WENBM00141

Shop Manual

HYDRAULIC
EXCAVATOR

PC80MR-5

SERIAL NUMBERS PC80MR-5 F50003 and up

KOMATSU

SAFETY NOTICE FOR OPERATION

- Appropriate servicing and repair are extremely important to ensure safe operation of the machine. The shop manuals describe the effective and safe servicing and repair methods recommended by Komatsu. Some of the servicing and repair methods require the use of special tools designed by Komatsu for special purposes.
- The symbol mark ⚠ is indicated for such matters that require special precautions. The work indicated with this warning mark ⚠ should be performed according to the instructions with special attention. Should a hazardous situation occurs or be anticipated during such work, be sure to keep safe first and take every necessary measures.

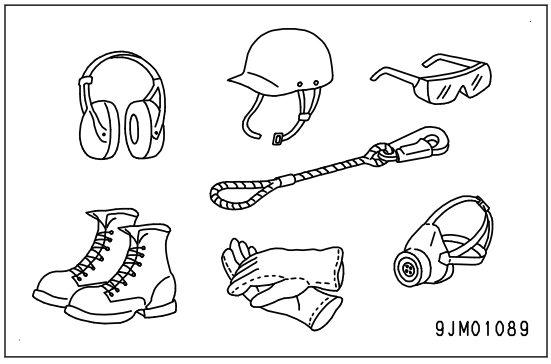
Safety matters

- Well organized work place
- Correct work clothes
- Observance of work standard
- Enforcement of hand signals
- Prohibition against unlicensed persons operating and handling the machine
- Safety check before starting work
- Wear of dust glasses (for cleaning or grinding work)
- Wear of welding goggles and protectors (for welding work)
- Being in good physical condition, and good preparation
- Always be alert and careful.

General precautions

⚠ **If the machine is handled incorrectly, it is dangerous. Read and understand what is described in the operation and maintenance manual before operation. Read and understand what is described in this manual before operation.**

- Read and understand the meaning of all the safety labels stuck to the machine before performing any greasing or repairs. For the locations of the safety labels and detailed explanation of precautions, see Operation and Maintenance Manual.
- Tools and removed parts in the workshop should be well organized. Always keep the tools and parts in their correct places. Always keep the work area clean and make sure that there is no dust, dirt, oil, or water on the floor. Smoke only in the designated areas. Never smoke while working.
- Keep all tools in good condition, learn the correct way to use them, and use the proper ones. Check the tools, machine, forklift truck, service car, etc. thoroughly before starting the work.
- Always wear safety shoes and helmet when performing any operation. Do not wear loose clothes, or clothes with buttons missing.



ACTIONS IF FIRE OCCURS

- Turn the starting switch to OFF position to stop the engine.
- Use the handrails and steps to get off the machine.
- Do not jump off the machine. You may fall and suffer serious injury.
- The fumes generated by a fire contain harmful materials which have a bad influence on your body when they are inhaled.
  Do not breathe the fumes.
- After a fire, there may be harmful compounds left. If they touch your skin they may have a bad influence on your body.
  Be sure to wear rubber gloves when handling the materials left after the fire.
  The material of the gloves, which is recommended is polychloroprene (Neoprene) or polyvinyl chloride (in the lower temperature environment).
  When wearing cotton work gloves, wear rubber gloves under them.

NOTICE

After repair is finished, when operating the machine which has been stored for a long period, bleed air from the hydraulic circuit according to the same procedure.

Precautions at the time of completion of work

Refilling of coolant or water or oil, greasing, and adding of AdBlue/DEF

- For machines with urea SCR system, fill AdBlue/DEF to the specified level before starting the engine.
- Supply the specified amount of grease to the work equipment parts.
- When the coolant is drained, be sure that the drain valve is securely tightened, then refill the coolant reservoir with the coolant Komatsu recommends to the specified level. Start the engine to circulate the coolant in the piping, and add the coolant to the specified level again.
- When the hydraulic components are removed and installed, refill the tank with the oil Komatsu recommends to the specified level. Start the engine to circulate the oil in the piping, and add the oil to the specified level again.
- If the hydraulic piping or hydraulic equipment is removed, be sure to bleed air from the system after rebuilding the parts, by referring to TESTING AND ADJUSTING.

Testing installed condition of cylinder heads and manifolds

- Check the cylinder head and intake and exhaust manifold mountings for looseness.
- If there is any looseness, retighten the part.

  REMARK

  For the tightening torques, see "DISASSEMBLY AND ASSEMBLY".

Test engine piping for damage and looseness

Intake and exhaust system

Check that there is no damage on the pipings, or no looseness on mounting bolts, nuts and clamps, or no leak of air or exhaust gas from connecting portion.

If there is any looseness, damage, or gas leak, retighten or repair the part.

Cooling system

Check that there is no damage on the pipings, no looseness on mounting bolts, nuts and clamps, and no water leak from connecting portion.

If there is any looseness, damage, or water leak, retighten or repair the part.

Fuel system

Check that there is no damage on the pipings, no looseness on mounting bolts, nuts and clamps, and no fuel leak from connecting portion.

If there is any looseness, damage, or fuel leak, retighten or repair the part.

Check the exhaust equipment and its installation portion for looseness and damage.

REMARK

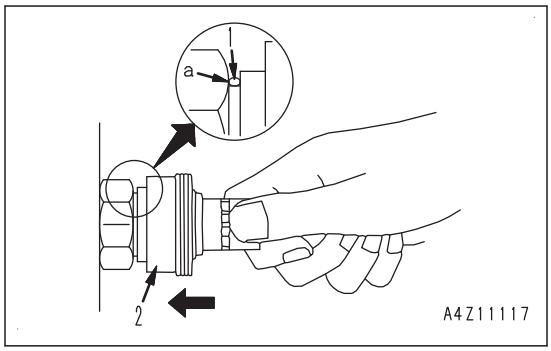
When an equipment is described as an exhaust equipment, it is one of the followings. (The applications or components of equipment are different depending on its models or specifications.)

- KDPF
- AdBlue/DEF mixing tube
- SCR assembly
- KDOC muffler
- Muffler
- Exhaust pipe
- Parts which connects the above, or etc.

Visually check that there is no crack or no damage on the exhaust equipment and its installation portion. If there is any damage, replace the part.

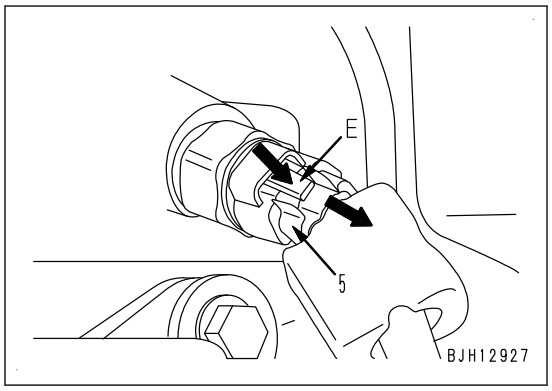
Connection

Hold the tightening adapter part, and push body (2) straight until sliding prevention ring (1) contacts contact surface (a) of the hexagonal part at the male end.



Method for disconnecting connector with lock to push (AMP-3)

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



Method for connecting connector with lock to push (AMP-3)

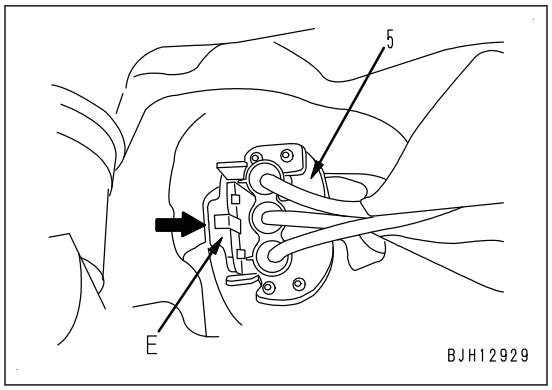
Insert it straight until it clicks.

Method for disconnecting connector with lock to push (SUMITOMO-3)

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

REMARK

Pull up the connector straight.

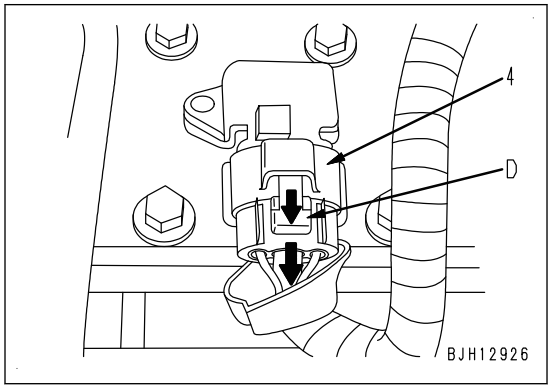


Method for connecting connector with lock to push (SUMITOMO-3)

Insert it straight until it clicks.

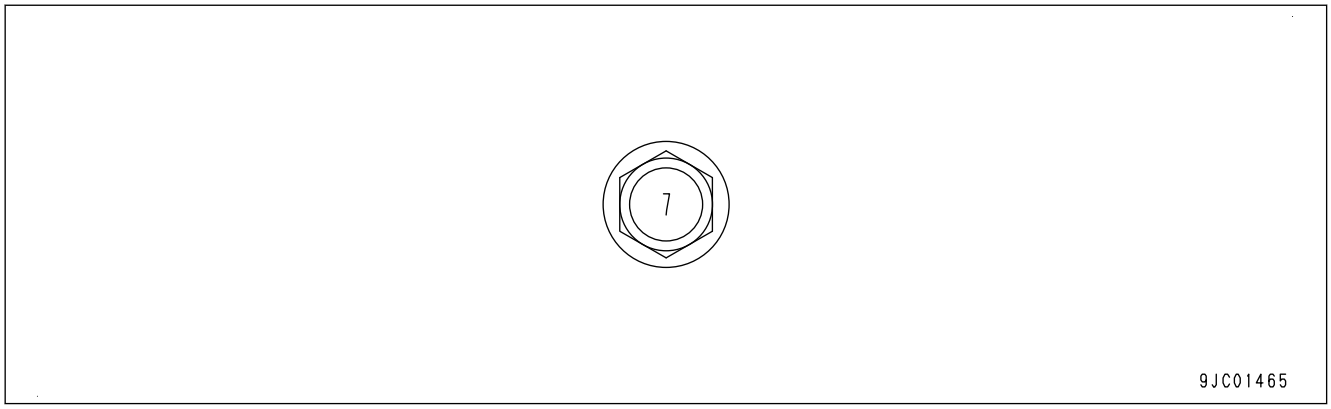
Method for disconnecting connector with lock to push (SUMITOMO-4)

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



Method for connecting connector with lock to push (SUMITOMO-4)

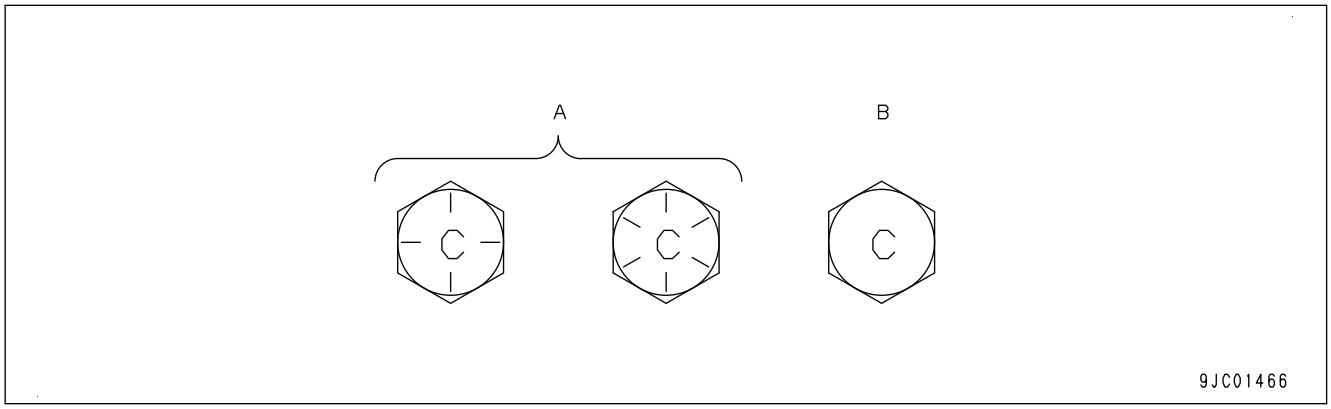
Insert it straight until it clicks.



Thread diameter (mm)	Width across flats (mm)	Tightening torque (Nm { kgm})
6	10	5.9 to 9.8 {0.6 to 1.0}
8	12	13.7 to 23.5 {1.4 to 2.4}
10	14	34.3 to 46.1 {3.5 to 4.7}
12	17	74.5 to 90.2 {7.6 to 9.2}

REMARK

Tighten the unified coarse threaded bolts and nuts to the torque shown in the table below unless otherwise specified.



Type of bolt	A		B	
Nominal size - threads per inch	Tightening torque (Nm { kgm})		Tightening torque (Nm { kgm})	
	Range	Target	Range	Target
$^{1}/_{4}$-20UNC	9.8 to 14.7 {1 to 1.5}	12.7 {1.3}	2.9 to 3.9 {0.3 to 0.4}	3.43 {0.35}
$^{5}/_{16}$-18UNC	24.5 to 34.3 {2.5 to 3.5}	29.4 {3}	6.9 to 8.8 {0.7 to 0.9}	7.8 {0.8}
$^{3}/_{8}$-16UNC	44.1 to 58.8 {4.5 to 6}	52.0 {5.3}	9.8 to 14.7 {1 to 1.5}	11.8 {1.2}
$^{7}/_{16}$-14UNC	73.5 to 98.1 {7.5 to 10}	86.3 {8.8}	19.6 to 24.5 {2 to 2.5}	21.6 {2.2}
$^{1}/_{2}$-13UNC	108 to 147 {11 to 15}	127 {13}	29.4 to 39.2 {3 to 4}	34.3 {3.5}
$^{9}/_{16}$-12UNC	157 to 216 {16 to 22}	186 {19}	44.1 to 58.8 {4.5 to 6}	51.0 {5.2}
$^{5}/_{8}$-11UNC	226 to 294 {23 to 30}	265 {27}	63.7 to 83.4 {6.5 to 8.5}	68.6 {7}
$^{3}/_{4}$-10UNC	392 to 530 {40 to 54}	461 {47}	108 to 147 {11 to 15}	127 {13}
$^{7}/_{8}$-9UNC	637 to 853 {65 to 87}	745 {76}	177 to 235 {18 to 24}	206 {21}

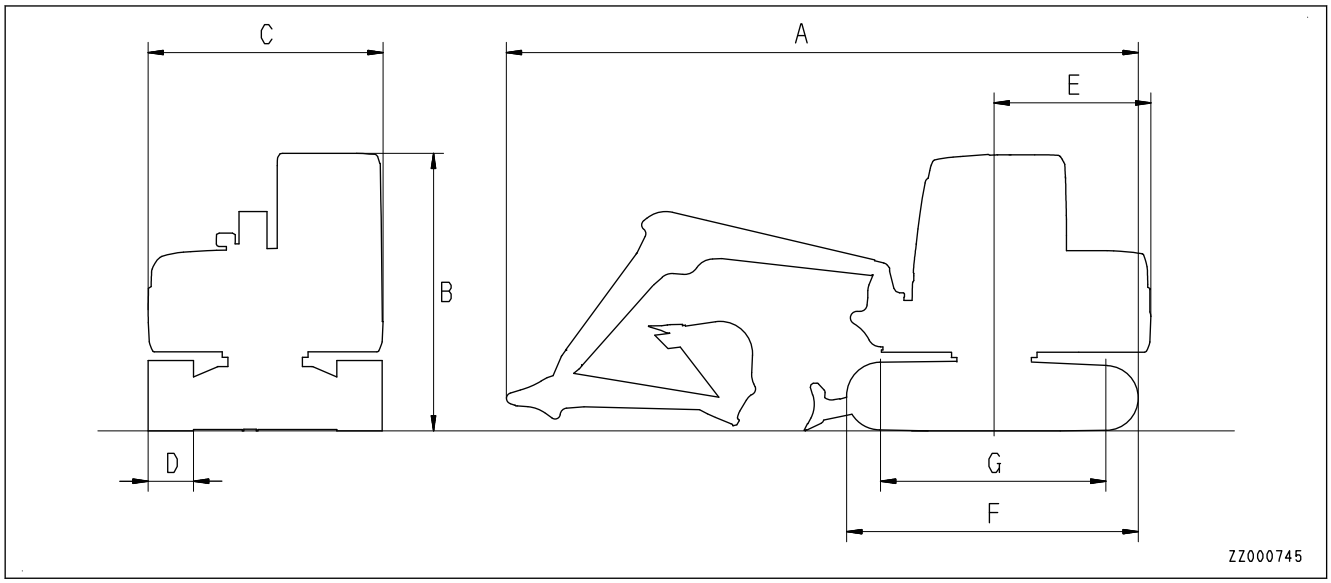
1 °C = 33.8 °F

°C		°F	°C		°F	°C		°F	°C		°F
-27.2	-17	1.4	-7.8	18	64.4	11.7	53	127.4	31.1	88	190.4
-26.7	-16	3.2	-7.2	19	66.2	12.2	54	129.2	31.7	89	192.2
-26.1	-15	5.0	-6.7	20	68.0	12.8	55	131.0	32.2	90	194.0
-25.6	-14	6.8	-6.1	21	69.8	13.3	56	132.8	32.8	91	195.8
-25.0	-13	8.6	-5.6	22	71.6	13.9	57	134.6	33.3	92	197.6
-24.4	-12	10.4	-5.0	23	73.4	14.4	58	136.4	33.9	93	199.4
-23.9	-11	12.2	-4.4	24	75.2	15.0	59	138.2	34.4	94	201.2
-23.3	-10	14.0	-3.9	25	77.0	15.6	60	140.0	35.0	95	203.0
-22.8	-9	15.8	-3.3	26	78.8	16.1	61	141.8	35.6	96	204.8
-22.2	-8	17.6	-2.8	27	80.6	16.7	62	143.6	36.1	97	206.6
-21.7	-7	19.4	-2.2	28	82.4	17.2	63	145.4	36.7	98	208.4
-21.1	-6	21.2	-1.7	29	84.2	17.8	64	147.2	37.2	99	210.2
-20.6	-5	23.0	-1.1	30	86.0	18.3	65	149.0	37.8	100	212.0
-20.0	-4	24.8	-0.6	31	87.8	18.9	66	150.8	40.6	105	221.0
-19.4	-3	26.6	0	32	89.6	19.4	67	152.6	43.3	110	230.0
-18.9	-2	28.4	0.6	33	91.4	20.0	68	154.4	46.1	115	239.0
-18.3	-1	30.2	1.1	34	93.2	20.6	69	156.2	48.9	120	248.0
-17.8	0	32.0	1.7	35	95.0	21.1	70	158.0	51.7	125	257.0
-17.2	1	33.8	2.2	36	96.8	21.7	71	159.8	54.4	130	266.0
-16.7	2	35.6	2.8	37	98.6	22.2	72	161.6	57.2	135	275.0
-16.1	3	37.4	3.3	38	100.4	22.8	73	163.4	60.0	140	284.0
-15.6	4	39.2	3.9	39	102.2	23.3	74	165.2	62.7	145	293.0
-15.0	5	41.0	4.4	40	104.0	23.9	75	167.0	65.6	150	302.0
-14.4	6	42.8	5.0	41	105.8	24.4	76	168.8	68.3	155	311.0
-13.9	7	44.6	5.6	42	107.6	25.0	77	170.6	71.1	160	320.0
-13.3	8	46.4	6.1	43	109.4	25.6	78	172.4	73.9	165	329.0
-12.8	9	48.2	6.7	44	111.2	26.1	79	174.2	76.7	170	338.0
-12.2	10	50.0	7.2	45	113.0	26.7	80	176.0	79.4	175	347.0

SPECIFICATIONS

SPECIFICATION DRAWING

SPECIFICATION DRAWING (STANDARD BOOM)



Road liner specification

	Item		Unit	1650 mm arm specification	2000 mm arm specification
	Machine weight (including blade)		kg	8090	
	Bucket capacity		m^3	0.20	
	Engine model		-	Komatsu 4D98E-5SFB diesel engine	
	Rated horsepower	SAE J1995 (Gross)	kW/rpm	46.2/2200	
		ISO 9249/ SAE J1349 (Net)		44.2/2200	
A	Overall length		mm	6059	6253
B	Overall height		mm	2734	2734
C	Overall width		mm	2229	2229
D	Shoe width		mm	450	450
E	Tail swing radius		mm	1395	1395
F	Overall length of track		mm	2878	2878
G	Distance between tumbler centers		mm	2234.5	2234.5
	Min. ground clearance		mm	395	
	Travel speed (Lo/Hi)		km/h	2.9/4.9	
	Continuous swing speed		rpm	10.0	

Rubber shoes specification

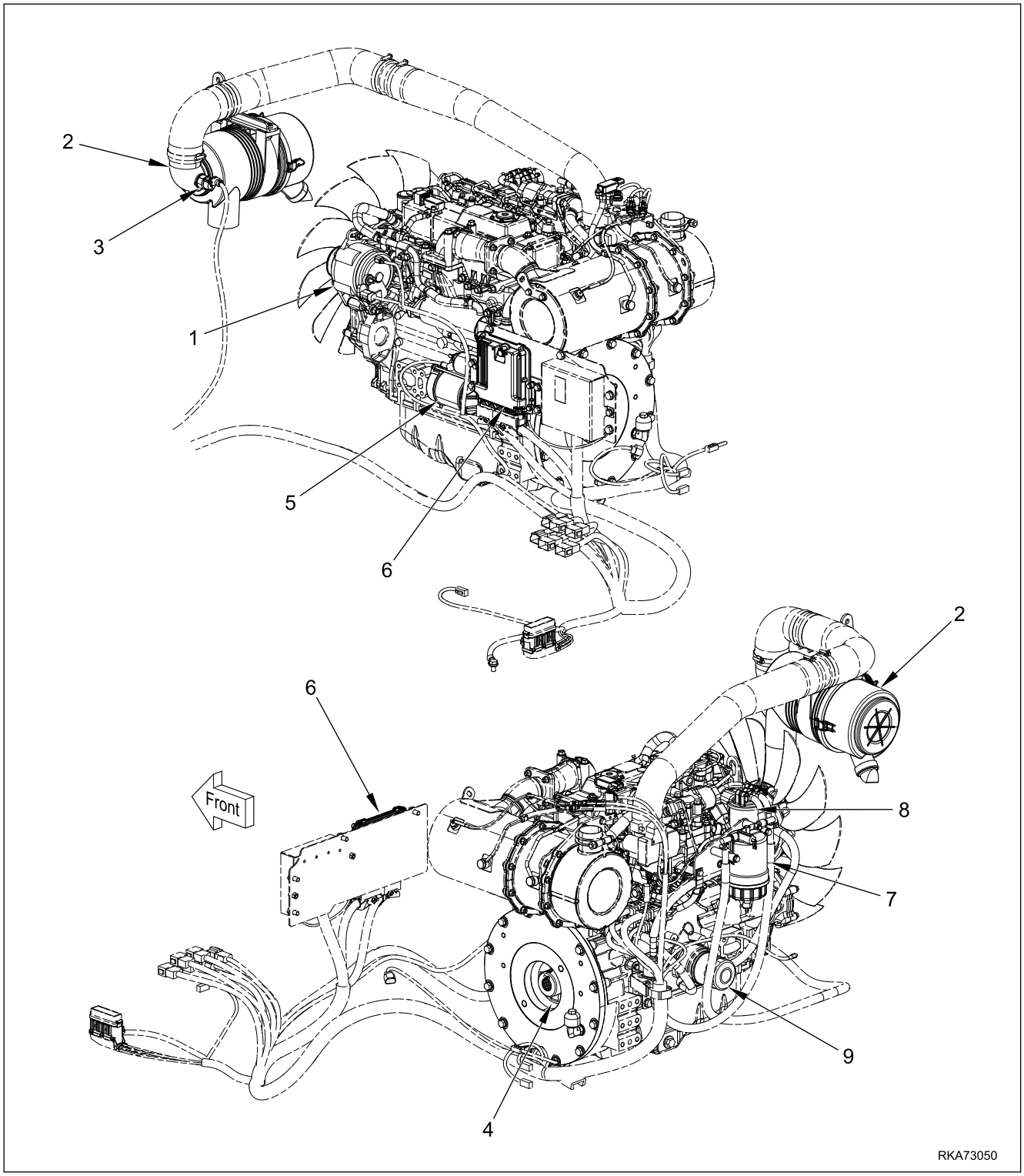
	Item	Unit	1650 mm arm specification	2000 mm arm specification
	Machine weight (including blade)	kg	8070	

Item	Unit	1650 mm arm specification	2000 mm arm specification
Theoretical discharged volume	cm^3/rev	7.0	
Set pressure	MPa { kg/cm^2}	3.13 {32}	
Control valve			
Type x quantity (1 attachment)	-	9-spool type x 1 piece	
Type x quantity (2 attachment)	-	11-spool type x 1 piece	
Operating method	-	Hydraulic assist type	
Travel motor			
Type x quantity	-	Variable displacement piston type x 2 pieces (With counterbalance valve, travel shaft brake)	
Swing motor			
Type x quantity	-	Fixed displacement piston type x 1 piece (With brake valve, swing shaft brake)	
Boom cylinder			
Type	-	Double-acting piston type	
Cylinder bore	mm	115	
Piston rod diameter	mm	65	
Stroke	mm	771	
Max. distance between pins	mm	2029	
Min. distance between pins	mm	1258	
Arm cylinder			
Type	-	Double-acting piston type	
Cylinder bore	mm	95	
Piston rod diameter	mm	60	
Stroke	mm	905	
Max. distance between pins	mm	2245	
Min. distance between pins	mm	1340	
2-piece boom cylinder			
Type	-	Double-acting piston type	
Cylinder bore	mm	95	
Piston rod diameter	mm	60	
Stroke	mm	501	
Max. distance between pins	mm	1372	
Min. distance between pins	mm	871	
Bucket cylinder			
Type	-	Double-acting piston type	
Cylinder bore	mm	85	
Piston rod diameter	mm	55	
Stroke	mm	768	

Abbreviation	Actual word spelled out	Purpose of use (major applicable machine (*1), or component/system)	Explanation
CRI	Common Rail Injection	Engine	This is a function that maintains optimum fuel injection amount and fuel injection timing. This is performed the engine controller which electronically controls supply pump, common rail, and injector.
ECM	Electronic Control Module	Electronic control system	This is an electronic control device that send the command to actuators using the signals from the sensors on the machine so that the optimum actuation is performed. (Same as ECU)
ECMV	Electronic Control Modulation Valve	Transmission (D, HD, WA, etc)	This is a proportional electromagnetic valve that decreases the transmission shock by gradually increasing oil pressure for engaging clutch.
ECSS	Electronically Controlled Suspension System	Travel (WA)	This is a device that ensures smooth high-speed travel by absorbing vibration of machine during travel with hydraulic spring effect of accumulator.
ECU	Electronic Control Unit	Electronic control system	This is an electronic control device that send the command to actuators using the signals from the sensors on the machine so that the optimum actuation is performed. (Same as ECM)
EGR	Exhaust Gas Recirculation	Engine	This is a function that recirculates a part of exhaust gas to combustion chamber, so that it reduces combustion temperature, and reduces emission of NOx.
EMMS	Equipment Management Monitoring System	Machine monitor	This is a function with which operator can check information from each sensor on the machine (filter, oil replacement interval, malfunctions on machine, failure code, and failure history).
EPC	Electromagnetic Proportional Control	Hydraulic system	Electromagnetic proportional control This is a mechanism with which actuators operate in proportion to the current.
FOPS	Falling Object Protective Structure	Cab and canopy	This structure protects the operator's head from falling objects. (Falling object protective structure) This performance is standardized as ISO 3449.
F-N-R	Forward-Neutral-Reverse	Operation	Forward - Neutral - Reverse
GPS	Global Positioning System	Communication (KOMTRAX, KOMTRAX Plus)	This system uses satellites to determine the current location on the earth.
GNSS	Global Navigation Satellite System	Communication (KOMTRAX, KOMTRAX Plus)	This is a general term for system uses satellites such as GPS, GALILEO, etc.
HSS	Hydrostatic Steering System	Steering (D Series)	This is a function that enables the machine to turn without steering clutch by controlling a difference in travel speed of right and left tracks with a combination of hydraulic motor and bevel shaft.
HST	Hydro Static Transmission	Transmission (D, WA)	Hydraulic transmission system that uses a combination of hydraulic pump and hydraulic motor without using gears for stepless gear shifting.

ENGINE SYSTEM

LAYOUT DRAWING OF ENGINE SYSTEM



1: Alternator
2: Air cleaner
3: Air filter clogging sensor
4: Flywheel
5: Starting motor
6: Engine controller
7: Fuel prefilter
8: Fuel filter
9: Engine oil filter

Failure code	Failure (displayed on screen)
B@BCNS	Eng Water Overheat
#B0118	Cooling water temperature sensor fault (High voltage)
#B0117	Cooling water temperature sensor fault (Low voltage)
DBHQKR	Controller Area Network 2 Defective Communication (Mcn Controller)
DB2QKR	CAN 2 Defective Communication (Engine Controller)
#B0123	Accelerator sensor 1 (Voltage high)
#B0122	Accelerator sensor 1 (Voltage low)

Setting time

Set the time for the auto idle stop function according to the following items.

For setting of each item, see “TESTING AND ADJUSTING”.

Auto Idle Stop Timer Set(service menu)

Setting	Contents of setting
OFF	The auto idle stop function does not operate, and the related items are not displayed on service menu and user menu.
1 minute	In Auto Idle Stop Time Fixing menu and Auto Idle Stop Timer Set menu, the selectable shortest time is 1 minute.
3 minutes	In Auto Idle Stop Time Fixing menu and Auto Idle Stop Timer Set menu, the selectable shortest time is 3 minutes.
5 minutes	In Auto Idle Stop Time Fixing menu and Auto Idle Stop Timer Set menu, the selectable shortest time is 5 minutes.

Auto Idle Stop Time Fixing (Service menu)

Setting	Contents of setting
Variable	In Auto Idle Stop Timer Set user menu, operator can select OFF or minimum set time in Auto Idle Stop Timer Set to maximum time of 60 minutes. (Default)
OFF	The auto idle stop function does not operate, and Auto Idle Stop Timer Set menu is not displayed.
Fix to "x" minutes.	In the Auto Idle Stop Timer Set menu, the operator can set the time up to "x" minutes (set time at left) in the auto idle stop setting time. (Cannot select OFF)

Auto Idle Stop Time Fixing (user menu)

Setting	Contents of setting
OFF	Auto idle stop function does not operate. (Default)
"y" minutes	The engine stops "y" minutes (set time at left) after the lock lever is set to “LOCK” position.

NOTICE

- **When "Fix to x min." is selected in the “Auto Idle Stop Time Fixing” menu, the screen changes to the operator screen automatically and the auto idle stop function operates 60 minutes after the lock lever is set to LOCK position, even when the Service menu is being used.**
- **When performing work with the Service menu, always check the set value of the auto idle stop function.**

TYPES OF CAUTION LAMPS DISPLAYED ON MACHINE MONITOR

Symbol	Item to be displayed	Range and method for display			Remarks
		Range	Caution lamp display (background color)	Action level display	
 9JC01159	Engine coolant temperature	Min. 107 °C	Lit (red)	L02	• Caution lamp background color changes depending on the temperature detected. • Alarm buzzer sounds when the temperature exceeds 110 °C. • If the background color of caution lamp is white, perform warm-up operation.
		Min. 60 °C, below 107 °C	Lit (blue)	-	
		Below 60 °C	Lit (white)	-	
 9JC01161	Fuel level	Below 38 ℓ	Lit (red)	-	• The background color of caution lamp changes depending on the fuel level.
		Min. 38 ℓ	Lit (blue)	-	
 9JC01163	Battery charge	When charging was faulty (below specified voltage)	Lit (red)	L03	• Caution lamp lights up and alarm buzzer sounds when an abnormality is detected while engine is running.
 9JC01164	Engine oil pressure	When it is abnormal (when pressure is below the specified pressure)	Lit (red)	L03	• Caution lamp lights up and alarm buzzer sounds when an abnormality is detected while engine is running.
 9JC01168	Maintenance due time warning	When maintenance due time is over	Lit (red)	-	• The display changes depending on how long it has passed since the maintenance due time was over. • After starting switch is turned to ON position, caution lamp lights up when condition is satisfied for lighting up, and then it goes out in 30 seconds.
		When maintenance notice time is over (*1)	Lit (yellow)	-	
 9JC01169	State of system	When action level L04 or L03 is detected	Lit (red)	L04 or L03	• Caution lamp lights up when an abnormality is detected in machine system. • When the background color of caution lamp is red, the warning buzzer sounds.
		When action level L01 is detected	Lit (yellow)	L01 (*2)	

Pin No.	Signal name	Input and output signals
81	(*1)	-

*1: Never connect these pins. It may cause malfunction or failures.

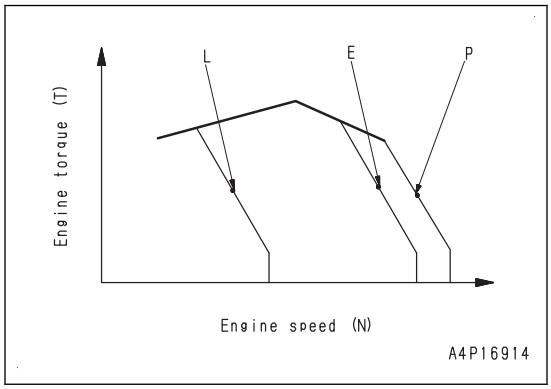
AMP-40P “CN-CP02”

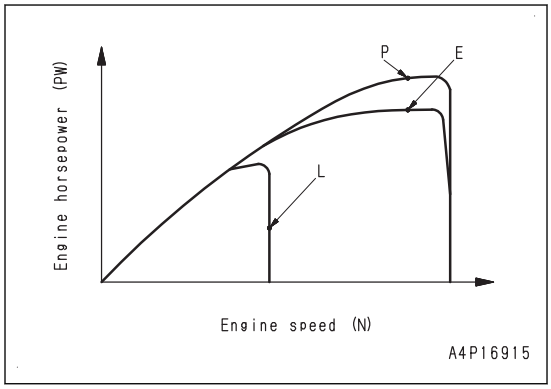
Pin No.	Signal name	Input and output signals
82	(*1)	-
83	Led out alternator signal to Komtrax	Output
84	(*1)	-
85	(*1)	-
86	Travel alarm	Output
87	2nd attachment B port EPC	Output
88	(*1)	-
89	(*1)	-
90	(*1)	-
91	(*1)	-
92	(*1)	-
93	Swing lock solenoid	Output
94	Quick coupler buzzer	Output
95	2nd attachment A port EPC	Output
96	(*1)	-
97	(*1)	-
98	(*1)	-
99	System operating lamp	Output
100	(*1)	-
101	(*1)	-
102	PC-EPC valve	Output
103	1st attachment B port EPC	Output
104	(*1)	-
105	(*1)	-
106	(*1)	-
107	Travel speed increase solenoid	Output
108	(*1)	-
109	PPC lock relay cancel	Output
110	(*1)	-
111	1st attachment A port EPC	Output
112	(*1)	-
113	(*1)	-
114	Solenoid return	Input

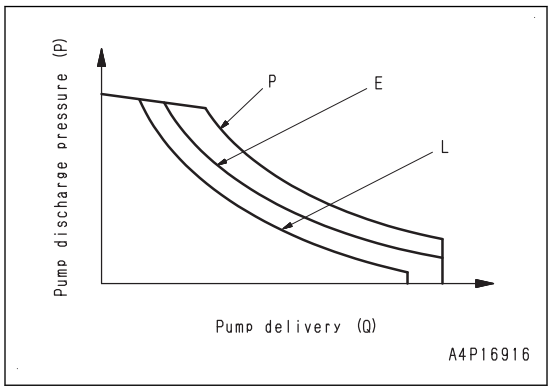
FUNCTION OF ENGINE AND PUMP COMBINED CONTROL SYSTEM

Working mode selection function

- The operator can select one from six working modes of P, E, B, L, ATT/P, and ATT/E in the working mode on machine monitor.
- Operator can select the most appropriate engine torque (T) and pump absorption torque according to the work.
- When “Without Attachment” is selected in “With/Without Attachment” items of “Default” in Service mode, the selectable modes are 2 of P and E.
- The machine controller obtains the pump absorption upper limit torque by calculating the engine speed being set with the working mode and the fuel control dial and the actual engine speed. It controls the pump so that the engine speed is kept around the matching point set in each mode even when the heavy load is applied.
- When the engine speed decreases, it reduces the pump absorption torque to prevent engine from being stopped.



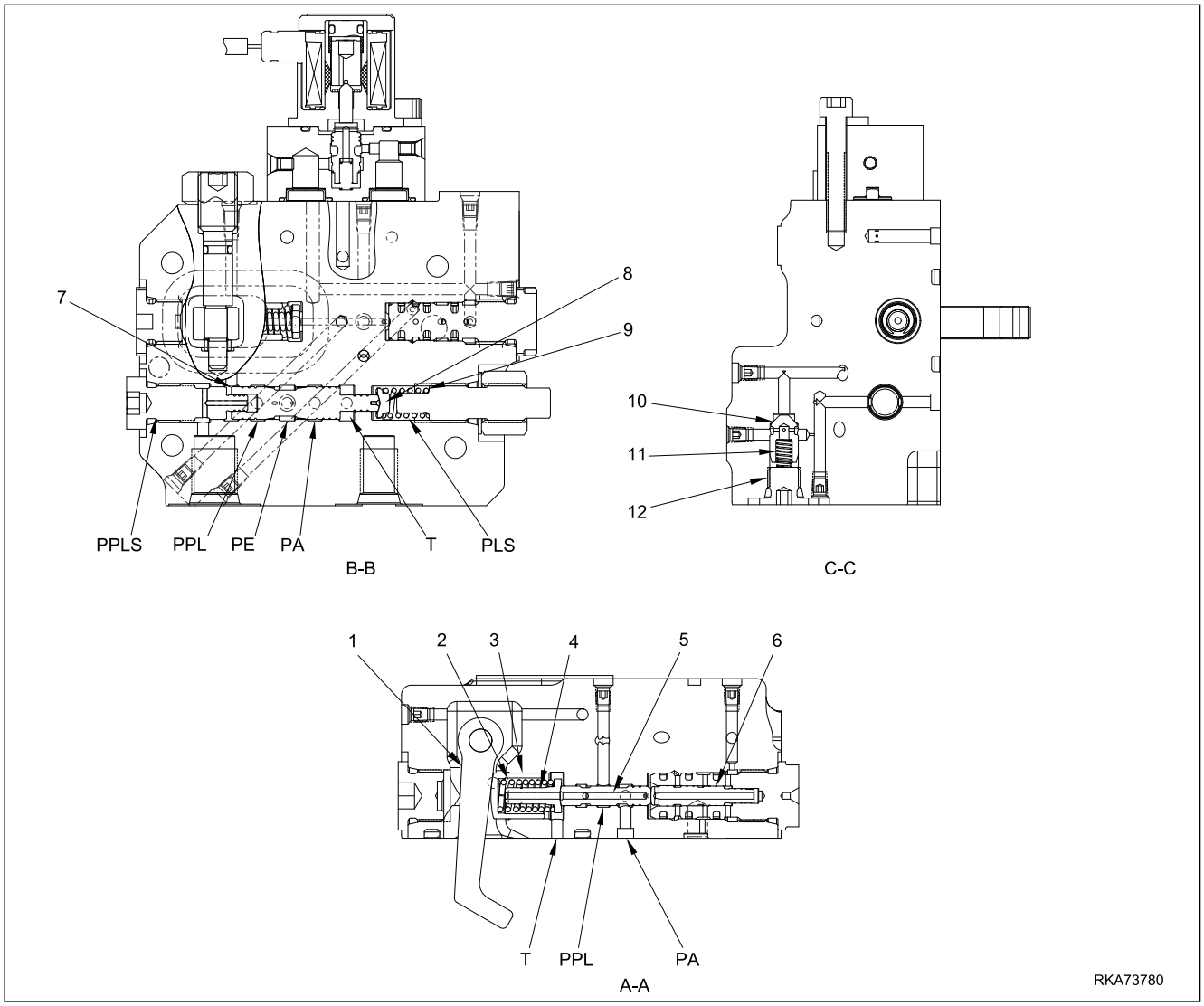




Control method in each mode

Working mode	Matching point
P, ATT/P (during operation), B	43.4 kW/2100 rpm{58.2 HP/2100 rpm}
E, ATT/E (during operation)	40.8 kW/2000 rpm{54.7 HP/2000 rpm}
L	33.7 kW/1650 rpm{45.2 HP/1650 rpm}

PD: Drain port
PE: Control piston pressure port
T: Drain port



PC valve

PA: Pump pressure
PPL: PC valve output pressure
T: Drain
1: Lever
2: Spring
3: Retainer
4: Seat
5: Spool
6: Piston

LS valve

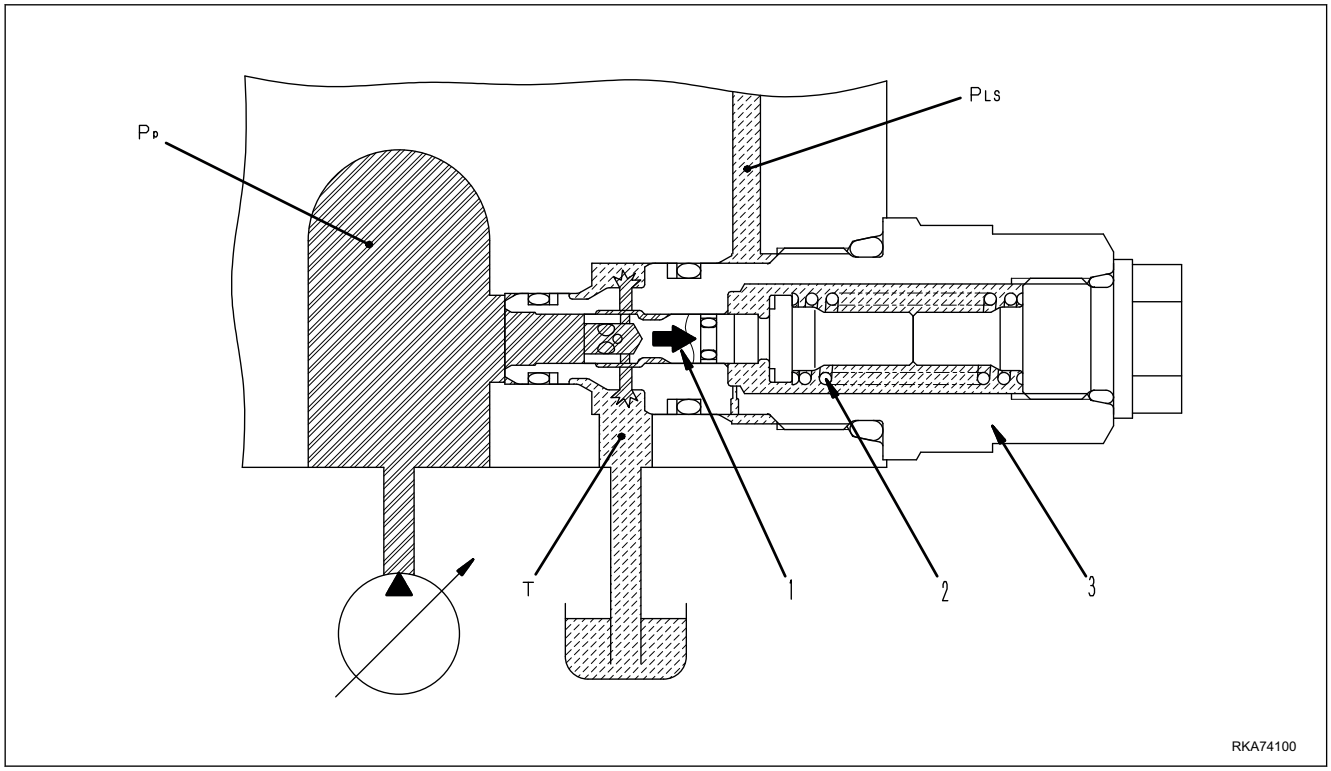
PA: Pump pressure
PE: Control pressure
PLS: LS pressure input
PPLS: LS pump pressure
T: Drain
7: Spool
8: Seat
9: Spring
10: Valve
11: Spring
12: Plug

5: Pressure compensation valve (*1) (arm)
6: Pressure compensation valve (*1) (bucket)
7: Pressure compensation valve (*1) (boom swing)
8: Pressure compensation valve (*1) (attachment 1)
9: Pressure compensation valve (*1) (2-Piece boom)
10: Pressure compensation valve (*1) (attachment 2)
11: Pressure compensation valve (*2) (attachment 2)
12: Pressure compensation valve (*2) (2-Piece boom)
13: Pressure compensation valve (*2) (attachment 1)
14: Pressure compensation valve (*2) (boom swing)
15: Pressure compensation valve (*2) (bucket)
16: Pressure compensation valve (*2) (arm)
17: Pressure compensation valve (*2) (boom)
*1: Flow control valve
*2: Pressure reducing valve
18: Pressure compensation valve (*2) (R.H. travel)
19: Pressure compensation valve (*2) (L.H. travel)
20: Swing and blade pump relief valve
21: Check valve (attachment 2)
22: Check valve (2-Piece boom)
23: Check valve (attachment 1)
24: Check valve (boom swing)
25: Check valve (bucket)
26: Check valve (arm)
27: Check valve (boom)
28: Check valve (blade)
29: Check valve (swing)

- When the control valve is operated, if the actuator demand flow exceeds the pump delivery at the minimum swash plate angle, the unload valve blocks the flow to tank circuit (T) and allows all of pump delivery (Q) to flow to the actuator circuit.

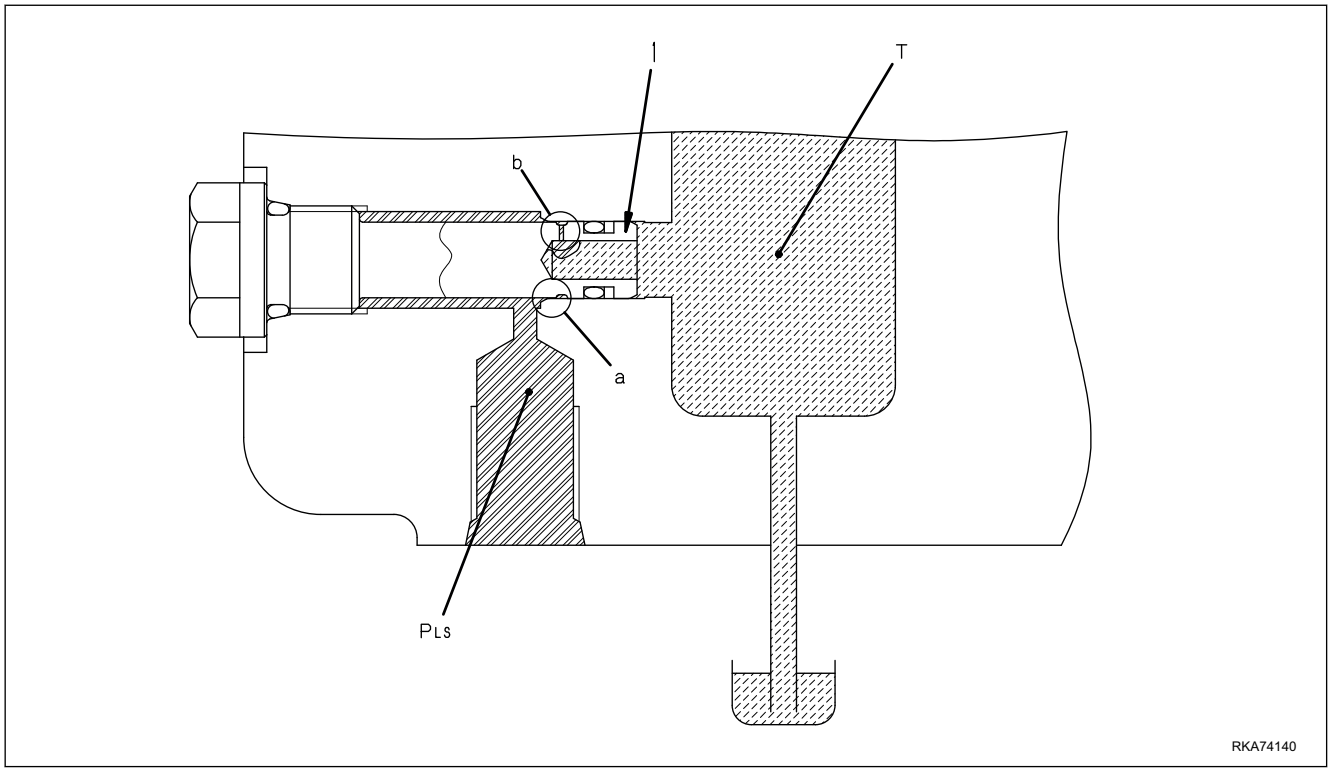
OPERATION OF UNLOAD VALVE OF CONTROL VALVE

When control valve is HOLD position



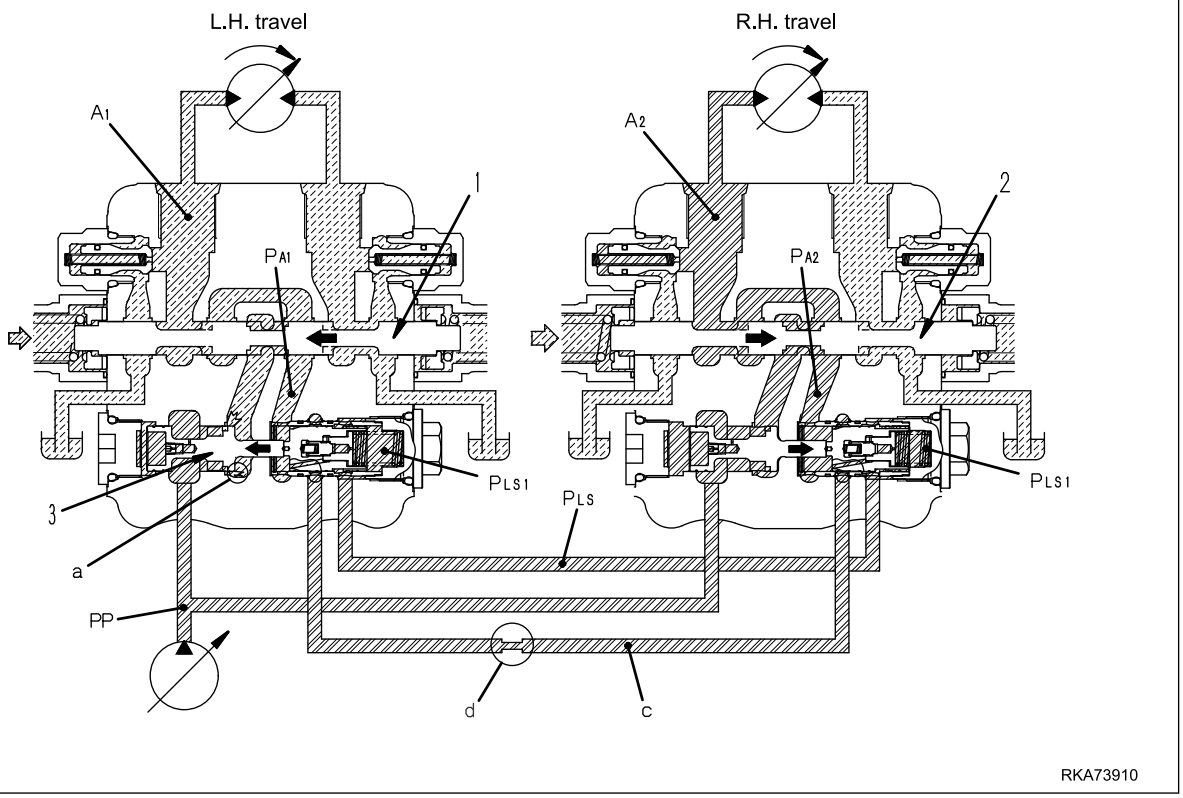
1. Pump delivery pressure(PP) is acting on the left end of spool (1), and LS pressure(PLS) is acting on the right end of the spool.
2. When the control valve is in HOLD position, LS pressure (PLS) is not generated, so only pump delivery pressure (PP) acts, and (PP) is set only by the force of spring (2).
3. As pump delivery pressure (PP) increases and reaches the force of spring (2) (3.4 MPa {35 kg/cm^2}), spool (1) moves to the right and pump circuit (PP) is connected to tank circuit (T) through the drill hole in sleeve (3).
4. As a result, pump delivery pressure (PP) is set to 3.4 MPa {35 kg/cm^2} .

OPERATION OF LS BYPASS PLUG OF CONTROL VALVE



The pressurized oil in LS circuit (PLS) flows through clearance filter (a) formed of the clearance between LS bypass plug (1) and valve body and orifice (b) to tank circuit (T).

Steering when traveling



1. When traveling in a straight line, if left travel spool (1) is returned to the neutral position and the steering is operated, a difference (A2 > A1) is generated in the load pressure of left and right travel actuator circuits PA1 and PA2, and LS pressure PLS becomes the same pressure as right A (the side with the high load pressure).
2. As a result, flow control valve (3) on the left travel side is pushed to the left by LS circuit PLS1, that is, right travel load pressure right A2, so the opening of the left notch **a** is closed, the left and right travel circuits are shut off, and it becomes possible to operate the steering when travelling.
3. Damper **d** is provided in the circuit to damp any excessive characteristics in the opening or closing of the travel junction circuit if the spool is operated suddenly.

TRAVEL LS BYPASS CIRCUIT

FUNCTION OF TRAVEL LS BYPASS CIRCUIT

- When the travel and another actuator are operated simultaneously, the discarded throttled flow of LS circuit (PLS) is increased to loosen the pressure compensation accuracy of the travel circuit and reduce lowering of the travel speed.
- While only the travel or another actuator is operated, the bypass circuit is kept closed.

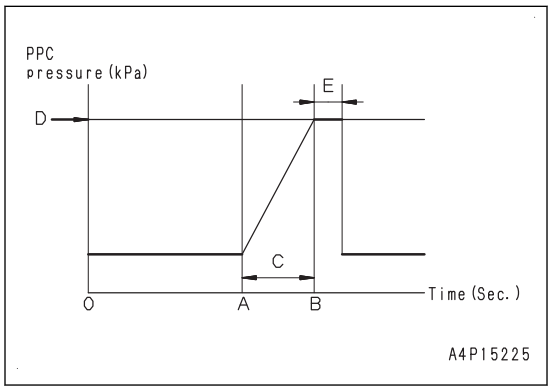
WORK EQUIPMENT AND TRAVEL AUTOMATIC LOCK SYSTEM

FUNCTION OF WORK EQUIPMENT AND TRAVEL AUTOMATIC LOCK SYSTEM

This function automatically sets the lock lever in the same state as when it is locked to prevent the work equipment or the machine continues its operation when the lock lever is unlocked while the work equipment control lever or the travel lever is operated.

OPERATION OF WORK EQUIPMENT AND TRAVEL AUTOMATIC LOCK SYSTEM

This system recognizes an abnormality when either one or more of the oil pressure switches or sensors detect the pressure higher than specified pressure (D), or if the attachment drive signal is input in time period (C) after the lock lever is canceled (A).



The machine controller outputs the lock lever automatic lock relay drive signal to shut off the current to PPC lock solenoid and set the machine to lock state (B).

A: Lock lever is canceled

B: Lock lever automatic lock is in operation

C: Within 0.4 seconds

D: 5 kPa

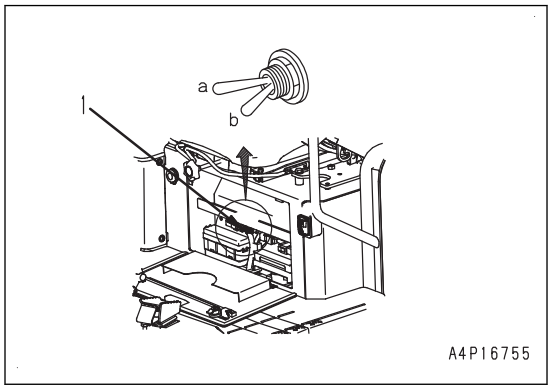
E: 0.1 seconds

REMARK

The pressure may not increase within time (C) and the lock lever automatic lock control may not operate when the hydraulic oil temperature is low or high-viscosity hydraulic oil used.

Control when lock lever automatic lock cancel switch is “ON”

you can operate the machine by operating lock lever automatic lock cancel switch (1) if an abnormality occurs in the controller, etc., and the main pump does not operate normally, and machine does not work.



At this time, the lock lever automatic lock control function does not work.

a: Emergency (when abnormal)

b: Normal (when normal)

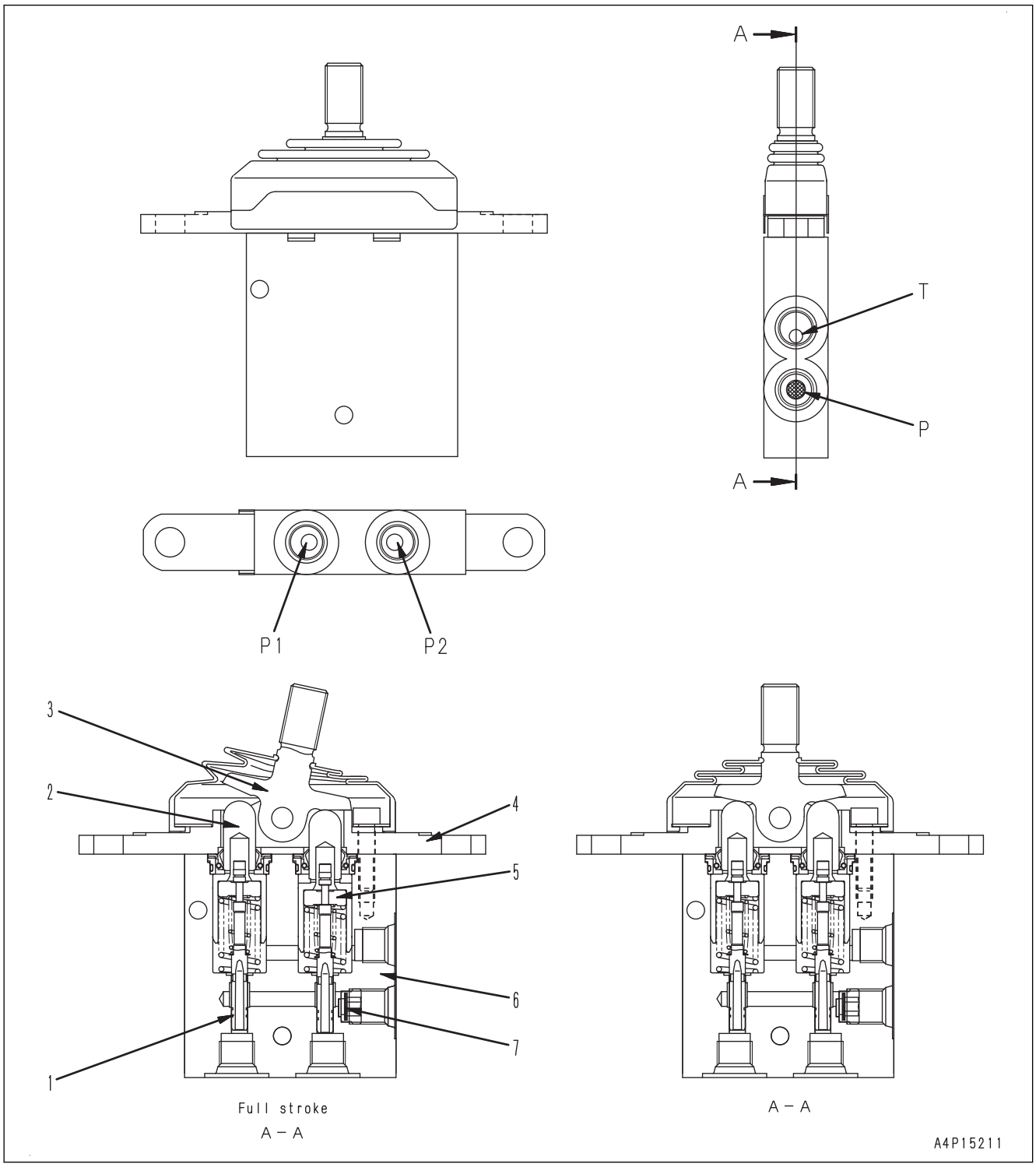
REMARK

- Lock lever automatic lock cancel switch (1) is an alternate type switch. The lock lever automatic lock cancel pilot lamp lights up on the display if it is set to “EMERGENCY (a)” position when PPC lock lever is in the free state.
- The following failure code is displayed when this switch is “ON”.

Action level	Failure code	Failure (displayed on screen)
L00	DDNS00	Lock Lever Auto Lock Release SW On

STRUCTURE OF BOOM SWING AND 2-PIECE BOOM PPC VALVE

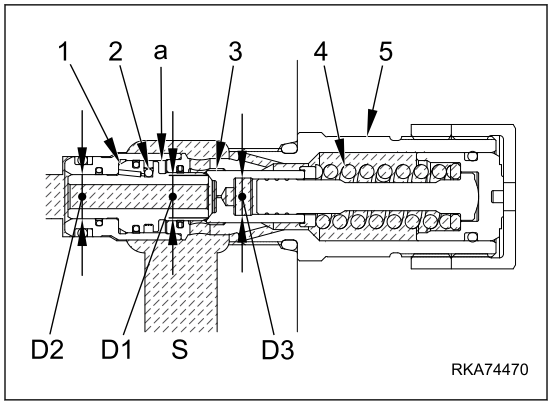
General view and sectional view

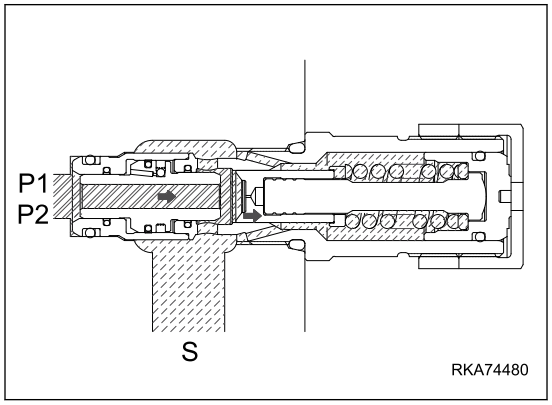


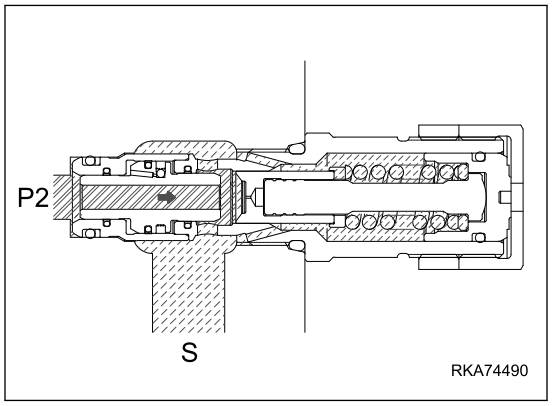
P: From solenoid valve
P1: To blade and boom swing valve
1: Spool
2: Piston
3: Lever
4: Plate
P2: To blade and boom swing valve
T: To hydraulic tank
5: Retainer
6: Body
7: Filter

When the circuit pressure rises abruptly

1. When circuit pressure reaches (P1), pressure acts on the area difference between (D1) and (D3) [(D1 > (D3)], and oil presses spring (4), thus valve (3) starts opening.
2. At this time, pressure acts on the area difference between (D1) and (D2) [(D2) > (D1)], thus seat (1) follows valve (3).
3. As seat (1) moves, the passage for the pressurized oil in chamber d to flow into port S is narrowed by ball (c). Accordingly, seat (1) does not move so fast as valve (3).
4. Accordingly, the relief pressure increases gradually from (P1) to (P2) until seat (1) reaches sleeve (5).



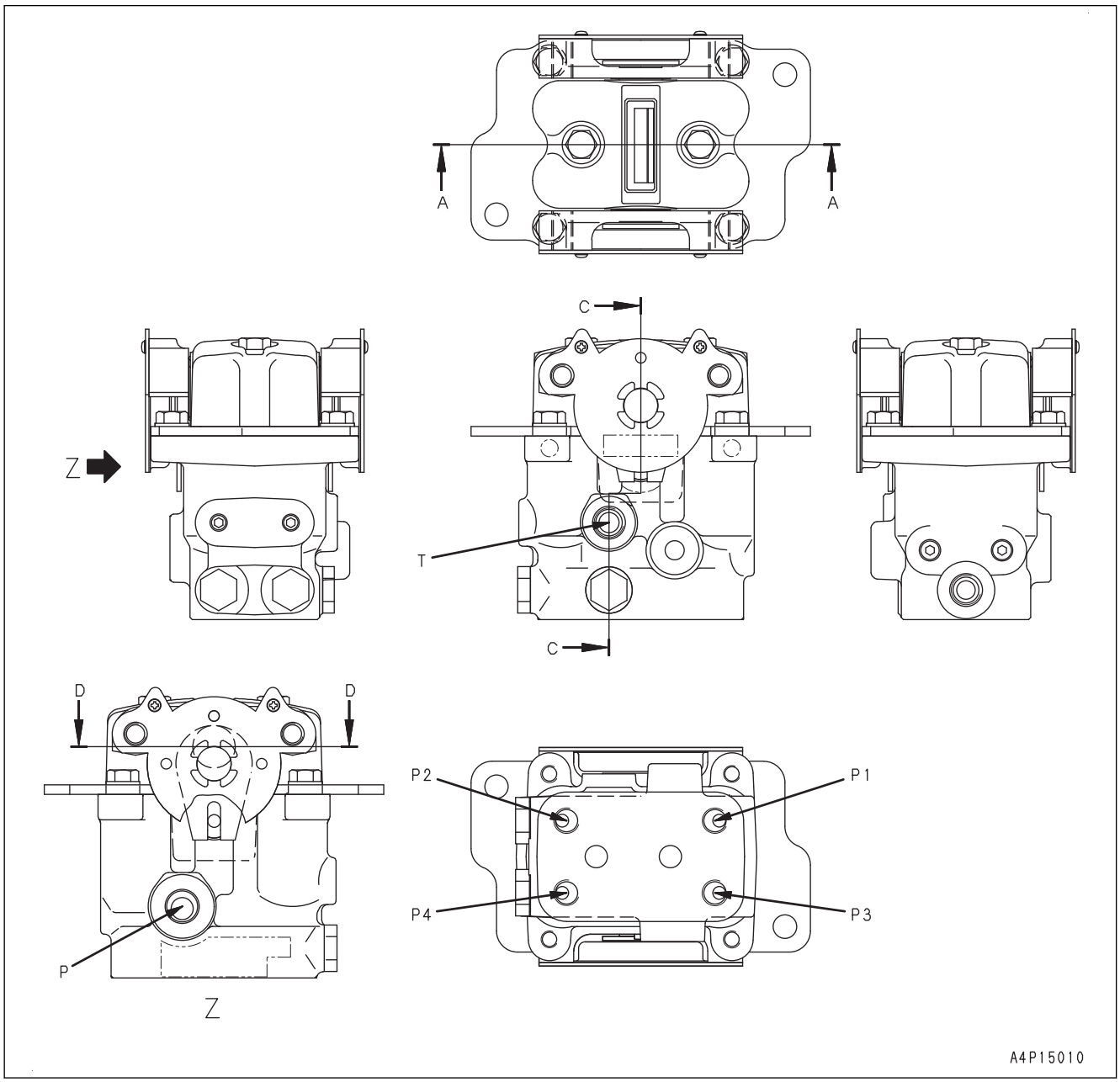




Travel speed	2.6 km/h	4.6 km/h
Travel motor swash plate angle	Maximum	Minimum

STRUCTURE OF TRAVEL PPC VALVE

General view



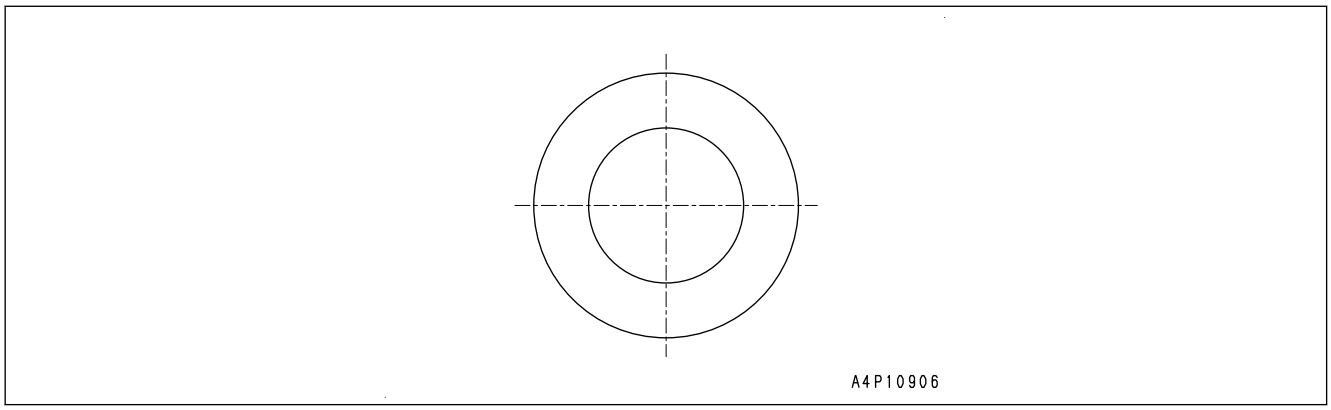
P: From self-pressure reducing valve
P1: To control valve (left REVERSE port)
P2: To control valve (left FORWARD port)
P3: To control valve (right REVERSE port)
P4: To control valve (right FORWARD port)
T: To hydraulic tank

WORK EQUIPMENT CLEARANCE ADJUSTMENT SHIM

FUNCTION OF WORK EQUIPMENT CLEARANCE ADJUSTMENT SHIM

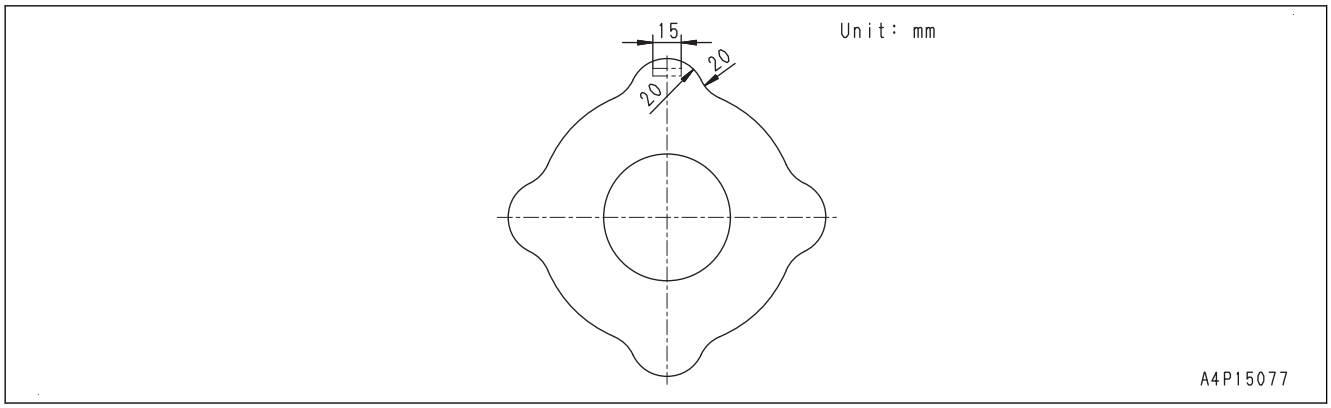
There are 2 types of the work equipment clearance adjustment shims. The steel shim and plastic shim. The following is the explanation of the function of each type of clearance adjustment shim.

Steel shim



The purpose of the steel shim is to reduce the clearance in the right and left direction. There may be some cases that shim is unnecessary to be inserted on one side if it is inserted in either on right or left side depending on the width of the clearance.

Plastic shim



The purpose of the plastic shim is to reduce the clearance in the right and left direction of the work equipment, and to prevent a creak and scuffing caused by rubbing of the end faces of steel parts of a joint.

STANDARD VALUE TABLE FOR ENGINE

STANDARD VALUE TABLE FOR ENGINE: PC80MR-5

Performance

Machine model			PC80MR-5	
Engine			4D98E-5SFB	
Item	Measurement condition	Unit	Standard value for new machine	Repair limit
Engine speed at high idle	• Engine coolant temperature: 60 to 100 °C • Hydraulic oil temperature: 45 to 55 °C • Fuel control dial: MAX (High idle) position • Working mode: P (Power Mode) • Travel speed: Hi • Auto-deceleration switch: OFF	rpm	2200±30 (With boom raise relief)	2200±30 (With boom raise relief)
			2230±20 (When the position of the operating lever is in neutral)	2230±20 (When the position of the operating lever is in neutral)
Engine speed at low idle	• Engine coolant temperature: 60 to 100 °C • Hydraulic oil temperature: 45 to 55 °C • Fuel control dial: MIN (Low idle) position • Working mode: P (Power Mode) • Auto-deceleration switch: OFF	rpm	1125±25	1125±25

Air intake and exhaust system

Machine model				PC80MR-5	
Engine				4D98E-5SFB	
Item	Measurement condition		Unit	Standard value for new machine	Repair limit
Exhaust gas color	• Engine coolant temperature: 60 to 100 °C • After keeping it at normal condition for 5 seconds • Fuel control dial: MAX (High idle) position • Auto-deceleration switch: OFF		Bosch index	Max. 2.0	Max. 2.0
Valve clearance	Engine coolant temperature: Normal temperature	Intake valve	mm	0.15 to 0.25	0.15 to 0.25
		Exhaust valve		0.15 to 0.25	0.15 to 0.25

Main body

Machine model			PC80MR-5	
Engine			4D98E-5SFB	
Item	Measurement condition	Unit	Standard value for new machine	Repair limit
Compression pressure	• Engine coolant temperature: 40 to 60 °C • At cranking (engine speed): 250 rpm (reference)	MPa { kg/cm^2}	-	-

Work equipment speed

Machine model				PC80MR-5	
Engine				4D98E-5SFB	
Item	Measurement condition		Unit	Standard value for new machine	Repair limit
Boom speed	• Hydraulic oil temperature: 45 to 55 °C • Fuel control dial: MAX (High idle) position • Working mode: P (Power Mode) • Time required to move bucket teeth from ground to RAISE stroke end • Measurement posture: See “MACHINE POSTURE AND PROCEDURE FOR MEASURING PERFORMANCE”, “Fig. 7”.	RAISE	Sec.	2.4±0.2	Max. 2.9
		LOWER		2.7±0.3	Max. 3.3
Arm speed	• Hydraulic oil temperature: 45 to 55 °C • Fuel control dial: MAX (High idle) position • Working mode: P (Power Mode) • Time required for operation between dump stroke end and arm IN stroke end • Measurement posture: See “MACHINE POSTURE AND PROCEDURE FOR MEASURING PERFORMANCE”, “Fig. 8”.	Arm IN	Sec.	3.2±0.3	Max. 3.8
		DUMP		2.9±0.3	Max. 3.5
Bucket speed	• Hydraulic oil temperature: 45 to 55 °C • Fuel control dial: MAX (High idle) position • Working mode: P (Power Mode) • Time required for operation between dump stroke end and arm IN stroke end • Measurement posture: See “MACHINE POSTURE AND PROCEDURE FOR MEASURING PERFORMANCE”, “Fig. 9”.	Bucket CURL	Sec.	3.1±0.3	Max. 3.8
		DUMP		2.3±0.2	Max. 2.8

TEST EXHAUST GAS COLOR

Tools for testing exhaust gas color

Symbol	Part No.	Part name	Q'ty	Remarks
A	799-201-9002	Handy smoke checker	1	Bosch index: 0 to 9
B	Commercially available	Smoke meter	1	

⚠ Place the machine on a level ground, lower the work equipment to the ground so that it is stable, set the lock lever to LOCK position, and stop the engine.

⚠ Immediately after the engine is stopped, its parts and oil are still very hot, and may cause burn injury. Accordingly, wait until all parts have cooled down before starting the work.

Check this item under the following conditions.

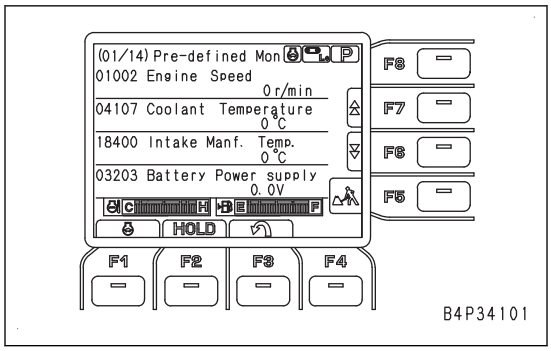
Engine coolant temperature: 60 to 100 °C

If an air source and an electric power source are not available in the field, use handy smoke checker A. When recording official data, etc., use smoke meter B.

For testing of exhaust gas color to perform troubleshooting or periodic maintenance, refer to this section.

METHOD FOR TESTING EXHAUST GAS COLOR BY HANDY SMOKE CHECKER

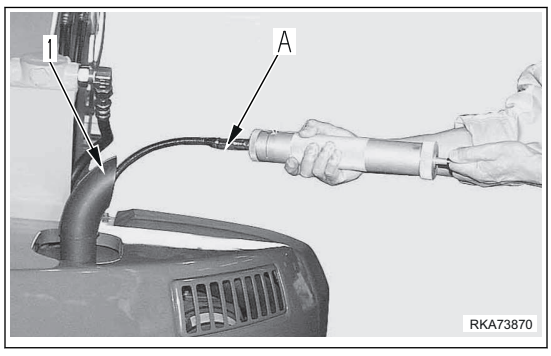
1. Start the engine and increase the coolant temperature into the specified range.



2. Fit a sheet of filter paper to handy smoke checker A.
3. Insert the exhaust gas intake pipe of handy smoke checker A into exhaust pipe (1).
4. Run the engine with fuel control dial at MAX (High idle) and put the auto-deceleration switch to OFF position for 5 seconds. Collect the exhaust gas to the filter paper by operating the handle of smoke checker A.

   REMARK

   Collecting time: 1.4±0.2 seconds



5. Remove the filter paper and compare it with the attached scale for judgment.

   For standard values, see STANDARD VALUE TABLE, “STANDARD VALUE TABLE FOR ENGINE”.

After finishing the test, remove the testing tools and restore the machine.

HANDLE CYLINDER CUT-OUT MODE OPERATION

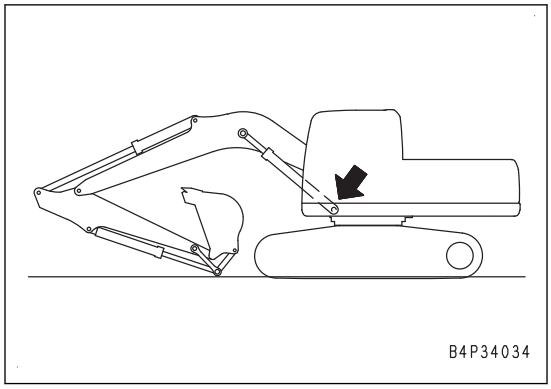
The cylinder cutout mode operation means to run the engine with the fuel injectors of one or more cylinders disabled electrically to reduce the number of active cylinders. The purposes and effects of cylinder cutout mode operation are as follows.

- Cylinder cutout mode operation is used to find out a cylinder which does not output power normally (or, combustion in it is abnormal).
- If the engine speed and output do not change from the normal operation (all-cylinder operation) when a cylinder is cutout with the cylinder cutout mode operation, that cylinder has a failure.
  The possible failures are as follows.
  - Compression gas leakage from cylinder head gasket area
  - Defective injection
  - Defective piston, piston ring or cylinder liner
  - Defective valve mechanism (valve operating system)
  - Defective electrical system
- Common rail fuel injection system individually controls the injector of each cylinder electronically , so the cylinder cutout test can be performed easily by the simple operations of the switches compared with the mechanical fuel injection system. So, the defective cylinder can be found out easily.

3. Extend the arm cylinder and bucket cylinder to the end (to the maximum CURL position) or retract them to the end (to the maximum DUMP position), and lower the work equipment to the ground.

   REMARK

   Since the anti-drop valve is attached to boom cylinder bottom side, hydraulic oil on bottom side of boom cylinder is drained when work equipment is lowered to the ground, and remaining pressure drops.



4. Turn the starting switch to OFF position.
5. Loosen the oil filler cap of the hydraulic tank gradually, and release the air in the tank.

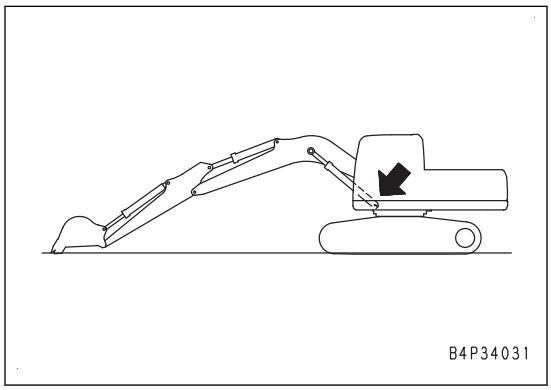
   REMARK

   Leave the oil filler cap of the hydraulic tank removed.

6. Release the remaining pressure in hydraulic cylinder circuit
   1) Turn the starting switch to ON position.
   2) Set the lock lever to FREE position, and operate the right and left work equipment control levers forward, backward, rightward, and leftward.

      REMARK

      The work equipment is operated by the pressure in PPC accumulator. Pressure in PPC accumulator is lost by operating the work equipment control levers 2 or 3 times.



   3) Set the lock lever in LOCK position.
   4) Start the engine and run it with the fuel control dial at MIN (Low idle) position for approximately 10 seconds to increase the pressure in PPC accumulator.
7. Repeat steps 1) and 4) 4 or 5 times to release the remaining pressure from the hydraulic cylinder circuit.

⚠ When disassembling the anti-drop valve, loosen anti-drop valve mounting bolts gradually. Make sure that hydraulic oil pressure is released, then disassemble.

Method for releasing remaining pressure from machine with anti-drop valve for arm in arm maximum IN posture

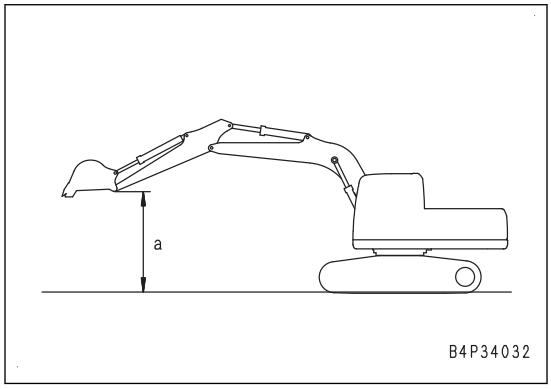
⚠ Place the machine on a level ground.

⚠ When disassembling the anti-drop valve, always release the remaining pressure in the cylinder circuit.

The following is the procedure for releasing the remaining pressure in the arm maximum IN posture.

1. Check the function of PPC accumulator
   1) Retract arm cylinder and bucket cylinder to the stroke ends (to set the machine in maximum reach posture), and hold the work equipment at height (a) above the ground.

      (a) : 1.5 m

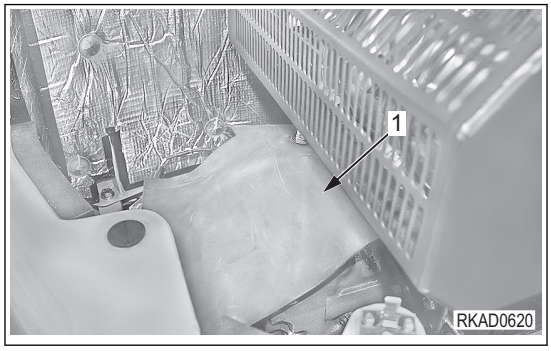


   2) Keep the arm cylinder and bucket cylinder retracted to the stroke ends, turn the starting switch to OFF position, and stop the engine.
   3) Turn the starting switch to ON position.
   4) Set the lock lever to FREE position.

After finishing the test, remove the testing tools and restore the machine.

METHOD FOR TESTING TRAVEL RELIEF PRESSURE BY TESTING TOOLS

1. Release the remaining pressure. For details, see “RELEASE REMAINING PRESSURE FROM HYDRAULIC SYSTEM”.
2. Open engine hood.
3. Remove cover (1).



4. Install nipple C to pump discharged pressure pickup port (P1), and connect gauge A1 of hydraulic tester A.

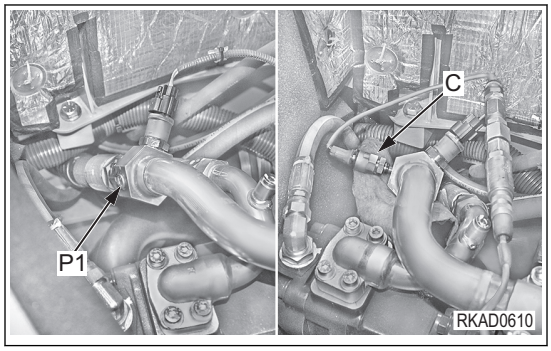
   REMARK

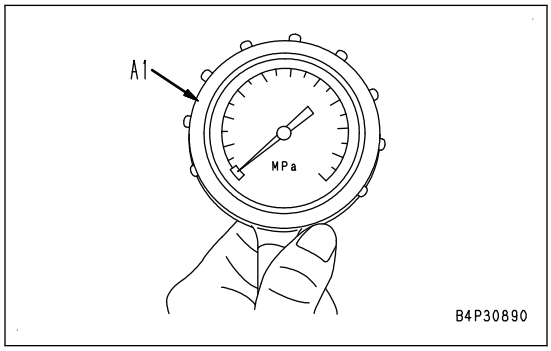
   - Gauge in digital hydraulic tester B can also be used in place of gauge A1.
   - If machine is equipped with quick coupler, remove hose and union from pickup port P1 and plug hose to avoid hydraulic oil leakage.
5. Set the working mode to P (“Power Mode”) mode.
6. Start the engine to increase the hydraulic oil temperature to 45 to 55 °C.
7. Insert pin E between the sprocket and the track frame to securely lock the track.
8. Set the fuel control dial in MAX (High idle) position and measure the oil pressure at travel relief.

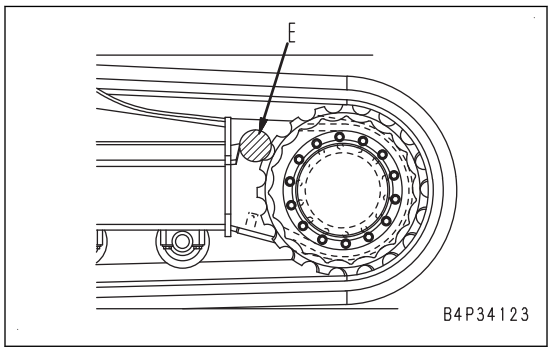
   ⚠ Before operating the travel lever and pedal, check the sprocket position locked with pin and locked direction of the travel again.

   Relieved pressure of the main relief valve for work equipment and travel circuits is displayed.

   For standard values, see STANDARD VALUE TABLE, “STANDARD VALUE TABLE FOR MACHINE”.







After finishing the test, remove the testing tools and restore the machine.

METHOD FOR TESTING BOOM SWING RELIEF PRESSURE BY MACHINE MONITOR

1. Release the remaining pressure by referring to “RELEASE REMAINING PRESSURE FROM HYDRAULIC SYSTEM”.

TEST AND ADJUST OIL PRESSURE OF CONTROL CIRCUIT

Testing and adjusting tools for oil pressure in control circuit

Symbol		Part No.	Part name	Q'ty	Remarks
A	-	799-101-5002	Hydraulic tester	1	
	1	799-101-5130	Gauge	1	Pressure range: 6 MPa
B		790-261-1205	Digital hydraulic tester	1	Pressure range: 70 MPa
C		799-101-5220	Nipple	1	Size: M10x1.25 mm
D		07002-11023	O-ring	1	
E		799T-404–8500	Sensor adapter	1	Pressure range: 50 MPa
F		799-401-3200	Adapter	1	Size: 03

⚠ **Lower the work equipment to the ground, and stop the engine. Operate the control levers several times to release the remaining pressure in the piping, and then loosen the oil filler cap of the hydraulic tank slowly to release the pressure in the tank.**

Check this item under the following conditions.

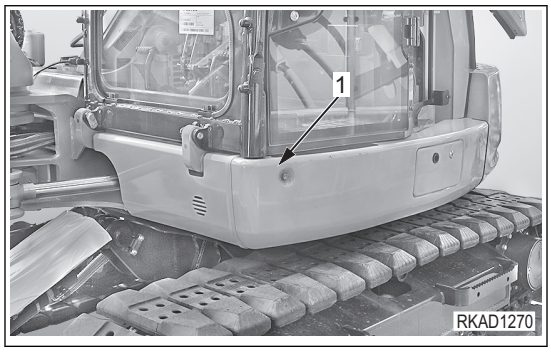
Hydraulic oil temperature: 45 to 55 °C

For testing and adjusting of control circuit pressure to perform troubleshooting or periodic maintenance, refer to this section.

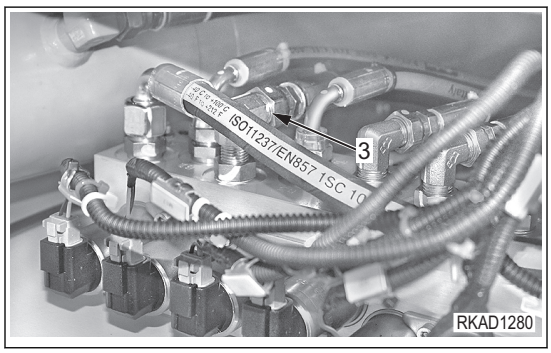
METHOD FOR TESTING OIL PRESSURE OF CONTROL CIRCUIT

METHOD FOR TESTING OIL PRESSURE OF CONTROL CIRCUIT BY MACHINE MONITOR

1. Release the remaining pressure by referring to “RELEASE REMAINING PRESSURE FROM HYDRAULIC SYSTEM”.
2. Remove the cover (1) on the left and front side of the machine.



3. Disconnect hose (3).



3. Connect adapter C, and connect the disconnected hose again.
4. Install elbow A3 and nipple A2 to adapter C, and connect them to gauge A1.

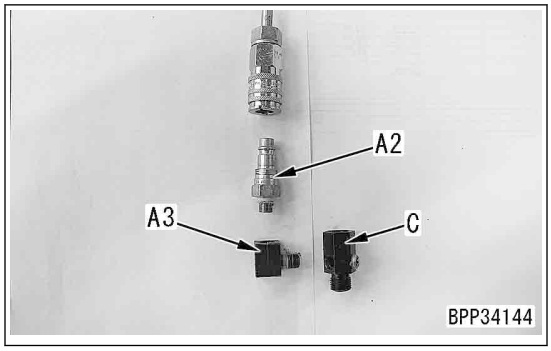
   REMARK

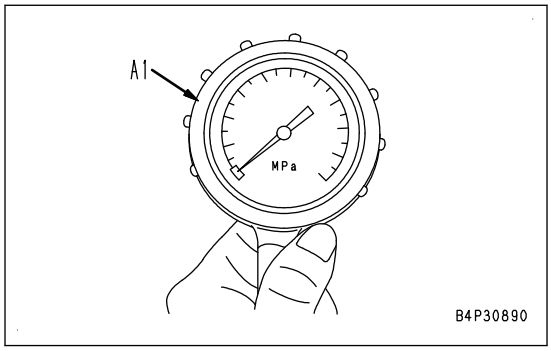
   Gauge in digital hydraulic tester B can also be used in place of gauge A1.
5. Start the engine to increase the hydraulic oil temperature to 45 to 55 °C.
6. Set the fuel control dial to MAX (High idle) position and operate each control levers and switches. Measure the outlet pressure when the solenoid valve is turned ON or OFF.

   REMARK

   For the conditions for turning the solenoid valve ON/OFF, see “OPERATING CONDITION OF SOLENOID VALVE”.

   For standard values, see STANDARD VALUE TABLE, “STANDARD VALUE TABLE FOR MACHINE”.





After finishing the test, remove the testing tools and restore the machine.

OPERATING CONDITION OF SOLENOID VALVE

(1) PPC lock solenoid valve operation table

Operating condition of solenoid valve		Operating state of solenoid valve
Lock lever	LOCK position (Lock)	OFF (De-energized)
	FREE position (Free)	ON (Energized)

(2) Operation table of 2nd travel speed selector solenoid valve

Operating condition of solenoid valve		Operating state of solenoid valve
Travel speed selector switch	OFF (Travel mode: Lo)	OFF (De-energized)
	ON (Travel mode: Hi)	ON (Energized)

TEST OIL LEAKAGE

Tools for testing oil leakage

Symbol	Part No.	Part name	Q'ty	Remarks
A	Commercially available	Measuring cylinder	1	
B	07376-70422	Plug	1	Size: 04
C	Commercially available	Block	1	

Check this item under the following conditions.

Hydraulic oil temperature: 45 to 55 °C

For testing of oil leakage to perform troubleshooting or periodic maintenance, refer to this section.

METHOD FOR TESTING OIL LEAKAGE FROM BOOM CYLINDER

1. Set the boom cylinder at RAISE stroke end, and stop the engine.
2. Release the remaining pressure from the piping on the boom cylinder head side. For details, see “RELEASE REMAINING PRESSURE FROM HYDRAULIC SYSTEM”.

   REMARK

   Operate the lever in the boom RAISE direction only to release the remaining pressure.
3. Disconnect hose (1) on the cylinder head side, and block the hose side by using plug B.

   ⚠ Be careful not to disconnect the hose on the cylinder bottom side.
4. Start the engine, and perform boom RAISE relief with the fuel control dial at MAX (High idle) position.

   ⚠ Be careful not to operate the lever to “Boom LOWER” side.
5. 30 seconds after relief starts, measure the leakage from the cylinder head side for 1 minute by using measuring cylinder A.

   For standard values, see STANDARD VALUE TABLE, “STANDARD VALUE TABLE FOR MACHINE”.

After finishing the test, remove the testing tools and restore the machine.

METHOD FOR TESTING OIL LEAKAGE FROM ARM CYLINDER

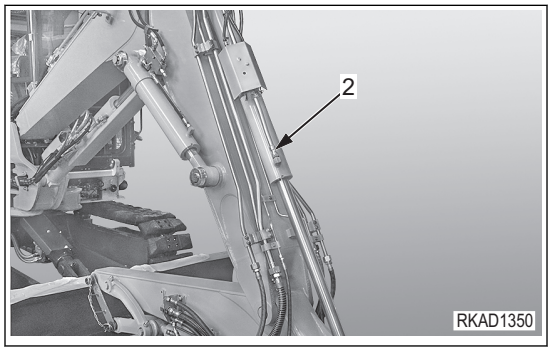
1. Set the arm cylinder at IN stroke end, and stop the engine.
2. Release the remaining pressure from the piping on the arm cylinder head side. For details, see “RELEASE REMAINING PRESSURE FROM HYDRAULIC SYSTEM”.

   REMARK

   Operate the lever in the arm IN direction only to release the remaining pressure.
3. Disconnect hose (2) on the cylinder head side and block the hose side by using plug B.

   ⚠ Be careful not to disconnect the hose on the cylinder bottom side.
4. Start the engine, and perform arm IN relief with the fuel control dial at MAX (High idle) position.

   ⚠ Be careful not to operate the lever to “Arm OUT” side.



Operator mode and service mode of machine monitor

Machine monitor has operator mode and service mode. Various information is displayed on multi-information display (a).

Some items are displayed automatically according to the configuration of the machine monitor whereas the other items can be displayed only when the machine monitor is operated with switches.

- Operator mode
  The information items in this mode are ordinarily displayed. The operator can display and set them by the operation with switches. (Display and setting of some items need special operation of switches.)
  For details, see Operation and Maintenance Manual.

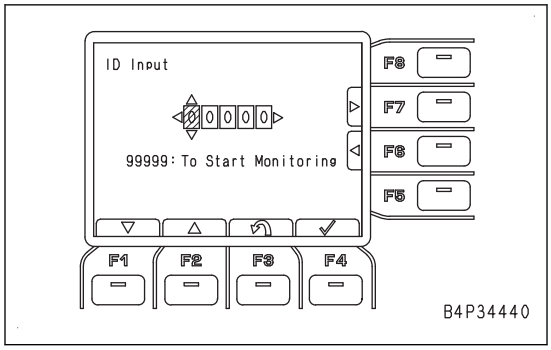
Operator mode
DISPLAY OF PASSWORD INPUT
MAINTENANCE TIME CAUTION LAMP
BASIC OPERATION OF MACHINE MONITOR WHEN STARTING ENGINE IN NORMAL SITUATION
BASIC OPERATION OF MACHINE MONITOR WHEN ENGINE IS STOPPED IN NORMAL SITUATION
BASIC OPERATION OF MACHINE MONITOR WHEN ENGINE IS STARTED WHILE ENGINE SHUTDOWN SECONDARY SWITCH IS ON
AUTO-DECELERATION FUNCTION
HOW TO USE WORKING MODE SELECTING FUNCTION
TRAVEL SPEED SELECTOR SWITCH
BUZZER CANCEL FUNCTION
SERVICE METER / CLOCK
MAINTENANCE SCREEN SETTING
USER MENU
BASIC OPERATION OF MACHINE MONITOR WHEN TROUBLE OCCURS WHILE OPERATING MACHINE
ACTION LEVEL DISPLAY

Following functions become operational by performing special operations.

CHECKING FUNCTION BY LCD (LIQUID CRYSTAL DISPLAY)
CHECKING FUNCTION OF SERVICE METER
METHOD FOR SETTING USAGE LIMITATION AND CHANGING PASSWORD

- Service Mode
  The information items in this mode are not ordinarily displayed. Technicians can change display and settings by operating the switches specially. This mode is used for testing, adjusting, or troubleshooting.

Service Mode
METHOD FOR CHECKING PRE-DEFINED MONITORING INFORMATION
METHOD FOR CHECKING SELF-DEFINE MONITORING INFORMATION
METHOD FOR CONFIRMING ABNORMALITY RECORD (MECHANICAL SYSTEMS)
METHOD FOR CONFIRMING ABNORMALITY RECORD (ELECTRICAL SYSTEMS)
METHOD FOR CONFIRMING MAINTENANCE RECORD
METHOD FOR OPERATING MAINTENANCE MODE SETTING
METHOD FOR OPERATING PHONE NUMBER ENTRY SETTING
METHOD FOR SETTING WITH DEFAULT SETTING MENU (KEY-ON MODE)



- If you press function switch F8 and input ID on Self-define Monitoring screen, the monitoring item is selected directly.

  F1: Decreases the number by 1

  F2: Increases the number by 1

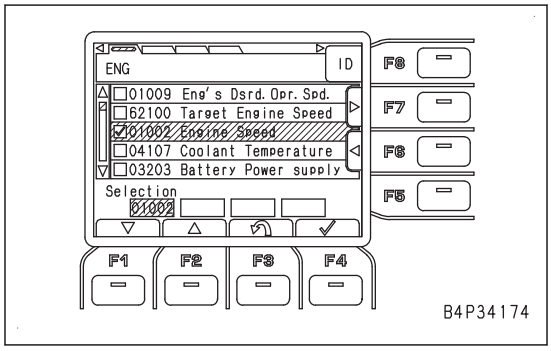
  F3: Cancels the input and returns to “Self-define Monitoring” screen

  F4: Enters the input value

  F6: Moves the selection leftward

  F7: Moves the selection rightward
- If the color of the selected box changes from yellow to red, the selection of the item of that box is entered.
- 4 monitoring items at maximum can be selected at the same time. However, it may not be possible to set up to 4 items depending on the display pattern of the selected items.

3. After selecting monitoring items, use the function switch to execute the monitoring.



  - Execution with function switch: Double click or keep pressing F4 for approximately 2 seconds.
  - When performing monitoring by inputting ID, input ID first, then input “99999” with the function switch, and enter with F4.

    F1: Decreases the number by 1

    F2: Increases the number by 1

    F3: Cancels the input and returns to “Self-define Monitoring” screen

    F4: Enters the input value

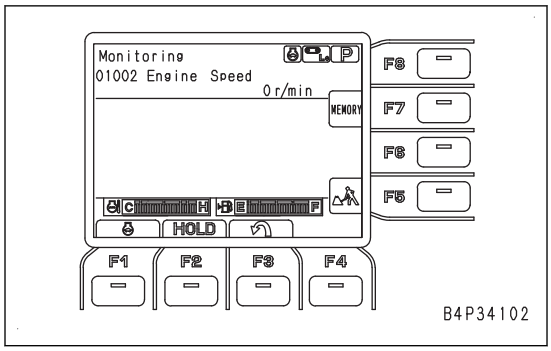
    F6: Moves the selection leftward

    F7: Moves the selection rightward
  - If monitoring items are selected up to the limit number, monitoring is executed automatically.

  REMARK

  When performing monitoring of only two items, select each item, and confirm them with F4. If F4 is pressed once again, monitoring is executed.

4. On “Monitoring” screen, perform the necessary operation of the machine and check the monitoring information.

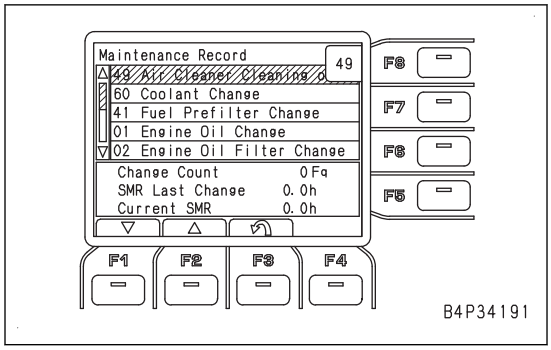


  REMARK

  - Monitoring information is indicated by value, ON/OFF, or special display.
  - The unit of display can be selected in “SI” unit, “Metric” unit, or “Imperial” unit with “Default” function in service mode.

2. When the “Maintenance Record” screen is displayed, use the function switch to select the confirmation item.
   F1: Moves the selection down by one item
   F2: Moves the selection up by one item
   F3: Returns the screen to “Service Menu” screen
   F8: Changes the screen to Code Input screen.

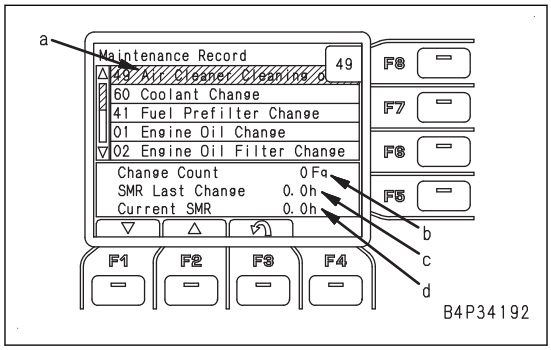
   REMARK
   Method of selecting is similar to “Service Menu” screen.



The following items can be selected on Maintenance Record

Code	Item
49	Air Cleaner Clean and Change
60	Coolant Change
41	Fuel Prefilter Change
01	Engine Oil Change
02	Engine Oil Filter Change
05	Hyd Oil Tank Breather Change
03	Fuel Main Filter Change
04	Hydraulic Oil Filter Change
08	Final Drive Case Oil Change
10	Hydraulic Oil Change
48	KDPF Filter Cleaning

Items displayed on Maintenance Record screen
a: Maintenance items
b: Number of replacements up to now
c: Service meter reading (SMR) at the last replacement
d: Current service meter reading (SMR)



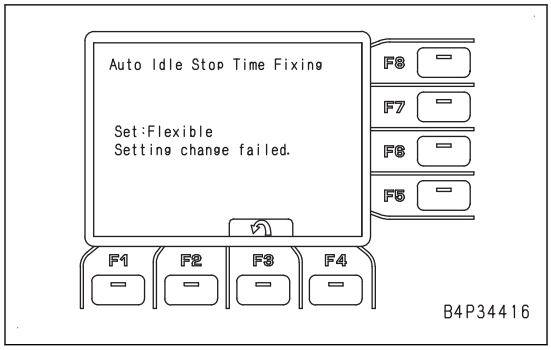
METHOD FOR OPERATING MAINTENANCE MODE SETTING

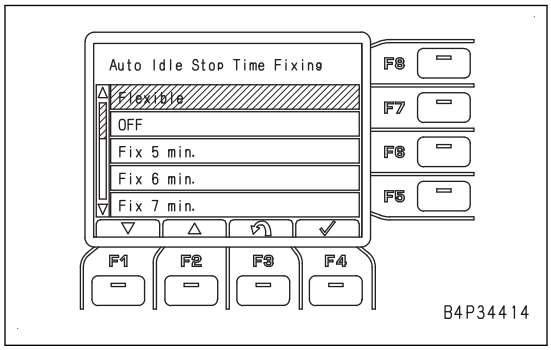
Following can be changed from the menu screen. Enable or disable the function of maintenance items and set the replacement interval of maintenance items.

- Enable or disable the function of maintenance items.
- To change the replacement interval setting of maintenance items (by item).
- To initialize all of the replacement interval setting of maintenance items.

- This is an example of screen when your change was not applied successfully.

  When the setting is not applied successfully, the screen returns to “Auto Idle Stop Time Fixing” screen after pressing F3.



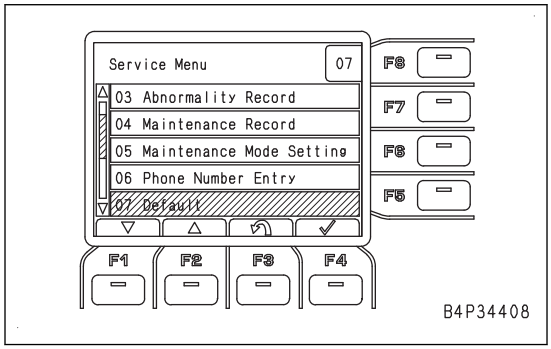


METHOD FOR SETTING WITH DEFAULT SETTING MENU (WITH/WITHOUT QUICK COUPLER)

Default setting menu is used to check or change default values of the machine monitor and the machine.

For setting With/Without, refer to this section.

1. Select “Default” on “Service Menu” screen.



2. On “Default” screen, select “With/Without Quick Coupler” with function switches or numeral input switches.

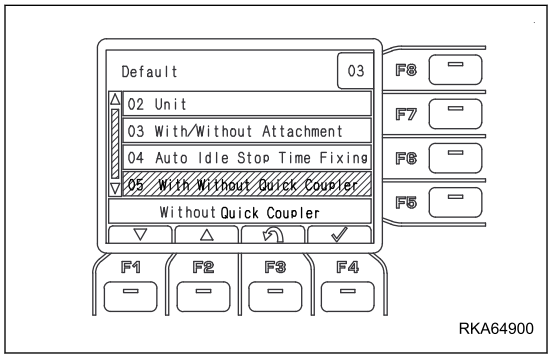
   F1: Moves the selected item down by one item

   F2: Moves the selected item up by one item

   F3: Returns the display to the “Service Menu” screen

   F4: Enters the selected item

   F8: Moves to the code entry screen



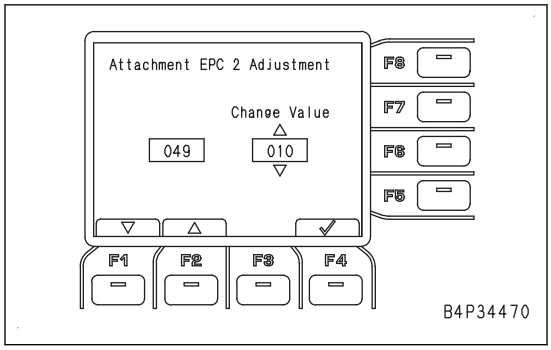
3. On “Attachment EPC 2 Adjustment” screen, select the desired value at the right side by using the function switches.

   Set value: For the actual adjustment value of attachment EPC current, see the table.

   F1: Decreases the set value

   F2: Increases the set value

   F4: Checks and enters setting. Returns to “Adjustment” screen.



REMARK

The 3-digit number in the left column does not change since it is the code of this function.

Relationship between set value and attachment EPC current adjustment value

Code	Set value	Attachment EPC current adjustment value
049	000	-100 mA
	001	-90 mA
	002	-80 mA
	003	-70 mA
	004	-60 mA
	005	-50 mA
	006	-40 mA
	007	-30 mA
	008	-20 mA
	009	-10 mA
	010	0 mA
	011	10 mA
	012	20 mA
	013	30 mA
	014	40 mA
	015	50 mA
	016	60 mA
	017	70 mA
	018	80 mA
	019	90 mA
	020	100 mA

METHOD FOR ADJUSTING WITH ADJUSTING MENU (ATTACHMENT EPC 3 ADJUSTMENT)

Adjustment menu is used to check the various settings of the machine or to adjust the value.

“Attachment EPC 3 Adjustment” function adjusts the current of attachment EPC3.

METHOD FOR STARTING UP KOMTRAX TERMINAL

Method for starting up komtrax terminal

Observe the following for using KOMTRAX.

1. KOMTRAX key person performs “Machine Registration” by using KOMTRAX client PC.
2. Perform “KOMTRAX Communication Inspection”.
   - For operation procedures, see “Global KOMTRAX Web Reference Manual (For Key Person)”.
   - Operating the KOMTRAX client PC requires the KOMTRAX key person authority of each distributor. Therefore, consult the KOMTRAX key person before using it.

When KOMTRAX terminal is replaced

Observe the following when replacing KOMTRAX terminal and using it again.

1. Our technician provides a new terminal, and records the part number and serial number.
2. Our technician replaces the terminal, and perform “KOMTRAX Communication Inspection”. Our technician notifies KOMTRAX key person of the completion of inspection work and new terminal information.
3. KOMTRAX key person performs “Terminal Replacement” by using KOMTRAX client PC.
4. KOMTRAX key person fills in required items on “Terminal Replacement Sheet”, and send it by email to KOMTRAX support center via KOMTRAX administrator in the subsidiary.
   - For details, see “Global KOMTRAX Web Reference Manual (For Key Person)”.
   - Operating the KOMTRAX client PC requires the KOMTRAX key person authority of each distributor. Therefore, consult the KOMTRAX key person before using it.

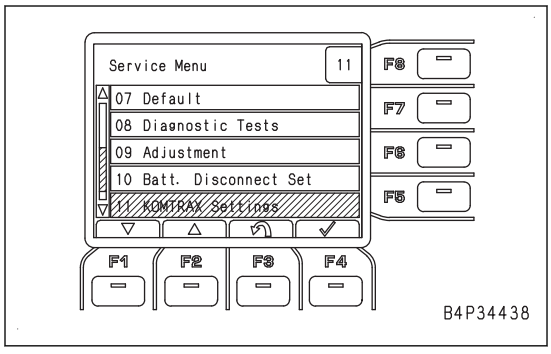
Machine side inspection for KOMTRAX Communication opening

- KOMTRAX Communication Inspection must be done to check whether normal communication is available from the terminal when the KOMTRAX terminal is replaced or started up.
- By performing this inspection, KOMTRAX starts communication.
- GPS and data communication are checked during the radio station establishment. Accordingly, it is preferable to place the machine under the open sky where radio wave from the satellite is not blocked. The radio station establishment may not be completed when the machine is placed indoor where radio wave from the satellite is blocked.

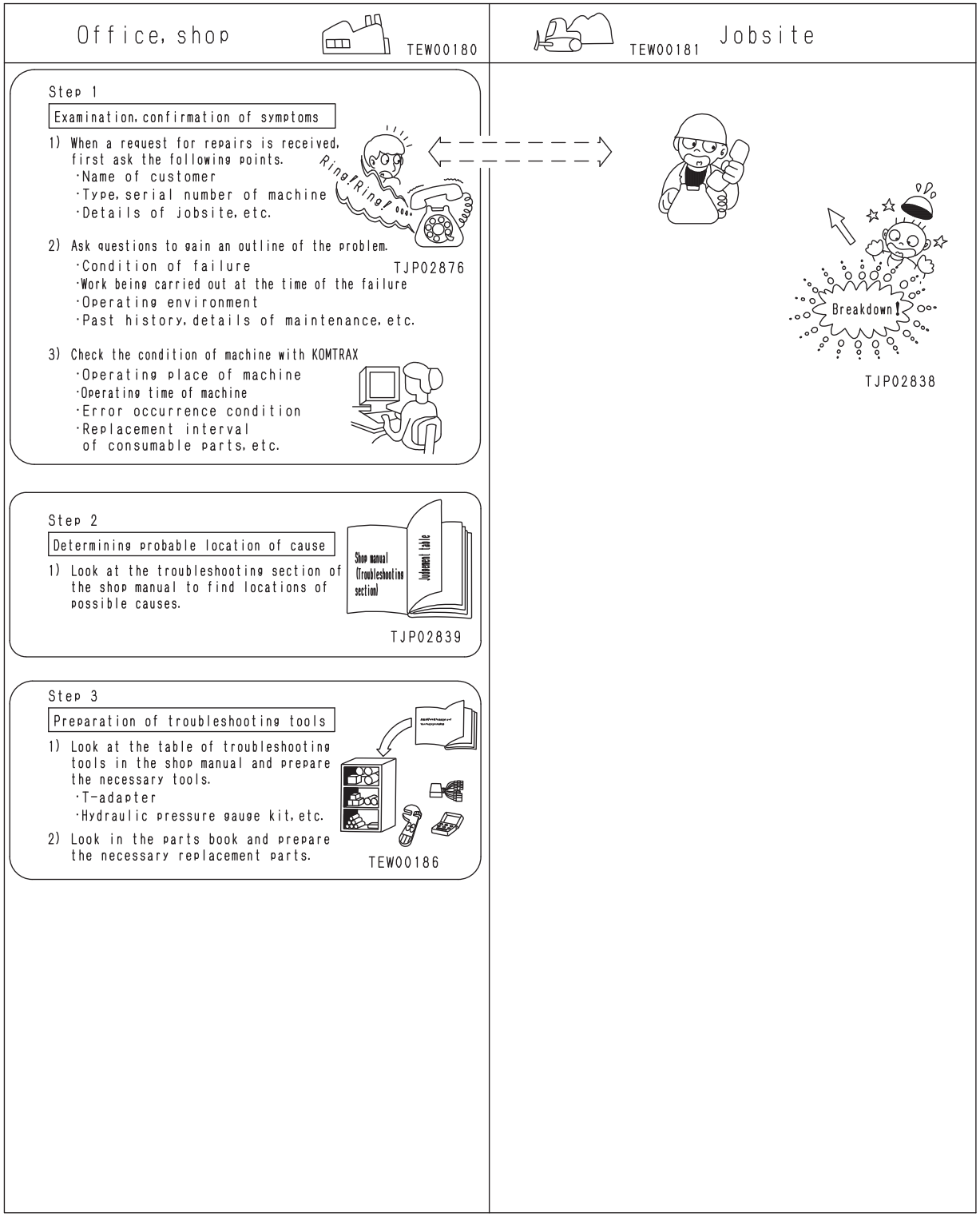
1. Check the machine for KOMTRAX Communication Inspection

   Observe the following when checking if KOMTRAX Communication Inspection is to be performed or not.

   1) On “Service Menu” screen, use the function switch to select “KOMTRAX Settings”.



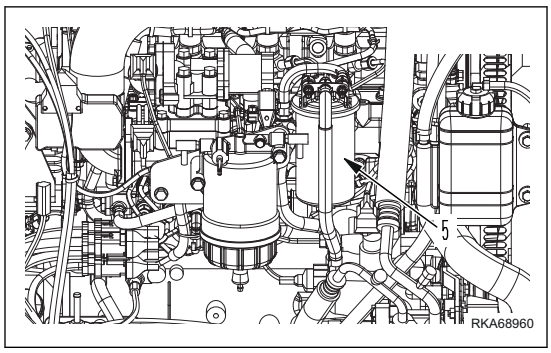
SEQUENCE OF EVENTS IN TROUBLESHOOTING



5. Turn the fuel filter cartridge (5) counterclockwise by using the filter wrench, and remove it.

   After removing the fuel filter cartridge (5), fuel drips down from the fuel filter head.

   In order to prevent flowing out of the fuel, be sure not to leave the machine with the fuel filter cartridge (5) removed.



6. Clean the mounting face of the fuel filter cartridge.
7. Apply thin film of fuel to the packing face.
8. Install the fuel filter cartridge to the mounting face of fuel filter cartridge.

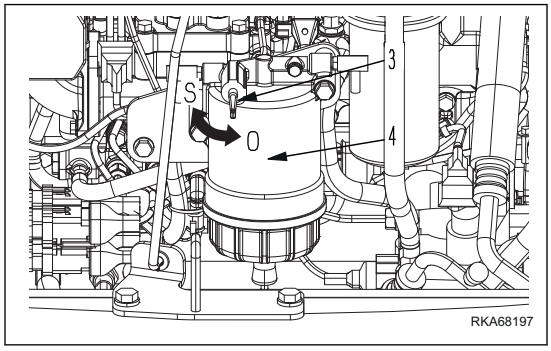
   When installing the fuel filter cartridge, turn it clockwise to bring the packing surface into contact with the seal surface of fuel filter cartridge, and then tighten it approximately 1 turn by using filter wrench.

   Tightening torque:
   19.6 to 23.5 Nm {2.0 to 2.4 kgm}

   If the fuel filter cartridge is tightened too far, the packing will be damaged and this will lead to leakage of fuel. If it is tightened too loose, fuel will also leak from the packing, so always tighten to the specified angle.

   When tightening with a filter wrench, be extremely careful not to dent or damage the filter.

9. Turn the handle (3) of water separator (4) to OPEN position (O).



10. After completing the replacement of the fuel filter cartridge, bleed air from the fuel circuit.

    For bleeding air, see “METHOD FOR BLEEDING AIR FUEL SYSTEM”.

11. After completing air bleeding from the fuel circuit, start the engine and run it at low idle for 10 minutes.
12. Check the filter seal surface for fuel leakage.

    If the fuel leaks, check according to the following procedure.

    1) Check the fastening condition of the fuel filter cartridge.
    2) If the fuel leaks, remove the fuel filter cartridge.
    3) Check the packing surface for damage and pinching of foreign material.

       If it has damage or pinching of foreign material, replace the fuel filter cartridge with a new one.
    4) Install the fuel filter cartridge.
    5) Check the filter seal surface for fuel leakage, and if the fuel leaks, check it again.

13. Remove cover support lever (2) and fix it to the lever lock securely.
14. Close engine hood (1).

CHECK ENGINE OIL LEVEL (OIL AMOUNT IN OIL PAN)

⚠ Immediately after the engine is stopped, its parts and oil are still very hot, and may cause burn injury. Accordingly, wait until all parts have cooled down before starting the work.

REMARK

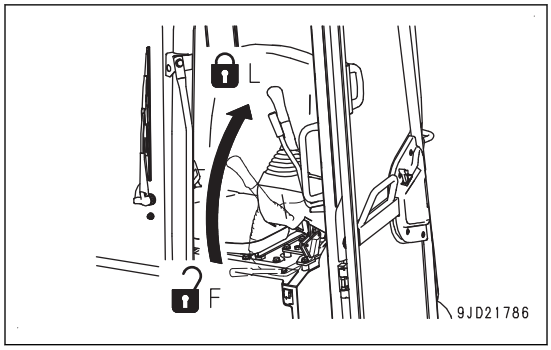
- When checking the oil level after the engine has been operated, wait at least 15 minutes after stopping the engine.
- If the machine is inclining, make it level before checking.

8) Set the lock lever to LOCK position (L).

9) Stop the engine.

2. Open dirt cover (1).

   Open dirt cover (1) fully and it will be secured by cover support lever (2).



3. Remove the cap of oil filler port (F) gradually to release the internal pressure.

   Release the internal pressure.

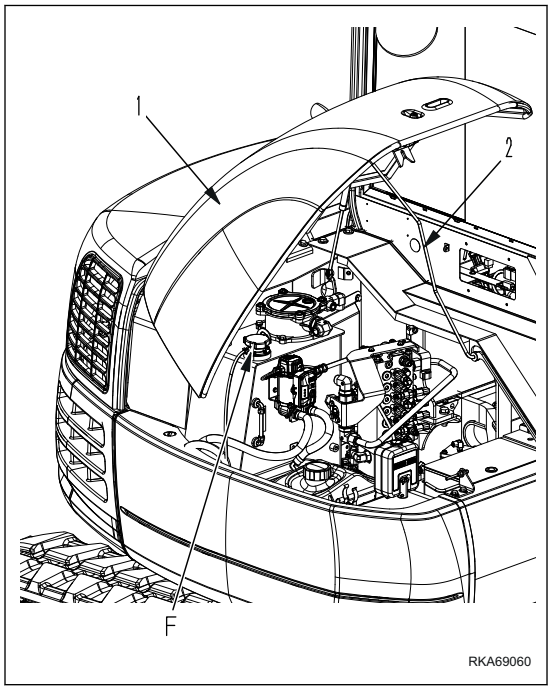
4. Place the oil container under the drain plug (P) at the bottom of the machine to catch the drained oil.

5. Remove the drain plug (P) to drain the oil.

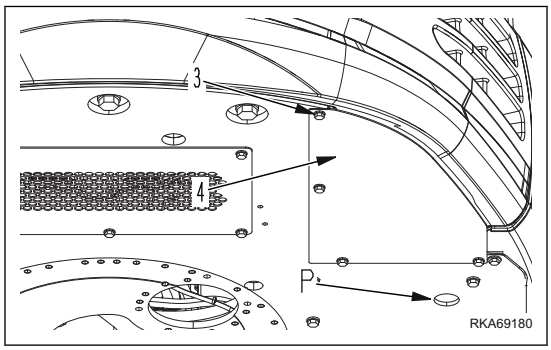
   When removing the drain plug (P), be careful not to get oil on yourself.

6. After draining the oil, tighten the drain plug (P).

   Tightening torque:
   80±8 Nm



7. Loosen the bolts (3) and remove the undercover (4).



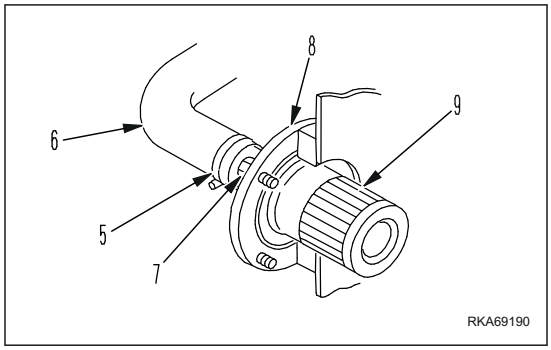
8. Loosen the hose clamp (5), remove the hose (6) and drain the oil.

9. Remove bolt (7), remove the flange (8), strainer (9) and remove dirt, etc. stuck to the tube, and then wash it in clean diesel fuel or flushing oil.

   If strainer (9) is damaged, replace it with a new strainer.

10. Install flange (8) with the strainer (9), check the gasket and the hose (6) are in good condition and fix them with the clamp (5).

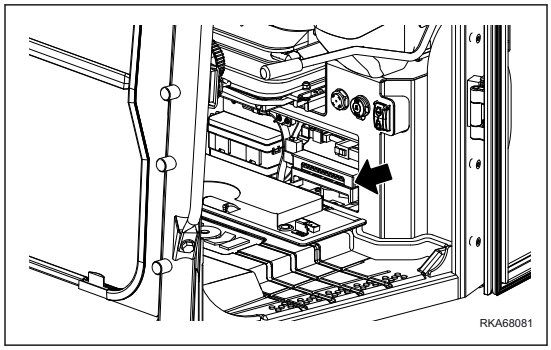
11. Fix the flange (8) with bolt (7).

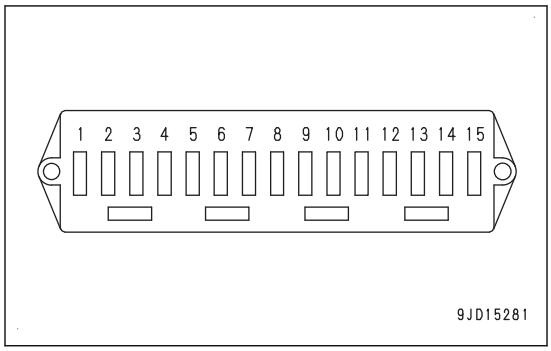


12. Install the undercover (4) with bolts (3).

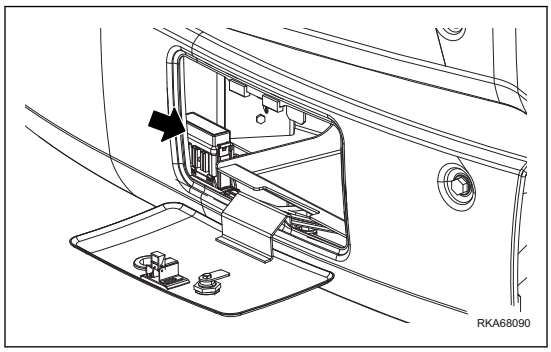
13. Add the refill capacity of oil through the oil filler port (F) of the hydraulic tank.

24. The fuse holder is provided inside the cover under the operator's seat.





25. Open the box on the left side and you will see fusible links.



Check of alternator voltage (when engine speed is medium or higher)

26. Open the engine hood.
27. Connect the positive (+) lead of the multimeter to alternator (B) terminal and connect the negative (-) lead to the chassis ground.
28. Start the engine and warm it up, and measure the voltage while running the engine at a medium or a higher speed.

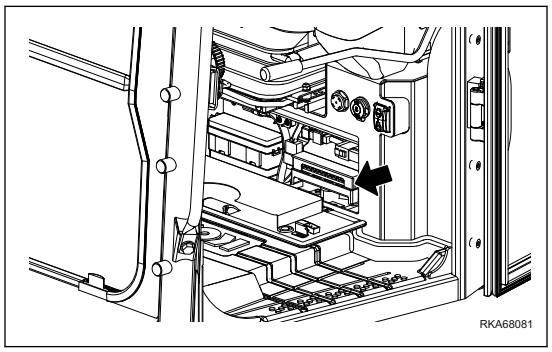
    REMARK

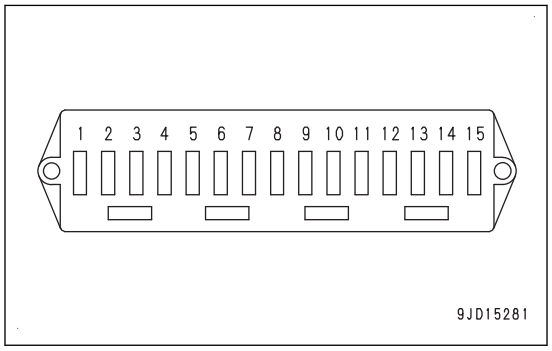
    If the voltage is abnormal, repair or replace the alternator.

No.	Symptom of failure	Troubleshooting Index
100	KOMTRAX system does not operate normally.	E-35
101	Air conditioner does not operate normally.	“PROCEDURE FOR TESTING AND TROUBLESHOOTING” in Chapter 80

Locations of fuse boxes and fuse No.

*: The fuse holder is provided inside the cover under the operator's seat.





Failure code	Failure (Displayed on screen)	Applicable component	Action level	History category	Remarks
#B2455	FAILURE CODE [#B2455] KDPF Differential Pressure Sens Error (High Volt)	ENG	L03	Electrical system	*1
#B2458	FAILURE CODE [#B2458] Defective Regeneration (StationaryRegene. Failure)	ENG	L04	Electrical system	*1
#B2459	FAILURE CODE [#B2459] Defective Regeneration (StationaryR Not Performed)	ENG	L04	Electrical system	*1
#B2463	FAILURE CODE [#B2463] Overaccumulation (Method C)	ENG	L04	Electrical system	*1
#BG10B	FAILURE CODE [#BG10B] CAN1 (for EGR): Reception Time Out	ENG	L03	Electrical system	*1
#BG167	FAILURE CODE [#BG167] Immobilizer CAN communication error	ENG	L04	Electrical system	*1
#BG292	FAILURE CODE [#BG292] TSC1 (CAN Message) Reception Time Out (SA1)	ENG	L01	Electrical system	*1
#BG401	FAILURE CODE [#BG401] EGR ECM Data Error	ENG	L03	Electrical system	*1
#BG426	FAILURE CODE [#BG426] Immobilizer system error	ENG	L04	Electrical system	*1
#BH292	FAILURE CODE [#BH292] Y_ECR1 (CAN Message) Reception Time Out	ENG	L01	Electrical system	*1
#BH293	FAILURE CODE [#BH293] Y_EC (CAN Message) Reception Time Out	ENG	L01	Electrical system	*1
#BH303	FAILURE CODE [#BH303] Y_DPFIF (CAN Message) Reception Time Out	ENG	L01	Electrical system	*1
#BH401	FAILURE CODE [#BH401] EGR Target Value Out of Range	ENG	L03	Electrical system	*1

- In this table, failure codes are arranged in alphabetical order.
- Applicable component is the controller which checks the system.

  MON: Machine monitor

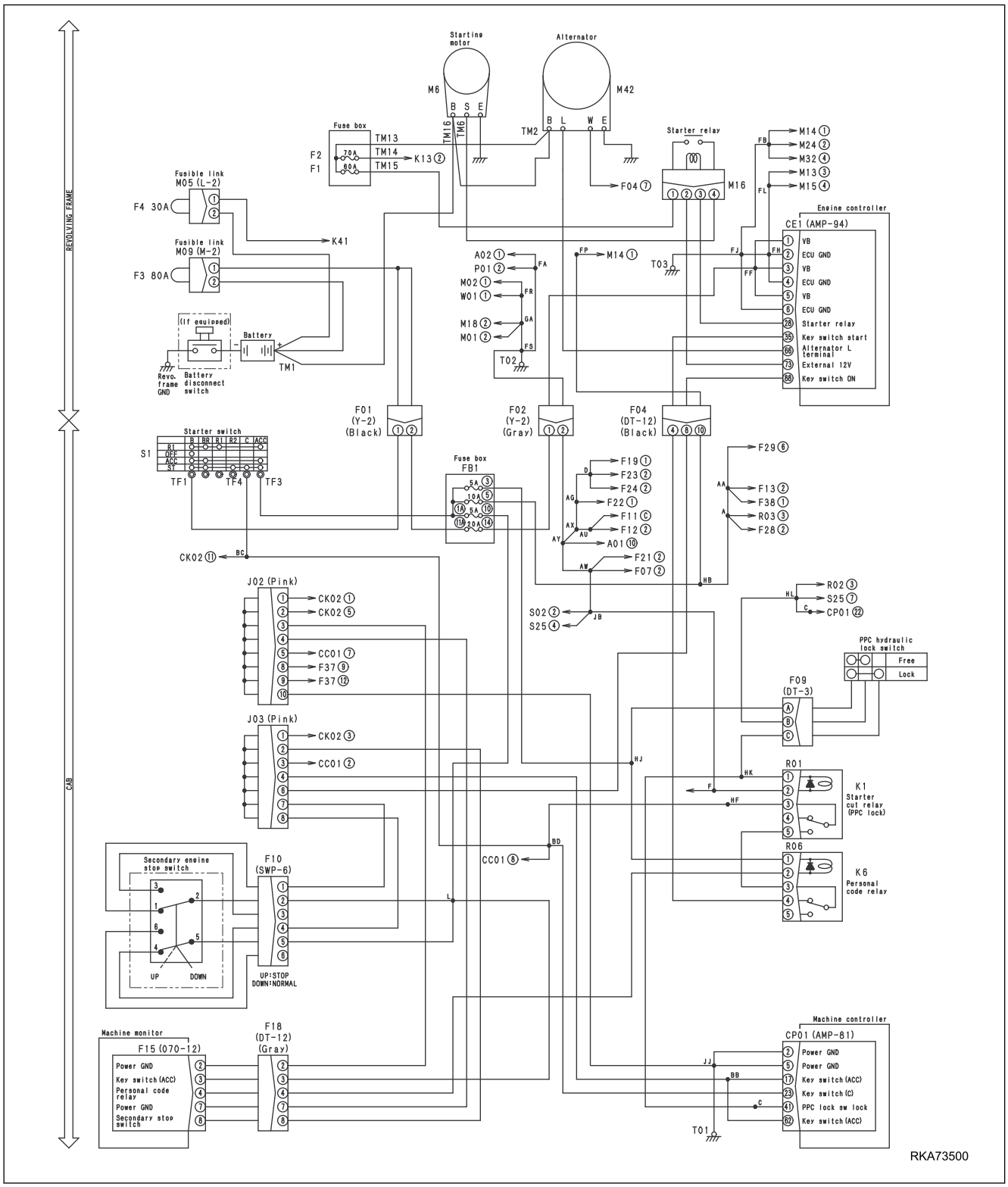
  ENG: Engine controller

  MACHINE: Machine controller

  KOMTRAX: KOMTRAX terminal
- The failure codes that do not have numbers in the action level columns are not displayed on the standard screen even when a failure related to them occurs. They are simply recorded in the abnormality record (electrical system or mechanical system) of the service menu.
- History category means the classification of either electrical system or mechanical system which is used for storage in the Failure History of the service menu.

*1: For troubleshooting concerning this failure code, see “ Shop Manual Engine 86E-7 to 98E-7 series”.

Circuit diagram related to personal code relay



FAILURE CODE [DAF0MB]

Action level	Failure code	Failure	Monitor ROM Abnormality (Machine monitor system)
-	DAF0MB		
Detail of failure	Machine monitor program is rewritten (program error).		
Action of controller	Even if cause of failure is eliminated, machine does not become normal until starting switch is turned to OFF position.		
Phenomenon on machine	• Machine monitor display is unreliable. • It can neither transmit the data to controllers nor receive the data from them.		
Related information	After completion of repair, check if the failure code is cleared by the following procedure. Procedure: Turn the starting switch to ON position.		

No.	Cause	Procedure, measuring location, criteria and remarks
1	Defective machine monitor	Defective machine monitor (Because this is an internal defect, troubleshooting cannot be performed.)

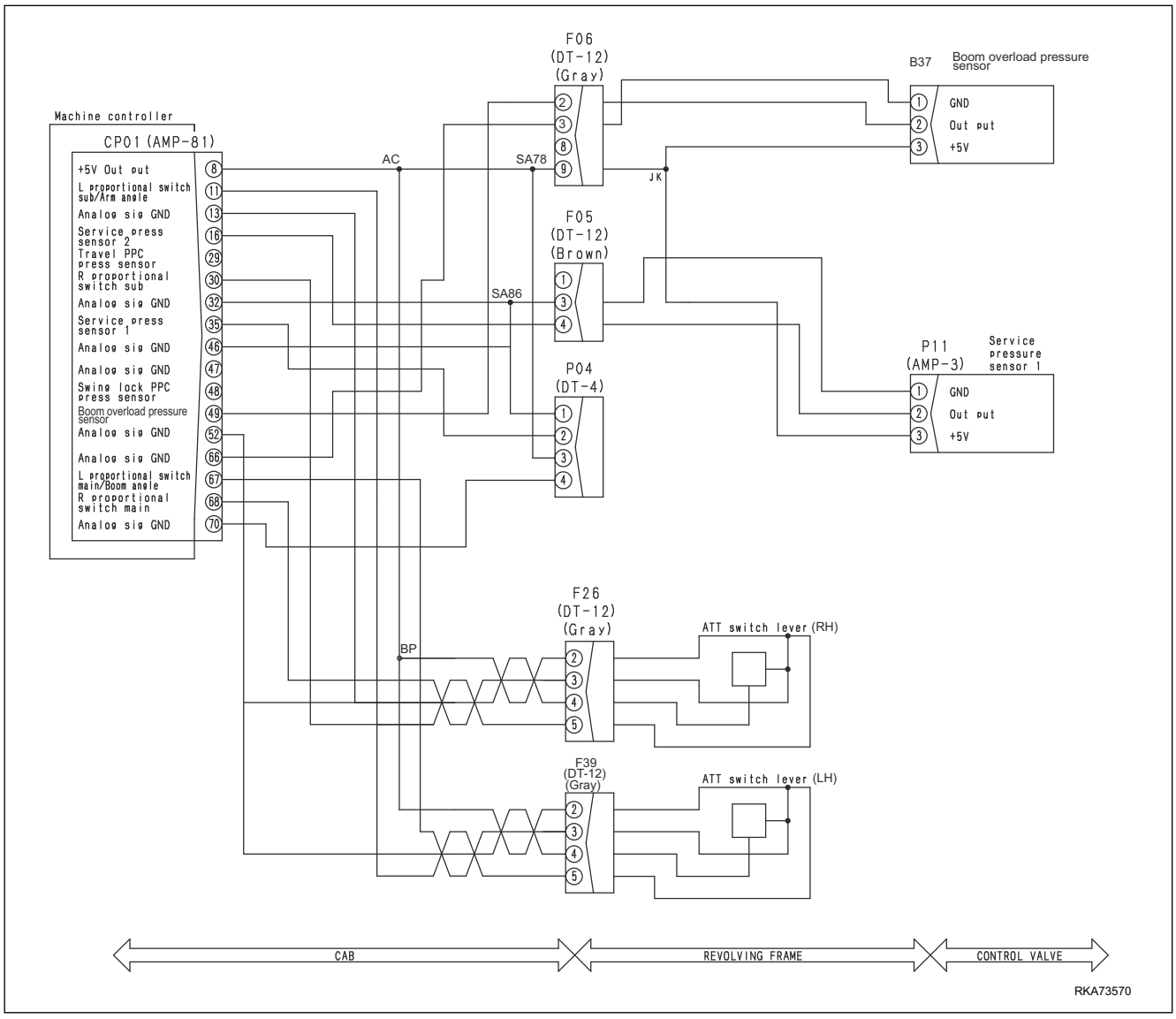
FAILURE CODE [DAFQKR]

Action level	Failure code	Failure	CAN 2 Defective Communication (Monitor) (KOMTRAX system)
-	DAFQKR		
Detail of failure	KOMTRAX terminal does not recognize machine monitor through CAN communication 2 line.		
Action of controller			
Phenomenon on machine	System may not operate normally.		
Related information	• After completion of repair, check if the failure code is cleared by the following procedure. Procedure: Turn the starting switch to ON position. • ACC signal of starting switch is the command to start CAN communication for each controller. • Failure code is transmitted to and displayed on machine monitor by CAN communication. If CAN communication with machine monitor fails, failure code [DAFQKR] is not displayed on machine monitor. It can be observed only through KOMTRAX system. • Since each controller and machine monitor are connected directly to the battery, they are supplied with power even after the starting switch is turned to OFF position. • Since signal of active CAN communication line is pulse voltage, it cannot be measured by using multimeter.		

No.	Cause	Procedure, measuring location, criteria and remarks
1	Defective power supply to machine monitor	Perform troubleshooting for “When starting switch is turned to ON position, machine monitor displays nothing” of E mode.
2	Defective CAN communication	Perform checks on cause 4 and subsequent causes in troubleshooting for failure code [DBHQKR].

No.	Cause	Procedure, measuring location, criteria and remarks		
4	Hot short circuit in wiring harness (Contact with 12 V circuit)	Measure voltage before controller stops output of power. 1. Turn the starting switch to OFF position. 2. Disconnect connectors P11, B37, F26 and F39. 3. Connect T-adapter to female side of connector P02. 4. Turn the starting switch to ON position (with connector disconnected).		
		Voltage	Between B37 (female) (3) and ground	4.5 to 5.5 V
5	Ground fault in wiring harness (Contact with ground circuit)	1. Turn the starting switch to OFF position. 2. Disconnect connectors P11, B37, F26 and F39. 3. Connect T-adapter to female side of connector CP01.		
		Resistance	Between CP01 (female) (8) and ground	Min. 1 MΩ

Circuit diagram related to machine controller 5V sensor power supply



FAILURE CODE [DDNRKA]

Action level	Failure code	Failure	Work Equipment Lever Lock Switch Open Circuit (Machine controller system)
L03	DDNRKA		
Detail of failure	• No current flows on the PPC lock lever relay side when the work equipment lock lever is in RELEASE position, so the open circuit is detected. • No current flows on the controller side when the work equipment lock lever is in LOCK position, so the open circuit is detected.		
Action of controller	• None in particular (Lock lever automatic lock control may operate wrongly.) • If cause of failure disappears, machine becomes normal by itself.		
Phenomenon on machine	• Starting motor does not start. • All work equipment, swing and travel does not work.		
Related information	• State of lock lever can be checked with monitoring function. (Code: 02203) • After completion of repair, check if the failure code is cleared by the following procedure. Procedure: Turn the starting switch to ON position, and lock and unlock work equipment lock lever.		

No.	Cause	Procedure, measuring location, criteria and remarks		
1	Defective fuse	If fuse No.3 in fuse box FB1 is blown out, circuit probably has ground fault, etc.		
2	Defective work equipment lever lock switch	Perform troubleshooting for failure code [DDNRKY].		
3	Open circuit in wiring harness	1. Turn the starting switch to OFF position. 2. Check that the system operating lamp goes off, then turn the battery disconnect switch to OFF position. 3. Remove fuse No. 3 in fuse box FB1. 4. Disconnect connectors CP01 and F09, and connect T-adapter to female side of CP01 and male side of F09.		
		Resistance	Between F09 (male) (A) and FB1 (3)	Max. 1 Ω
			Between CP01 (female) (41) and F09 (male) (C)	Max. 1 Ω
			Between CP01 (female) (22) and F09 (male) (B)	Max. 1 Ω
4	Defective machine controller	If no failure is found by preceding checks, work equipment controller is defective. (Since this is an internal defect, troubleshooting cannot be performed.)		

FAILURE CODE [DFB1KZ]

Action level	Failure code	Failure	Service Lever Potentio 1 Open or Short Circuit (Machine controller system)
L01	DFB1KZ		
Detail of failure	When attachment proportional switch of service lever 1 (right lever) was used, abnormality was detected in circuit.		
Action of controller	• Stops driving attachment flow rate adjustment EPC2 solenoid. • Stops driving attachment flow rate adjustment EPC5 solenoid.		
Phenomenon on machine	Attachment does not operate.		
Related information	• This failure code is displayed only when attachment 1 (with Attachment) or attachment 2 (with Attachment) is set. • Service lever 1 (right lever) potentiometer 1 signal voltage can be checked with the monitoring function (code: 42008). • After repairing, check if the failure code is cleared by the following procedure. Procedure: Turn the starting switch to ON position and set machine in attachment mode (ATT).		

No.	Cause	Procedure, measuring location, criteria and remarks			
1	Defective 5 V sensor 1 power supply system	If failure code [DBH5KP] is also displayed, perform troubleshooting these first.			
2	Defective service lever 1 (right iever) potentiometer (internal defect)	1. Turn the starting switch to OFF position. 2. Disconnect connector F26, and connect T-adapter to female side. 3. Turn the starting switch to ON position.			
		Voltage	Between F26 (female) (5) and (4)	RAISE	4.3±0.2 V
				NEUTRAL	2.5 V
				LOWER	0.7±0.2 V
3	Open circuit in wiring harness	1. Turn starting switch to OFF position. 2. Disconnect connector CP01 and F26, and connect T-adapters to each female side.			
		Resistance	Between CP01 (female) (68) and F26 (5)		Max. 1 Ω
			Between CP01 (female) (8) and F26 (2)		Max. 1 Ω
4	Ground fault in wiring harness (Contact with ground circuit)	1. Turn starting switch to OFF position. 2. Disconnect connector CP01, and connect T-adapter to female side.			
		Resistance	Between CP01 (female) (68) and ground		Min. 1 MΩ
5	Defective machine controller	1. Turn the starting switch to OFF position. 2. Disconnect connector CP01, and connect T-adapter to female side.			
		Resistance	Between CP01 (female) (13) and (8)		4.0 to 6.0 kΩ
			Between CP01 (female) (68) and (13)		0.25 to 5.0 kΩ
			Between CP01 (female) (68) and (8)		0.25 to 5.0 kΩ
			Between CP01 (female) (68) and ground		Min. 1 MΩ

FAILURE CODE [DFB6KZ]

Action level	Failure code	Failure	Service Lever sub-Potentio 2 Open or Short Circuit (Machine controller system)
-	DFB6KZ		
Detail of failure	When attachment proportional switch of service lever 2 (left lever) was used, abnormality was detected in circuit.		
Action of controller	• Stops driving attachment flow rate adjustment EPC3 solenoid. • Stops driving attachment flow rate adjustment EPC4 solenoid.		
Phenomenon on machine	Attachment 2 does not operate.		
Related information	• This failure code is displayed by only machine equipped with attachment proportional switch. • Service lever 2 (left lever) sub potentiometer signal voltage can be checked with the monitoring function (code: 42011). • After repairing, check if the failure code is cleared by the following procedure. Procedure: Turn the starting switch to ON position and set machine in attachment mode (ATT).		

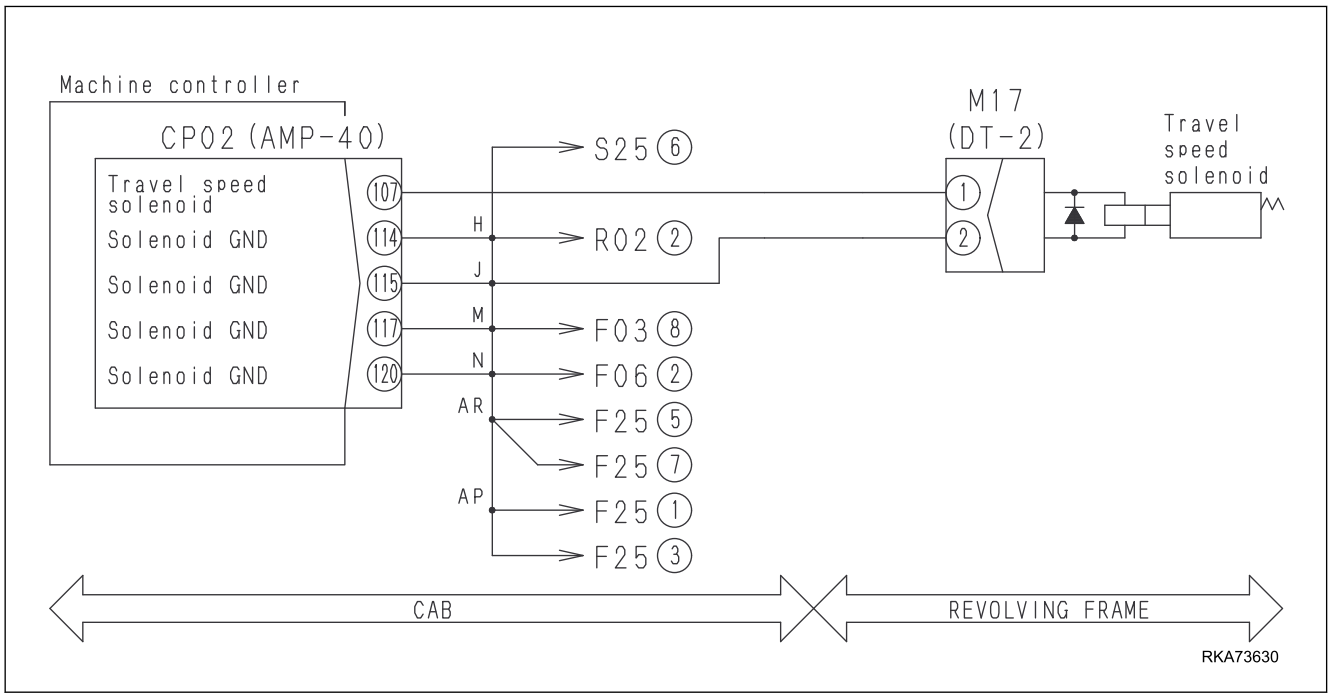
No.	Cause	Procedure, measuring location, criteria and remarks			
1	Defective 5 V sensor 1 power supply system	If failure code [DBH5KP] is also displayed, perform troubleshooting these first.			
2	Defective service lever 2 (left lever) potentiometer (internal defect)	1. Turn the starting switch to OFF position. 2. Disconnect connector F29, and connect T-adapter to female side. 3. Turn the starting switch to ON position.			
		Voltage	Between F29 (female) (3) and (4)	RAISE	0.7±0.2 V
				NEUTRAL	2.5 V
				LOWER	4.3±0.2 V
3	Open circuit in wiring harness	1. Turn starting switch to OFF position. 2. Disconnect connector CP01 and F29, and connect T-adapters to each female side.			
		Resistance	Between CP01 (female) (11) and F29 (3)		Max. 1 Ω
			Between CP01 (female) (8) and F29 (2)		Max. 1 Ω
4	Ground fault in wiring harness (Contact with ground circuit)	1. Turn starting switch to OFF position. 2. Disconnect connector CP01, and connect T-adapter to female side.			
		Resistance	Between CP01 (female) (11) and ground		Min. 1 MΩ
5	Defective machine controller	1. Turn the starting switch to OFF position. 2. Disconnect connector CP01, and connect T-adapter to female side.			
		Resistance	Between CP01 (female) (13) and (8)		4.0 to 6.0 kΩ
			Between CP01 (female) (11) and (13)		0.25 to 5.0 kΩ
			Between CP01 (female) (11) and (8)		0.25 to 5.0 kΩ
			Between CP01 (female) (67) and ground		Min. 1 MΩ

FAILURE CODE [DKULKY]

Action level	Failure code	Failure	Proportional Pressure Control Lock Relay Hot Short Circuit (Machine controller system)
L03	DKULKY		
Detail of failure	Hot short circuit is detected in the circuit when output to PPC lock relay (coil side) is stopped (during lock lever automatic lock control).		
Action of controller	• None in particular. • If cause of failure disappears, machine becomes normal by itself.		
Phenomenon on machine	When the lock lever is unlocked while the work equipment control lever or the travel lever is operated, the lock lever automatic lock system does not function.		
Related information	After completion of repair, check if the failure code is cleared by the following procedure. Procedure: Start the engine, and lock the lock lever.		

No.	Cause	Procedure, measuring location, criteria and remarks		
1	Hot short circuit in wiring harness	1. Turn the starting switch to OFF position. 2. Disconnect relay R02 K2, and connect T-adapter to female side. 3. Turn the starting switch to ON position.		
		Voltage	Between R02 K2 (female) (1) and ground	Max. 4.5 V
2	Defective machine controller	If no failure is found by preceding checks, work equipment controller is defective. (Since this is an internal defect, troubleshooting cannot be performed.)		

Circuit diagram related to travel Hi/Lo solenoid



FAILURE CODE [DXE7KA]

Action level	Failure code	Failure	Attachment Flow Regulating EPC2 Solenoid Open Circuit (Machine controller system)
-	DXE7KA		
Detail of failure	When attachment flow rate adjustment EPC2 solenoid is driven, no current flows in the circuit, so the open circuit is detected.		
Action of controller	• Stops driving attachment flow rate adjustment EPC2 solenoids. • Also sets output command to attachment flow rate adjustment EPC5 solenoid to 0 mA. • Even if cause of failure disappears, machine does not become normal until starting switch is turned to OFF position.		
Phenomenon on machine	Attachment does not move.		
Related information	• Drive current of attachment flow rate adjustment EPC2 solenoid can be checked with monitoring function (code: 01702). • After repairing, check if the failure code is cleared by the following procedure. Procedure: Turn the starting switch to ON position and set machine in attachment mode (ATT).		

No.	Cause	Procedure, measuring location, criteria and remarks		
1	Defective attachment flow rate adjustment EPC2 (internal open circuit)	1. Turn starting switch to OFF position. 2. Disconnect connector F29, and connect T-adapter to male side.		
		Resistance	Between V02 (male) (1) and (2)	3 to 15 Ω
2	Open circuit in wiring harness	1. Turn starting switch to OFF position. 2. Disconnect connectors CP02 and F29, and connect T-adapters to each female side.		
		Resistance	Between CP02 (female) (103) and F29 (female) (2)	Max. 1 Ω
			Between each of CP02 (female) (114), (115), (117), (120) and F29 (female) (1)	Max. 1 Ω
3	Defective machine controller	If no failure is found by preceding checks, machine controller is defective. (Since this is an internal defect, troubleshooting cannot be performed.)		

FAILURE CODE [DXE8KY]

Action level	Failure code	Failure	Attachment Flow Regulating EPC3 Hot Short Circuit (Machine controller system)
-	DXE8KY		
Detail of failure	Current flows when driving attachment flow rate adjustment EPC3 solenoid circuit stops.		
Action of controller	• Stops driving attachment flow rate adjustment EPC3 solenoids. • Also sets output command to attachment flow rate adjustment EPC4 solenoid to 0 mA. • Even if cause of failure disappears, machine does not become normal until starting switch is turned to OFF position.		
Phenomenon on machine	Attachment does not move.		
Related information	• Drive current of attachment flow rate adjustment EPC3 solenoid can be checked with monitoring function (code: 01703). • After repairing, check if the failure code is cleared by the following procedure. Procedure: Turn the starting switch to ON position and set machine in attachment mode (ATT).		

No.	Cause	Procedure, measuring location, criteria and remarks		
1	Defective attachment flow rate adjustment EPC3 (internal short circuit or ground fault)	1. Turn starting switch to OFF position. 2. Disconnect connector F36, and connect T-adapter to male side.		
		Resistance	Between F36 (male) (1) and (2)	3 to 15 Ω
			Between F36 (male) (2) and ground	Min. 1 MΩ
2	Hot short circuit in wiring harness	1. Turn starting switch to OFF position. 2. Disconnect connector F36, and connect T-adapter to female side. 3. Turn starting switch to ON position.		
		Voltage	Between F36 (female) (2) and ground	Max. 4.5 V
3	Defective machine controller	If no failure is found by preceding checks, machine controller is defective. (Since this is an internal defect, troubleshooting cannot be performed.)		

FAILURE CODE [DXEAKB]

Action level	Failure code	Failure	Attachment Flow Regulating EPC5 Solenoid Short Circuit (Machine controller system)
-	DXEAKB		
Detail of failure	Abnormal current flows when driving attachment flow rate (service current) EPC5 solenoid, so short circuit is detected.		
Action of controller	• Stops driving attachment flow rate adjustment EPC5 solenoids. • Also sets output command to attachment flow rate adjustment EPC2 solenoid to 0 mA. • Even if cause of failure disappears, machine does not become normal until starting switch is turned to OFF position.		
Phenomenon on machine	Attachment does not move.		
Related information	• Drive current of attachment flow rate adjustment EPC5 solenoid can be checked with monitoring function (code: 01701). • After repairing, check if the failure code is cleared by the following procedure. Procedure: Turn the starting switch to ON position and set machine in attachment mode (ATT).		

No.	Cause	Procedure, measuring location, criteria and remarks		
1	Defective attachment flow rate adjustment EPC5 (internal short circuit or ground fault)	1. Turn starting switch to OFF position. 2. Disconnect connector F27, and connect T-adapter to male side.		
		Resistance	Between F27 (male) (1) and (2)	3 to 15 Ω
			Between F27 (male) (2) and ground	Min. 1 MΩ
2	Ground fault in wiring harness (contact with ground circuit)	1. Turn starting switch to OFF position. 2. Disconnect connectors CP02 and F27, and connect T-adapters to each female side.		
		Resistance	Between ground and CP02 (female) (111) or F27 (female) (2)	Min. 1 MΩ
3	Defective machine controller	If no failure is found by preceding checks, work equipment controller is defective. (Since this is an internal defect, troubleshooting cannot be performed.)		

E-2 ENGINE DOES NOT START (FUEL FEED PUMP SYSTEM)

Failure	Engine does not start (fuel feed pump system).
Related information	When engine cranks

<table>
<tr><th>No.</th><th>Cause</th><th colspan="3">Procedure, measuring location, criteria and remarks</th></tr>
<tr><td>1</td><td>Defective fuse</td><td colspan="3">If fuse No.5 in fuse box FB1 is blown out, circuit probably has ground fault, etc.</td></tr>
<tr><td rowspan="4">2</td><td rowspan="4">Defective fuel feed pump</td><td colspan="3">1. Turn the starting switch to OFF position.
2. Connect T-adapter to connector M14.</td></tr>
<tr><td>Resistance</td><td>Between M14 (male) (1) and (2)</td><td>Approx. 140 Ω</td></tr>
<tr><td colspan="3">1. Turn the starting switch to OFF position.
2. Disconnect fuel hose at outlet side.
3. Turn the starting switch to ON position.</td></tr>
<tr><td colspan="3">Fuel flows out.</td></tr>
<tr><td rowspan="3">3</td><td rowspan="3">Open circuit in wiring harness (wire breakage or defective contact of connector)</td><td colspan="3">1. Turn the starting switch to OFF position.
2. Disconnect connectors M14, and connect T-adapter to female side of M14.</td></tr>
<tr><td rowspan="2">Resistance</td><td>Between FB1(5) and M14 (female) (2)</td><td>Max. 1 Ω</td></tr>
<tr><td>Between ground and M14 (female) (1)</td><td>Max. 1 Ω</td></tr>
<tr><td rowspan="3">4</td><td rowspan="3">Ground fault in wiring harness (contact with ground circuit)</td><td colspan="3">1. Turn the starting switch to OFF position.
2. Disconnect connectors M14, and connect T-adapter to female side of M14.</td></tr>
<tr><td>Resistance</td><td>Between ground and FB1(5) or M14 (female) (2)</td><td>Min. 1 MΩ</td></tr>
</table>

E-8 ENGINE COOLANT TEMPERATURE MONITOR LIGHTS UP IN RED WHILE ENGINE IS RUNNING

Failure	Engine coolant temperature monitor lights up in red while engine is running.
Related information	• Signal voltage of engine coolant temperature sensor is input to engine controller, and then it is transmitted to machine monitor via machine controller through CAN communication system. • Engine coolant temperature can be checked with monitoring function. (Code: 04107)

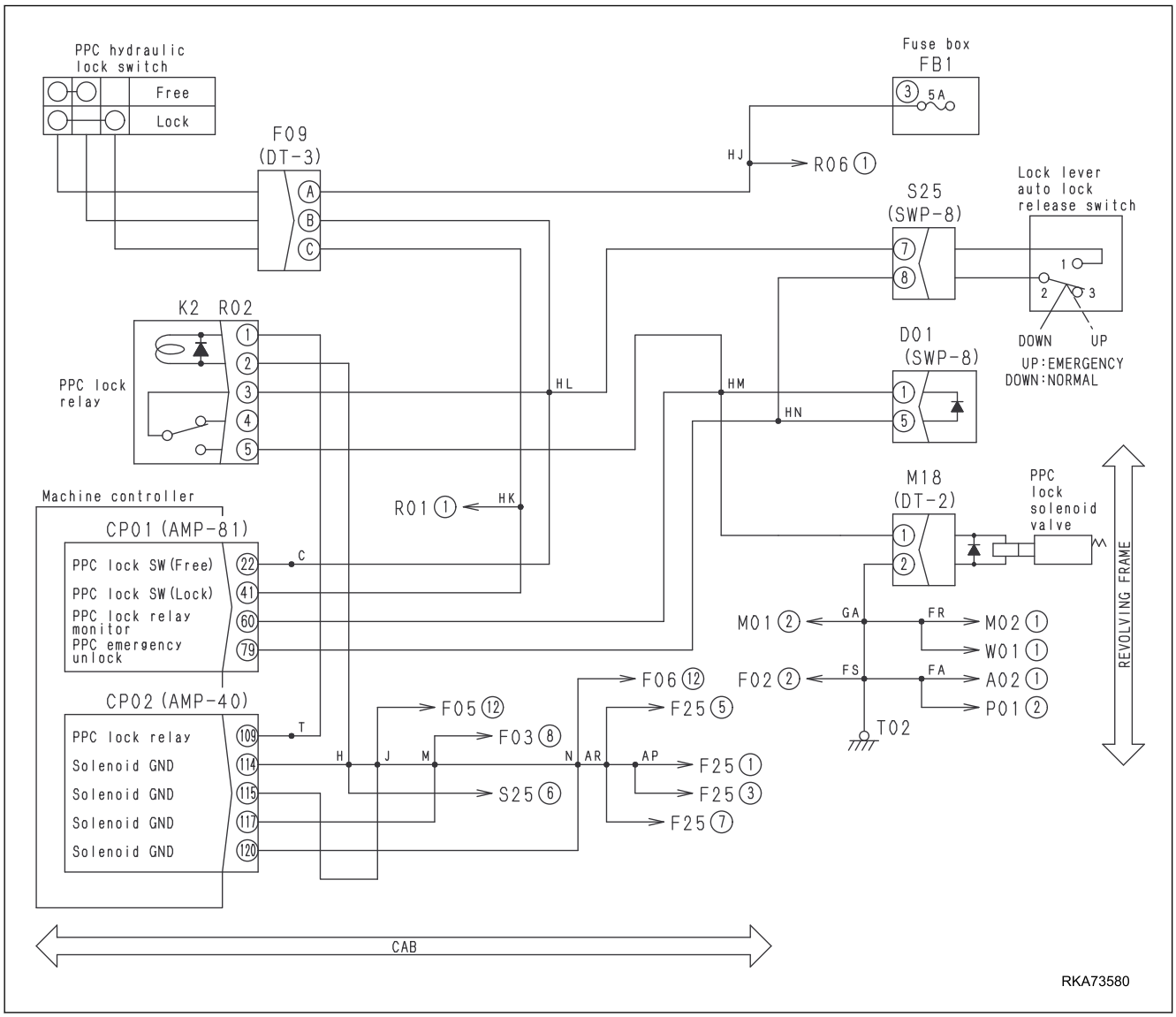
No.	Cause	Procedure, measuring location, criteria and remarks
1	Overheat of engine coolant (when system works properly)	If monitor is lit in red, coolant temperature may be high (above approximately 107 °C). Cool down coolant. (Run engine at low idle speed.) • Lights up in red: Coolant temperature is high (overheating). • Lights up in blue: Coolant temperature is proper. • Perform troubleshooting S-mode “COOLANT TEMPERATURE RISES TOO HIGH (OVERHEATING).”
2	Engine coolant temperature gauge open circuit	Error [#B0118] (L03) on monitor machine
3	Defective engine coolant temperature gauge system	If no failure is found by preceding checks, engine coolant temperature gauge system may be defective. Perform following troubleshooting. • E-mode “ENGINE COOLANT TEMPERATURE GAUGE DISPLAY DOES NOT MOVE FROM MINIMUM OR MAXIMUM” • E-mode “DISPLAY OF ENGINE COOLANT TEMPERATURE GAUGE DIFFERS FROM ACTUAL COOLANT TEMPERATURE”(indicates neither full nor empty)

E-17 WHEN WORKING MODE IS CHANGED, SETTING OF ENGINE AND HYDRAULIC PUMP IS NOT CHANGED

Failure	Setting of engine and hydraulic pump is not changed when working mode is changed.
Related information	

No.	Cause	Procedure, measuring location, criteria and remarks
1	Defective machine monitor	Machine monitor may be defective. (Because this is an internal defect, troubleshooting cannot be performed.)
2	Defective machine controller	If no failure is found by preceding checks, work equipment controller is defective. (Since this is an internal defect, troubleshooting cannot be performed.)

Circuit diagram related to PPC lock switch



<table>
<tr><th>No.</th><th>Cause</th><th colspan="3">Procedure, measuring location, criteria and remarks</th></tr>
<tr><td rowspan="18">8</td><td rowspan="18">Open circuit in wiring harness
(wire breakage or defective contact of connector)</td><td colspan="3">If no failure is found by check on cause 7, this check is not required.
1. Turn the starting switch to OFF position.
2. Remove fuses FB1 (1) and FB1 (11).
3. Disconnect connectors S02, D01, R04 K4, R05 K5, F03, F22A, F22B and F22C, and connect T-adapter to each female side.</td></tr>
<tr><td rowspan="17">Resistance</td><td>Between F22A (female) (1) and ground</td><td>Max. 1 Ω</td></tr>
<tr><td>Between F22B (female) (1) and ground</td><td>Max. 1 Ω</td></tr>
<tr><td>Between F22C (female) (1) and ground</td><td>Max. 1 Ω</td></tr>
<tr><td>Between F22A (female) (2) and R05 K5 (female) (5)</td><td>Max. 1 Ω</td></tr>
<tr><td>Between F22B (female) (2) and R05 K5 (female) (5)</td><td>Max. 1 Ω</td></tr>
<tr><td>Between F22C (female) (2) and R05 K5 (female) (5)</td><td>Max. 1 Ω</td></tr>
<tr><td>Between R04 K4 (female) (1) and D01 (female) (3)</td><td>Max. 1 Ω</td></tr>
<tr><td>Between R04 K4 (female) (1) and D01 (female) (4)</td><td>Max. 1 Ω</td></tr>
<tr><td>Between R05 K5 (female) (1) and D01 (female) (3)</td><td>Max. 1 Ω</td></tr>
<tr><td>Between R05 K5 (female) (1) and D01 (female) (4)</td><td>Max. 1 Ω</td></tr>
<tr><td>Between R04 K4 (female) (2) and ground</td><td>Max. 1 Ω</td></tr>
<tr><td>Between R05 K5 (female) (2) and ground</td><td>Max. 1 Ω</td></tr>
<tr><td>Between R04 K4 (female) (3) and FB1 (11)</td><td>Max. 1 Ω</td></tr>
<tr><td>Between R05 K5 (female) (3) and FB1 (11)</td><td>Max. 1 Ω</td></tr>
<tr><td>Between D01 (female) (7) and each of S02 (female) (1) and (6)</td><td>Max. 1 Ω</td></tr>
<tr><td>Between S02 (female) (2) and ground</td><td>Max. 1 Ω</td></tr>
<tr><td>Between D01 (female) (8) and each of S02 (female) (3) and (4)</td><td>Max. 1 Ω</td></tr>
<tr><td>Between S02 (female) (5) and FB1 (1)</td><td>Max. 1 Ω</td></tr>
<tr><td rowspan="5">9</td><td rowspan="5">Ground fault in wiring harness
(contact with ground circuit)</td><td colspan="3">If no failure is found by check on cause 7, this check is not required.
1. Turn the starting switch to OFF position.
2. Remove fuses FB1 (1) and FB1 (11).
3. Disconnect connectors S02, D01, R04 K4, R05 K5, F03, F22A, F22B and F22C, and connect T-adapter to female side of S02 and R04 K4.</td></tr>
<tr><td rowspan="4">Resistance</td><td>Between ground and R04 K4 (female) (1) or R05 K5 (1)</td><td>Min. 1 MΩ</td></tr>
<tr><td>Between ground and R04 K4 (female) (3) or R05 K5 (3)</td><td>Min. 1 MΩ</td></tr>
<tr><td>Between ground and R04 K4 (female) (5) or R05 K5 (5)</td><td>Min. 1 MΩ</td></tr>
<tr><td>Between S02 (female) (5) and ground</td><td>Min. 1 MΩ</td></tr>
</table>

E-35 KOMTRAX SYSTEM DOES NOT OPERATE NORMALLY

Failure	KOMTRAX system does not operate normally.
Related information	• Perform following troubleshooting if administrator of KOMTRAX system requests to check whether failure occurs in system on machine. • Even when KOMTRAX system is defective, no problem is displayed on machine. • All troubleshooting can be checked on the service menu of the machine monitor. • For checking of Terminal Status, see Testing and adjusting, “METHOD FOR CONFIRMING KOMTRAX SETTINGS (TERMINAL STATUS)”. • For checking of GPS & Communication State, see Testing and adjusting, “METHOD FOR CONFIRMING KOMTRAX SETTINGS (GPS AND COMMUNICATION STATUS)”.

<table>
<tr><th>No.</th><th>Cause</th><th colspan="3">Procedure, measuring location, criteria and remarks</th></tr>
<tr><td rowspan="2">1</td><td rowspan="2">Transmitting error 1</td><td colspan="3">1. Turn starting switch to ON position.
2. Display Terminal Status screen.</td></tr>
<tr><td>Monitoring display</td><td>Check item: KOMTRAX Communication</td><td>State of radio station establishment</td></tr>
<tr><td rowspan="5">2</td><td rowspan="5">Defective GPS positioning</td><td colspan="3">1. Turn starting switch to ON position.
2. Display GPS & Communication Status screen.</td></tr>
<tr><td rowspan="3">Monitoring display</td><td rowspan="3">Check item: Positioning</td><td>N ###.##.## (Latitude)</td></tr>
<tr><td>E ###.##.## (Longitude)</td></tr>
<tr><td>Positioning in Progress</td></tr>
<tr><td colspan="3">If the latitude and longitude are not displayed within 5 minutes in an open-sky area, call the KOMTRAX service hot-line for advice.</td></tr>
<tr><td rowspan="3">3</td><td rowspan="3">Defective communication environment</td><td colspan="3">1. Turn starting switch to ON position.
2. Display GPS & Communication Status screen.</td></tr>
<tr><td>Monitoring display</td><td>Check item: Communication</td><td>Communication reception range level 1 to 3</td></tr>
<tr><td colspan="3">Contact KOMTRAX service hot-line if communication reception range is not within level 1 to 3.</td></tr>
<tr><td rowspan="2">4</td><td rowspan="2">Transmitting error 2</td><td colspan="3">1. Turn starting switch to ON position.
2. Display GPS & Communication Status screen.</td></tr>
<tr><td>Monitoring display</td><td>Check item: Number of message(s) not yet sent</td><td>0 to 100 (normally 0)</td></tr>
</table>

H-9 FINE CONTROL PERFORMANCE OR RESPONSE IS POOR

Failure	Fine control performance or response is poor.
Related information	• Perform all troubleshooting with working mode to be set to power mode (P). • Perform troubleshooting with the hydraulic oil temperature at 45 to 55 °C.

No.	Cause	Procedure, measuring location, criteria and remarks			
1	Clogging of LS circuit orifice	LS circuit orifice may be clogged. Check it.			
2	Defective adjustment and malfunction of LS valve	Be ready with engine stopped, then perform troubleshooting with engine at high idle.			
		LS differential pressure	Bucket CURL operated	Differential pressure between pump discharged pressure and LS valve input pressure	1.57±0.1 MPa {16±1 kg/cm^2}
		Lever operation and oil pressure ratio	All control levers in NEUTRAL	Differential pressure between pump discharged pressure and LS valve input pressure	3.2±0.49 MPa {33±5 kg/cm^2}
		When pressure cannot be adjusted to normal level, the LS valve may have malfunction. Check for malfunction of the LS valve (fatigue of spring), internal defect (seized LS spool, stick), etc.			
3	Malfunction of servo piston	Check if orifice and filter in pump servo device is not clogged.			
4	Malfunction of unload valve	Be ready with engine stopped, then perform troubleshooting with engine at high idle.			
		Unload pressure	All control levers in NEUTRAL		3.4±0.49 MPa {35±5 kg/cm^2}
5	Clogged main pump orifice plug	If no failure is found by above checks, main pump orifice plug may be clogged. Check it.			

<table>
<tr><th>No.</th><th>Cause</th><th colspan="3">Procedure, measuring location, criteria and remarks</th></tr>
<tr><td rowspan="5">6</td><td rowspan="5">Malfunction of boom lock valve</td><td colspan="3">Release remaining pressure from hydraulic tank and piping, and then perform troubleshooting with engine stopped.</td></tr>
<tr><td colspan="3">• Check if pilot spool is stuck or seized with valve body.
• Remove pilot spool from valve body and check it for flaw and sticking of dirt.
• When restoring, be careful about the dirt to enter.</td></tr>
<tr><td colspan="3">Be ready with engine stopped, then perform troubleshooting with engine at high idle.</td></tr>
<tr><td>Boom relief pressure</td><td>Boom RAISE relief</td><td>26.5±1.5 MPa {270±15 kg/cm^2}</td></tr>
<tr><td colspan="3">• If only the relief pressure of anti-drop valve side is low among the work equipment relief pressures, safety valve may be defective. Replace safety valve assembly.</td></tr>
<tr><td>7</td><td>Malfunction or defective sealing of centralized safety valve and suction valve</td><td colspan="3">Centralized safety valve and suction valve of control valve may malfunction or may have defective sealing. Check it.</td></tr>
<tr><td>8</td><td>Malfunction of boom control valve (lock valve)</td><td colspan="3">Lock valve of boom control valve may be defective. Check it.</td></tr>
<tr><td rowspan="2">9</td><td rowspan="2">Defective boom cylinder</td><td colspan="3">Be ready with engine stopped, then perform troubleshooting with engine at high idle.</td></tr>
<tr><td>Leakage of boom cylinder</td><td>Boom RAISE relief</td><td>10 cc/min</td></tr>
</table>

H-26 HYDRAULIC DRIFT OF BLADE IS LARGE

Failure	Hydraulic drift of blade is large (during blade RAISE or blade thrusting condition).
Related information	• Perform all troubleshooting with working mode to be set to power mode (P). • Perform troubleshooting with the hydraulic oil temperature at 45 to 55 °C.

No.	Cause	Procedure, measuring location, criteria and remarks		
1	Defective blade cylinder	Be ready with engine stopped, then perform troubleshooting with engine at high idle.		
		Leakage of blade cylinder	Blade LOWER relief	10 cc/min
2	Malfunction of blade RAISE (suction-safety valve)	Be ready with engine stopped, then perform troubleshooting with engine at high idle.		
		Blade relief pressure	Blade RAISE relief	20.0 (+0.98/-0.49) MPa {205(+10/-5) kg/cm^2}
		• If blade RAISE relief pressure is low, suction valve may be defective. Check it. • Check that check valve of suction safety valve is seated on valve body in position (it is not stuck halfway). **REMARK** Since relief pressure of safety valve cannot be adjusted when it is installed on the machine, replace safety valve assembly if it is found to be defective.		
3	Malfunction of blade control valve (spool)	Release remaining pressure from hydraulic tank and piping, and then perform troubleshooting with engine stopped.		
		• Check if the bucket spool is stuck or seized with control valve body. (Spool should move smoothly.) • Remove the blade spool from valve body, and check it for flaw and sticking of dirt. • When restoring, be careful about the dirt to enter.		
4	Malfunction of blade LOWER (suction safety valve)	Be ready with engine stopped, then perform troubleshooting with engine at high idle.		
		Blade relief pressure	Blade LOWER relief	20.0 (+0.98/-0.49) MPa {205(+10/-5) kg/cm^2}
		• If only blade LOWER relief pressure is low between swing and blade LOWER relief pressure, suction valve may be defective. Check it. • Check that check valve of suction valve is seated on valve body in position (it is not stuck halfway). • Remove check valve from valve body, and check it for flaw and sticking of dirt. • Check spring for fatigue and deformation. • When restoring, be careful about the dirt to enter.		

No.	Cause	Procedure, measuring location, criteria and remarks		
5	Defective travel motor	Travel motor may have an internal defect. Check it. (You can exchange right and left travel motors and final drive assemblies, and check whether the direction of travel deviation changes for judgment.)		
6	Defective final drive	Check for unusual noise, unusual heat, and metallic powders in drained oil to make judgment.		
7	Defective undercarriage	• Check that track shoe tension is adjusted equally on right and left. • Check front idler and roller, etc. for defective rotation, deformation, damage.		
8	Malfunction of logic valve	Logic valve may malfunction. Check it.		
9	Malfunction of travel Junction valve (spool)	Release remaining pressure from hydraulic tank and piping, and then perform troubleshooting with engine stopped.		
		• Check travel Junction valve for stick (spool should move smoothly). • Remove spool from valve body, and check it for flaw and sticking of dirt. When restoring, be careful about the dirt, etc. to enter.		
10	Malfunction of travel control valve (pressure compensation valve) (R.H.)	Be ready with engine stopped, then perform troubleshooting with engine at high idle.		
		Travel relief pressure	R.H. travel FORWARD hydraulic relief	26.5±0.98 MPa {270±10 kg/cm^2}
11	Malfunction of travel control valve (pressure compensation valve) (L.H.)	Be ready with engine stopped, then perform troubleshooting with engine at high idle.		
		Travel relief pressure	L.H. travel FORWARD hydraulic relief	26.5±0.98 MPa {270±10 kg/cm^2}
12	Improper adjustment or malfunction of main relief valve	Be ready with engine stopped, then perform troubleshooting with engine at high idle.		
		Main relief pressure	Travel hydraulic relief	26.5 ± 0.98 MPa {270 ± 10 kg/cm^2}

No.	Cause	Procedure, measuring location, criteria and remarks		
6	Incorrect adjustment or malfunction of relief valve for Swing and blade pump	Be ready with engine stopped, then perform troubleshooting with engine at high idle.		
		Swing and blade pump relief pressure	Blade LOWER relief	20.0 (+0.98/-0.49) MPa {205 (+10/-5) kg/cm^2}
7	Clogging of swing PPC line throttle, slow return valve	Check for unusual noise, unusual heat, and metallic powders in drained oil to make judgment.		
8	Defective swing motor	If no failure is found by preceding checks, internal defect of the swing motor is suspected. Check it.		

S-2 ENGINE CRANKS BUT NO EXHAUST GAS COMES OUT

Failure	Engine cranks but no exhaust gas comes out.
Related information	If any failure code is displayed, perform troubleshooting for that code first.

No.	Cause	Point to check, remarks	Remedy
1	Fuel level is low.	If fuel tank is checked, it is empty.	Refueling
2	Clogging fuel tank cap air bleeding hole	Fuel tank cap air bleeding hole is clogged.	Flush air breather hole in fuel tank cap surrounding area.
3	Clogged fuel filter element	Check used hours of fuel filter element. If it is used over specified time, fuel filter element may be clogged.	Fuel filter element replacement
4	Foreign materials are mixed into fuel.	If drain fuel from fuel tank, rust or water comes out.	Fuel replacement
5	Air mixed in fuel piping system	When performing bleeding air from the fuel system, air comes out. (For details, see Testing and adjusting, “Bleeding air from fuel system”).	• Perform air bleeding operation • Correct or replace fuel piping
6	Leakage from fuel piping system	Fuel leaks from fuel piping. (For details, see Testing and adjusting, “Test fuel circuit for leakage”).	Correct or replace fuel piping related parts
7	Defective common rail	Check leakage from common rail pressure limiter. For details, see Testing and adjusting, “Testing fuel delivery, return rate, and leakage”.	Common rail replacement
8	Defective supply pump	**NOTICE** **Be sure to check for above “Defective common rail”.** Check common rail pressure with machine monitor. If it does not increase even during cranking, supply pump is defective. **REMARK** Common rail pressure can be checked with monitoring function (Code: 36400 (MPa)).	Supply pump replacement
9	Defective air bleeding from common rail or injection pipe	When common rail pressure (code: 36400 “Common rail pressure”) is checked on monitor, pressure does not drop after stopping (Pressure does not drop, if air is left).	Loosen common rail side of injection pipe and high-pressure pipe mounting nuts to bleed air.

S-9 KDPF GETS CLOGGED IN A SHORT TIME

No.	Cause	Point to check, remarks	Remedy
1	Unspecified fuel is used.	Unspecified fuel is used.	Use recommended fuel described in Operation and Maintenance Manual.
2	Foreign materials are mixed into fuel.	If drain fuel from fuel tank, rust or water comes out.	Fuel replacement
3	Defective air cleaner	Check air cleaner and rectifying wire net for deformation.	Air cleaner repair or replacement
4	Defective exhaust pipe.	Check exhaust pipes for damage and exhaust gas leakage (Check heat insulation cover and soot on heat insulation plate)	Exhaust piping replacement
5	Air intake pipe and joint part failures.	Air suction from the air intake pipe.	Repair or replacement of air intake pipe and joint part.
6	Gas leakage from EGR piping	Gas leaking from EGR piping.	Replace EGR piping
7	Defective injector	• Some cylinder is found to be cool when exhaust manifolds are touched by hand immediately after engine is started. • Perform cylinder cutout mode operation to identify cylinder that does not change in speed (see “TESTING AND ADJUSTING”, “HANDLING CYLINDER CUTOUT MODE OPERATION”).	Replace injector.
8	Defective fuel return piping	When checking fuel return rate, fuel return rate is excessive. (Reference: See Testing and adjusting, “Testing fuel return rate and leakage”.)	Fuel return piping repair or replacement
9	defective temperature sensor	Replace a sensor, and check if it operates normally (failure code may be displayed due to dust attached to sensor).	Mass temperature sensor replacement
10	Defective valve clearance	• When engine is operated, unusual noise is heard from around cylinder head. • Check valve clearance (Reference: See Testing and adjusting, “Testing and adjusting valve clearance”).	Valve clearance adjustment
11	Defective contact of valve and valve seat	• Measure compression pressure (See Standard value table). (Reference: See Testing and adjusting, “Testing compression pressure”.) • Check valve clearance (Reference: See Testing and adjusting, “Testing and adjusting valve clearance”).	Valve or valve seat repair or replacement
12	Defective piston ring	• Check exhaust gas color.(Reference: See “TESTING AND ADJUSTING”, “Checking exhaust gas color”). • Measure compression pressure (See standard value table). (Reference: See “TESTING AND ADJUSTING”, “Testing compression pressure”.) • Check piston ring and piston ring groove.	Piston ring and piston replacement

S-18 UNUSUAL NOISE IS HEARD

Failure	Unusual noise is heard.
Related information	• Check place of sound source, inside or outside, then perform troubleshooting. • While engine is not warmed up sufficiently, it is operated in warm-up mode and it generates a little larger sound. This is not abnormal. • When engine is accelerated, it is set in acceleration mode and it generates a little larger sound for approximately 3 to 5 seconds. This is not abnormal. • If any failure code is displayed, perform troubleshooting for that code first.

No.	Cause	Point to check, remarks	Remedy
1	Gas leakage from each part of the piping	• Gas leakage from following parts; between cylinder head and exhaust manifold • Gas leakage from EGR piping or air intake piping	Problematic portions repair or replacement
2	Vibration of exhaust piping and exhaust bellows	Confirm the presence of vibration by visual check	Check and retighten piping fixed bracket
3	KDPF broken internally	Check internal KDPF.	KDPF cleaning or replacement
4	Defective injector	• Some cylinder is found to be cool when exhaust manifolds are touched by hand immediately after engine is started. • Perform cylinder cutout mode operation to identify cylinder that does not change in speed (see “TESTING AND ADJUSTING”, “HANDLING CYLINDER CUTOUT MODE OPERATION”).	Replace injector.
5	Defective valve clearance	Check valve clearance (Reference: See Testing and adjusting, “Testing and adjusting valve clearance”).	Valve clearance adjustment
6	Seizure of pin bushing, front bearing, or main bearing	Check inside of oil pan for metallic powder.	Damaged parts repair or replacement
7	Worn piston ring or cylinder block	1. If metal particles are found in oil pan or oil filter, overhaul engine and check piston rings and cylinder block. 2. Measure pressure (See Standard value table) (Reference: See Testing and adjusting, “Testing compression pressure”)	Replace piston ring, repair or replace cylinder block
8	Broken valve or rocker arm	Overhaul engine and check valve and rocker arm parts.	Valve or rocker arm replacement
9	Broken peripheral parts of idler gear	Overhaul engine and inspect idler gear parts.	Idler gear replacement
10	Defective alternator belt	Check if alternator belt is damaged or interfered	Replace alternator belt and damaged parts

Abbreviation	Actual word spelled out	Purpose of use (major applicable machine (*1), or component/system)	Explanation
ICT	Information and Communication Technology	Communication and electronic control	A general term for the engineering and its socially applied technology of information processing and communication.
IMA	Inlet Metering Actuator	Engine	This is a valve that adjusts the fuel intake amount at the pump inlet in order to control the supply pump fuel discharged volume. (Same as IMV)
IMU	Inertial Measurement Unit	Engine	This is a device to detect the angle (or angular velocity) and acceleration of the 3 axes that control motions.
IMV	Inlet Metering Valve	Engine	This is a valve that adjusts the fuel intake amount at the pump inlet in order to control the supply pump combustion discharged volume. (Same as IMA)
KCCV	Komatsu Closed Crankcase Ventilation	Engine	This is a mechanism that burns the blowby gas again by separating oil from blowby gas and returning it to the intake side. It primarily consists of filters.
KCSF	Komatsu Catalyzed Soot Filter	Engine	This is a filter that captures soot in exhaust gas. It is built in to KDPF.
KDOC	Komatsu Diesel Oxidation Catalyst	Engine	This is a catalyst that is used for purifying exhaust gas. It is built in to KDPF or assembled with the muffler.
KDPF	Komatsu Diesel Particulate Filter	Engine	This is a component that is used to purify the exhaust gas. KDOC (catalyst) and KCSF (filter to capture soot) are built-in it. It is installed instead of the conventional muffler.
KTCS	Komatsu Traction Control System	Travel and brake (HM)	This is a function that performs braking with the optimum force and recovers the driving force of the wheels by actuating the inter-axle differential lock when the wheels runs idle while the machine travels on the soft ground.
LCD	Liquid Crystal Display	Machine monitor	This is an image display equipment such as a monitor in which the liquid crystal elements are assembled.
LED	Light Emitting Diode	Electronic parts	This is a semiconductor element that emits light when the voltage is applied in forward direction.
LIN	Local Interconnect Network	Communication and electronic control	This is one of communication standards that are used in the network on the machine.
LS	Load Sensing	Hydraulic system	This is a function that detects differential pressure of pump, and controls discharged volume corresponding to load.
LVDS	Low Voltage Differential Signaling	Communication and electronic control	This is one of communication standards that are used in the network on the machine.
MAF	Mass Air Flow	Engine	This indicates engine intake air flow. This is not used independently but is used as combined with sensor. Mass air flow sensor can be called as MAF sensor.

SPECIAL TOOLS LIST

How to read the tool list

- Part No.
  Tools with part number 79*T-***-**** are not supplied (to be locally manufactured).
- Necessity:
  ■: Tools not substituted, must always be equipped.
  ●: Very useful tools which can be substituted with commercially available tools.
- New/Redesign:
  N: Tools with new part numbers, newly developed for this model.
  R: Tools, with advanced part numbers, developed by improving existing tools for other models.
  Blank: Tools already available for other models that can be used without any modification.
- Sketch:
  ○: Tools marked with ○ in the sketch column have the sketches.
  Sketches are introduced in “SKETCHES OF SPECIAL TOOLS”, and all sketches of “79*T-***-***”are described.

Tools for removal and installation of supply pump assembly

Symbol	Part No.	Part name	Necessity	Q'ty	New/Redesign	Sketch	Remarks
A	Commercially available	Puller	■	1			Removal of gear

Tools for removal and installation of travel motor and final drive assembly

Symbol	Part No.	Part name	Necessity	Q'ty	New/Redesign	Sketch	Remarks
A	Commercially available	Block	●	2			Removal and installation of travel motor and final drive assembly
B	Commercially available	Lifting tool	●	1			

Tools for removal and installation of swing motor and swing machinery assembly

Symbol	Part No.	Part name	Necessity	Q'ty	New/Redesign	Sketch	Remarks
A	Commercially available	Forcing screw	■	2			Removal of swing motor and swing machinery assembly

Tools for removal and installation of operator's cab glass (adhered glass)

Symbol	Part No.	Part name	Necessity	Q'ty	New/Redesign	Sketch	Remarks
A	793-498-1210	Lifter (suction cup)	■	2			Removal and installation of operator's cab glass (adhered glass)
B	Commercially available	Seal cutter	■	1			
C	Commercially available	Extra fine wire (piano wire, etc)	■	1			
D	Commercially available	Pliers	■	1			
E	Commercially available	Cutter knife	■	1			
F	Commercially available	Scraper	■	1			
G	Commercially available	Caulking gun	■	1			

REMOVE AND INSTALL RADIATOR AND OIL COOLER ASSEMBLY

⚠ Place the machine on a level ground, and lower the work equipment to the ground in a stable posture.

⚠ Set the lock lever to LOCK position.

⚠ Turn the battery disconnect switch to OFF position, remove the key and check that the system operation lamp goes off.

REMARK

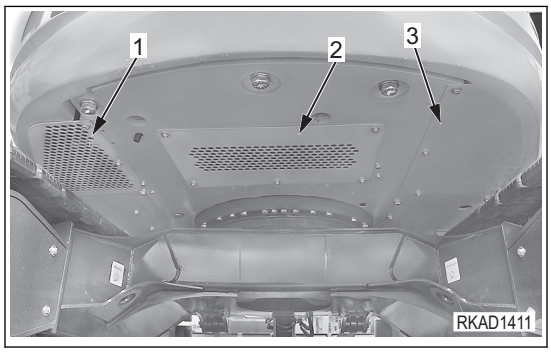
- Removal section: in this instruction there is this mark [*1], [*2], etc.. It shows that there are instructions or precautions for installing parts.
- Installation section: installation of parts is done in the reverse order to removal. Mark [*1], [*2], etc. shows which step of removal instruction is intended for.

METHOD FOR REMOVING RADIATOR AND OIL COOLER ASSEMBLY

1. Drain the coolant. [*1]

   Coolant:
   max. 12.0 ℓ

2. Remove counterweight assembly. For details, see “REMOVE AND INSTALL COUNTERWEIGHT ASSEMBLY”.
3. Remove the lower covers (1), (2) and (3).
4. Release the remaining pressure in the hydraulic tank. For details, see TESTING AND ADJUSTING, “RELEASE REMAINING PRESSURE FROM HYDRAULIC TANK”.



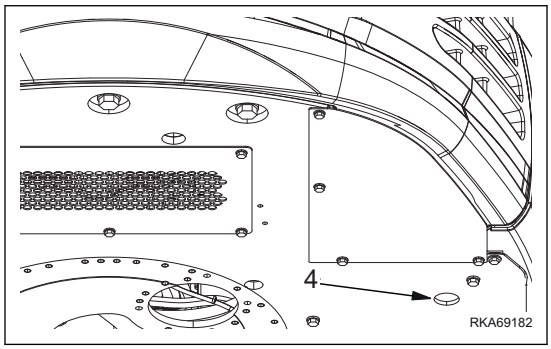
5. Remove the drain plug (4) while slowly loosening it to drain hydraulic oil. [*2]

   Hydraulic tank:
   65.0 ℓ

   Drain plug (4):
   72 to 88 Nm {7.3 to 9.0 kgm}

   REMARK

   Check that hydraulic oil is drained completely, and then tighten the drain plug (4).



[*4]

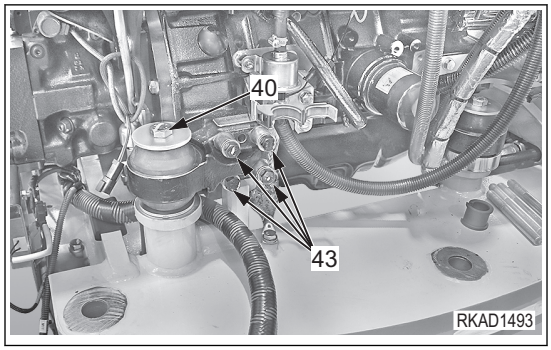
Bolts (40):
245.0 to 309.0 Nm {25.0 to 31.5 kgm}

Support fixing bolts (M10) (43):
56.0 to 77.0 Nm {5.7 to 7.8 kgm}

Support fixing bolts (M10) (43):
Liquid adhesive (LT-2)

Support fixing bolts (M12) (43):
98.0 to 122.6 Nm {10.0 to 12.5 kgm}

Support fixing bolts (M12) (43):
Liquid adhesive (LT-2)



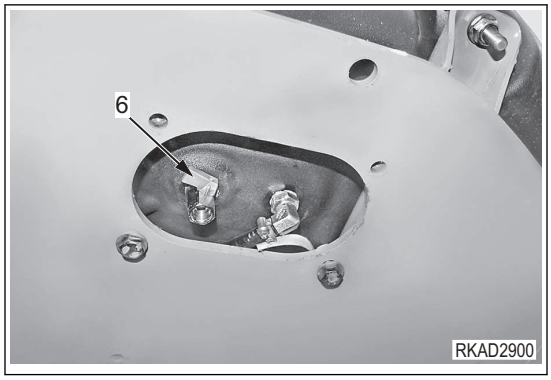
4. Open fuel drain valve (6), and drain fuel.

When filled up with fuel:

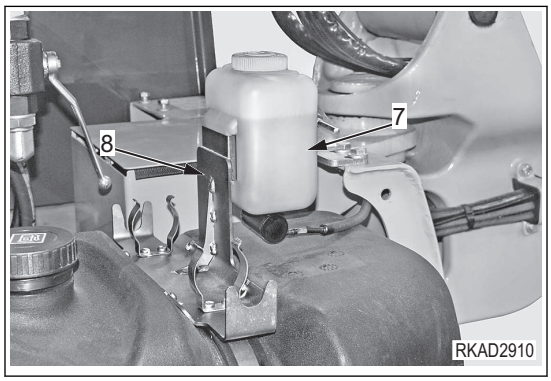
100 ℓ

REMARK

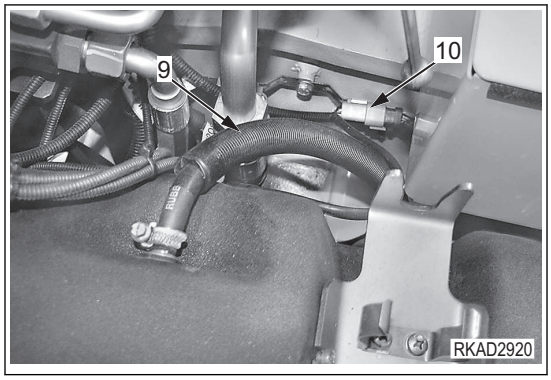
Check that fuel is completely drained, and then tighten drain valve (6).



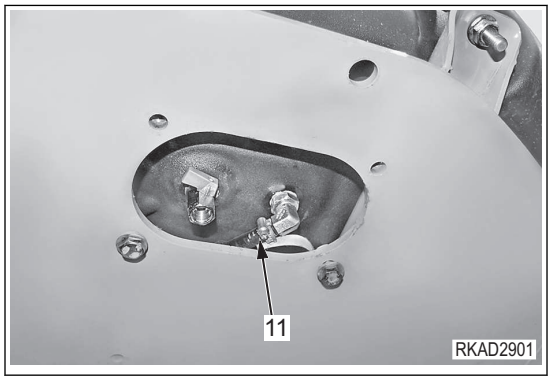
5. Disconnect washer tank (7) from support (8).



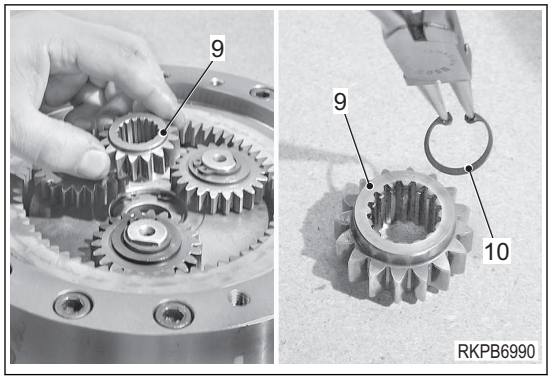
6. Disconnect return hose (9) and fuel level sensor connector (10).



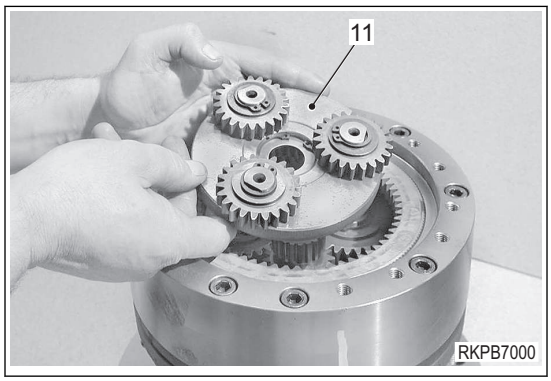
7. Disconnect suction hose (11).



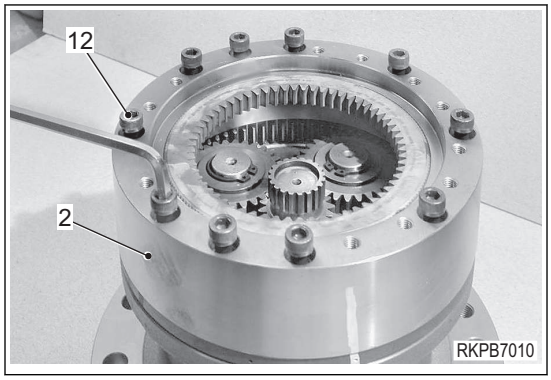
3. Remove the pinion (9) and the snap ring (10).



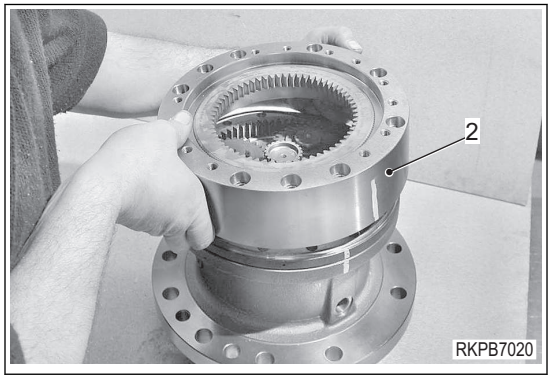
4. Remove the planetary carrier (11).



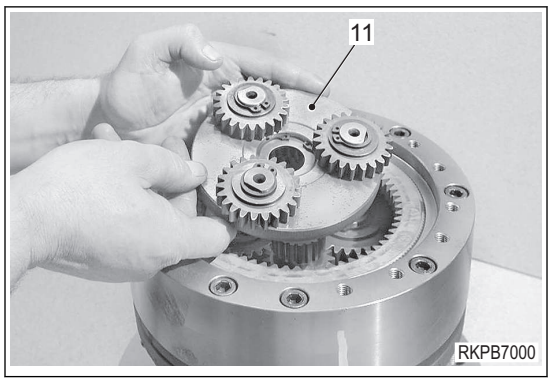
5. Remove the ten screw (12) fixing the snap ring (2).



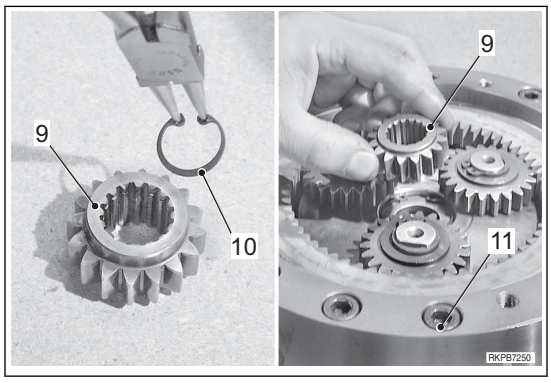
6. Remove the snap ring (2).



22. Mount the planetary carrier (11).



23. Mount the snap ring (10) on the pinion (9) and insert it on the 1st sun gear group (11).

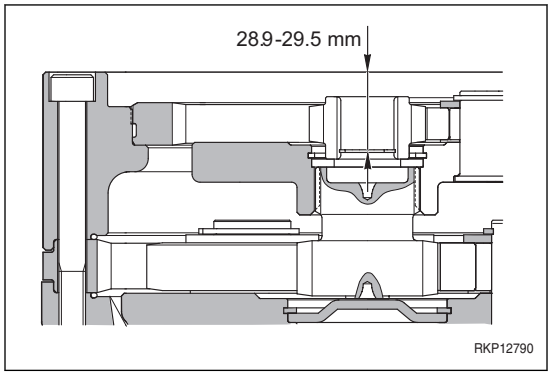


24. Using a caliper verify the correct assembly of the gearbox checking the axial quota.

    Axial quota: 28.9-29.5 mm

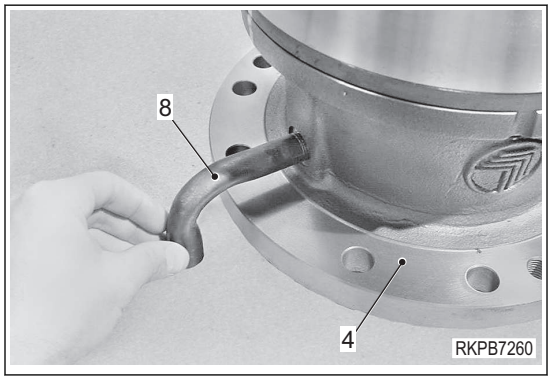
    REMARK

    - If the value is higher, reduce the sun gear(9) width in the axial direction flattening the support plane (reduction side).
    - If the value is lower, insert adjusting spacer between sun gear (9) and planetary carrier (11).



25. Install fitting (8) to the reduction gear housing (4).

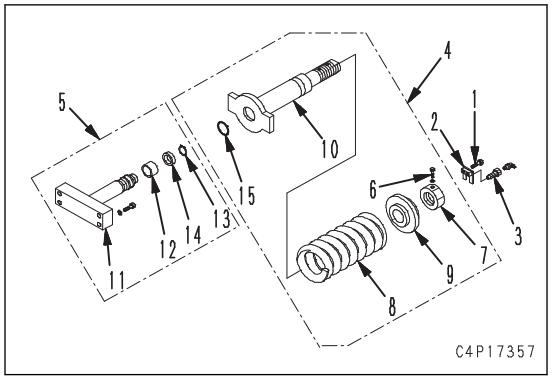
    Union:
    Loctite 243



6. Slowly apply the hydraulic pressure to compress the spring, and then remove the nut (7).

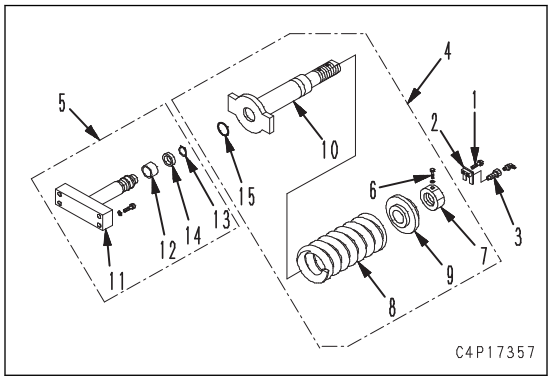
   REMARK

   - Compress the spring until the nut is loosened.
   - Release the oil pressure slowly to release the reaction force of spring.
7. Remove the collar (9) and cylinder (10) from the spring (8).
8. Remove the O-ring (15) from the cylinder (10).
9. Remove the snap ring (13), and remove U-packing (14).
10. Remove the wear ring (12) from the yoke piston (11).

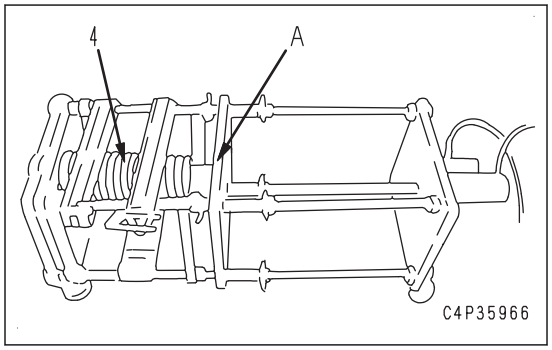


METHOD FOR ASSEMBLING IDLER CUSHION ASSEMBLY

1. Install U-packing (14) to the yoke piston (11), and fix them with the snap ring (13).
2. Install the wear ring (12).
3. Fit O-ring (15) to the cylinder (10).
4. Install the cylinder (10) and collar (9) to the spring (8).



5. Set the recoil spring (4) to the tool A.



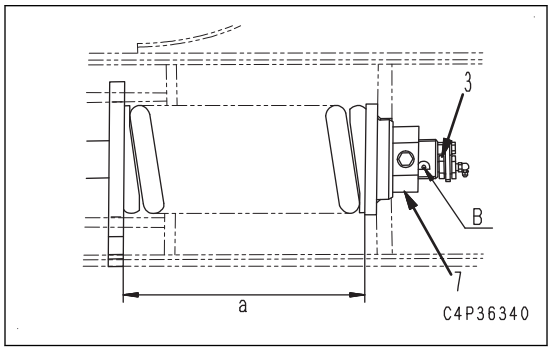
6. Apply hydraulic pressure slowly to compress the spring and to tighten the nut (7) so that the installed length of the spring becomes the dimension (a).

   Installed length (a) of spring (a):

   Steel shoe: 323 mm

   Rubber shoe: 283 mm

   Nut:
   Molybdenum disulfide lubricant (LM-P)



REMOVE AND INSTALL COUNTERWEIGHT ASSEMBLY

Tools for removal and installation of counterweight assembly

Symbol	Part No.	Part name	Necessity	Q'ty	New/Redesign	Sketch	Remarks
A	Commercially available	Lifting tool	■	1			Removal of counterweight assembly
B	Commercially available	Eyebolts (M24x3)	■	2			

⚠ **Place the machine on a level ground, and lower the work equipment to the ground in a stable posture.**

⚠ **Set the lock lever to LOCK position.**

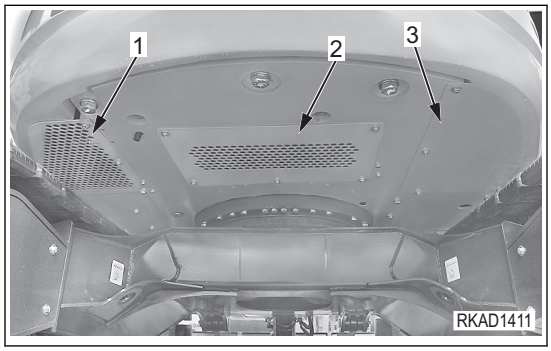
⚠ **Turn the battery disconnect switch to OFF position, remove the key and check that the system operation lamp goes off.**

REMARK

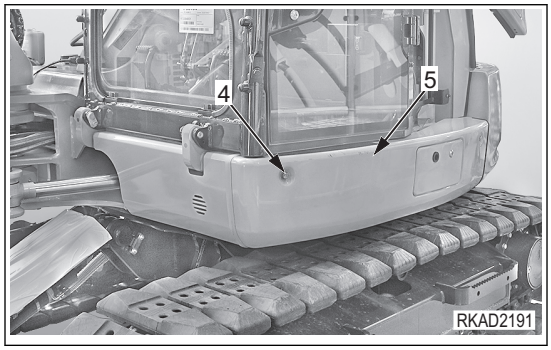
- Removal section: in this instruction there is this mark [*1], [*2], etc.. It shows that there are instructions or precautions for installing parts.
- Installation section: installation of parts is done in the reverse order to removal. Mark [*1], [*2], etc. shows which step of removal instruction is intended for.

METHOD FOR REMOVING COUNTERWEIGHT ASSEMBLY

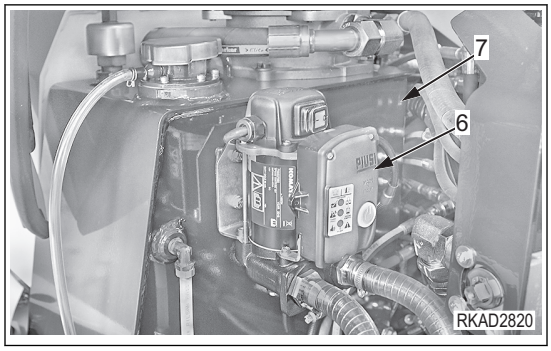
1. Remove the engine hood assembly. For details, see “METHOD FOR REMOVING ENGINE HOOD ASSEMBLY”.
2. Remove the lower covers (1), (2) and (3).



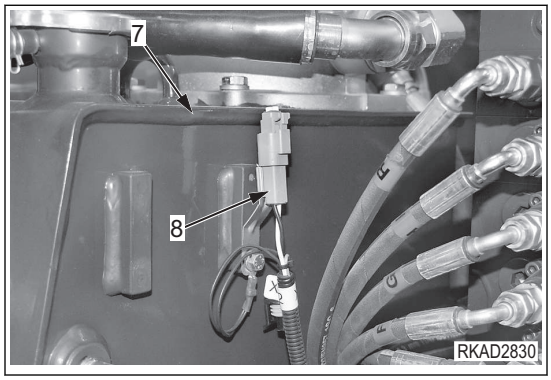
3. Remove mounting bolts (4) (5 pieces) and remove L.H. cover (5).



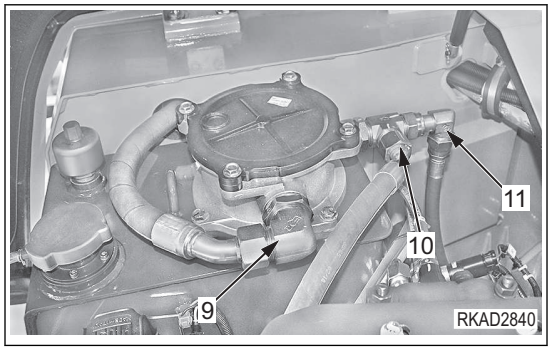
5. If installed, disconnect the self refuel pump (6) from the hydraulic tank (7).



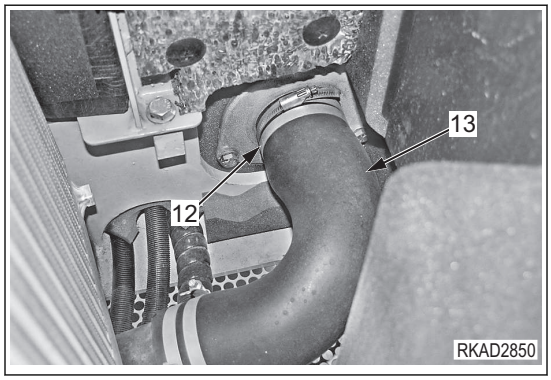
6. Disconnect wiring harness (8) for hydraulic tank (7).



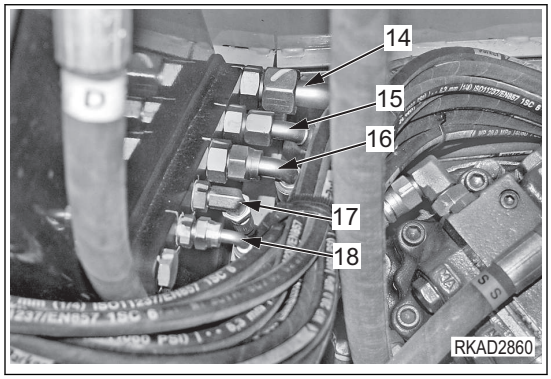
7. Disconnect hoses (9), (10) and (11) from hydraulic tank.



8. Remove clamp (12), and disconnect suction hose (13).



9. Disconnect hoses (14), (15), (16), (17) and (18).



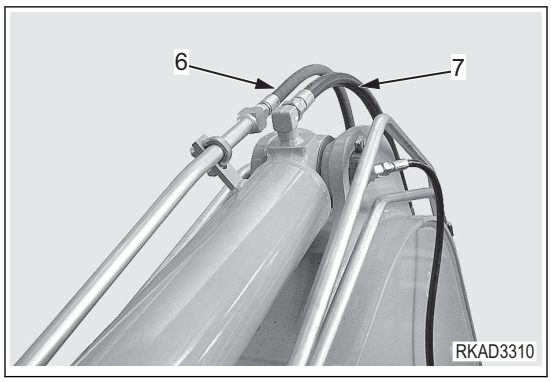
- Apply grease (G2-LI) to the contact surfaces of disc (13) and piston (8).
  Application amount:

   Rocking portion of joint:
  Grease (G2-LI) (7 to 10 ml/entire circumference)

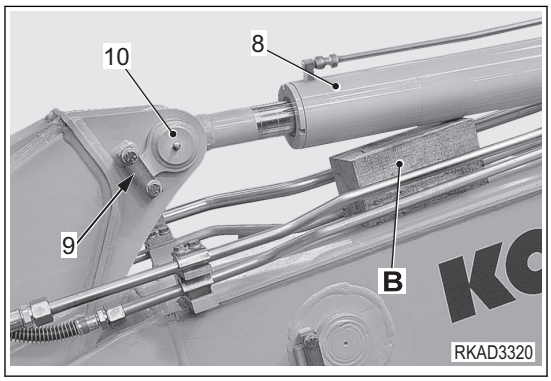
   Rocking portion of disc and piston:
  Grease (G2-LI) (0.3 to 0.8 ml/place)
- When assembling disc (13), adjust play of the lever end so that the play is within the range from 0.5 to 3.0 mm at the point of 200 mm from the rotation center.
  See TESTING AND ADJUSTING, “ADJUST WORK EQUIPMENT AND SWING PPC VALVES”.

   Nut (14):
  69 to 88 Nm {7 to 9 kgm}

4. Disconnect hoses (6) and (7).

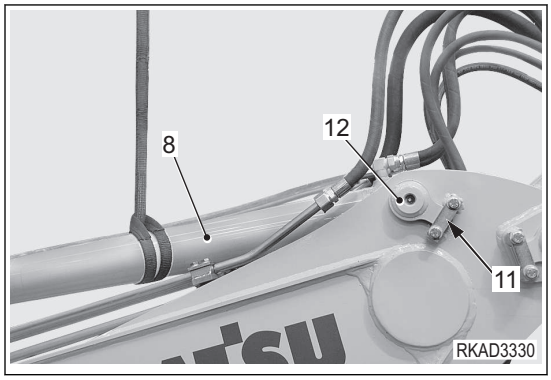


5. Insert a block (B) under the arm cylinder (8).
6. Disconnect hoses (9) and (10). [*1]



7. Remove plate (11), and remove bottom side pin (12). [*2]
8. Sling arm cylinder assembly (8), and remove it.

Arm cylinder assembly (11):
80 kg



METHOD FOR INSTALLING ARM CYLINDER ASSEMBLY

Perform installation in the reverse order to removal.

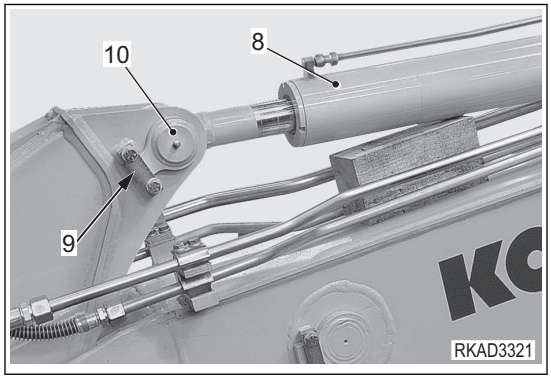
[*1]

1. Insert head side pin (10), and install plate (9).

⚠ Never insert your finger into the pin hole when aligning pin hole position.

Sliding surface on the pin and arm side :
Grease G2-T (Hyper white grease)

Greasing after installation :
Grease G2-T (Hyper white grease)

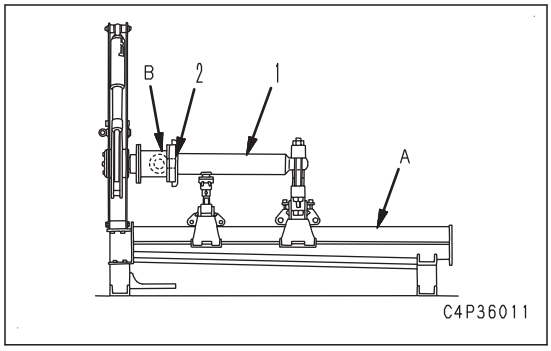


Symbol	Part No.	Part name	Necessity	Q'ty	New/Redesign	Sketch	Remarks
G	790-201-1500	Push tool kit	●	1			Installing the dust seal
	790-201-1610	• Plate		1			
	790-201-5021	• Grip		1			
	01010-50816	• Bolt		1			
	790-201-1500	Push tool kit	●	1			
	790-201-1590	• Plate		1			
	790-101-5021	• Grip		1			
	01010-50816	• Bolt		1			
	790-201-1500	Push tool kit	●	1			
	790-201-1580	• Plate		1			
	790-101-5021	• Grip		1			
	01010-50816	• Bolt		1			

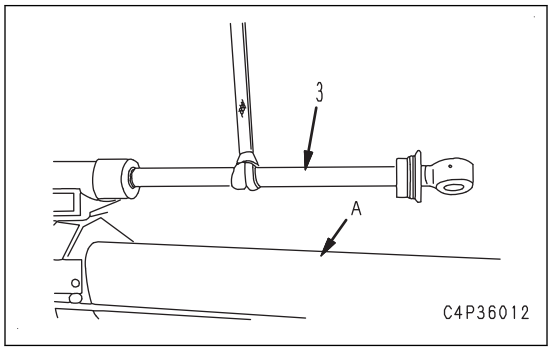
METHOD FOR DISASSEMBLING WORK EQUIPMENT CYLINDER ASSEMBLY

Cylinder assembly

1. Set cylinder assembly (1) on tool A.
2. Loosen head assembly (2) by using tool B and a hydraulic pump or a torque multiplier wrench.



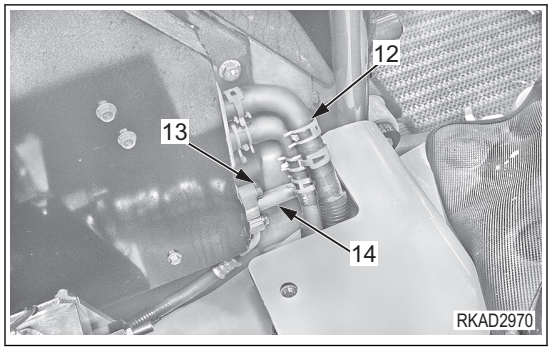
3. Pull out the piston rod assembly (3).



8. Disconnect heater hoses (12).
9. Remove the bolts (13) disconnect air conditioner tubes (14). [*3]

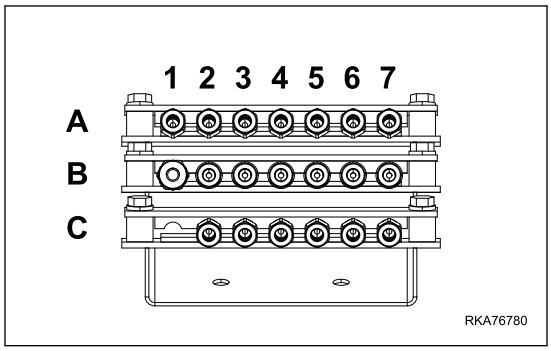
REMARK

- Plug the hoses to prevent dust and water from entering.
- Be careful not to damage or lose O-ring.

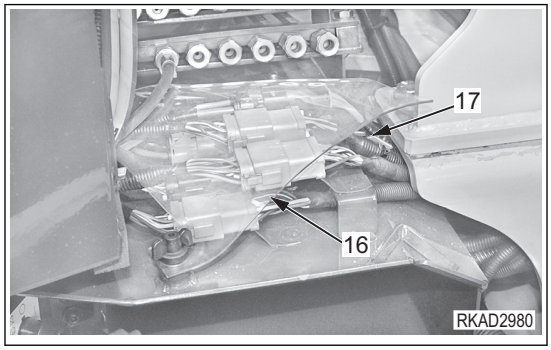


10. Disconnect hoses (15) (20 pieces).

Id	Color	Function
A1	Black Green	PPC supply
A2	White Red	Boom swing RIGHT
A3	White Black	Boom swing LEFT
A4	White White	2nd boom DUMP
A5	White Green	2nd boom CURL
A6	Yellow Blue	Blade LOWER
A7	Yellow Red	Blade RAISE
B1	Black Orange	PPC relief
B2	Yellow Black	R.H. Travel FORWARD
B3	Yellow Green	R.H. Travel REVERSE
B4	Orange	Arm DUMP
B5	Green	Arm CURL
B6	Yellow	Boom RAISE
B7	Black	Boom LOWER
C1	Empty	Empty
C2	Yellow Orange	L.H. Travel REVERSE
C3	Yellow Brown	L.H. Travel FORWARD
C4	White	Swing RIGHT
C5	Brown	Swing LEFT
C6	Blue	Bucket CURL
C7	Red	Bucket DUMP

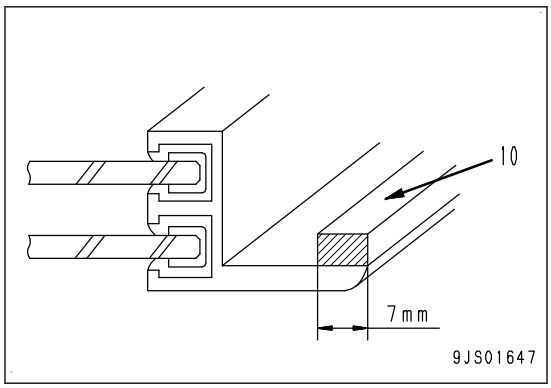


11. Remove protection (16) and disconnect connectors (17) (6 pieces).



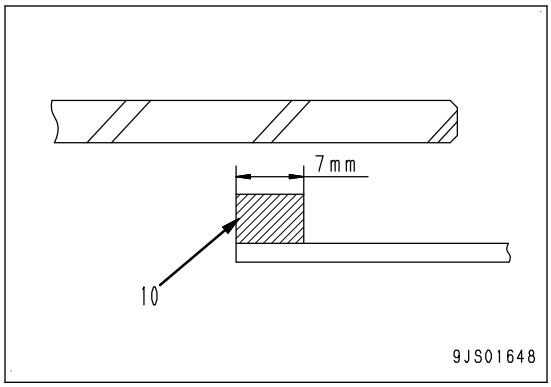
- Slide sash

  Install the dam rubber along the adhesive surface periphery of the sash frame.



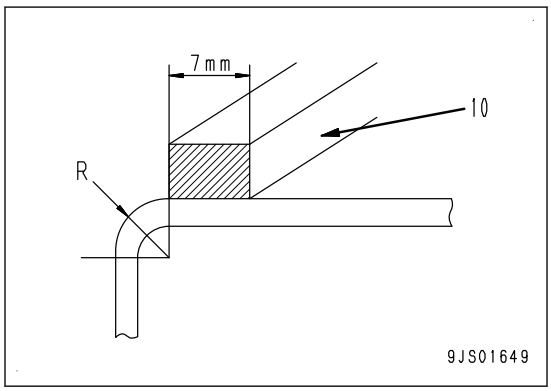
- Sheet metal part

  Install the dam rubber along the sheet metal edge.

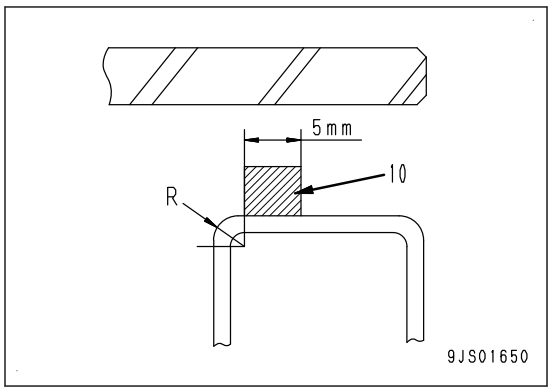


- Pipe material part

  Align the dam rubber with the position where the pipe round corner R ends, and install it.



- Front sash (glass adhesion side)
  Both sides of the frame



REMOVE AND INSTALL SEAT BELT

⚠ **Place the machine on a level ground, and lower the work equipment to the ground in a stable posture.**

⚠ **Set the lock lever to LOCK position.**

⚠ **Turn the battery disconnect switch to OFF position, remove the key and check that the system operation lamp goes off.**

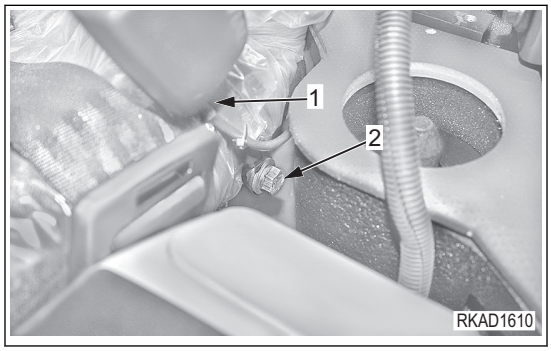
METHOD FOR REMOVING SEAT BELT

Operator's seat

1. Remove the operator's seat. For details, see “REMOVE AND INSTALL OPERATOR'S SEAT”.

Seat belt

2. Remove mounting bolts (2) (1 piece each on right and left sides) of seat belt (1), and remove seat belt (1).

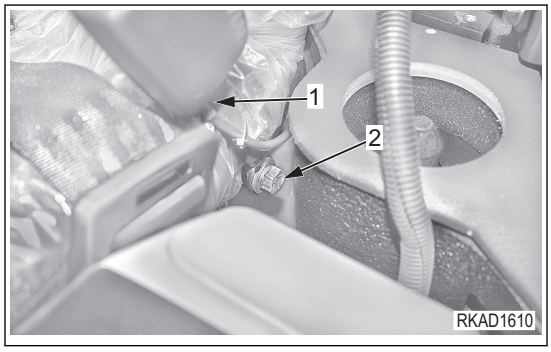


METHOD FOR INSTALLING SEAT BELT

Seat belt

1. Install seat belt (1) with mounting bolts (2) (1 piece each on the right and left).

   Mounting bolt (2):
   19.6 to 29.4 Nm {2.0 to 3.0 kgm}



Operator's seat

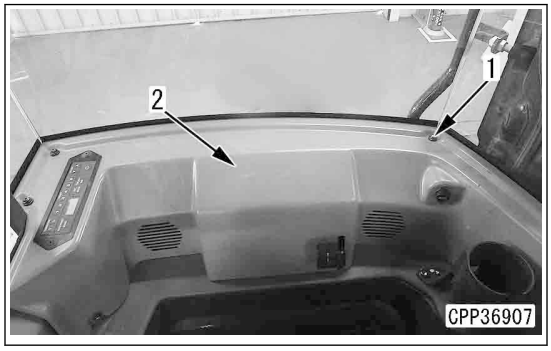
2. Install the operator's seat. For details, see “REMOVE AND INSTALL OPERATOR'S SEAT”.

Cover

5. Install cover (2), and install it with bolts (1).

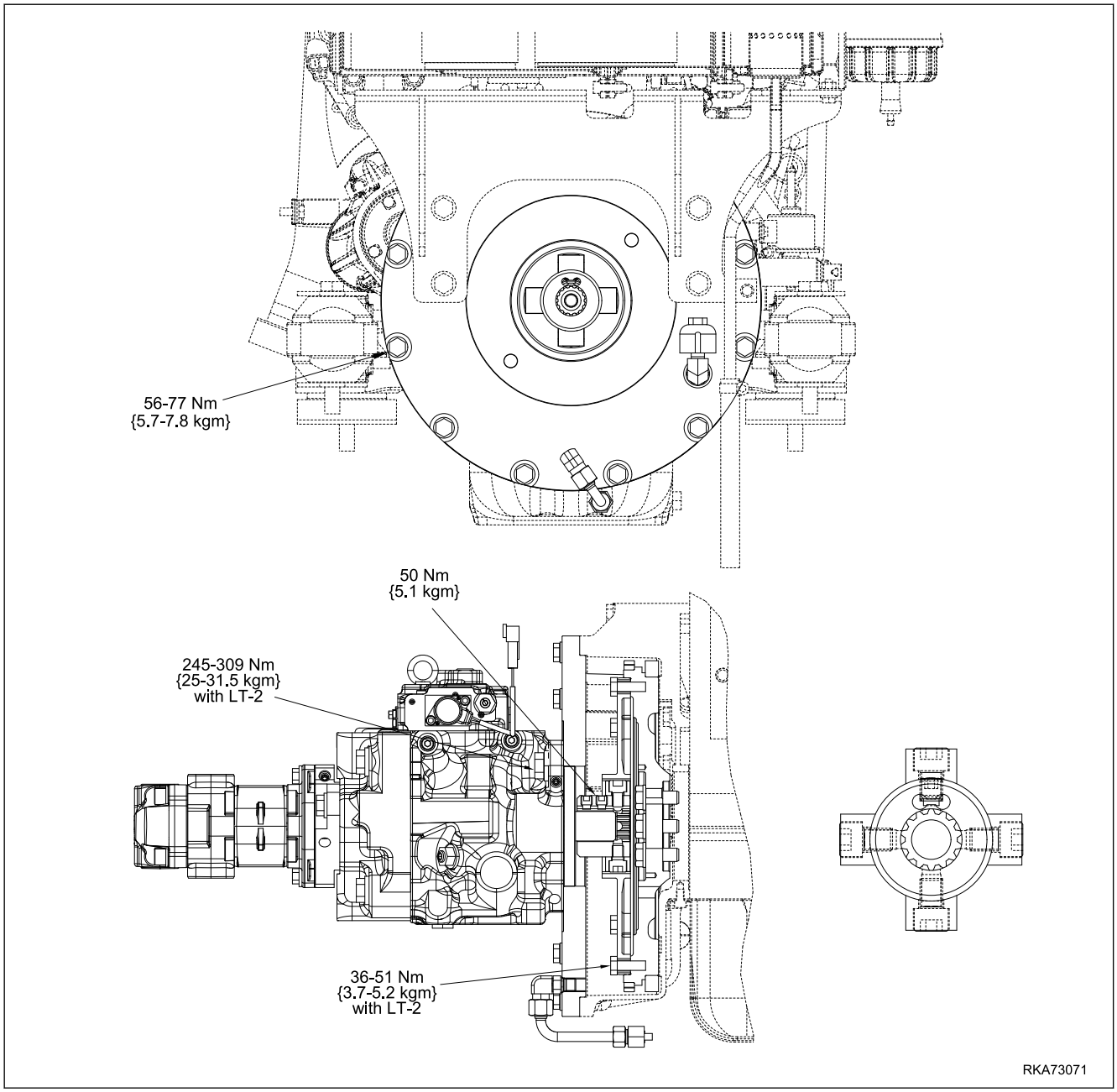
   REMARK

   If equipped, connect connector on the back side of cover (1).

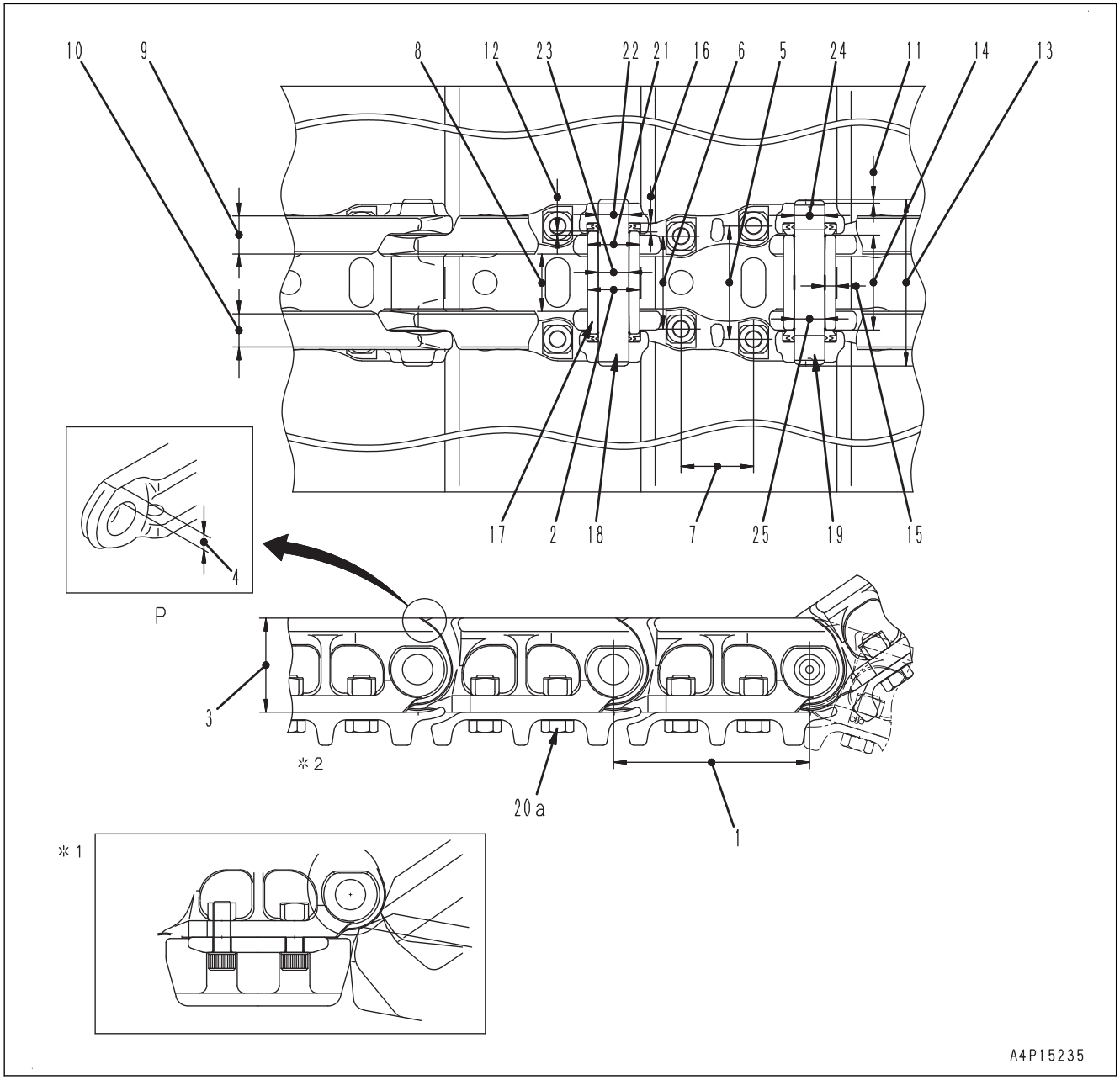


ENGINE AND COOLING SYSTEM

MAINTENANCE STANDARD FOR PTO



MAINTENANCE STANDARD OF TRACK SHOE



REMARK

P part shows the link in which the bushing is press-fitted.

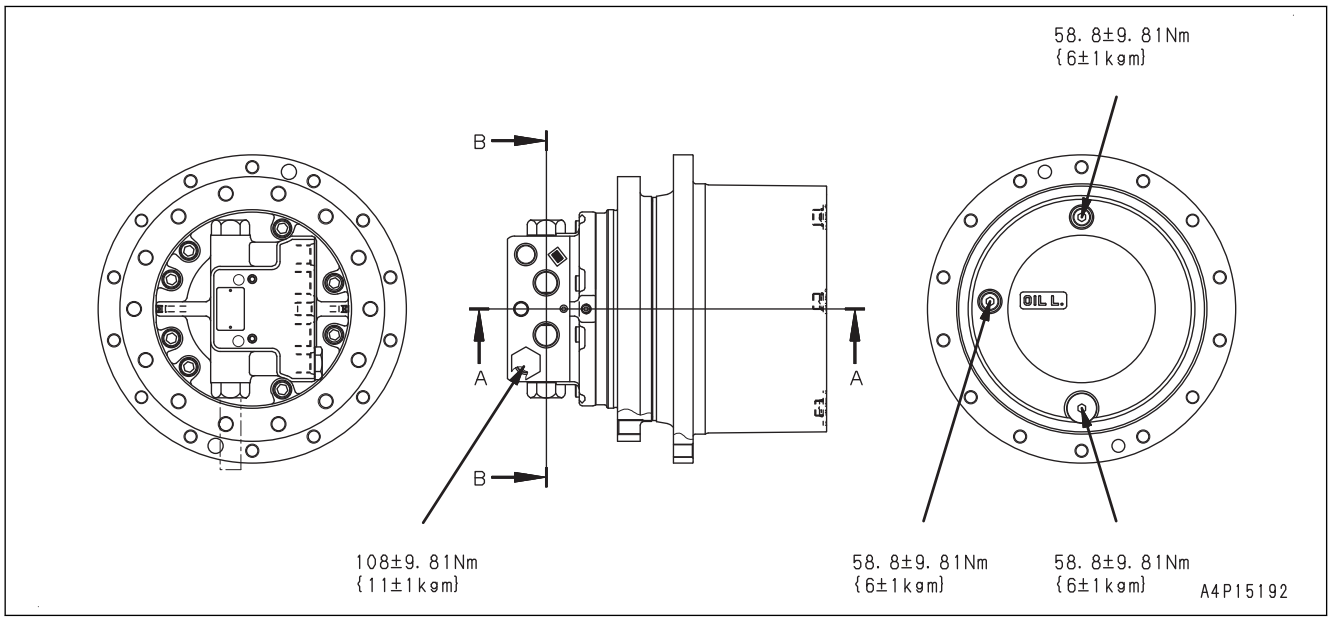
*1: Road liner

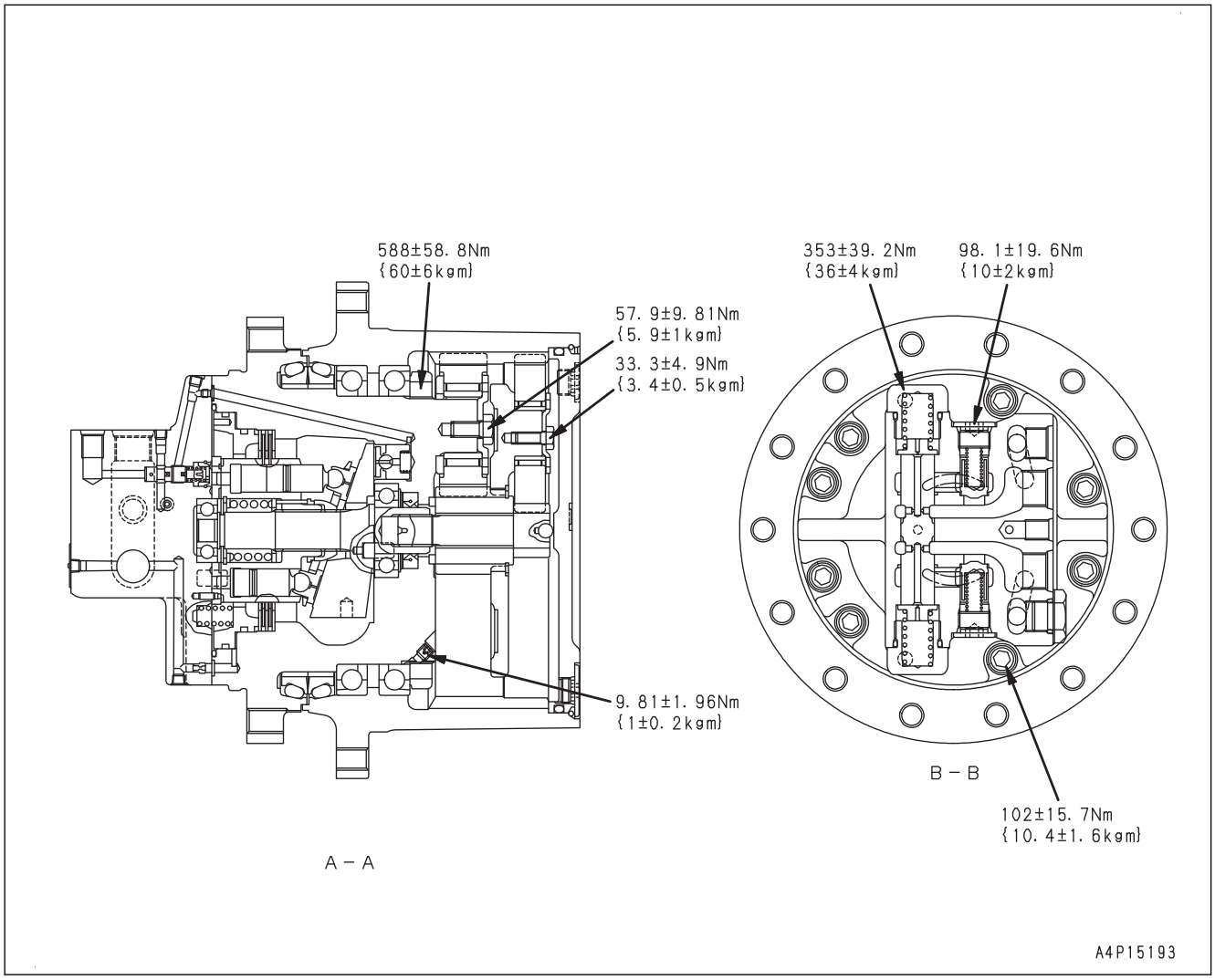
*2:

Rubber pad shoe (if equipped)

Triple grouser shoe (if equipped)

MAINTENANCE STANDARD OF TRAVEL MOTOR





Unit: mm

No.	Item	Judgment criteria					Remedy
1	Tightening torque of plug	14.7 to 19.6 Nm {1.5 to 2.0 kgm} with Loctite 638					Retighten
2	Tightening torque of plug	58.8 to 78.5 Nm {6.0 to 8.0 kgm}					
3	Tightening torque of plug	65.7 to 82.3 Nm {6.7 to 8.4 kgm}					
4	Tightening torque of valve	49.0 to 59.0 Nm {5.0 to 6.0 kgm}					
5	Tightening torque of plug	14.7 to 19.6 Nm {1.5 to 2.0 kgm} with Loctite 638					
6	Tightening torque of plug	14.7 to 19.6 Nm {1.5 to 2.0 kgm} with Loctite 638					
7	Check valve spring	Standard dimension			Repair limit		Replace (Replace spring if damaged or deformed as well)
		Free height x outside diameter	Installed height	Load at installed height	Free height	Load at installed height	
		-	9.0	1.225 N {0.125 kg}	-	-	
8	Check valve spring	-	31.0	13.7 N {1.4 kg}	-	-	
9	Spool return spring	-	36.0	227.5 N {23.2 kg}	-	-	
10	Check valve spring	-	6.5	0.54 N {0.054 kg}	-	-	
11	Check valve spring	-	7.0	0.39 N {0.04 kg}	-	-	
12	Check valve spring	-	7.0	0.39 N {0.04 kg}	-	-	