Shop Manual

VENBM75000

PW168-11E1

MACHINE MODEL	SERIAL NUMBER
PW168-11E1	H68051 AND UP

- This shop manual may contain attachments and optional equipment that are not available in your area. Please consult your local Komatsu distributor for those items you may require.
- Materials and specifications are subject to change without notice.
- PW168-11E1 mount the SAA4D107E-5 engine.
- For details of the engine, see the 107 Series Engine Shop Manual.

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KOMATSU

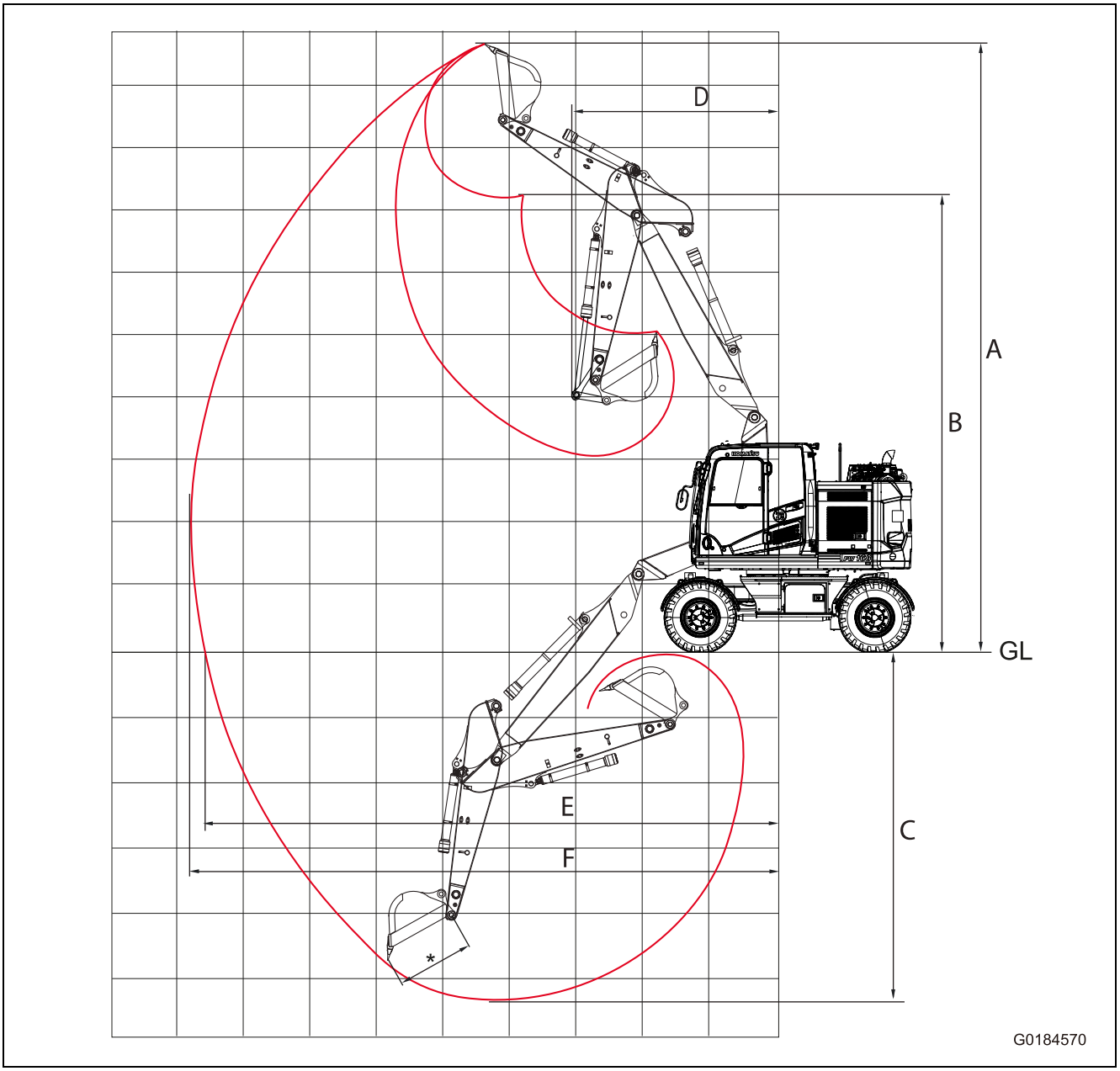
List of Abbreviations Used in the Circuit Diagrams

Abbreviation	Actual word spelled out
A/C	Air Conditioner
A/D	Analogue-to-Digital
A/M	Air Mix Damper
ACC	Accessory
ADD	Additional
AUX	Auxiliary
BR	Battery Relay
CW	Clockwise
CCW	Counter Clockwise
ECU	Electronic Control Unit
ECM	Electronic Control Module
ENG	Engine
EXGND	External Ground
F.G.	Frame Ground
GND	Ground
IMA	Inlet Metering Actuator
NC	No Connection
S/T	Steering
STRG	
SIG	Signal
SOL	Solenoid
STD	Standard
OPT	Option
OP	
PRESS	Pressure
SPEC	Specification
SW	Switch
TEMP	Temperature
T/C	Torque Converter
T/M	Transmission

Working Range: 2-Piece Boom

Value will vary depending on attachment specification.

Arm length (mm)		2100	2500	3000
A	Max. digging height	9613	9912	10360
B	Max. dumping height	7034	7335	7766
C	Max. digging depth	5062	5455	5963
D	Min. swing radius	2329	2423	2698
E	Max. digging reach GL	8324	8774	9259
F	Max. digging reach	8593	8969	9473



* 1316 mm. The length between the arm pin and the bucket cutting edge varies depending on the attachment.

To confirm machine has engine type [1] EU Stage V refer to the "METHOD FOR CHECKING ENGINE TYPE" section of this manual.

- When the DEF level in the tank becomes low, DEF level caution lamp on the machine monitor lights up, the Audible alert sounds, the action level is displayed and Inducement strategy including engine power deration is activated.
- The Inducement strategy progresses in 4 levels from Warning, Continuous Warning, Low-Level Inducement, and Severe Inducement.
- Up to the start of Severe Inducement the start of each warning step is triggered by the amount of DEF in the DEF tank.
- The Inducement strategy status can be checked on “SCR Information” screen of the user menu.
- The table shows warning indications and engine power derations by each Inducement strategy status.

Status		DEF level (*1) (DEF level gauge)	Machine monitor				Engine deration (*3)
			Message of SCR Information	DEF level caution lamp (Action level)	Tone of audible alert	Activated failure code (*2)	
1	Warning	10% (The bottom two gradations light on)	1: DEF low level warning appears.	Red 	No sound	CA3497 (DEF level low error 1)	No deration
2	Continuous Warning (Warning 2)	5% (Within the gradation of the second from the bottom)	2: Without treatment, engine power will be derated.	Red 	Triplet (*4) Short intermittently (*5)	CA3498 (DEF level low error 2)	No deration
3	Low level Inducement (Inducement 1)	2.5% (The gradation of the end of the bottom lights on)	3: Engine power is under deration.	Red  Red 	Long intermittently	CA1673 (DEF level low error 3)	Torque: over 25%
4	Severe Inducement (Inducement 2)	0% (All gradations lights off)	4: Engine power is under heavy deration.	Red  Red 	Continuously	CA1673 CA3547 (DEF level low error 4)	Torque: over 50% and RPM: over 40%

*1: It is shown the value of Monitoring ID 19111: “DEF Level Corrected”.

*2: These failure codes are displayed on “Current Abnormality” in the operator mode, or “Abnormality Record” in the service mode. For the failure codes, see TROUBLESHOOTING, “TROUBLESHOOTING POINTS FOR UREA SCR SYSTEM”.

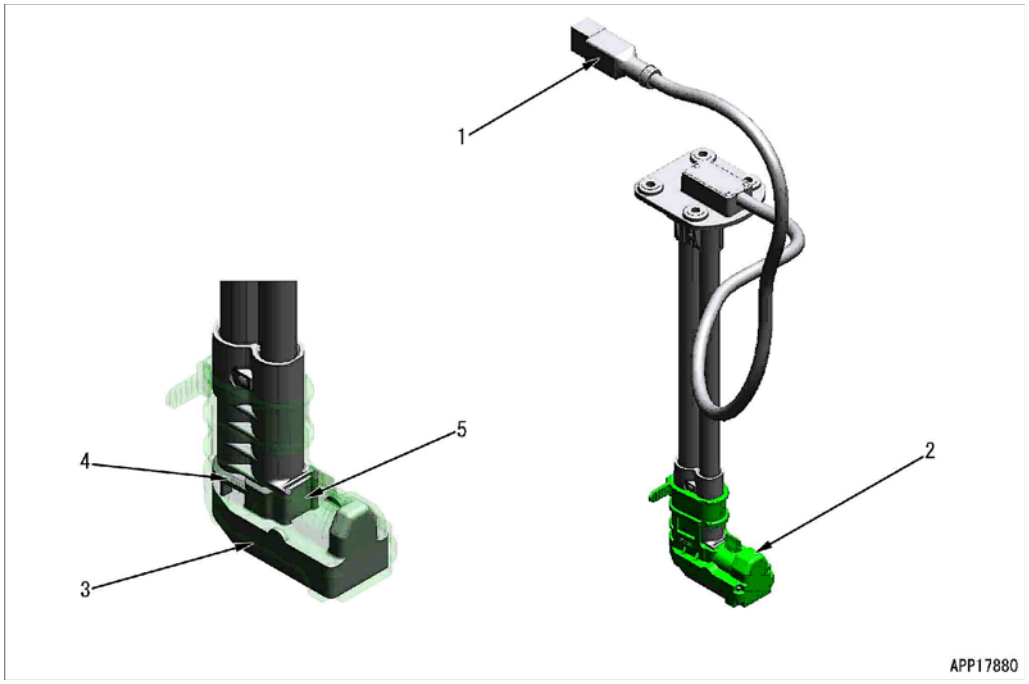
*3: These percentages show a torque reduction ratio from the full torque curve, and a speed reduction ratio from the rated speed.

DEF tank sensor

Structure of AdBlue Tank Sensor

REMARK

The shape is subject to machine models.



1. Connector
2. Cover
3. Temperature sensing part
4. Level sensing part
5. Concentration Sensing part

Function of AdBlue Tank Sensor

- This sensor is installed to DEF tank and outputs DEF level, DEF concentration, and DEF temperature through CAN communication.
- DEF level and DEF concentration are measured by using ultrasonic wave.
- When the tank is frozen or empty, DEF level and DEF concentration are not measured.

Setting Time

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

For setting of each menu, see TESTING AND ADJUSTING

Auto Idle Stop Time Fixing (service menu)

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

Auto Idle Stop Time Fixing (user menu)

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

NOTICE

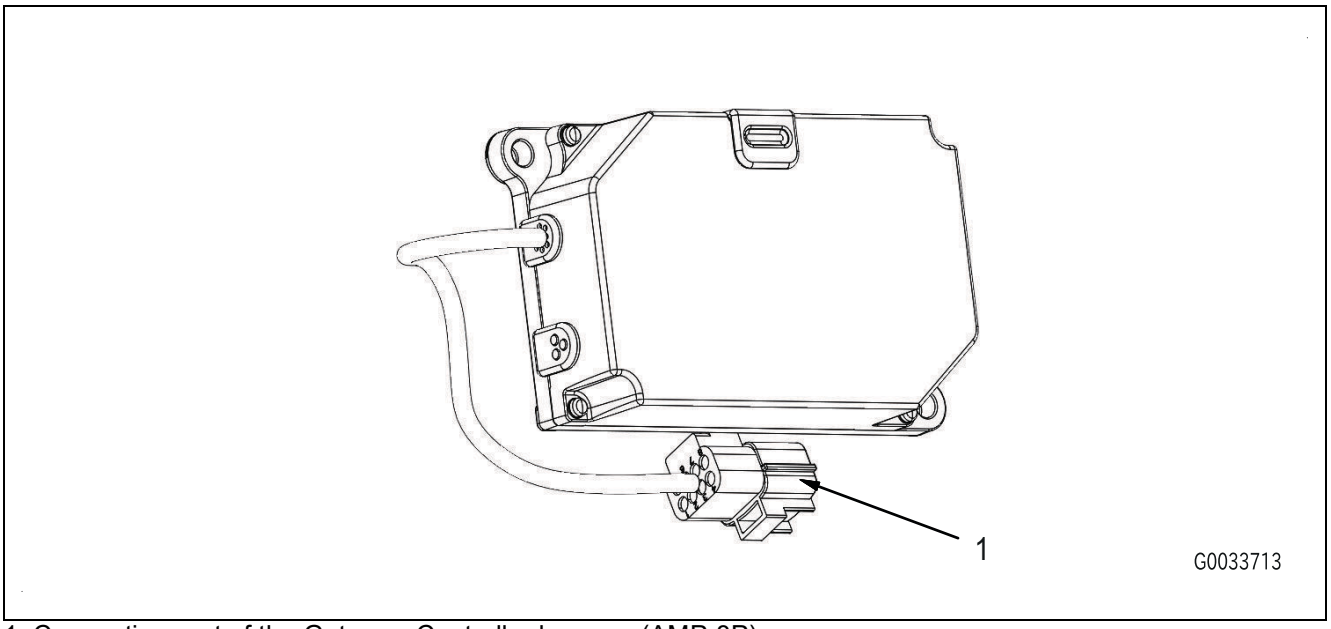
The screen changes to the operator screen automatically and the auto idle stop function operates 60 minutes after the lock lever is set to LOCK position if "Fix to x min." is selected in the “Auto Idle Stop Time Fixing” even when the Service menu is being used.
Check the set value of the auto idle stop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

(8) Joystick steering pilot lamp
(9) Axle lock pilot lamp
(10) F/N/R pilot lamp
(11) Activation JSS at over 15km/h caution lamp (reduce speed)
(12) Activation JSS at over 15km/h caution lamp
(13) Street mode pilot lamp
(14) Activation JSS in street mode caution lamp
(15) ECO gauge
(16) Maintenance time caution lamp
(17) Fuel consumption gauge
(18) Seat belt caution lamp
(19) Engine stop pilot lamp
(20) Parking brake pilot lamp
(21) PPC lock pilot lamp
(22) One-touch power maximizing pilot lamp
(23) KDPF Regeneration pilot lamp
(24) Quick coupler pilot lamp
(25) Floating pilot lamp
(26) Message display
(27) Bucket or 2ATT pilot lamp
(28) ECSS pilot lamp
(29) Service meter
(30) PPC pressure reduction pilot lamp
(31) Automatic grease pilot lamp
(32) Travel swing alignment pilot lamp
(33) Swing lock pilot lamp
(34) Engine preheating pilot lamp
(35) Auto-deceleration pilot lamp
(36) Working mode pilot lamp
(37) Travel speed pilot lamp
(38) Clock
(39) Camera selection pilot lamp
(40) Undercarriage attachment pilot lamp
(41) DEF level gauge
(42) DEF level caution lamp
(43) Fuel gauge
(44) Fuel level caution lamp
(45) Hydraulic oil temperature gauge
(46) Function switches (F1 to F6)
(47) Hydraulic oil temperature caution lamp
(48) Engine coolant temperature gauge
(49) Engine coolant temperature caution lamp
(50) Battery charge level caution lamp
(51) Engine oil pressure caution lamp
(52) System caution lamp
(53) Action level display
(54) Pilot display
(55) Speedo meter

Communication Terminal

Structure of communication terminal for mobile communication

General view



1: Connecting part of the Gateway Controller harness (AMP-8P)

INPUT AND OUTPUT SIGNALS OF COMMUNICATION TERMINAL FOR MOBILE COMMUNICATION AMP-8P “CK06”

Pin No.	Signal name	Input/output signal
1	Communication terminal power supply	Input
2	Communication terminal start signal	Input
3	Communication terminal power supply GND	Input
4	Communication terminal call-in start signal	Output
5	Ethernet_100BASE RX+	Input
6	Ethernet_100BASE RX-	Input
7	Ethernet_100BASE TX+	Output
8	Ethernet_100BASE TX-	Output

1. Control Method in Each Mode

Mode P

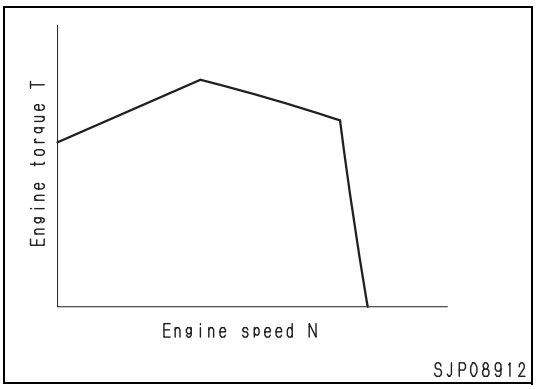
- Matching point in mode P: Rated speed

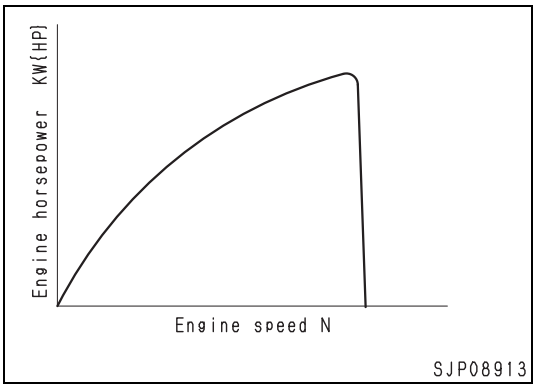
Mode P Working PW168	1,690 rpm

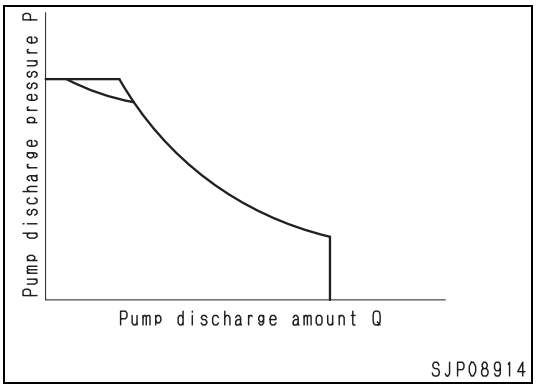
- If the pump load increases and the pressure rises, the engine speed lowers.

  At this time, the controller lowers the pump discharge so that the engine speed will be near the full output point. If the pressure lowers, the controller increases the pump discharge so that the engine speed will be near the full output point.

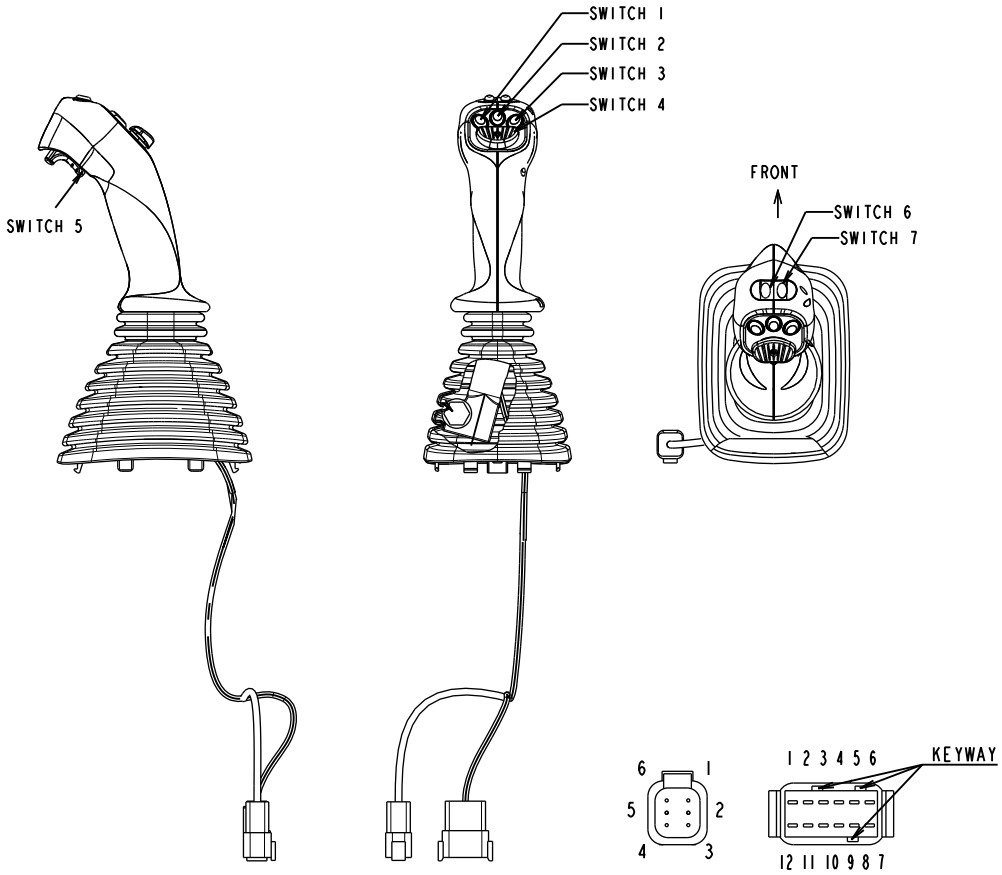
  By repeating these operations, the controller constantly uses the engine near the full output point.

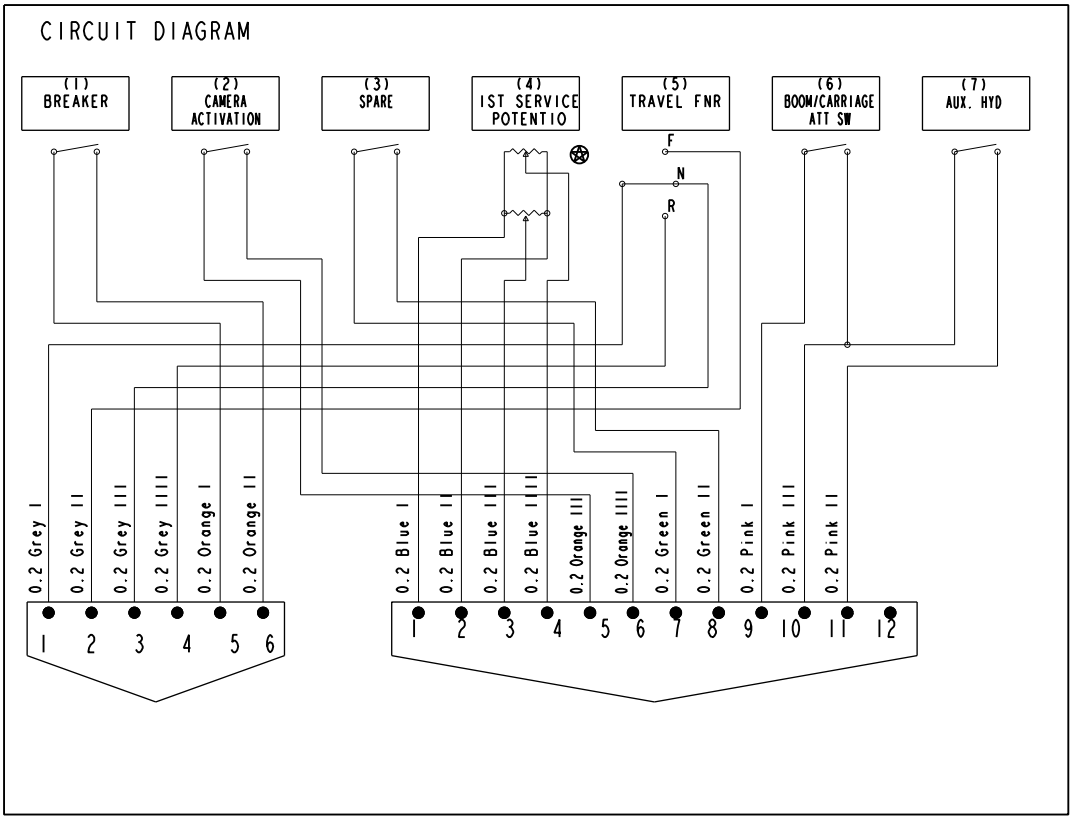






RH PPC Lever


SWITCH 1
SWITCH 2
SWITCH 3
SWITCH 4
SWITCH 5
FRONT
SWITCH 6
SWITCH 7
6 1
5 2
4 3
1 2 3 4 5 6
KEYWAY
12 11 10 9 8 7


CIRCUIT DIAGRAM
(1) BREAKER
(2) CAMERA ACTIVATION
(3) SPARE
(4) IST SERVICE POTENTIO
(5) TRAVEL FNR
(6) BOOM/CARRIAGE ATT SW
(7) AUX. HYD
F
N
R
0.2 Grey I
0.2 Grey II
0.2 Grey III
0.2 Grey IIII
0.2 Orange I
0.2 Orange II
0.2 Blue I
0.2 Blue II
0.2 Blue III
0.2 Blue IIII
0.2 Orange III
0.2 Orange IIII
0.2 Green I
0.2 Green II
0.2 Pink I
0.2 Pink III
0.2 Pink II
1 2 3 4 5 6
1 2 3 4 5 6 7 8 9 10 11 12

1. Hydraulic oil filter
2. Gear pump
3. Priority valve
4. Brake control valve
5. Accumulator - service brake (0.75 l)
6. Accumulator - service brake (0.75 l)
7. Accumulator - parking brake (0.75 l)
8. Pressure switch - stop light (5 ±0.5 bar)
9. Service brake pressure sensor
10. Pressure switch - accumulator (50 ± 1 bar)
11. T/M clutch solenoid valve
12. Pressure switch (parking brake) - (50 ± 1 bar) < less than activates
13. Brake pedal
14. Swivel joint
15. Service brake cylinder
16. Small (high speed) clutch
17. Large (low speed) clutch
18. Service brake pressure sensor
19. Brake control valve (digging brake)
20. Digging brake valve

Structure and Function

The brake system is fully hydraulic. Hydraulic oil is supplied at high pressure by gear pump to a priority valve giving priority to the steering circuit first and secondly to the braking circuit when the steering is not being used in the steering circuit. When braking oil is sent to the brake valve which provides braking pressure to two separate braking circuits (service brakes). In the event of failure of the power supply, the accumulators provide brake pressure to allow the machine to be safely stopped.

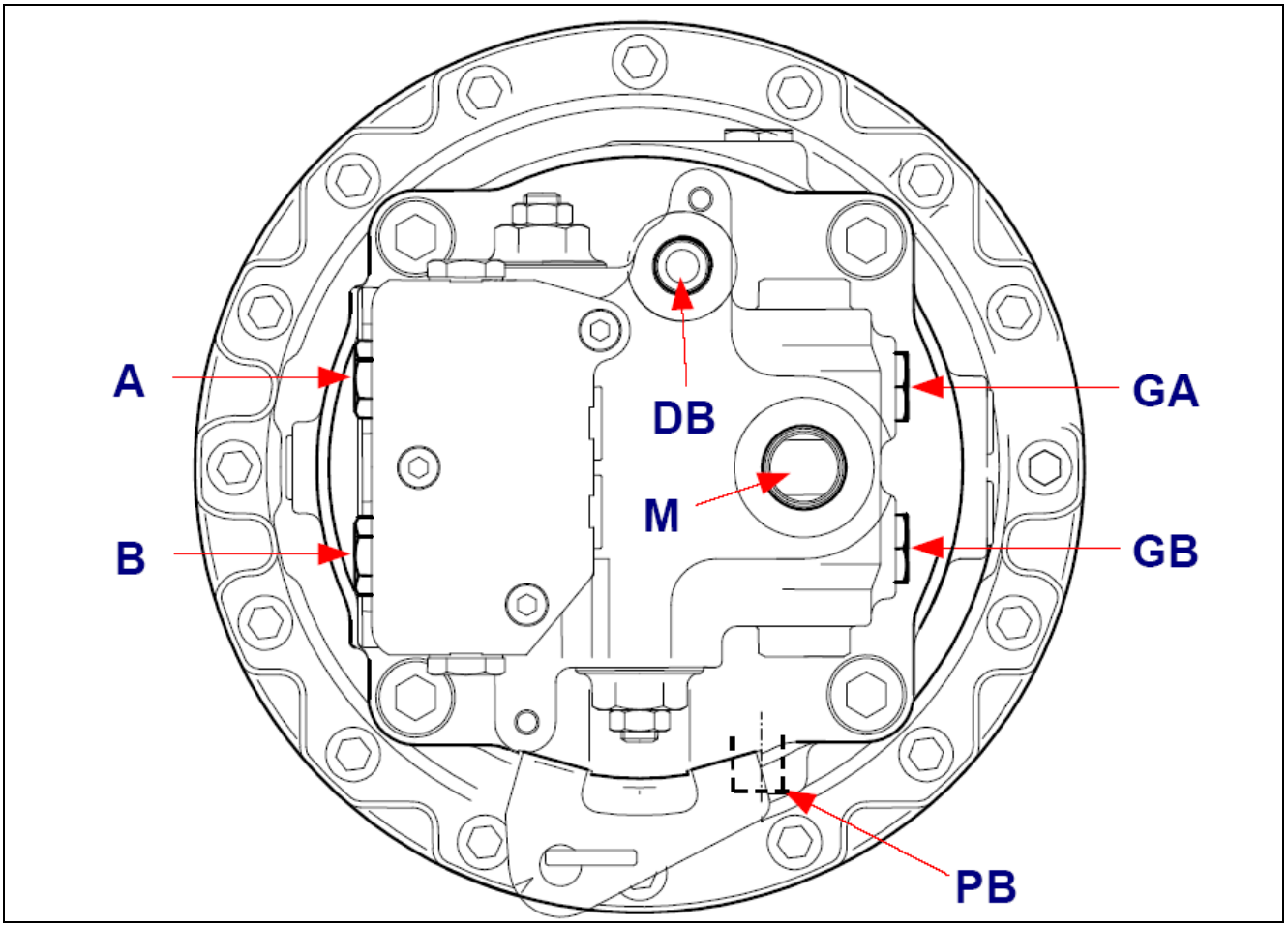
A parking brake is provided which is operated by selecting park brake switch in cab. This de-energises both high and low gear signals and locks the transmission gears.

If there is no pressure the parking brake will activate.

If Option digging brake is equipped an additional hydraulic line from the priority valve (PPC-Line) will supply hydraulic oil to the digging brake valve. This valve will only use a defined oil flow. When the system is activated, the digging brake controller activates the digging brake valve. Then the brake control valve (digging brake) will be activated with pressure on the mounted cylinder.

Swing Motor

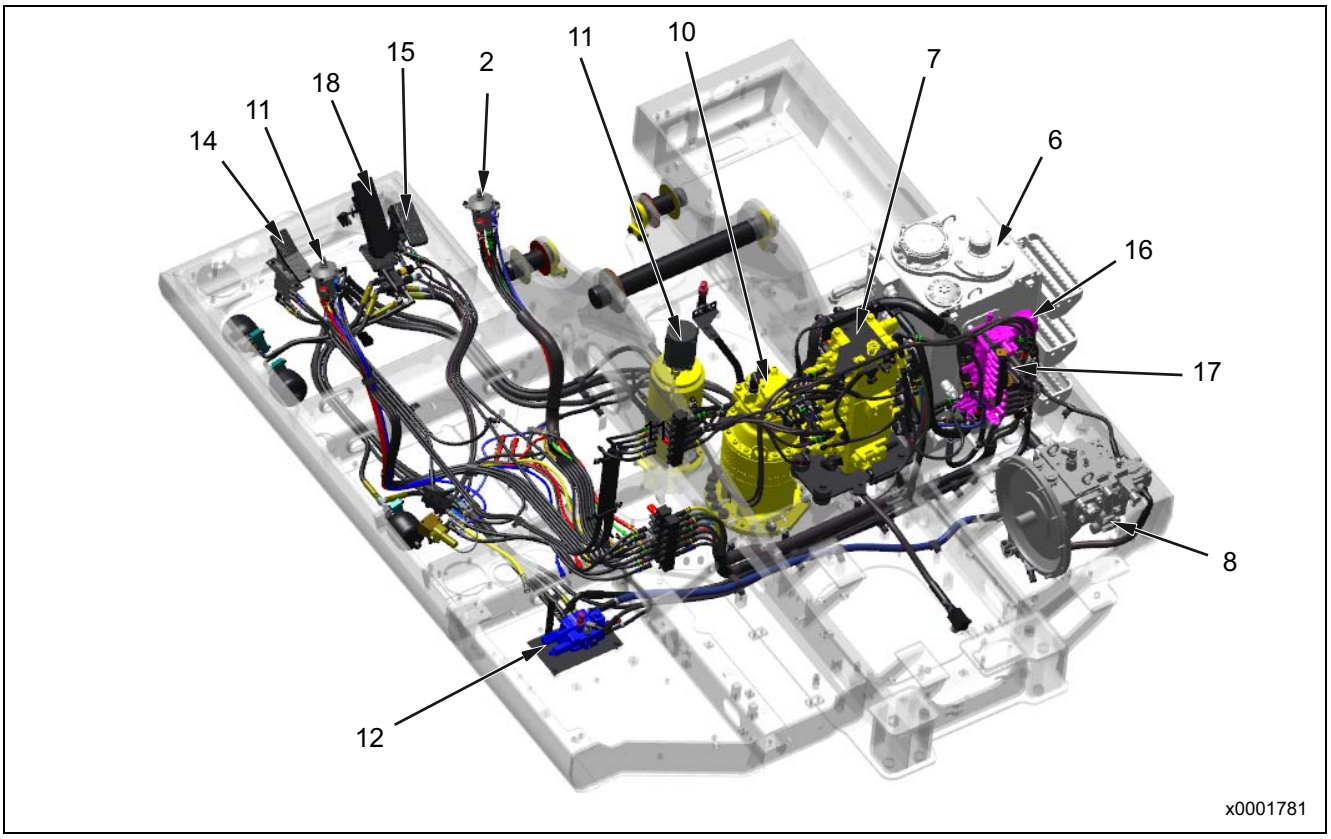
MSF 85P-11



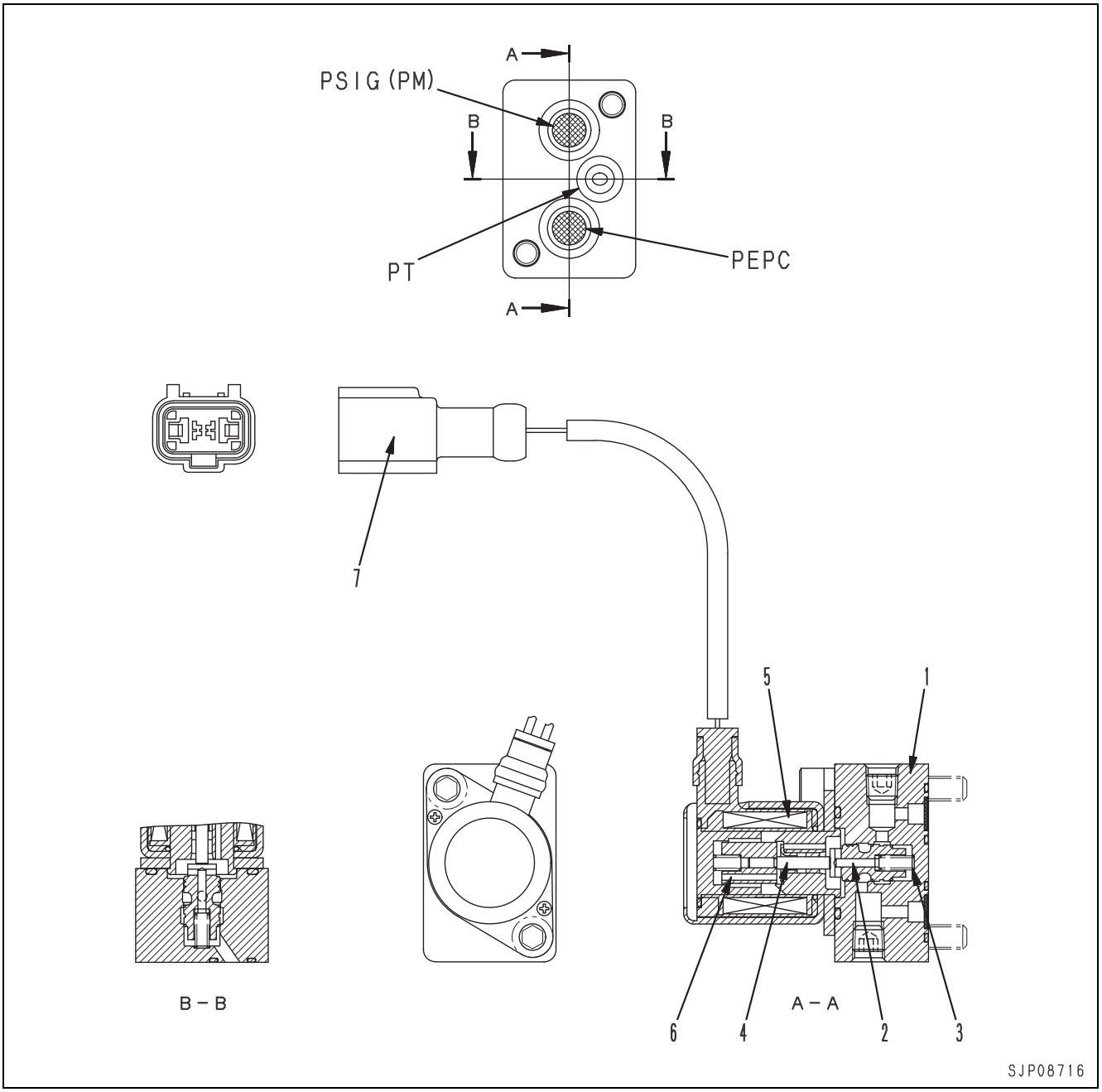
A	Service ports
B	
M	Anti-cavitation
DB	Drain port
GA	Pressure gauge ports
GB	
PB	Brake port

Specifications

Model	MSF85P-11
Theoretical displacement	87.3 cm³/rev
Safety valve set pressure	19.6 MPa {200 kg/cm²}
Rated revolving speed	1,553 rpm
Brake release pressure	1.9 MPa {19 kg/cm²}


14
11
18
15
2
11
10
7
6
16
17
8
12
x0001781

LS(PC)-EPC Valve



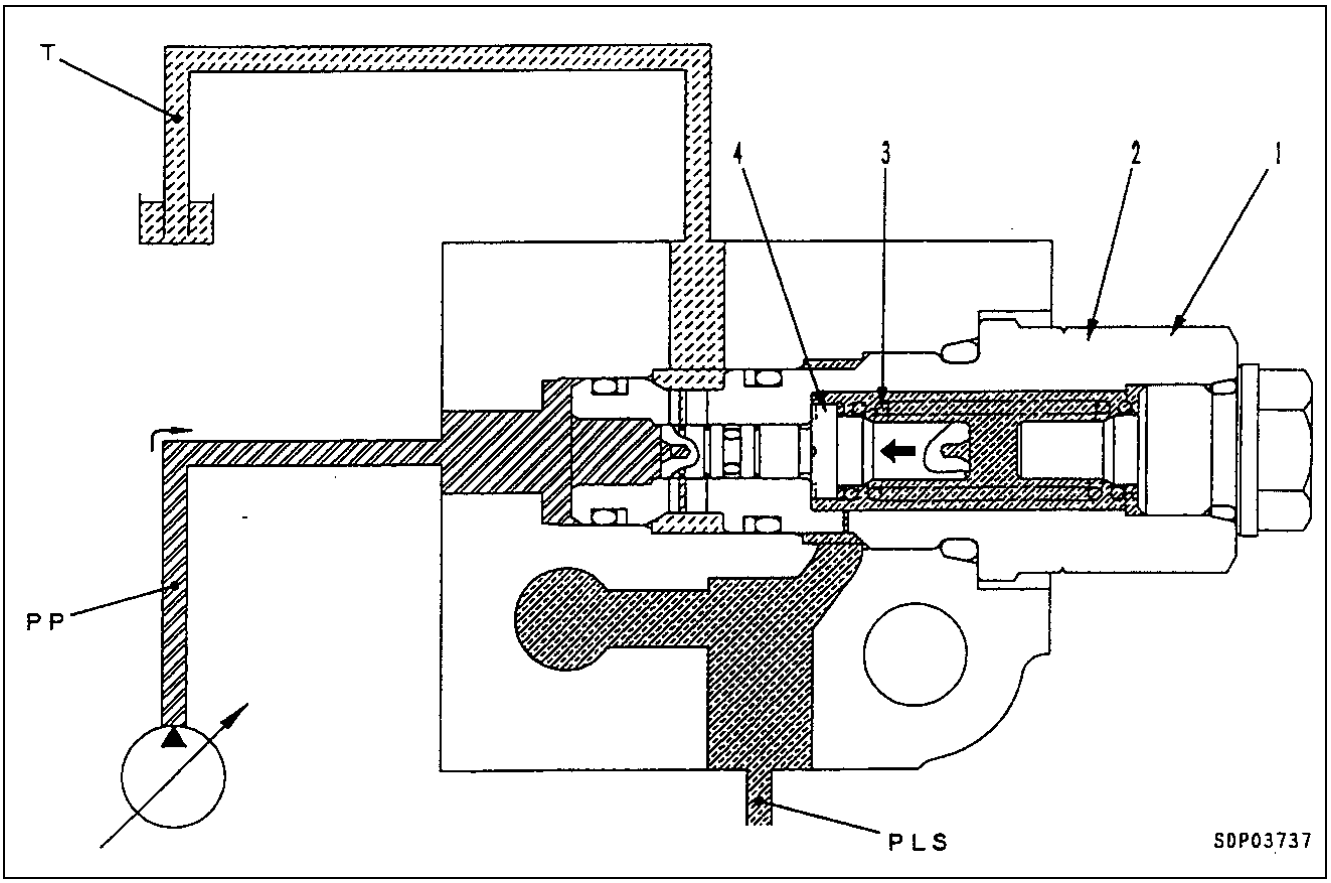
1. Body
2. Spool
3. Spring
4. Rod
5. Coil
6. Plunger
7. Connector

PSIG(PM): To LS(PC) valve

PT: To tank

PEPC: PPC pressure from solenoid block valve

4. When the control valve is being operated and the demand flow for the actuator becomes greater than the pump discharge from the minimum swash plate angle, the flow of the oil out to tank circuit **T** is cut off and all of pump discharge amount **Q** flows to the actuator circuit.



Operation

Control valve operated

- When fine control valve is operated to a bigger stroke, LS pressure **PLS** is generated and acts on the right end of the spool (4). When this happens, the area of the opening of the control valve spool is large, so the difference between LS pressure **PLS** and pump discharge pressure **PP** is small.
- For this reason, the differential pressure between pump discharge pressure **PP** and LS pressure **PLS** does not reach the load of spring (3) (2.45MPa {25kg/cm²}), so spool (4) is pushed to the left by spring (3).
- As a result, pump circuit **PP** and tank circuit **T** are shut off, and all the pump discharge amount **Q** flows to the actuator circuit.

1. Unload valve
2. Sleeve
3. Spring
4. Spool

PP: Pump circuit (pressure)
PLS: LS circuit (pressure)
T: Tank circuit (pressure)

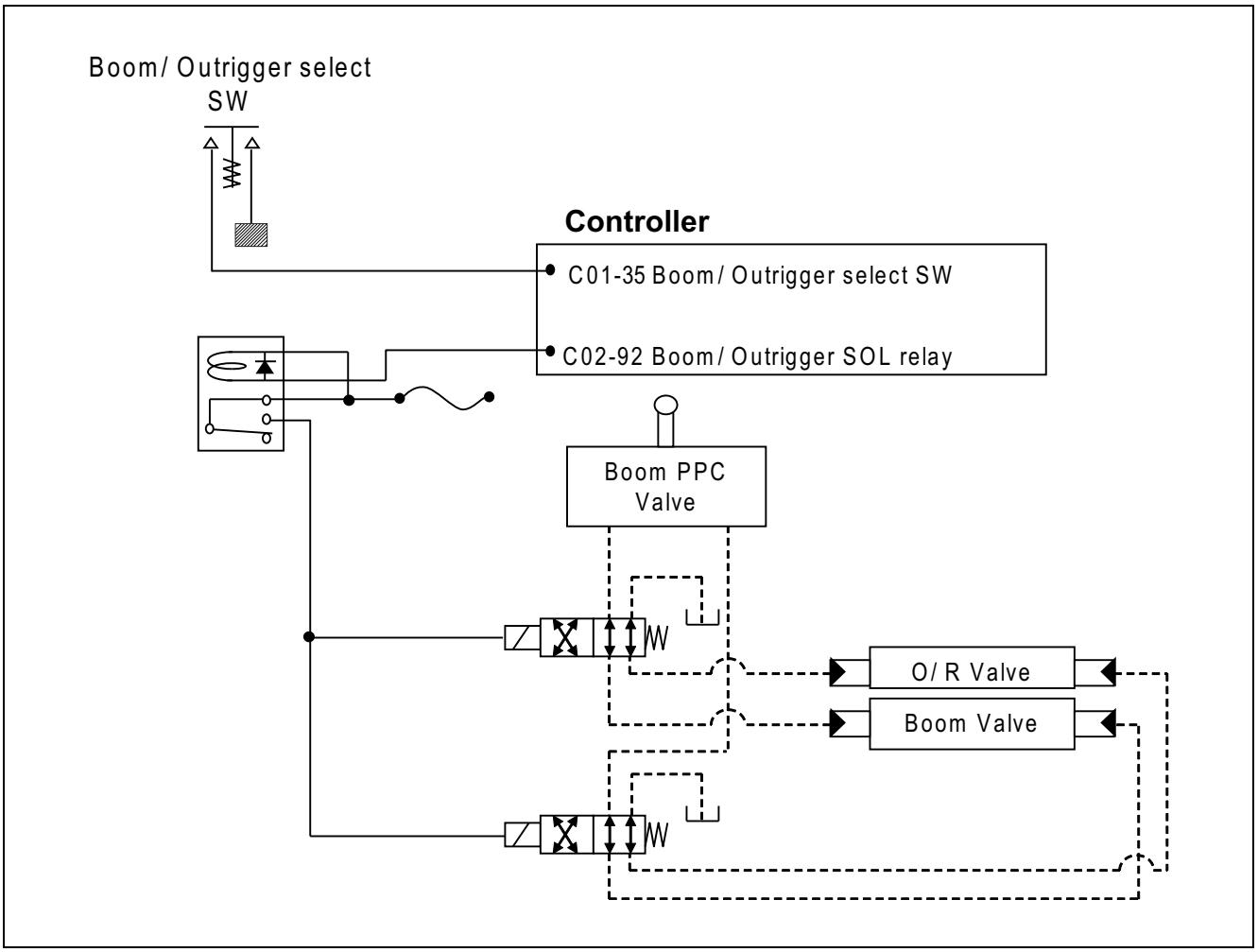
Boom/Outrigger Schematic

The boom/ outrigger selector switch on the left joystick sends a signal to the pump controller.

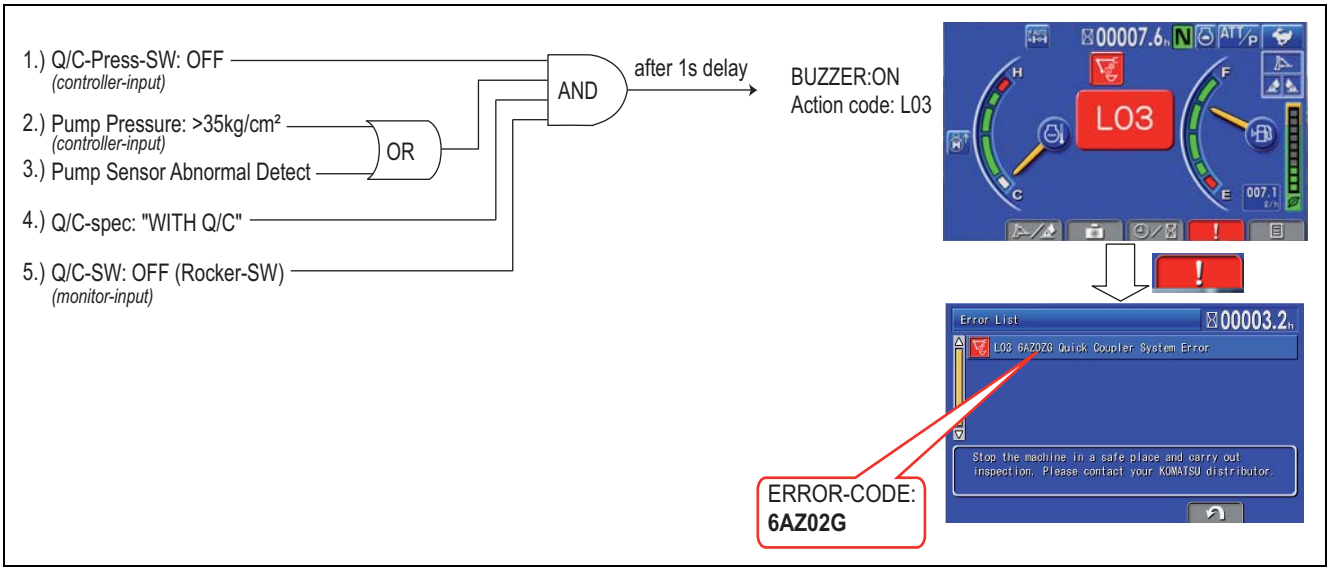
The pump controller switches boom/ outrigger relay R15.

Relay R15 sends 24V to relay R20 and to the boom/ outrigger solenoid valves.

The pump controller drives the attachment solenoid valves directly.



Quick Coupler Error Logic



1. Signal from pressure switch S30 is OFF
2. Main pump pressure > 35kg/cm²
3. Main pump pressure sensor error detected
4. Quick coupler is set as "WITH quick coupler" see "setting of control system"
5. Rocker switch in the LH console (S48) is on OFF-position

Error-condition:

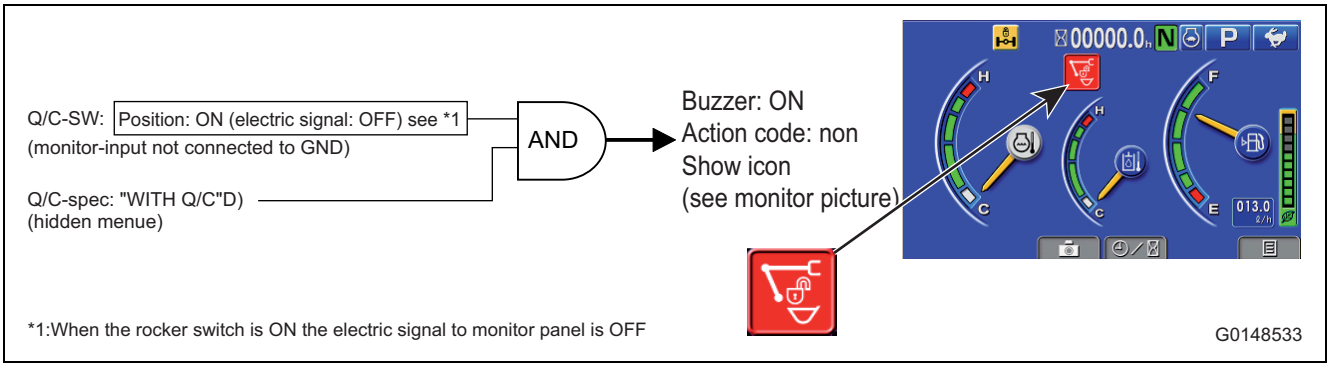
An icon with code appears on the monitor panel. In addition an error code is generated.

Also icon indicate the lock and unlock condition of the quick coupler.

Error code **6AZ0ZG**
KOMTRAX: **YES**
Buzzer: **Intermitted**
Buzzer-cancel: **allowed**

Quick Coupler Indication Logic

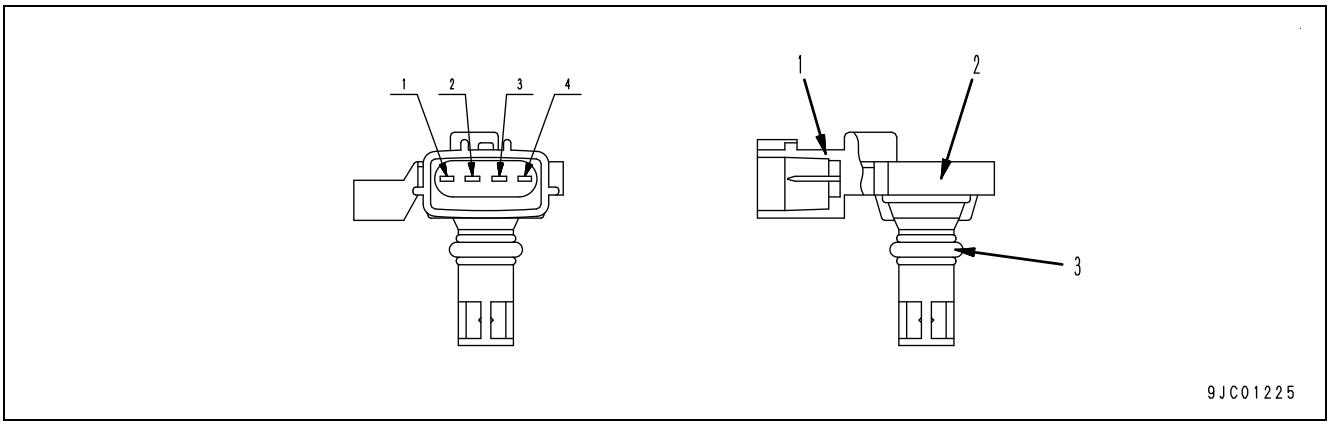
Q/C-system is activated by initiating control



Error code **NO**
KOMTRAX: **NO**
Buzzer: **Continuous**
Buzzer-cancel: **Not allowed**

Charge (Boost) Pressure and Temperature Sensor

CN-BPT on engine wiring harness

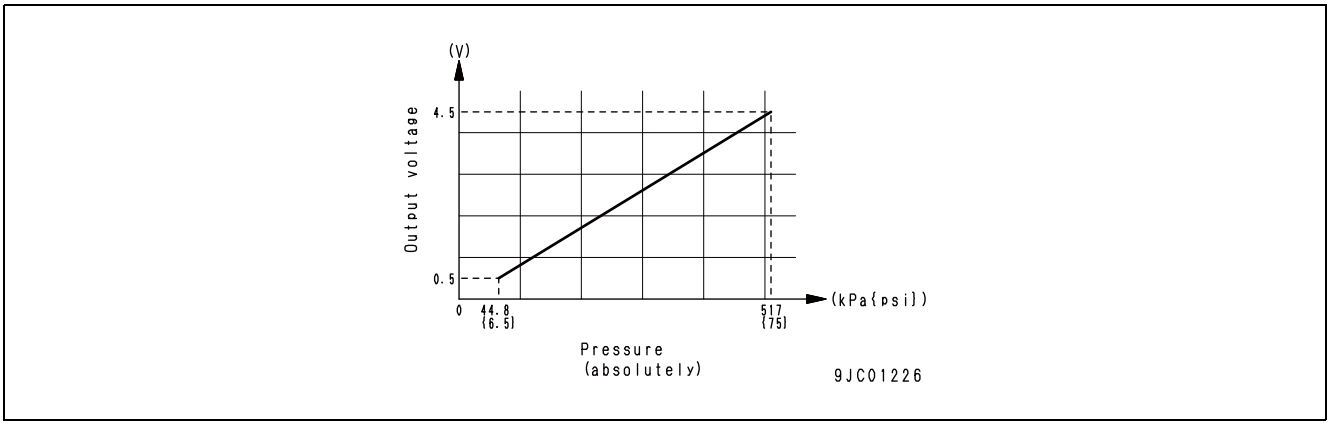


1. Connector
2. Sensor
3. O-ring

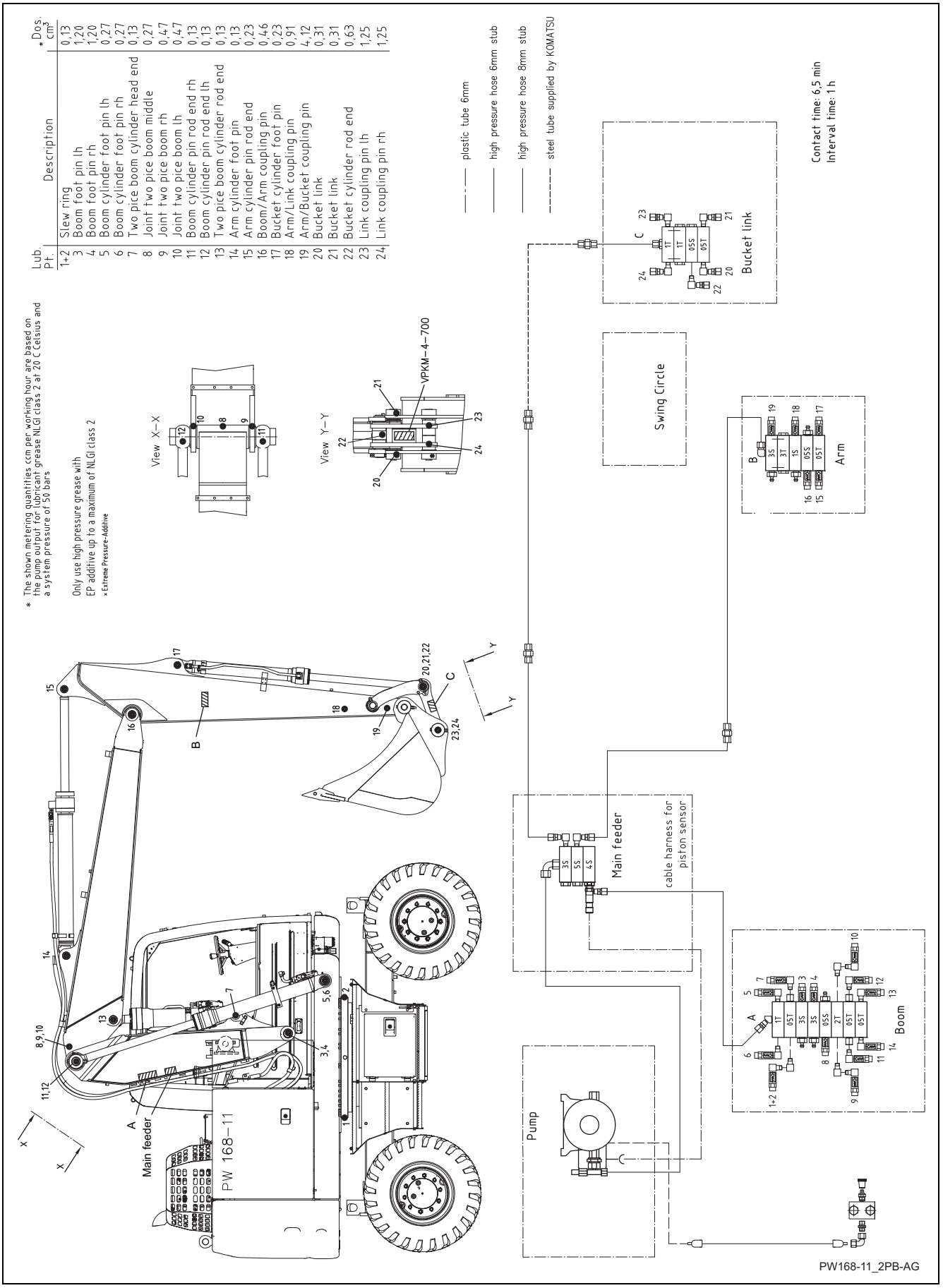
Function

- This sensor is installed to the engine intake manifold. It detects the engine intake air pressure and its temperature, and outputs signals as a variable voltage for pressure, and as variable resistance for temperature.
- "Charge pressure and temperature" are the engine intake air pressure and temperature of a turbocharged engine. These are also referred to as "boost pressure and temperature" or "intake air pressure and temperature".

Output characteristics



Auto-Grease Pump With Two-Piece Boom



Applicable model					PW168-11E1	
Category	**Item**		**Measurement Condition**	**Unit**	**Standard value**	**Permissible value**
Work equipment	Time lag	2-piece boom 1st boom lift	 • Hydraulic oil temperature: Within operation range • Engine running at low idle • Operate full boom down from stroke end till bucket touches ground. Measure delay from bucket touching ground to bucket starting to push the machine up.	sec	max. 1.0	max. 1.2
		2-piece boom 2nd boom adjust	 Hydraulic oil temperature: Within operation range Engine running at low idle Operate full boom adjust down from stroke end till bucket touches ground. Measure delay from bucket touching ground to bucket starting to push the machine up.	sec	max. 1.0	max. 1.2
		Outrigger	• Hydraulic oil temperature: Within operation range • Engine running at low idle • Raise outrigger off ground then operate full lower • Measure delay from when outrigger touches ground to out-rigger starting to lift machine up		max. 1.0	max. 1.2
		Blade	• Hydraulic oil temperature: Within operation range • Engine running at low idle • Raise blade off ground then operate full lower • ‘Measure delay from when blade touches ground to blade starting to lift machine up		max. 1.0	max. 1.2
Performance of hydraulic pump	Hydraulic pump delivery		See next page	l/min	See next page	

How to Examine Compression Pressure

1. Open the engine hood.
2. Set the cylinders to be checked to the compression top dead centre. For details, see “TEST AND ADJUST VALVE CLEARANCE”.

   REMARK

   Check that both of the intake rocker arm and exhaust rocker arm at the compression top dead center are movable by hand as much as the valve clearance.

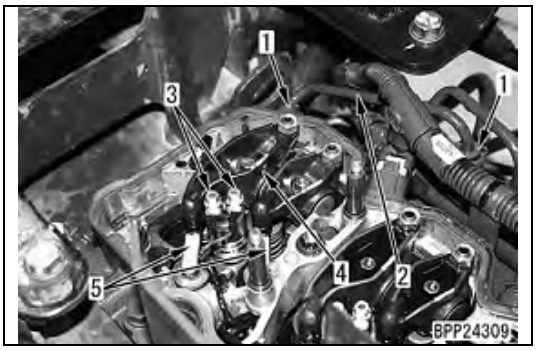
3. Remove fuel spray prevention cap (1), loosen the sleeve nut, and disconnect high-pressure pipe (2).

   REMARK

   When measuring the compression pressure, the fuel spurts out of the disconnected part on the common rail side. Install hose E to a container in order to drain the fuel.

   NOTICE

   Do not bend high-pressure pipe to correct before installing.



4. Loosen injector terminal nuts (3) and remove the terminals from the injector.

   REMARK

   Insulate the terminals with tape etc. so that adjacent terminals do not touch each other.

5. Remove rocker arm assembly (4).

   REMARK

   When removing rocker arm assembly (4), be careful not to drop the support and shaft.

6. Remove crosshead (5).

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 cut-out 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.

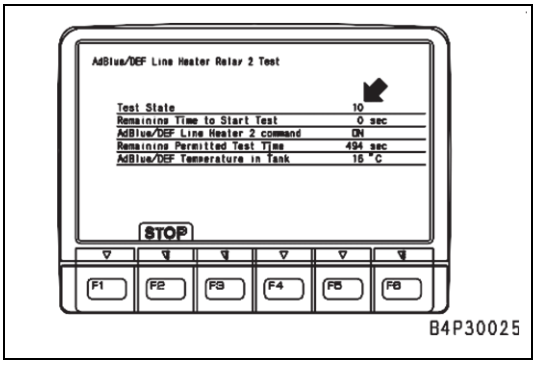
Handle No-Injection Cranking Operation

No-injection cranking operation means to crank the engine by using the starting motor while disabling injection in all cylinders electrically. The purpose and effect of this operation are as follows.

No-injection cranking is performed to lubricate the engine parts and to protect them from seizure. It is performed before the engine is started after the machine or engine has been stored for a long period.

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

11. When the voltage of 24.5±1.5 V is measured, press F2. “0” starts flashing in “Test State” column.



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

REMARK

Always turn the battery disconnect switch to OFF position when disconnecting connector.

Examine DEF Pump Heater Relay

Tools to Examine DEF Pump Heater Relay

Symbol	Part No.	Part name	Q'ty	Remarks
A	799-601-9130	T-adapter	1	
B	799-601-2600	T-box	1	
C	Commercially available	Multimeter	1	

⚠ Place the machine on a level ground, lower the work equipment to the ground in a stable posture, set the lock lever to LOCK position, and stop the engine.
NOTICE

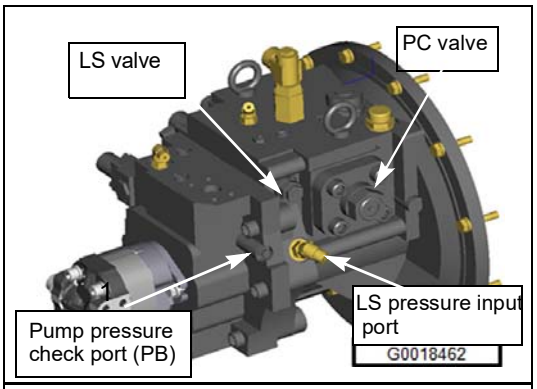
- **If KOMNET communication error remains less than 1 second, engine controller is unable to detect it, and the test may be continued while the machine monitor does not continue (standard screen). In that case, turn the starting switch to OFF position once, and then system operating lamp goes out, and the engine controller shuts down to reset the test.**
  - **In this pump heater relay test, when the starting switch is turned to OFF position while testing (energizing), and turned to ON position again before system operating lamp goes out, then energizing restarts. If, by mistake, the starting switch is turned to ON position while testing (energizing) without waiting that system lamp goes out, immediately turn the starting switch to OFF position regardless of the display of machine monitor, and wait the system operating lamp goes out.**

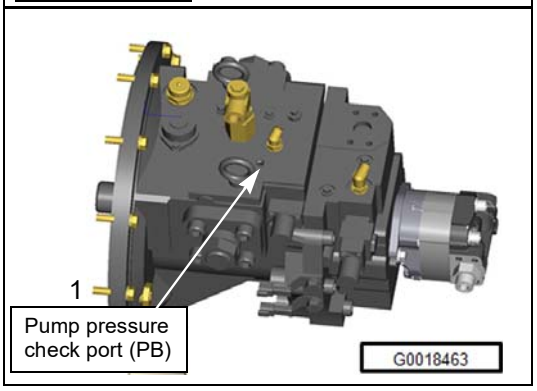
“DEF Pump Heater Relay Test” function can actuate DEF pump heater at any timing, and can check electrical action.

For testing of DEF pump heater relay to perform troubleshooting or others, refer to this section.

a. Remove oil pressure measurement plugs (1) and (2).

   - Plug (1): For measuring the pump delivery pressure
   - Plug (2): For measuring the pump PC valve delivery pressure





b. Fit tool J2 to each port (1 and 2), connect each tool to oil pressure gauge of hydraulic tester J1.

   - Use an oil pressure gauge with the capacity of 58.8 MPa{600 kgf/cm²}

c. Start the engine and keep it running until the hydraulic oil temperature rises to the operating range.

d. Measure the pump delivery pressure and PC valve output pressure (servo piston inlet pressure) together with the engine running at high idling, after setting the machine at the following conditions.

   - Working mode: A mode
     Swing lock switch: ON (switched to high pressure relief with 2-stage relief turned ON)
     Work equipment, swing and travel circuit: Arm digging relief

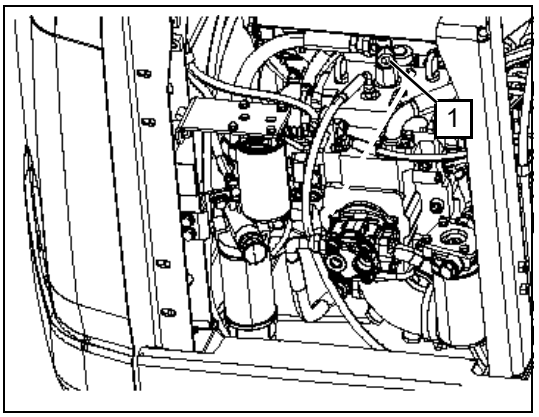
   - Judgement method:
     When the ratio between the pump delivery pressure and PC valve output pressure (servo piston output pressure) reaches the following values, both pressures are judged normal.

Pressure to be measured	Pressure ratio
Pump delivery pressure	1
PC valve outlet pressure	Approx. 3/5

   - If there is any abnormality with PC valve or servo piston, the PC valve output pressure (servo piston output pressure) equals to the pump delivery pressure, or approxi-

c. After clear oil flows out of bleeder (1) tighten the bleeder.

Bleeder: 7.8–9.8 Nm {0.8–1.0 kgfm}



2. Starting engine

When running the engine after the engine after performing step 1, keep its speed at low idle for 10 minutes.

3. Bleeding air from cylinder

- If a cylinder was replaced, bleed air from it before connecting the work equipment. In particular, the boom cylinder does not move to the lowering stroke end, if it is installed to the work equipment.

a. Run the engine at low idle for about 5 minutes.

b. Running the engine at low idle, raise and lower the boom 4-5 times.

- Stop the piston rod about 100mm before each stroke end. Do not relieve the oil.

c. Running the engine at high idle, perform step 2.

d. Running the engine at low idle, move the piston rod to the stroke end and relieve the oil.

e. Bleed air from the arm cylinder and bucket cylinder according to steps 2-d.

4. Bleeding air from swing motor

a. Motor unit

- Bleed air from the motor unit according to the following procedure.

I. Run the engine at low idle

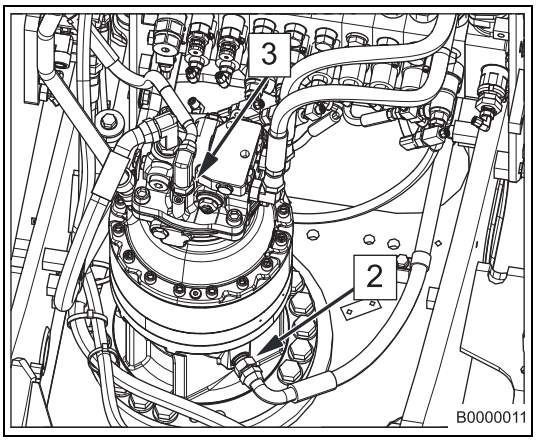
II. Swing to the right and left slowly to bleed air.

b. Parking brake circuit

- Normally, air in the parking brake circuit is bled by swinging the machine in step 1. If you feel dragging of the brake circuit according to the following procedure.

I. Loosen the fitting of brake hose (2) and start the engine.

II. Run the engine at low idle and set the swing holding brake release switch to the release switch to the RELEASE and NORMAL positions repeatedly. After clear oil oozes out, tighten the fitting.



Pre-defined Monitoring (24/34) Fan clutch

No	ID	Item	Unit (SI)	Applicable component
1	01002	Engine Speed	r/min	ENG
2	10010	Fan Speed Command	r/min	PUMP
3	10007	Fan Speed	r/min	PUMP
4	10019	Fan Speed Deviation	r/min	PUMP
5	04107	Coolant Temperature	°C	ENG
6	04401	Hydraulic Oil Temperature	°C	PUMP

Pre-defined Monitoring (25/34) Engine status

No	ID	Item	Unit (SI)	Applicable component
1	01002	Engine Speed	r/min	ENG
2	18600	Inject Fuelling Command	mg/st	ENG
3	19200	Exhaust Gas Flow Rate	kL/h	ENG
4	47300	KDOC 1 Inlet Temperature	°C	ENG
5	19300	SCR Temperature	°C	ENG
6	19302	SCR Outlet Temperature	°C	ENG

Pre-defined Monitoring (26/34) AdBlue/ DEF Injector

No	ID	Item	Unit (SI)	Applicable component
1	47200	KDPF 1 Outlet Temperature	°C	ENG
2	19304	DEF Pump State	-	ENG
3	19120	DEF Injection Quantity	ml/sec	ENG
4	19205	SCR NH3 Concentration Corrected	ppm	ENG
5	19202	Turbo Outlet Nox Corrected	ppm	ENG
6	19209	SCR Outlet Nox Corrected	ppm	ENG

Pre-defined Monitoring (27/34) AdBlue/ DEF Pump

No	ID	Item	Unit (SI)	Applicable component
1	19120	DEF Injection Quantity	ml/sec	ENG
2	19108	DEF Pump Pressure	kPa	ENG
3	19109	DEF Pump Press Sensor Volt	V	ENG
4	19304	DEF Pump State	-	ENG
5	19136	DEF Pump Temperature	°C	ENG
6	19114	DEF Reverting Valve Cmd	-	ENG

Selectable items in Maintenance mode

Code	Item
00	Maintenance Mode Change
49	Air Cleaner Clean and Change
60	Coolant Change
41	Fuel Prefilter Change
01	Engine Oil Change
02	Engine Oil Filter Change
05	Hydraulic Tank Breather Change
04	Hydraulic Oil Filter Change
09	Swing Machinery Case Oil Change
15	Axle Oil Change
12	Transmission Oil Change
10	Hydraulic Oil Change
99	All Default Value

3. Select “Maintenance Mode Change”, and select “ON” or “OFF” of the maintenance mode with the function switches after the screen is displayed.

   ON: Functions of all maintenance items are enabled in operator mode

   OFF: Functions of all maintenance items are disabled in operator mode

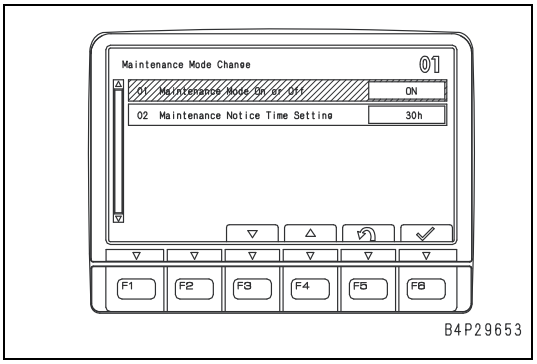
   F3: Moves the selected item down by one item

   F4: Moves the selected item up by one item

   F5: Cancels the selection and returns to the “Maintenance Mode Change” screen

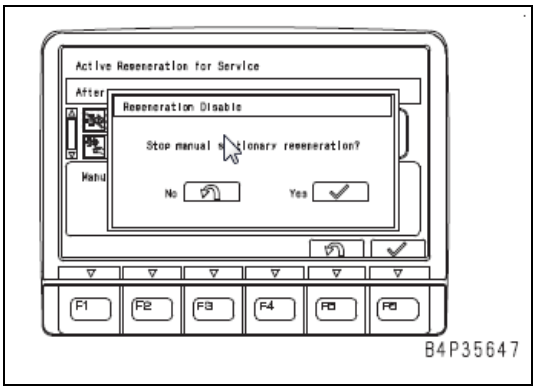
   F6: Enters the selected item, and returns to the “Maintenance Mode Change” screen

   REMARK
   Even if ON/OFF of each item has been set, if the above setting is changed, it overrides the individual setting.



REMARK
By pressing F6 during the manual stationary regeneration, “Stop manual stationary regeneration?” is displayed on the screen. The regeneration treatment can be stopped by pressing F6.

- F5: Does not stop regeneration (manual stationary regeneration is continued)
- F6: Stops regeneration



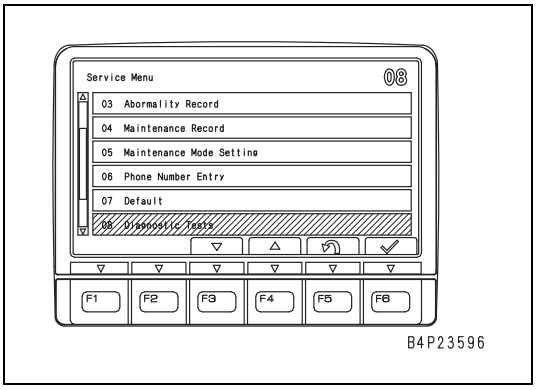
Method for operating testing menu (KDPF Memory Reset)

Testing menu checks the machine or resets the settings of the machine monitor.

“KDPF Memory Reset” resets KDOC information saved in the machine. Refer to this section and reset KDOC information after cleaning or replacing KDOC.

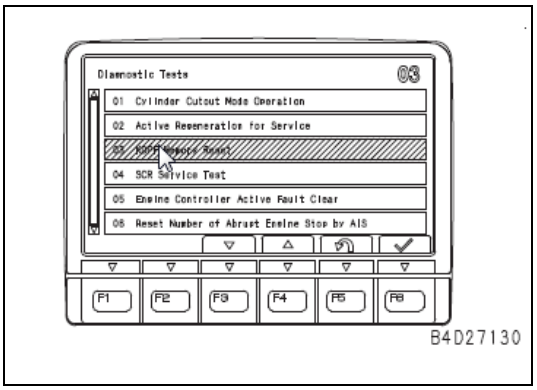
1. Select “Diagnostic Tests” from the “Service Menu” screen.

   REMARK
   For selecting method, see “Operating method of service mode” in “SERVICE MODE”.



2. On the “Diagnostic Tests” screen, select “KDPF Memory Reset” with function switches or numeral input switches.

   REMARK
   For selecting method, see “Operating method of service mode” in “SERVICE MODE”.



- While waiting for all items to be “OK”, operation such as turning the starting switch to OFF position or starting the engine will not be a problem.

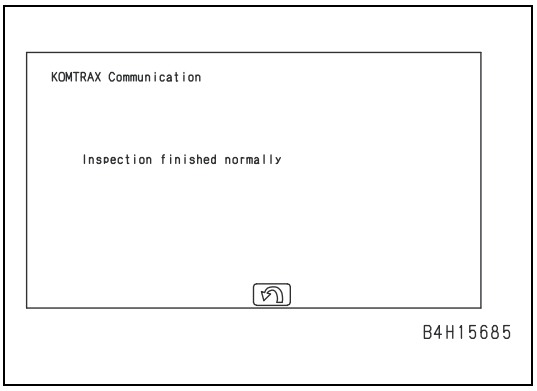
  If there is nothing abnormal, KOMTRAX Communication Inspection finishes automatically. Select “KOMTRAX Settings” –> “Terminal Status” of “Service Menu” to make sure that “Already Open” is indicated for the item in “KOMTRAX Communication Inspection”.

- KOMTRAX Communication Inspection may not be completed when the machine is placed indoor where radio wave from the satellite is blocked.

6) When all items are “OK”, “Inspection finished normally” screen automatically displayed.

   Press ENTER switch. “GPS & Communication State” appears, and the KOMTRAX Communication Inspection for machine side is completed.

   Other than the above, perform step 3.



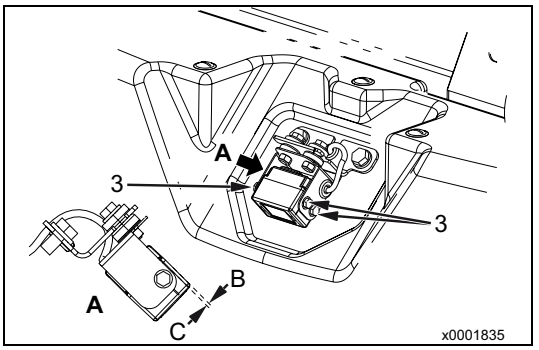
3. Troubleshooting when KOMTRAX Communication Inspection is finished unsuccessfully.

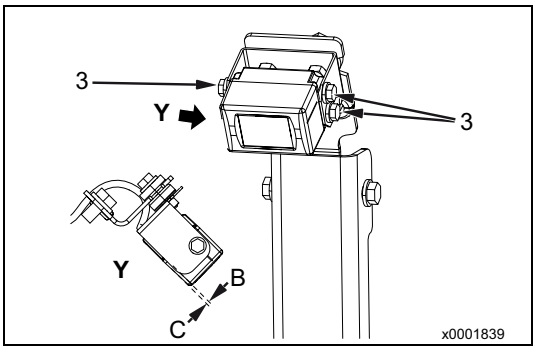
   - If any of 1) to 5) in step 2 is finished unsuccessfully, perform inspection from 1) in step 2.
   - If 6) in step 2 is finished unsuccessfully, following problems are suspected.

Troubleshooting when the failure occurs

Phenomenon	Cause	Required action
GPS does not become OK.	Something on the cab blocks off GPS satellites acquisition.	Remove the obstacle on the cab.
	GPS antenna cable is not connected to the machine monitor, or they are loose.	Check for the connection. If the connection is loose, secure it.
Modem does not become OK.	The mobile phone is out of communication range.	Check for state of in/out communication range with your mobile phone. If it is out of communication range, move into communication reception range and perform inspection.
	Communication antenna cable is not connected to the KOMTRAX terminal, or they are loose.	Check for the connection. If the connection is loose, secure it.
	KOMTRAX terminal is not connected to machine side wiring harness, or they are loose.	Check for the connection. If the connection is loose, secure it.

4. After troubleshooting, perform 1) in step 2 again.





Calibrate the KomVision camera after adjusting the angle of the KomVision camera by referring to “METHOD FOR SETTING OF KomVision (CAMERA CALIBRATION)”.

When the Failure Code Cannot be Cleared by “Loaded Diagnostics Operation to Confirm Failure Correction” or “Loaded Diagnostics Operation to Clear Failure Code”

- Even if the cause of failure is removed, corresponding failure code may not be cleared due to engine power deration by “Inducement”, environment condition, and other failure. Details and the remedy are as follows.

Failure code is not cleared, case 1: Engine power deration by “Inducement”

- When the failure code is related to “Inducement”, engine power is derated and the failure code may not be cleared. (For the mechanism of “Inducement”, see STRUCTURE AND FUNCTION, “Inducement”.)
- When the failure code is related to “Inducement” and if it is cleared by turning the starting switch to ON position or turning the starting switch to OFF position or running the engine at low idle after repair, check as usual.
- However, if the failure code is related to “Inducement” and requires “Loaded Diagnostics Operation To Clear Failure Code”, necessary operation for troubleshooting may not be performed due to power deration by “Inducement” (Inducement is tightened by step as time elapses.) (For the corresponding code, see the following table. This is also written in the item of corresponding failure code.)
- Remedies:
- Perform “Engine Con Inducement Fault Clear” after the repair, and then perform “Loaded Diagnostics Operation To Confirm Failure Correction” or "Loaded Diagnostics Operation To Clear Failure Code", and check that the failure code is cleared.

Failure code is not cleared, case 2: Environment condition

- Due to the nonconformity of environmental conditions (high altitude, outside air temperature) while “Loaded Diagnostics Operation To Confirm Failure Correction” or “Loaded Diagnostics Operation To Clear Failure Code” is performed, or due to thawing of DEF, the failure code may not be cleared.
  (This is written in corresponding failure code as the condition that is not cleared.)
- Remedies:
  1. After repair, perform “Loaded Diagnostics Operation To Confirm Failure Correction” or “Loaded Diagnostics Operation To Clear Failure Code” at the environment with proper condition.
     (See each failure code.)
  2. If the above remedy 1 cannot be performed, perform “Engine Controller Active Fault Clear” or “Engine Con Inducement Fault Clear” after the repair, and then check the failure code is cleared.
     (Check with monitoring by KOMTRAX or hearing from the user.)
- Specific example:
  - There are some failure codes which cannot be cleared due to environmental conditions (high altitude, outside air temperature, etc.).
    I. There are some failure codes which cannot be cleared at high altitude (ambient pressure is 80 kPa and below).
    II. There are some failure codes which cannot be cleared at low temperature (outside air temperature is -7 °C and below).
    III. There are some failure codes which can be detected only at “DEF under Thawing”.
    IV. There are some failure codes which cannot be detected at DEF frozen.
  - Failure code cannot be cleared because DEF pump is stopped or DEF injection is stopped.
  - The condition for DEF pump to stop or stop injection is as follows.
    I. Outside air temperature is -24 °C and below.
    II. Thawing is under control.

7	Defective controller	Precautions for troubleshooting (1) Connector number indication method and handling of T-adapter For troubleshooting, insert or connect T-adapters as follows unless otherwise specified. • When (male) or (female) is not indicated with a connector number, disconnect the connector, and insert T-adapters to both sides of male and female. • When (male) or (female) is indicated with a connector number, disconnect the connector, and connect T-adapter to the indicated side of connector. • „Male and female“ means male and female of connector pins, not connector housings. • Male and female of connector pins and housing in DT series, etc, are opposite to those described in this manual. Take care. (2) Pin number description sequence and tester lead handling For troubleshooting, connect the positive (+) and negative (-) leads of a multimeter as shown below unless otherwise specified. • Connect the positive (+) lead to pin or wiring harness indicated first. • Connect the negative (-) lead to a pin or wiring harness indicated second.

Related circuit diagram

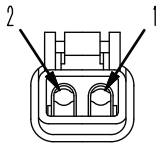
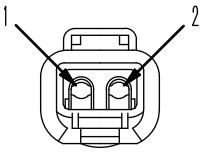
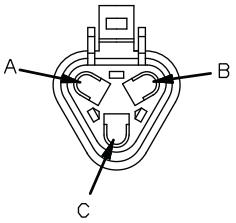
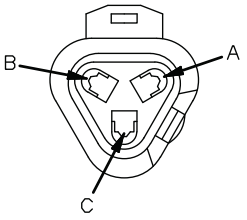
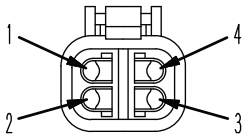
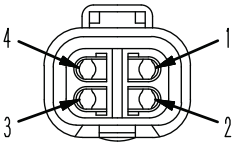
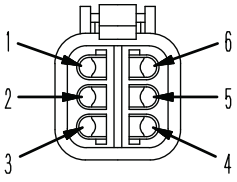
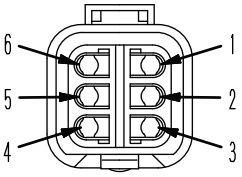
This is the excerpted circuit diagram related to troubleshooting

- The circuit diagram contains the connector No., pin No., and connector colour related to the failure.
- “/” is used in the connector No. in the following 2 cases.
  - Abbreviation (3 letters in many cases) Example) T/C: Abbreviation for Torque Converter
  - Male side and female side have different connector Nos. Example) BREAK OUT / E24
- The circuit diagram contains the destination or source of the branch line in a wiring harness.
- Arrow (↔): Approximate installation position on the machine

  NO: Normally Open

  NC: Normally Closed
- Signal names such as GND and 24 V are included in addition to connector numbers at junctions, etc. in circuit diagrams.
- Except for GND and 24 V, a signal name indicated at a junction, etc. shows that the wire is connected to another junction or controller at where the same signal name is indicated.

[The pin No. is also marked on the connector (electric wire insertion end)]

No. of pins	DT Series connector		
	Body (plug)	Body (receptacle)	Testing connection use special tool Part No.
2	 BWP05037	 BWP05038	799-601-9020 (T-adapter) 799-601-9890 (T-adapter)
	Part No. :08192-12200 (normal type) 08192-22200 (fine wire type)	Part No. :08192-12100 (normal type) 08192-22100 (fine wire type)	
3	 BWP05039	 BWP05040	799-601-9030 (T-adapter) 799-601-9890 (T-adapter)
	Part No. :08192-1A200 (normal type) 08192-2A200 (fine wire type)	Part No. :08192-13100 (normal type) 08192-23100 (fine wire type)	
4	 BWP05041	 BWP05042	799-601-9040 (T-adapter) 799-601-9890 (T-adapter)
	Part No. :08192-14200 (normal type) 08192-24200 (fine wire type)	Part No. :08192-14100 (normal type) 08192-24100 (fine wire type)	
6	 BWP05043	 BWP05044	799-601-9050 (T-adapter)
	Part No. :08192-16200 (normal type) 08192-26200 (fine wire type)	Part No. :08192-16100 (normal type) 08192-26100 (fine wire type)	

B4D18410

Part No.	Part name	Number of pins	ID marking	T-adapter kit														Non-kit part
				799-601-2500	799-601-2700	799-601-2800	799-601-7000	799-601-7100	799-601-7400	799-601-7500	799-601-8000	799-601-9000	799-601-9100	799-601-9200	799-601-9300	799-601-4101	799-601-4201	
799-601-7530	Adapter for 070	14	07-14							●								
799-601-7540	Adapter for 070	18	07-18							●								
799-601-7550	Adapter for 070	20	07-20							●								
799-601-7360	Adapter for relay	5	REL-5P															●
799-601-7370	Adapter for relay	6	REL-6P															●
799-601-7380	Adapter for JFC	2																●
799-601-9010	Adapter for DTM	2	DTM2									●		●				
799-601-9020	Adapter for DT	2	DT2									●		●		●	●	
799-601-9030	Adapter for DT	3	DT3									●		●				
799-601-9040	Adapter for DT	4	DT4									●		●		●	●	
799-601-9050	Adapter for DT	6	DT6									●		●				
799-601-9060	Adapter for DT (gray)	8	DT8GR									●		●				
799-601-9070	Adapter for DT (black)	8	DT8B									●		●				
799-601-9080	Adapter for DT (green)	8	DT8G									●		●				
799-601-9090	Adapter for DT (brown)	8	DT8BR									●		●				
799-601-9110	Adapter for DT (gray)	12	DT12GR									●		●				
799-601-9120	Adapter for DT (black)	12	DT12B									●		●				
799-601-9130	Adapter for DT (green)	12	DT12G									●		●				
799-601-9140	Adapter for DT (brown)	12	DT12BR									●		●				
799-601-9210	Adapter for HD30-18	8	D18-8									●	●					
799-601-9220	Adapter for HD30-18	14	D18-14									●	●					
799-601-9230	Adapter for HD30-18	20	D18-20									●	●					
799-601-9240	Adapter for HD30-18	21	D18-21									●	●					
799-601-9250	Adapter for HD30-24	9	D24-9									●	●					
799-601-9260	Adapter for HD30-24	16	D24-16									●	●					
799-601-9270	Adapter for HD30-24	21	D24-21									●	●					
799-601-9280	Adapter for HD30-24	23	D24-23									●	●					
799-601-9290	Adapter for HD30-24	31	D24-31									●	●					
799-601-9310	Plate for HD30 (24 pins)											●	●		●			
799-601-9320	T-box (for ECONO)	24										●	●		●			
799-601-9330	Case											●						
799-601-9340	Case												●					
799-601-9350	Adapter for DRC	40	DRC-40												●			
799-601-9360	Adapter for DRC	24	DRC-24												●			
799-601-9410*	Socket for engine (CRI-T2)	2	G															●

Pages 40-101 to 40-116
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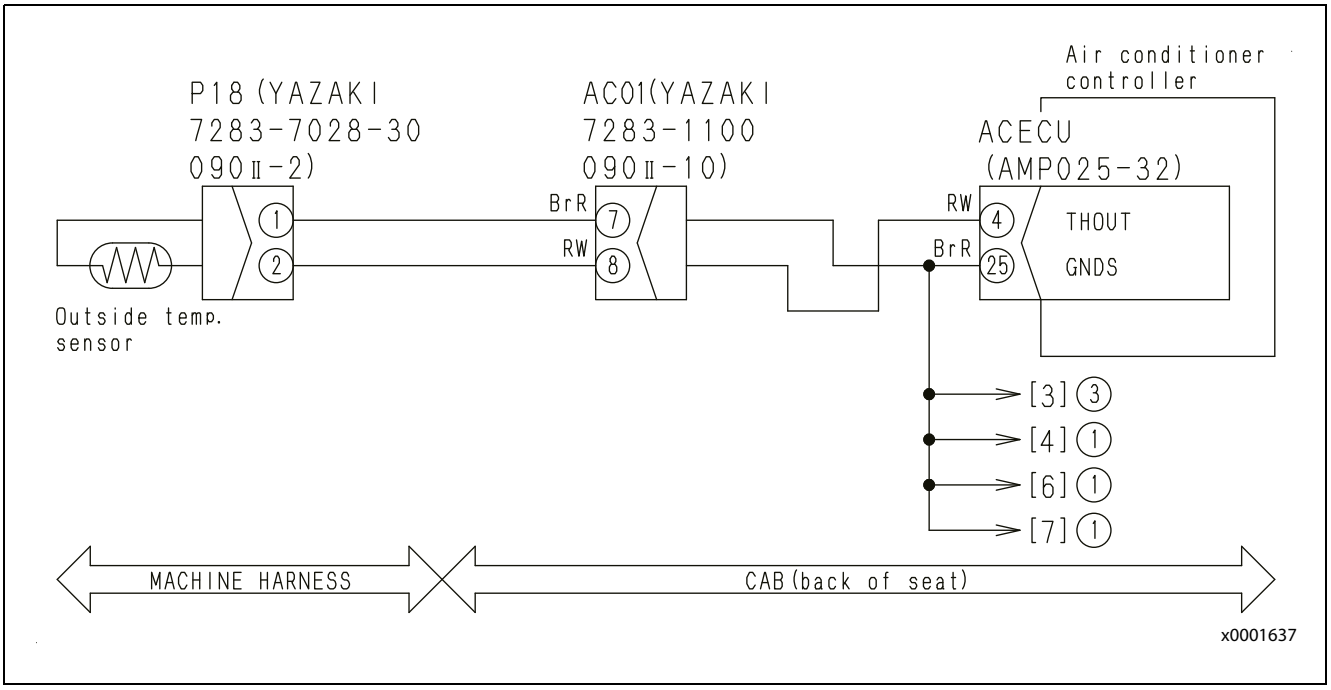
Circuit Diagram of Air Conditioner Fresh Air Temperature Sensor

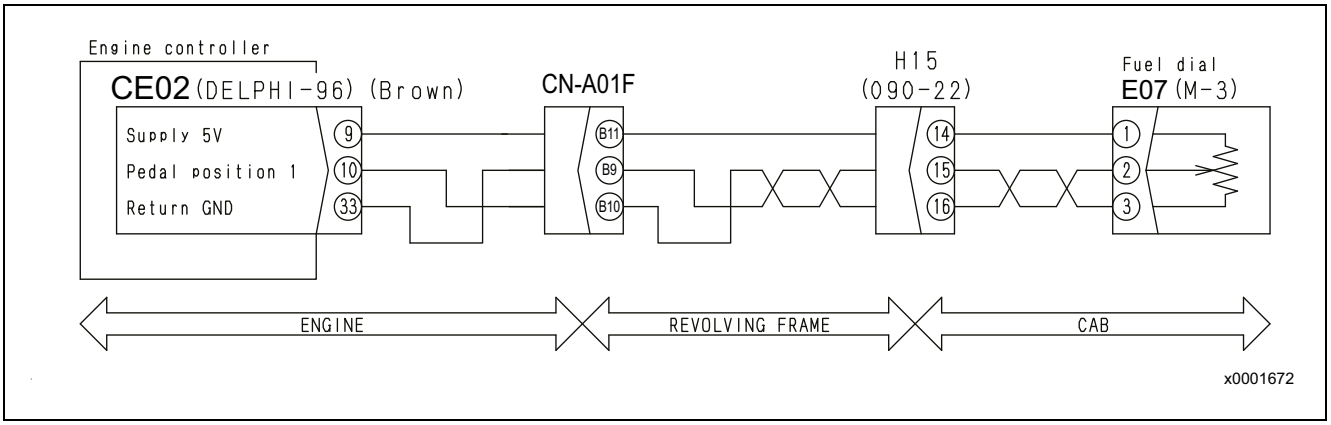


Failure Code [AS00R3] – Inducement 1

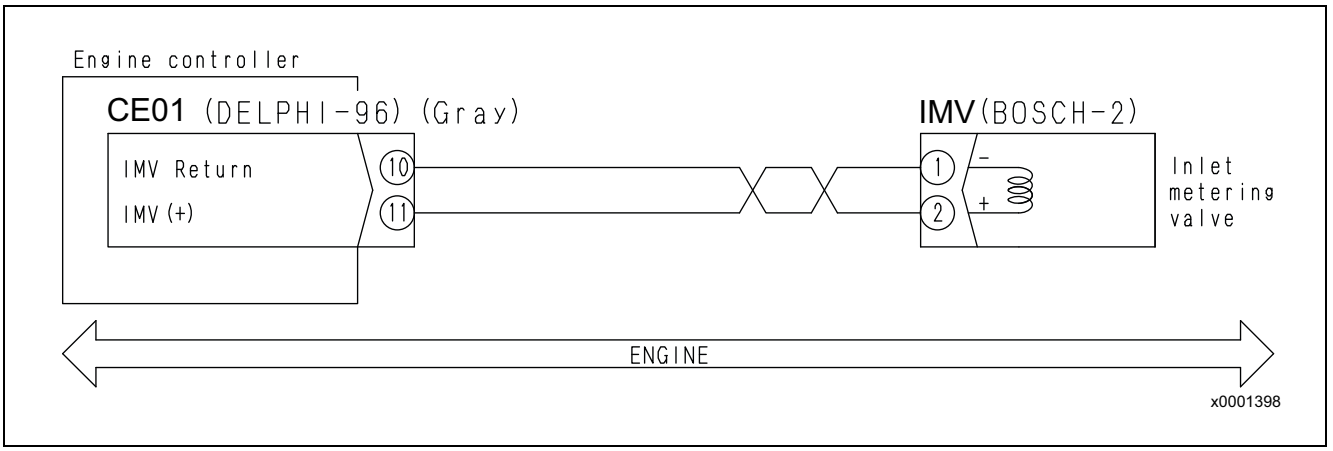
Action level	Failure code	Failure	Inducement 1 (SCR Device Abnormality) (Engine controller system)
L03	**AS00R3**		
Detail of failure	• A certain time has passed since AS00R2 occurs. • An abnormality of SCR system has occurred again within a certain time since abnormality repair of SCR system. (EU Specification)		
Action of controller	• The information related to this failure code is displayed on the monitor screen. • Engine power deration • [AS00R4] occurs and operates with largely restricted output after a certain time.		
Phenomenon on machine	• Engine power deration • The engine output reduces heavily after a certain time.		
Related information	• This failure code is detected during engine operation. • If this failure code displays after SCR system abnormality is repaired and the engine controller is shut down, run the engine for 1 minute to clear the failure code. • After this failure code is cleared, engine power deration continues until the starting switch is turned to OFF position.		

No.	Cause	Procedure, measuring location, criteria and remarks
1	SCR system abnormality	Failure codes of SCR system abnormality are displayed. Perform troubleshooting for them.
2	Engine system abnormality	If any other failure codes than SCR system abnormality are displayed, perform troubleshooting for them.

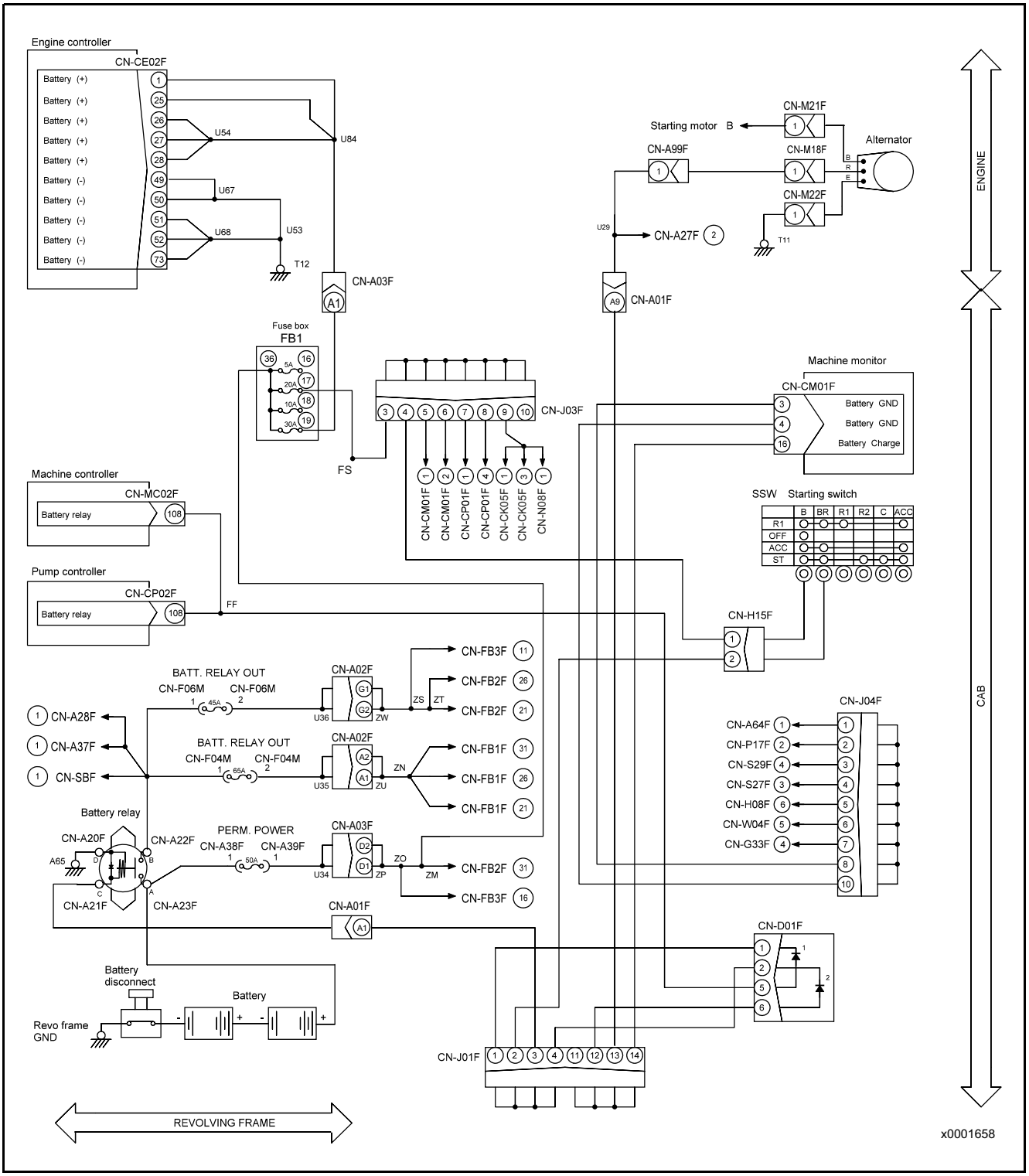
Circuit Diagram of Throttle Sensor



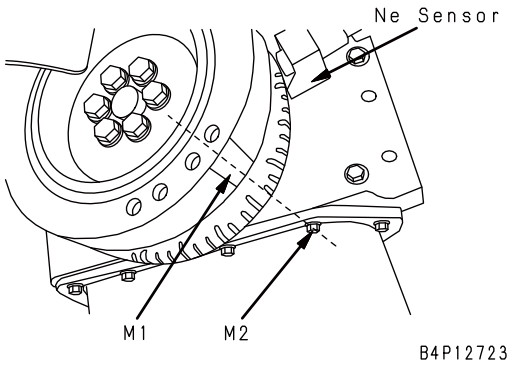
Circuit Diagram of IMV/PCV1

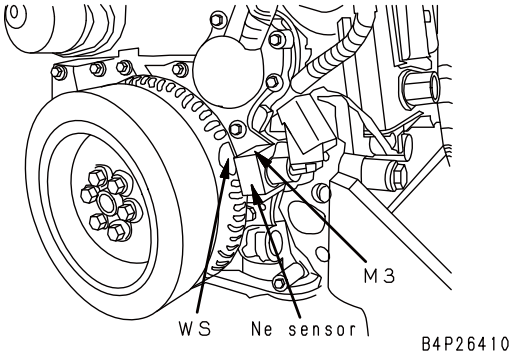


Circuit Diagram (Engine Controller Power Supply)

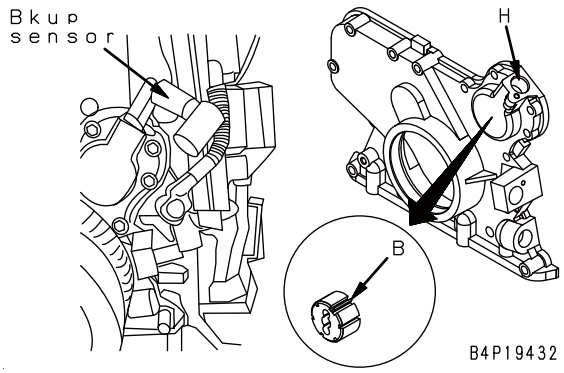


Engine NE speed (CRANK) sensor

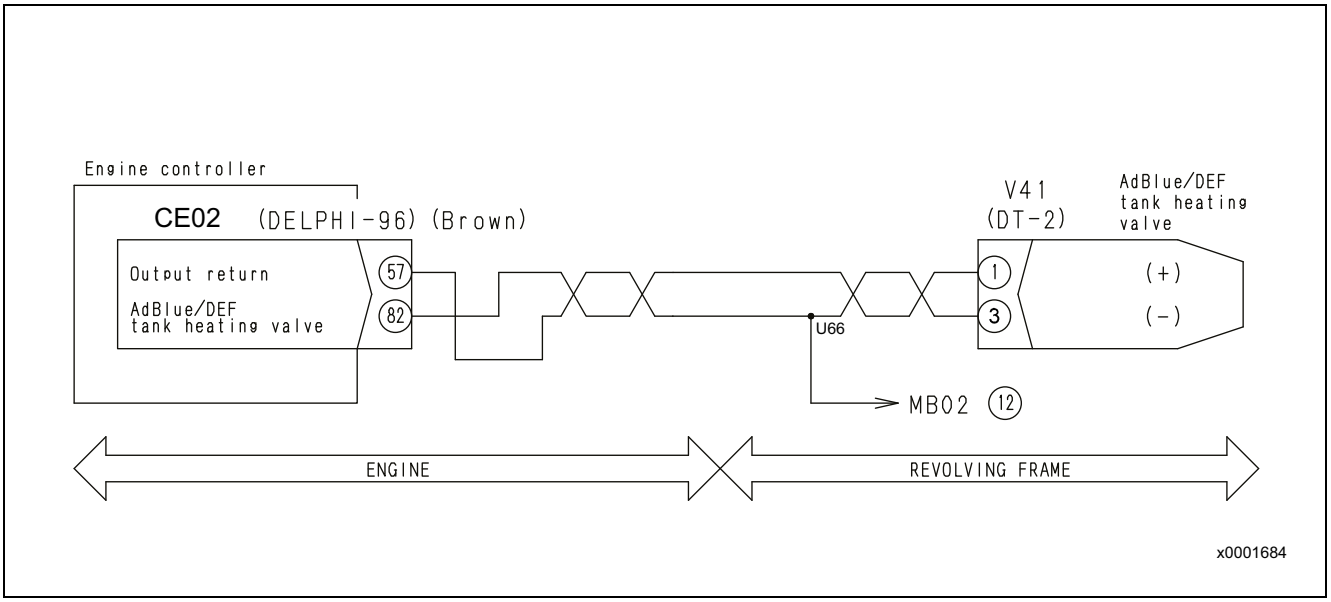




Engine Bkup speed (CAM) sensor



Circuit Diagram of DEF Tank Heating Valve



3	Defective sensor power supply system	If Failure Code [CA1695] or [CA1696] is displayed, perform troubleshooting for [CA1695] or [CA1696] first.		
		1. Turn starting switch to OFF position. 2. Disconnect connector E25, and connect T-adapter to female side. 3. Turn starting switch to ON position.		
		Voltage	Between E25 (female) (4) and (1)	4.75 to 5.25 V
4	Defective wiring harness connector	See descriptions of wiring harness and connectors in “Electrical equipment” in “CHECKS BEFORE TROUBLESHOOTING” of “RELATED INFORMATION ON TROUBLESHOOTING”, and check and repair defects, if any.		
5	Defective wiring harness or engine controller	1. Turn starting switch to OFF position. 2. Disconnect connector E25. 3. Turn starting switch to ON position.		
		If Failure Code [CA1881] is cleared, the wiring harness or engine controller is defective. Check cause 4 again. Ignore other failure codes displayed.		
		1. Turn starting switch to OFF position. 2. Disconnect connector E25 and connect short socket adapter to female side. Connect 5 V to the signal line. (Short-circuit pins (4) and (3) of connector E25.) 3. Turn starting switch to ON position.		
		If Failure Code [CA1879] is cleared, the wiring harness or engine controller is defective. Check cause 4 again. REMARK Ignore other failure codes displayed.		
6	Defective KDPF differential pressure sensor	If failure codes [CA1881] and [CA1879] are displayed after checks on cause 5, the KDPF differential pressure sensor is defective.		
7	Defective engine controller	If failure code is still displayed after above checks, any internal parts in the engine controller is defective. (In case of an internal defect, troubleshooting is impossible as an assembly. Replace whole assembly.)		

Loaded Diagnostics Operation To Clear Failure Code

Check if the repair has been completed with the following procedure:

(Make sure this failure code is cleared after this procedure.)

⚠ Place the machine on a level ground.

1. Turn starting switch to ON position and leave it for 1 minute.

REMARK

It is required that the engine controller recognizes the dispersion of sensor.

2. Turn the starting switch from OFF to ON.
3. Start the engine and keep the engine running for approximately 1 minute at low idle speed.
4. After warm-up operation, set the swing lock to ON, working mode to P, and fuel control dial to MAX position.
5. Operate for 40 seconds with Arm IN relief.

NOTICE

Be careful care not to overheat hydraulic oil temperature.

Blank for technical reason

Failure Code [CA3143] – SCR Temperature Sensor Low Error

Action level	Failure code	Failure	SCR Temperature Sensor Low Error (Engine controller system)
L01	**CA3143**		
Detail of failure	Ground fault or sensor circuit error in SCR temperature sensor measuring section or probe (+)		
Action of controller	• As the SCR temperature cannot be detected, substitute the SCR outlet temperature for the SCR temperature and run the engine (if the SCR outlet temperature sensor also has an error, use the latest normal value). • Advances to Inducement strategy. • DEF injection stops.		
Phenomenon on machine	• NOx emission increases because DEF injection is disabled. • Engine power deration according to inducement strategy.		
Related information	⚠ **SCR assembly, sensor fitting piping, and sensor probe become hot (Min. 400 °C). Be careful not to get burned.** • The SCR temperature sensor and SCR outlet temperature sensor are integrated into one sensor controller which provides CAN communication with the engine controller. • Ground fault or sensor circuit error in SCR temperature sensor measuring section or probe (+) is sent to the engine controller via CAN communication, and this failure code is displayed. • After repairing, check if the failure code is cleared by the following procedure. Procedure: Turn starting switch to ON position.		

No.	Cause	Procedure, measuring location, criteria and remarks
1	Defective SCR temperature sensor (internal defect)	1. Turn starting switch to OFF position. 2. Replace SCR temperature sensor. 3. Turn starting switch to ON position. If this failure code is cleared, the original SCR temperature sensor is defective. (In case of an internal defect, troubleshooting is impossible as an assembly. Replace whole assembly.)
2	Defective engine controller	If no failure is found by above checks, engine controller is defective. (Since this is an internal defect, troubleshooting cannot be performed.)

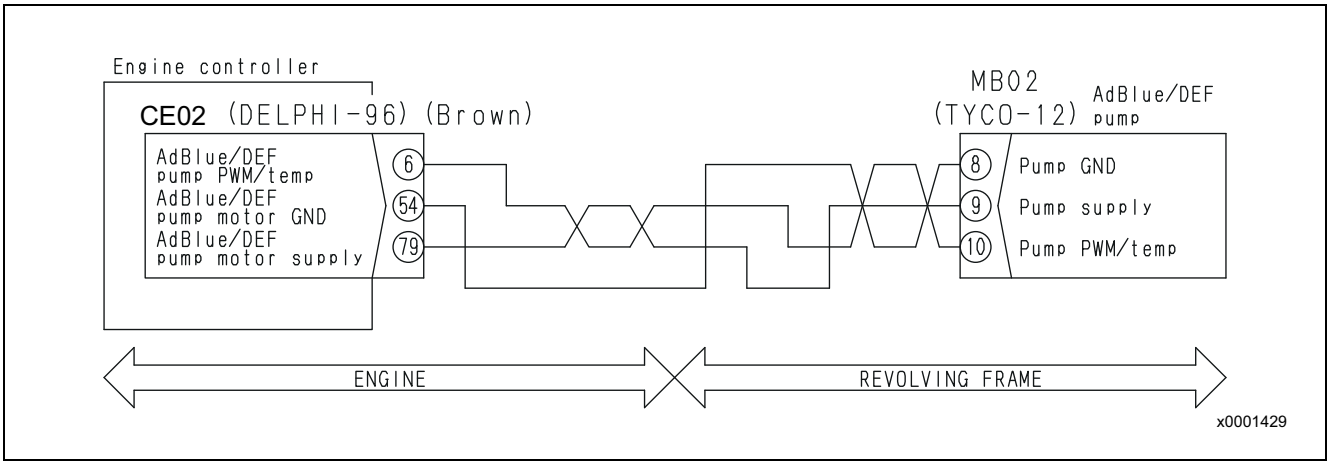
Blank for technical reason

Failure Code [CA3314] – KDOC Inlet Temperature Sensor High Error

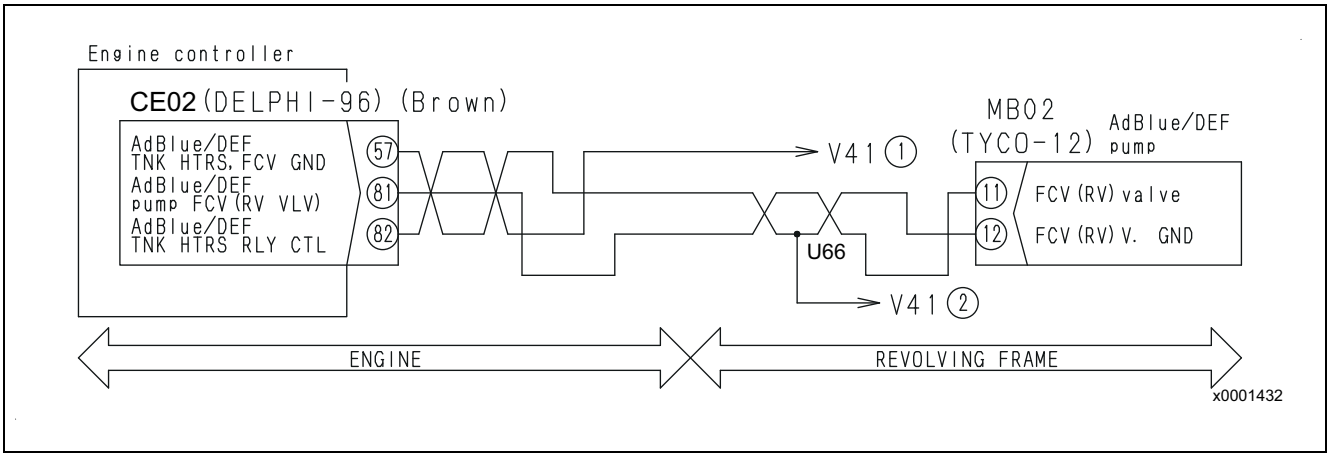
Action level	Failure code	Failure	KDOC Inlet Temperature Sensor High Error (Engine controller system)
L03	**CA3314**		
Detail of failure	Open circuit, hot short-circuit, or sensor circuit error in KDOC inlet temperature sensor measuring section or probe (+) side		
Action of controller	• As KDOC inlet temperature cannot be detected, substitutes KDOC outlet temperature for KDOC inlet temperature and runs the engine (if KDOC outlet temperature sensor also has an error, uses a fixed value (150 °C)). • Derates engine power for operation. • Prohibits DEF injection. • Stops regeneration control. • Stops fuel dosing.		
Phenomenon on machine	• NOx emission increases because DEF injection is disabled. • Control of active regeneration is defective. • Engine output is reduced.		
Related information	⚠ **KDOC is heated to 500 °C or higher. Be careful not to get burn injury.** • See “RELATED INFORMATION ON TROUBLESHOOTING”, “CHECKS BEFORE TROUBLESHOOTING”, “Electrical equipment”, and check them according to the descriptions of wiring harness and connectors. • KDOC inlet temperature sensor and KDOC outlet temperature sensor are integrated into one sensor, and controller of integrated sensor communicates with the engine controller through CAN communication. • If open circuit or hot short circuit or sensor circuit error in KDOC inlet temperature sensor measuring section or probe (+) side occurs, the information is sent to the engine controller through CAN communication so this failure code is displayed. • After completion of repair, check that the failure code is cleared by the following operation. Procedure: Turn the starting switch to ON position.		

No.	Cause	Procedure, measuring location, criteria and remarks
1	Defective KDOC inlet temperature sensor	1. Check the sensor connector for stain or damage. 2. Turn the starting switch to OFF position. 3. Replace the KDOC temperature sensor. 4. Turn the starting switch to ON position.
		If this failure code is not displayed, the original KDOC inlet temperature sensor is defective. (Since this is an internal defect, troubleshooting cannot be performed.)
2	Defective engine controller	If no failure is found by above checks, engine controller is defective. (Since this is an internal defect, troubleshooting cannot be performed.)

Circuit Diagram of DEF Pump



Circuit Diagram of DEF FCV



2	Defective turbocharger outlet NOx sensor	1. Turn the starting switch to OFF position. 2. Replace the turbocharger outlet NOx sensor since NOx sensor is irreparable. 3. Turn the starting switch to ON position. 4. Perform Loaded Diagnostics Operation To Clear Failure Code. **REMARK** Offset/drift may occur due to sulfur-poisoned turbocharger outlet NOx sensor.
		If this failure code is not displayed, the original sensor is defective. (Since this is an internal defect, troubleshooting cannot be performed.)
3	Defective engine controller	If no failure is found by above checks, engine controller is defective. (Since this is an internal defect, troubleshooting cannot be performed.)

Loaded diagnostics operation to clear failure code

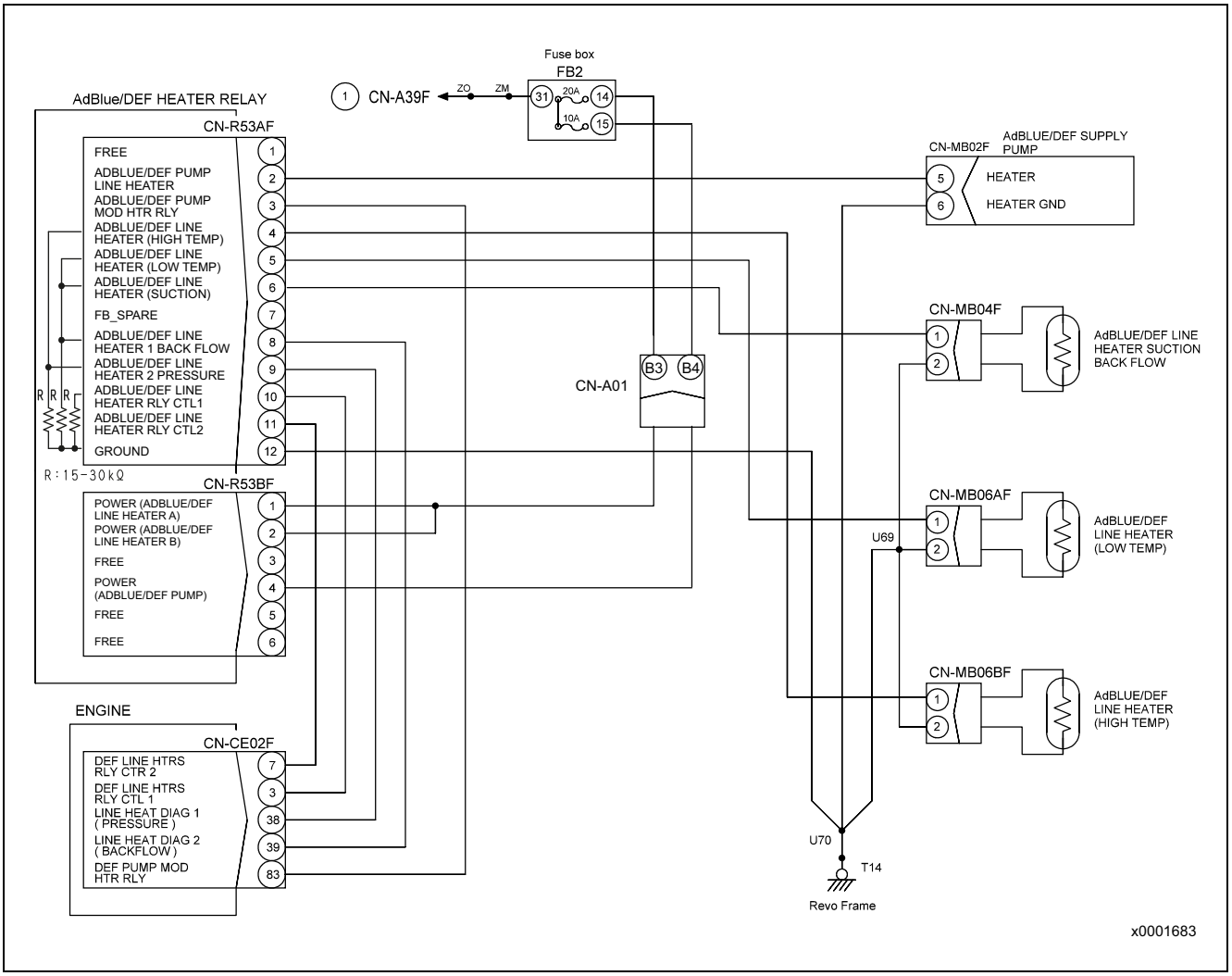
Perform the following procedure to check that the repair is completed. (Make sure that this failure code is not displayed after this procedure.)

1. Turn the starting switch to OFF position, and shut down the engine controller.
2. Turn the starting switch to ON position, and start the engine.
3. Run the engine at high idle speed with safe condition in order to raise the exhaust gas temperature. (Keep the engine speed so that the monitoring code 47300 “KDOC 1 Inlet Temperature” becomes 150 °C or higher. Check that the monitoring code 19203 “Turbo Outlet NOx Sensor State” changes from 0 to 1.)
4. Repair is completed if failure code is not displayed after 3 minutes have passed while the engine runs at low idle speed.

REMARK

If the turbocharger outlet NOx sensor cannot be activated (that is, monitoring code 19203 “Turbo Outlet NOx Sensor State” remains as 0), return to troubleshooting.

Circuit Diagram of DEF Heater Relay



3. See TESTING AND ADJUSTING, “SET AND OPERATE MACHINE MONITOR”, “DIAGNOSTIC TESTS MENU”, and “Inspection menu (SCR Service Test)” to perform “DEF Pump Heater Relay Test”.

4. Repair will be completed if monitoring code 19136 “DEF Pump Temperature” increases by 5 °C or higher from the start of testing within 30 minutes.

5. After the repair is completed, see “PROCEDURE FOR TROUBLESHOOTING” to clear the failure code and make sure that the failure code is cleared from “Abnormality Record” screen.

REMARK

If monitoring code 19136 “DEF Pump Temperature” does not increase by 5 °C or higher from the start of testing within 30 minutes, return to troubleshooting.

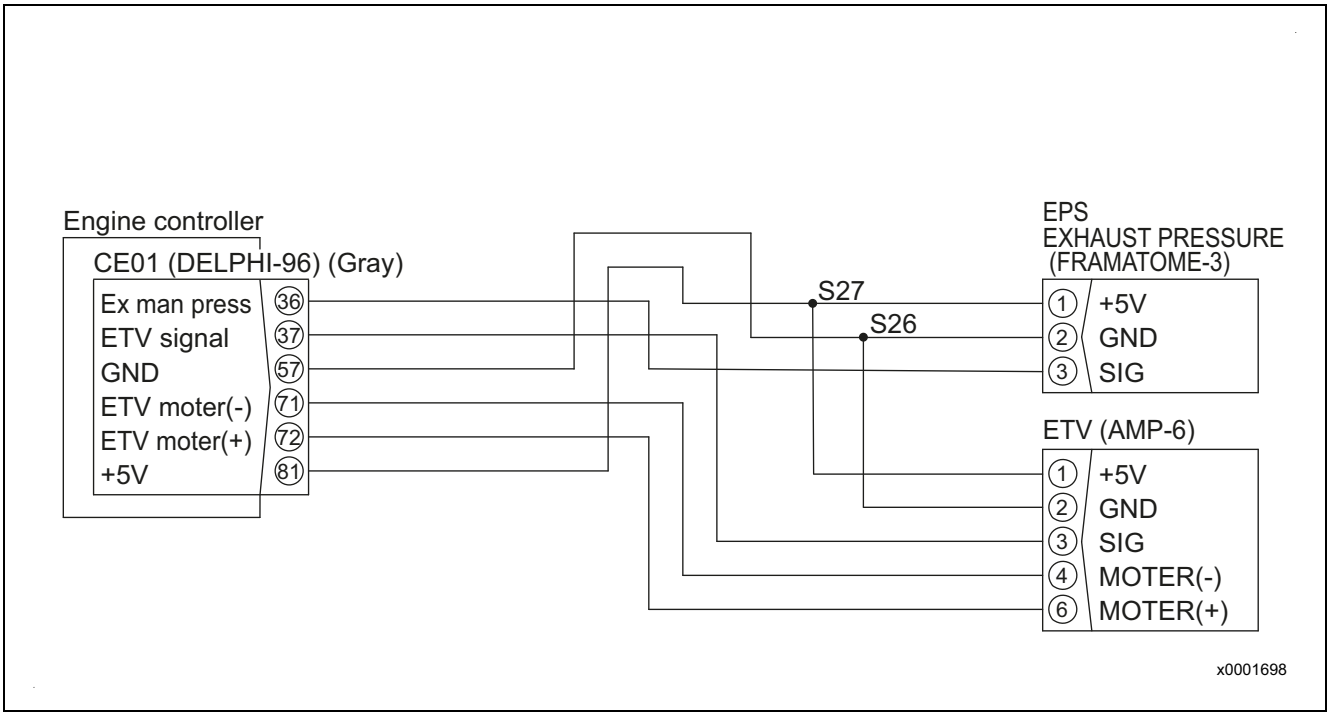
No.	Cause	Procedure, measuring location, criteria and remarks
3	Defective DEF tank sensor	• Check the sensor connector for contamination and damage. • Make sure that DEF tank contains 15 % or more of DEF. 1. Turn starting switch to OFF position. 2. Replace the DEF tank sensor. 3. Turn starting switch to ON position. 4. If the value of DEF level is displayed correctly on machine monitor, perform “Loaded Diagnostics Operation To Clear Failure Code” and repair is completed.
4	Defective engine controller	If no failure is found by above checks, engine controller is defective. (Since this is an internal defect, troubleshooting cannot be performed.)

Loaded Diagnostics Operation to Clear Failure Code

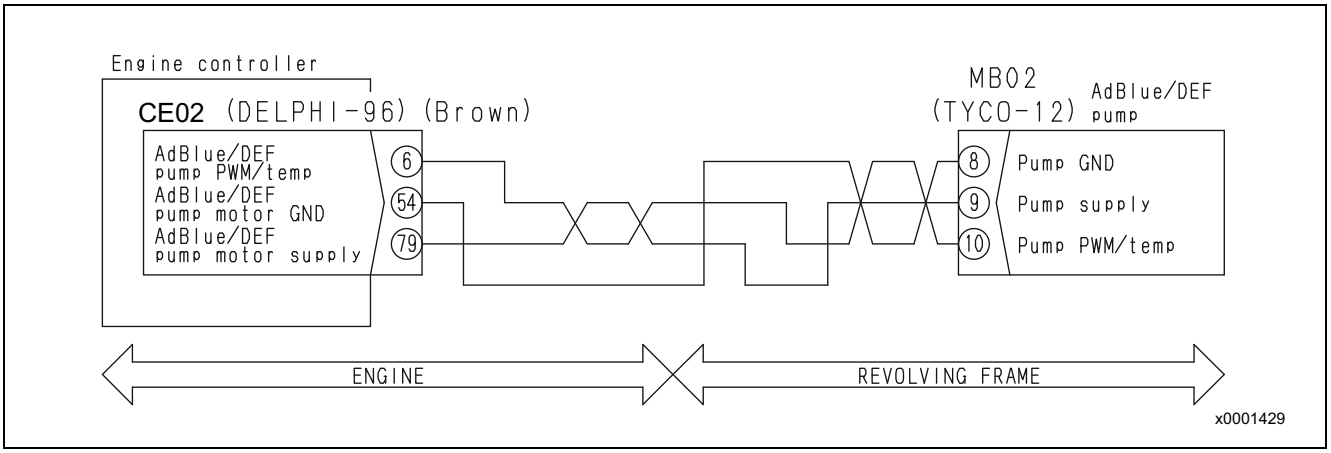
Check if the repair has been completed with the following procedure: (Make sure this failure code is cleared after this procedure.)

1. Turn the starting switch to OFF position, and shut down the engine controller.
2. Turn the starting switch to ON position.
3. Display monitoring code 19115 “DEF Temperature in Tank” on “Pre-defined Monitoring” screen.
4. Do not operate the levers and pedals of the machine, but wait.
   The waiting time is different as follows by the initial temperature at the time the test of DEF temperature in tank is started.
   - When the initial temperature is 0°C or below, start the engine to increase the tank temperature to 0°C or above, and wait for 60 minutes. (Make sure that the DEF level caution lamp lights up from white to blue.)
     Wait for 30 minutes after that.
   - When the initial temperature is 1°C or above, wait for 30 minutes. (You can, but do not need to, start the engine.)
5. If this failure code is cleared, repair is completed.

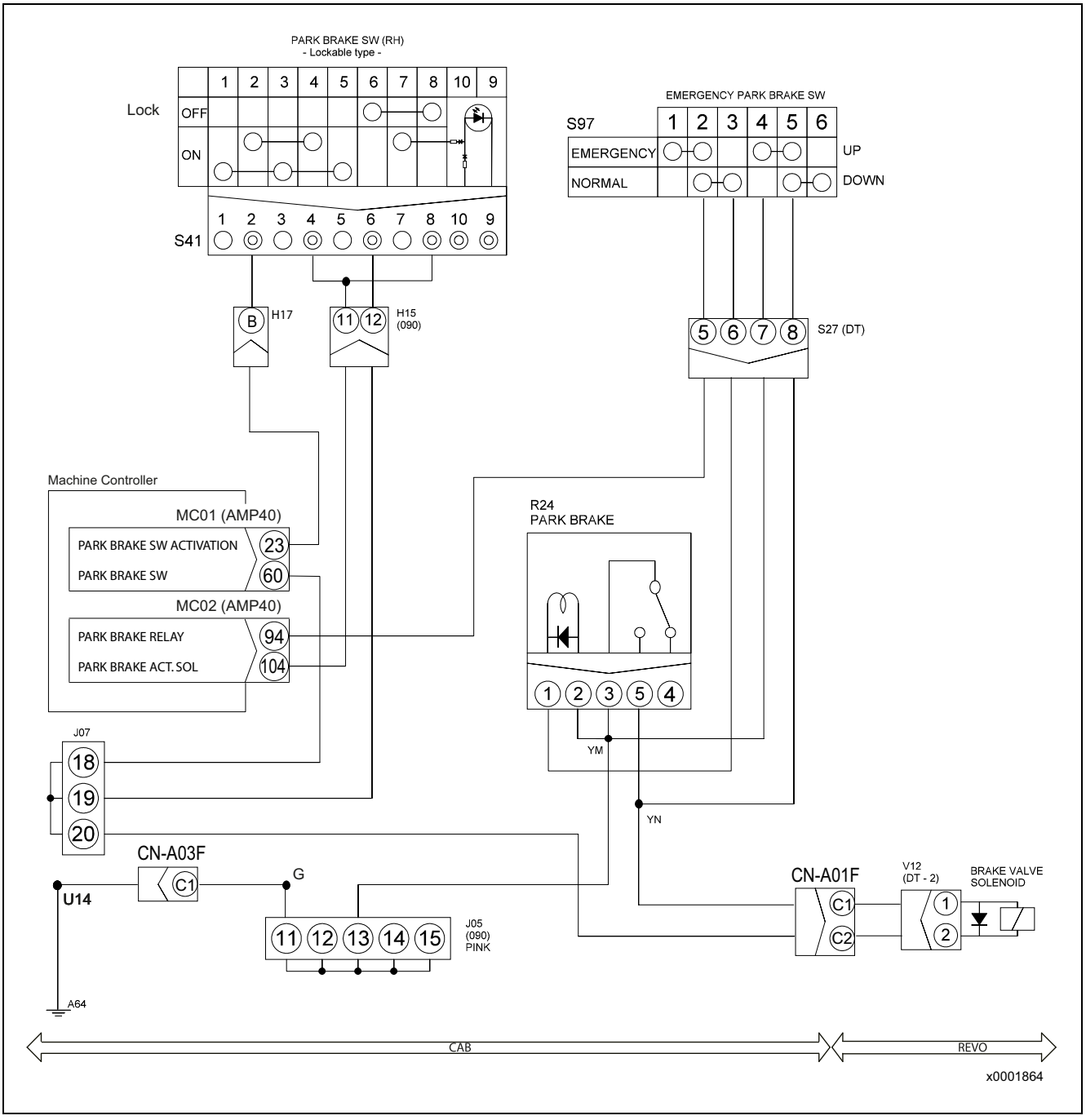
Circuit Diagram of Exhaust Throttle Valve Drive Motor



Circuit Diagram of DEF Pump

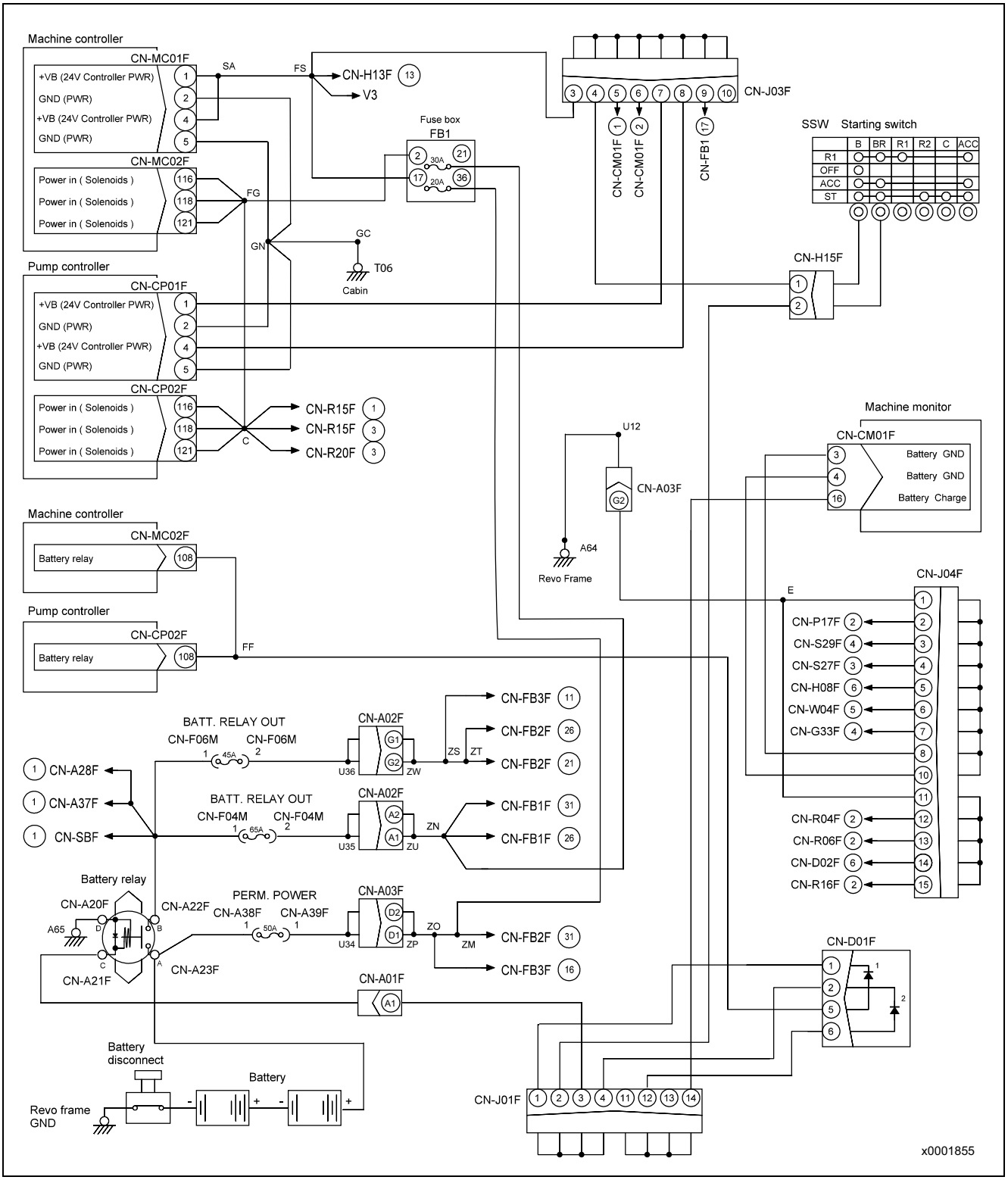


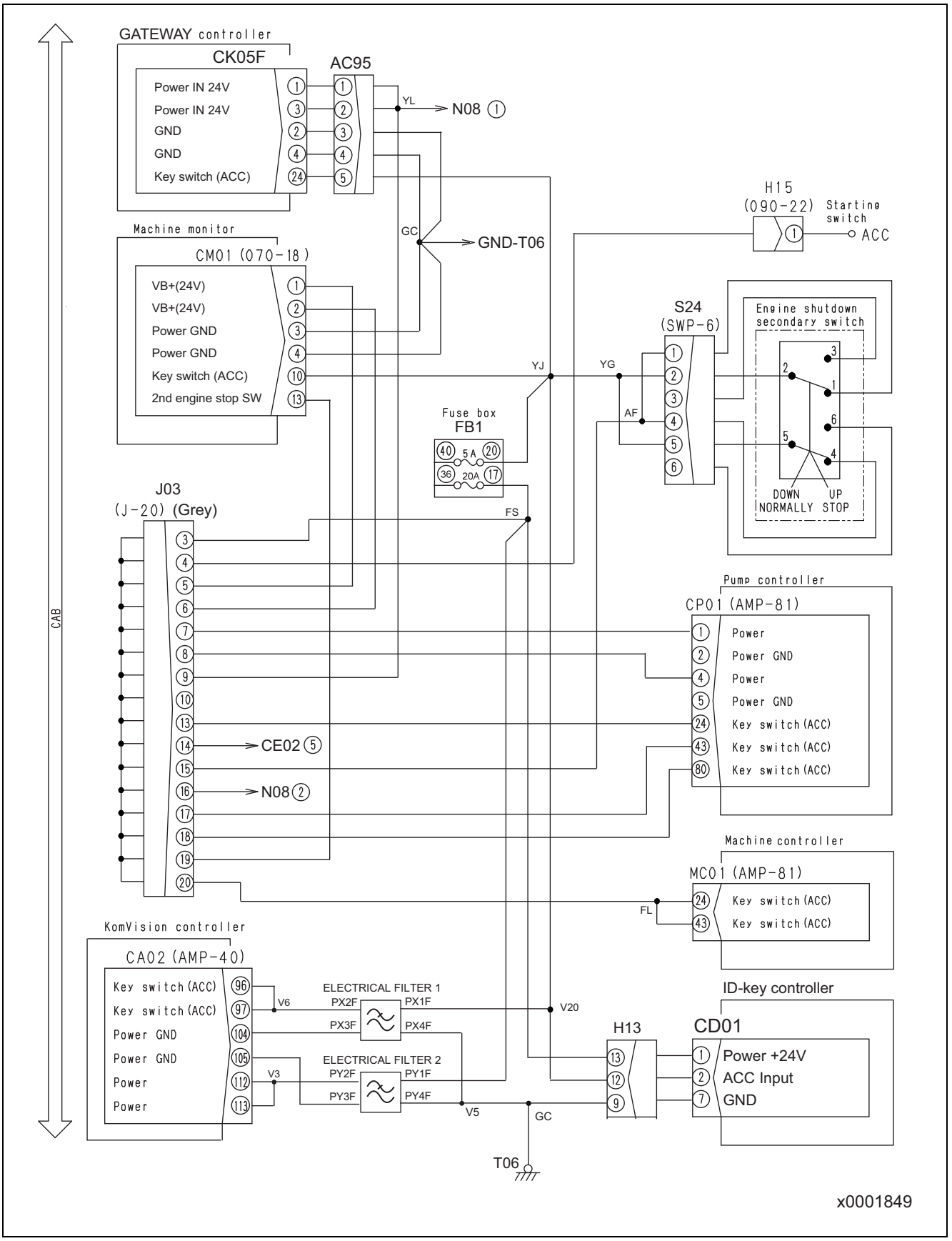
Circuit Diagram of Parking Brake Relay



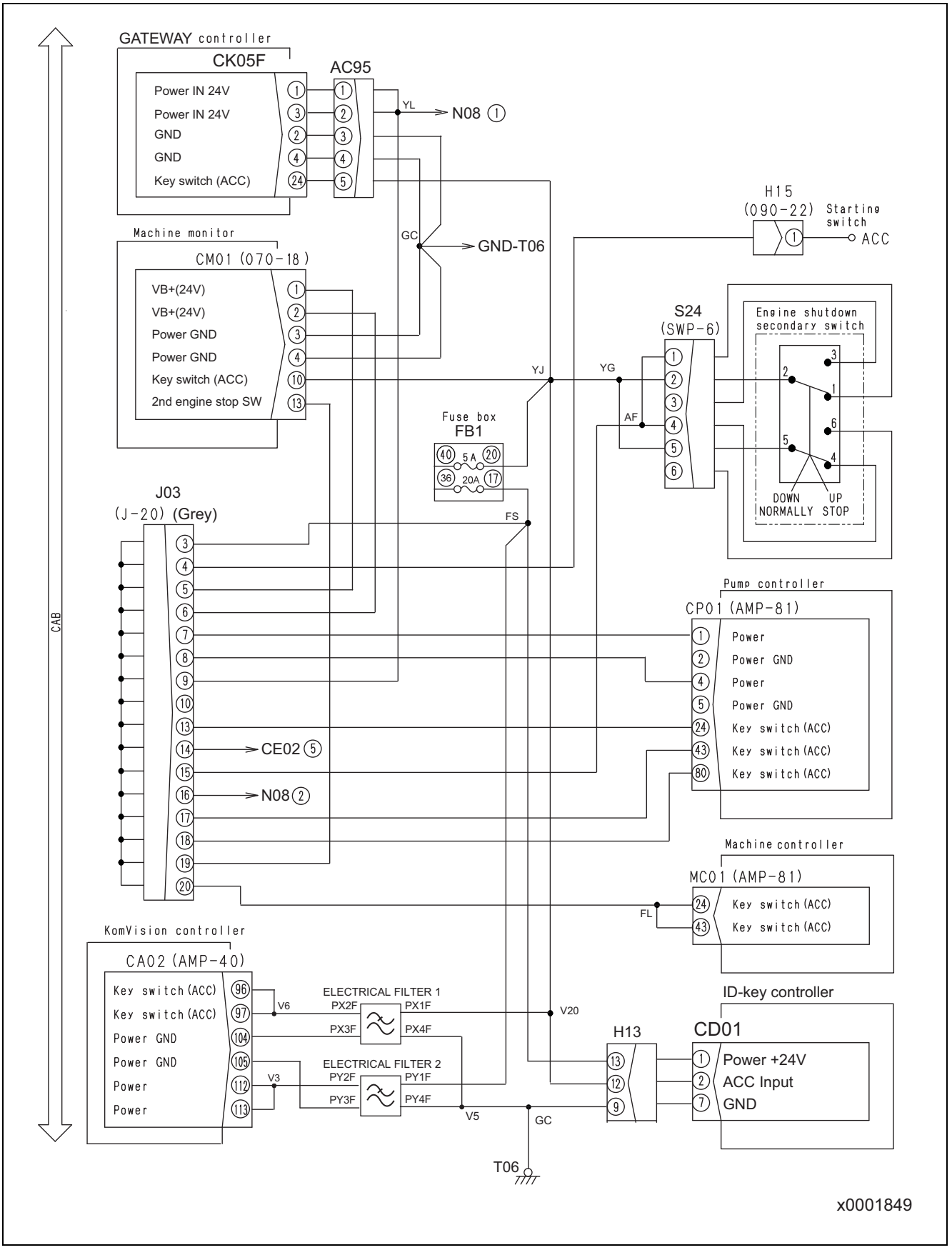
7	Defective pump controller	If no failure is found by preceding checks, pump controller is defective. (In case of an internal defect, troubleshooting is impossible as an assembly. Replace whole assembly).

Circuit Diagram of Solenoid Power Supply



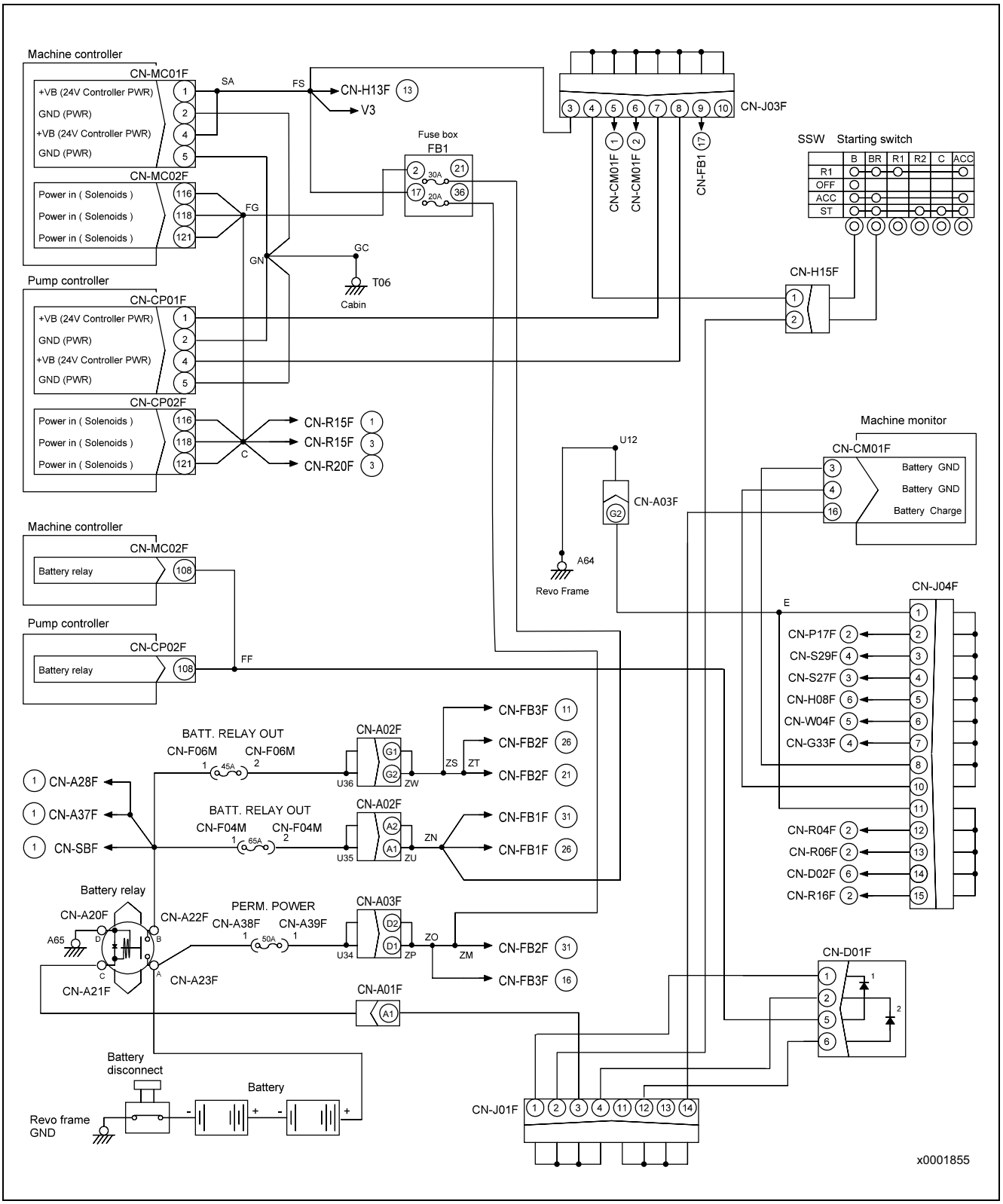

GATEWAY controller
CK05F
AC95
Power IN 24V
Power IN 24V
GND
GND
Key switch (ACC)
YL
N08 (1)
GC
GND-T06
Machine monitor
CM01 (070-18)
VB+(24V)
VB+(24V)
Power GND
Power GND
Key switch (ACC)
2nd engine stop SW
H15
(090-22)
Starting switch
ACC
S24
(SWP-6)
Engine shutdown secondary switch
DOWN
NORMALLY
UP
STOP
YJ
YG
AF
Fuse box
FB1
5A
20A
FS
J03
(J-20) (Grey)
CE02 (5)
N08 (2)
CAB
Pump controller
CP01 (AMP-81)
Power
Power GND
Power
Power GND
Key switch (ACC)
Key switch (ACC)
Key switch (ACC)
Machine controller
MC01 (AMP-81)
Key switch (ACC)
Key switch (ACC)
FL
KomVision controller
CA02 (AMP-40)
Key switch (ACC)
Key switch (ACC)
Power GND
Power GND
Power
Power
V6
V3
ELECTRICAL FILTER 1
PX2F
PX1F
PX3F
PX4F
ELECTRICAL FILTER 2
PY2F
PY1F
PY3F
PY4F
V20
V5
GC
H13
ID-key controller
CD01
Power +24V
ACC Input
GND
T06
x0001849

Circuit Diagram of Engine Controller Power Source

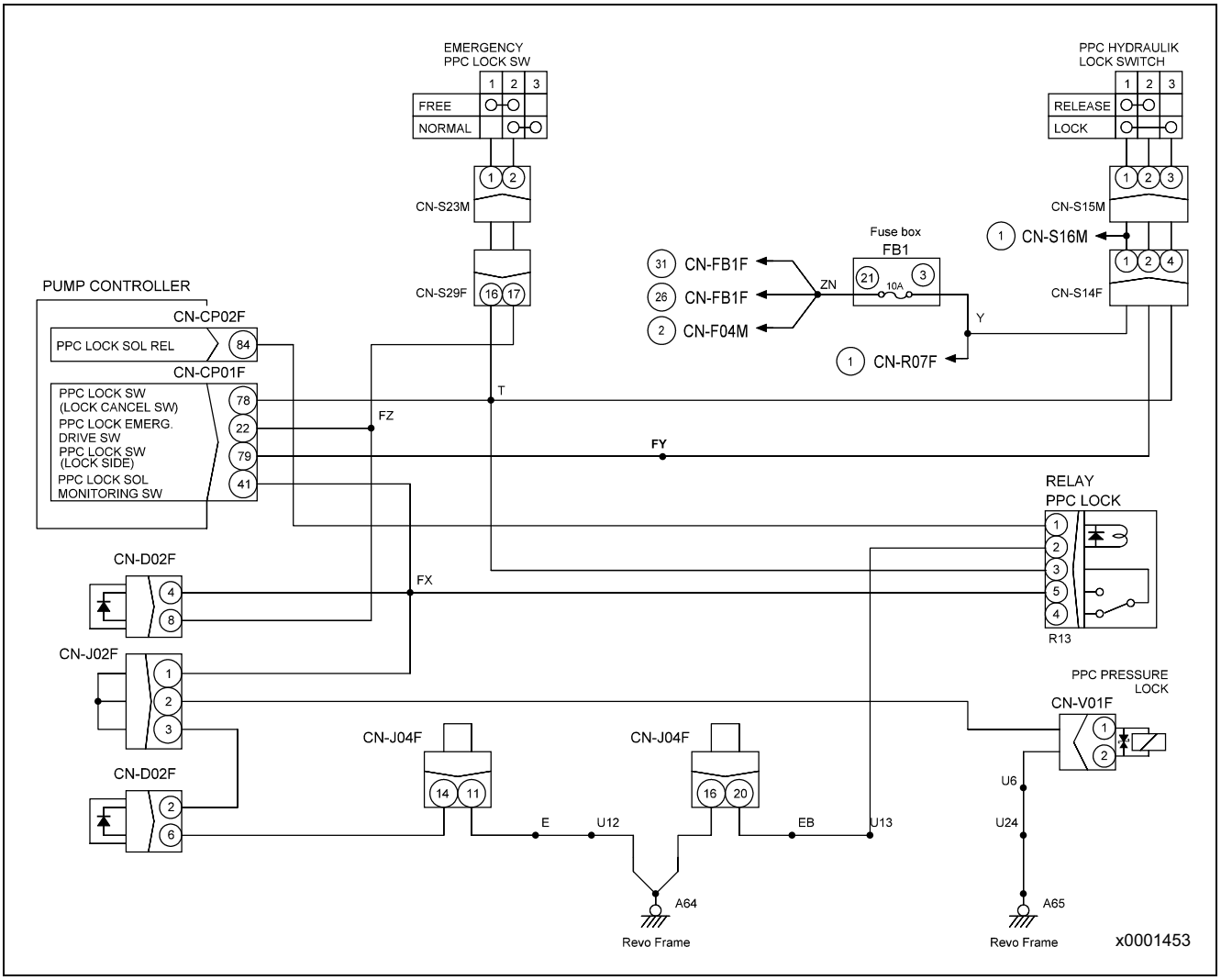


No.	Cause	Procedure, measuring location, criteria and remarks		
3	Defective KomVision controller ACC signal circuit	1. Turn the starting switch to OFF position. 2. Check that system operating lamp is not lit, and then turn the battery disconnect switch to OFF position. 3. Disconnect connector CA02, and connect T-adapter to female side. 4. Turn the battery disconnect switch to ON position. 5. Turn the starting switch to ON position. **REMARK** If there is no failure, troubleshooting for No. 4 is not required.		
		Voltage	Between CA02 (female) (96) and (104)	20 to 30 V*
			Between CA02 (female) (97) and (105)	20 to 30 V*
4	Open circuit in wiring harness	1. Turn the starting switch to OFF position. 2. Check that system operating lamp is not lit, and then turn the battery disconnect switch to OFF position. 3. Remove the fuse No.20 in fuse box FB1. 4. Disconnect the connector CA02, and connect the T-adapter to female side.		
		Resistance	Between CA02 (female) (96) and FB1 -20	Max. 1 Ω
			Between CA02 (female) (97) and FB1 -20	Max. 1 Ω
			Between CA02 (female) (104) and ground	Max. 1 Ω
			Between CA02 (female) (105) and ground	Max. 1 Ω
5	Defective CAN 2 terminating resistor	1. Turn the starting switch to OFF position. 2. Disconnect connectors K48 and K02, and connect T-adapter to each male side.		
		Resistance	Between K48 (male) (A) and (B)	120 ± 12 Ω
			Between K02 (male) (A) and (B)	120 ± 12 Ω
6	Open circuit in wiring harness (CAN 2 communication line)	1. Turn the starting switch to OFF position. 2. Check that system operating lamp is not lit, and then turn the battery disconnect switch to OFF position. 3. Disconnect connectors CA02 and K02, and connect T-adapter to each female side.		
		Resistance	Between CA02 (female) (110) and CM02 (female) (8)	Max. 1 Ω
			Between CA02 (female) (111) and CM02 (female) (9)	Max. 1 Ω
			Between CA02 (female) (110) and K02 (female) (A)	Max. 1 Ω
			Between CA02 (female) (111) and K02 (female) (B)	Max. 1 Ω
7	Ground fault in wiring harness (CAN 2 communication line)	1. Turn the starting switch to OFF position. 2. Check that system operating lamp is not lit, and then turn the battery disconnect switch to OFF position. 3. Disconnect connectors CA02, and CM02, and connect T-adapter to either female side. 4. Disconnect connector, terminal, and fuse of all the devices which branch out connector CA02 (110), and (111).		
		Resistance	Between ground and any of CA02 (female) (110) or CM02 (female) (8)	Min. 1 MΩ
			Between ground and either of CA02 (female) (111) or CM02 (female) (9)	Min. 1 MΩ
8	Hot short circuit in wiring harness (CAN 2 communication line)	1. Turn the starting switch to OFF position. 2. Check that system operating lamp is not lit, and then turn the battery disconnect switch to OFF position. 3. Insert T-adapter into connector K02 or K48. 4. Turn the battery disconnect switch to ON position. 5. Turn the starting switch to ON position. **REMARK** Voltage of CANH and CANL is 2.5 ± 1 V including during communication, so regard wiring harness as normal if measured voltage is 1 to 4 V.		
		Voltage	Between ground and any of K02 (A) or K48 (A)	1 to 4 V
			Between ground and any of K02 (B) or K48 (B)	1 to 4 V

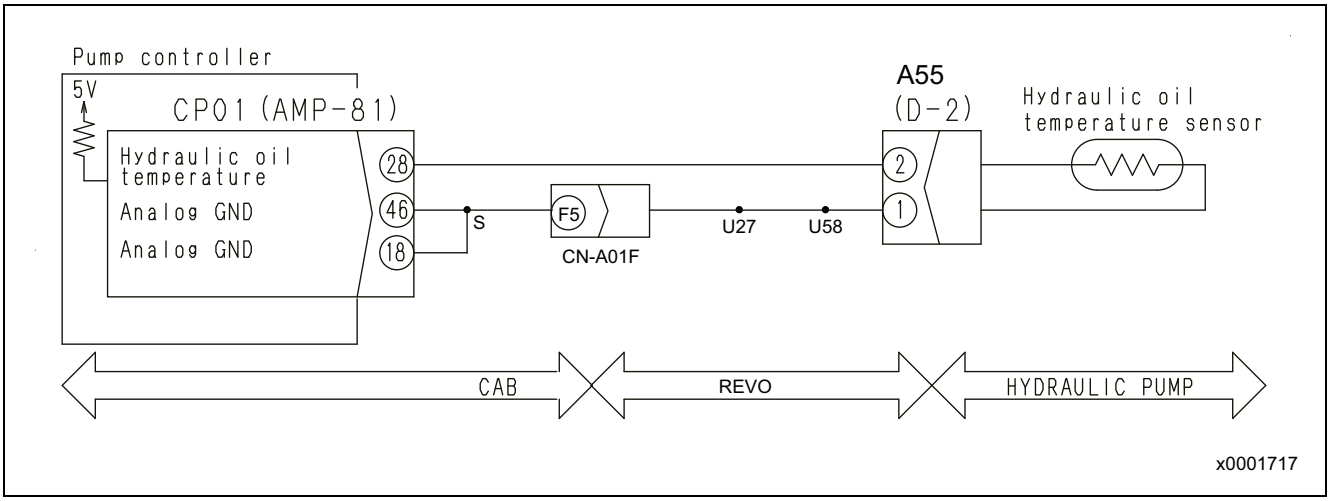
7	Defective machine monitor	If no failure is found by above checks, machine monitor is defective. (Since this is an internal defect, troubleshooting cannot be performed.)



Circuit Diagram of PPC Lock Switch

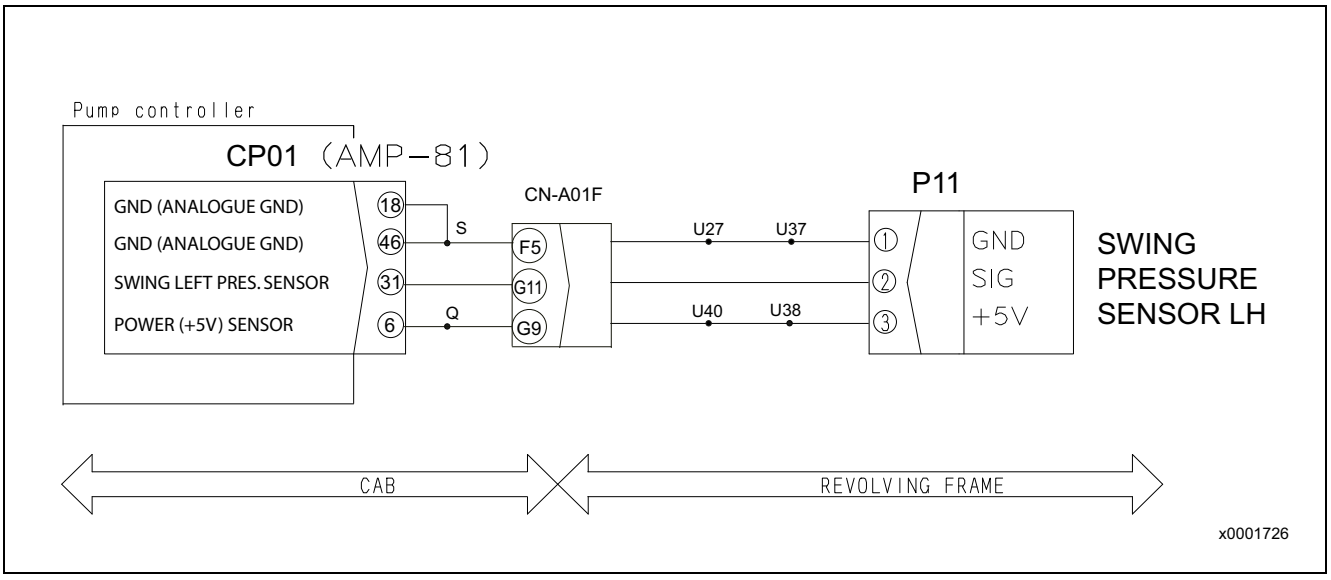


Circuit Diagram of Hydraulic Oil Temperature Sensor

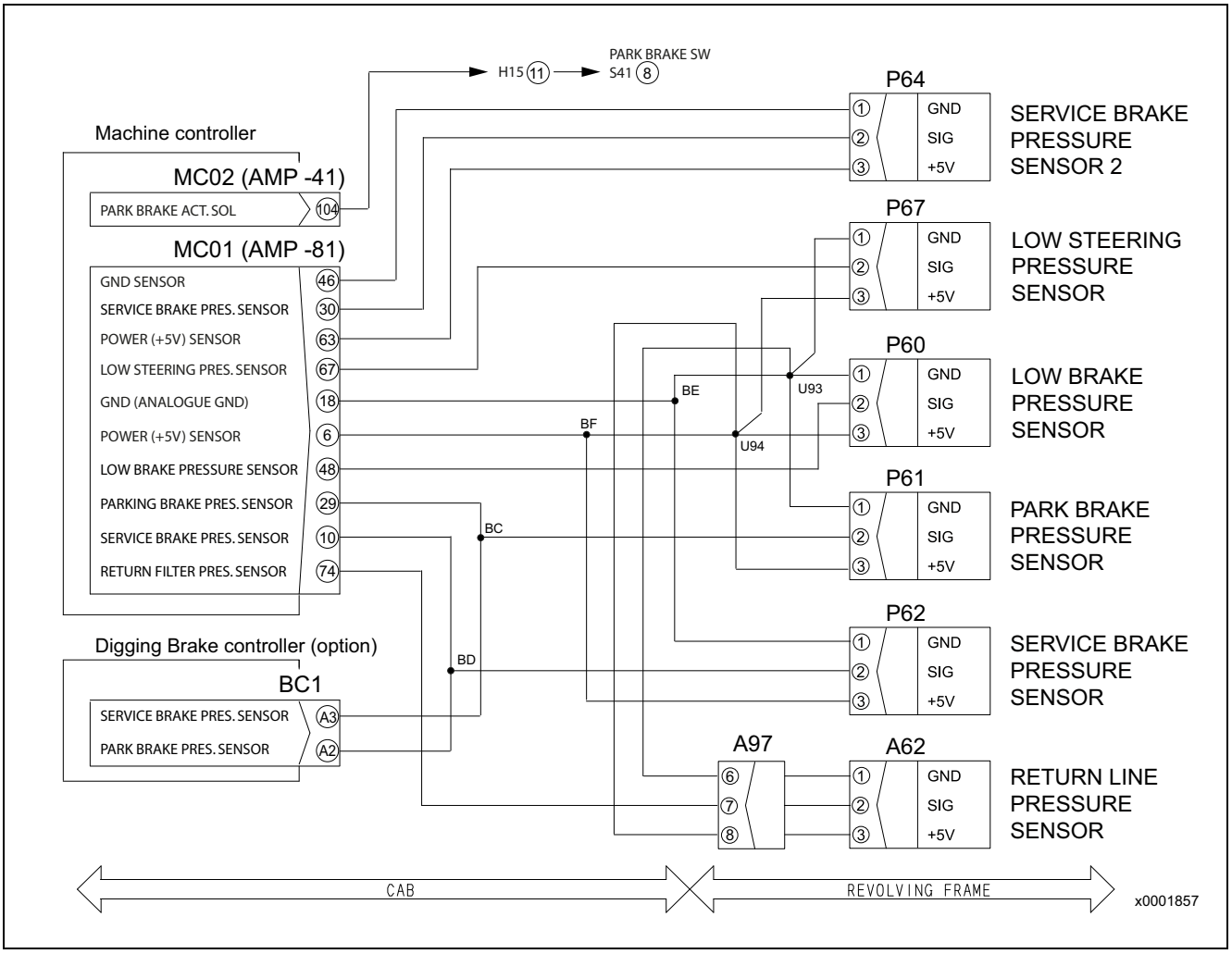


No.	Cause	Procedure, measuring location, criteria and remarks		
4	Ground fault in wiring harness (contact with ground circuit)	1. Turn starting switch to OFF position. 2. Disconnect connectors CP01 and P11, and connect T-adapter to either female side.		
		Resistance	Between ground and CP01 (female) (31) or P11 (female) (2)	Min. 1 MΩ
5	Hot short circuit in wiring harness (contact with 5 V circuit or 24 V circuit)	1. Turn starting switch to OFF position. 2. Disconnect connector P11. 3. Connect T-adapter to female side of connector P11. 4. Turn starting switch to ON position.		
		Voltage	Between P11 (female) (2) and ground	Max. 1 V
6	Defective pump controller	If no failure is found by preceding checks, pump controller is defective. (In case of an internal defect, troubleshooting is impossible as an assembly. Replace whole assembly).		

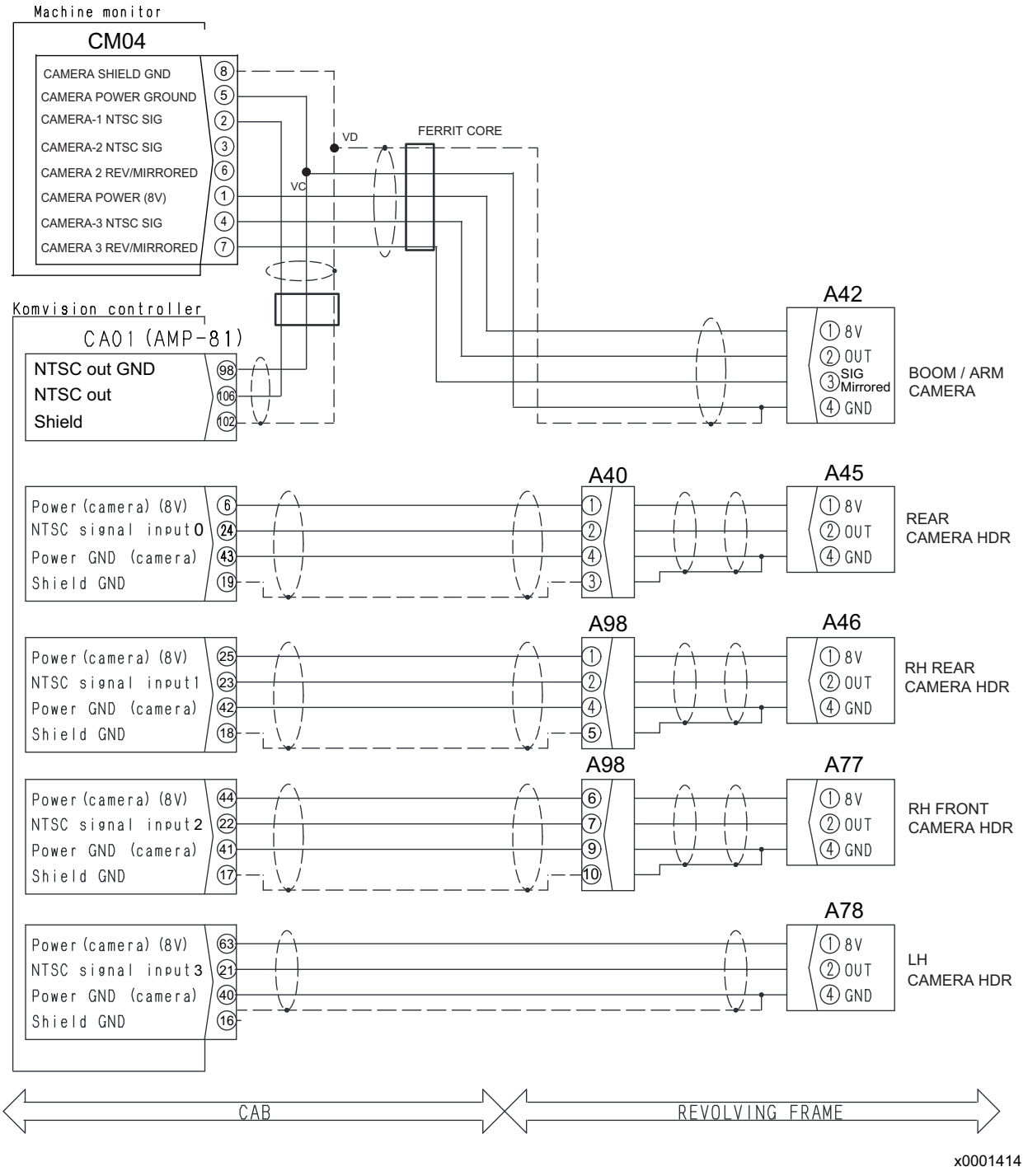
Circuit Diagram of Swing LEFT PPC Pressure Sensor



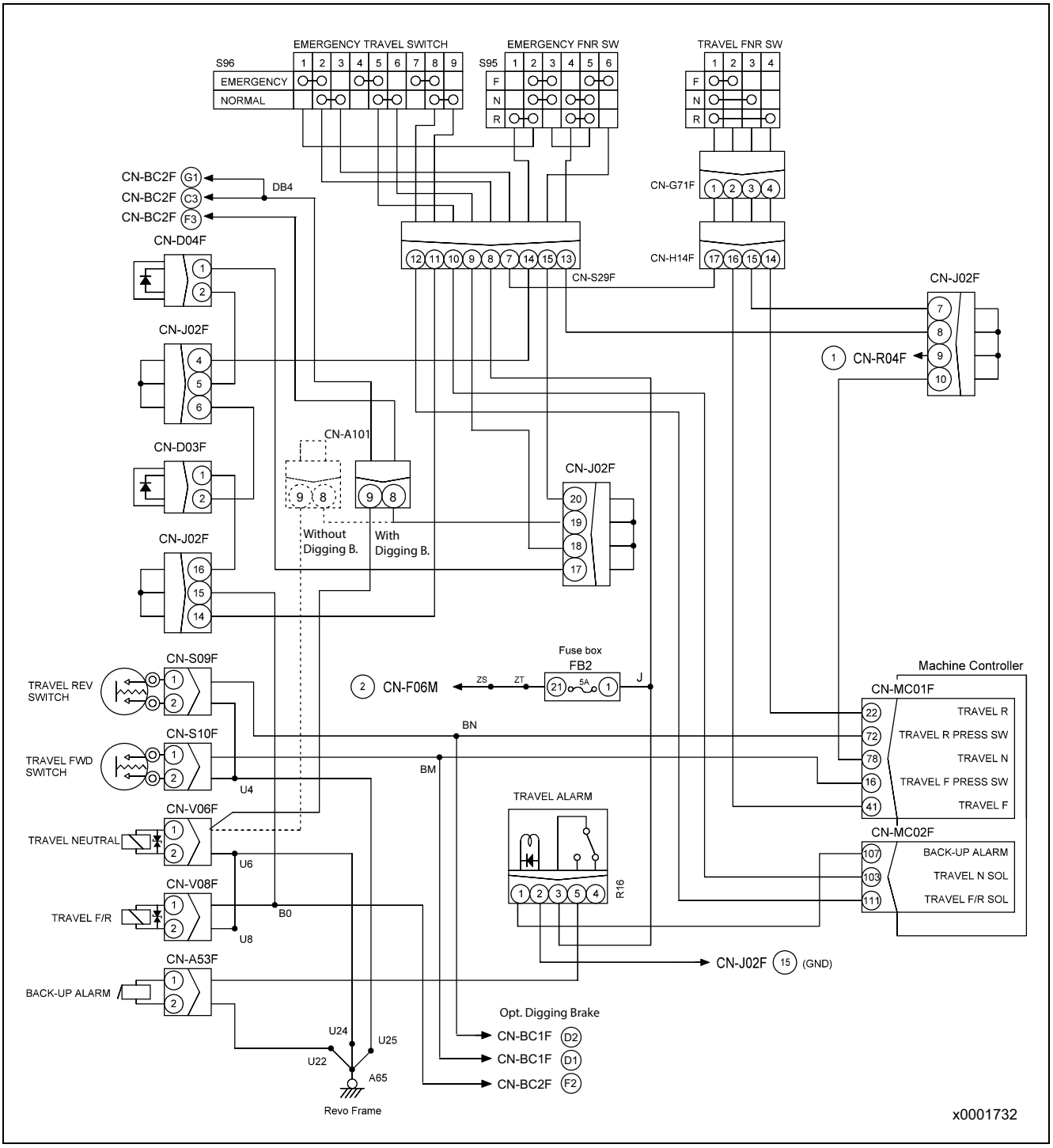
Circuit Diagram of Parking Brake Press Sensor



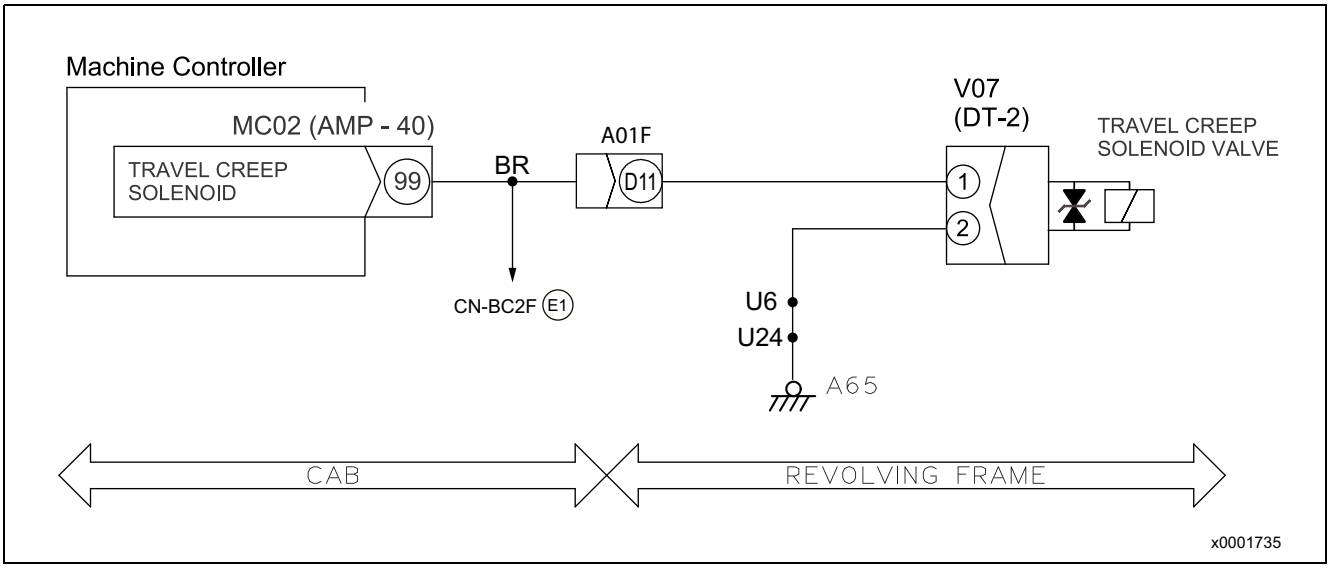
Circuit Diagram of Camera Power Supply



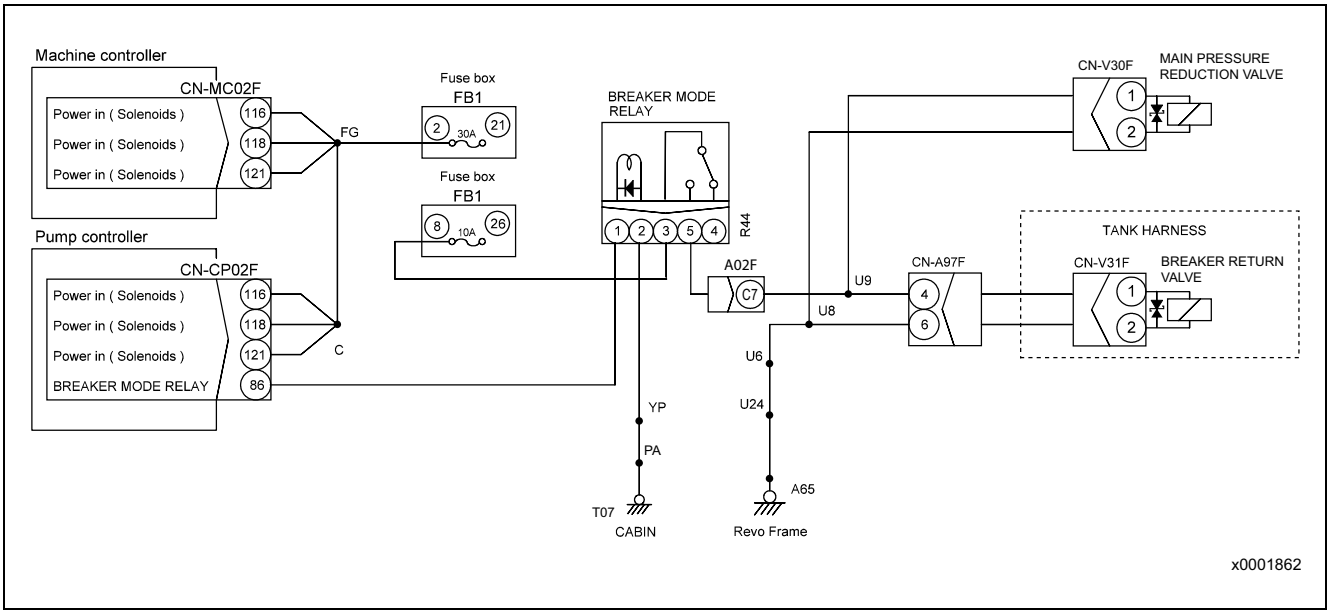
Circuit Diagram of Travel F/R Solenoid



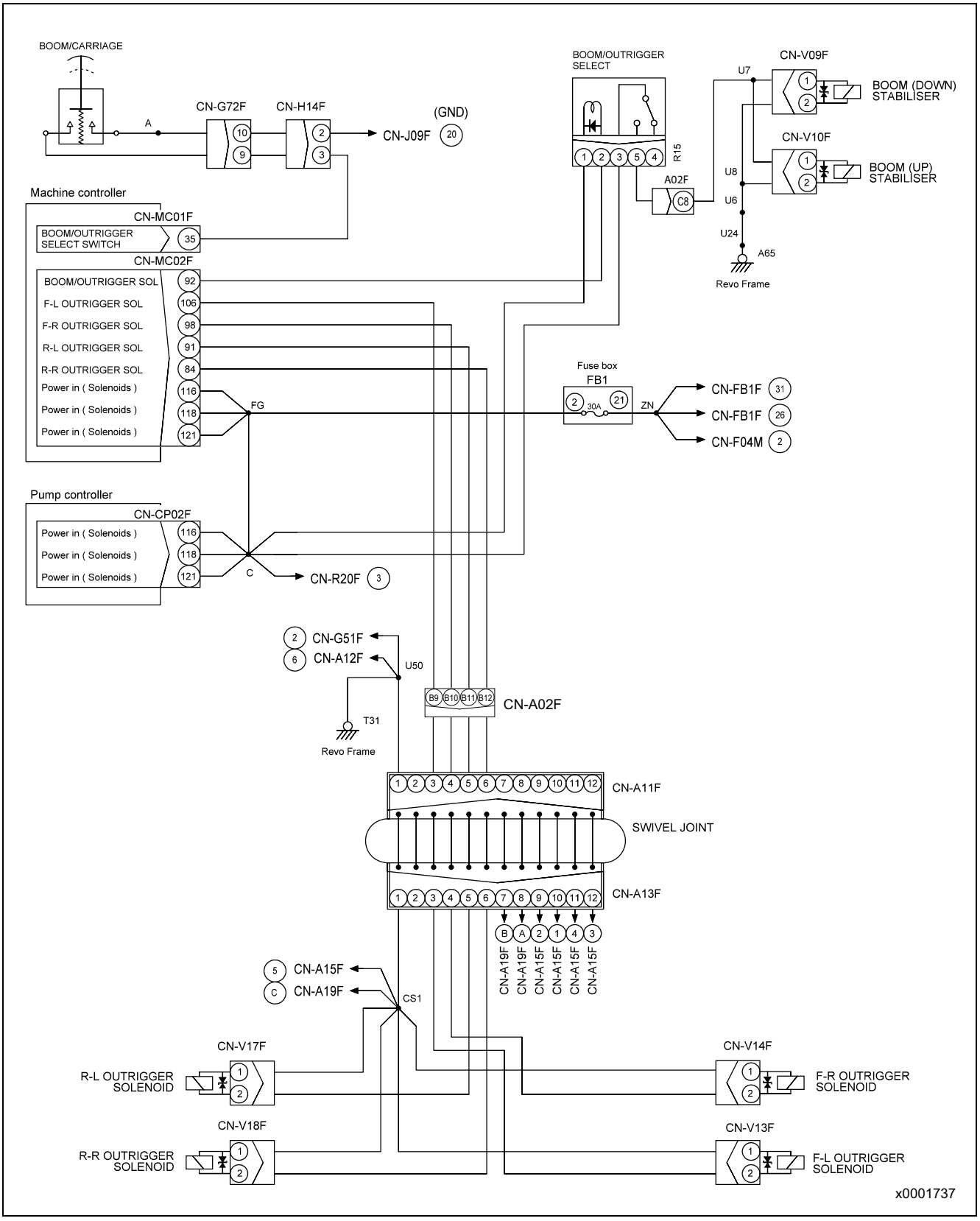
Circuit Diagram of Creep Solenoid



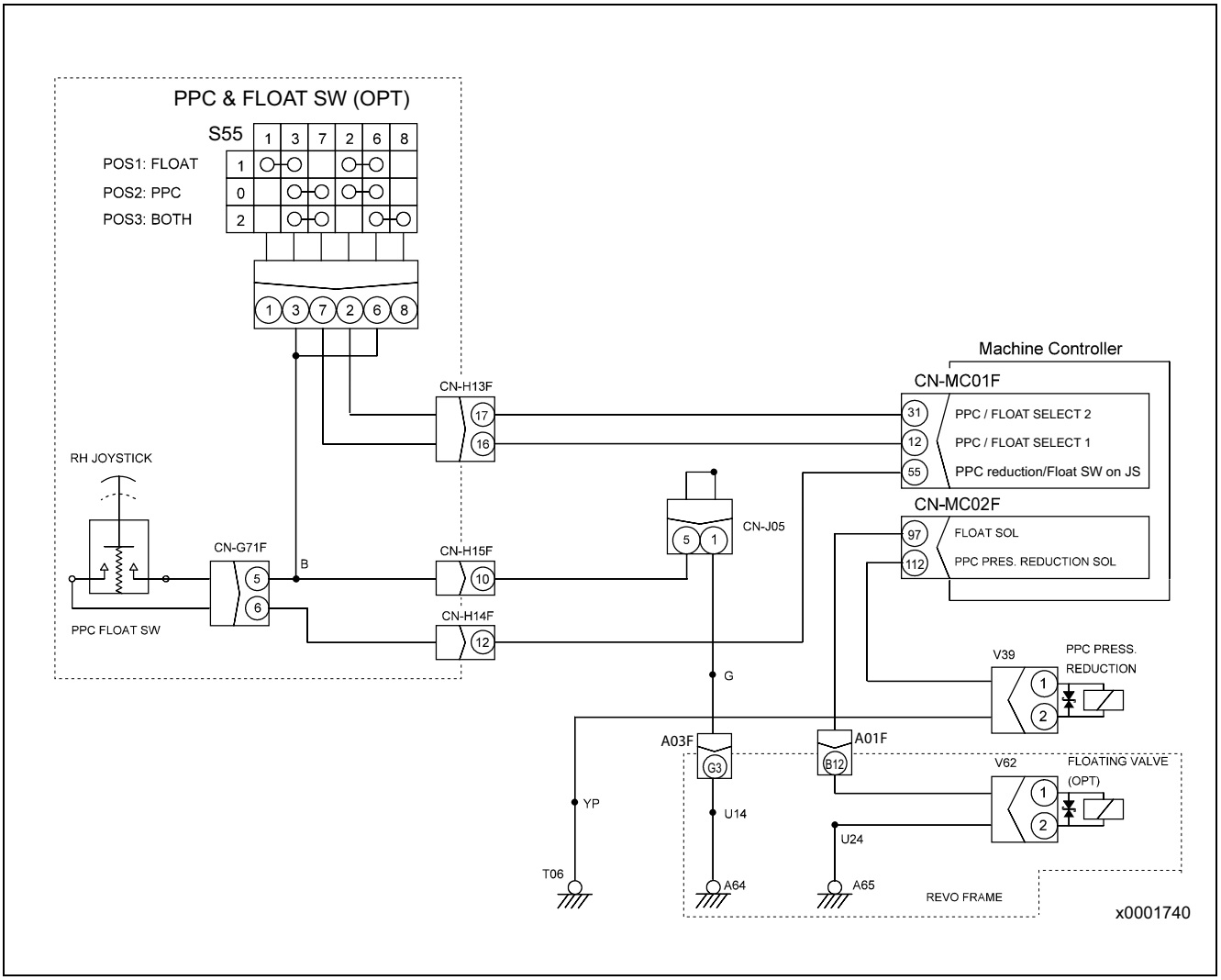
Circuit Diagram of Breaker Mode Relay



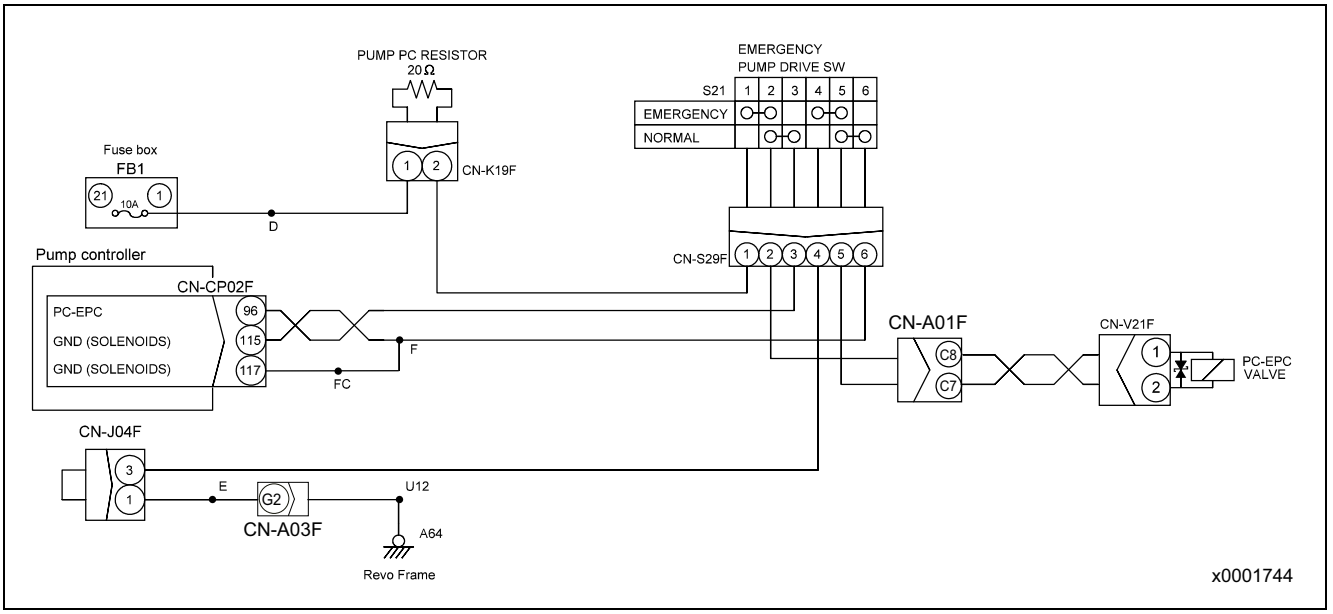
Circuit Diagram of 4th Outrigger Solenoid



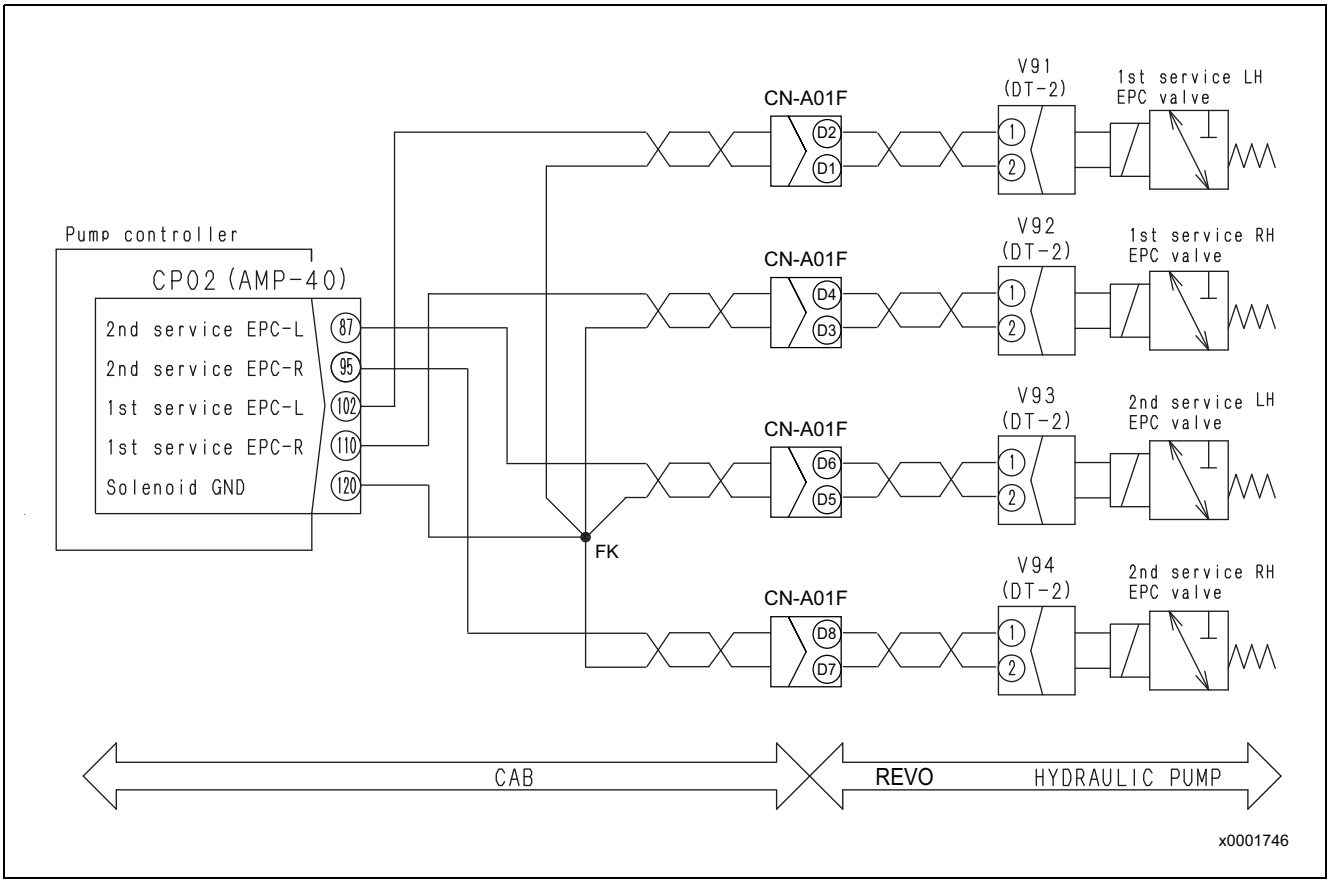
Circuit Diagram of PPC Reduction



Circuit Diagram of PC-EPC Solenoid System

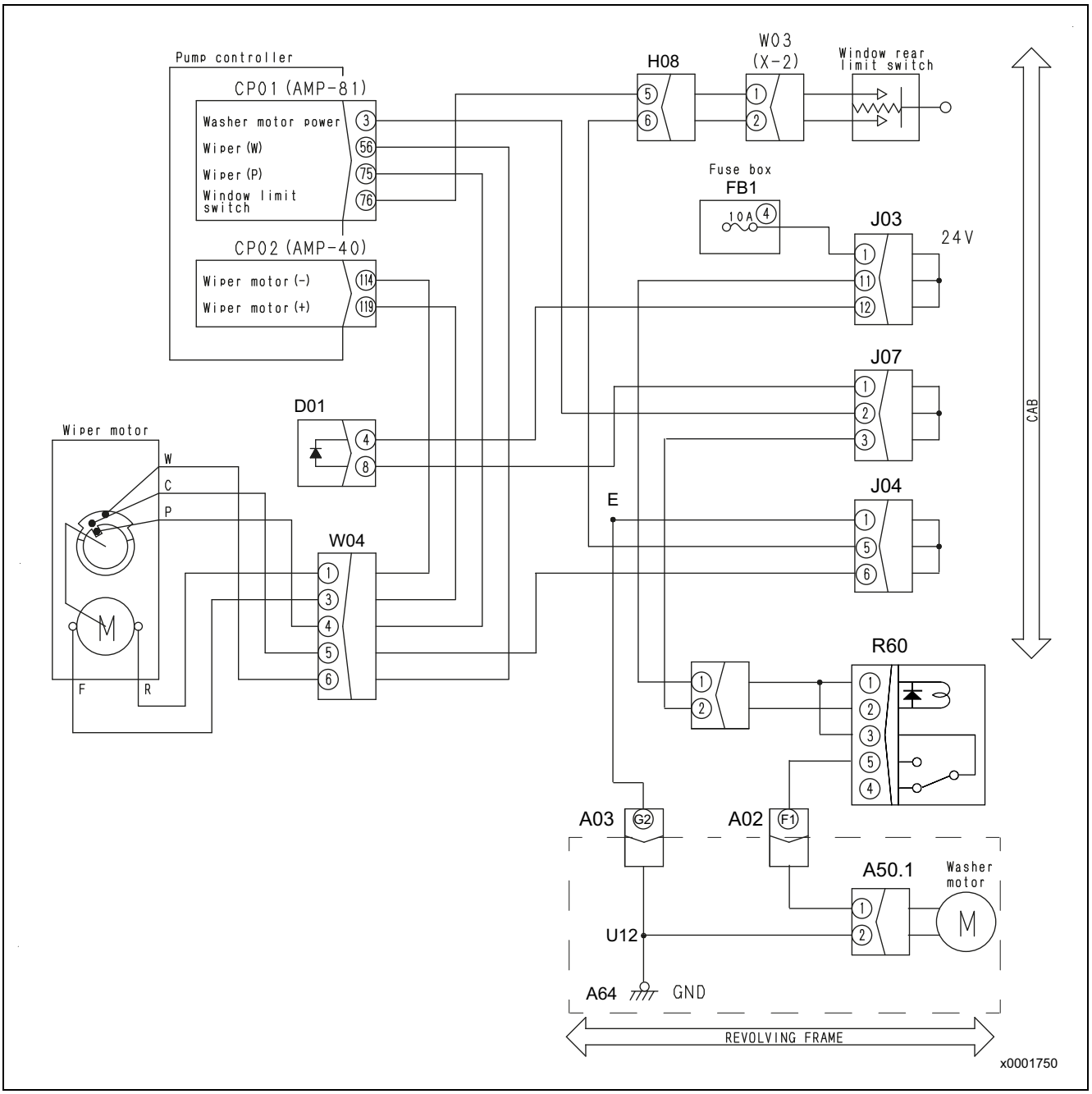


Circuit Diagram of ATT Flow Rate Adjustment EPC



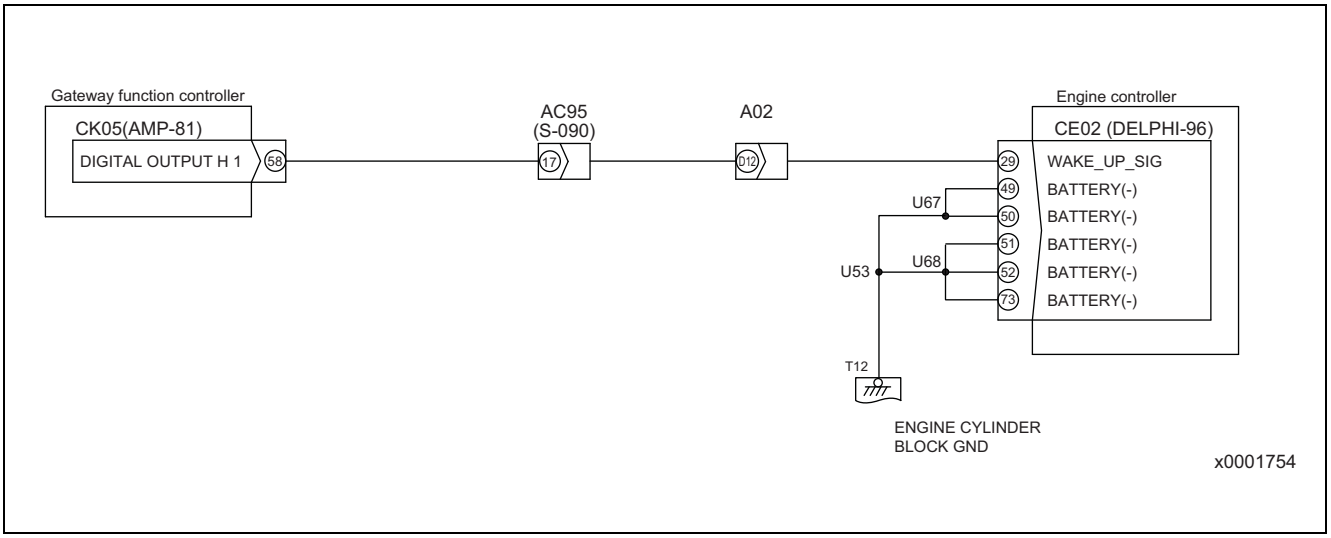
No.	Cause	Procedure, measuring location, criteria and remarks		
6	Hot short circuit in wiring harness (Contact with 24 V circuit)	1. Turn starting switch to OFF position. 2. Disconnect connectors CP01 and A50, and connect T-adapter to female side of CP01. 3. Remove fuse No. 4. 4. Turn starting switch to ON position. **REMARK** Ignore failure codes displayed on machine monitor.		
		Voltage	Between CP01 (female) (3) and ground	Max. 1 V
7	Defective pump controller	If no failure is found by preceding checks, pump controller is defective. (In case of an internal defect, troubleshooting is impossible as an assembly. Replace whole assembly).		

Circuit Diagram of Windshield Washer Drive System

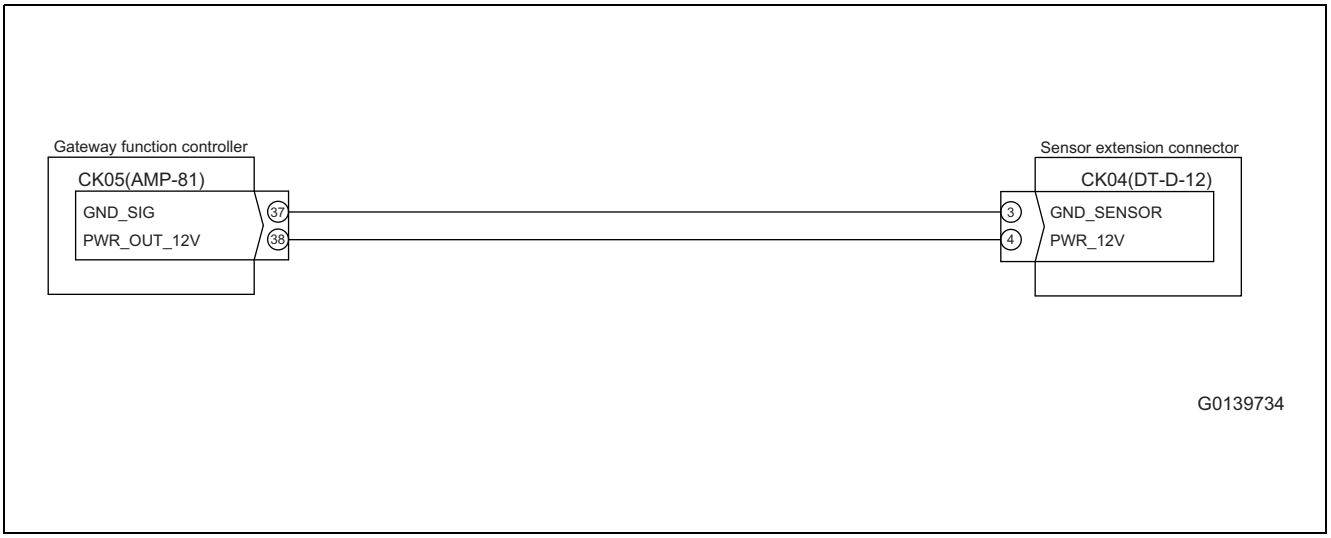


No.	Check item	Procedure of troubleshooting	Judgment and remedy	
5	Confirmation of check results	1. Do the troubleshooting above again. 2. Can you find the cause by the check?	YES	The repair is done.
			NO	• The gateway function controller can be defective. • Replace the gateway function controller. • Go to "Confirmation of repair".
6	Confirmation of repair	1. Turn the starting switch to the OFF position. 2. Connect all the component parts. 3. Turn the starting switch to the ON position. Then, do the troubleshooting. 4. Is this failure code shown?	YES	Go back to the first check item.
			NO	The repair is done.

Circuit Diagram of Gateway Function Controller



Circuit Diagram of Gateway Function Controller



S-2 Engine Cranks but No Exhaust Smoke 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.	Refuelling
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	Fuel leakage at Injector and inlet connector	Return rate from injector is high. (See TESTING AND ADJUSTING, “METHOD FOR TESTING FUEL DISCHARGE, RETURN AND LEAKAGE”)	Tighten or replace inlet connector
7	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
8	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
9	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
10	Defective priming pump	Priming pump has no or heavy resistance to operation.	Priming pump replacement
11	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.

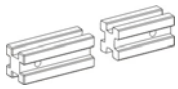
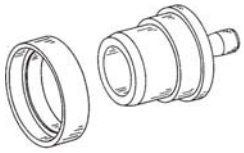
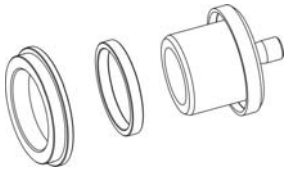
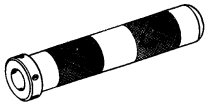
S-23 White Smoke is Exhausted During Active Regeneration

Failure	White smoke is exhausted during active regeneration.
Related information	• White smoke may be discharged for a short time just after the engine is started or during the regeneration in the cold season, but this is not trouble. • If any failure code is displayed, perform troubleshooting for that code first.

No.	Cause	Point to check, remarks	Remedy
1	Coolant leakage to exhaust system	Check for lowering of coolant level.	Do the troubleshooting for “WATER MIXES INTO ENGINE OIL (MILKY)” in S-mode.
2	Blocked KDOC caused by coolant leakage to exhaust system	If white smoke emission does not become correct after corrective measures for cause 1, KDOC is in a state of face plugging.	Replace KDPF
3	Use of fuel other than specified one	Fuel other than specified one is used.	Use recommended fuel specified in the Operation and Maintenance Manual.
4	Deteriorated KDOC by use of fuel other than specified one	Deteriorated KDOC by high sulfur content (If the check result does not agree with cause 1 to 3 and white smoke emission does not become correct, KDOC is deteriorated.)	Replace KDPF
5	Blocked KDOC	If the check result does not agree with cause 1 to 4 and white smoke emission does not become correct, KDOC is in a state of face plugging.	Clean KDOC
6	Coolant enters into DEF tank	Check that DEF in the tank is not colored in blue. (Make sure that coolant is not mixed in.)	• Replace heating pipe • Clean DEF hose • Replace DEF pump • Replace DEF injector • Replace SCR

SPECIAL TOOLS FOR DISASSEMBLY AND REASSEMBLY

MS-E 3050 / 3060 / 3070 II
4472 097 200 / 4472 098 200 / 4472 099 201

Cons. No.	Figure	Designation Order no.	Qty.	Chapter/ Figure
31		**Straightedge** **5870 200 022**	1	6/17 6/18 7/42
32		**Driver tool** **5870 048 286**	1	6/28
33		**Driver tool** MS-E 3050 **5870 055 081**	1	7/1 7/3 7/8 7/10
34		**Driver tool** MS-E 3060/3070 **5870 055 090**	1	7/1 7/3 7/8 7/10
35		**Handle** **5870 260 002**	1	7/1 7/3 7/5 7/8 7/10

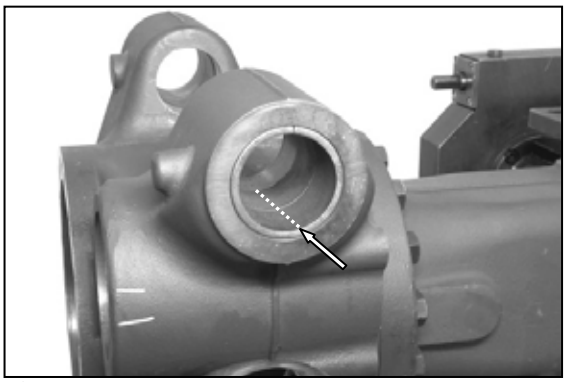


Figure 13

If necessary, provide bushings with a separating slot (see arrow) and remove from holes.

☞ **Bushings are destroyed by this!**

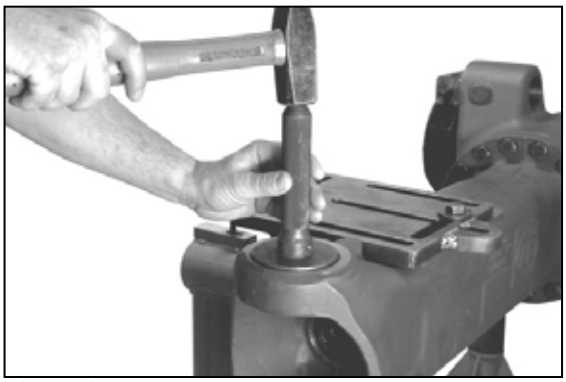


Figure 5

Insert both bearing outer rings into the pivot bearing holes of the axle housing.

MS-E 3050	
(S) Driver tool	5870 058 058
(S) Handle	5870 260 002
MS-E 3060	
(S) Driver tool	5870 058 022
(S) Handle	5870 260 002
MS-E 3070	
(S) Driver tool	5870 058 078
(S) Handle	5870 260 002

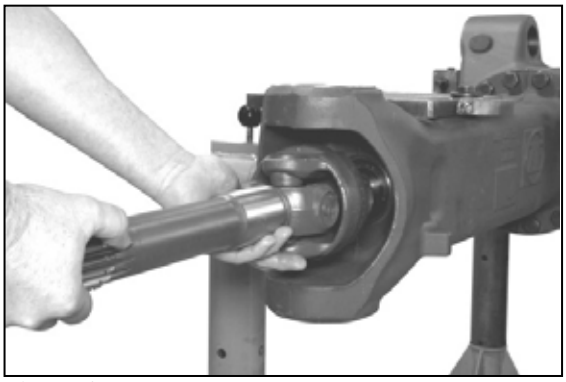


Figure 6

Install the u-joint shaft – by inserting the u-joint shaft into the axle bevel gear teeth.

⚠ **Pay attention to shaft seal ring in the axle housing – risk of damage!**

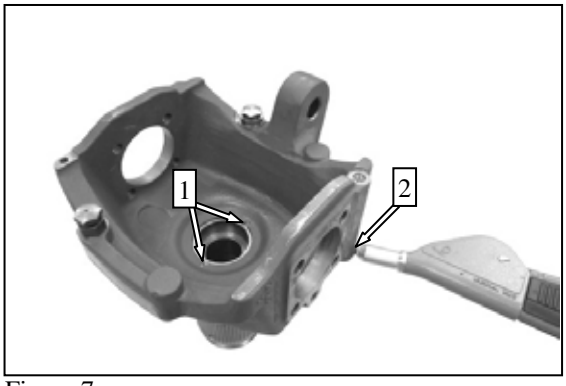


Figure 7

7.2 Reassembly knuckle housing (Pivot bearing-SET-RIGHT)

Seal machining openings of oil supply holes – position 1 (MS-E 3050/3060/3070) and 2 (only version MS-E 3060) with plugs.

(S) Lever riveting tongs	5870 320 016

☞ **Operation is only required when using a new knuckle housing!**


Figure 8

Insert bushing into the hole of the knuckle housing – considering the installation dimension „B“ and installation position „Y“ (see also sketch 9 and 11).

MS-E 3050	
(S) Driver tool (MS-E 3050)	5870 055 081
S) Handle	5870 260 002
MS-E 3060/3070	
(S) Driver tool (MS-E 3060/3070)	5870 055 090
(S) Handle	5870 260 002

REPAIR MANUAL
ZF - Multitrac
MT-E 3050/3060/3070 II

I M P O R T A N T I N F O R M A T I O N :

Due to the great variety of ZF units it is necessary to limit disassembly and reassembly manuals to a current ZF production unit. Continuous technical upgrading of the ZF units and extensions concerning design options may require differing steps, which can be carried out by qualified specialists without greater difficulties by means of the perspective views included in the corresponding spare parts lists.

This disassembly and reassembly manual is based on the design level of a ZF production unit at the time of issue of the manual.

ZF Friedrichshafen AG reserves the right to replace this disassembly and reassembly manual by a successive edition at any time without advance notice. Upon request, ZF Friedrichshafen AG will advise which edition is the latest one.

Any maintenance work is to be done in accordance with ZF's Operating Instructions (ZF Order No: 5871 565 902) and ZF's List of Lubricants TE-ML 05!

The ZF list of lubricants is being continuously updated and can be obtained or viewed as follows:
- In all ZF-plants
- In all ZF-service organizations
- Internet **www.zf.com**

CAUTION:
For the installation as well as for the commissioning of the unit, the Instructions and Specifications of the Vehicle Manufacturer have to be observed!

ZF Friedrichshafen AG
ZF Services
Donaustr. 71
D - 94034 Passau

Design level 2008/05
5. Edition 2016/01

COMMERCIAL TOOLS FOR DISASSEMBLY AND REASSEMBLY

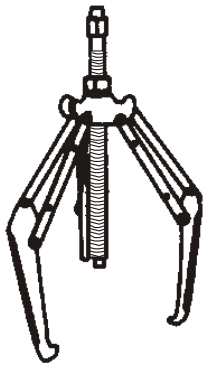
Cons. No.	Figure	Designation Order no.	Qty.	Chapter/ Figure
18		**Three armed puller** **5870 971 001** Jaw width 85 mm Throat depth 65 mm **5870 971 002** Jaw width 130 mm Throat depth105 mm **5870 971 003** Jaw width 230 mm Throat depth150 mm **5870 971 004** Jaw width 295 mm Throat depth235 mm **5870 971 005** Jaw width 390 mm Throat depth230 mm **5870 971 006** Jaw width 640 mm Throat depth290 mm	1	Universal

Figure 27

Heat both bearing inner rings and mount them.

Adjust bearing inner rings after cooling-down!

Wear protective gloves!

ZF – HYDROSTATIC POWERSHIFT

TRANSMISSION

2 HL-250/270/290

5871.042.002 de

1. Separate HL-TRANSMISSION from AXLE HOUSING

(only for version „Axle attachment“)

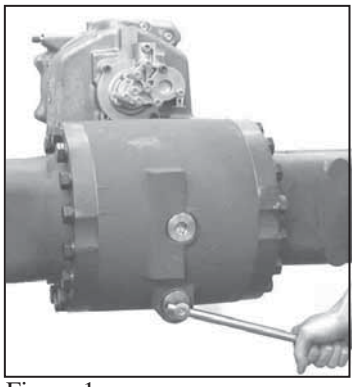


Figure 1

Drain oil from axle housing – use a suitable oil reservoir.

(S) Assembly truck	5870 350 000
(S) Clamping fork	5870 350 106

Waste oil to be disposed of ecologically!

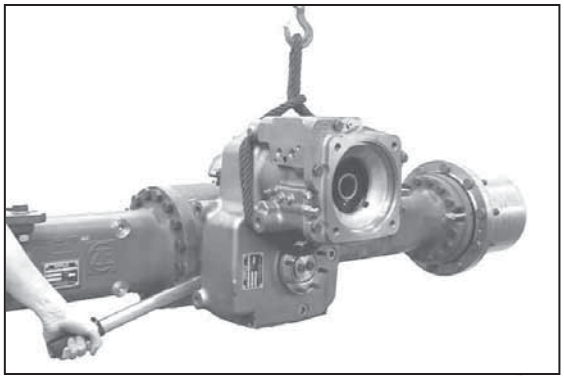


Figure 2

Pick-up HL-Transmission by means of lifting tackle, loosen threaded joint and separate complete HL-Transmission from axle housing.

(S) Lifting strap	5870 281 026

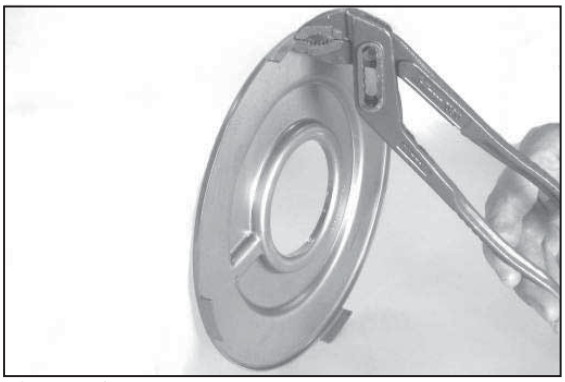


Figure 16

Bend edges of fixing straps of oil screen sheet slightly – assembly aid (sheet is fixed to bearing cover – see Fig. no. 17).

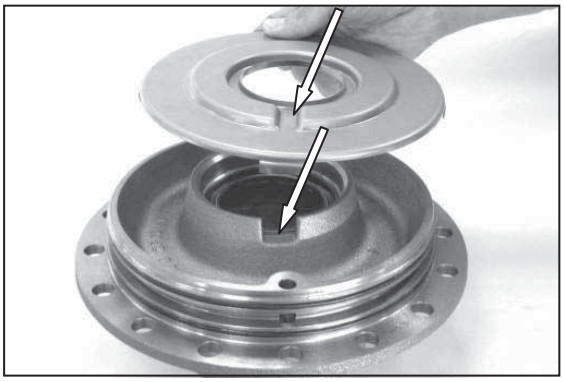


Figure 17

Mount oil screen sheet on bearing cover.

☞ **Pay attention to installation position – place locating tab of oil screen sheet into recess of bearing cover (see arrow)!**

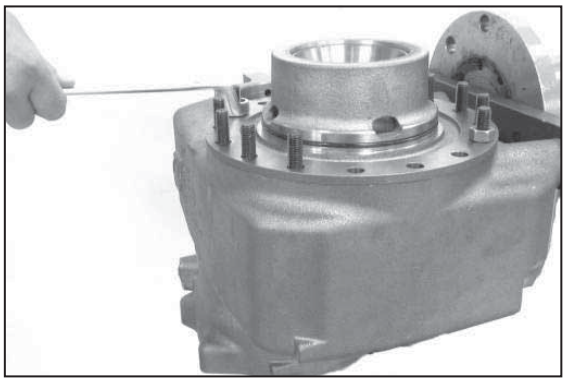


Figure 18

Mount preassembled bearing cover and locate equally with hexagon nuts until contact is obtained.
Then remove hexagon nuts again.

☞ **Oil contact face/oil screen sheet/housing (assembly aid).**

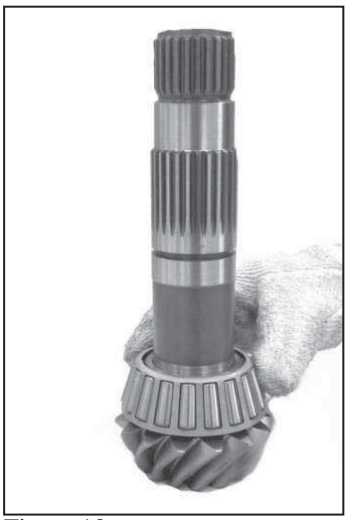


Figure 19

Install heated bearing inner ring until contact is obtained.

☞ **Adjust bearing inner ring after cooing down!**

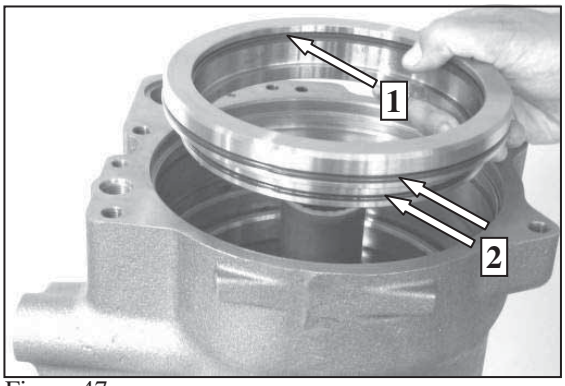
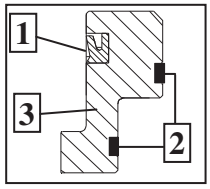


Figure 47

Oil sealing surfaces in housing and sealing elements.

Insert seal (1) with sealing lip showing to oil sump – also see detail sketch.



Put both O-rings (2) into annular grooves of pressure ring (3) and insert preassembled pressure ring into housing.


Figure 48

Bring pressure ring with driver tool into contact position.

(S) Driver tool 5870 506 161

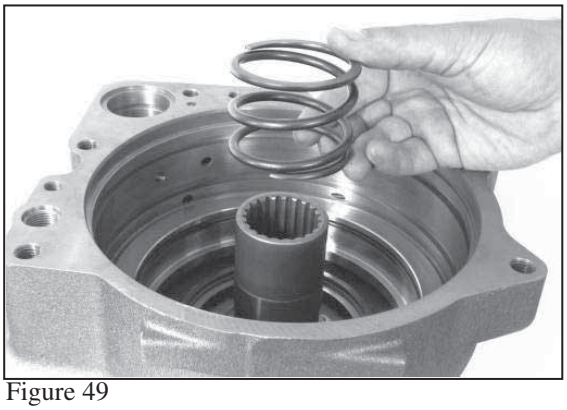


Figure 49

Insert compression spring until contact is obtained.

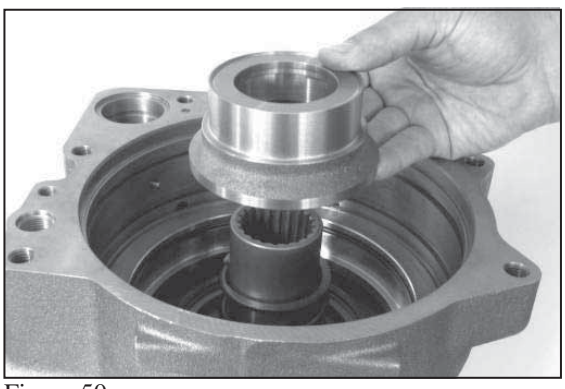


Figure 50

Insert pressure piece over compression spring until contact is obtained.

8. REASSEMBLY SHIFT INTERLOCK

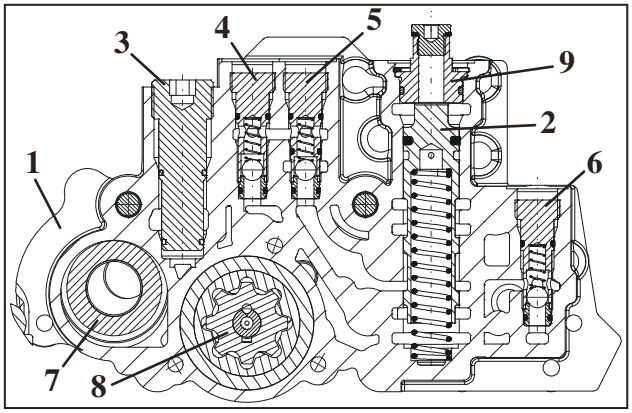


Figure 1

Legend to sketch no. 1:

1 = Housing
2 = Shift piston
3 = Pressure relief valve
4 = Check valve (008)
5 = Check valve (009)
6 = Check valve (010)
7 = Filter
8 = Lubrication pump
9 = Plug

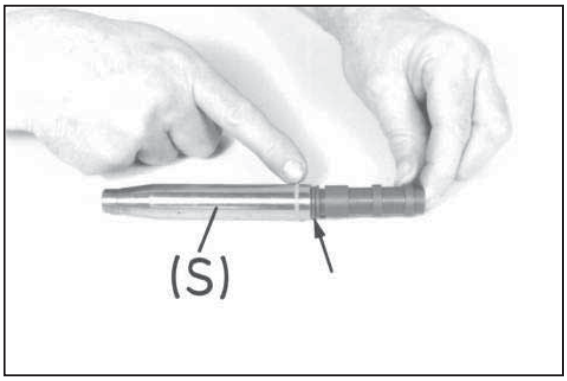


Figure 2

Put O-ring (see arrow) into annular groove of piston.

Lead plastic ring by means of inner installer (S) over piston and position it at O-ring.

(S) Inner installer 5870 651 055

☞ **Seal consists of plastic ring and O-ring (see Figure no. 2 …. 3).**

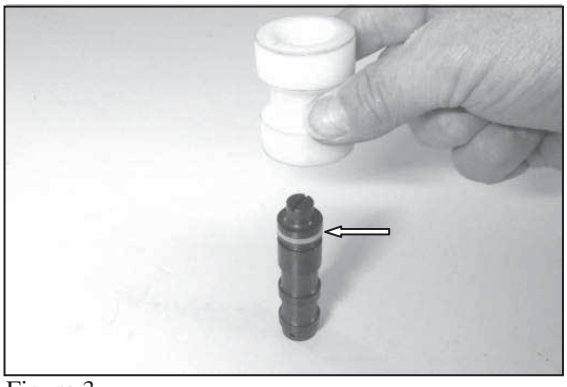


Figure 3

Center plastic ring (see arrow) with calibrating mandrel.

(S) Calibrating mandrel 5870 651 056

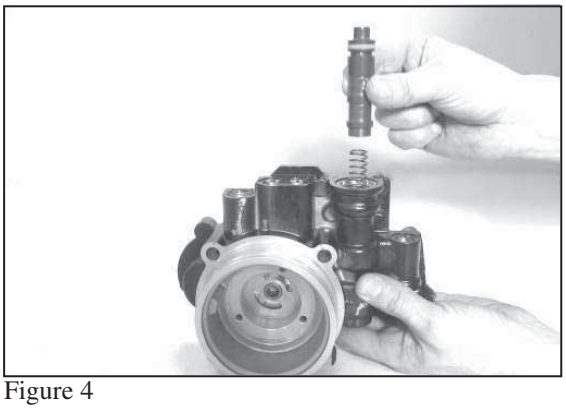
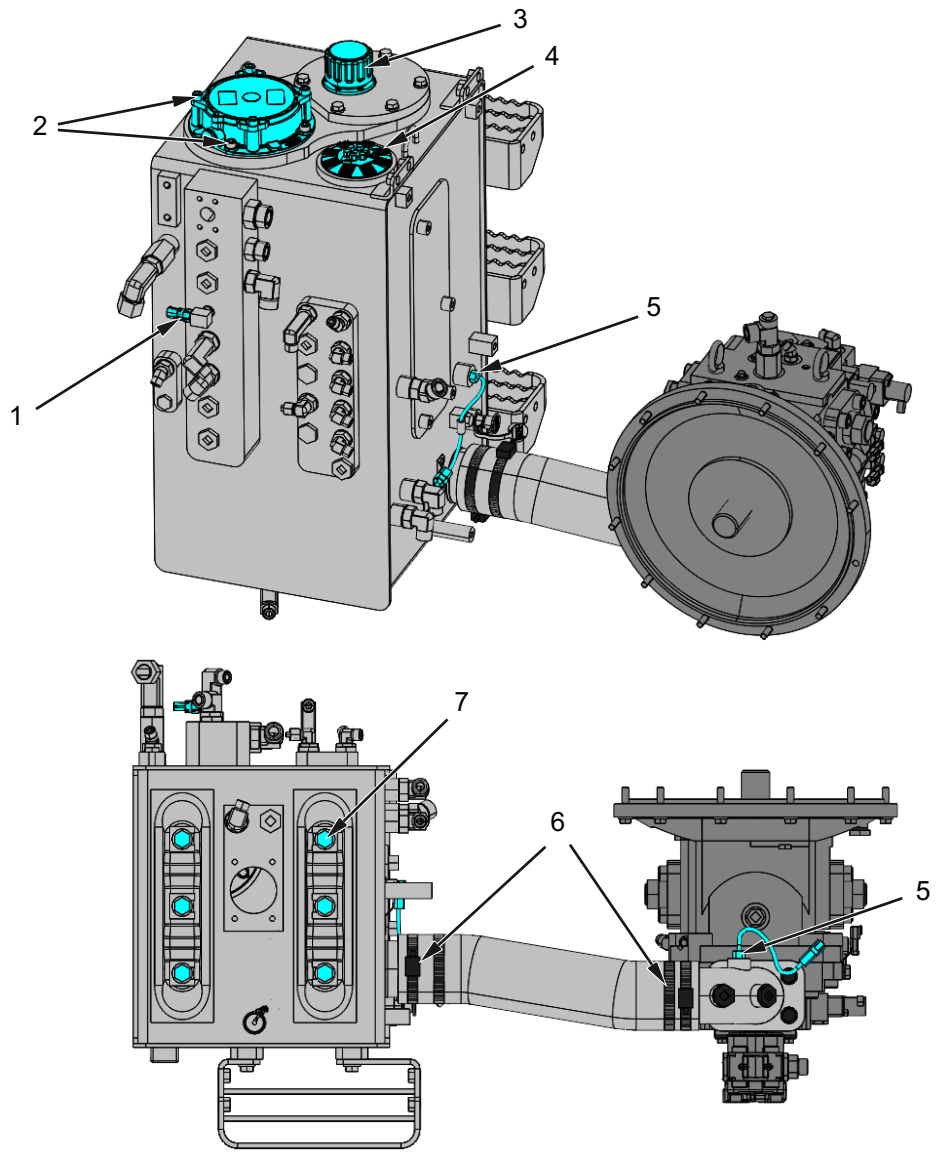


Figure 4

Insert compression spring, oil preassembled piston and install.

Hydraulic System

Maintenance Standard of Hydraulic Tank



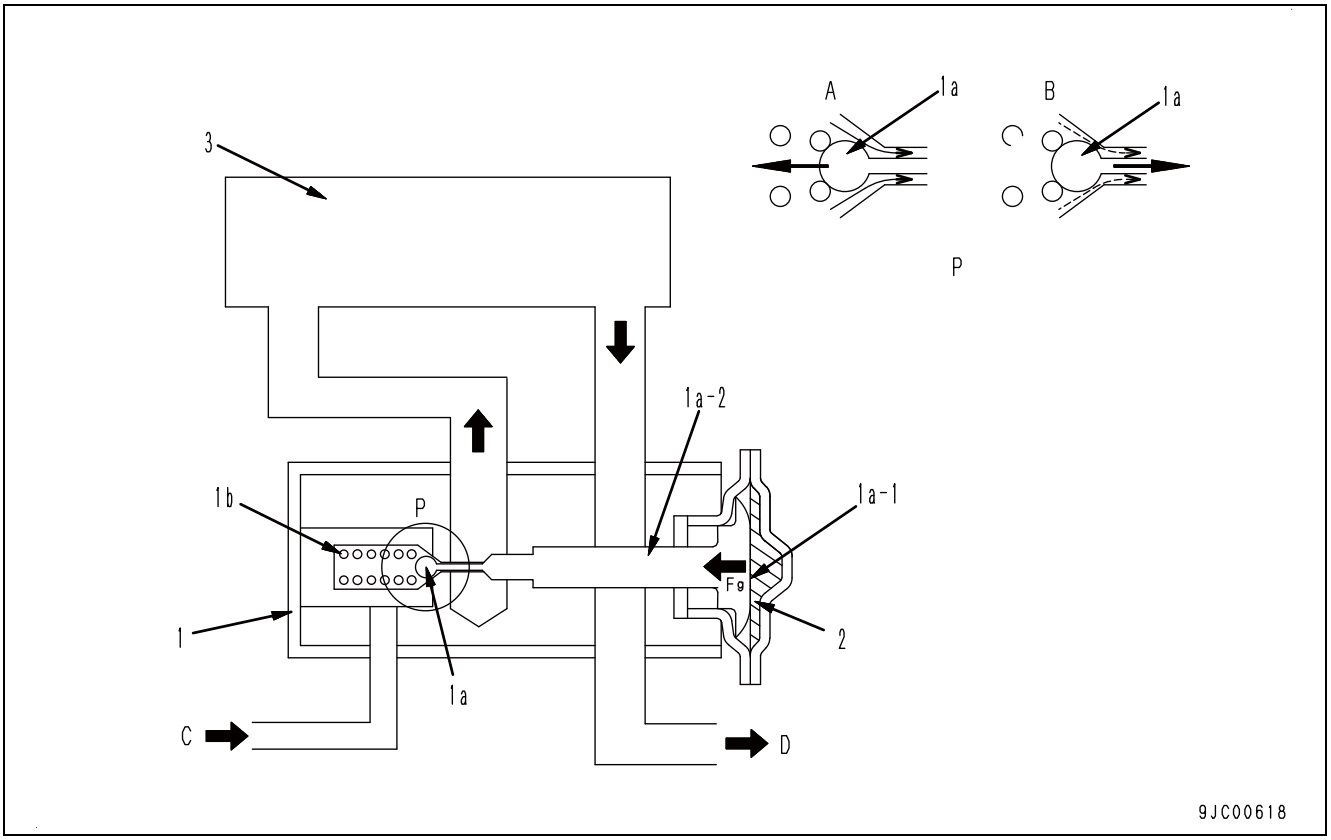
No.	Item	Criteria
1	Tightening torque	8 ~ 9 Nm
2	Tightening torque (8x)	25 ~ 30 Nm
3	Tightening torque	max. 2 Nm
4	Tightening torque	30 Nm
5	Tightening torque	29 ~ 49 Nm
6	Tightening torque (4x)	8 ~ 9 Nm
7	Tightening torque (6x)	235 ~ 285 Nm

Unit: mm

Dimension		PW168-11 arm size		
		2,100	2,500	3,000
1		Ø70 $^{+0.1}_{0}$		
2		81.5 $^{+1.0}_{0}$		
3		226 $^{+0.2}_{-0.7}$		
4		Ø70 $^{+0.29}_{+0.07}$		
5		293.9±1.0	275.7±2.0	291.7±2.0
6		199.7±1.0	199.7±1.0	219.8±1.0
7		635.0±0.5	635.0±0.5	632±1.0
8		2,125.5	2,492.2	2,992
9		1810±1	2,100±1.5	2,100±1.5
10		290±0.5		
11		493±0.2		
12		422±0.2		
13		depending on equipped bucket		
14		Ø60 $^{-0.030}_{-0.080}$		
15		259 $^{0}_{-1.0}$		
16		Ø60 $^{-0.030}_{-0.080}$		
17	arm as individual part	226 $^{0}_{-0.5}$		
	when pressfitting bushing	258 $^{+1.0}_{-1.5}$		
18	min.	1,378±2.0		
	max.	2,263		

Structure of Expansion Valve as Air Conditioner Unit Component

Route diagram



A: When evaporator outlet temperature is high
B: When evaporator outlet temperature is low
C: From condenser (high-pressure refrigerant)
D: To compressor (Low-pressure refrigerant)
1: Expansion valve
1a: Needle valve
1a-1: Diaphragm
1a-2: Thermoprobe
1b: Spring
2: Refrigerant gas
3: Evaporator

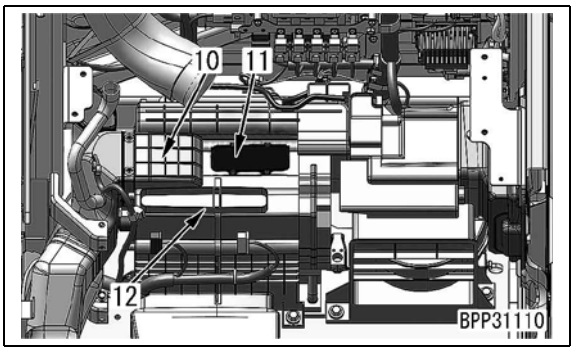
Structure

- Box-type expansion valve (1) consists of needle valve (1a), spring (1b), etc.
- The diaphragm chamber (hatched area) on the outside of diaphragm (1a-1) of needle valve (1a) is filled with refrigerant gas (2).

Function of Expansion Valve as Air Conditioner Unit Component

- Expansion valve (1) converts the high-pressure and high-temperature liquid refrigerant sent from the receiver drier into low-pressure and low-temperature misty refrigerant by throttle action.
- It controls the refrigerant flow rate by changing the throttle degree according to the temperature in the operator's cab.
- The temperature of the air flowing out of the vents is controlled by the flow rate of the refrigerant into evaporator (3).

7. Turn battery disconnect switch to “ON” position.
8. Start the engine and turn the power supply of the air conditioner to “ON”.
9. Operate the vent selector switch.
10. Check the opening and closing operations of rear door (11) and defroster door (12) of air conditioner unit (10).



After finishing testing, turn the starting switch to OFF position.

A-1 Troubleshooting for Power Supply System (Air Conditioner Does not Operate)

Failure	Air conditioner does not operate because of power supply system failure.
Phenomenon on machine	[DAZQKR] is displayed on operation screen of machine monitor. No air comes out (Blower motor does not turn).
Related information	• When Failure Code [DAZQKR] is displayed on machine monitor, perform this troubleshooting first. • [DAZQKR] is displayed on operation screen of machine monitor in following cases. In this section, 1 and 2 below are explained. 1. Air conditioner controller is receiving no power. 2. Air conditioner controller is broken. 3. No communication is possible between air conditioner controller and machine monitor (see Failure Code [DAZQKR]). • Turn starting switch to ON position, and check if [DAZQKR] is displayed on machine monitor and CAN communication is abnormal. Abnormal state of CAN communication means that CAN communication between air conditioner controller and machine monitor does not function. • Ground cable of air conditioner is connected together with other electrical components in- side machine wiring harness. • For each connector, see “Locations of Air Conditioner Parts and Layout of Connectors”. • If fuse is broken when air conditioner switch is pressed, see “A-2 Troubleshooting of Compressor System”. • Since air conditioner controller connector ACECU has no T-adapter and has small pins, perform troubleshooting by using intermediate connector (although intermediate connector has no T-adapter either, it has large pins). • When replacing air conditioner harness between air conditioner controller connector ACECU and intermediate connector, replace air conditioner unit.

No.	Cause	Procedure, measuring location, criteria and remarks		
1	Blown fuse	1. Turn starting switch to OFF position. 2. Referring to “Locations of Air Conditioner Parts and Layout of Connectors”, check fuse No.1 (5 A) in fuse box FB3 for breakage.		
2	Defective wiring harness (ground cable)	1. Turn starting switch to OFF position. 2. Turn battery disconnect switch OFF. 3. Disconnect connector AC02.		
		Resistance	Between AC02 (female) (1) and ground	Max. 1 Ω
3	Defective wiring harness	If fuse described in Related information is blown, replace it. 1. Turn starting switch to OFF position. 2. Turn battery disconnect switch OFF. 3. Disconnect connector AC02. 4. Turn battery disconnect switch ON. 5. Turn starting switch to ON position.		
		Voltage	Between AC02 (female) (4) and (1) (black)	20 to 30 V
4	Open circuit in wiring harness	1. Turn starting switch to OFF position. 2. Turn battery disconnect switch OFF. 3. Disconnect connector AC02. 4. Remove fuse No. 1 of fuse box FB3.		
		Resistance	Between AC02 (female) (4) and F03-1.	Max. 1 Ω

4.3 Error Pin (C2p01) High Signal, Also Indicated on PVES-SP LED:

PVE fault monitoring overview

PVE type	Fault monitoring	Delay before error out	Error mode	Error output status	Fault output on PVE [1]	LED light	Memory (reset needed)
PVEA PVEH PVEP PVES PVEU	Active	500 ms (PVEA: 750 ms)	No fault	Low	< 2 V	Green	-
			Input signal faults	High	~U_{DC}	Flashing red	Yes
			Transducer (LVDT)			Constant red	
			Close loop fault				

[1] Measured between fault output pin and ground.

To avoid the internal PVES electronics in undefined state a general supervision of power supply (UDC) and internal clock frequency is implemented. This function is independently of fault monitoring- and will not activate fault monitoring:

5 Wiring-Failure

5.1 Joystick Signals out of Range

5.2 Joystick Redundant Signals Mismatch

5.3 Joystick Mode Signals have the Same Value

5.4 Cut Off valve current output and feedback mismatch

5.5 Steering Valve Supply Current Output and Feedback Mismatch

5.6 Steering Valve Control Duty Output and Feedback Mismatch

Controller reporting either:

- Overload
- Safety Circuit Failure
- Safety FET Disabled (can be enforced from secondary controller to enter a safe state)
- Internal voltages out of range

For the following outputs:

5.7 Steering Valve Control

5.8 Steering Valve Supply

5.9 Steering Valve Failure Signal

5.10 Cut Off Valve Outputs

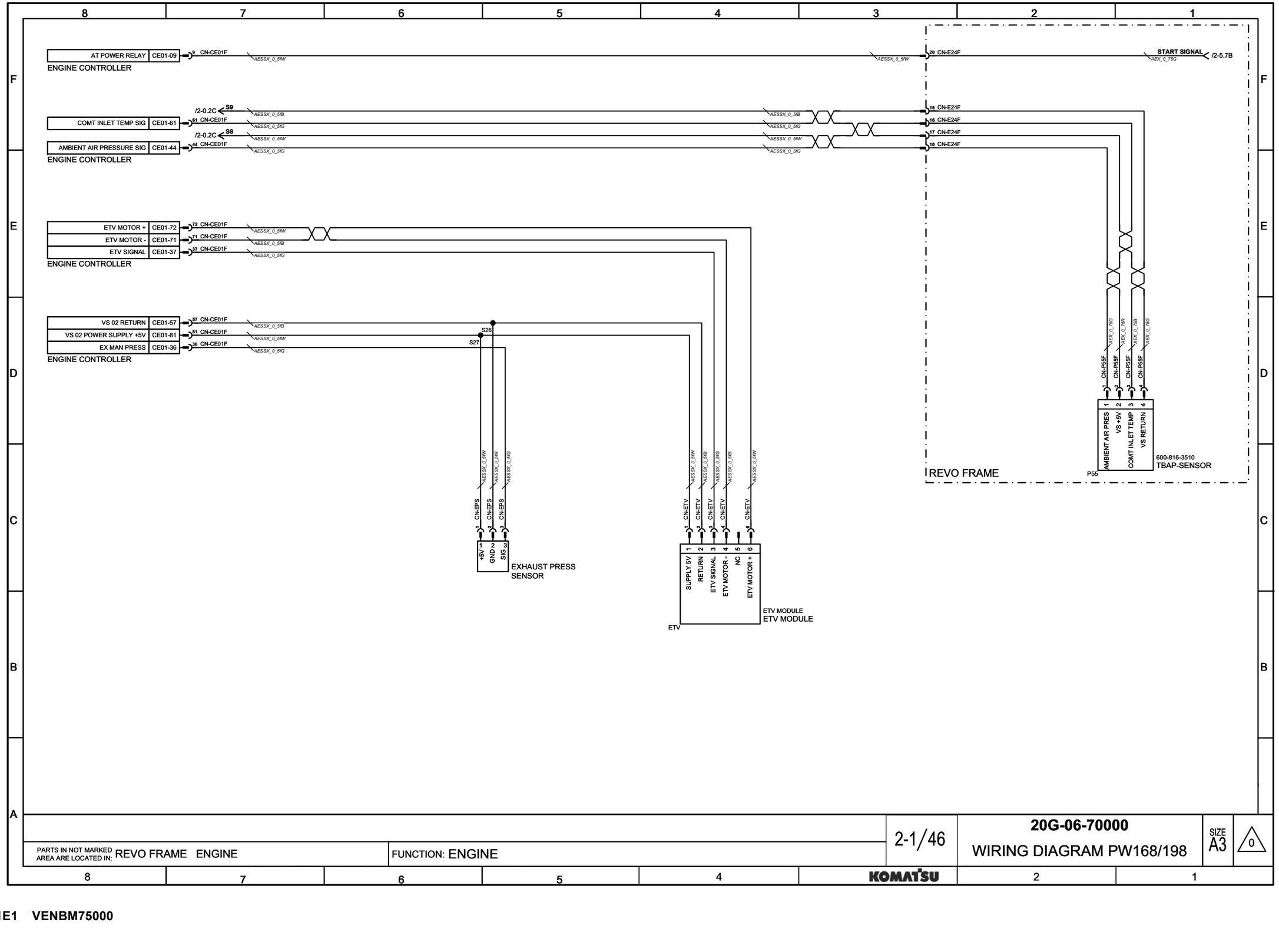
5.11 Joystick Mode Switch Reference

5.12 Failure LED Output

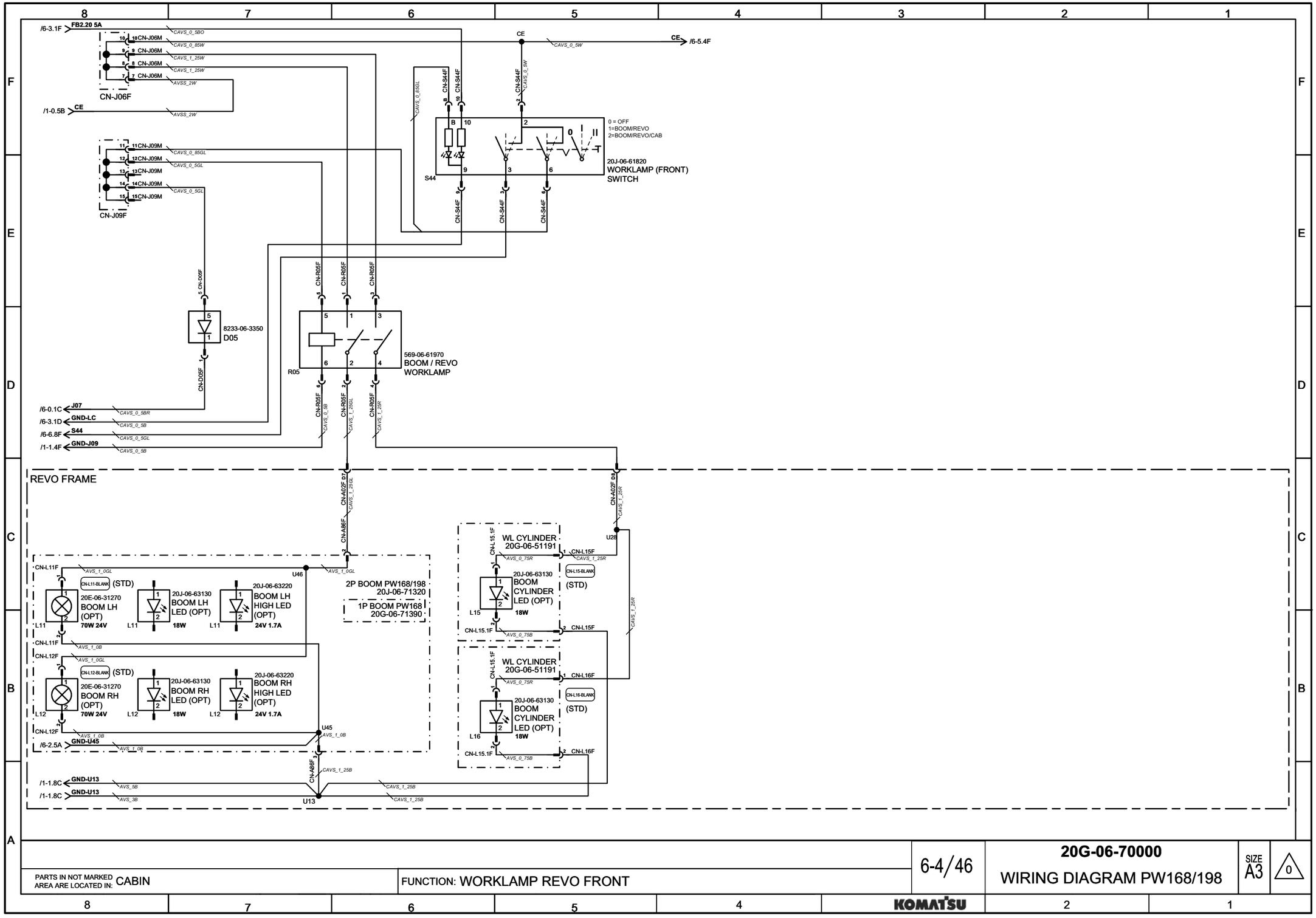
Controller reporting either:

- Unspecified Error
- Config Error: Bias (DigIn active Low/High etc.)
- Config Error: Range (voltage range for the A/D converter)
- Config Error: InputMode (if multi-function pin)

- Investigate and correct:
  - Check for open circuit of the wiring, or short circuit to Battery+.
    - Correct wiring.
  - Check for open circuit in the valve spool.
    - Replace the valve.
- **Err_PinStat_COHi_Short_Actv**
  - The driving pin for the cut off valve has reported a short circuit (measured current above 2000,0 mA or the pin reports Overload) for more than 200ms.
  - The pin is C2p09.
- Investigate and correct:
  - Check for short circuit to GND in the wiring.
    - Correct wiring.
  - Check for short circuit in the valve spool.
    - Replace the valve.
- **Err_PinStat_COLo_Fail_Actv**
  - The sinking pin for the cut off valve has reported, for more than 200ms, either:
    - Overload
    - Configuration Error
    - Safety Circuit Failure (controller internal)
    - Internal voltage out-of-range (controller internal)
  - The pin is C2p10.
- Investigate and correct:
  - Check for continuity to Battery+ in the wiring.
    - Correct wiring.
  - Check for short circuit in the valve spool.
    - Replace the valve.
  - Is the application version displayed in the Service Tool the latest released version?
    - Update the application software to the latest version.
  - Does another joystick controller show the same error?
    - If not; replace the joystick controller.
- **Err_PinStat_COLo_Short_Actv**
  - The sinking pin for the cut off valve has reported a short circuit (pin reports Overload) for more than 200ms.
  - The pin is C2p10.
- Investigate and correct:
  - Check for short circuit to Battery+ in the wiring.
    - Correct wiring.
  - Check for short circuit in the valve spool.


AT POWER RELAY CE01-09
9 CN-CE01F
AESSX_0_5W
ENGINE CONTROLLER
28 CN-E24F
START SIGNAL
/2-5.7B
AEX_0_75G
COMT INLET TEMP SIG CE01-61
61 CN-CE01F
/2-0.2C S9
AESSX_0_5B
AESSX_0_5G
AMBIENT AIR PRESSURE SIG CE01-44
44 CN-CE01F
/2-0.2C S8
AESSX_0_5W
AESSX_0_5G
15 CN-E24F
16 CN-E24F
17 CN-E24F
18 CN-E24F
ETV MOTOR + CE01-72
72 CN-CE01F
ETV MOTOR - CE01-71
71 CN-CE01F
ETV SIGNAL CE01-37
37 CN-CE01F
VS 02 RETURN CE01-57
57 CN-CE01F
VS 02 POWER SUPPLY +5V CE01-81
81 CN-CE01F
EX MAN PRESS CE01-36
36 CN-CE01F
S26
S27
CN-P55F
AEX_0_75G
AEX_0_75B
AEX_0_75R
AEX_0_75G
AMBIENT AIR PRES
VS +5V
COMT INLET TEMP
VS RETURN
600-816-3510
TBAP-SENSOR
P55
REVO FRAME
CN-EPS
AESSX_0_5W
AESSX_0_5B
AESSX_0_5G
+5V
GND
SIG
EXHAUST PRESS SENSOR
CN-ETV
SUPPLY 5V
RETURN
ETV SIGNAL
ETV MOTOR -
NC
ETV MOTOR +
ETV MODULE
ETV
PARTS IN NOT MARKED AREA ARE LOCATED IN: REVO FRAME ENGINE
FUNCTION: ENGINE
2-1/46
20G-06-70000
WIRING DIAGRAM PW168/198
SIZE A3
0
KOMATSU

6-4 Worklamp Revo Front



Connector List W2-7

No	◀ NAME	PART NUMBER	PART OF
535	CN-T00	08030-06010	REVO FRAME POWER SUPPLY MAIN SW GND 20G-06-62180
536	CN-T01	08030-06010	REVO FRAME POWER SUPPLY ENGINE GND 08028-43040
537	CN-T02	08031-10210	CABIN RADIO RADIO 20J-06-61130
538	CN-T03	08030-06010	REVO FRAME POWER SUPPLY ENGINE GND 08028-43040
539	CN-T04	08031-20210	CABIN FLOOR CABIN FLOOR 20G-06-71162
540	CN-T05	08031-20510	CABIN FLOOR CABIN FLOOR 20G-06-71162
541	CN-T06.1	08031-20510	CABIN FLOOR CABIN FLOOR 20G-06-71162
542	CN-T06.2	08031-20110	CABIN FLOOR CABIN FLOOR 20G-06-71162
543	CN-T07	08031-20510	CABIN FLOOR CABIN FLOOR 20G-06-71162
544	CN-T08	08030-06010	REVO FRAME POWER SUPPLY FLOOR FRAME GROUND 08028-43035
545	CN-T09	08030-06010	REVO FRAME POWER SUPPLY FLOOR FRAME GROUND 08028-43035
546	CN-T11	08030-04010	REVO FRAME ALTERNATOR ALTERNATOR GND 20G-06-72171
547	CN-T12	08031-20512	REVO FRAME UPPER AREA REVO 20G-06-71152
548	CN-T13	08031-10212	REVO FRAME UPPER AREA REVO 20G-06-71152
549	CN-T14	08031-10212	REVO FRAME UPPER AREA REVO 20G-06-71152
550	CN-T15	08031-10212	REVO FRAME UPPER AREA REVO 20G-06-71152
551	CN-T30	08031-10108	REVO FRAME PREHEATER HEATER RELAY GND 20E-06-41470
552	CN-T30	08031-10108	REVO FRAME UPPER AREA REVO 20G-06-71152
553	CN-T31	08031-10512	REVO FRAME UPPER AREA REVO 20G-06-71152
554	CN-T32	08031-10212	REVO FRAME UPPER AREA REVO 20G-06-71152
555	CN-T33	20G-06-71970	REVO FRAME UPPER AREA REVO 20G-06-71152
556	CN-T50	08031-10106	REVO FRAME PREHEATER HEATER RELAY GND 20E-06-41470
557	CN-V01F	08192-22910	REVO FRAME UPPER AREA REVO 20G-06-71152
558	CN-V02F	08192-22910	REVO FRAME UPPER AREA REVO 20G-06-71152
559	CN-V03F	08192-22910	REVO FRAME UPPER AREA REVO 20G-06-71152
560	CN-V04F	08192-22910	REVO FRAME UPPER AREA REVO 20G-06-71152
561	CN-V06F	08192-22910	REVO FRAME UPPER AREA REVO 20G-06-71152
562	CN-V07F	08192-22910	REVO FRAME UPPER AREA REVO 20G-06-71152
563	CN-V08F	08192-22910	REVO FRAME UPPER AREA REVO 20G-06-71152
564	CN-V09F	08192-22910	REVO FRAME UPPER AREA REVO 20G-06-71152
565	CN-V10F	08192-22910	REVO FRAME UPPER AREA REVO 20G-06-71152
566	CN-V11F	08192-22910	CHASSIS LOWER ATTACHMENT CHASSIS 20G-06-71252
567	CN-V12-COVER	6217-81-8740	REVO FRAME UPPER AREA REVO 20G-06-71581
568	CN-V12F	08192-22910	REVO FRAME UPPER AREA REVO 20G-06-71152
569	CN-V13F	08192-22910	CHASSIS LOWER ATTACHMENT CHASSIS 20G-06-71252
570	CN-V14F	08192-22910	CHASSIS LOWER ATTACHMENT CHASSIS 20G-06-71252
571	CN-V15F	08192-22910	REVO FRAME UPPER AREA REVO 20G-06-71152
572	CN-V16F	08192-22910	CHASSIS LOWER ATTACHMENT CHASSIS 20G-06-71252
573	CN-V17F	08192-22910	CHASSIS LOWER ATTACHMENT CHASSIS 20G-06-71252
574	CN-V18F	08192-22910	CHASSIS LOWER ATTACHMENT CHASSIS 20G-06-71252
575	CN-V20-BLANK	08192-22100	REVO FRAME UPPER AREA REVO 20G-06-71152
576	CN-V20F	08192-22910	REVO FRAME UPPER AREA REVO 20G-06-71152
577	CN-V21F	08192-22910	REVO FRAME UPPER AREA REVO 20G-06-71152
578	CN-V22F	08192-22910	REVO FRAME UPPER AREA REVO 20G-06-71152
579	CN-V30F	08192-22910	REVO FRAME UPPER AREA REVO 20G-06-71152
580	CN-V31F	08192-22910	REVO FRAME UPPER AREA TANK 20G-06-71581
581	CN-V32F	08192-22910	CHASSIS AUXILIARY CIRCUIT AUX CIRCUIT (OPT) 20G-06-71260
582	CN-V33F	08192-22910	CHASSIS AUXILIARY CIRCUIT AUX CIRCUIT (OPT) 20G-06-71260
583	CN-V39F	08192-22910	CABIN FLOOR CABIN FLOOR 20G-06-71162
584	CN-V40-BLANK	08192-22100	REVO FRAME UPPER AREA
585	CN-V40F	08192-22910	REVO FRAME UPPER AREA TANK 20G-06-71581
586	CN-V41F	42W-06-52120	REVO FRAME UPPER AREA REVO 20G-06-71152
587	CN-V42F	08192-22910	CHASSIS AUXILIARY CIRCUIT AUX CIRCUIT (OPT) 20G-06-71260
588	CN-V43-BLANK	08192-22100	REVO FRAME UPPER AREA REVO 20G-06-71152
589	CN-V43F	08192-22910	REVO FRAME UPPER AREA REVO 20G-06-71152
590	CN-V44-BLANK	08192-22100	REVO FRAME UPPER AREA REVO 20G-06-71152
591	CN-V44F	08192-22910	REVO FRAME UPPER AREA REVO 20G-06-71152
592	CN-V60F	08055-00292	CABIN FLOOR CABIN FLOOR 20G-06-71162
593	CN-V61-BLANK	08192-22100	REVO FRAME UPPER AREA REVO 20G-06-71152
594	CN-V61F	08192-22910	REVO FRAME UPPER AREA REVO 20G-06-71152
595	CN-V62-BLANK	08192-22100	REVO FRAME UPPER AREA REVO 20G-06-71152
596	CN-V62F	08192-22910	REVO FRAME UPPER AREA REVO 20G-06-71152
597	CN-V63F	08192-26910	CABIN JOYSTICK STEERING JSS 20G-06-71281
598	CN-V64F	08192-22910	CABIN JOYSTICK STEERING JSS 20G-06-71281
599	CN-V65-BLANK	08192-22100	REVO FRAME UPPER AREA REVO 20G-06-71152
600	CN-V65F	08192-22910	REVO FRAME UPPER AREA REVO 20G-06-71152
601	CN-V66-BLANK	08192-12100	WORK EQUIPMENT BOOM 2P BOOM PW168/198 20J-06-71320
602	CN-V66F	08192-12910	WORK EQUIPMENT BOOM 2P BOOM PW168/198 20J-06-71320
603	CN-V67-BLANK	08192-22100	REVO FRAME UPPER AREA REVO 20G-06-71152
604	CN-V67F	08192-22910	REVO FRAME UPPER AREA REVO 20G-06-71152
605	CN-V68-BLANK	08192-22100	REVO FRAME UPPER AREA REVO 20G-06-71152
606	CN-V68F	08192-22910	REVO FRAME UPPER AREA REVO 20G-06-71152
607	CN-V91F	08055-00292	REVO FRAME UPPER AREA REVO 20G-06-71152
608	CN-V92F	08055-00292	REVO FRAME UPPER AREA REVO 20G-06-71152
609	CN-V93-BLANK	08055-00212	REVO FRAME UPPER AREA REVO 20G-06-71152
610	CN-V93F	08055-00292	REVO FRAME UPPER AREA REVO 20G-06-71152
611	CN-V94-BLANK	08055-00212	REVO FRAME UPPER AREA REVO 20G-06-71152
612	CN-V94F	08055-00292	REVO FRAME UPPER AREA REVO 20G-06-71152
613	CN-V95F	08192-22910	REVO FRAME DIGGING BRAKE DIGGING BRAKE 20G-06-71311
614	CN-V96F	08192-22910	REVO FRAME DIGGING BRAKE DIGGING BRAKE 20G-06-71311
615	CN-W03F	08055-00292	CABIN RADIO RADIO 20J-06-61130
616	CN-W04F	08056-00681	CABIN FLOOR PARALLEL WIPER 20E-06-61461
617	CN-W04M	08056-00671	CABIN FLOOR CABIN FLOOR 20G-06-71162
618	CN-W06.1F	SMB_RADIO	CABIN RADIO RADIO ANTENNA 42T-07-54200
619	CN-W06.1M	JASO_RADIO	CABIN RADIO RADIO ANTENNA 42T-07-54200
620	CN-WM1F	08192-24930	CABIN FLOOR PARALLEL WIPER 20E-06-61461
621	CN-Y01-COVER	20J-06-51760	REVO FRAME UPPER AREA REVO 20G-06-71152
622	CN-Y01F	20J-06-51720	REVO FRAME UPPER AREA REVO 20G-06-71152
623	CN-Y02-BLANK	08192-22200	REVO FRAME UPPER AREA REVO 20G-06-71152

PARTS IN NOT MARKED AREA ARE LOCATED IN:

FUNCTION: CONNECTOR LIST

W2-7

20G-06-70000

WIRING DIAGRAM PW168/198

SIZE A3

0

KOMATSU

Pin Location List W3-23

NO.	▲1 CONNECTOR NAME	▲2 PIN NO		▲3 PART OF	DRAWN ON PAGE
1959	CN-FB3F	7	CABIN	FLOOR CABIN FLOOR 20G-06-71162 CN-FB3F	20G-06-70000 1-0.2B
1960	CN-FB3F	8	CABIN	FLOOR CABIN FLOOR 20G-06-71162 CN-FB3F	20G-06-70000 1-0.2B
1961	CN-FB3F	9	CABIN	FLOOR CABIN FLOOR 20G-06-71162 CN-FB3F	
1962	CN-FB3F	10	CABIN	FLOOR CABIN FLOOR 20G-06-71162 CN-FB3F	20G-06-70000 1-0.3C
1963	CN-FB3F	11	CABIN	FLOOR CABIN FLOOR 20G-06-71162 CN-FB3F	
1964	CN-FB3F	12	CABIN	FLOOR CABIN FLOOR 20G-06-71162 CN-FB3F	
1965	CN-FB3F	13	CABIN	FLOOR CABIN FLOOR 20G-06-71162 CN-FB3F	
1966	CN-FB3F	14	CABIN	FLOOR CABIN FLOOR 20G-06-71162 CN-FB3F	
1967	CN-FB3F	15	CABIN	FLOOR CABIN FLOOR 20G-06-71162 CN-FB3F	
1968	CN-FB3F	16	CABIN	FLOOR CABIN FLOOR 20G-06-71162 CN-FB3F	20G-06-70000 1-0.2C
1969	CN-FB3F	17	CABIN	FLOOR CABIN FLOOR 20G-06-71162 CN-FB3F	
1970	CN-FB3F	18	CABIN	FLOOR CABIN FLOOR 20G-06-71162 CN-FB3F	
1971	CN-FB3F	19	CABIN	FLOOR CABIN FLOOR 20G-06-71162 CN-FB3F	
1972	CN-FB3F	20	CABIN	FLOOR CABIN FLOOR 20G-06-71162 CN-FB3F	
1973	CN-G02F	1	CABIN	COLUMN SWITCH STEERING COLUMN 20G-40-71250 CN-G02F	20G-06-70000 7-5.2E
1974	CN-G02F	2	CABIN	COLUMN SWITCH STEERING COLUMN 20G-40-71250 CN-G02F	20G-06-70000 7-5.2F
1975	CN-G02F	3	CABIN	COLUMN SWITCH STEERING COLUMN 20G-40-71250 CN-G02F	20G-06-70000 7-5.2E
1976	CN-G02F	4	CABIN	COLUMN SWITCH STEERING COLUMN 20G-40-71250 CN-G02F	20G-06-70000 6-1.3F
1977	CN-G02F	5	CABIN	COLUMN SWITCH STEERING COLUMN 20G-40-71250 CN-G02F	20G-06-70000 6-1.3D
1978	CN-G02F	6	CABIN	COLUMN SWITCH STEERING COLUMN 20G-40-71250 CN-G02F	20G-06-70000 6-1.3D
1979	CN-G02F	7	CABIN	COLUMN SWITCH STEERING COLUMN 20G-40-71250 CN-G02F	20G-06-70000 7-4.7E
1980	CN-G02F	8	CABIN	COLUMN SWITCH STEERING COLUMN 20G-40-71250 CN-G02F	20G-06-70000 7-5.2F
1981	CN-G02F	9	CABIN	COLUMN SWITCH STEERING COLUMN 20G-40-71250 CN-G02F	20G-06-70000 6-0.7F
1982	CN-G02F	10	CABIN	COLUMN SWITCH STEERING COLUMN 20G-40-71250 CN-G02F	20G-06-70000 6-0.6D
1983	CN-G02F	11	CABIN	COLUMN SWITCH STEERING COLUMN 20G-40-71250 CN-G02F	20G-06-70000 6-0.8D
1984	CN-G02F	12	CABIN	COLUMN SWITCH STEERING COLUMN 20G-40-71250 CN-G02F	20G-06-70000 6-0.6D
1985	CN-G02F	13	CABIN	COLUMN SWITCH STEERING COLUMN 20G-40-71250 CN-G02F	20G-06-70000 3-3.7F
1986	CN-G02F	14	CABIN	COLUMN SWITCH STEERING COLUMN 20G-40-71250 CN-G02F	
1987	CN-G02M	1	CABIN	FLOOR CABIN FLOOR 20G-06-71162 CN-G02M	20G-06-70000 7-5.2E
1988	CN-G02M	2	CABIN	FLOOR CABIN FLOOR 20G-06-71162 CN-G02M	20G-06-70000 7-5.2F
1989	CN-G02M	3	CABIN	FLOOR CABIN FLOOR 20G-06-71162 CN-G02M	20G-06-70000 7-5.2E
1990	CN-G02M	4	CABIN	FLOOR CABIN FLOOR 20G-06-71162 CN-G02M	20G-06-70000 6-1.3F
1991	CN-G02M	5	CABIN	FLOOR CABIN FLOOR 20G-06-71162 CN-G02M	20G-06-70000 6-1.3D
1992	CN-G02M	6	CABIN	FLOOR CABIN FLOOR 20G-06-71162 CN-G02M	20G-06-70000 6-1.3D
1993	CN-G02M	7	CABIN	FLOOR CABIN FLOOR 20G-06-71162 CN-G02M	20G-06-70000 7-4.7E
1994	CN-G02M	8	CABIN	FLOOR CABIN FLOOR 20G-06-71162 CN-G02M	20G-06-70000 7-5.2F
1995	CN-G02M	9	CABIN	FLOOR CABIN FLOOR 20G-06-71162 CN-G02M	20G-06-70000 6-0.7F
1996	CN-G02M	10	CABIN	FLOOR CABIN FLOOR 20G-06-71162 CN-G02M	20G-06-70000 6-0.6D
1997	CN-G02M	11	CABIN	FLOOR CABIN FLOOR 20G-06-71162 CN-G02M	20G-06-70000 6-0.8D
1998	CN-G02M	12	CABIN	FLOOR CABIN FLOOR 20G-06-71162 CN-G02M	20G-06-70000 6-0.6D
1999	CN-G02M	13	CABIN	FLOOR CABIN FLOOR 20G-06-71162 CN-G02M	20G-06-70000 3-3.7F
2000	CN-G02M	14	CABIN	FLOOR CABIN FLOOR 20G-06-71162 CN-G02M	
2001	CN-G03F	1	CABIN	COLUMN SWITCH STEERING COLUMN 20G-40-71250 CN-G03F	20G-06-70000 7-5.3E
2002	CN-G03F	2	CABIN	COLUMN SWITCH STEERING COLUMN 20G-40-71250 CN-G03F	20G-06-70000 6-1.3E
2003	CN-G03F	3	CABIN	COLUMN SWITCH STEERING COLUMN 20G-40-71250 CN-G03F	20G-06-70000 6-1.3E
2004	CN-G03F	4	CABIN	COLUMN SWITCH STEERING COLUMN 20G-40-71250 CN-G03F	20G-06-70000 7-5.3E
2005	CN-G03F	5	CABIN	COLUMN SWITCH STEERING COLUMN 20G-40-71250 CN-G03F	20G-06-70000 6-1.3F
2006	CN-G03F	6	CABIN	COLUMN SWITCH STEERING COLUMN 20G-40-71250 CN-G03F	20G-06-70000 7-5.4E
2007	CN-G03F	7	CABIN	COLUMN SWITCH STEERING COLUMN 20G-40-71250 CN-G03F	20G-06-70000 7-5.3F
2008	CN-G03M	1	CABIN	COLUMN SWITCH STALK SWITCH 20E-06-K1240 CN-G03M	20G-06-70000 7-5.3E
2009	CN-G03M	2	CABIN	COLUMN SWITCH STALK SWITCH 20E-06-K1240 CN-G03M	20G-06-70000 6-1.3E
2010	CN-G03M	3	CABIN	COLUMN SWITCH STALK SWITCH 20E-06-K1240 CN-G03M	20G-06-70000 6-1.3E
2011	CN-G03M	4	CABIN	COLUMN SWITCH STALK SWITCH 20E-06-K1240 CN-G03M	20G-06-70000 7-5.3E
2012	CN-G03M	5	CABIN	COLUMN SWITCH STALK SWITCH 20E-06-K1240 CN-G03M	20G-06-70000 6-1.3F
2013	CN-G03M	6	CABIN	COLUMN SWITCH STALK SWITCH 20E-06-K1240 CN-G03M	20G-06-70000 7-5.4E
2014	CN-G03M	7	CABIN	COLUMN SWITCH STALK SWITCH 20E-06-K1240 CN-G03M	20G-06-70000 7-5.3F
2015	CN-G04F	1	CABIN	COLUMN SWITCH STALK SWITCH 20E-06-K1240 CN-G04F	20G-06-70000 7-4.7D
2016	CN-G04F	2	CABIN	COLUMN SWITCH STALK SWITCH 20E-06-K1240 CN-G04F	20G-06-70000 6-0.6E
2017	CN-G04F	3	CABIN	COLUMN SWITCH STALK SWITCH 20E-06-K1240 CN-G04F	20G-06-70000 6-0.6E
2018	CN-G04F	4	CABIN	COLUMN SWITCH STALK SWITCH 20E-06-K1240 CN-G04F	20G-06-70000 6-0.6E
2019	CN-G04F	5	CABIN	COLUMN SWITCH STALK SWITCH 20E-06-K1240 CN-G04F	20G-06-70000 6-0.6E
2020	CN-G04F	6	CABIN	COLUMN SWITCH STALK SWITCH 20E-06-K1240 CN-G04F	20G-06-70000 7-5.4F
2021	CN-G04F	7	CABIN	COLUMN SWITCH STALK SWITCH 20E-06-K1240 CN-G04F	
2022	CN-G04M	1	CABIN	COLUMN SWITCH STEERING COLUMN 20G-40-71250 CN-G04M	20G-06-70000 7-4.7D
2023	CN-G04M	2	CABIN	COLUMN SWITCH STEERING COLUMN 20G-40-71250 CN-G04M	20G-06-70000 6-0.6E
2024	CN-G04M	3	CABIN	COLUMN SWITCH STEERING COLUMN 20G-40-71250 CN-G04M	20G-06-70000 6-0.6E
2025	CN-G04M	4	CABIN	COLUMN SWITCH STEERING COLUMN 20G-40-71250 CN-G04M	20G-06-70000 6-0.6E
2026	CN-G04M	5	CABIN	COLUMN SWITCH STEERING COLUMN 20G-40-71250 CN-G04M	20G-06-70000 6-0.6E
2027	CN-G04M	6	CABIN	COLUMN SWITCH STEERING COLUMN 20G-40-71250 CN-G04M	20G-06-70000 6-0.6E
2028	CN-G04M	7	CABIN	COLUMN SWITCH STEERING COLUMN 20G-40-71250 CN-G04M	20G-06-70000 7-5.4F
2029	CN-G05F	1	CABIN	COLUMN SWITCH STEERING COLUMN 20G-40-71250 CN-G05F	20G-06-70000 3-3.7D
2030	CN-G05F	2	CABIN	COLUMN SWITCH STEERING COLUMN 20G-40-71250 CN-G05F	20G-06-70000 3-3.7F
2031	CN-G05F	3	CABIN	COLUMN SWITCH STEERING COLUMN 20G-40-71250 CN-G05F	20G-06-70000 6-1.3F
2032	CN-G05F	4	CABIN	COLUMN SWITCH STEERING COLUMN 20G-40-71250 CN-G05F	20G-06-70000 3-3.7D
2033	CN-G05F	5	CABIN	COLUMN SWITCH STEERING COLUMN 20G-40-71250 CN-G05F	20G-06-70000 3-3.7D
2034	CN-G05F	6	CABIN	COLUMN SWITCH STEERING COLUMN 20G-40-71250 CN-G05F	20G-06-70000 6-1.3F
2035	CN-G05F	7	CABIN	COLUMN SWITCH STEERING COLUMN 20G-40-71250 CN-G05F	20G-06-70000 6-1.3F
2036	CN-G05F	8	CABIN	COLUMN SWITCH STEERING COLUMN 20G-40-71250 CN-G05F	20G-06-70000 3-3.7F
2037	CN-G05M	1	CABIN	FLOOR CABIN FLOOR 20G-06-71162 CN-G05M	20G-06-70000 3-3.7D
2038	CN-G05M	2	CABIN	FLOOR CABIN FLOOR 20G-06-71162 CN-G05M	20G-06-70000 3-3.7F
2039	CN-G05M	3	CABIN	FLOOR CABIN FLOOR 20G-06-71162 CN-G05M	20G-06-70000 6-1.3F
2040	CN-G05M	4	CABIN	FLOOR CABIN FLOOR 20G-06-71162 CN-G05M	20G-06-70000 3-3.7D
2041	CN-G05M	5	CABIN	FLOOR CABIN FLOOR 20G-06-71162 CN-G05M	20G-06-70000 3-3.7D
2042	CN-G05M	6	CABIN	FLOOR CABIN FLOOR 20G-06-71162 CN-G05M	20G-06-70000 6-1.3F
2043	CN-G05M	7	CABIN	FLOOR CABIN FLOOR 20G-06-71162 CN-G05M	20G-06-70000 6-1.3F
2044	CN-G05M	8	CABIN	FLOOR CABIN FLOOR 20G-06-71162 CN-G05M	20G-06-70000 3-3.7F
2045	CN-G10-BLANK	1	REVO FRAME	COUNTER WEIGHT C/W 20G-06-71551 CN-G10-BLANK	
2046	CN-G10-BLANK	2	REVO FRAME	COUNTER WEIGHT C/W 20G-06-71551 CN-G10-BLANK	
2047	CN-G10F	1	REVO FRAME	COUNTER WEIGHT C/W 20G-06-71551 CN-G10F	20G-06-70000 6-1.5B

No entry in „DRAWN ON PAGE“ means pin is not used.

PARTS IN NOT MARKED AREA ARE LOCATED IN:

FUNCTION: PIN LOCATION LIST

W3-23

20G-06-70000

WIRING DIAGRAM PW168/198

SIZE A3

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KOMATSU