

Shop Manual

HYDRAULIC
EXCAVATOR

PC170LC-10

SERIAL NUMBERS 30001 and up

KOMATSU

SHOP MANUAL

HYDRAULIC EXCAVATOR

PC170LC-10

Model Serial Number

PC170LC-10 30001 and up

00 Index and foreword

00 Index and foreword

Index

Index (ALL-0310-001-A-00-A)

00 Index and foreword	00-1
Index	00-2
Foreword, safety and general information	00-13
Important safety notice	00-13
How to read the shop manual	00-20
Explanation of terms for maintenance standard	00-22
Handling equipment of fuel system devices	00-24
Handling of intake system parts	00-25
Handling of hydraulic equipment	00-26
Method of disconnecting and connecting of push-pull type coupler	00-28
Handling of electrical equipment	00-31
How to read electric wire code	00-39
Precautions when performing operation	00-42
Practical use of KOMTRAX	00-47
Standard tightening torque table	00-48
List of abbreviation	00-54
Conversion table	00-59
01 Specification	01-1
Table of contents	01-2
Specifications	01-3
Specification drawing	01-3
Working range drawings	01-4
Specifications	01-5
Weight table	01-8
Table of fuel, coolant, and lubricants	01-9
10 Structure and function	10-1
Table of contents	10-2
Engine and cooling system	10-3
Engine related parts	10-3
VFT	10-5
EGR system piping drawing	10-9
EGR system circuit diagram	10-11
EGR valve	10-12
EGR cooler	10-14
KCCV layout drawing	10-16
KCCV ventilator	10-19
KDOC muffler	10-21
Cooling system	10-23
Power train	10-25
Power train system	10-25
Swing circle	10-27
Swing machinery	10-28
Final drive	10-30
Undercarriage and frame	10-32
Track frame and idler cushion	10-32
Hydraulic system	10-34
Hydraulic component layout	10-34
Valve control	10-37
Hydraulic tank	10-39
CLSS	10-41
Main pump	10-45
Control valve	10-71
Swing motor	10-119
Travel motor	10-121
PPC valve	10-136
Solenoid valve	10-158
Attachment circuit selector valve (for high pressure circuit)	10-162

Attachment circuit selector valve (for low pressure circuit).....	10-164
Center swivel joint.....	10-167
Accumulator.....	10-169
Work equipment.....	10-170
Work equipment.....	10-170
Work equipment shim.....	10-171
Bucket play adjustment shim.....	10-172
Cab and its attachments.....	10-173
Cab mount and cab tipping stopper.....	10-173
ROPS cab.....	10-174
Electrical system.....	10-175
Electrical control system.....	10-175
Machine monitor system.....	10-220
KOMTRAX system.....	10-242
Sensor.....	10-245
20 Standard value tables.....	20-1
Table of contents.....	20-2
Standard service value table.....	20-3
Standard value table for engine.....	20-3
Standard value table for machine.....	20-5
Standard value table for electrical system.....	20-19
30 Testing and adjusting.....	30-1
Table of contents.....	30-2
Related information on testing and adjusting.....	30-3
Tools for testing and adjusting.....	30-3
Sketch of tools for testing and adjusting.....	30-6
Engine and cooling system.....	30-7
Testing engine speed.....	30-7
Testing boost pressure.....	30-8
Testing exhaust gas color.....	30-10
Testing and adjusting valve clearance.....	30-11
Testing compression pressure.....	30-14
Testing blowby pressure.....	30-18
Testing engine oil pressure.....	30-19
Testing fuel pressure.....	30-20
Testing fuel discharge, return and leakage.....	30-25
Bleeding air from fuel system.....	30-30
Testing fuel circuit for leakage.....	30-32
Handling cylinder cutout mode operation.....	30-33
Handling no-injection cranking operation.....	30-34
Checking and adjusting air conditioner compressor belt tension.....	30-35
Replacing fan belt.....	30-36
Power train.....	30-37
Testing swing circle bearing clearance.....	30-37
Undercarriage and frame.....	30-38
Testing and adjusting track tension.....	30-38
Hydraulic system.....	30-39
Releasing remaining pressure from hydraulic circuit.....	30-39
Testing oil pressure of control circuit.....	30-40
Testing and adjusting oil pressure in work equipment, swing, and travel circuits.....	30-41
Testing and adjusting oil pressure in pump PC control circuit.....	30-45
Testing and adjusting oil pressure in pump LS control circuit.....	30-48
Testing outlet pressure of solenoid valve.....	30-52
Testing PPC valve outlet pressure.....	30-55
Adjusting play of work equipment and swing PPC valves.....	30-57
Testing pump swash plate sensor.....	30-58
Isolating the parts causing hydraulic drift in work equipment.....	30-59
Testing and adjusting travel deviation.....	30-61
Testing oil leakage.....	30-63

Bleeding air from hydraulic circuit	30-66
Cab and its attachments	30-68
Checking cab tipping stopper	30-68
Adjusting mirrors	30-69
Electrical system	30-71
Special functions of machine monitor	30-71
KOMTRAX terminal start-up procedure	30-129
Adjusting rearview camera angle	30-132
Handling voltage circuit of engine controller	30-134
Handling battery disconnect switch	30-135
Testing diodes	30-136
Pm clinic	30-137
Pm Clinic service	30-137
40 Troubleshooting	40-1
Table of contents	40-2
Related information on troubleshooting	40-8
Troubleshooting points	40-8
Sequence of events in troubleshooting	40-10
Checks before troubleshooting	40-12
Inspection procedure before troubleshooting	40-14
Preparation work for troubleshooting of electrical system	40-32
Classification and procedure for troubleshooting	40-37
Symptom and troubleshooting numbers	40-40
Information in troubleshooting table	40-43
Procedure for troubleshooting wiring harness of pressure sensor system for open circuit	40-45
Connector list and layout	40-48
Connector contact identification	40-58
T-branch box and T-branch adapter table	40-96
Fuse location table	40-101
Failure codes table	40-103
Troubleshooting by failure code (Display of code)	40-110
Failure code [879AKA] A/C Inner Sensor Open Circuit	40-110
Failure code [879AKB] A/C Inner Sensor Short Circuit	40-111
Failure code [879BKA] A/C Outer Sensor Open Circuit	40-112
Failure code [879BKB] A/C Outer Sensor Short Circuit	40-113
Failure code [879CKA] Ventilating Sensor Open Circuit	40-114
Failure code [879CKB] Ventilating Sensor Short Circuit	40-115
Failure code [879DKZ] Sunlight Sensor Open Or Short Circuit	40-116
Failure code [879EMC] Ventilation Damper Abnormality	40-117
Failure code [879FMC] Air Mix Damper Abnormality	40-118
Failure code [879GKX] Refrigerant Abnormality	40-119
Failure code [989L00] Engine Controller Lock Caution 1	40-120
Failure code [989M00] Engine Controller Lock Caution 2	40-121
Failure code [989N00] Engine Controller Lock Caution 3	40-122
Failure code [AA10NX] Air Cleaner Clogging	40-123
Failure code [AB00KE] Charge Voltage Low	40-125
Failure code [B@BAZG] Eng Oil Press Low	40-127
Failure code [B@BAZK] Eng Oil Level Low	40-128
Failure code [B@BCNS] Eng Water Overheat	40-129
Failure code [B@BCZK] Eng Water Level Low	40-130
Failure code [B@HANS] Hyd Oil Overheat	40-132
Failure code [CA115] Eng Ne and Bkup Speed Sens Error	40-133
Failure code [CA122] Chg Air Press Sensor High Error	40-134
Failure code [CA123] Chg Air Press Sensor Low Error	40-136
Failure code [CA131] Throttle Sensor High Error	40-138
Failure code [CA132] Throttle Sensor Low Error	40-140
Failure code [CA144] Coolant Temp Sens High Error	40-142
Failure code [CA145] Coolant Temp Sens Low Error	40-144

Failure code [CA153] Chg Air Temp Sensor High Error	40-146
Failure code [CA154] Chg Air Temp Sensor Low Error	40-148
Failure code [CA187] Sensor 2 Supply Volt Low Error	40-150
Failure code [CA221] Ambient Press Sensor High Error	40-152
Failure code [CA222] Ambient Press Sens Low Error	40-154
Failure code [CA227] Sensor 2 Supply Volt High Error	40-156
Failure code [CA234] Eng Overspeed	40-157
Failure code [CA238] Ne Speed Sensor Supply Volt Error	40-158
Failure code [CA239] Ne Speed Sens Supply Volt High Error	40-159
Failure code [CA271] IMV/PCV1 Short Error	40-160
Failure code [CA272] IMV/PCV1 Open Error	40-162
Failure code [CA295] Ambient Press Sens In Range Error	40-164
Failure code [CA322] Inj #1(L#1) Open/Short Error	40-165
Failure code [CA324] Inj #3(L#3) Open/Short Error	40-167
Failure code [CA331] Inj #2(L#2) Open/Short Error	40-169
Failure code [CA332] Inj #4(L#4) Open/Short Error	40-171
Failure code [CA343] ECM Critical Internal Failure	40-173
Failure code [CA351] Injectors Drive Circuit Error	40-174
Failure code [CA352] Sensor 1 Supply Volt Low Error	40-175
Failure code [CA356] Mass Air Flow Sensor High Error	40-177
Failure code [CA357] Mass Air Flow Sensor Low Error	40-179
Failure code [CA386] Sensor 1 Supply Volt High Error	40-181
Failure code [CA428] Water in Fuel Sensor High Error	40-182
Failure code [CA429] Water in Fuel Sensor Low Error	40-184
Failure code [CA435] Eng Oil Press Sw Error	40-186
Failure code [CA441] Battery Voltage Low Error	40-187
Failure code [CA442] Battery Voltage High Error	40-189
Failure code [CA449] Rail Press Very High Error	40-190
Failure code [CA451] Rail Press Sensor High Error	40-191
Failure code [CA452] Rail Press Sensor Low Error	40-193
Failure code [CA466] KVGT Motor Driver Position Error	40-195
Failure code [CA488] Chg Air Temp High Torque Derate	40-197
Failure code [CA515] Rail Press Sens Sup Volt High Error	40-198
Failure code [CA516] Rail Press Sens Sup Volt Low Error	40-200
Failure code [CA553] Rail Press High Error	40-202
Failure code [CA555] Crankcase Press High Error 1	40-203
Failure code [CA556] Crankcase Press High Error 2	40-204
Failure code [CA559] Rail Press Low Error	40-205
Failure code [CA689] Eng Ne Speed Sensor Error	40-209
Failure code [CA691] Intake Air Temp Sens High Error	40-211
Failure code [CA692] Intake Air Temp Sens Low Error	40-213
Failure code [CA697] ECM Internal Temp Sensor High Error	40-215
Failure code [CA698] ECM Int Temp Sensor Low Error	40-216
Failure code [CA731] Eng Bkup Speed Sens Phase Error	40-217
Failure code [CA778] Eng Bkup Speed Sensor Error	40-218
Failure code [CA1117] Persistent Data Lost Error	40-221
Failure code [CA1695] Sensor 5 Supply Volt High Error	40-222
Failure code [CA1696] Sensor 5 Supply Volt Low Error	40-223
Failure code [CA1843] Crankcase Press Sens High Error	40-224
Failure code [CA1844] Crankcase Press Sens Low Error	40-226
Failure code [CA1896] EGR Valve Stuck Error	40-228
Failure code [CA1942] Crankcase Press Sens In Range Error	40-229
Failure code [CA1961] EGR_Motor Driver IC Over Temp Error	40-230
Failure code [CA2185] Throt Sensor Sup Volt High Error	40-231
Failure code [CA2186] Throt Sensor Sup Volt Low Error	40-233
Failure code [CA2249] Rail Press Very Low Error	40-235
Failure code [CA2272] EGR Valve Pos Sens Low Error	40-236
Failure code [CA2311] IMV Solenoid Error	40-238
Failure code [CA2349] EGR Valve Solenoid Open Error	40-239

Failure code [CA2353] EGR Valve Solenoid Short Error	40-241
Failure code [CA2357] EGR Valve Servo Error	40-243
Failure code [CA2373] Exhaust Manifold Press Sens High Error	40-244
Failure code [CA2374] Exhaust Manifold Press Sens Low Error	40-246
Failure code [CA2375] EGR Orifice Temp Sens High Error	40-248
Failure code [CA2376] EGR Orifice Temp Sens Low Error	40-250
Failure code [CA2554] Exh Manifold Press Sens In Range Error	40-252
Failure code [CA2555] Grid Htr Relay Volt Low Error	40-253
Failure code [CA2556] Grid Htr Relay Volt High Error	40-255
Failure code [CA2961] EGR Orifice Temp High Error 1	40-257
Failure code [CA2973] Chg Air Press Sensor In Range Error	40-258
Failure code [CA3419] Mass Air Flow Sensor Sup Volt High Error	40-259
Failure code [CA3421] Mass Air Flow Sensor Sup Volt Low Error	40-261
Failure code [CA3724] EGR/KVGT Motor Driver Power Low Error	40-263
Failure code [CA3741] Rail Press Valve Trip Error	40-265
Failure code [CA3918] KVGT Stuck Error	40-266
Failure code [CA3919] KVGT Motor Driver IC Over Temp Error	40-267
Failure code [CA3921] KVGT Servo Error 2	40-268
Failure code [CA3922] KVGT Motor Driver Open Error	40-269
Failure code [CA3923] KVGT Motor Driver Short Error	40-271
Failure code [D110KB] Battery Relay Drive Short Circuit	40-273
Failure code [D19JKZ] Personal Code Relay Abnormality	40-275
Failure code [D811MC] KOMTRAX Error	40-278
Failure code [D862KA] GPS Antenna Open Circuit	40-279
Failure code [D8ALKA] System Operating Lamp Disconnection (KOMTRAX)	40-280
Failure code [D8ALKB] System Operating Lamp Short Circuit (KOMTRAX)	40-282
Failure code [D8AQKR] CAN2 Discon (KOMTRAX)	40-283
Failure code [DA20MC] Pump Controller Malfunction	40-285
Failure code [DA22KK] Pump Solenoid Power Low Error	40-286
Failure code [DA25KP] 5V Sensor 1 Power Abnormality	40-288
Failure code [DA29KQ] Model Selection Abnormality	40-290
Failure code [DA2LKA] System Operating Lamp Disconnection (Pump Con)	40-292
Failure code [DA2LKB] System Operating Lamp Short Circuit (Pump Con)	40-294
Failure code [DA2QKR] CAN2 Discon (Pump Con)	40-295
Failure code [DA2RKR] CAN1 Discon (Pump Con)	40-297
Failure code [DAF0MB] Monitor ROM Abnormality	40-298
Failure code [DAF0MC] Monitor Error	40-299
Failure code [DAF8KB] Camera Power Supply Short Circuit	40-300
Failure code [DAF9KQ] Model Selection Abnormality	40-302
Failure code [DAFGMC] GPS Module Error	40-303
Failure code [DAFLKA] Operating Lamp Open Circuit(Monitor)	40-304
Failure code [DAFLKB] System Operating Lamp Short Circuit (Monitor)	40-306
Failure code [DAFQKR] CAN2 Discon (Monitor)	40-307
Failure code [DAZ9KQ] A/C Model Selection Abnormality	40-308
Failure code [DAZQKR] CAN2 Discon (Aircon ECU)	40-309
Failure code [DB2QKR] CAN2 Discon (Engine Con)	40-313
Failure code [DB2RKR] CAN1 Discon (Engine Con)	40-317
Failure code [DGH2KB] Hyd Oil Sensor Short Circuit	40-322
Failure code [DHA4KA] Air Cleaner Clogging Sensor Open Circuit	40-324
Failure code [DHPAMA] F Pump Press Sensor Abnormality	40-326
Failure code [DHPBMA] R Pump Press Sensor Abnormality	40-328
Failure code [DHS3MA] Arm Curl PPC Press Sensor Abnormality	40-330
Failure code [DHS4MA] Bucket Curl PPC Press Sensor Abnormality	40-332
Failure code [DHS8MA] Boom Raise PPC Press Sensor Abnormality	40-334
Failure code [DHS9MA] Boom Lower PPC Press Sensor Abnormality	40-336
Failure code [DHSAMA] Swing RH PPC Press Sensor Abnormality	40-338
Failure code [DHSBMA] Swing LH PPC Press Sensor Abnormality	40-340
Failure code [DHSCMA] Arm Dump PPC Press Sensor Abnormality	40-342
Failure code [DHSDMA] Bucket Dump PPC Press Sensor Abnormality	40-344

Failure code [DKR0MA] Pump Swash Plate Sensor Abnormality	40-346
Failure code [DR21KX] Camera 2 Picture Rev. Drive Abnormality	40-348
Failure code [DR31KX] Camera 3 Picture Rev. Drive Abnormality	40-350
Failure code [DV20KB] Travel Alarm Short Circuit	40-351
Failure code [DW43KA] Travel Speed Sol Open Circuit	40-353
Failure code [DW43KB] Travel Speed Sol Short Circuit	40-355
Failure code [DW45KA] Swing Brake Sol Open Circuit	40-357
Failure code [DW45KB] Swing Brake Sol Short Circuit	40-360
Failure code [DW91KA] Travel Junction Sol Open Circuit	40-362
Failure code [DW91KB] Travel Junction Sol Short Circuit	40-364
Failure code [DWA2KA] Attachment Sol Open Circuit	40-366
Failure code [DWA2KB] Attachment Sol Short Circuit	40-368
Failure code [DWJ0KA] Merge-divider Sol Open Circuit	40-369
Failure code [DWJ0KB] Merge-divider Sol Short Circuit	40-370
Failure code [DWK0KA] 2-Stage Relief Sol Open Circuit	40-371
Failure code [DWK0KB] 2-Stage Relief Sol Short Circuit	40-373
Failure code [DXA8KA] PC-EPC Sol Open Circuit	40-374
Failure code [DXA8KB] PC-EPC Sol Short Circuit	40-376
Failure code [DXE4KA] Attachment Flow EPC Open Circuit	40-378
Failure code [DXE4KB] Attachment Flow EPC Short Circuit	40-380
Failure code [DY20KA] Wiper Working Abnormality	40-381
Failure code [DY20MA] Wiper Parking Abnormality	40-383
Failure code [DY2CKB] Washer Drive Short Circuit	40-385
Failure code [DY2DKB] Wiper Drive (Fwd) Short Circuit	40-387
Failure code [DY2EKB] Wiper Drive (Rev) Short Circuit	40-389
Troubleshooting of electrical system (E-mode)	40-391
E-1 Engine does not start (Engine does not crank)	40-391
E-2 Manual preheating system does not work	40-397
E-3 Automatic preheating system does not work	40-400
E-4 While preheating is working, preheating monitor does not light up	40-402
E-5 When starting switch is turned to ON position, machine monitor displays nothing	40-404
E-6 While starting switch is turned to ON position (with engine stopped), engine oil level monitor lights up in yellow	40-407
E-7 While starting switch is turned to ON position (with engine stopped), radiator coolant level monitor lights up in yellow	40-408
E-8 Engine coolant temperature monitor lights up in red while engine is running	40-409
E-9 Hydraulic oil temperature monitor lights up in red while engine is running	40-410
E-10 Charge level monitor lights up in red while engine is running	40-411
E-11 Fuel level monitor lights up in red while engine is running	40-412
E-12 Air cleaner clogging monitor lights up in yellow while engine is running	40-413
E-13 Water separator monitor lights up in red while engine is running	40-414
E-14 Engine coolant temperature monitor lights up in red while engine is running	40-415
E-15 Hydraulic oil temperature monitor lights up in red while engine is running	40-416
E-16 Engine oil pressure monitor lights up in red while engine is running	40-417
E-17 Fuel gauge display does not move from minimum or maximum	40-418
E-18 Fuel gauge indicates incorrect amount (indicates neither full nor empty)	40-419
E-19 Engine coolant temperature gauge display does not move from minimum or maximum	40-420
E-20 Engine coolant temperature gauge indicates incorrect temperature (indicates neither full nor empty)	40-421
E-21 Hydraulic oil temperature gauge does not move from minimum or maximum	40-422
E-22 Hydraulic oil temperature gauge indicates incorrect temperature (indicates neither full nor empty)	40-424
E-23 Contents of display on machine monitor is different from actual machine condition	40-425
E-24 Some areas of machine monitor screen are not displayed	40-426
E-25 Function switch does not work	40-427
E-26 Automatic warm-up system does not operate (in cold season)	40-428

E-27 Auto-deceleration monitor does not light up, or does not go out, while auto-deceleration switch is operated	40-429
E-28 Auto-deceleration function does not operate or is not canceled while lever is operated	40-430
E-29 Working mode selection screen is not displayed while working mode selector switch is operated	40-431
E-30 Setting of engine and hydraulic pump is not changed while working mode is changed.....	40-432
E-31 Travel speed monitor does not change when travel speed switch is operated	40-433
E-32 Travel speed does not change while travel speed selection is changed.....	40-434
E-33 Alarm buzzer does not stop sounding.....	40-435
E-34 Service meter is not displayed, while starting switch is in OFF position.....	40-436
E-35 Service mode cannot be selected	40-437
E-36 Any of work equipment, swing and travel does not work.....	40-438
E-37 Any of work equipment, swing and travel cannot be locked	40-440
E-38 Upper structure does not swing while swing parking brake cancel switch is set to CANCEL position.....	40-442
E-39 Swing brake does not operate while swing parking brake cancel switch is set to NORMAL position	40-444
E-40 One-touch power maximizing function does not operate, or indicator is not displayed on monitor	40-446
E-41 One-touch power maximizing function cannot be canceled	40-448
E-42 Alarm does not sound during travel.....	40-449
E-43 Alarm does not stop sounding while machine is stopped.....	40-450
E-44 Horn does not sound	40-451
E-45 Horn does not stop sounding.....	40-453
E-46 Wiper monitor does not light up, or does not go out, while wiper switch is operated	40-454
E-47 Wiper does not operate while wiper switch is operated	40-455
E-48 Window washer does not operate while window washer switch is operated	40-457
E-49 Boom LOWER is not displayed correctly with monitoring function	40-458
E-50 Arm OUT is not displayed correctly with monitoring function	40-459
E-51 Arm IN is not displayed correctly with monitoring function	40-460
E-52 Boom RAISE is not displayed correctly with monitoring function	40-461
E-53 Bucket CURL is not displayed correctly with monitoring function.....	40-462
E-54 Bucket DUMP is not displayed correctly with monitoring function.....	40-463
E-55 Swing is not displayed correctly with monitoring function.....	40-464
E-56 Travel is not displayed correctly with monitoring function	40-465
E-57 Service is not displayed correctly with monitoring function	40-467
E-58 Attachment hydraulic circuit cannot be changed.....	40-469
E-59 KOMTRAX system does not operate normally	40-470
Troubleshooting of hydraulic and mechanical system (H-mode).....	40-471
Information described in troubleshooting table (H-mode)	40-471
System chart of hydraulic and mechanical systems.....	40-472
Failure mode and cause table	40-474
H-1 All of work equipments, swing and travel operations lack speed or power	40-482
H-2 Engine speed drops significantly or engine stalls	40-484
H-3 All work equipment, swing and travel does not work	40-485
H-4 Unusual sound is heard from around hydraulic pump	40-486
H-5 Fine control performance or response is poor	40-487
H-6 Boom speed or power is low	40-488
H-7 Arm speed or power is low.....	40-491
H-8 Bucket speed or power is low.....	40-494
H-9 Work equipment does not move in single operation.....	40-496
H-10 Hydraulic drift of boom is large	40-497
H-11 Hydraulic drift of arm is large	40-498
H-12 Hydraulic drift of bucket is large	40-499
H-13 Time lag of work equipment is large	40-500

H-14 When part of work equipment is relieved singly, other parts of work equipment move	40-502
H-15 One-touch power maximizing function does not operate	40-503
H-16 In combined operation of work equipment, equipment having heavier load moves slower	40-504
H-17 In combined operations of swing and boom RAISE, boom rising speed is low	40-505
H-18 In combined operation of swing and travel, travel speed drops largely	40-506
H-19 Machine does not travel straight	40-507
H-20 Travel speed is slow	40-509
H-21 Machine is hard to steer or travel power is low	40-511
H-22 Travel speed does not change, or travel speed is too slow or fast	40-514
H-23 One of tracks does not run	40-515
H-24 Upper structure does not swing to the right or left	40-517
H-25 Upper structure swing only to the right or left	40-518
H-26 Swing acceleration or swing speed is low in both directions (right and left)	40-519
H-27 Swing acceleration performance is poor or swing speed is slow in only one direction	40-520
H-28 Upper structure overruns excessively when it stops swinging (both right and left)	40-521
H-29 Upper structure overruns excessively when it stops swinging (either right or left)	40-522
H-30 Shock is large when upper structure stops swinging	40-523
H-31 Large unusual noise is heard when upper structure stops swinging	40-524
H-32 Swing drift on a slope is large while swing parking brake is applied	40-525
H-33 Swing drift on a slope is large while swing parking brake is released	40-526
H-34 Attachment hydraulic circuit cannot be changed while attachment is installed	40-527
H-35 Oil flow in attachment circuit cannot be controlled	40-528
Troubleshooting of engine (S-mode)	40-529
Information mentioned in troubleshooting table (S mode)	40-529
S-1 Engine does not crank when starting switch is turned to START position	40-530
S-2 Engine cranks but no exhaust smoke comes out	40-531
S-3 Fuel is being injected but engine does not start (misfiring: engine cranks but does not start)	40-532
S-4 Engine startability is poor	40-533
S-5 Engine does not pick up smoothly	40-535
S-6 Engine stops during operation	40-537
S-7 Engine runs rough or is unstable	40-539
S-8 Engine lacks power	40-540
S-9 Exhaust smoke is black	40-542
S-10 Engine oil consumption is excessive	40-544
S-11 Oil becomes contaminated quickly	40-545
S-12 Fuel consumption is excessive	40-546
S-13 Oil is in coolant (or coolant spurts or coolant level goes down)	40-547
S-14 Oil pressure drops	40-548
S-15 Fuel mixes into engine oil	40-549
S-16 Water mixes into engine oil (milky)	40-550
S-17 Coolant temperature rises too high (overheating)	40-551
S-18 Unusual noise is heard	40-552
S-19 Vibration is excessive	40-553
S-20 Air cannot be bled from fuel circuit	40-554
50 Disassembly and assembly	50-1
Table of contents	50-2
Related information on disassembly and assembly	50-4
How to read this manual	50-4
Coating materials list	50-6
Special tools list	50-10
Sketches of special tools	50-15
Engine and cooling system	50-19
Removal and installation of supply pump assembly	50-19
Removal and installation of injector assembly	50-23

Removal and installation of cylinder head assembly	50-29
Removal and installation of radiator assembly	50-46
Removal and installation of hydraulic oil cooler assembly	50-48
Removal and installation of aftercooler assembly	50-51
Removal and installation of engine and main pump assembly	50-53
Removal and installation of engine front oil seal	50-60
Removal and installation of engine rear oil seal	50-64
Removal and installation of fuel cooler assembly	50-67
Removal and installation of fuel tank assembly	50-69
Removal and installation of engine hood assembly	50-71
Removal and installation of KDOC assembly	50-73
Removal and installation of KCCV assembly	50-75
Removal and installation of air cleaner assembly	50-80
Power train	50-82
Removal and installation of travel motor and final drive assembly	50-82
Disassembly and assembly of final drive assembly	50-83
Removal and installation of swing motor and swing machinery assembly	50-92
Disassembly and assembly of swing machinery assembly	50-94
Removal and installation of swing circle assembly	50-101
Undercarriage and frame	50-102
Separation and connection of track shoe assembly	50-102
Removal and installation of sprocket	50-104
Removal and installation of idler and idler cushion assembly	50-105
Disassembly and assembly of idler assembly	50-106
Disassembly and assembly of idler cushion assembly	50-109
Disassembly and assembly of track roller assembly	50-111
Disassembly and assembly of carrier roller assembly	50-113
Removal and installation of revolving frame assembly	50-116
Removal and installation of counterweight assembly	50-118
Hydraulic system	50-120
Removal and installation of center swivel joint assembly	50-120
Disassembly and assembly of center swivel joint assembly	50-123
Removal and installation of hydraulic tank assembly	50-124
Removal and installation of main pump assembly	50-128
Removal and installation of main pump input shaft oil seal	50-131
Removal and installation of control valve assembly	50-132
Disassembly and assembly of control valve assembly	50-136
Disassembly and assembly of work equipment PPC valve assembly	50-138
Disassembly and assembly of travel PPC valve assembly	50-140
Work equipment	50-142
Removal and installation of work equipment assembly	50-142
Disassembly and assembly of work equipment cylinder assembly	50-145
Cab and its attachments	50-151
Removal and installation of operator's cab assembly	50-151
Removal and installation of operator cab glass (adhered glass)	50-156
Removal and installation of front window assembly	50-166
Removal and installation of floor frame assembly	50-172
Removal and installation of air conditioner unit assembly	50-177
Removal and installation of operator's seat	50-181
Removal and installation of seat belt	50-183
Removal and installation of front wiper assembly	50-185
Electrical system	50-192
Removal and installation of air conditioner compressor assembly	50-192
Removal and installation of air conditioner condenser assembly	50-194
Removal and installation of engine controller assembly	50-196
Removal and installation of pump controller assembly	50-198
Removal and installation of machine monitor assembly	50-201
Removal and installation of pump swash plate sensor	50-203
Removal and installation of mass air flow and temperature sensor	50-204

Removal and installation of KOMTRAX terminal assembly	50-205
60 Maintenance standard	60-1
Table of contents	60-2
Engine and cooling system	60-3
Engine mount	60-3
Cooling system	60-4
Power train	60-5
Swing circle	60-5
Swing machinery	60-6
Final drive	60-7
Sprocket	60-9
Undercarriage and frame	60-11
Track frame and idler cushion	60-11
Idler	60-13
Track roller	60-15
Carrier roller	60-16
Track shoe	60-17
Hydraulic system	60-21
Hydraulic tank	60-21
Main pump	60-22
Control valve	60-25
Travel motor	60-36
Work equipment and swing PPC valve	60-39
Travel PPC valve	60-42
1st-line attachment PPC valve (with EPC valve)	60-45
2nd-line attachment PPC valve	60-48
Solenoid valve	60-50
Attachment circuit selector valve (for high-pressure circuit)	60-51
Attachment circuit selector valve (for low-pressure circuit)	60-52
Center swivel joint	60-53
Work equipment	60-54
Work equipment	60-54
Boom cylinder	60-63
Arm cylinder	60-64
Bucket cylinder	60-65
80 Appendix	80-1
Table of contents	80-2
Air conditioner components	80-3
Precautions for refrigerant	80-3
Air conditioner component	80-4
Configuration and function of refrigeration cycle	80-7
Outline of refrigeration cycle	80-8
Air conditioner unit	80-10
Dual pressure switch	80-17
Air conditioner controller	80-18
Compressor	80-19
Air conditioner condenser	80-20
Sunlight sensor	80-22
Outer temperature sensor (outside air temperature sensor)	80-23
Procedure for testing and troubleshooting	80-24
Circuit diagram and arrangement of connector pins	80-26
System diagram	80-28
Input and output signals of the air conditioner controller	80-29
Parts and connectors layout	80-31
Testing air leakage (duct)	80-35
Testing with self-diagnosis function	80-38
Testing vent (mode) changeover	80-41
Testing FRESH/RECIRC air changeover	80-43
Testing sunlight sensor	80-44

00 Index and foreword


Index

Testing (dual) pressure switch for refrigerant.....	80-45
Testing relays	80-46
Troubleshooting chart 1	80-47
Troubleshooting chart 2	80-48
Information in troubleshooting table	80-51
Failure code list related to air conditioner.....	80-52
Failure code [879AKA] A/C Inner Sensor Open Circuit	80-53
Failure code [879AKB] A/C Inner Sensor Short Circuit.....	80-54
Failure code [879BKA] A/C Outer sensor Open Circuit	80-55
Failure code [879BKB] A/C Outer sensor Short Circuit	80-57
Failure code [879CKA] Ventilating Sensor Open Circuit.....	80-59
Failure code [879CKB] Ventilating Sensor Short Circuit.....	80-60
Failure code [879DKZ] Sunlight sensor Open or Short Circuit	80-61
Failure code [879EMC] Ventilation Damper Abnormality	80-63
Failure code [879FMC] Air Mix Damper Abnormality	80-64
Failure code [879GKX] Refrigerant Abnormality.....	80-65
A-1 Troubleshooting for power supply system (Air conditioner does not operate).....	80-66
A-2 Troubleshooting for compressor and refrigerant system (Air is not cooled)	80-68
A-3 Troubleshooting for blower motor system (No air comes out or air flow is abnormal)	80-71
A-4 Troubleshooting for FRESH/RECIRC air changeover	80-73
Troubleshooting with gauge pressure.....	80-75
Connection of service tool.....	80-78
Precautions for disconnecting and connecting air conditioner piping.....	80-80
Handling of compressor oil.....	80-82
Desiccant replacement	80-84
90 Diagrams and drawings.....	90-1
Table of contents	90-2
Hydraulic circuit diagram	90-3
Symbols in hydraulic circuit diagram	90-3
Hydraulic circuit diagram.....	90-7
Electric circuit diagram	90-9
Symbols in electric circuit diagram	90-9
Electrical circuit diagram	90-13
Electric circuit diagram for air conditioner unit	90-25
Index.....	1


Foreword, safety and general information (ALL-0370-001-A-00-A)

Important safety notice (ALL-1120-012-A-01-A)

(Rev. 2012/10)

- Appropriate servicing and repair are extremely important to ensure safe operation of the machine. The shop manual describes the effective and safe servicing and repair methods recommended by Komatsu. Some of these methods require the use of the special tools designed by Komatsu for the specific purpose.
- The symbol mark  is used for such matters that require special cautions during the work. The work indicated by the caution mark should be performed according to the instructions with special attention to the cautions. Should hazardous situation occur or be anticipated during such work, be sure to keep safe first and take every necessary measure.

General precautions

 Inappropriate handling causes an extreme danger. Read and understand what is described in the operation and maintenance manual before operating the machine. Read and understand what is described in this manual before starting the work.

- Before performing any greasing or repairs, read all the safety labels stuck to the machine. For the locations of the safety labels and detailed explanation of precautions, see the operation and maintenance manual.
- Locate a place in the repair workshop to keep the tools and removed parts. Always keep the tools and parts in their correct places. Always keep the work area clean and make sure that there is no dirt, water or oil on the floor. Smoke only in the areas provided for smoking. Never smoke while working.
- When performing any work, always wear the safety shoes and helmet. Do not wear loose work cloths, or clothes with buttons missing.
 1. Always wear the protective eyeglasses when hitting parts with a hammer.
 2. Always wear the protective eyeglasses when grinding parts with a grinder, etc.
- When performing any work with two or more workers, always agree on the working procedure before starting. While working, always keep conversations of the work between your fellow workers and your self on any step of the work. During the work, hang the warning tag of "UNDER WORKING" in the operator's compartment.
- Only qualified workers must perform the work and operation which require license or qualification.
- Keep the tools in good condition. And learn the correct way to use the tools, and use the proper ones among them. Before starting the work, thoroughly check the tools, lift truck, service vehicle, etc.
- If welding repairs is required, always have a trained and experienced welder with good

knowledge of welding perform the work. When performing welding work, always wear welding gloves, apron, shielding goggles, cap, etc.

- Before starting work, warm up your body thoroughly to start work under good condition.
- Avoid continuing work for long hours and take rests with proper intervals to keep your body in good condition. Take a rest in a specified safe place.

Safety points

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

Preparation

- Before adding oil or making any repairs, place the machine on a firm and level ground, and apply the parking brake and chock the wheels or tracks to prevent the machine from moving.
- Before starting work, lower the work equipment (blade, ripper, bucket, etc.) to the ground. If it is not possible to lower the equipment to the ground, insert the lock pin or use blocks to prevent the work equipment from falling. And be sure to lock all the work equipment control levers and hang a warning tag on them.
- When performing the disassembling or assembling work, support the machine securely with blocks, jacks, or stands before starting the work.
- Remove all of mud and oil from the steps or other places used to get on and off the machine completely. Always use the handrails, ladders of

steps when getting on or off the machine. Never jump on or off the machine. When the scaffold is not provided, use steps or stepladder to secure your footing.

Precautions during work

- For the machine equipped with the battery disconnect switch, check that the system operating lamp is turned off before starting the work. Then, turn the battery disconnect switch to OFF (○) position and remove the switch key. For the machine not equipped with the battery disconnect switch, remove the cable from the battery before starting the work. Be sure to remove the negative end (-) of the battery cable first.
- Release the remaining pressure in the circuits completely before the work when the parts in the circuits of oil, fuel, coolant and air are disconnected or removed. When the cap of the oil filter, drain plug or oil pressure pickup plug is removed, loose them slowly to prevent the oil from spurting out.
- When removing or installing the checking plug or the piping in the fuel circuit, wait 30 seconds or longer after the engine is shut down and start the work after the remaining pressure is released from the fuel circuit.
- Immediately after the engine is shut down, the coolant and oil in the circuits are hot. Be careful not to get scalded by the hot coolant and oil. Start the work after checking that the coolant and oil are cooled down sufficiently.
- Start the work after the engine is shut down. Be sure to shut down the engine when working on or around the rotating parts in particular. When checking the machine without shutting down the engine (measuring oil pressure, rotational speed, oil or coolant temperature), take extreme care not to get caught in the rotating parts or the working equipment.
- The hoist or crane must be used to sling the components weighing 25 kg or heavier. Check the slings (wire rope, nylon sling, chain and hook) for damage before the work. Use the slings with ample capacity and install them to the proper places. Operate the hoist or crane slowly to prevent the component from hitting any other part. Do not work with any part still raised by the hoist or crane.
- When removing the part which is under internal pressure or reaction force of the spring, always leave 2 bolts in diagonal positions. Loosen those 2 bolts gradually and alternately and release the pressure, then, remove the part.
- When removing the part, be careful not to break or damage the electrical wiring. The damaged wiring may cause electrical fires.
- When removing piping, prevent the fuel or oil from spilling out. If any fuel or oil drips onto the floor, wipe it off immediately. Fuel or oil on the floor can cause you to slip and can even cause fires.
- As a general rule, do not use gasoline to wash parts. Do not use gasoline to clean the electrical parts, in particular.
- Reinstall the parts removed to their original places. Replace the damaged parts and the parts which must not be used with new ones. When installing the hoses and wiring harnesses, be careful that they are not damaged by contacting with other parts when the machine is operated.
- When connecting the high pressure hoses and tubes, make sure that they are not twisted. The damaged high pressure hoses and tubes are very dangerous when they are installed. So, be extremely careful when connecting the high pressure pipings. In addition, check that their connections are correct.
- When assembling or installing the parts, be sure to tighten the bolts to the specified torque. When installing the protective parts such as guards, or the parts which vibrate violently or rotate at high speeds, be sure to check that they are installed correctly.
- When aligning 2 holes, never insert your fingers or hand into the holes. Align the holes with care so that your fingers are not caught in the hole.
- When measuring hydraulic pressure, check that the measuring tools are correctly installed.
- Pay attention to safety when removing and installing the tracks of the track type machines. When removing the track, it separates suddenly. The workers should not stand at either end of the track.
- If the engine is operated for a long time in a closed place which is not ventilated well, you may suffer from gas poisoning. Accordingly, open the windows and doors to ventilate the place well.

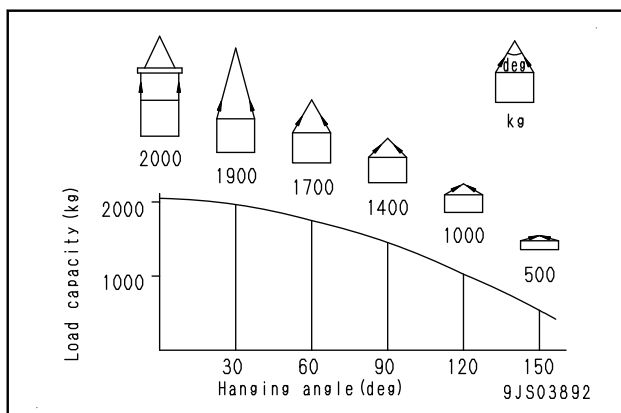
Precautions for slinging work and making signals

- Only one appointed worker must make signals and co-worker must communicate with each other frequently. The appointed signaler must make specified signals clearly at the place where the signaler is well seen from the operator's seat and where the signaler can see the working condition easily. The signaler must always stand in front of the load and guide the operator safely.
 1. Do not stand under the load.
 2. Do not step on the load.
- Check the slings before starting sling work.

- Keep putting on the gloves during sling work. (Put on the leather gloves, if available.)
- Measure the weight of the load by the eye and check its center of gravity.
- Use the proper sling according to the weight of the load and method of slinging. If too thick wire ropes are used to sling a light load, the load may slip and fall.
- Do not sling a load with 1 wire rope only. If do so, the load may rotate or the sling gets loose and the sling may slip off. Install 2 or more wire ropes symmetrically.

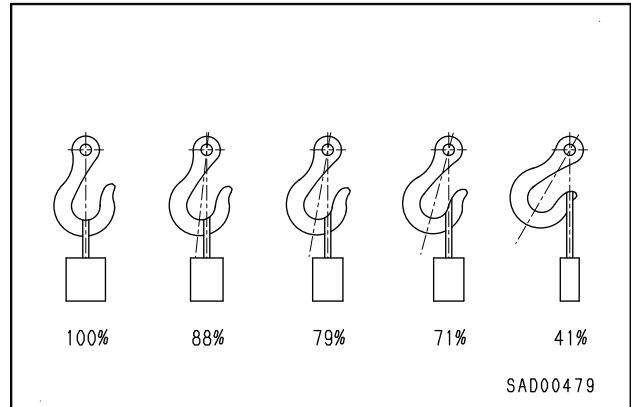
⚠ Slinging with one rope may cause turning of the load during hoisting, untwisting of the rope, or slipping of the rope from its original slinging position on the load, which can result in a dangerous accident.

- Hanging angle must be 60 degrees or smaller as a rule.
- When hanging a heavy load (25kg or heavier), the hanging angle of the rope must be narrower than that of the hook.
- ★ When slinging a load with 2 ropes or more, the larger the hanging angle is, the larger the tension of each rope. The figure bellow shows the variation of allowable load in kg when hoisting is made with 2 ropes, each of which is allowed to sling up to 9.8 kN {1,000kg} a load vertically, at various hanging angles. When the 2 ropes sling a load vertically, up to 2000 kg of total weight can be suspended. This weight is reduced to 1000 kg when the 2 ropes make a hanging angle of 120 degrees. If the two ropes sling a 2000 kg load at a hanging angle of 150 degrees, each rope is subjected to a force as large as 4000 kg.



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

- Apply wire ropes to the middle part of the hook.
- ★ Slinging near the tip of the hook may cause the rope to slip off the hook during hoisting. The strength of the hook is maximum at its central part.




- Do not use twisted or kinked wire ropes.
- When slinging up a load, observe the following.
 1. Wind up the rope slowly until the wire rope tensions. When putting your hands on the wire ropes, do not grasp them but press them down from above. If you grasp them, your fingers may be caught.
 2. After the wire ropes are stretched, stop the crane and check the condition of the slung load, wire ropes, and pads.
 3. If the load is unstable or the wire rope or chains are twisted, lower the load and lift it up again.
 4. Do not lift up the load at an angle.
- When lowering a load, pay attention to the following.
 1. When lifting down a load, stop it temporarily at 30 cm above the floor, and then lower it slowly.
 2. Check that the load is stable, and then remove the sling.
 3. Remove kinks and dirt from the wire ropes and chains used for the sling work, and put them in the specified place.

Precautions for using mobile crane

- ★ Read the Operation and Maintenance Manual of the crane carefully in advance and operate the crane safely.

Precautions for using overhead traveling crane

- ⚠ The hoist or crane must be used to sling the components weighing 25 kg or heavier. A part weighing 25 kg or heavier in "disassembly and assembly" section is indicated with the symbol of .

00 Index and foreword

Foreword, safety and general information

- Before starting work, check the wire ropes, brake, clutch, controller, rails, over winding prevention device, ground fault circuit interrupter for electric shock prevention, crane collision prevention device, and energizing warning lamp, and check the following safety items.
- Observe the signals for sling work.
- Operate the hoist at a safe place.
- Be sure to check the directions of the direction indication plate (north, south, east and west) and the operating button.
- Do not sling a load at an angle. Do not move the crane while the slung load is swinging.
- Do not raise or lower a load while the crane is moving longitudinally or laterally.
- Do not drag a sling.
- When lifting up a load, stop it just after it leaves the ground and check safety, and then lift it up.
- Consider the travel route in advance and lift up a load to a safe height.
- Place the control switch in a position where it will not be an obstacle to work and passage.
- After operating the hoist, do not swing the control switch.
- Remember the position of the main switch so that you can turn off the power immediately in an emergency.
- Shut down the main switch when the hoist stops because of a blackout. When turning on a switch which is turned OFF by the ground fault circuit interrupter for electric shock prevention, check that the devices related to that switch are not in operating condition.
- If you find an obstacle around the hoist, stop the operation.
- After finishing the work, stop the hoist at the specified position and raise the hook to at least 2 meters above the floor. Do not leave the sling attached to the hook.

Selecting wire ropes

- Select adequate ropes depending on the weight of the parts to be hoisted, referring to the table below

Wire rope (JIS G3525, 6 x 37 - Type A)

(Standard Z twist wire ropes without galvanizing)

Nominal diameter of rope	Allowable load	
	kN	ton
mm		
10	8.8	0.9
12	12.7	1.3
14	17.3	1.7
16	22.6	2.3
18	28.6	2.9
20	35.3	3.6
25	55.3	5.6
30	79.6	8.1
40	141.6	14.4

Nominal diameter of rope	Allowable load	
	kN	ton
mm		
50	221.6	22.6
60	318.3	32.4

- ★ The allowable load is calculated as one sixth of the breaking load of the rope to be used (safety coefficient: 6).

Precautions for disconnecting and connecting hoses and tubes in air conditioner circuit

Disconnection

⚠ When replacing the air conditioner unit, air conditioner compressor, condenser or receiver drier, etc., collect the refrigerant (air conditioner gas: R134a) from the air conditioner circuit before disconnecting the air conditioner hoses.

- ★ Ask a qualified person for collecting, adding and filling operations of the refrigerant (air conditioner gas: R134a). (Only registered persons can work.)
- ★ Never release the refrigerant (air conditioner gas: R134a) to the atmosphere.

⚠ If refrigerant gas (air conditioner gas: R134a) gets in your eyes, you may lose your sight. And if it touches your skin, you may suffer from frostbite. Put on protective eyeglasses, gloves and working clothes with long sleeves while collecting the refrigerant or filling the air conditioner circuit with the refrigerant.

- When loosening the nuts fixing air conditioner hoses and tubes, be sure to use 2 wrenches; use one wrench to fix and use the other one to loosen the nut.

Connection

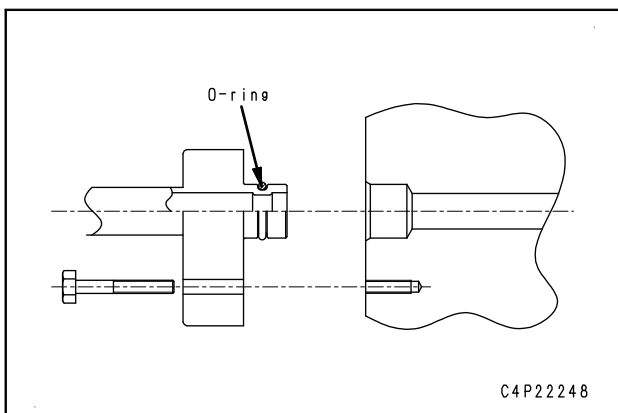
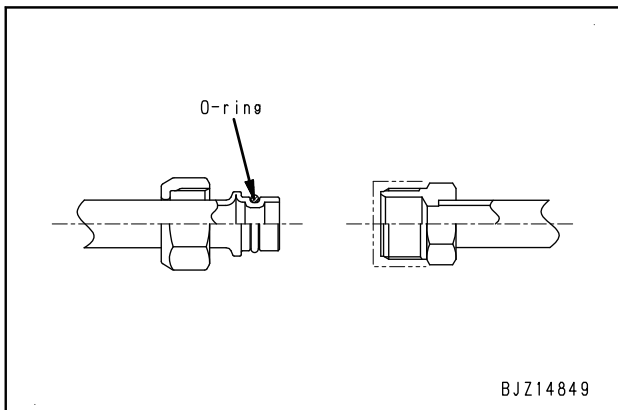
- When installing the hose for the air conditioner circuit, take care not to allow invasion of dirt, dusts and water into the hose.
- Check that the O-rings are fitted to the joints when connecting the air conditioner piping.
- Once an O-ring is used, it is deformed and deteriorated. Accordingly, do not reuse it.
- When removing the O-rings, use a soft tool so that the piping is not damaged.
- Check that the O-ring is not damaged or deteriorated.
- Apply compressor oil for refrigerant (R134a) to the O-ring.
 - ★ However, do not apply oil to the threaded portion of a bolt, nut or union.

Manufacturer	Part name
DENSO	ND-OIL8
VALEO THERMAL SYSTEMS	ZXL100PG (equivalent to PAG46)
SANDEN	SP-10

- When tightening nuts of the air conditioner hoses and tubes, be sure to use 2 wrenches. Use one wrench to fix and tighten the nut with the other wrench to the specified torque (Use a torque wrench for tightening).

★ Example of fitting of O-ring

- An O-ring is fitted to every joint of the air conditioner piping.



**For tightening torques, see "Others",
"Precautions for disconnection and connection
of air conditioner piping".**

Precautions to prevent fire (ALL-0000-17B-K-03-A)

• **Fire caused by fuel, oil, coolant or window washer fluid**

Do not bring any flame or fire close to flammable substances such as fuel, oil, coolant or window washer fluid. There is danger that they may catch fire. Always observe the following.

- Do not smoke or use any flame near fuel or other flammable substances.
- Shut down the engine before adding fuel.
- Do not leave the machine when adding fuel or oil.
- Tighten all the fuel and oil caps securely.
- Be careful not to spill fuel on overheated surfaces or on parts of the electrical system.
- After adding fuel or oil, wipe up any spilled fuel or oil.
- Put greasy rags and other flammable materials into a safe container to maintain safety at the workplace.
- When washing parts with oil, use a non-flammable oil. Do not use diesel oil or gasoline. There is danger that they may catch fire.
- Do not weld or use a cutting torch to cut any pipes or tubes that contain flammable liquids.
- Determine well-ventilated areas for storing oil and fuel. Keep the oil and fuel in the specified place and do not allow unauthorized persons to enter.
- When performing grinding or welding work on the machine, move any flammable materials to a safe place before starting.

- Remove any dry leaves, chips, pieces of paper, coal dust, or any other flammable materials accumulated or attached to or around the engine exhaust manifold, muffler, or battery, or on the undercovers.
- To prevent fires from being caught, remove any flammable materials such as dry leaves, chips, pieces of paper, coal dust, or any other flammable materials accumulated around the cooling system (radiator, oil cooler) or on the undercover.

• **Fire coming from electric wiring**

Short circuits in the electrical system can cause fire. Always observe the following.

- Keep all the electric wiring connections clean and securely tightened.
- Check the wiring every day for looseness or damage. Reconnect any loose connectors or refasten wiring clamps. Repair or replace any damaged wiring.

• **Fire caused by piping**

Check that all the clamps for the hoses and tubes, guards, and cushions are securely fixed in position.

If they are loose, they may vibrate during operation and rub against other parts. There is danger that this may lead to damage to the hoses and cause high-pressure oil to spurt out, leading to fire and serious personal injury or death.

• **Fire around the machine due to highly heated exhaust gas**

Some machines are equipped with KDPF (Komatsu Diesel Particulate Filter).

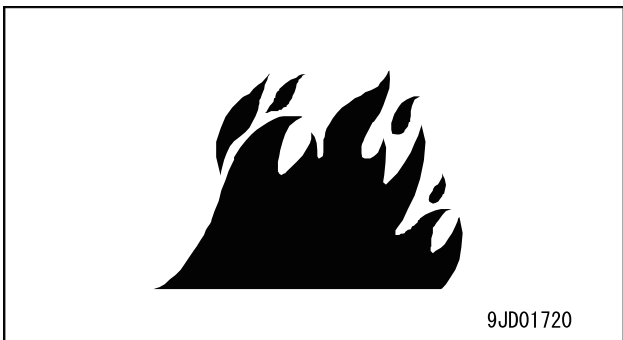
KDPF is a system for purifying soot in exhaust gas. Its exhaust gas discharged during purification process (regeneration) can be at higher temperature than that from existing models. Do not bring any flammable material close to the outlet of the exhaust pipe.

- When there are thatched houses, dry leaves or pieces of paper near the work site, set the system to disable the regeneration before starting work to prevent fire hazards due to highly heated exhaust gas.

See the operation and maintenance manual for the setting procedure.

• **Explosion caused by lighting equipment**

- When checking fuel, oil, battery electrolyte, or coolant, always use lighting equipment with anti-explosion specifications.
- When taking the electrical power for the lighting equipment from the machine itself, follow the instructions in the operation and maintenance manual.



• **Fire caused by accumulation or attachment of flammable material**