   Fig. 1 ⋯ The O-ring (B) and the floating seal (C) are fitted into the seal cover (A) in parallel.
   Fig. 2 ⋯ The O-ring (B) is fitted into the seal cover (A) in parallel, but the floating seal (C) is aslant fitted into it.
   Fig. 3 ⋯ The floating seal (C) is fitted into the seal cover (A) in parallel, but the O-ring (B) is aslant fitted into it.
3) The position of the floating seal inside the O-rings may make it difficult to fit them into the opening of the seal cover, but do not lubricate the seal cover, O-ring contact faces on the floating seal, and O-rings. Torque is transmitted through them, and if they are lubricated, the O-rings will slip. When they are fitted into each seal cover, wipe the sliding faces clean and check that there are no foreign bodies on them, then apply a little lubricating oil (lubricating oil sealed into the seal).

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2-3 Track roller (767S-0166-0E)

2-3-1 Removal and disassembly (937S-0056-1E)

(1) Retract the adjuster cylinder to allow more slack in the track shoe then use the boom to raise the body on the side from which the track roller is to be removed.

Note If this operation is difficult, remove the track shoe altogether.

(2) Remove bolts [2] and remove the track roller from the traveling frame. (Fig. ①)

(3) If it is necessary to disassemble the track roller, follow the procedure below. (Fig. ②)

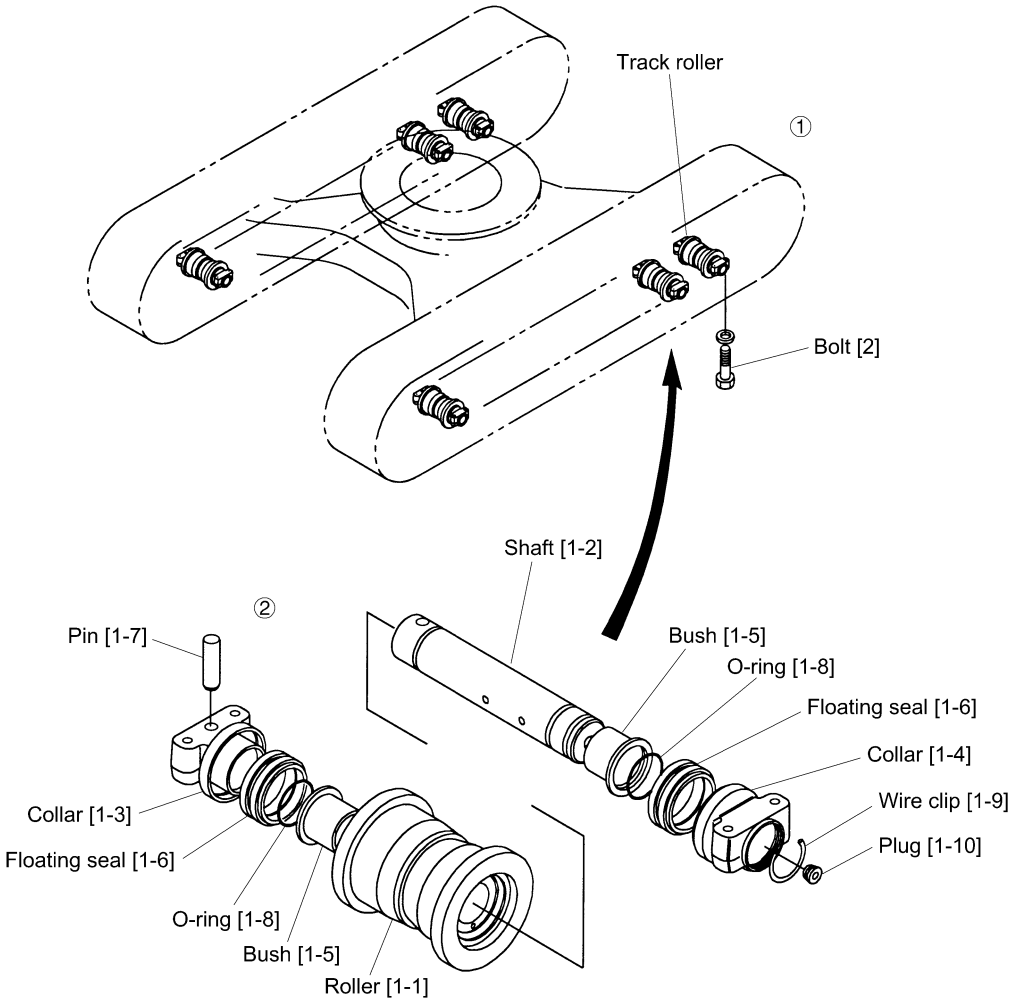
1) Remove wire clip [1-9] from the outside of the shaft and pin [1-7] from the inside to remove collars [1-3] and [1-4] from the both sides of shaft [1-2].

Note Remove plug [1-10] and drain oil out before doing this work.

2) Remove floating seals [1-6] from the collars and roller.

3) Remove O-rings [1-8] from the shaft.

4) Remove roller [1-1] with bushes [1-5] from the shaft.



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2-3-2 Inspection and repair (777S-0106-1E)

(1) Measure wear on each part of the track roller. (Refer to "Service standards".)

(2) Measure the inner diameters of the bushes. (Refer to "Service standards".)

(3) Check that there is no abnormal wear, seizure marks or other damage on the roller shaft.

(4) Check that there is no abnormal wear, damage, crack or other defect on the floating seals. Also check the O-rings.

(5) Replace any parts which are defective or worn beyond the limit of use.

2-3-3 Assembly and mounting (847S-0069-2E)

Reverse the removal and disassembly procedures to reassemble and mount the track roller.

Note 1. Refer to "2-2-4 Assembly method of the floating seal" for the reassembly procedure for the floating seals.

2. After assembly, use an oiling nozzle to pour engine oil into the track roller. (0.26L)

3. Tightening torque for bolts [2]: 411N・m (41.9kgf・m)

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2-4 Front idler (767S-0167-0E)

2-4-1 Removal and disassembly (937S-0058-0E)

(1) Separate the track shoe at the front idler position then pull the front idler off the traveling frame. (Fig. ①)

Note Refer to "2-1-1 Removal" for removal of the track shoe.

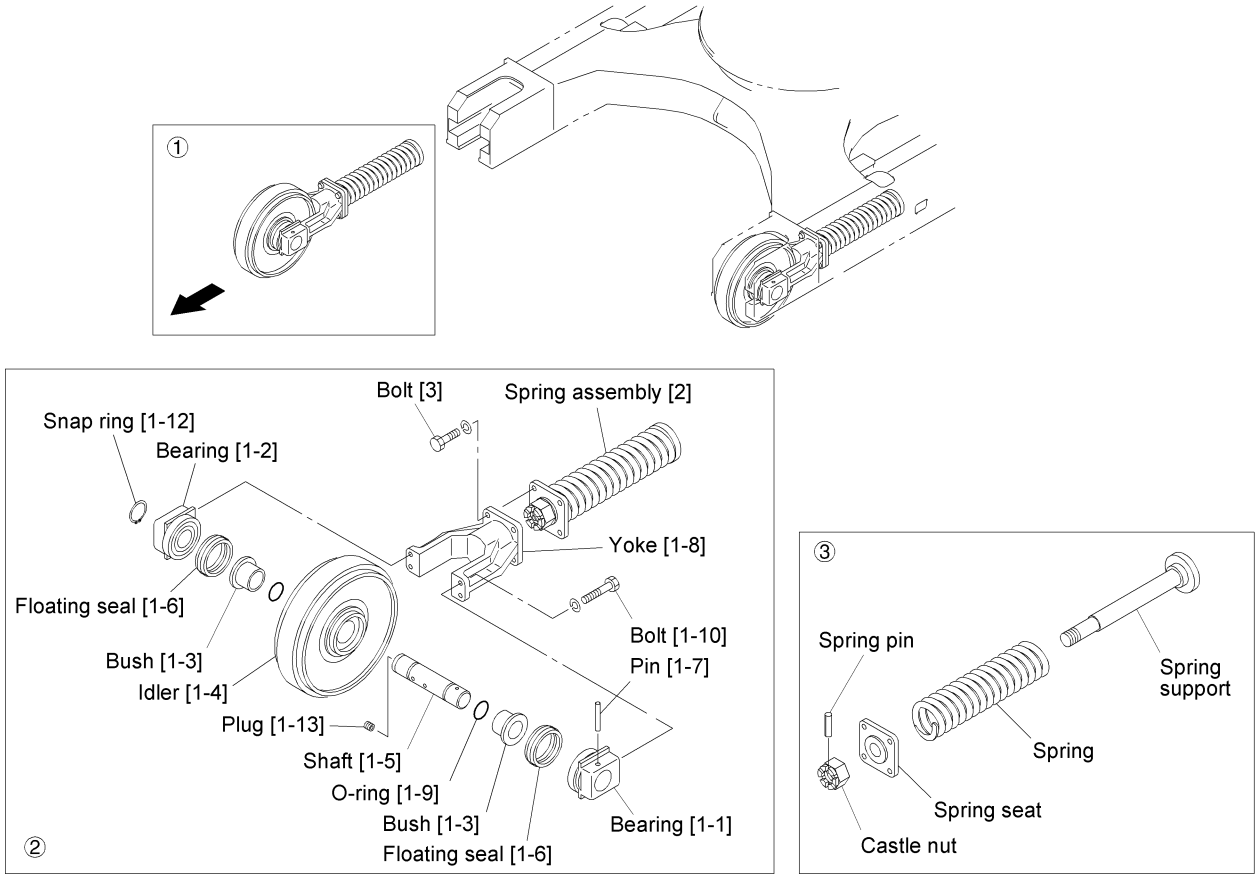
(2) If it is necessary to disassemble the front idler, follow the procedure below. (Fig. ②)

1) Remove bolts [3] and remove spring assembly [2] from yoke [1-8].
2) Remove bolts [1-10] and detach the yoke from bearings [1-1] and [1-2].
3) Remove pin [1-7] and snap ring [1-12] then take bearings [1-1] and [1-2] from both ends of the shaft.

Note Remove plug [1-13] and drain oil out before doing this work.

4) Remove floating seals [1-6] from bearings [1-1] and [1-2], and idler [1-4].
5) Remove O-rings [1-9] from shaft [1-5].
6) Remove idler [1-4] with bushes [1-3] from the shaft.

(3) If necessary, disassemble spring assembly [2]. (Fig. ③)



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2-4-2 Inspection and repair (777S-0108-1E)

(1) Inspect each part of the front idler for damage, cracks, breakages etc.
(2) Measure wear on each part of the front idler. If the allowable value is exceeded, build up metal by welding. (Refer to "Service standards".)
(3) Measure the inner diameters of the bearings.
(4) Check that there is no abnormal wear, seizure marks or other damage on the shaft.
(5) Check that there is no weakening, damage, crack or other defect in the spring.
(6) Replace any parts which are defective or worn beyond the limit of use.

2-4-3 Assembly and mounting (947S-0053-0E)

Reverse the removal and disassembly procedures to reassemble and mount the idler with particular attention to the following points.

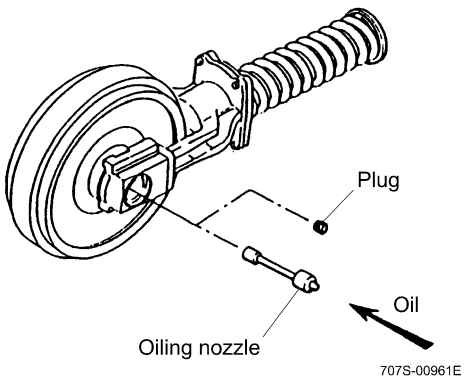
(1) Do not disassemble the spring assembly unless it is necessary.
If you have done so unavoidably, you will need a hydraulic jack to reassemble it.

Note When you reset the spring, the attachment length (A) and set load are as follows.

Attachment length (A)	Spring set load
655mm	143.3kN (14610kgf)

707S-00950E

(2) Refer to "2-2-4 Assembly method of the floating seal" for the reassembly procedure for the floating seals.
(3) Assemble the front idler so that the shaft oiling holes are faced to the front of the machine.
(4) After assembly, use an oiling nozzle to pour engine oil into the front idler. (0.3L)



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(5) Refer to "2-1-4 Tension inspection and adjustment" to adjust track shoe tension after mounting is complete.

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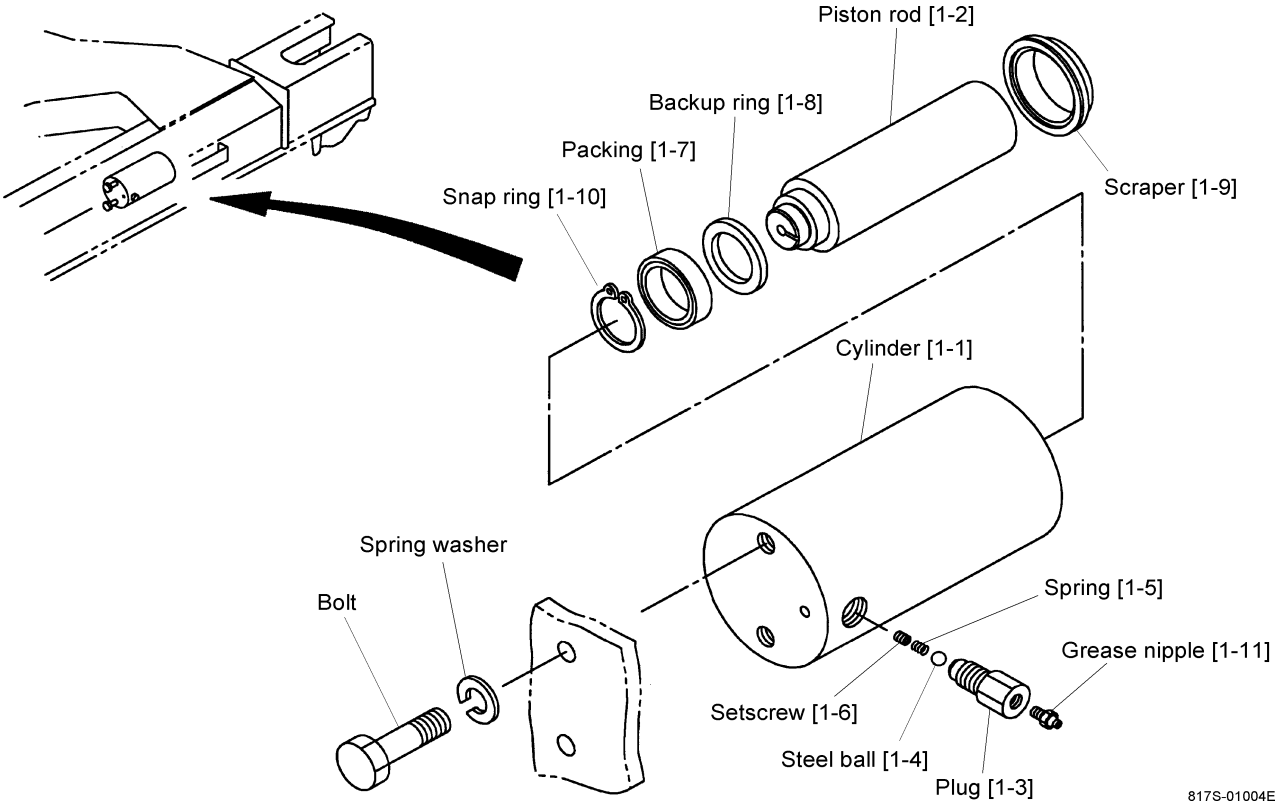
2-5 Adjuster cylinder (767S-0168-1E)

2-5-1 Structure and function (777S-0109-0E)

Inject grease to this single-action cylinder to adjust track shoe tension by exerting pressure on the front idler.



2-5-2 Disassembly (847S-0072-2E)

(1) Tools required

1) Ring pliers (for shaft, ϕ 80)
2) Socket wrench #19
3) Shockless hammer ϕ 51 $\times$ 108
4) Grease pump
5) Punch jig for scraper

(2) Use the socket wrench to remove plug [1-3] from cylinder [1-1].

Note Remember that grease will come out through the plug hole. Remove grease nipple [1-11] and setscrew [1-6] from the plug and take out spring [1-5] and steel ball [1-4].

(3) Extract piston rod [1-2] as a set from cylinder [1-1].

(4) Use a screwdriver or spatula to remove scraper [1-9].

Note Take care not to damage the inner and outer peripheral lips of the scraper when you remove it.

(5) Stand piston rod [1-2] with the mounting side of packing [1-7] up and fix it in place.

(6) Remove snap ring [1-10] and detach packing [1-7] and backup ring [1-8] from piston rod [1-2].

2-5-3 Assembly (777S-0110-2E)

(1) Moisten each part with grease or hydraulic oil before reassembly.

(2) Stand piston rod [1-2] upright and hold it in place. Insert backup ring [1-8] and push packing [1-7] onto the rod.

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(3) Apply grease to the top of packing [1-7] and fix the above components in place with snap ring [1-10].
(4) Apply grease to the upper face of piston rod [1-2].
(5) Stand cylinder [1-1] upright and squeeze grease into the tube.

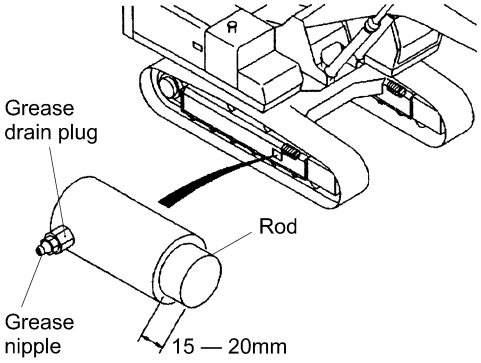
Note Insert grease until the piston rod reaches the bottom of the cylinder.

(6) Insert piston rod [1-2] into cylinder [1-1].
(7) Place scraper [1-9] onto piston rod [1-2] and mount the punch jig for scraper onto piston rod [1-2].
(8) Use a shockless hammer to tap the jig evenly until scraper [1-9] is fitted to cylinder [1-1].
(9) Assemble plug [1-3] and insert it into cylinder [1-1].

2-5-4 Extracting air (777S-0111-0E)

When you are overhauling the travel system such as the track shoes etc. or in any other case when it is necessary to remove the adjuster cylinder and extract air from it, follow the procedure below.

(1) Unscrew the grease drain plug and fully retract the cylinder rod.
(2) Inject grease so that the rod extends by 15 — 20mm.
(3) Face the drain plug upward and again fully retract the cylinder rod. This completes the air extraction procedure. Finish by screwing the plug in.
Tightening torque: 196N・m (20kgf・m)



2-5-5 Inspection after assembly (847S-0073-0E)

(1) Unladen operation test
Place the cylinder in a horizontal position unladen and apply pressure to the extension port to move the piston rod five times to check that it moves correctly. (Extract air at the same time.) There is nothing to limit the extension of this cylinder, so do not allow it to extend through a stroke of more than 140mm. A longer stroke could cause the rod to fly out.
(2) Pressure resistance test
1) Apply a pressure of 29.4MPa (300kgf/cm^2) to the extension port for three minutes and confirm that there is no leakage around the rod etc. and there is no permanent deformation. Keep stroke within 140mm and never run a pressure resistance test beyond 140mm of stroke.
2) Eliminate all air from the cylinder before you conduct the tests. There is the risk of heat damage to the gasket in the presence of air.

2-5-6 Precautions (767S-0272-5E)

(1) Clean the gasket etc. with petroleum-based hydraulic oil. Other types of oil will severely shorten the lifespan of the gasket etc.
(2) After prolonged disuse, work the cylinder slowly three or four times unladen before applying load. This is because the film of oil over sliding surfaces can break over long periods and sudden loaded operation in this condition can cause damage to the gasket.
(3) You only need to remove scraper [1-9] for replacement, so the old scraper can be broken or deformed during removal if necessary.

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2-6 Driving tumbler (767S-0169-0E)

2-6-1 Removal (937S-0059-0E)

(1) Separate the track shoe and remove it from the driving tumbler.

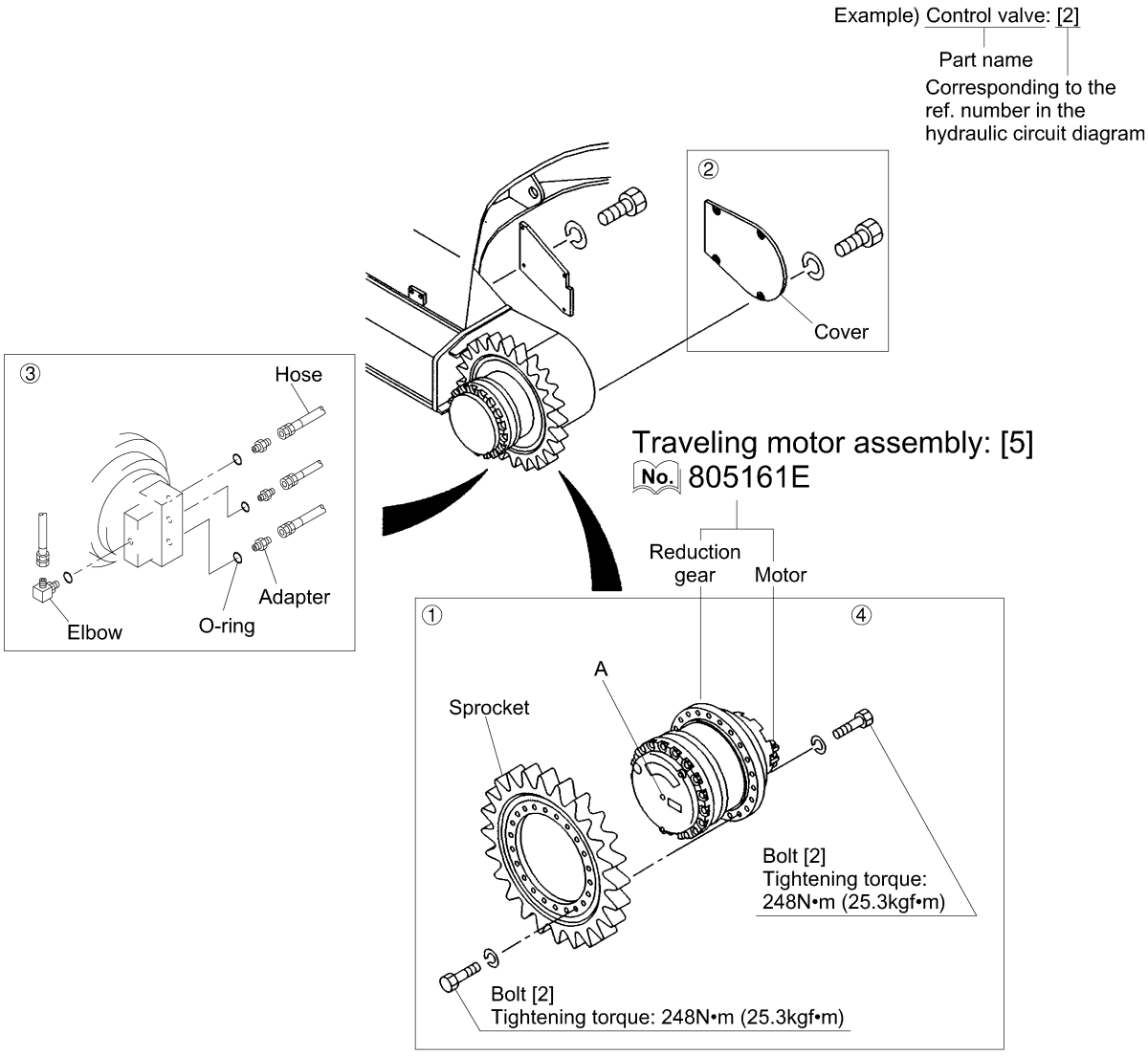
Note Refer to "2-1-1 Removal" for removal of the track shoe.

(2) Attach the sling wire rope to the sprocket and support it with a crane. Then remove bolts [2] to lift the sprocket off the motor assembly. (Fig. ①)

(3) Remove the cover. (Fig. ②)

(4) Disconnect all piping from the motor. (Fig. ③)

(5) Attach the sling wire rope to the motor assembly and support it with a crane. Then remove bolts [2] to lift the motor assembly off the traveling frame. (Fig. ④)



937V-00090E

2-6-2 Inspection and repair (767S-0274-0E)

(1) Examine the sprocket for defects, cracks, damage etc.

(2) Investigate the degree of wear to the sprocket. (Refer to "Service standards".)

(3) Examine the brake valve, motor and reduction gear for damage.

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2-6-3 Mounting (937S-0060-0E)

Reverse the removal procedure to mount the driving tumbler with particular attention to the following points.

(1) When you remove parts, pay attention to the orientation of ports and the way they are assembled so you can reassemble them quickly and accurately.

(2) Replace all O-rings once you remove them regardless of their apparent condition.

(3) When mounting the motor assembly onto the traveling frame, you must not strike the area marked A in Fig. ④.

(4) Thoroughly wipe away all traces of oil and grease from the threaded parts of the bolts and always apply screw-lock compound to them before tightening them.

Note Tightening torque for bolts [2]: 248N・m (25.3kgf・m)

2-6-4 Oiling and inspecting the traveling motor reduction gear (9370-0050-0E)

(8270-0197-1E)

⚠ WARNING

- Immediately after the traveling motor has stopped, the motor, shoes and other parts are hot, so do not start to work before all parts have cooled sufficiently.
- Residual pressure inside the traveling motor reduction gear may cause the plug or oil to fly out. Loosen the plug slowly to relieve pressure before proceeding.

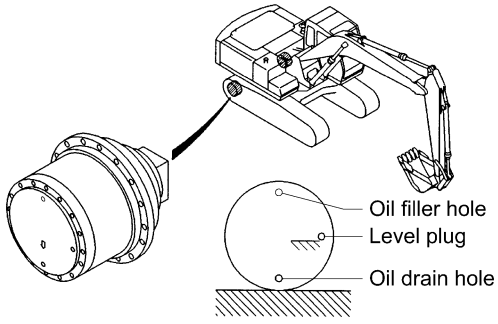
(8570-0089-1E)

⚠ CAUTION

If you replace the traveling motor reduction gear oil and the drained oil contains the metal dust etc., the reduction gear may need to be overhauled. Contact your authorised KATO dealer.

(1) Oiling method

1) Place the traveling motor reduction gear as shown in the diagram.
2) Remove the oil filler hole and level plugs.
3) Pour gear oil in through the oil filler hole until it pours out from the level hole.
4) Screw the plugs back in to prevent oil leakage.
   Tightening torque: 157±8N·m (16±0.8kgf·m)



8370-00701E

Note Refer to the recommended lubricants table for the brand of gear oil.

Note Allow at least ten minutes after traveling before you measure the oil volume.

Note You may use any brand of gear oil, but you should use one brand consistently and avoid mixing different brands.

Note The standard temperature of the reduction gear casing is normal hydraulic oil temperature + 20°C in continuous operation.

(2) Inspection and replacement intervals

Inspection interval ····· Every 250 hours of operation

Replacement interval ····· Every 1000 hours of operation or yearly
After delivery of a new machine, the gear oil should be replaced after 500 hours of operation.

Oil volume (per traveling motor reduction gear) ····· 5.0L

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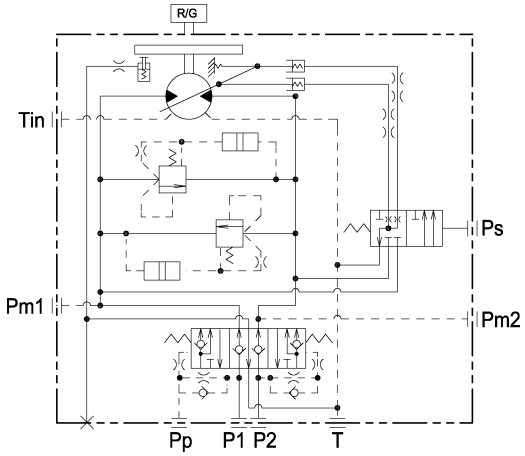
3. Data file (817S-0055-0E)

3-1 Traveling motor (937S-0098-0E)

Part No.	619-00336011
Type	MAG170VP-3400E-3
Rated pressure	32.9MPa (335kgf/cm^2)
Capacity	170/109.9cm^3/rev
Maximum torque	38.4kN･m (3920kgf･m)
Reduction gear ratio	43.246
Mass	280kg

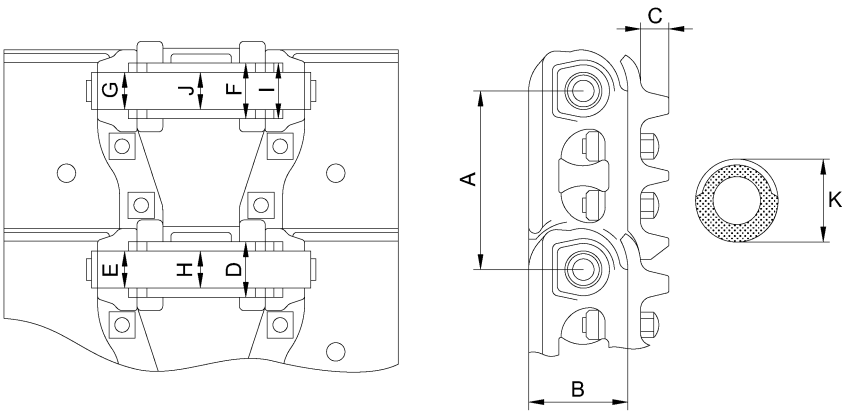
(937S-0135-2E)



937S-00760

3-2 Service standards (767S-0170-0E)

3-2-1 Track shoe (937S-0062-0E)



707S-01293

Units: mm

Part No.		707-51000003				
Alphabet in the figure	Inspection items	Evaluation standards				Action
A	Link pitch	Standard dimensions	Limit of reversal		Limit of use	Reverse or replace
		190	194.5		198	
B	Link height	Standard dimensions	Limit of reparability		Limit of use	Build up metal or replace
		106	101		98	
C	Height of triple grouser	26	16		11	Lug weld or replace
		Standard dimensions	Tolerance		Standard clearance and interference	
			Shaft	Hole		
D	Interference of track bush and link	58.72	+0.05 0	–0.25 –0.32	0.25－0.37	Replace
E	Interference of track pin and link	36.65	+0.05 –0.05	–0.33 –0.38	0.28－0.43	Replace
F	Interference of master bush and link	58.72	+0.05 0	–0.25 –0.32	0.25－0.37	Replace
G	Interference of master pin and link	36.65	+0.05 –0.05	–0.33 –0.38	0.28－0.43	Replace
H	Clearance between track pin and track bush	36.65	+0.05 –0.05	+1.15 +0.65	0.6－1.2	Replace
I	Clearance between collar and link	58.6	+0.1 –0.1	+1.06 +0.66	0.56－1.16	Repair or replace
J	Clearance between master pin and master bush	36.34	+0.04 0	–1.42 +0.96	+0.92 (clearance) –1.46 (interference)	Repair or replace
K	Track bush	Standard dimensions	Limit of service		Limit of use	Reverse or replace
		58.72	56.0		55	

(937S-0061-2E)

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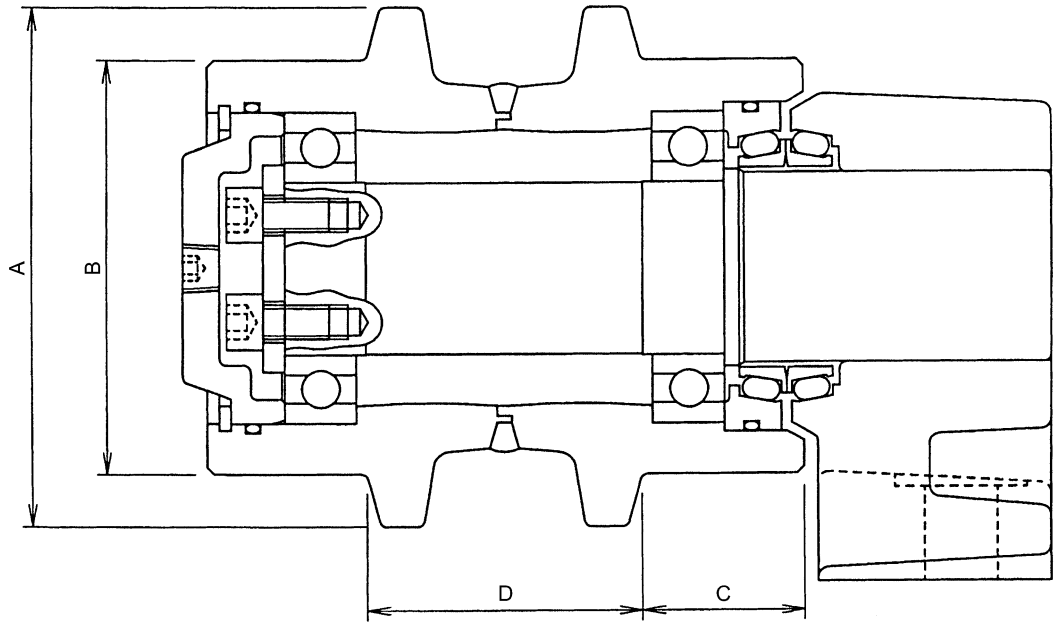
3-2-2 Carrier roller (937S-0063-0E)



707S-00630

Units: mm

Part No.		187-50600112		
Alphabet in the figure	Inspection items	Standard dimensions	Limit of use	Action
A	Diameter of flange	150	140	Build up or replace
B	Diameter of outer surface	120	110	Build up or replace
C	Width of outer surface	46	50	Build up or replace
D	Width of flange	78	70	Build up or replace

(847S-0077-1E)

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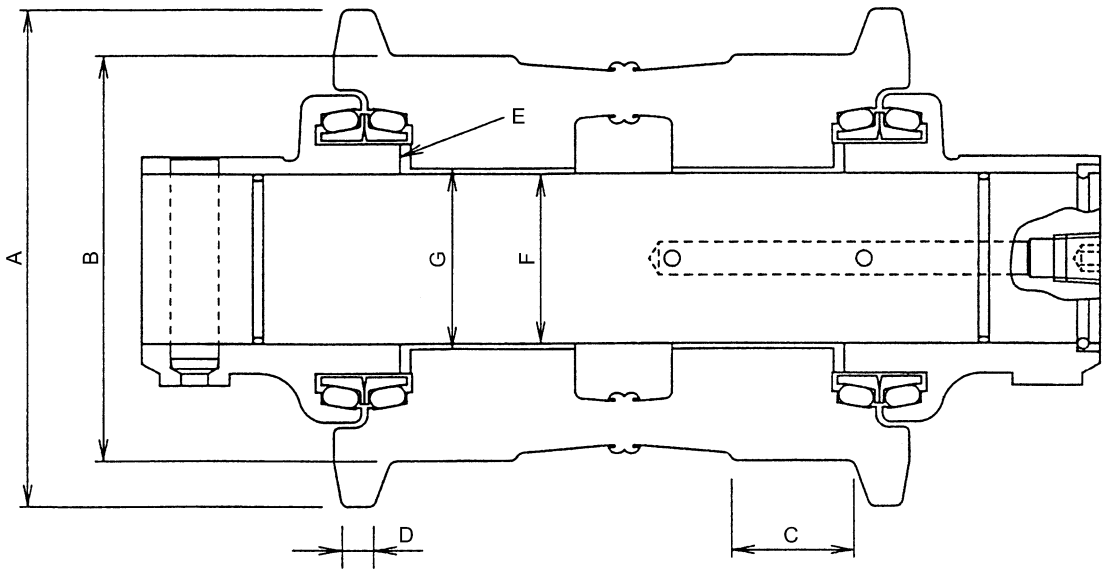
3-2-3 Track roller (937S-0064-0E)



707S-00640

Units: mm

Part No.		707-50800103					
Alphabet in the figure	Inspection items	Standard dimensions			Limit of use		Action
A	Diameter of flange	190			180		Build up or replace
B	Diameter of outer surface	155			140		Build up or replace
C	Width of outer surface	46			51		Build up or replace
D	Width of flange	12			6		Build up or replace
E	Clearance of track roller in shaft direction	Standard clearance 0.3 — 1.3			Limit of use 2.5		Replace
		Standard dimensions	Tolerance		Standard clearance and interference	Limit of use	
			Shaft	Hole			
F	Clearance between track roller shaft and bush	65	–0.06 –0.106	+0.35 +0.2	0.26 — 0.456	1.0	Replace bush
G	Interference of track roller and bush	69	+0.19 +0.14	+0.03 –0.02	0.11 — 0.21	0	Replace bush

(847S-0078-4E)

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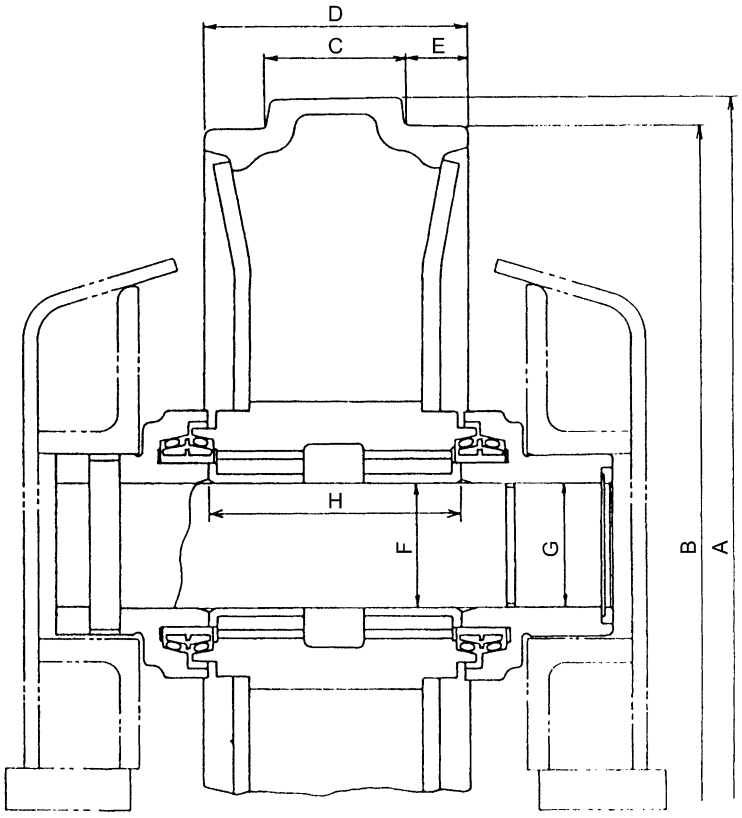
3-2-4 Front idler (937S-0065-0E)

(1) Shaft and bush



707S-00650

Units: mm

Part No.		387-50400102				
Alphabet in the figure	Inspection items	Standard dimensions		Limit of use		Action
A	Diameter of raised section	538		530		Build up or replace
B	Diameter of outer surface	500		491		Build up or replace
C	Width of raised section	84		76		Build up or replace
D	Overall width	159		150		Build up or replace
E	Width of outer surface	37.5		40		Build up or replace
		Standard dimensions	Tolerance		Standard clearance	Limit of use	
			Shaft	Hole			
F	Clearance between shaft and bush	75	–0.01 –0.05	+0.4 +0.23	0.45 — 0.24	1.0	Replace bush
G	Clearance between shaft and bearing	75	–0.01 –0.05	+0.07 +0.03	0.12 — 0.04	1.0	Replace
H	Overall width of idler (After push-insertion of bush)	147				144	Replace bush

(847S-0079-4E)

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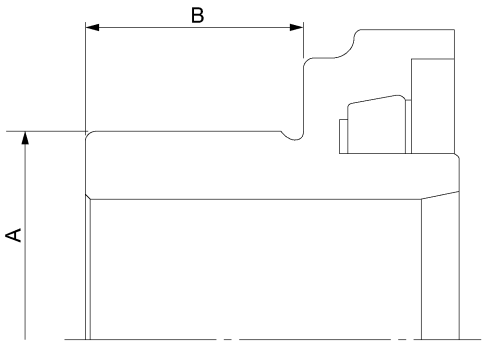
(2) Bearing



707S-00660

Units: mm

Part No.		387-50401003, 387-50402003		
Alphabet in the figure	Standard dimensions	Recommended replacement	Limit of use	Action
A	108	106	105	Build up and finish with a shaper
B	53	55	57	Build up and finish with a shaper

(847S-0080-2E)

3-2-5 Adjuster cylinder (937S-0125-0E)

Part No.		817-32600101
Dimensions	Cylinder bore	80mm
	Rod diameter	80mm
	Stroke	140mm
Pressure test load (extension side)		147.1kN/29.4MPa（15000kgf/300kgf/cm^2）
Mass		25kg

(937S-0054-0E)

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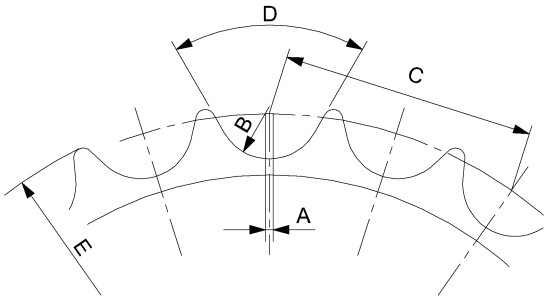
3-2-6 Sprocket (937S-0066-0E)



707S-00670

Units: mm

Part No.				707-50201002								
Standard dimensions				Standard dimensions for tooth form					Amount of wear (A) on sprocket tooth form	Limit of use		Action
Pitch	The number of teeth	Tooth width	Pitch diameter	A	B	C	D	E		Outside diameter	Tooth width (B)	
190	21	74	644.6	12	30	190	60°	656	6	646	70	Build up or replace

(847S-0081-4E)

A: Amount of wear on sprocket tooth form

Measure in at least four areas around the sprocket with a gauge which can measure across three or more teeth. If the allowable value is exceeded, build up metal by welding or replace the sprocket.

B: Sprocket tooth width

Measure in at least four areas around the sprocket.

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(937V-0012-1E)

J Electrical equipment

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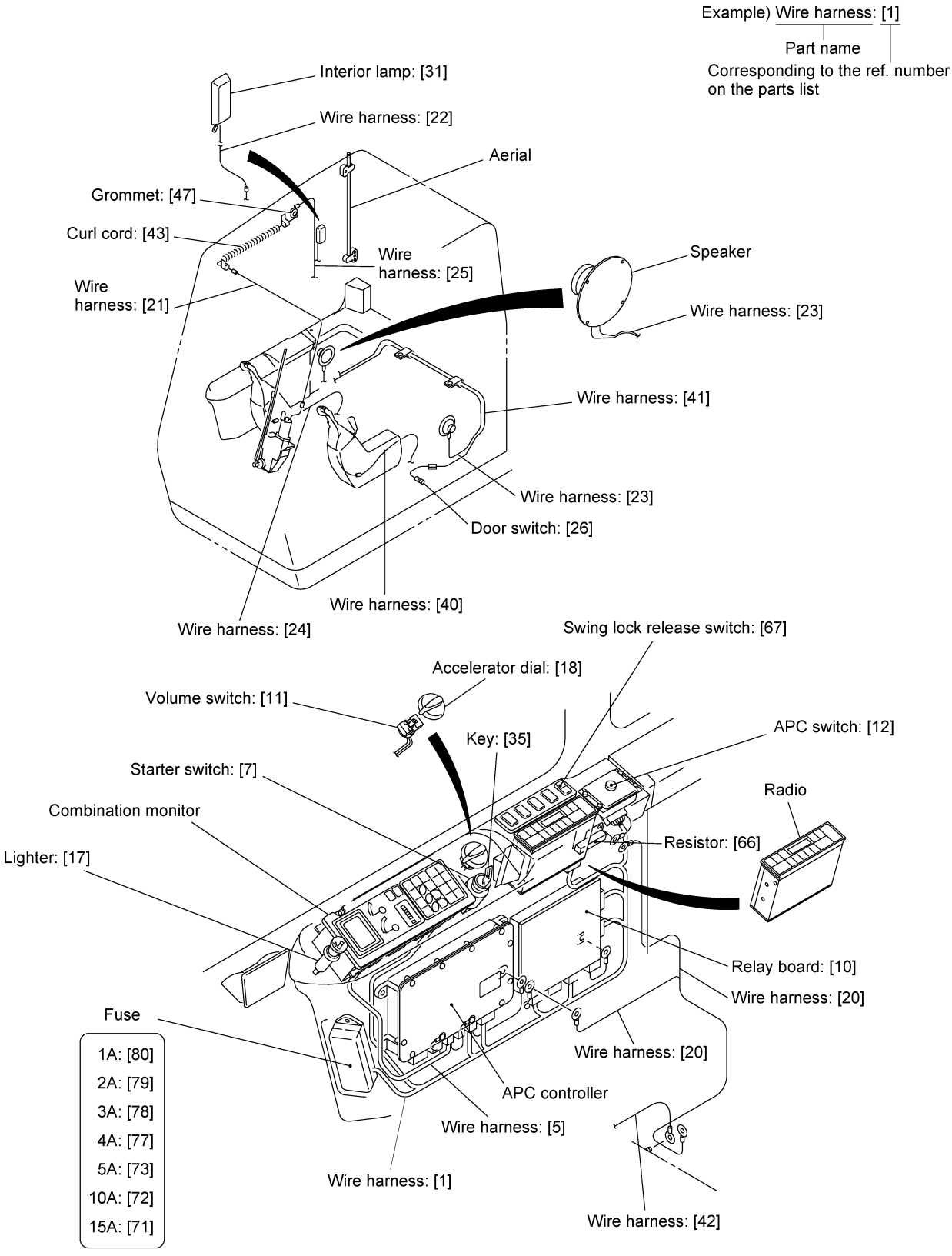
1. Layout of electrical equipment (817S-0089-0E)

1-1 Inside the cab (817S-0090-0E)



777S-00982E

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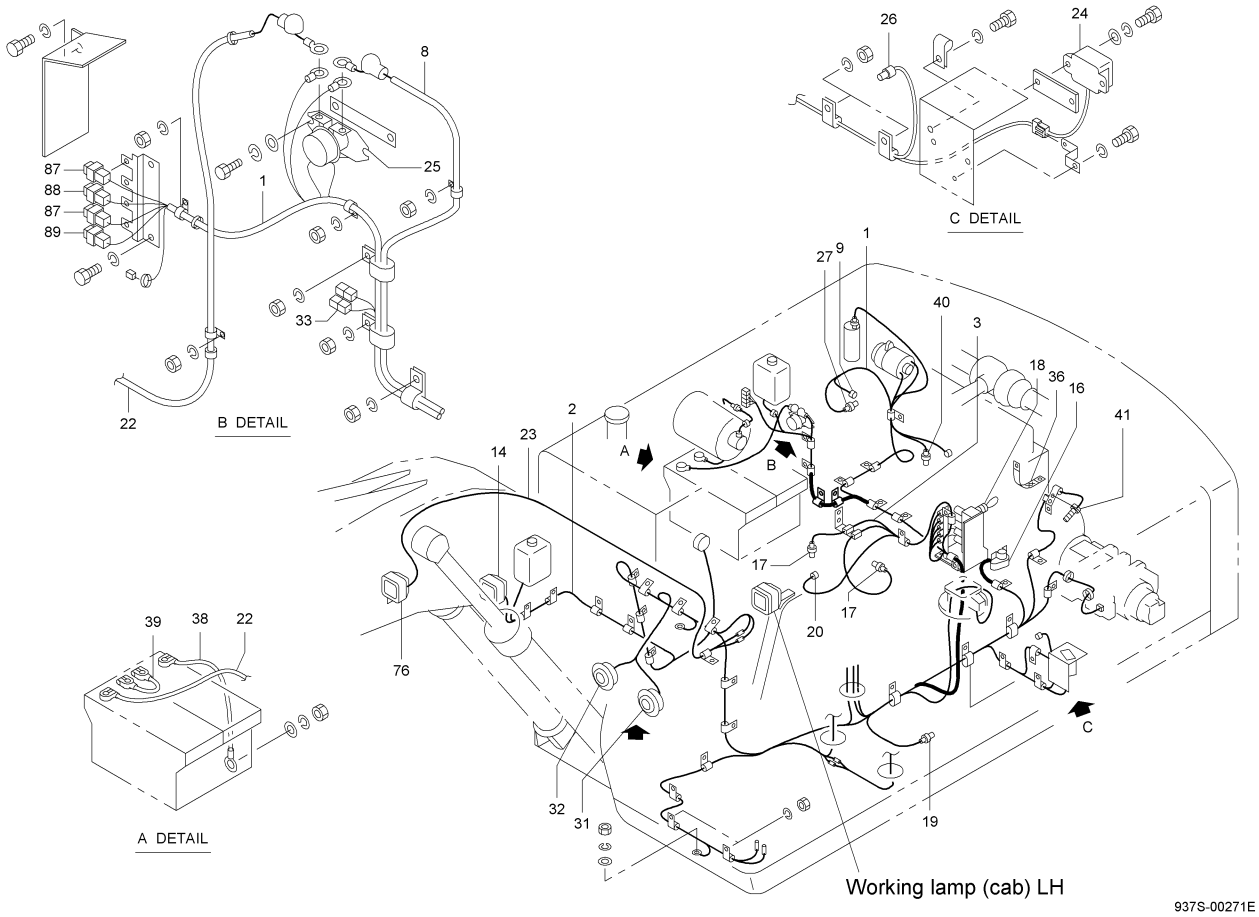
1-2 Superstructure (937S-0109-0E)



Ref. No.	Part name	Ref. No.	Part name
1	Wire harness	26	Thermo sending unit
2	Wire harness	27	Thermal switch
3	Wire harness	31	Horn
8	Battery cord	32	Horn
9	Unit thermo sensor	33	Diode
14	Working lamp	36	Earth cord
16	Heater relay	38	Battery cord
17	Pressure sensor	39	Battery cord
18	Pressure switch	40	Oil pressure switch
19	Pressure switch	41	Revolution sensor
20	Pressure switch	76	Working lamp
22	Battery cord	87	High current fuse (65A)
23	Wire harness	88	High current fuse (30A)
24	Starter safety relay	89	High current fuse (45A)
25	Battery relay		

(937S-0108-1E)

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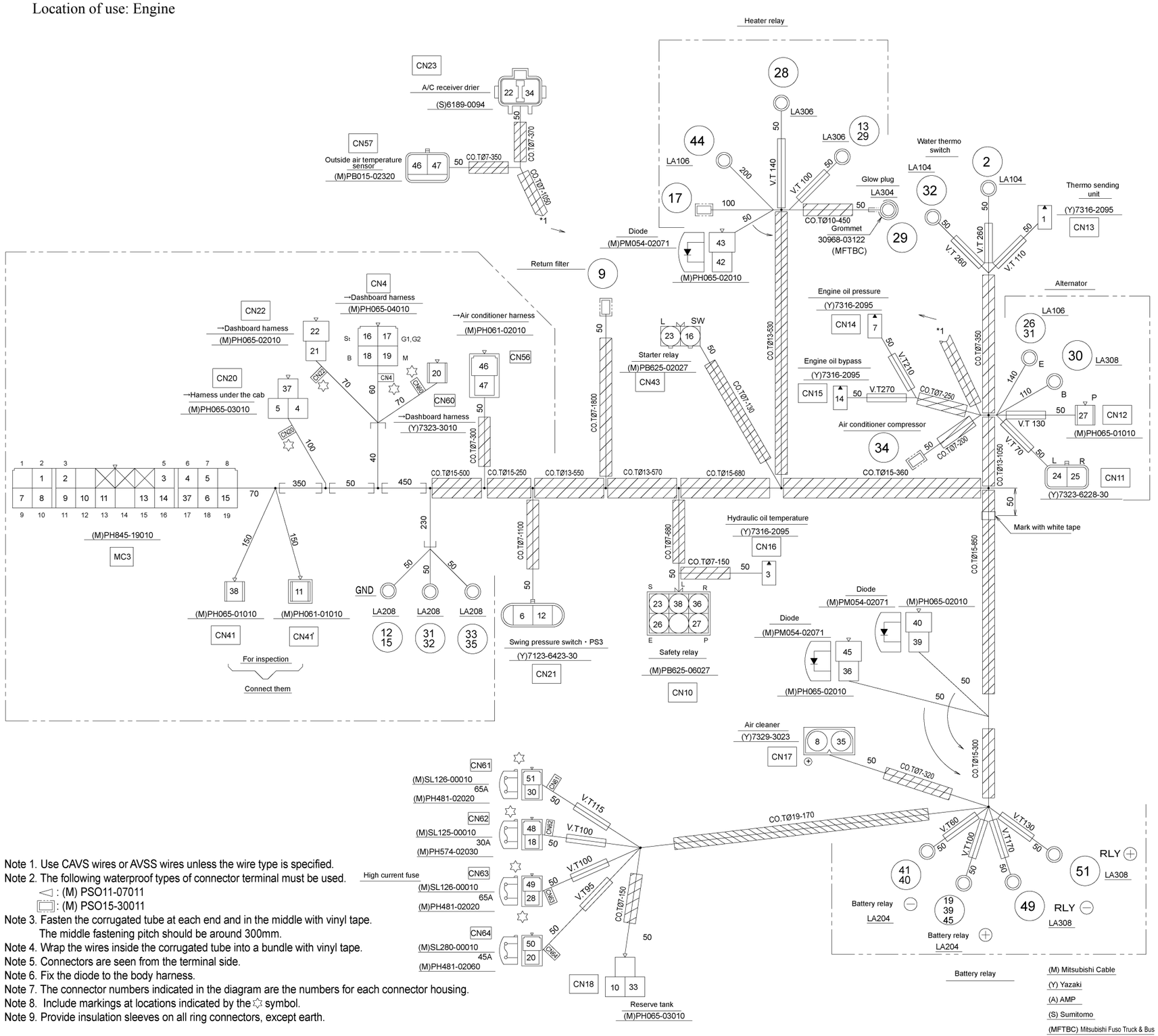
(1) Wire harness

Location of use: Engine



No.	Wire type	Size	Color	From	To
1		0.85	GB	MC3-2	CN13 Engine water temperature gauge
2		0.85	Br	MC3-3	Engine water temperature switch
3		0.85	Br	MC3-5	CN16 Hydraulic oil temperature
4		0.85	RG	MC3-6	CN20 Harness under the cab
5		0.85	YB	MC3-7	CN20 Harness under the cab
6		0.85	L	MC3-18	CN21 Swing pressure switch
7		0.85	RL	MC3-9	CN14 Engine oil pressure
8	AVS	0.85	R	MC3-10	CN17 Air cleaner
9	AVS	0.85	YR	MC3-11	Return filter
10		0.85	GW	MC3-12	CN18 Reserve tank
11		0.85	Y	MC3-13	CN41'
12		0.85	B	CN21 Swing pressure switch	Earth (dashboard)
13		0.85	RW	MC3-15	Heater relay
14		0.85	BrW	MC3-16	CN15 Engine oil bypass
15		0.85	B	MC3-19	Earth (dashboard)
16		0.85	Br	CN4 Dashboard harness	CN43 Starter relay
17	AVS	0.85	LW	CN4 Dashboard harness	Heater relay
18	AVS	2.0	R	CN4 Dashboard harness	CN62 High current fuse
19		0.85	BrW	CN4 Dashboard harness	Battery relay (+)
20	AVS	5.0	W	CN60 Dashboard harness	CN64 High current fuse
21	AVS	2.0	R	CN22 Dashboard harness	⑱
22		0.85	G	CN22	CN23 Air conditioner receiver drier
23		0.85	WL	CN10 Safety relay	CN43 Starter relay
24		0.85	Y	㊳	CN11 Alternator L
25		0.85	WG	㊱	CN11 Alternator R
26		0.85	B	CN10 Safety relay	Alternator E
27		0.85	WY	CN10 Safety relay	CN12 Alternator P
28	AVS	8.0	B	Heater relay (+)	CN63 High current fuse
29	AVS	8.0	B	Heater relay	Glow plug
30	AEX	8.0	W	Alternator B	CN61 High current fuse
31		0.85	B	Alternator E	Earth (dashboard)
32		0.85	B	Water thermo switch	Earth (dashboard)
33		0.85	B	CN18 Reserve tank	Earth (dashboard)
34	AVS	0.85	G	CN23 Air conditioner receiver drier	Air conditioner compressor
35	AVS	0.85	B	CN17 Air cleaner	Earth (dashboard)
36		0.85	WG	CN10 Safety relay	Diode
37		0.85	G	MC3-17	CN20 Left lever switch (spare)
38		0.85	Y	CN41	CN10 Safety relay
39		0.85	BrW	Battery relay (+)	Diode
40		0.85	B	Battery relay (–)	Diode
41		0.85	B	Battery relay (–)	㉝
42		0.85	LW	⑰	Diode
43		0.85	B	Diode	㉜
44		0.85	B	Heater relay	㉛
45		0.85	WG	Diode	Battery relay (+)
46		0.5	OB	CN57 Outside air temperature sensor	CN56 Air conditioner harness
47		0.5	BY	CN57 Outside air temperature sensor	CN56 Air conditioner harness
48	AVS	2.0	RW	CN62 High current fuse	㊶
49	AVS	8.0	BW	CN63 High current fuse	RLY (–)
50	AVS	5.0	BW	CN64 High current fuse	㊾
51	AVS	8.0	R	CN61 High current fuse	RLY (+)

(937S-0098-1E)

Note 1. Use CAVS wires or AVSS wires unless the wire type is specified.
Note 2. The following waterproof types of connector terminal must be used.
◁ : (M) PSO11-07011
▭ : (M) PSO15-30011
Note 3. Fasten the corrugated tube at each end and in the middle with vinyl tape.
The middle fastening pitch should be around 300mm.
Note 4. Wrap the wires inside the corrugated tube into a bundle with vinyl tape.
Note 5. Connectors are seen from the terminal side.
Note 6. Fix the diode to the body harness.
Note 7. The connector numbers indicated in the diagram are the numbers for each connector housing.
Note 8. Include markings at locations indicated by the ☼ symbol.
Note 9. Provide insulation sleeves on all ring connectors, except earth.

937-77601011

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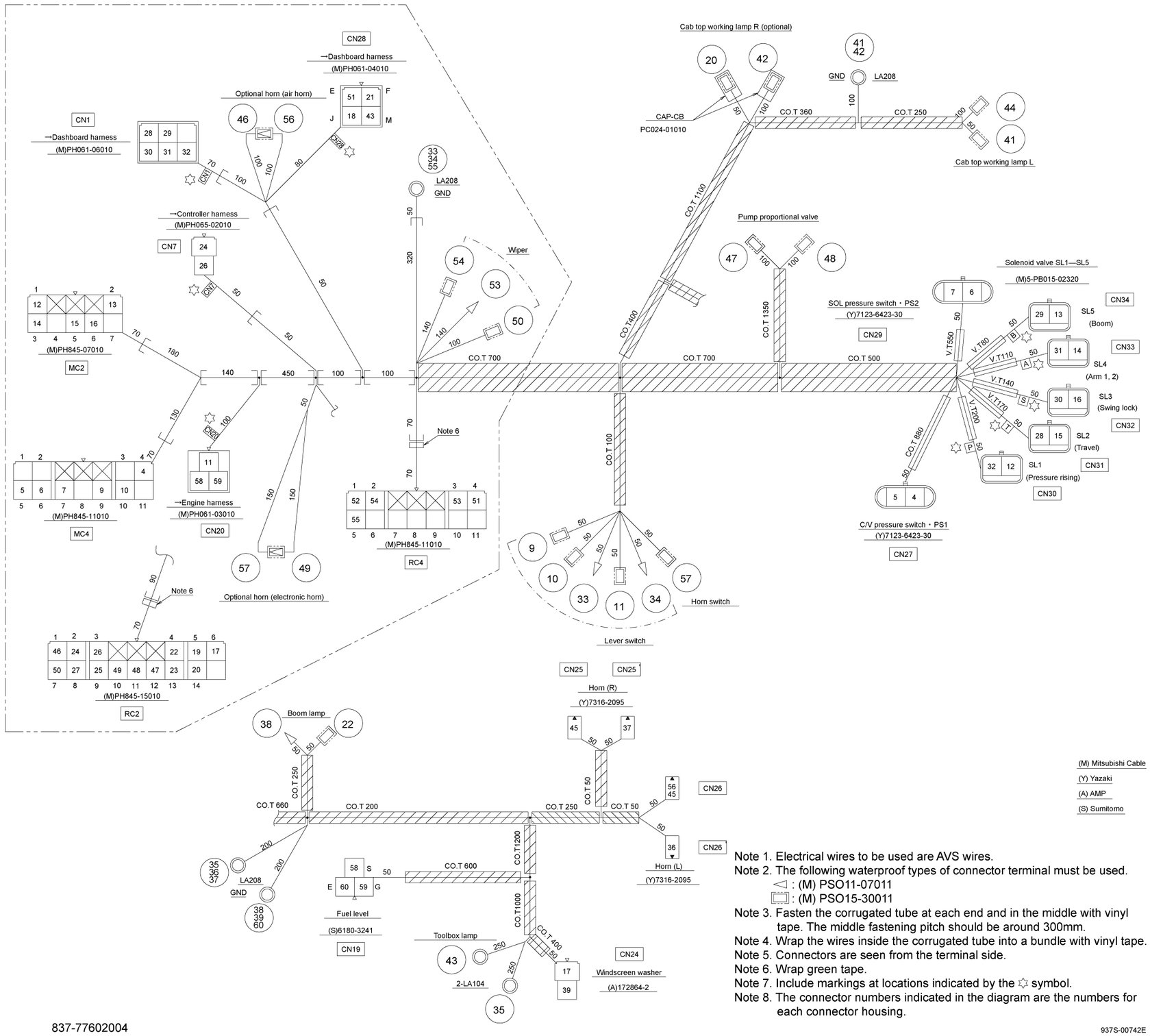
(2) Wire harness

Location of use: Under the cab



(M) Mitsubishi Cable
(Y) Yazaki
(A) AMP
(S) Sumitomo

Note 1. Electrical wires to be used are AVS wires.
Note 2. The following waterproof types of connector terminal must be used.
◁ : (M) PSO11-07011
▭ : (M) PSO15-30011
Note 3. Fasten the corrugated tube at each end and in the middle with vinyl tape. The middle fastening pitch should be around 300mm.
Note 4. Wrap the wires inside the corrugated tube into a bundle with vinyl tape.
Note 5. Connectors are seen from the terminal side.
Note 6. Wrap green tape.
Note 7. Include markings at locations indicated by the ☆ symbol.
Note 8. The connector numbers indicated in the diagram are the numbers for each connector housing.

837-77602004

937S-00742E

No.	Size	Color	From	To
1				
2				
3				
4	0.85	G	MC4-4	CN27 C/V pressure switch
5	0.85	B	MC4-5	CN27 C/V pressure switch
6	0.85	B	MC4-6	CN29 SOL pressure switch
7	0.85	GY	MC4-7	CN29 SOL pressure switch
8				
9	0.5	WY	MC4-9	Lever switch R
10	0.5	RW	MC4-10	Lever switch R
11	0.5	G	CN20	Lever switch L
12	0.85	WR	MC2-1	CN30 SL1
13	0.85	L	MC2-2	CN34 SL5
14	0.85	LR	MC2-3	CN33 SL4
15	0.85	Y	MC2-5	CN31 SL2
16	0.85	LW	MC2-6	CN32 SL3
17	0.5	LR	RC2-6	CN24 Windscreen washer
18	0.5	R	CN28	㉒
19	0.5	RL	RC2-5	⑳
20	0.85	RL	RC2-14	Cab top working lamp R
21	0.85	LW	CN28	⑯
22	0.85	R	RC2-4	Boom lamp
23	0.5	R	RC2-13	㉒
24	0.5	WR	RC2-2	CN7
25	0.5	WG	RC2-9	㉖
26	0.85	WG	RC2-3	CN7
27	0.5	WR	RC2-8	㉔
28	0.85	RW	CN1 SOL power source	CN31 SL2
29	0.85	RY	CN1 SOL power source	CN34 SL5
30	0.85	R	CN1 SOL power source	CN32 SL3
31	0.85	RB	CN1 SOL power source	CN33 SL4
32	0.85	RG	CN1 SOL power source	CN30 SL1
33	0.85	B	Lever switch R	Earth
34	0.85	B	Lever switch L	Earth
35	0.85	B	Toolbox lamp	Earth
36	0.85	B	CN26' Horn L	Earth
37	0.85	B	CN25' Horn R	Earth
38	0.85	B	Boom lamp	Earth
39	0.85	B	CN24 Windscreen washer	Earth
40				
41	0.85	B	Cab top working lamp L	Earth
42	0.85	B	Cab top working lamp R	Earth
43	0.85	RW	CN28	Toolbox lamp
44	0.85	RL	⑳	Cab top working lamp L
45	0.85	GW	CN26 Horn L	CN25 Horn R
46	0.85	GW	RC2-1	Female terminal for optional horn
47	0.85	YR	RC2-12	Pump proportional valve (–)
48	0.85	Y	RC2-11	Pump proportional valve (+)
49	0.5	GR	RC2-10	Male terminal for optional horn
50	0.5	LB	RC2-7	Wiper B
51	0.85	LR	RC4-4	CN28
52	0.5	LR	RC4-1	㊶
53	0.5	LW	RC4-3	Wiper S
54	0.5	BW	RC4-2	Wiper P
55	0.5	B	RC4-5	Earth
56	0.85	GW	Male terminal for optional horn	CN26 Horn L
57	0.5	GR	Female terminal for optional horn	Horn switch
58	0.85	RG	CN20	CN19 Fuel remaining volume switch
59	0.85	YB	CN20	CN19 Fuel level
60	0.85	B	CN19 Fuel level switch	Earth

(937S-0099-1E)

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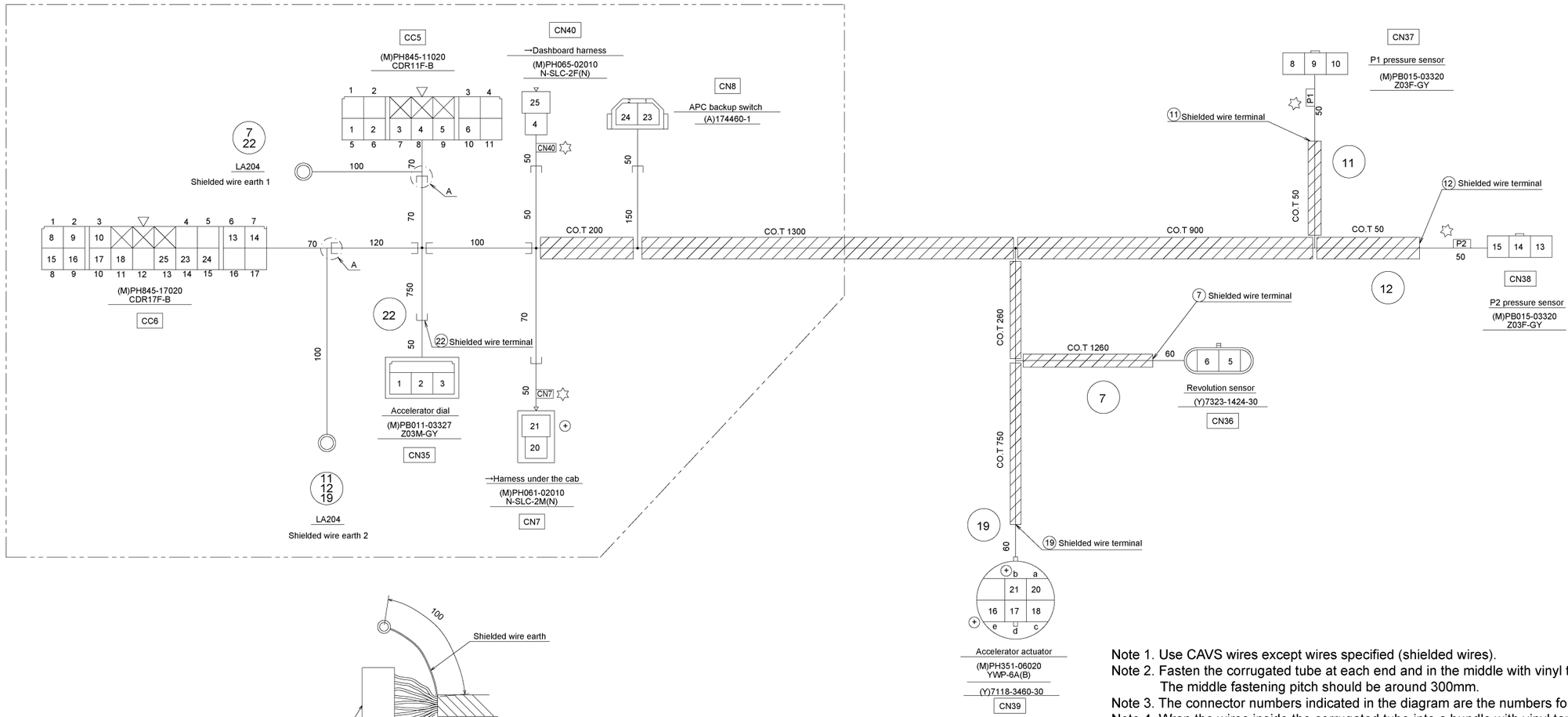
(3) Wire harness

Location of use: Control



(M) Mitsubishi Cable

(A) AMP

(Y) Yazaki

Note 1. Use CAVS wires except wires specified (shielded wires).
Note 2. Fasten the corrugated tube at each end and in the middle with vinyl tape.
The middle fastening pitch should be around 300mm.
Note 3. The connector numbers indicated in the diagram are the numbers for each connector housing.
Note 4. Wrap the wires inside the corrugated tube into a bundle with vinyl tape.
Note 5. Connectors are seen from the terminal side.
Note 6. Include markings at locations indicated by the ☆ symbol.

937S-00752E

No.	Size	Color	From	To
1	0.5	R	CC5-5	CN35 Accelerator dial 3
2	0.5	W	CC5-6	CN35 Accelerator dial 2
3	0.5	B	CC5-7	CN35 Accelerator dial 1
4	0.85	Y	CC5-8	CN40
5	0.5	W	CC5-9	CN36 Revolution sensor (+)
6	0.5	B	CC5-10	CN36 Revolution sensor
7	2-core shielded wire		CN36 Revolution sensor	Earth 1
8	0.5	R	CC6-1	CN37 P1 pressure sensor
9	0.5	W	CC6-2	CN37 P1 pressure sensor
10	0.5	B	CC6-3	CN37 P1 pressure sensor
11	3-core shielded wire		CN37 P1 pressure sensor	Earth 2
12	3-core shielded wire		CN38 P2 pressure sensor	Earth 2
13	0.5	B	CC6-6	CN38 P2 pressure sensor

No.	Size	Color	From	To
14	0.5	W	CC6-7	CN38 P2 pressure sensor
15	0.5	R	CC6-8	CN38 P2 pressure sensor
16	0.5	R	CC6-9	CN39 Accelerator actuator e
17	0.5	W	CC6-10	CN39 Accelerator actuator d
18	0.5	B	CC6-11	CN39 Accelerator actuator c
19	3-core shielded wire		CN39 Accelerator actuator	Earth 2
20	0.85	WG	CN7	CN39 Accelerator actuator a
21	0.85	WR	CN7	CN39 Accelerator actuator b
22	3-core shielded wire		CN35 Accelerator dial	Earth 1
23	0.5	WR	CC6-14	CN8 APC backup
24	0.5	RY	CC6-15	CN8 APC backup
25	0.5	G	CC6-13	CN40 Dashboard harness

(937S-0100-2E)

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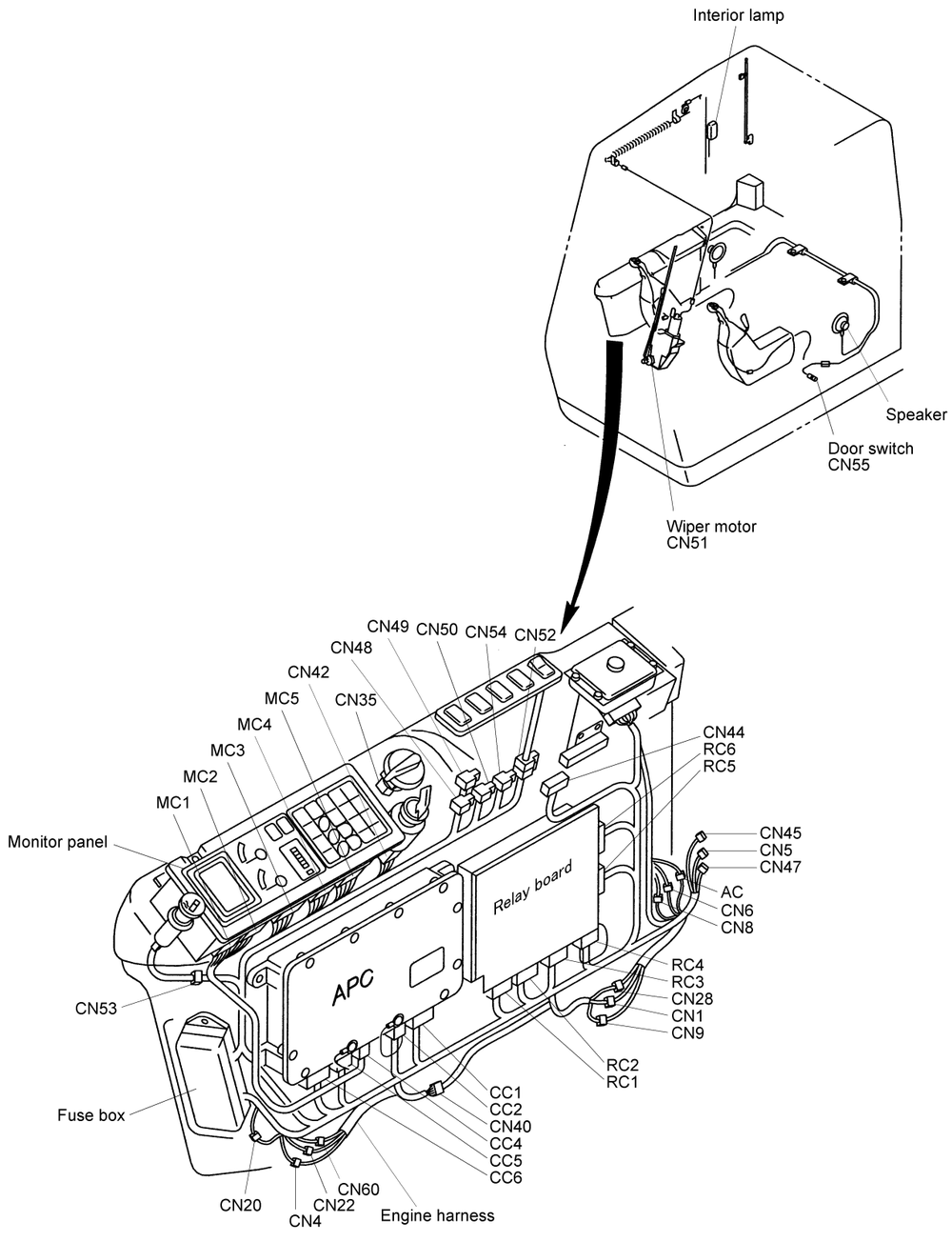
1-3 Layout of connectors (inside the cab) (857S-0077-1J)



817S-01061E

Connector No.		Circuit name	Connector No.	Circuit name
Monitor panel	MC1	Travel signal, swing signal, monitor power source, windscreen wiper, windscreen washer	CN25	Horn (H)
			CN26	Horn (L)
	MC2	High power, boom slow, H/L travel, swing lock	CN27	(Superstructure signal) control valve, pressure switch (PS1)
	MC3	Water temperature, engine oil, air cleaner, filter, charge		
	MC4	Proportional valve, pressure switch, high power switch	CN28	Swing lock release switch, radio ILL, working lamp
	MC5	RX1, TX1	CN29	Solenoid pressure switch (PS2)
APC	CC1	Power source of the APC, accelerator and proportional valve	CN30	Solenoid valve, high power (P)
	CC2	Speaker	CN31	Solenoid valve, travel H/L (T)
	CC4	RX1, TX1	CN32	Solenoid valve, swing lock (S)
	CC5	Accelerator dial, key OFF, revolution sensor	CN33	Solenoid valve, arm (A)
	CC6	Pump AV, engine governor, swing lock	CN34	Solenoid valve, boom (B)
Relay board	RC1	Speaker	CN35	Accelerator dial
	RC2	Windscreen washer, working lamp, horn, windscreen wiper, accelerator	CN36	Revolution sensor
	RC3	Working lamp, windscreen washer, windscreen wiper	CN37	Control valve, pressure sensor (P1)
	RC4	Wiper motor	CN38	Control valve, pressure sensor (P2)
	RC5	Power source of the APC, accelerator and proportional valve, and speaker	CN39	Accelerator actuator
	RC6	Key OFF, power source of the accelerator, APC, monitor and windscreen wiper	CN40	Engine key OFF, swing lock release
AC		APC switch	CN41	For hour meter stop
CN1		Fuse box — solenoid valve power source	CN42	Starter switch
CN4		Battery relay — starter switch	CN43	Starter relay L, SW
CN5		Air conditioner power source	CN44	Radio
CN6		APC switch — power source	CN45	Speaker R — L
CN7		RC2 — accelerator actuator	CN47	Heater power source (OP)
CN8		APC switch, backup	CN48	OP1 switch (fan)
CN9		Travel signal, swing signal	CN49	OP2 switch
CN10		Safety relay	CN50	OP3 switch
CN11		Alternator L, R — safety relay	CN51	Wiper motor
CN12		Alternator P — safety relay	CN52	Swing lock release switch
CN13		Thermo sending unit	CN53	Lighter
CN14		Engine oil pressure	CN54	OP horn switch (OP4)
CN15		Engine oil bypass alarm	CN55	Door switch
CN16		Oil reservoir oil temperature	CN56	Air conditioner — outside air temperature sensor
CN17		Air cleaner sensor	CN57	Outside air temperature sensor
CN18		Water level sensor	CN61	High current fuse 65A
CN19		Fuel level sensor		Battery relay — alternator
CN20		Fuel level, left lever spare	CN62	High current fuse 30A
CN21		Swing pressure switch (PS3)		Battery relay — fuse box
CN22		High current fuse — fuse box	CN63	High current fuse 65A
		Air conditioner — receiver drier		Battery relay — heater relay
CN23		Receiver drier pressure switch	CN64	High current fuse 45A
CN24		Windscreen washer		Battery relay — fuse box

(947S-0059-2E)

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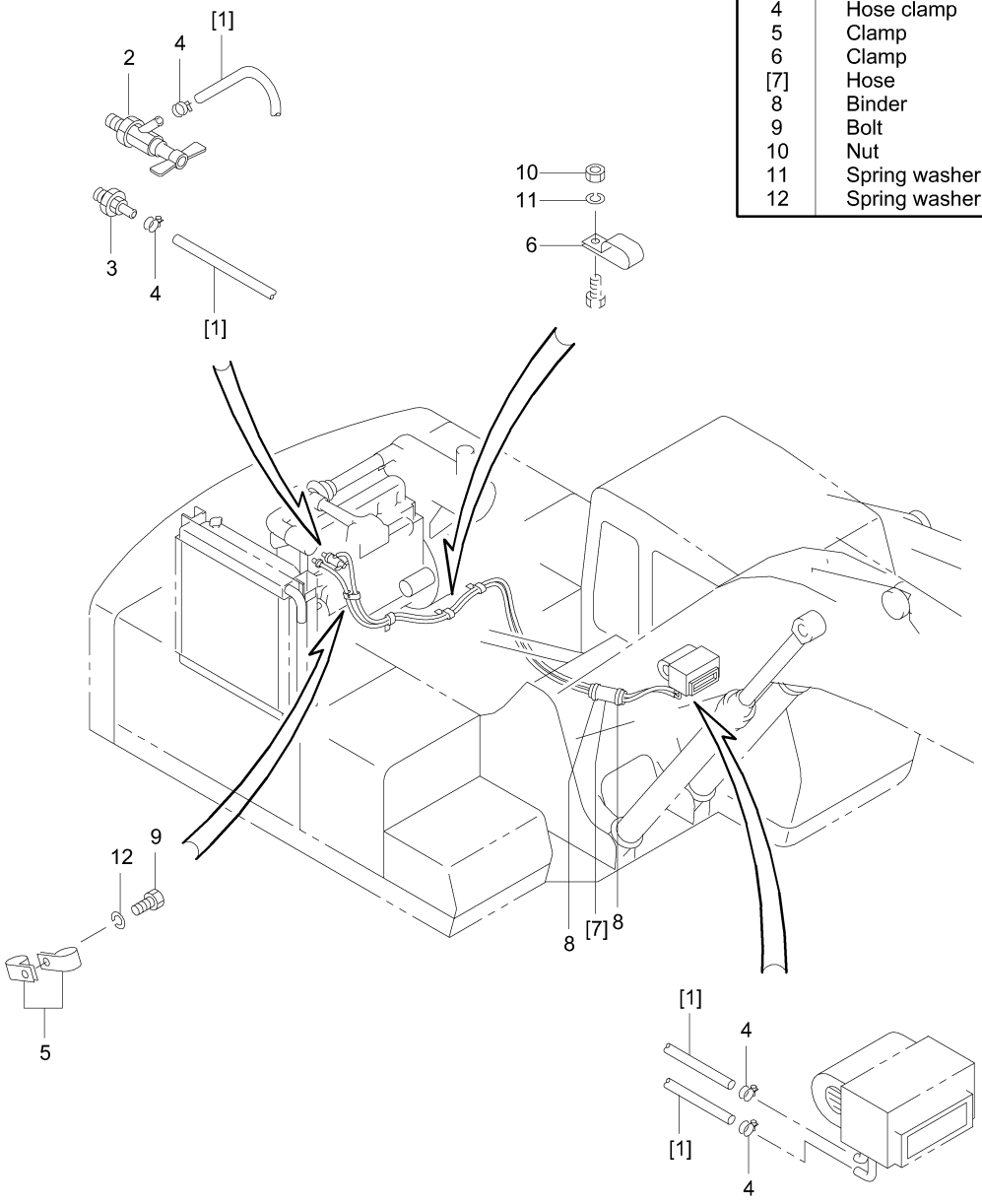
2. Heater (817S-0096-0E)

2-1 Heater pipes (767S-0181-0E)

Ref. No.	Part name	Q'ty
[1]	Hose	2
2	Water cock	1
3	Joint	1
4	Hose clamp	4
5	Clamp	2
6	Clamp	3
[7]	Hose	1
8	Binder	2
9	Bolt	1
10	Nut	3
11	Spring washer	3
12	Spring washer	1



937S-00280E

⚠ CAUTION (937S-0117-0E)

Hoses [1] and [7] are designated as safety parts for periodic replacement and as such they must be replaced every 2 years or every 4000 hours of use, whichever occurs sooner.

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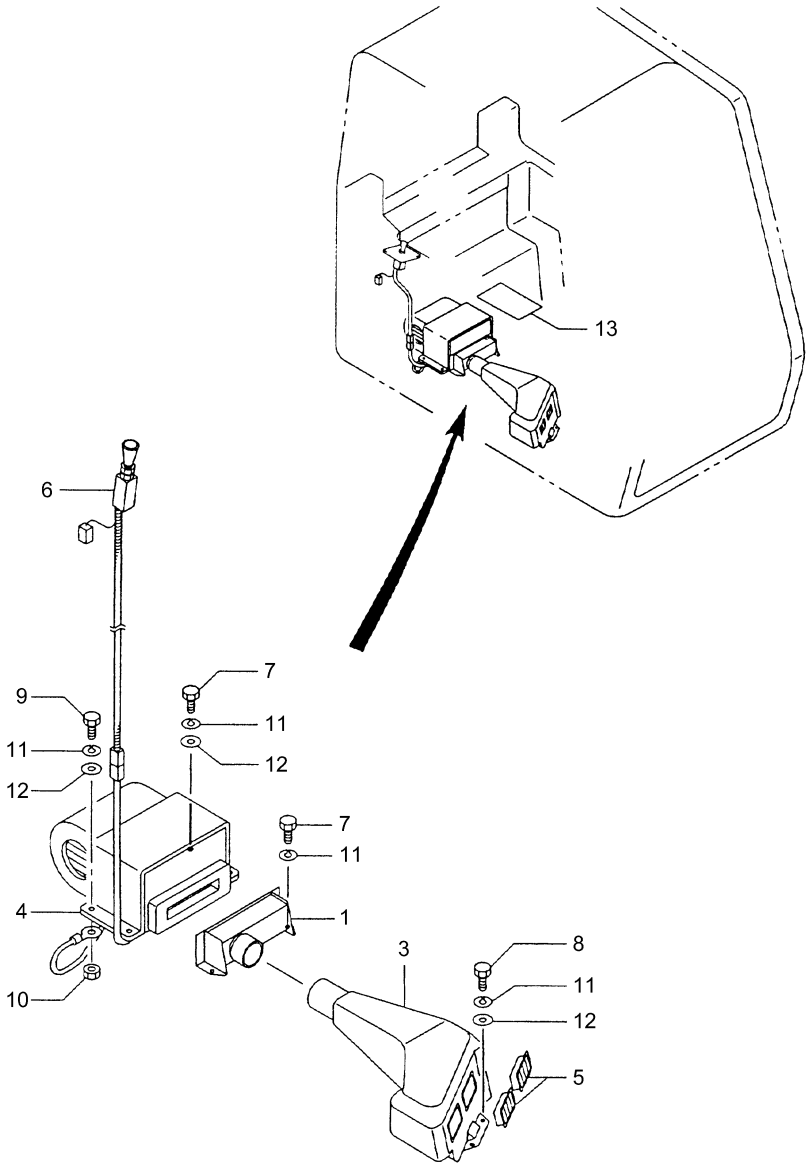
2-2 Heater body (767S-0200-0E)

Ref. No.	Part name	Q'ty
1	Duct	1
3	Duct	1
4	Heater	1
5	Grille	2
6	Heater switch	1
7	Bolt	5
8	Bolt	2
9	Bolt	1
10	Flange nut	1
11	Spring washer	8
12	Washer	6

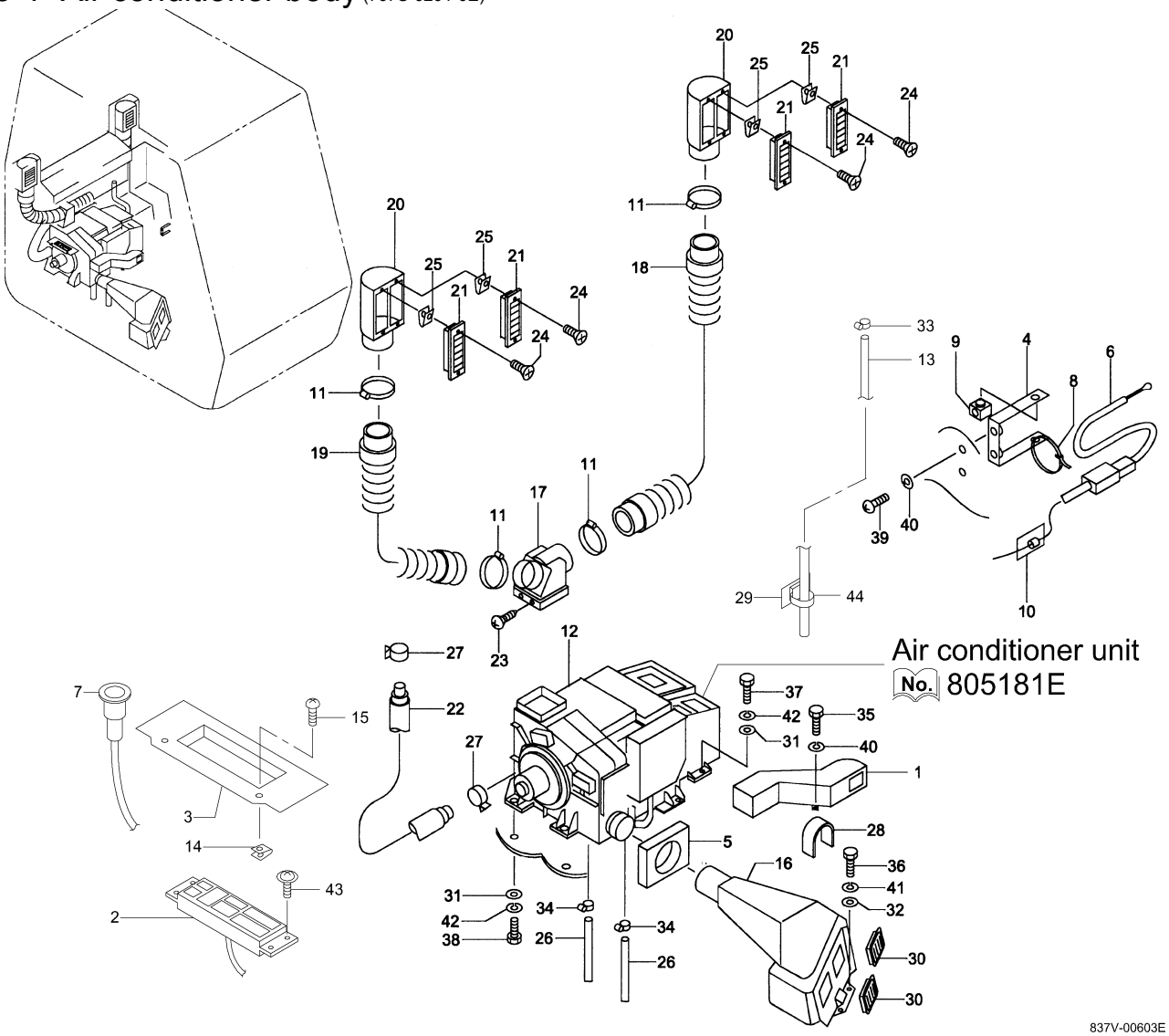


707S-01040

https://truckmanualshub.com/

3. Air conditioner (817S-0092-0E)

3-1 Air conditioner body (767S-0201-0E)

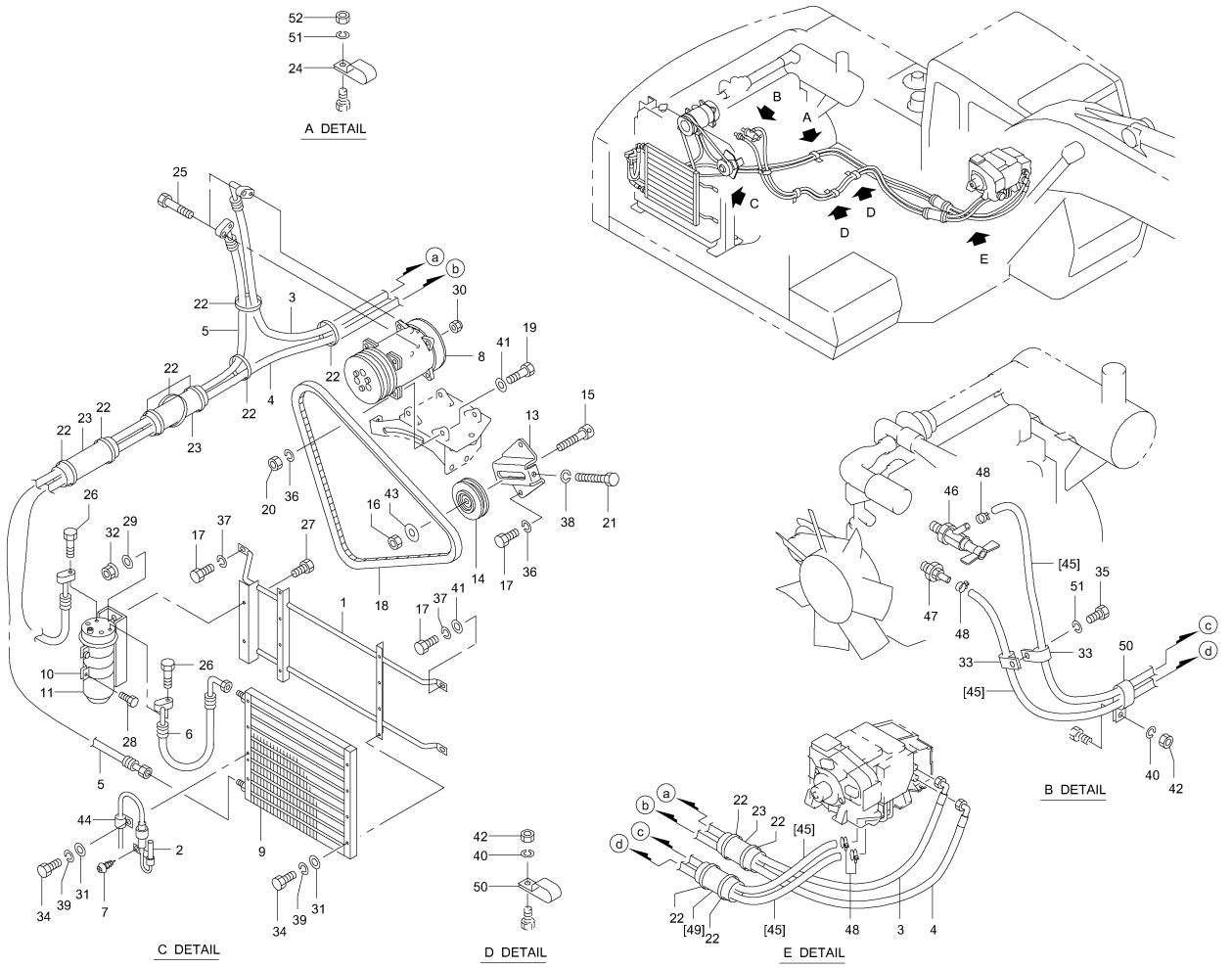


Ref. No.	Part name	Q'ty	Ref. No.	Part name	Q'ty	Ref. No.	Part name	Q'ty
1	Duct	1	16	Duct	1	31	Washer	5
2	Control panel	1	17	Bend duct	1	32	Washer	2
3	Bracket	1	18	Hose	1	33	Hose clamp	1
4	Bracket	1	19	Hose	1	34	Hose clamp	2
5	Lining	1	20	Grille duct	2	35	Bolt	2
6	Sensor	1	21	Grille	4	36	Bolt	2
7	Sensor	1	22	Hose	1	37	Bolt	3
8	Binder	1	23	Screw	4	38	Bolt	2
9	Clamp	1	24	Screw	8	39	Machine screw	2
10	Clamp	1	25	Nut	8	40	Spring washer	4
11	Hose band	4	26	Hose	2	41	Spring washer	2
12	Air conditioner unit	1	27	Hose clamp	2	42	Spring washer	5
13	Hose	1	28	Tape	1	43	Screw	4
14	Spring nut	2	29	Base	1	44	Binder	1
15	Tapping screw	2	30	Grille	2			

(847V-0016-1E)

https://truckmanualshub.com/

3-2 Air conditioner pipes (767S-0202-0E)



937S-00291

Ref. No.	Part name	Q'ty
1	Bracket	1
2	Sensor	1
3	Hose（S）	1
4	Hose（L）	1
5	Hose（D）	1
6	Hose（L）	1
7	Tapping screw	1
8	Compressor	1
9	Condenser	1
10	Drier bracket	1
11	Receiver drier	1
13	Bracket	1
14	Pulley	1
15	Slide shaft	1
16	Nut	1
17	Bolt	6
18	V-belt	1

Ref. No.	Part name	Q'ty
19	Bolt	4
20	Nut	4
21	Adjusting bolt	1
22	Binder	12
23	Hose	3
24	Clamp	1
25	Bolt	2
26	Bolt	2
27	Bolt	2
28	Bolt	2
29	Washer	2
30	Cover	1
31	Washer	8
32	Flange nut	2
33	Clamp	2
34	Bolt	8
35	Bolt	1

Ref. No.	Part name	Q'ty
36	Spring washer	6
37	Spring washer	4
38	Spring washer	1
39	Spring washer	8
40	Spring washer	3
41	Washer	6
42	Nut	3
43	Stopper	1
44	Clamp	1
[45]	Hose	2
46	Water cock	1
47	Joint	1
48	Hose clamp	4
[49]	Hose	1
50	Clamp	3
51	Spring washer	2
52	Nut	1

(937S-0068-1E)

(937V-0017-0E)

⚠ CAUTION

Hoses [45] and [49] are designated as safety parts for periodic replacement and as such they must be replaced every 2 years or every 4000 hours of use, whichever occurs sooner.

https://truckmanualshub.com/

3-3 Air conditioner-related (8370-0037-4E)

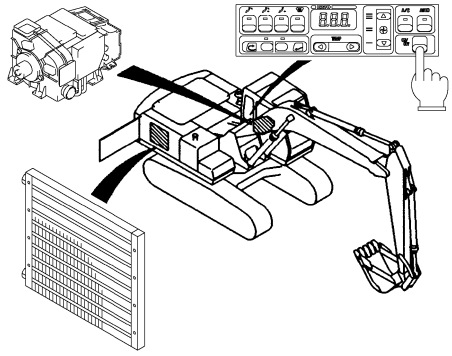
Have the air conditioner inspected and serviced regularly to maintain it at full performance.

(857E-0014-0E)

⚠ CAUTION

- If the air conditioner malfunctions, switch it OFF and contact your authorised KATO dealer.
- Filling with refrigerant (gas) and other service tasks require special tools and instruments and should only be attempted in a properly equipped KATO dealer.
- The refrigerant used for this air conditioner is R134a. Do not loosen the piping or compressor section before extracting refrigerant (gas) in a properly equipped place.

Note Even in seasons when the air conditioner is not used, run it in cooling mode for a few minutes two or three times a month to circulate oil to all parts of the compressor and maintain their oil coating.
At the same time, check whether refrigerant has leaked out.
If the air conditioner is left for a long period with refrigerant leaking, corrosion can form on internal parts.



8370-00791

3-3-1 Inspection and servicing table (7670-0229-0E)

Inspection and servicing item		Inspection and servicing interval			
		Preoperational check	Monthly	Every 6 months	Replacement interval (years)
Filter	Blockage, dirt	○			2
Condenser	Blockage, dirt	○			
	Clean		○		
Belt	Slack, damage	○			
Refrigerant	Filled volume			○	
Connection piping	Looseness, damage, gas leakage			○	
Receiver drier	Replace				2

(8270-0211-3E)

(8270-0212-1E)

⚠ CAUTION

When filling with the refrigerant, refer to the separate service manual to confirm the refrigerant volume and the method of filling.

https://truckmanualshub.com/

3-3-2 Removal and attachment of the inspection cover (7670-0230-3E)

In machines fitted with an air conditioner, inspection and cleaning of the filters, inspection of the belts, inspection for blockage of the condenser are necessary.

The air conditioner unit of this machine is fitted inside the inspection cover at the rear of the seat. Remove the cover to inspect and clean the internal air filter and outside air filter.

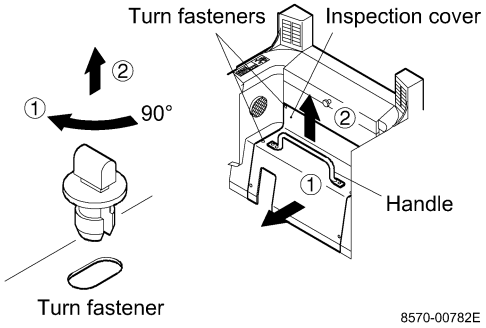
(1) Removal

Turn the turn fasteners (7 locations) 90° to pull them out. Hold the handle on the cover top to slightly pull toward you and remove the cover by taking it up.

(2) Attachment

Align the attaching holes of the cover to those of the air conditioner.

Fix the turn fasteners back into the place and turn them 90°.



3-3-3 Filter inspection, cleaning and replacement (7770-0093-4E)

This air conditioner unit is fitted with the filters to prevent lint, paper scraps etc. from clogging the evaporator heater core etc. Remove the filters to inspect occasionally and clean them by blowing with compressed air or tapping gently on a hard surface. Replace the filter if there are any blockages you cannot remove without damaging the filter. Filter blockages reduce the performance of the air conditioner.

(1) Removal and mounting of the filter

Before detaching the internal and outside air filters, remove the cover located at the rear of the cab.

1) Internal air filter

Removal: Gently lift the hook of the filter and draw it toward you.

Mounting: Reverse the removal procedure.

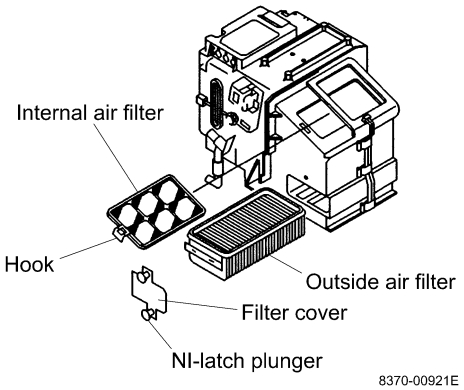
2) Outside air filter

Removal: Pull the two (upper and lower) NI-latch plungers and remove the filter cover. Next, draw the outside air filter out toward you, keeping the fold part.

Mounting: Reverse the removal procedure.

(2) Consumable part number

Refer to the "Consumable parts guide".



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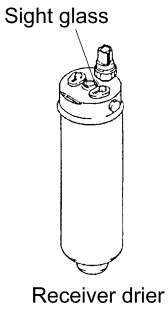
3-3-4 Inspection of refrigerant (gas) volume (7670-0232-1E)



707E-04301E

The refrigerant for this air conditioner is HFC-134a.

Never fill the air conditioner with any other refrigerant.

(1) Conditions for evaluating refrigerant volume

Engine speed:	Low idling
Air volume switch:	Strong
Temperature setting switch:	Maximum cooling
Pressure on high-pressure side:	1.37 — 1.57MPa (14 — 16kgf/cm^2) (Block the front of the condenser by the right amount to produce a pressure in this range.)
Door:	Fully open
Windows:	Fully open

(2) Evaluation guidelines

Compare the state of bubbling visible through the sight glass with the diagrams below.

Refrigerant volume	Status seen from the sight glass	Action
○ Correct	After the air conditioner is turned on, a very small amount of bubbling is visible, becoming transparent and then slightly milky.	
× Incorrect	After the air conditioner is turned on, bubbles are continuously visible.	Have your authorised KATO dealer check and refill with refrigerant.

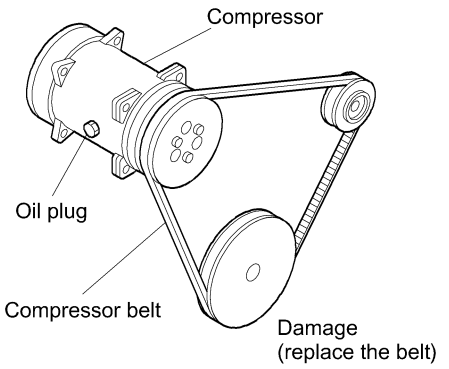
(Explanation of refrigerant flow illustrations)

- Bubbling: Refrigerant is liquid with extensive mixing of vapour and liquid phases.
- Bubbles have disappeared: As all the refrigerant becomes liquid, it turns transparent.
- Milky: Oil and refrigerant separate to produce a slight milkiness.

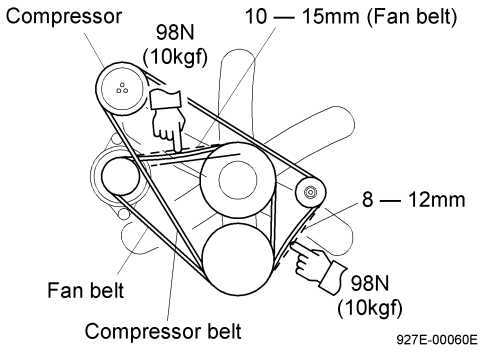
7070-04312EX

3-3-5 Belt inspection (7670-0233-2E)

Check that the compressor belt and fan belt are not slack or worn. If the compressor belt is loose and slips, cooling performance will be reduced. If the fan belt is loose, it can cause overheating and battery depletion.



9370-00261E

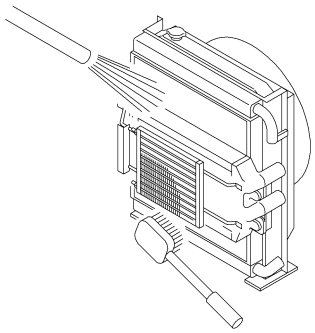


927E-00060E

https://truckmanualshub.com/

3-3-6 Inspection for blockage in the radiator and condenser (937V-0015-0E)

If the radiator and condenser are clogged with mud, insects etc., the passage of air will be obstructed, causing overheating and reduced cooling performance. Clean them regularly according to the section "D,1-2-3 Cooling system, (8) Radiator core cleaning procedure".



9270-00300

3-3-7 Display of malfunctions (7670-0235-1E)

When a malfunction is indicated on the temperature setting display, it can be one of the following three types.

HL.* ← Multiple sensors have malfunctioned, including the internal air temperature sensor (where * is a number from 0 — 9).
All AUTO control functions are deactivated and the output air is heated in proportion to the number * on the temperature setting switch.
(This is equivalent to manual operation. In other words, all the air outlet temperature, airflow volume and compressor control functions are selected manually.)

**.E ← A sensor other than the internal air temperature sensor and solar radiation sensor has malfunctioned, or the motor actuator has malfunctioned (where ** is a number from 18 — 32).
The temperature setting can be increased or decreased by 1°C and the control system does not use the problem sensor or actuator.
(For example, if the evaporation sensor has malfunctioned, the compressor control can no longer be turned ON.)

HL.E ← The internal air temperature sensor has malfunctioned in conjunction with the motor actuator for the hot water flow regulator valve. All AUTO control functions are deactivated. It is no longer possible to adjust how much the output air is heated or the temperature setting.

4. Battery handling (827E-0026-3E)

This machine uses two 12V batteries connected in series with a 24V negative earth. Observe the following precautions when handling the batteries.

(541D-0137-6E)

⚠ WARNING

1) The battery electrolyte used is dilute sulfuric acid, so keep it away from your eyes, skin, clothing and any metal components. If it comes into contact with any of them, wash it away with large amounts of water. (In case of personal contact, consult a doctor after washing.)
2) The batteries generate flammable hydrogen, so do not use flame or other source of ignition near the batteries.
   In particular take care when welding.
3) Before inspecting, servicing or charging the batteries or servicing the electrical system, turn the starter key to the "OFF" position and detach the negative side of the battery cable from the terminal for safety.
4) When detaching the battery cable, always begin with the negative terminal and when reattaching the battery cable, begin with the positive terminal. Take care to connect the terminals correctly.
5) Handle the batteries with care. In particular do not charge them near flame or a source of ignition and do not dispose of them in fire as an explosion could result.
6) Never take the batteries apart or make holes in the casing.
   Any resulting leakage could cause dangerous corrosion and personal injury.
7) When recharging the batteries, dismount them from the machine, remove all bungs and place them in a well-ventilated area.

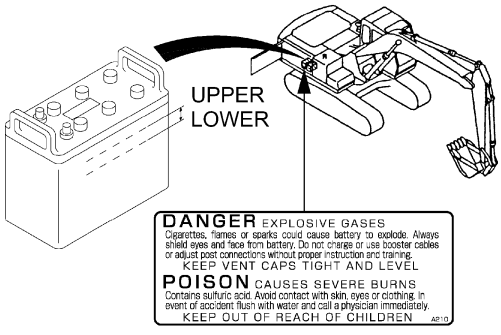
(1) Battery electrolyte level inspection

(8270-0206-1E)

⚠ CAUTION

When performing the preoperational checks, be sure to check the batteries for the electrolyte level and refill if they are insufficient. If the electrolyte level is below "LOWER", the battery could explode when starting the engine.

The battery electrolyte level should be between the "UPPER" and "LOWER" level lines.
If it is below the "LOWER" level, top it up with battery electrolyte or distilled water to the "UPPER" level.
Do not top up beyond the UPPER level.

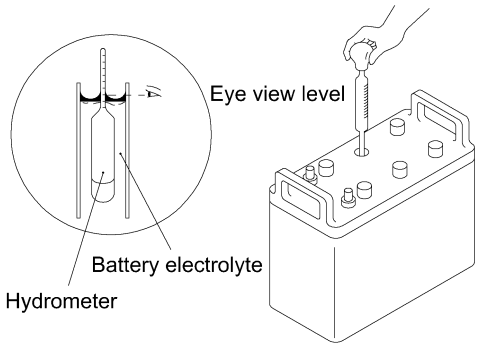


837E-00141X

(2) Battery terminal inspection

Check for loose terminals and clean away dirt and corrosion.

1) If the terminals are covered with whitish powdery corrosion, wash it with away with boiling water.
   If corrosion is severe, use a wire brush or sandpaper to scrape it away.
2) After cleaning the terminals, coat them in a thin layer of grease.
3) Specific gravity inspection ····· Full charge 1.28 (at 20°C)
   Half charge 1.22
   You must recharge the battery if the specific gravity is at or below 1.22.



(3) Inspection and cleaning intervals for the batteries

Battery electrolyte level inspection·····At the time of preoperational checks

Specific gravity inspection·····Every 250 hours of operation

Terminal cleaning·····Every 250 hours of operation

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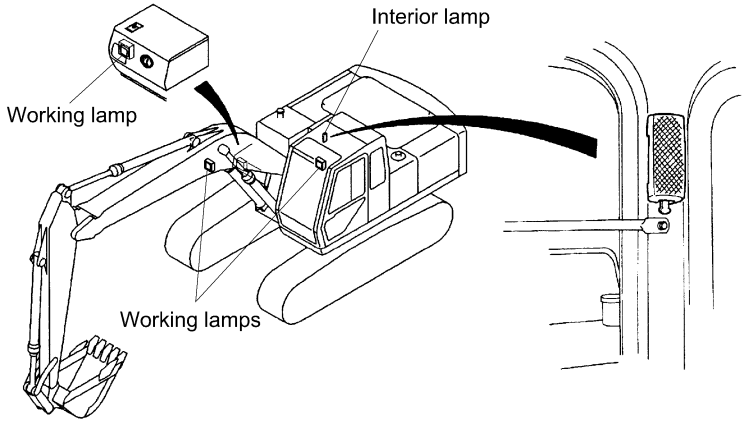
5. Bulb replacement (7670-0225-1E)

Always switch the starter switch and lamp switches "OFF" before you start to replace the bulb.
Only use bulbs of the correct rated voltage and wattage.

(8270-0208-1E)

⚠ CAUTION

Always replace the bulb with that of the specified capacity. If you use the bulb in excess of the rated capacity, the excess power consumption will cause accidents by blowing the fuse, burning to damage the relay or igniting electrical insulation.

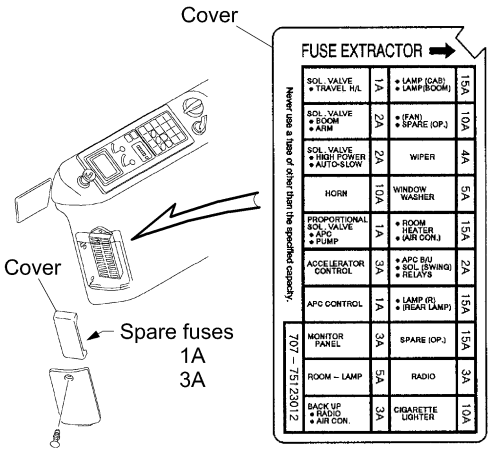


8370-00732E

(1) Consumable part number
Refer to the "Consumable parts guide".

6. Fuse replacement (7670-0226-1E)

The fuse box is located inside a panel in the cab.
If a fuse blows, investigate its cause, turn off the power (turn off the starter switch), repair the damaged place and then replace the fuse with a new one with same capacity. When removing the fuse, use the "fuse extractor" of the cover.



747E-00381EX

(8270-0086-1E)

⚠ CAUTION

Never use fuses of other than the rated capacity, or wire etc.
In the event of a power surge the wiring and electrical devices will not be protected from burning out.

(1) Consumable part number
Refer to the "Consumable parts guide".

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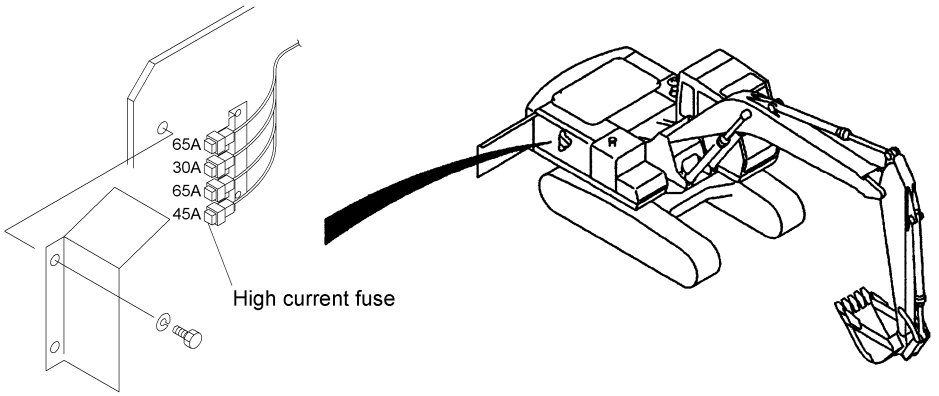
7. High current fuse replacement (9470-0015-0E)

(8770-0033-1E)

⚠ CAUTION

- Disconnect the negative side of the battery cable from the terminal before removing the high current fuse.
  If the battery cable is not disconnected from the negative terminal, battery voltage may be constantly applied on the high current fuses dangerously.
- When the fuse has blown, investigate the cause carefully and repair the problem completely before attaching the fuse.
- Be sure to use the fuse with the designated ampere.

High current fuses are placed to blow and protect the circuit if a large current flows in the circuit between the batteries and the fuse box due to a short circuit or other problem.
If there is no abnormality in the fuses and a problem occurs in the electrical system, the high current fuse has blown. Contact your authorised KATO dealer and replace the high current fuse after the problem has been repaired.



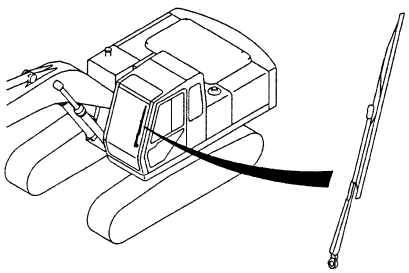
9370-00470E

(1) Consumable part number
Refer to the "Consumable parts guide".

8. Inspection and replacement of the wiper blade (7670-0228-1E)

Inspect the wiper blade and replace if it is worn or damaged.

(1) Consumable part number
Refer to the "Consumable parts guide".



8370-00850

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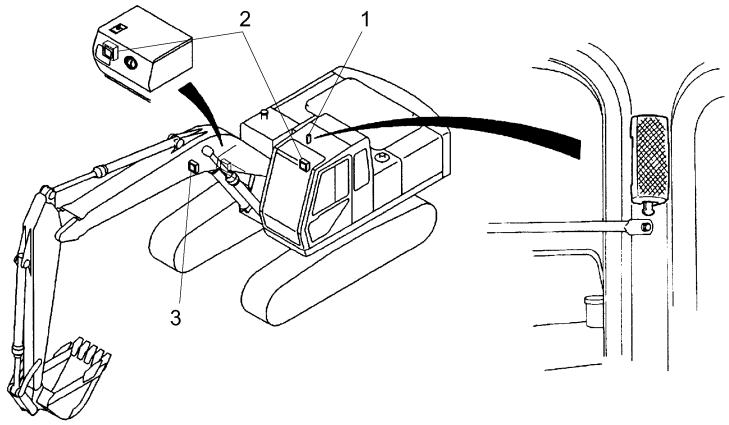
9. Data file (817S-0055-0E)

9-1 Consumable parts guide (857S-0080-2E)

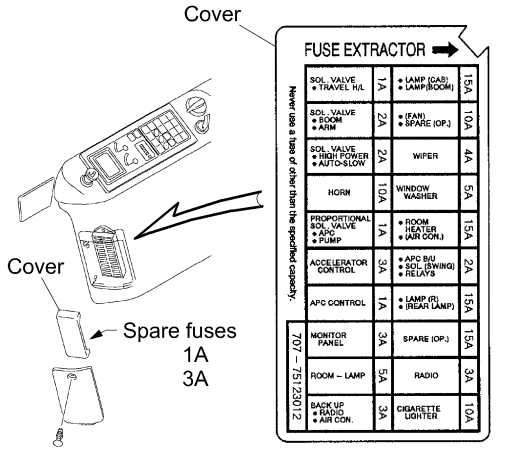
[Consumable part name] Bulb



937E-00260

No.	Type of lamp	Assembly No.	Bulb/lamp No.	Bulb capacity	Q'ty	Notes
1	Interior lamp	709-24700001	709-24701001	24V ／ 6W	1	
2	Working lamp	709-22000003	709-22007002	24V ／ 70W	2	H3
3	Working lamp	709-31600001	709-23906000	24V ／ 70W	1	H3

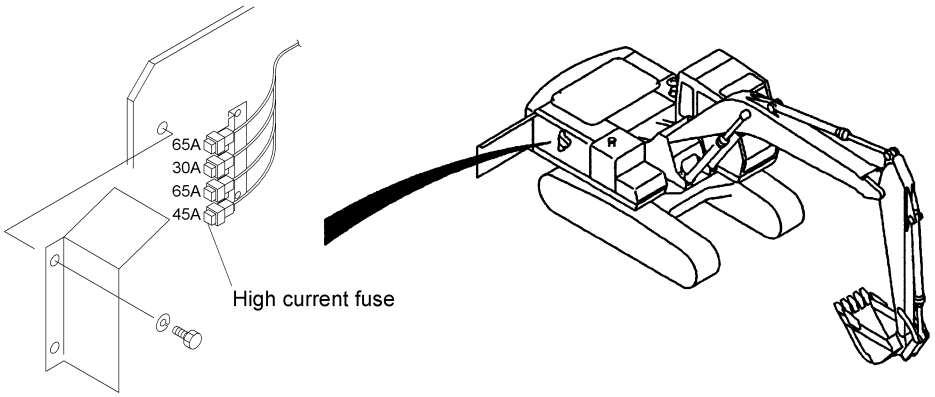
[Consumable part name] Fuse



747E-00381EX

Fuse 1A : 719-11033001
2A : 719-11032001
3A : 719-11031001
4A : 719-11030001
5A : 719-11040001
10A : 719-11034001
15A : 719-11035001

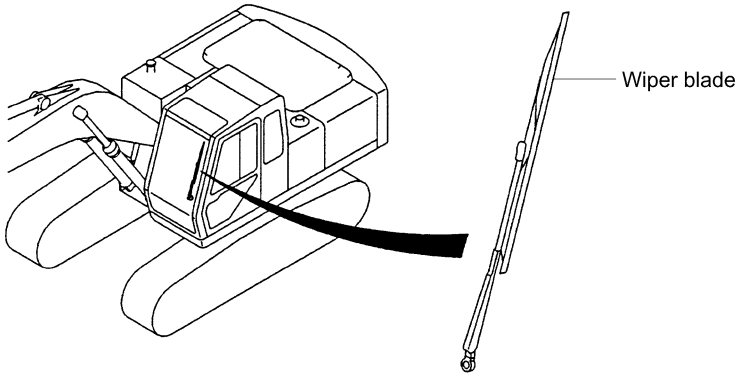
[Consumable part name] High current fuse



9370-00470E

High current fuse 30A: 719-11045001
45A: 719-11046001
65A: 719-11047001

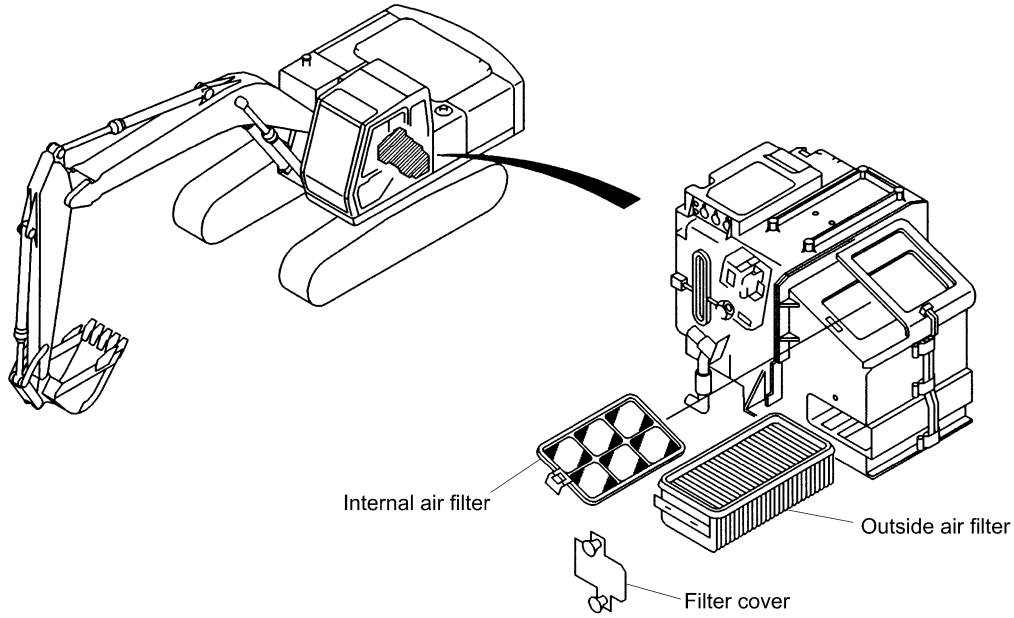
[Consumable part name] Wiper blade



8370-00770E

Wiper blade: 709-47101001

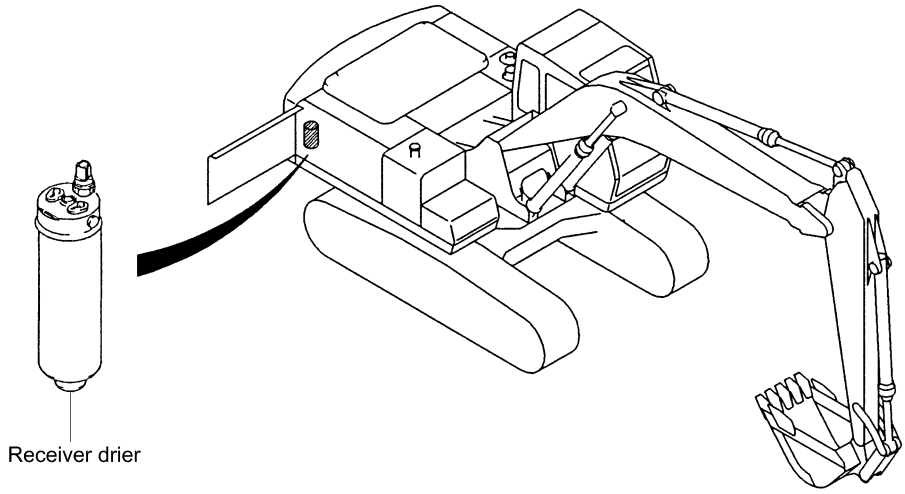
[Consumable part name] Internal air filter and outside air filter



8370-00931E

Internal air filter: 709-82613001
Outside air filter: 709-82614003

[Consumable part name] Receiver drier



8370-00940E

Receiver drier: 817-76205000

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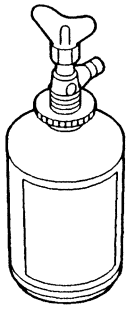
[Consumable part name] Refrigerant



2310-03120

Refrigerant = R134a 200g: 709-82598001
R134a 250g: 709-82599001

https://truckmanualshub.com/

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