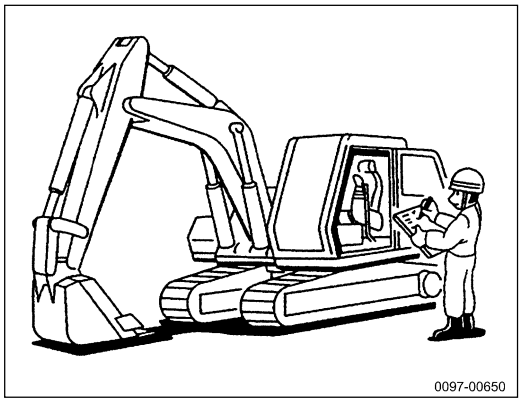
3. Precautions on inspection and servicing (0097-0013-5E)

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.

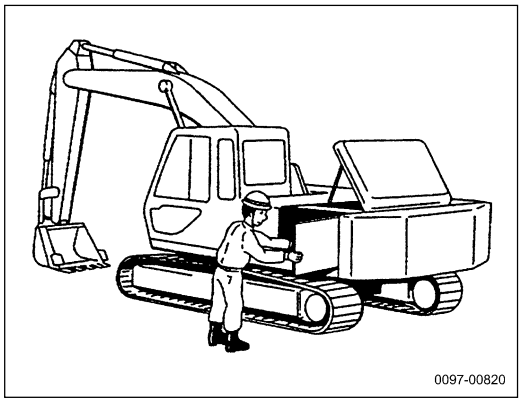
(1) Regular independent inspection
Draw up an inspection and servicing schedule and implement it.


0097-00650

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

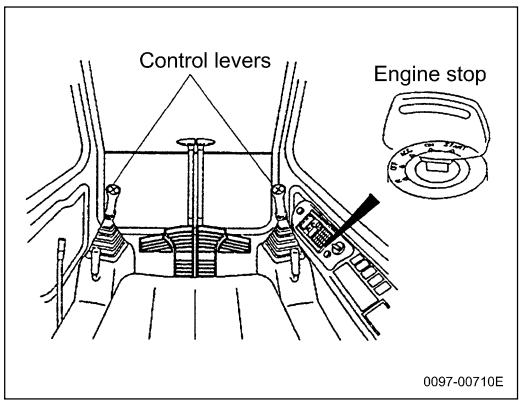

0097-00660

(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.


0097-00820

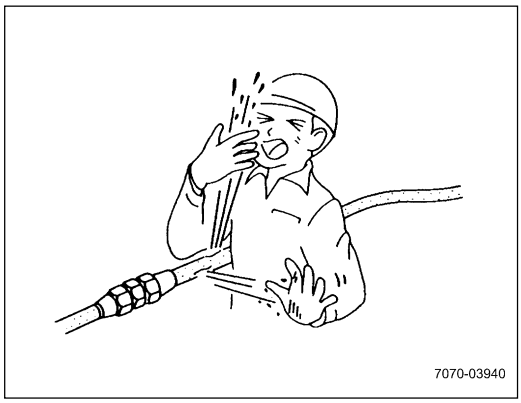
(9) Relieve hydraulic pressure

- 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.



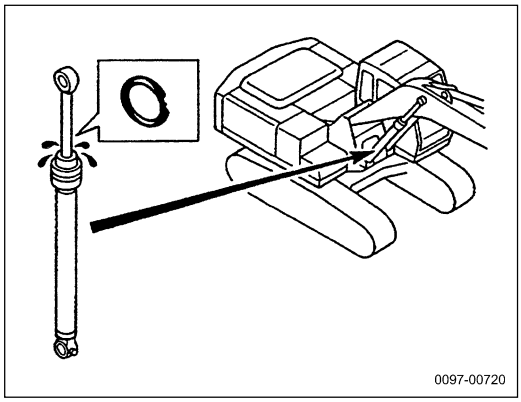
(10) Beware of highly pressurized oil

- 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.

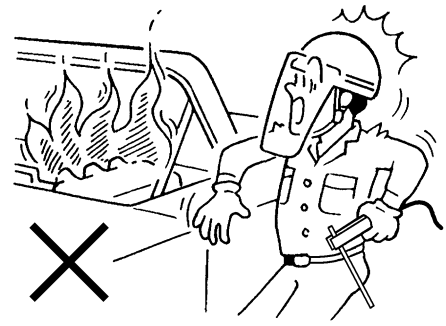
(21) Servicing with the engine running is a job for two people

- 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.

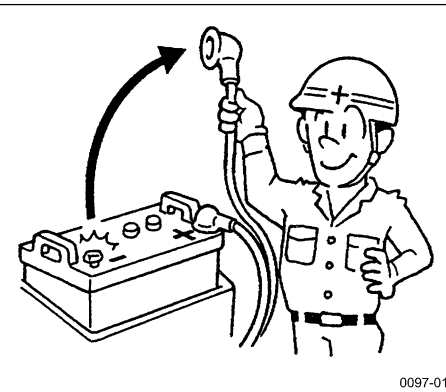
(8570-0081-1E)

⚠ 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.)


0097-01110

	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
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	Heater		Inspect		○							—	3-4 5	—
	Air conditioner	Refrigerant volume	Inspect							○		—	5 4-7-4	J, 3-3-4
		Belt tension	Inspect and adjust		○							—	5 4-7-5	J, 3-3-5
		Condenser	Clean and inspect		○							—	5 4-7-6	J, 3-3-6
		Filter	Clean and inspect		○							—	4-7-3	J, 3-3-3

(947S-0049-0E)

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

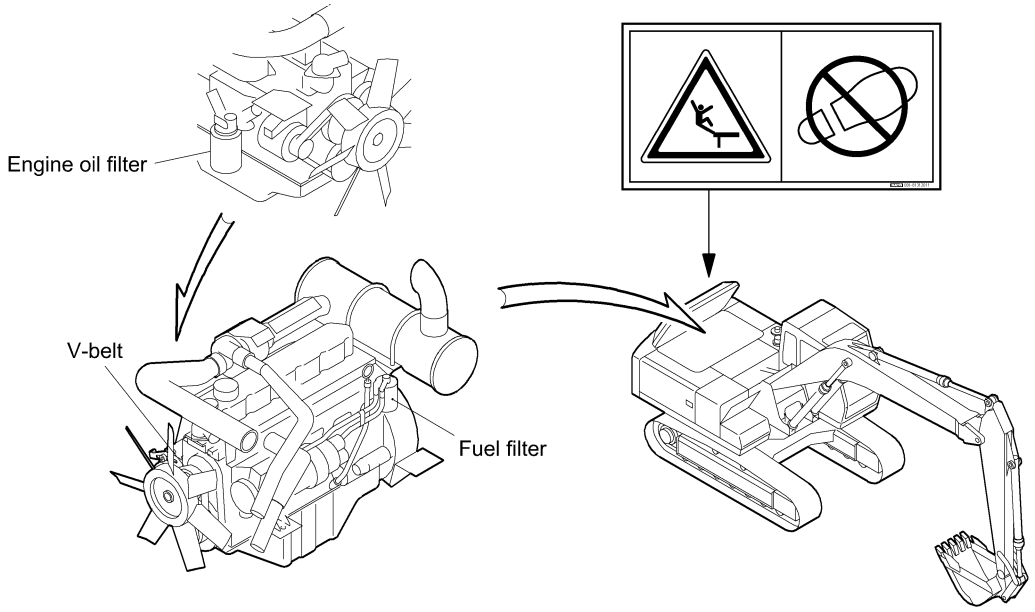
Name		KATO HY-DIG Fully Hydraulic Excavator	
Model		HD1023Ⅲ	HD1023Ⅲ-LC
Operating weight		23000kg	23600kg
Dimensions	Overall length (in transport position)	9970mm	
	Overall height (in transport position)	3120mm	
	Overall width	2990mm	3200mm
	Minimum ground clearance	480mm	
	Tail swing radius	2940mm	
	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	125kW/2150min^{-1} (170PS/2150rpm)	
	Maximum torque	620N･m/1600min^{-1} (63kgf･m/1600rpm)	
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	290L	
Fuel tank	Capacity	380L	
Operation performance	Swing speed	11min^{-1} (11rpm)	
	Traveling speed	5.5/3.9/2.7km/h	
	Grade ability	70%	

(9470-0003-0E)

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.

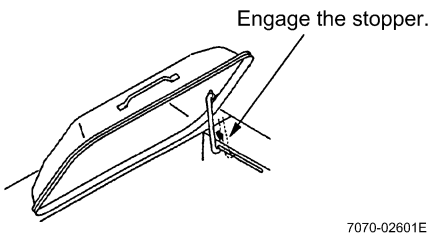


937E-00200E

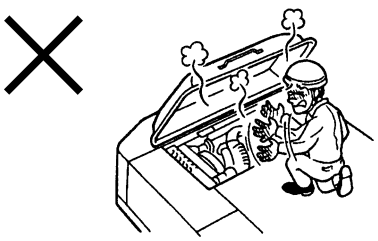
(8270-0172-2E)

⚠ 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

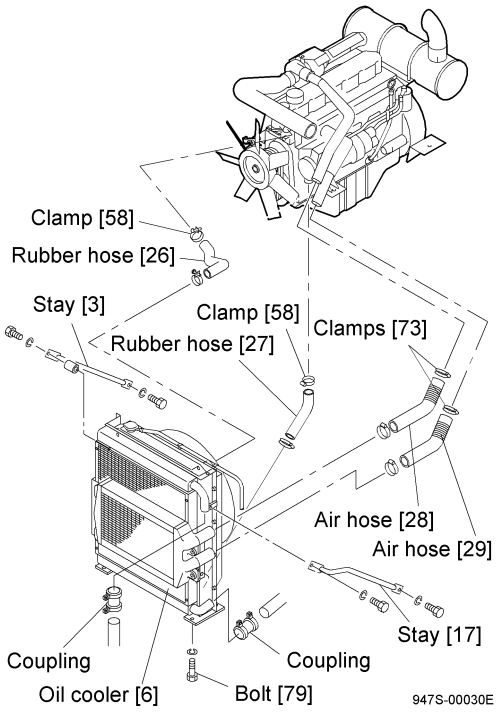


7070-02612

(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 [6].
3) Loosen clamps [58] and detach rubber hoses [26] and [27] from the engine.
4) Loosen clamps [73] and detach air hoses [28] and [29] from the engine.
5) Remove stays [3] and [17] from the radiator.
6) Arrange the sling wire rope to the radiator and support it with a crane then remove bolts [79] 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

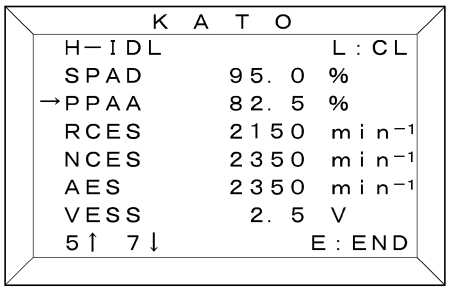
Always check the coolant volume before starting the engine and check that the volume exceeds the "LOW" level of the reserve tank. Add the coolant if the level is low.

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.

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.  847V-00020	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		
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. 2350min^{-1} (rpm)
		[IF NOT] ・ Readjust the cables on the accelerator side and the engine stop side of the accelerator actuator.			

(847S-0025-1E)

(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.

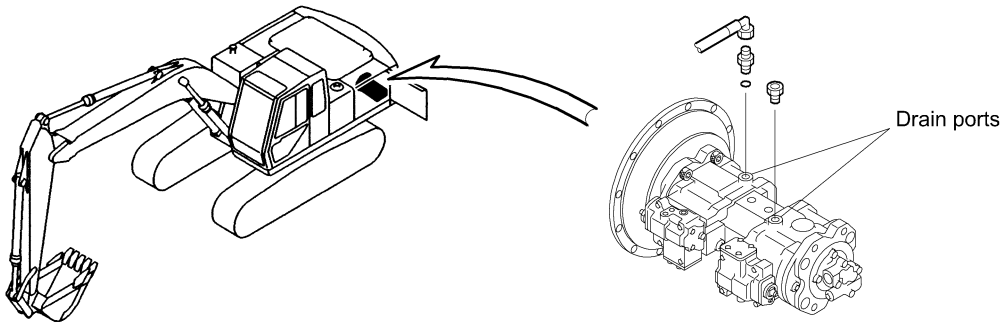
1) Tightening torque for bolts [5]: 210－230N･m (21－23kgf･m)

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 (7270-0107-3E)

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.



8370-00591E

(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.

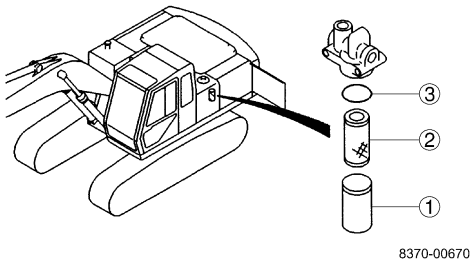
4-1-11 Replacement of the pilot line filter element (7770-0100-3E)

(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

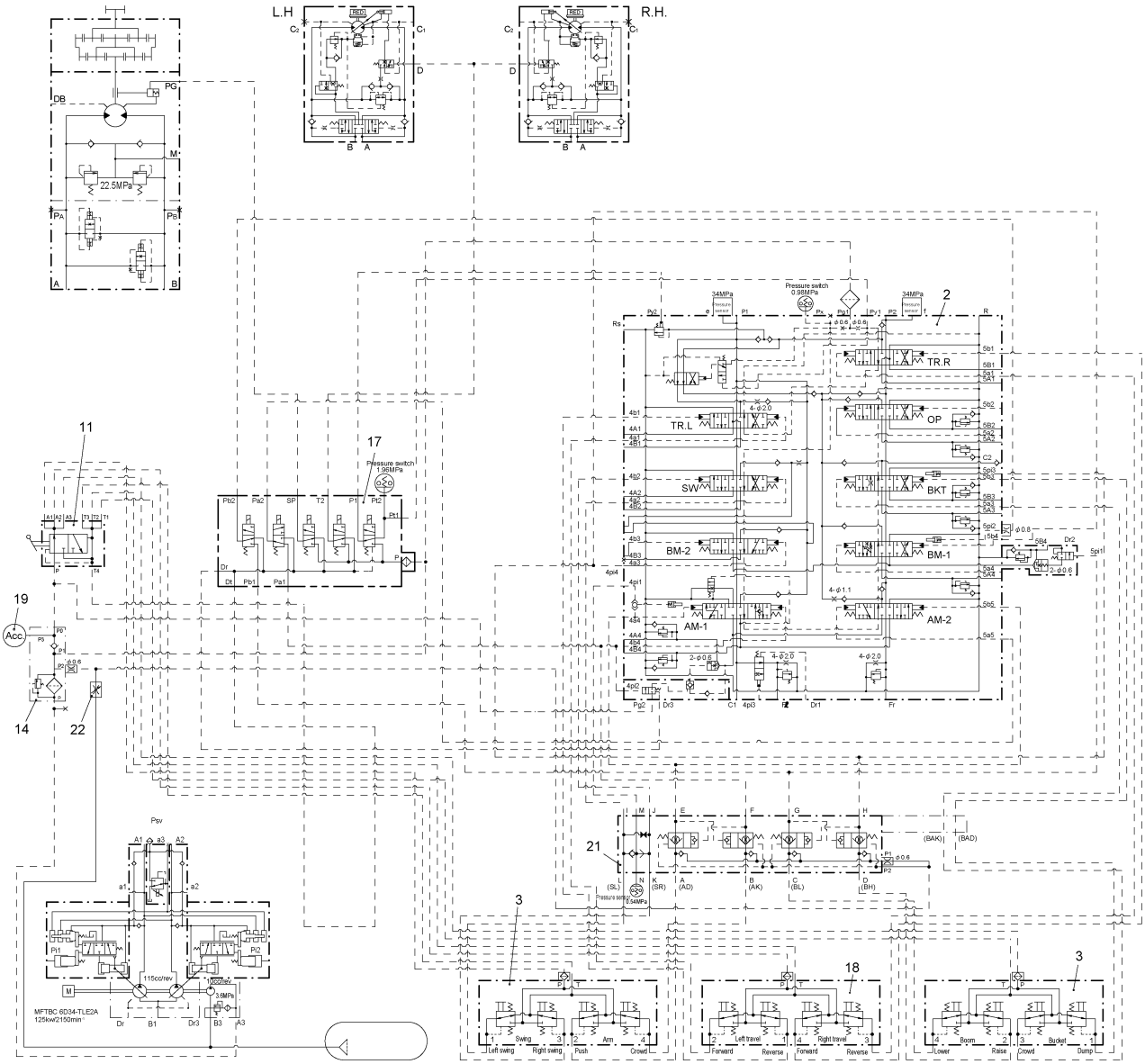
Refer to the "Consumable parts guide".

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)

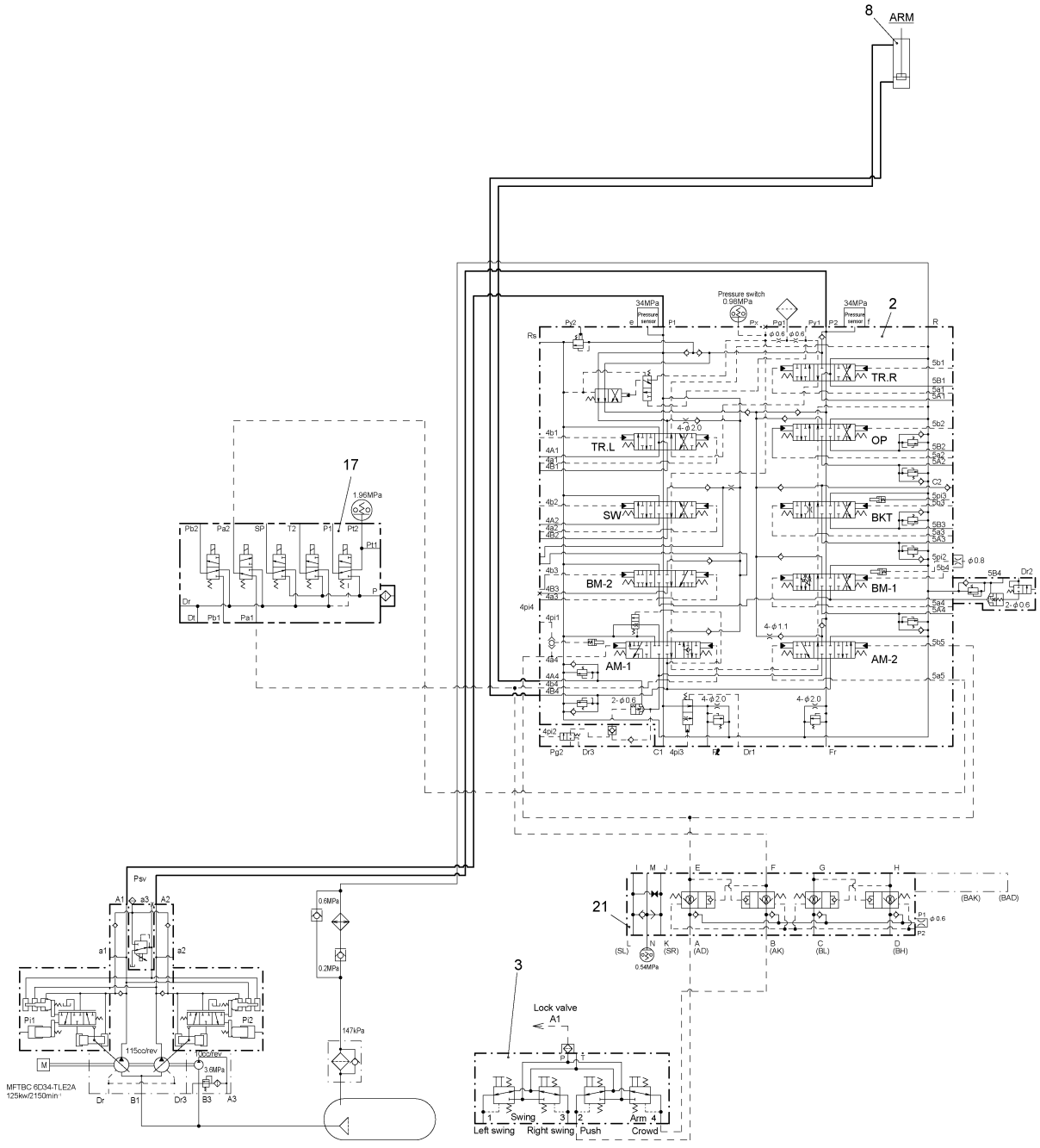


Ref. No.	Part name	Q'ty
2	Control valve	1
3	Pilot valve	2
11	Lock valve	1
14	Pilot filter	1
17	Solenoid valve	1
18	Pilot valve	1
19	Accumulator	1
21	Shockless valve	1
22	Throttle valve	1

947S-00140E

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	2
8	Arm cylinder	1
17	Solenoid valve	1
21	Shockless valve	1

947S-00260E

2-1-6 Removal and mounting of the bucket cylinder and hoses (947S-0026-0E)

(1) Removal

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

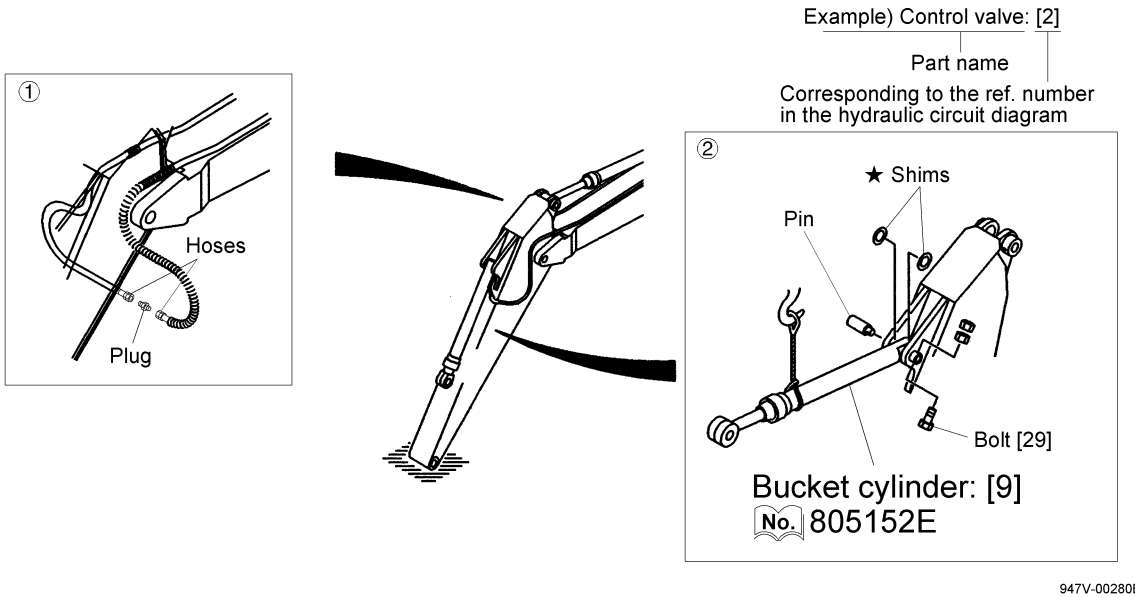
(767S-0309-0E)

⚠ 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 [29] and extract the pin. (Fig. ②)



947V-00280E

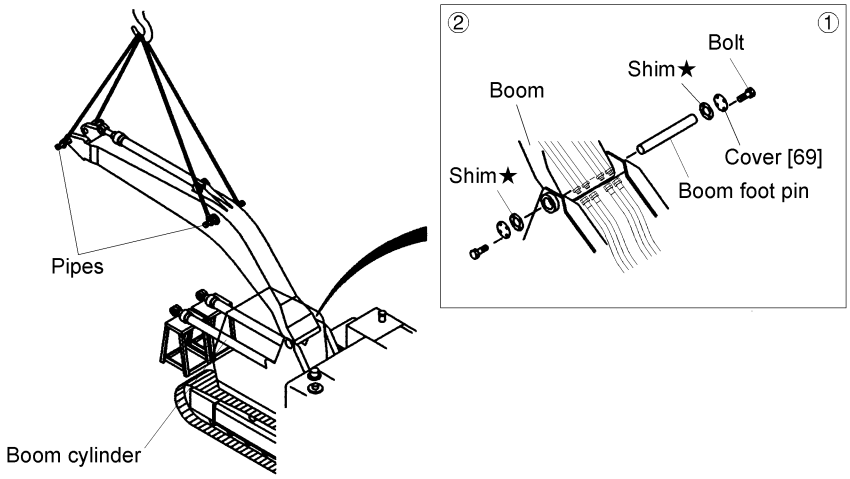
(2) Inspection and repair

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.

(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.



947S-00340E

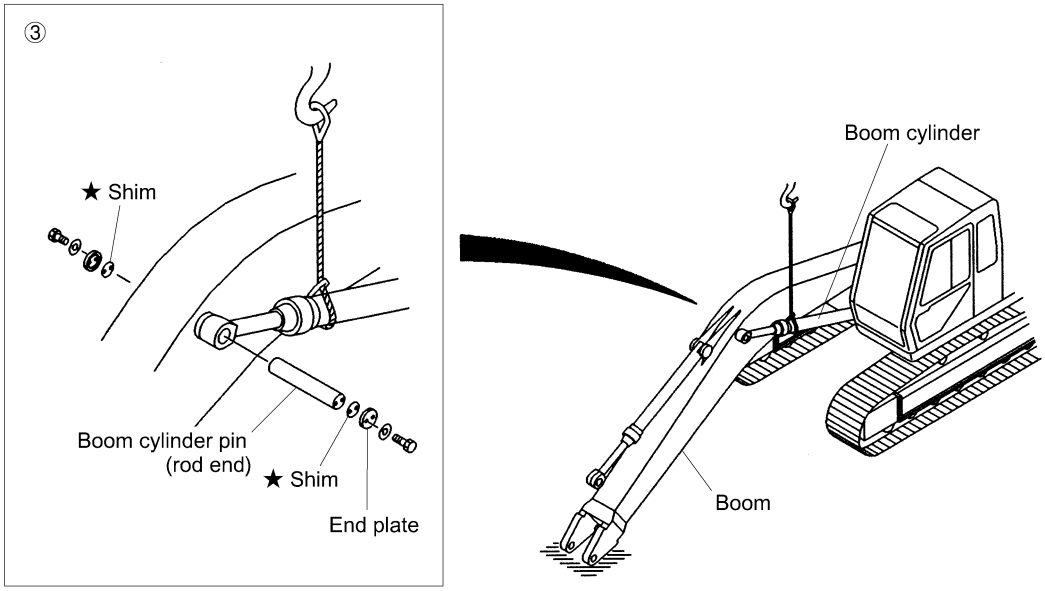
(3) Transfer the sling wire rope to the boom cylinder to support it with a crane and align the centers of the attachment holes then insert the boom cylinder pin (rod end) to attach the rod ends of the cylinders to the boom. After inserting the pin, attach the end plates. (Fig. ③)

(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.

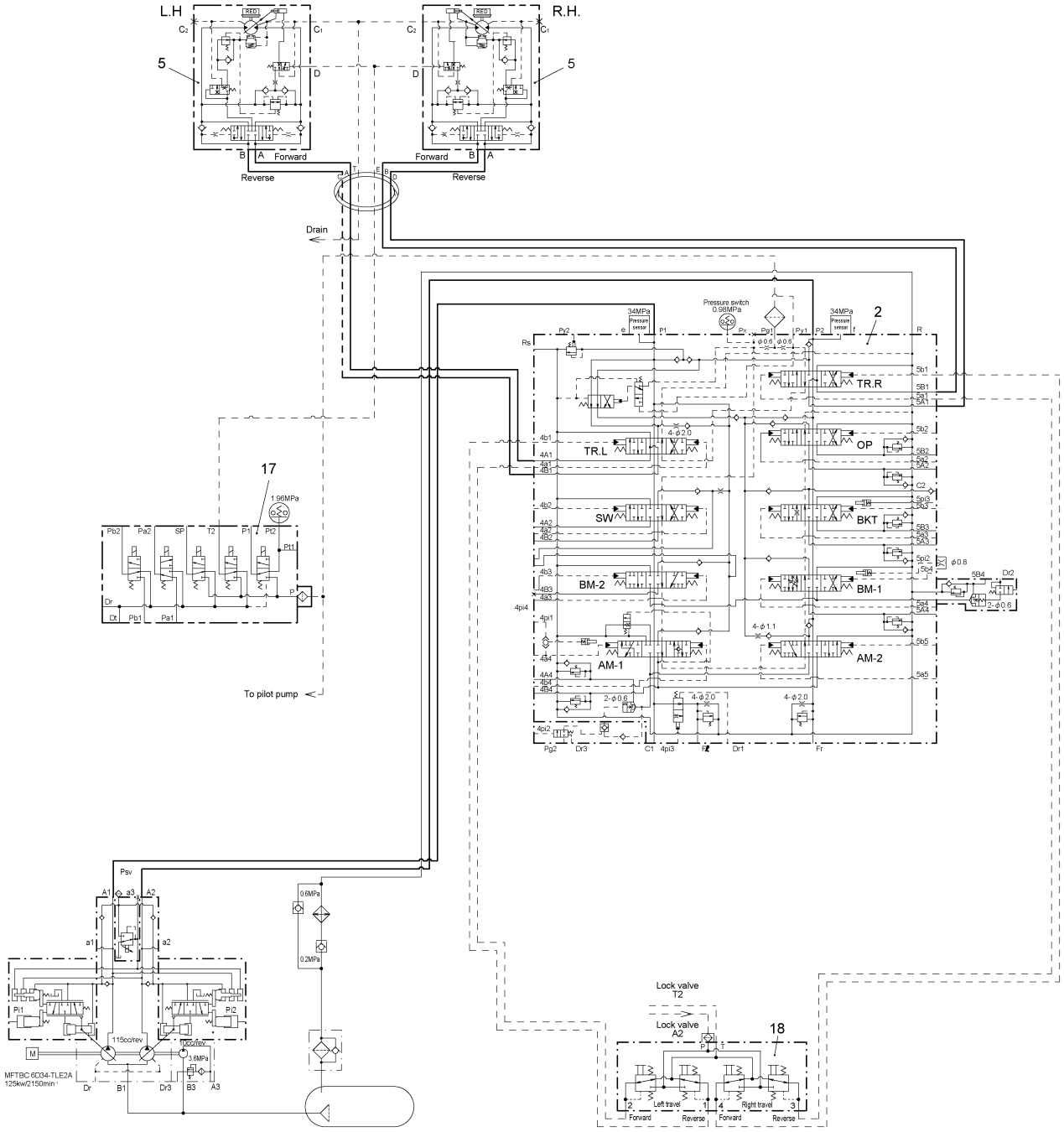


837S-00472E

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

947S-00450E