Group	1 Before Troubleshooting	6-1
Group	2 Hydraulic and Mechanical System	6-4
Group	3 Electrical System	6-24
Group	4 Mechatronics System	6-38

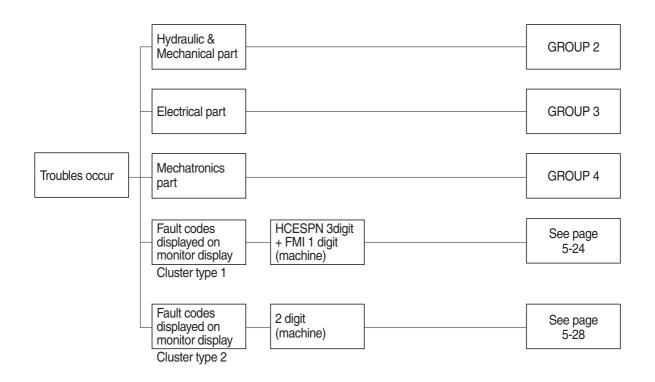
GROUP 1 BEFORE TROUBLESHOOTING

1. INTRODUCTION

When a trouble is occurred in the machine, this section will help an operator to maintain the machine with easy.

The trouble of machine is parted Hydraulic & Mechanical system, Electrical system and Mechatronics system. At each system part, an operator can check the machine according to the troubleshooting process diagram.

* Before carring out troubleshooting procedure, check monitoring menu in the cluster.



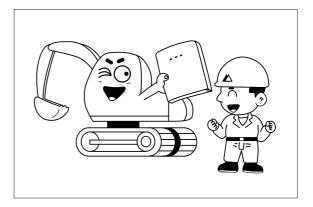
2. DIAGNOSING PROCEDURE

To carry out troubleshooting efficiently, the following steps must be observed.

STEP 1. Study the machine system

Study and know how the machine is operating, how the system is composing, what kinds of function are installed in the machine and what are specifications of the system components by the machine service manual.

Especially, deepen the knowledge for the related parts of the trouble.



STEP 2. Ask the operator

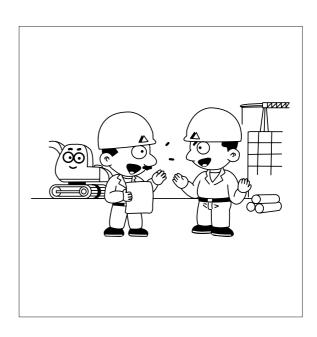
Before inspecting, get the full story of malfunctions from a witness --- the operator.

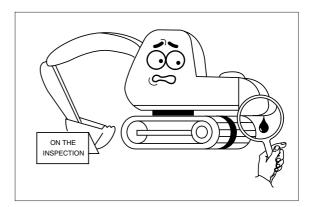
- 1) How the machine is used and when it is serviced?
- 2) When the trouble was noticed and what work the machine was doing at that time?
- 3) What is the phenomenon of the trouble? Was the trouble getting worse, or did it come out suddenly for the first time?
- Did the machine have any troubles previously? If so, which parts were repaired before.

STEP 3. Inspect the machine

Before starting troubleshooting, check the machine for the daily maintenance points as shown in the operator's manual.

And also check the electrical system including batteries, as the troubles in the electrical system such as low battery voltage, loose connections and blown out fuses will result in malfunction of the controllers causing total operational failures of the machine.

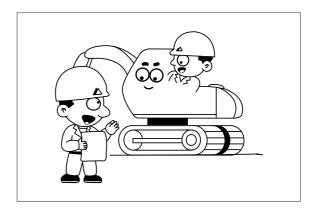




STEP 4. Inspect the trouble actually on the machine

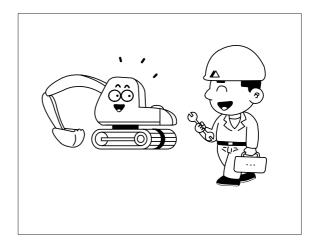
In case that some trouble cannot be confirmed, obtain the details of the malfunction from the operator.

Also, check if there are any in complete connections of the wire harnesses are or not.



STEP 5. Perform troubleshooting

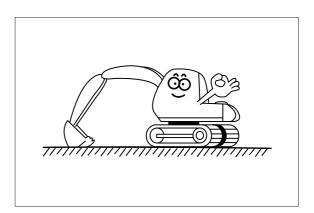
According to where the trouble parts are located, hydraulic & mechanical system part or electrical system part or mechatronics system part, perform troubleshooting the machine refer to the each system part's troubleshooting process diagram.



STEP 6. Trace a cause

Before reaching a conclusion, check the most suspectible causes again. Try to trace what the real cause of the trouble is.

Make a plan of the appropriate repairing procedure to avoid consequential malfunctions.



GROUP 2 HYDRAULIC AND MECHANICAL SYSTEM

1. INTRODUCTION

1) MACHINE IN GENERAL

- If even a minor fault is left intact and operation is continued, a fatal failure may be caused, entailing a large sum of expenses and long hours of restoration. Therefore when even a small trouble occurs, do not rely on your intuition and experience, but look for the cause based on the troubleshooting principle and perform maintenance and adjustment to prevent major failure from occurring. Keep in mind that a fault results from a combination of different causes.
- (2) The following lists up commonly occurring faults and possible causes with this machine. For the troubleshooting of the engine, refer to the coming troubleshooting and repair.
- (3) When carrying out troubleshooting, do not hurry to disassemble the components. It will become impossible to find the cause of the problem.
- (4) Ask user or operator the following.
- ① Was there any strange thing about machine before failure occurred?
- ② Under what conditions did the failure occur?
- ③ Have any repairs been carried out before the failure?
- (5) Check before troubleshooting.
- ① Check oil and fuel level.
- ② Check for any external leakage of oil from components.
- ③ Check for loose or damage of wiring and connections.

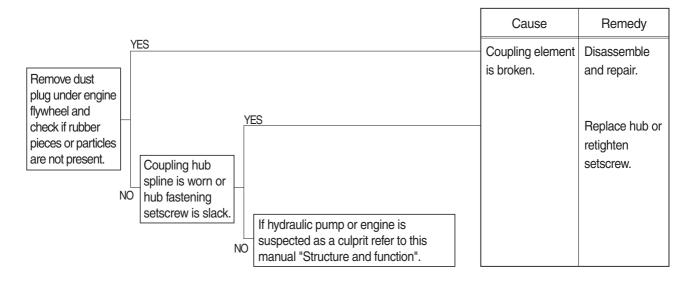
2) MACHINE STATUS MONITORING ON THE CLUSTER

- (1) The machine status such as the engine rpm, oil temperature, voltage and pressure etc. can be checked by this menu.
- (2) Specification

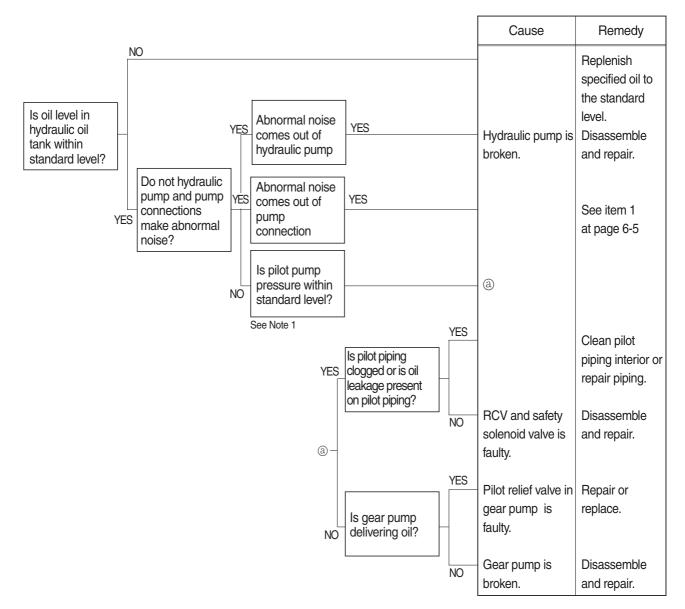
Description	Specification
Eppr pressure	0~40 bar
Boom up pilot pressure	0~40 bar
P1 pump negative pressure	0~38 bar
Pump 1 pressure	0~350 bar
Pump 2 pressure	0~350 bar

2. DRIVE SYSTEM

1) UNUSUAL NOISE COMES OUT OF PUMP CONNECTION

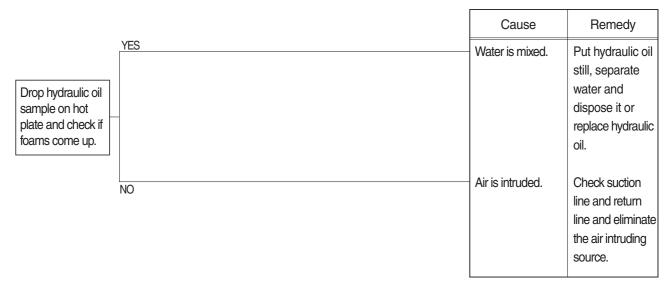


2) ENGINE STARTS BUT MACHINE DOES NOT OPERATE AT ALL

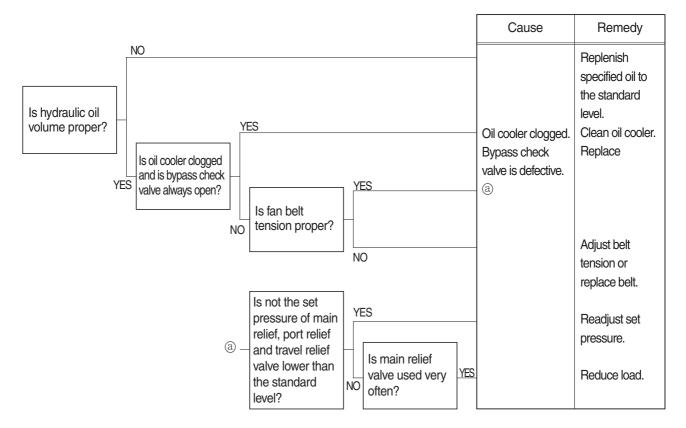


3. HYDRAULIC SYSTEM

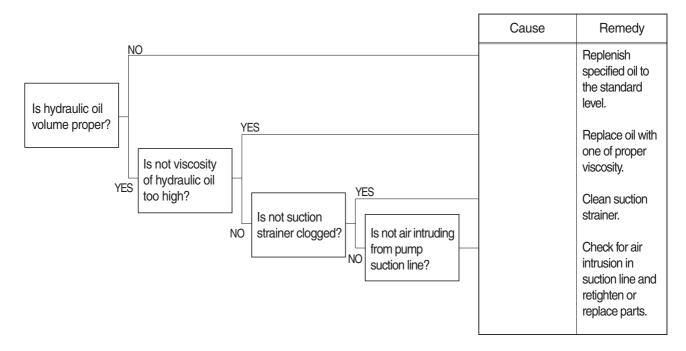
1) HYDRAULIC OIL IS CLOUDY



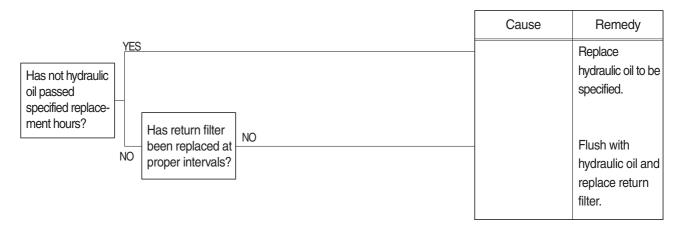
2) HYDRAULIC OIL TEMPERATURE HAS RISEN ABNORMALLY



3) CAVITATION OCCURS WITH PUMP

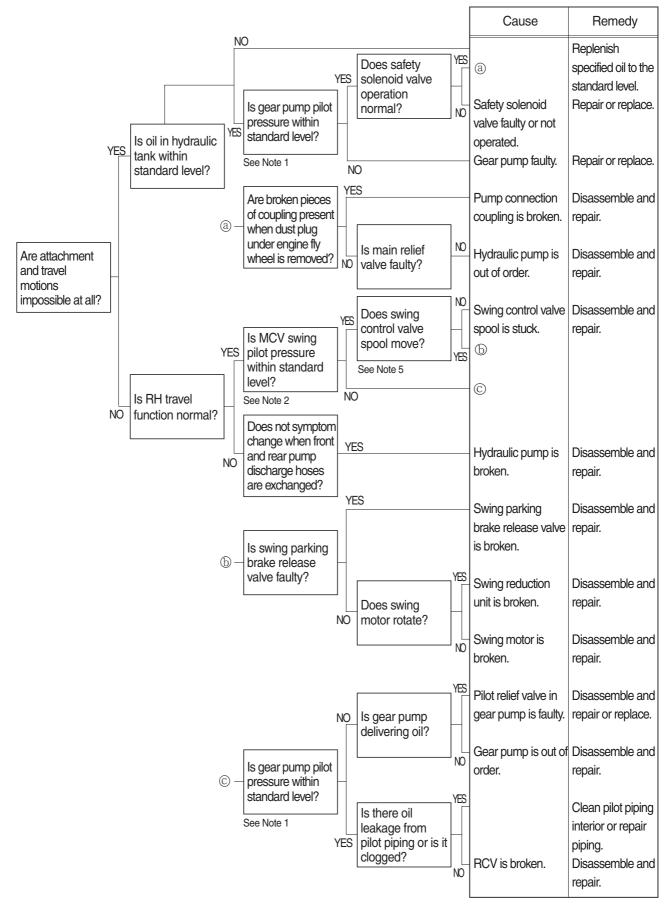


4) HYDRAULIC OIL IS CONTAMINATED

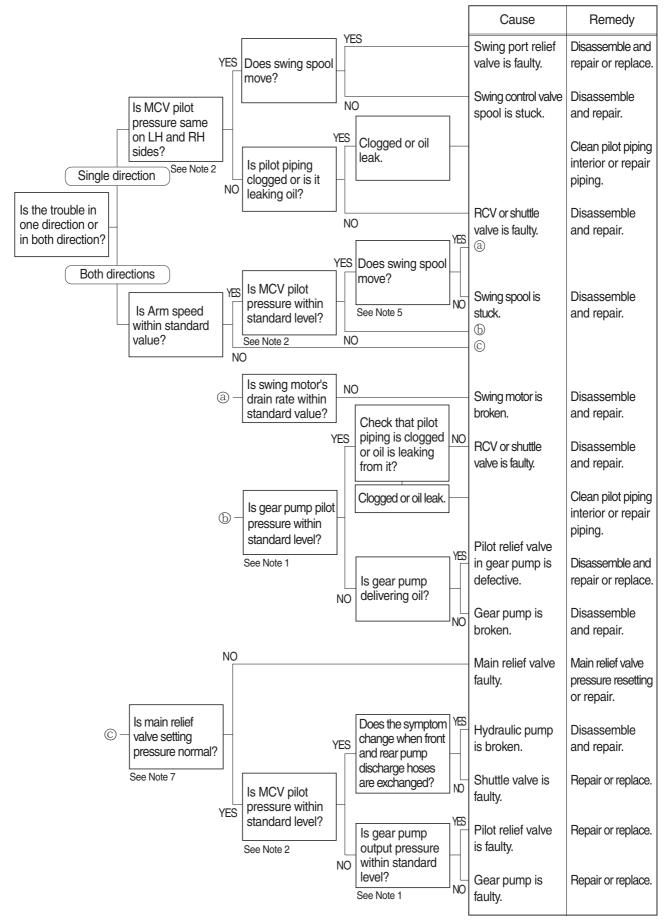


4. SWING SYSTEM

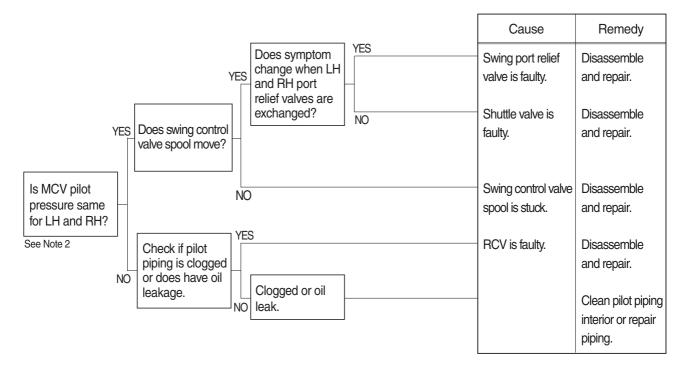
1) BOTH LH AND RH SWING ACTIONS ARE IMPOSSIBLE



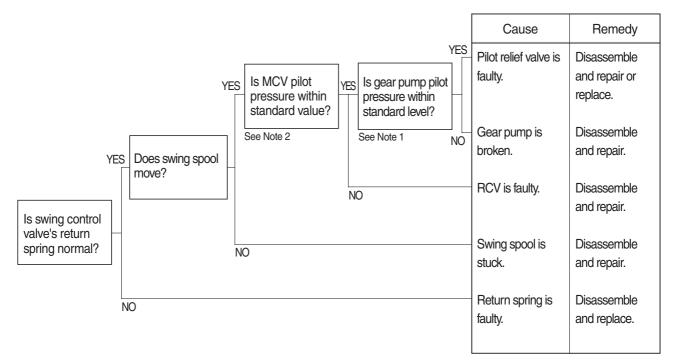
2) SWING SPEED IS LOW



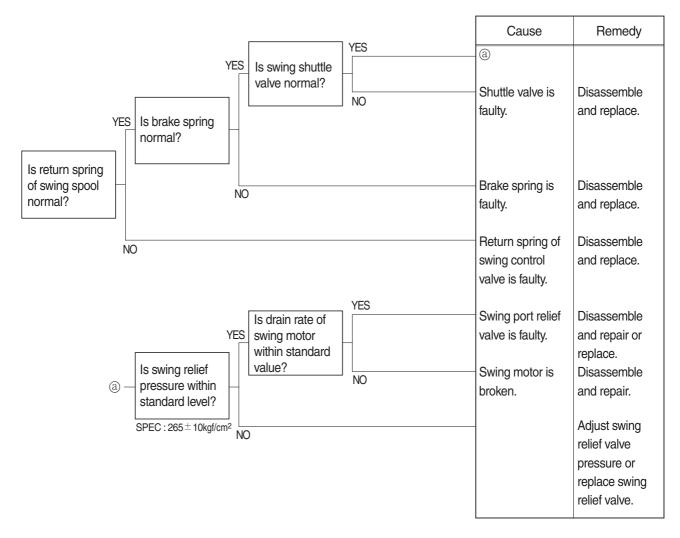
3) SWING MOTION IS IMPOSSIBLE IN ONE DIRECTION



4) MACHINE SWINGS BUT DOES NOT STOP

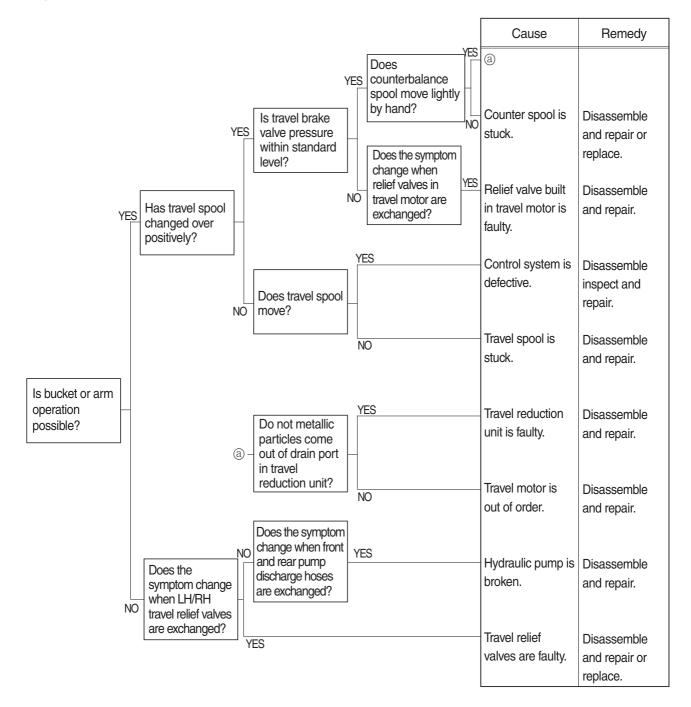


5) THE SWING UNIT DRIFTS WHEN THE MACHINE IS AT REST ON A SLOPE

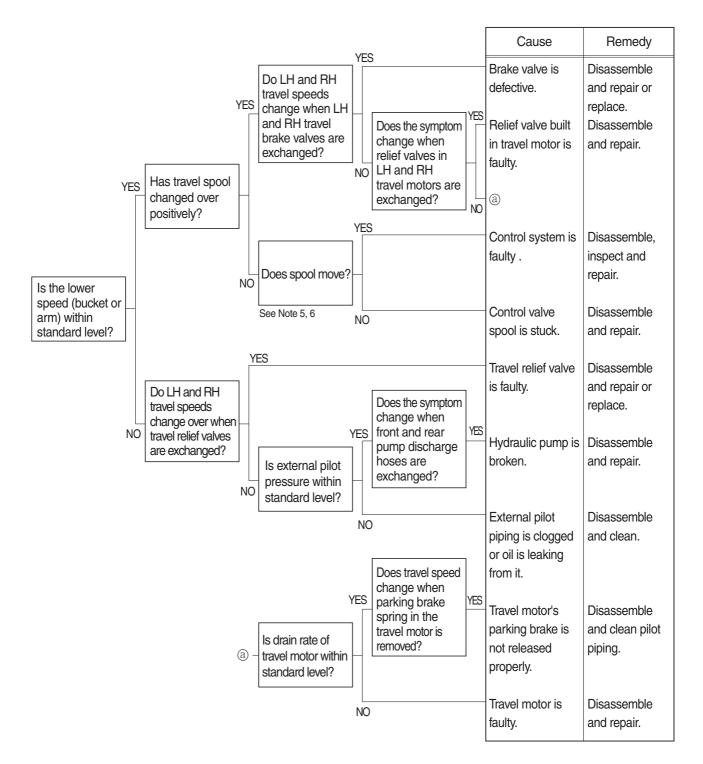


5. TRAVEL SYSTEM

1) TRAVEL DOES NOT FUNCTION AT ALL ON ONE SIDE

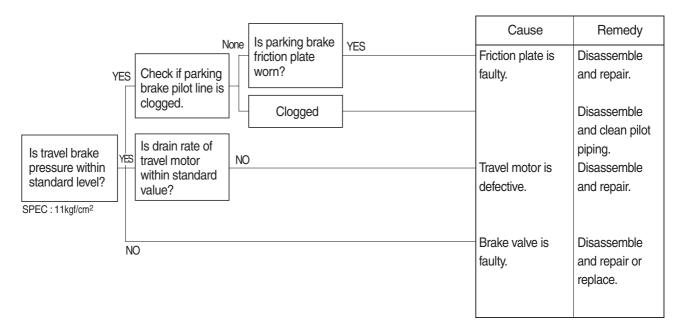


2) SPEED ON ONE SIDE FALLS AND THE MACHINE CURVES

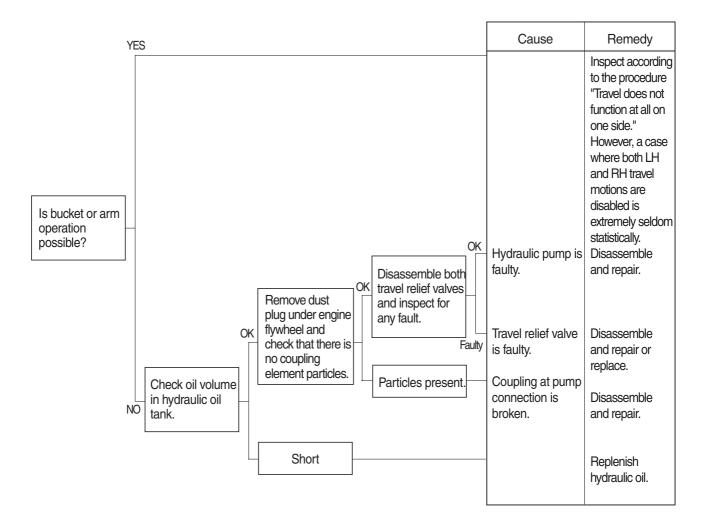


3) MACHINE DOES NOT STOP ON A SLOPE

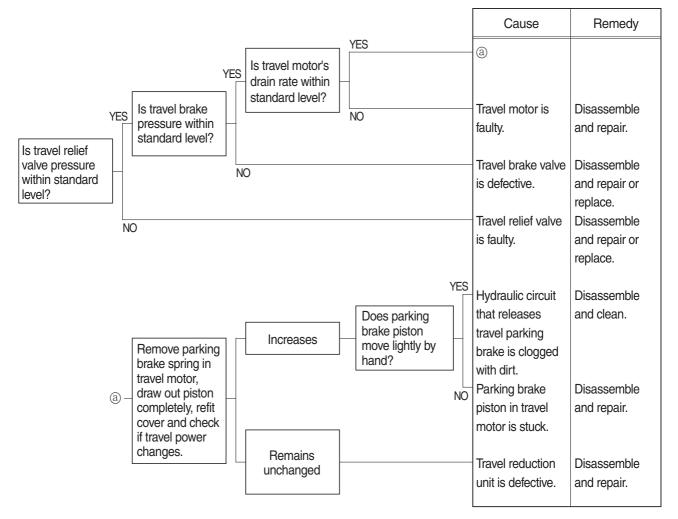
Machine is pulled forward as sprocket rotates during digging operation.



4) LH AND RH TRAVEL MOTIONS ARE IMPOSSIBLE



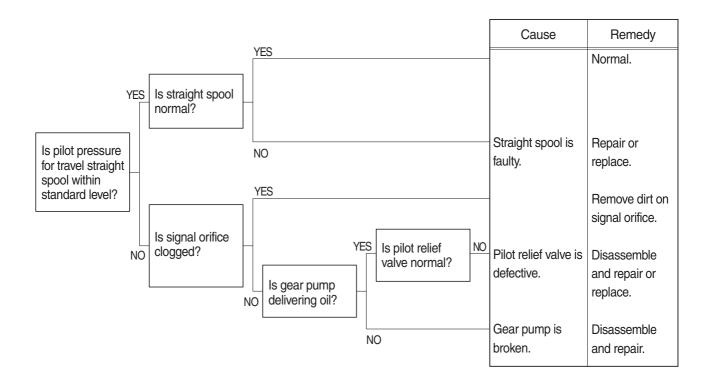
5) TRAVEL ACTION IS POWERLESS (travel only)



6) MACHINE RUNS RECKLESSLY ON A SLOPE

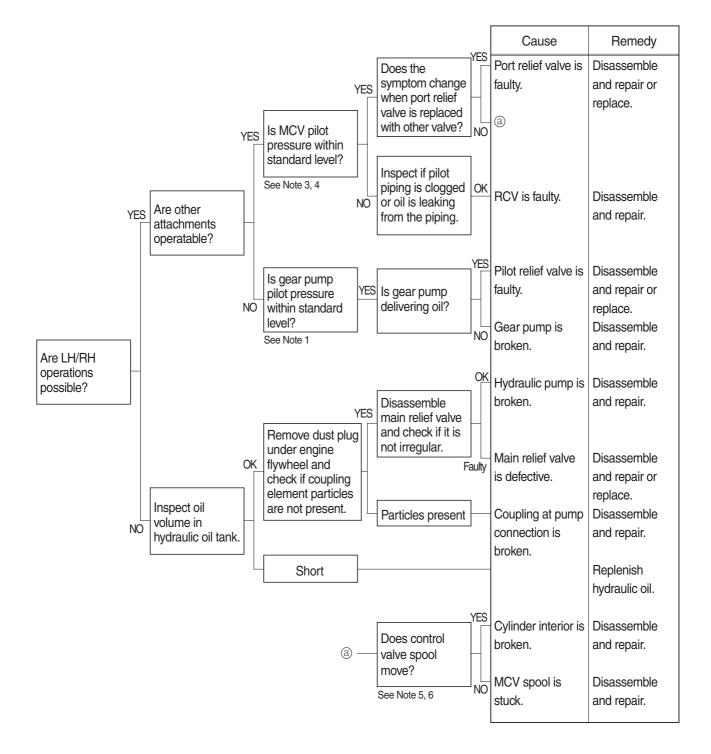
Travel brake valve	Cause	Remedy
(counterbalance valve) is faulty.		Disassemble and repair or replace.

7) MACHINE MAKES A CURVED TRAVEL OR DOES NOT TRAVEL AT ALL WHEN TRAVEL AND ATTACHMENT OPERATIONS ARE EXECUTED AT THE SAME TIME

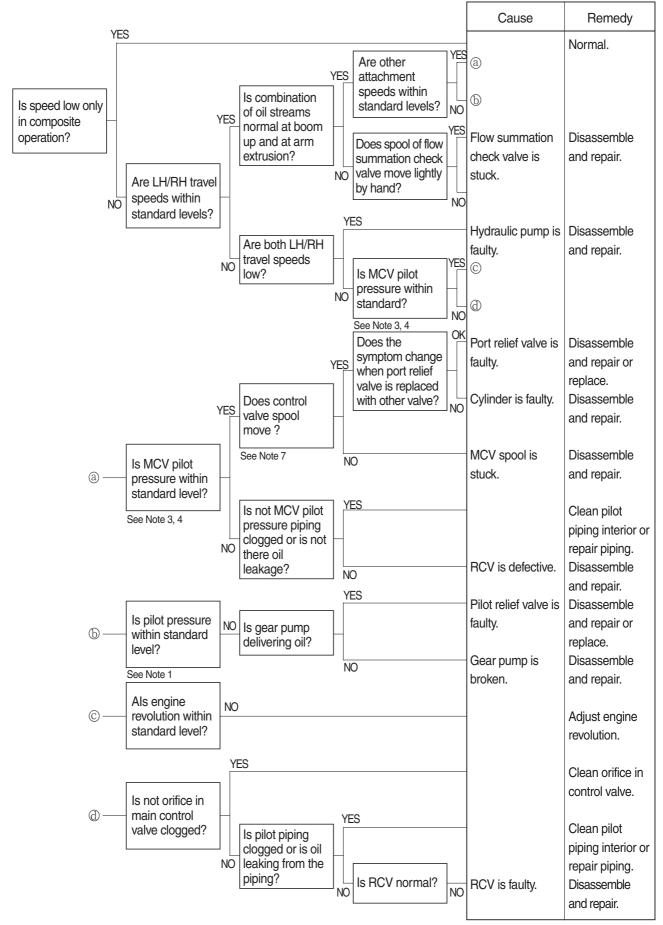


6. ATTACHMENT SYSTEM

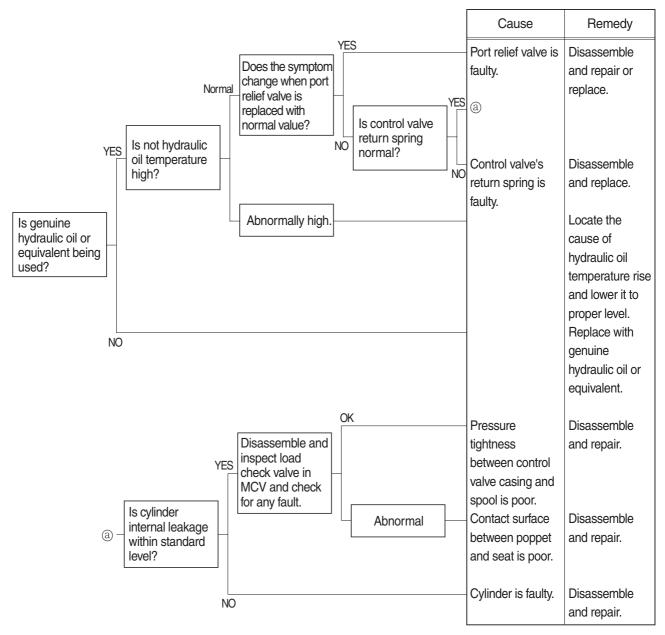
1) BOOM OR ARM ACTION IS IMPOSSIBLE AT ALL



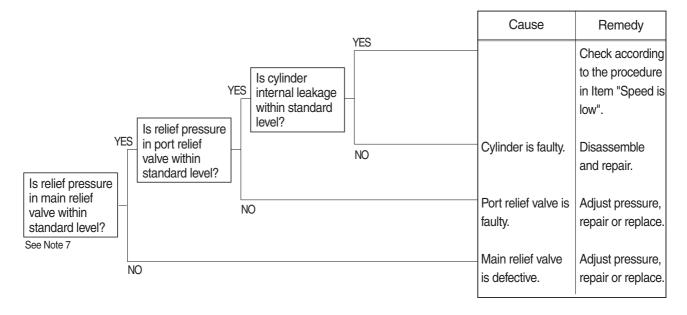
2) BOOM, ARM OR BUCKET SPEED IS LOW



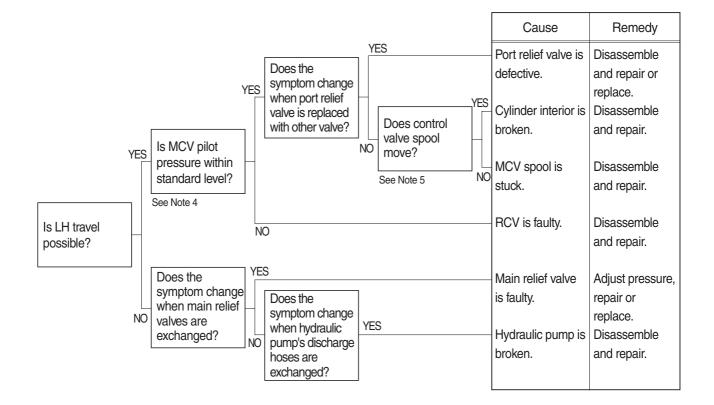
3) BOOM, ARM OR BUCKET CYLINDER EXTENDS OR CONTRACTS ITSELF AND ATTACHMENT FALLS



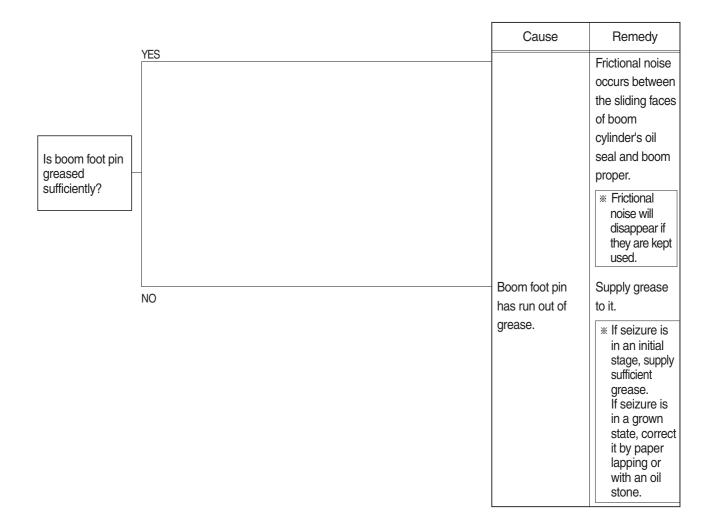
4) BOOM, ARM OR BUCKET POWER IS WEAK



5) ONLY BUCKET OPERATION IS TOTALLY IMPOSSIBLE

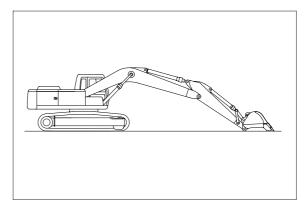


6) BOOM MAKES A SQUEAKING NOISE WHEN BOOM IS OPERATED

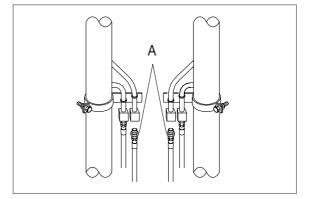


*** HOW TO CHECK INTERNAL BOOM CYLINDER LEAKAGE**

1. Lower the bucket teeth to the ground with bucket cylinder fully retracted and arm cylinder rod retracted almost in full.



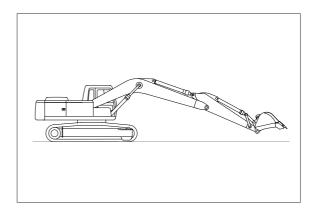
 Disconnect hose (A) from rod side of boom cylinder and drain oil from cylinders and hose. (put cups on piping and hose ends)



3. Raise bucket OFF the ground by retracting the arm cylinder rod.

If oil leaks from piping side and boom cylinder rod is retracted there is an internal leak in the cylinder.

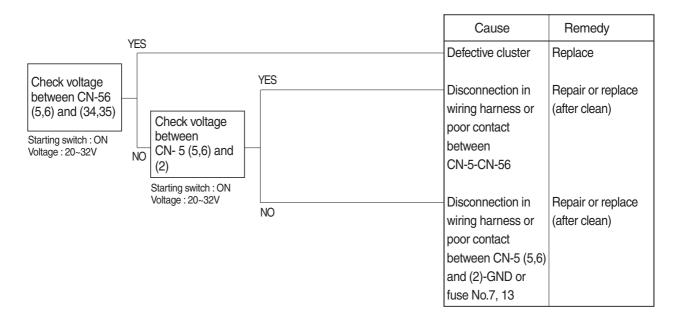
If no oil leaks from piping side and boom cylinder rod is retracted, there is an internal leak in the control valve.



GROUP 3 ELECTRICAL SYSTEM

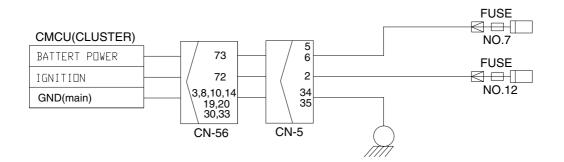
1. WHEN STARTING SWITCH IS TURNED ON, MONITOR PANEL DISPLAY DOES NOT APPEAR

- \cdot Before disconnecting the connector, always turn the starting switch OFF.
- Before carrying out below procedure, check all the related connectors are properly inserted and fuse No.7 and 8 burnt out.
- · After checking, insert the disconnected connectors again immediately unless otherwise specified.



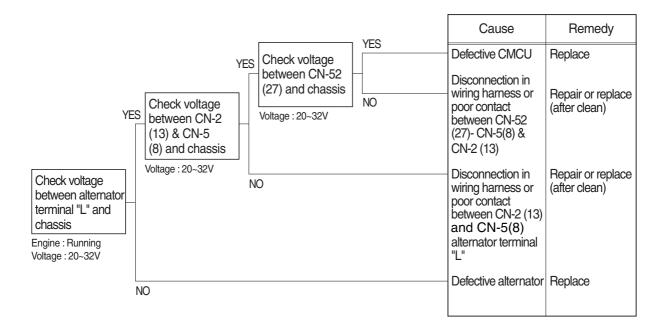
Check voltage

YE	S	20~32V
N	0	0V



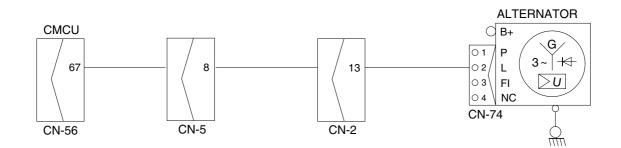
2. **BATTERY CHARGING WARNING LAMP LIGHTS UP** (Starting switch : ON)

- \cdot Before disconnecting the connector, always turn the starting switch OFF.
- \cdot Before carrying out below procedure, check all the related connectors are properly inserted.
- · After checking, insert the disconnected connectors again immediately unless otherwise specified.



Check voltage

YES	20~32V
NO	0V

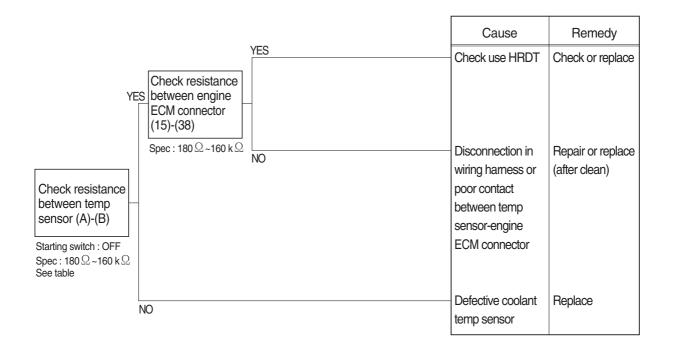


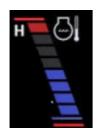
3. 3. WHEN COOLANT OVERHEAT WARNING LAMP LIGHTS UP (engine is started)

 \cdot Before disconnecting the connector, always turn the starting switch OFF.

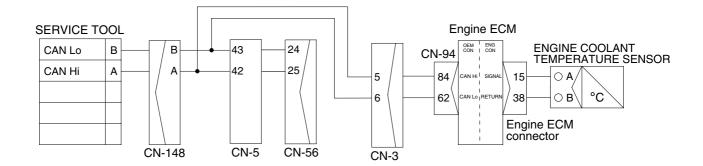
Check Table

- \cdot Before carrying out below procedure, check all the related connectors are properly inserted.
- · After checking, insert the disconnected connectors again immediately unless otherwise specified.



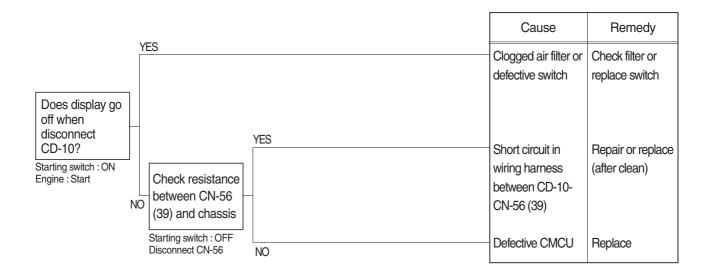


Temperature (°C)	0	25	50	80	95
Resistance (kΩ)	30~37	9.3~10.7	3.2~3.8	1.0~1.3	0.7~0.8



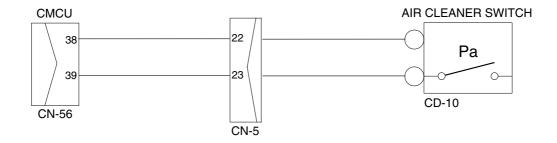
4. (WHEN AIR CLEANER WARNING LAMP LIGHTS UP (engine is started)

- \cdot Before disconnecting the connector, always turn the starting switch OFF.
- · Before carrying out below procedure, check all the related connectors are properly inserted.
- · After checking, insert the disconnected connectors again immediately unless otherwise specified.



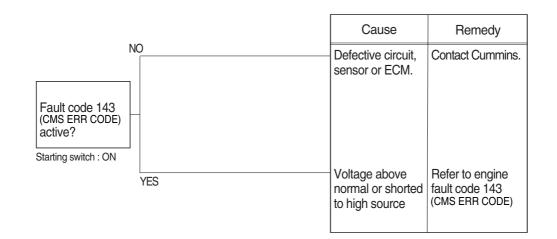
Check resistance

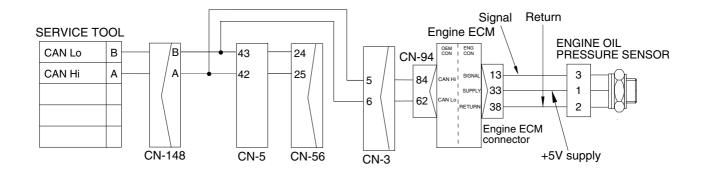
YES	ΜΑΧ 1 Ω				
NO	MIN 1MΩ				



5. WHEN ENGINE OIL PRESSURE WARNING LAMP LIGHTS UP (engine is started)

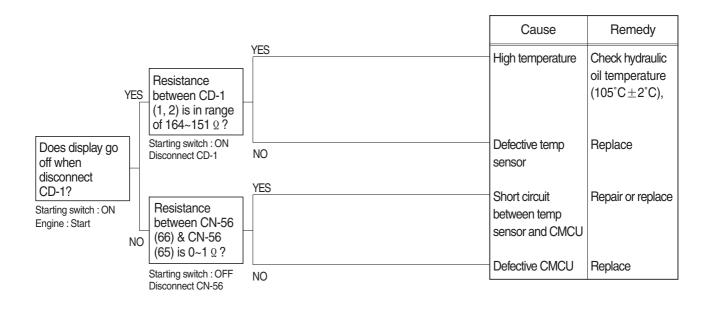
- \cdot Before disconnecting the connector, always turn the starting switch OFF.
- · Before carrying out below procedure, check all the related connectors are properly inserted.
- · After checking, insert the disconnected connectors again immediately unless otherwise specified.

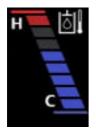




6. UN WHEN HYDRAULIC OIL TEMPERATURE WARNING LAMP LIGHTS UP (engine is started)

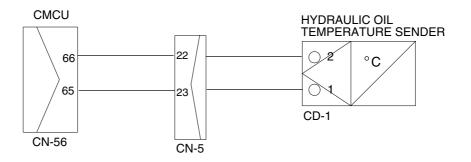
- \cdot Before disconnecting the connector, always turn the starting switch OFF.
- Before carrying out below procedure, check all the related connectors are properly inserted.
- · After checking, insert the disconnected connectors again immediately unless otherwise specified.





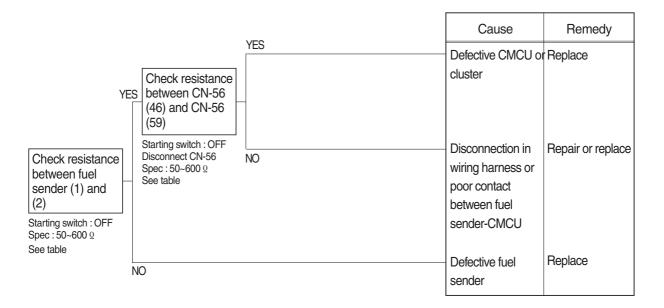
Check Table

Temperature (°C)	~ -30	~ -10	~ 0	~ 40	~ 70	~ 80	~ 90	~ 100	105~
Resistance (k Ω)		8.16 ~10.74							



7. WHEN FUEL GAUGE DOES NOT OPERATE

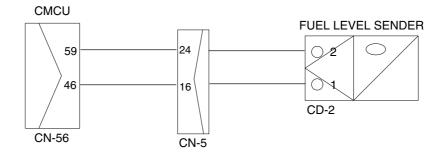
- \cdot Before disconnecting the connector, always turn the starting switch OFF.
- · Before carrying out below procedure, check all the related connectors are properly inserted.
- · After checking, insert the disconnected connectors again immediately unless otherwise specified.



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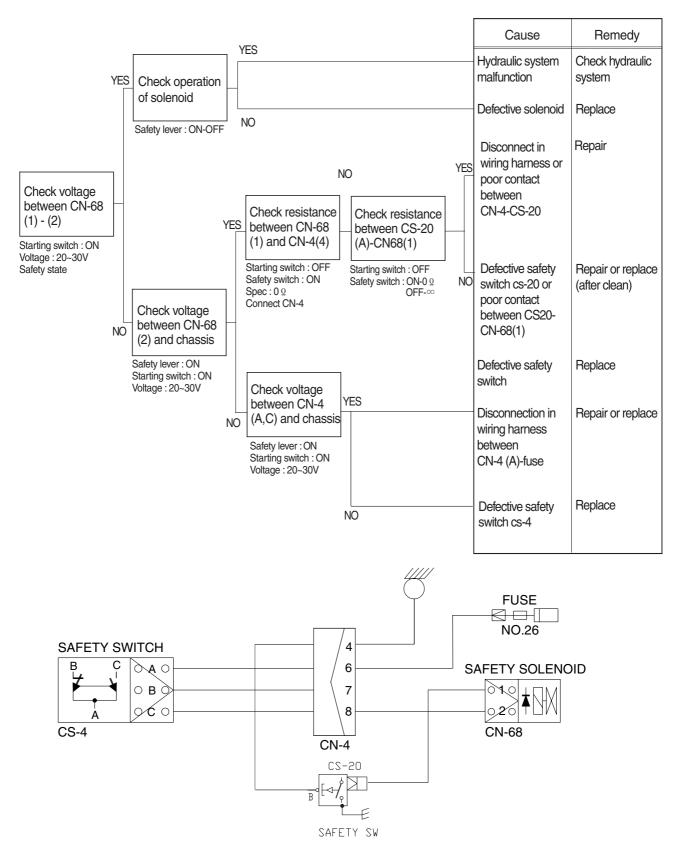
Check Table

Range	Resistance (Ω)	Range	Resistance (Ω)
Full	50	5/12	400
11/12	100	4/12	450
10/12	150	3/12	500
9/12	200	2/12	550
8/12	250	1/12	600
7/12	300	Empty warning	700
6/12	350	-	-



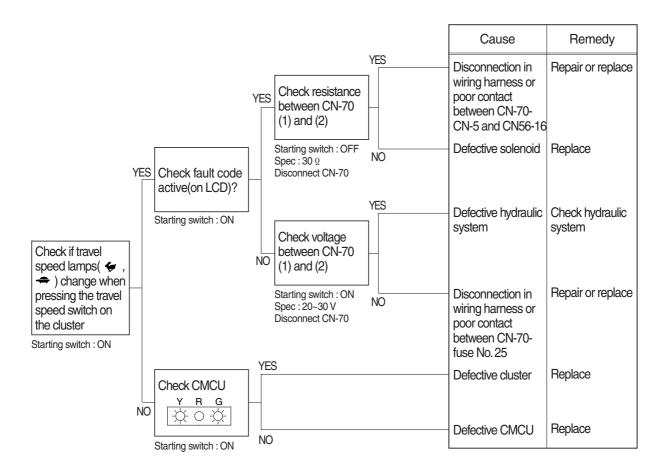
8. WHEN SAFETY SOLENOID DOES NOT OPERATE

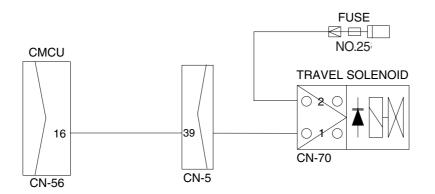
- \cdot Before disconnecting the connector, always turn the starting switch OFF.
- Before carrying out below procedure, check all the related connectors are properly inserted and fuse No.23 burnt out.
- · After checking, insert the disconnected connectors again immediately unless otherwise specified.



9. WHEN TRAVEL SPEED 1, 2 DOES NOT OPERATE

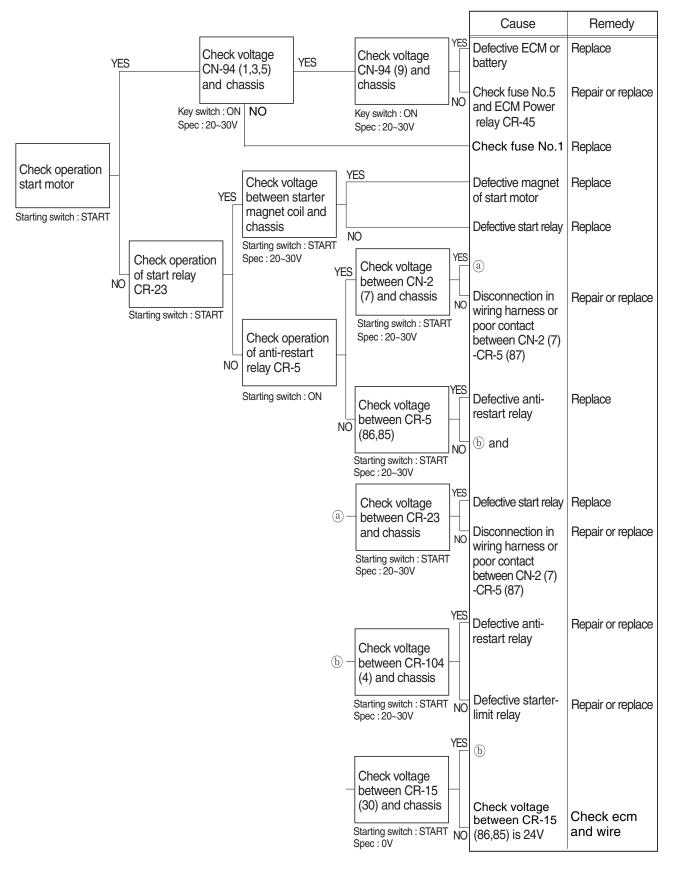
- · Before disconnecting the connector, always turn the starting switch OFF.
- Before carrying out below procedure, check all the related connectors are properly inserted and fuse No. 25 burnt out.
- · After checking, insert the disconnected connectors again immediately unless otherwise specified.

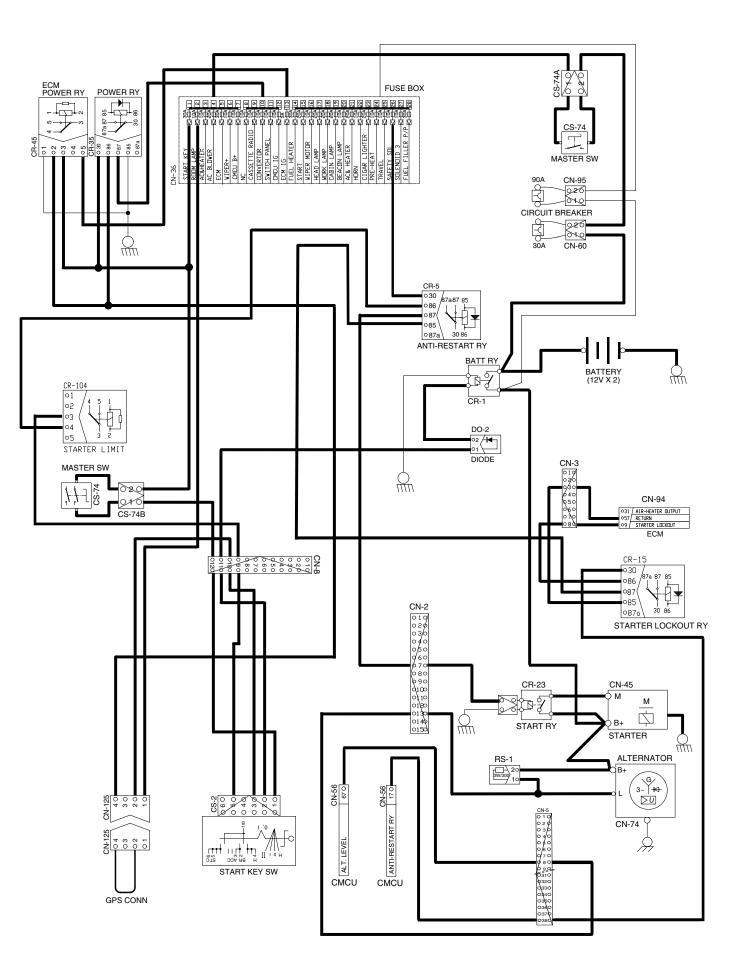




11. WHEN ENGINE DOES NOT START (_____ lights up condition)

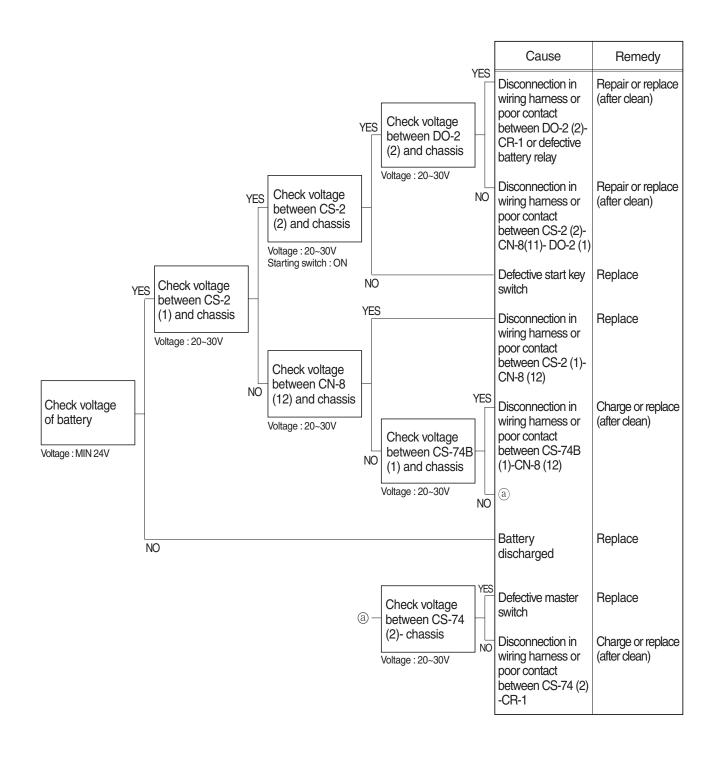
- \cdot Before disconnecting the connector, always turn the starting switch OFF.
- Before carrying out below procedure, check all the related connectors are properly inserted and short of fuse No. 1,2,5,7,12,13,15
- · After checking, insert the disconnected connectors again immediately unless otherwise specified.

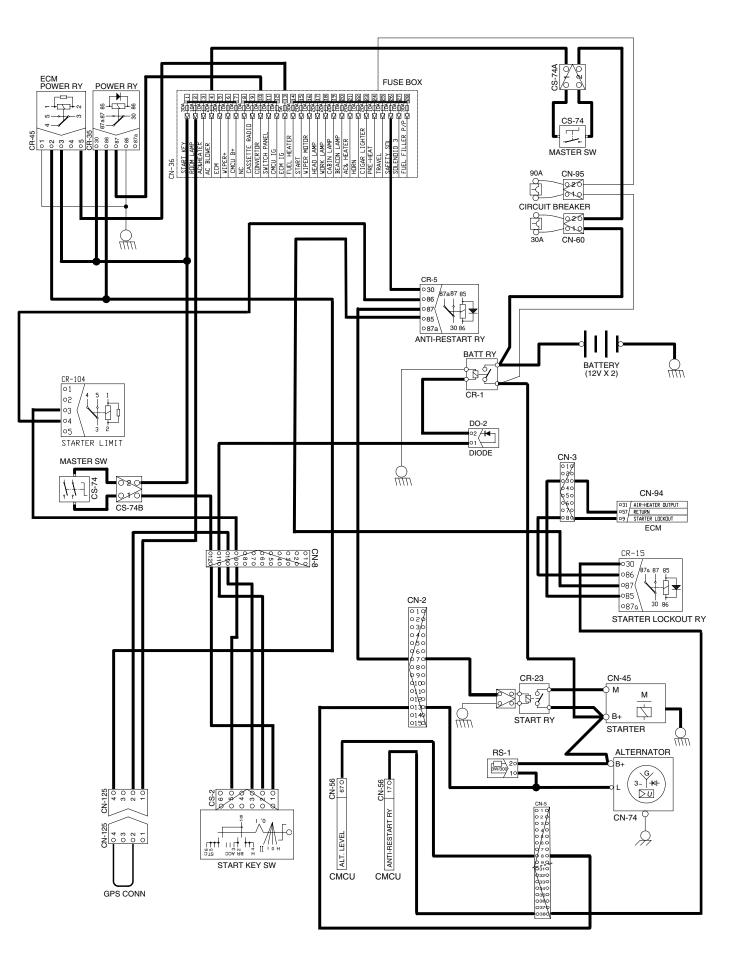




12. WHEN STARTING SWITCH ON DOES NOT OPERATE

- · Before disconnecting the connector, always turn the starting switch OFF.
- Before carrying out below procedure, check all the related connectors are properly inserted, master switch ON and check open circuit of fusible link (CN-60).
- · After checking, insert the disconnected connectors again immediately unless otherwise specified.



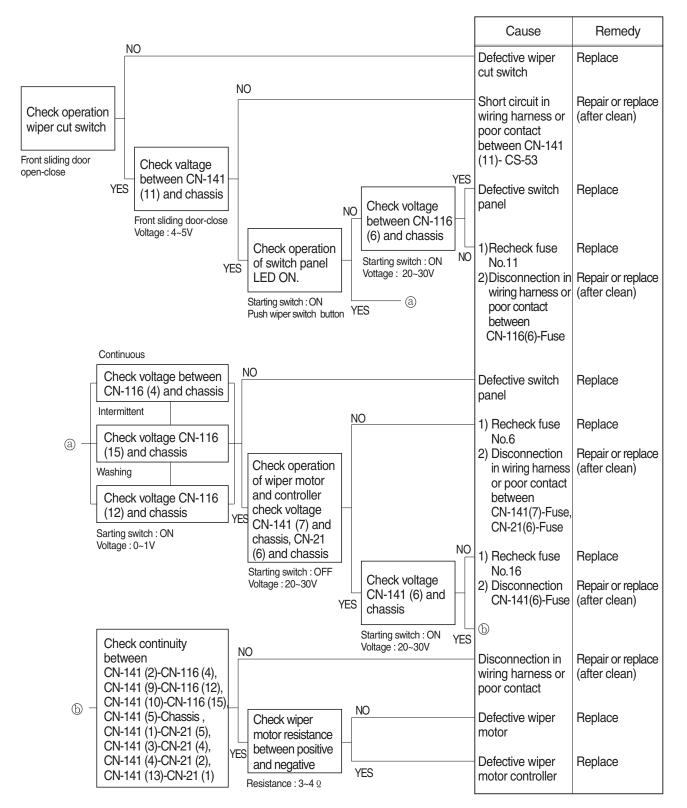


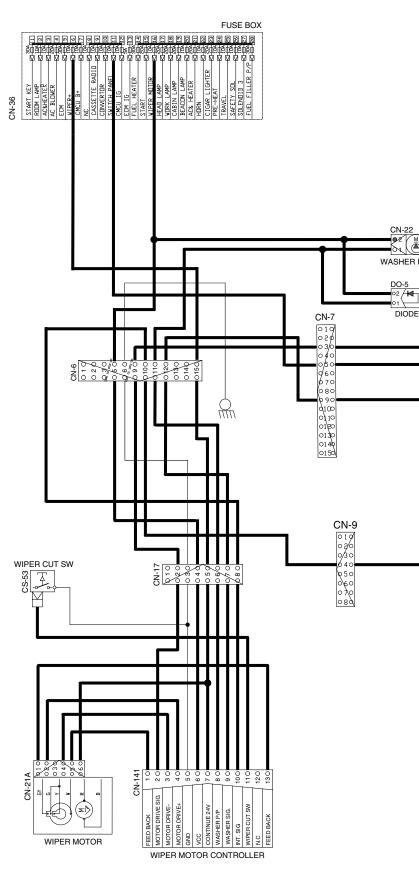
13. WHEN STARTING SWITCH IS TURNED ON, WIPER MOTOR DOES NOT OPERATE

· Before disconnecting the connector, always turn the starting switch OFF.

· Before carrying out below procedure, check all the related connectors are properly inserted and fuse No. 6, 11 and 16 burnt out.

After checking, insert the disconnected connectors again immediately unless otherwise specified.





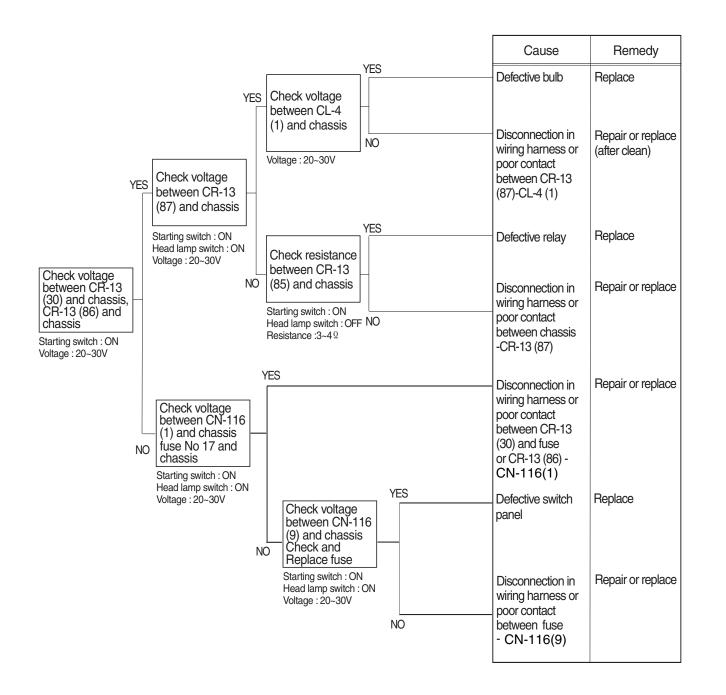
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						l					
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CN-116	000 1000 1000	200	07	80 60	010	012	013	014	015	016	017
CN-	WORK L HEAD L	05 PRE-HEAT	0.7 CABIN LIG	HEAD L CABIN	WURK L	012 WASHER SIG	OI3 GND	014 TRAVEL ALARM	OI5 INT. SIG	CABIN	CABIN
	WIRK LIGHT DUT WORK LIGHT DUT WORK LIGHT DUT HEAD LIGHT DUT	AT no no	07 CABIN LIGHT DUT	09 HEAD LIHGT 24V 08 CABIN LIGHT DUT	010 WORK LIGHT 24V	SIG		. ALARM	:16	O16 CABIN LIGHT 24V	017 CABIN LIGHT 24V
				псн	PAN	 IEL				~	<

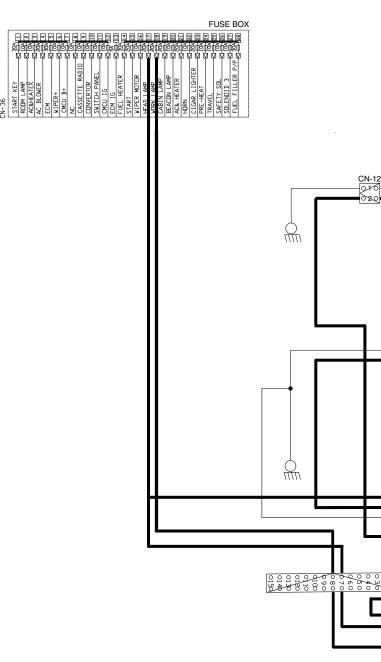
DO-5 ●⁰²/₩

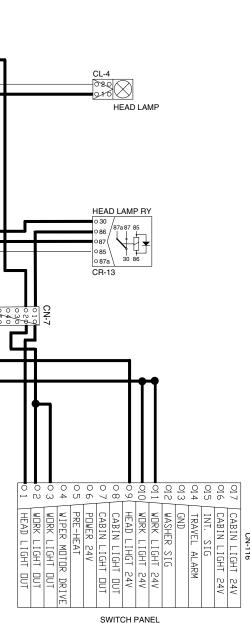
WASHER PUMP

14. WHEN STARTING SWITCH IS TURNED ON, HEAD LAMP DOES NOT LIGHTS UP

- · Before disconnecting the connector, always turn the starting switch OFF.
- Before carrying out below procedure, check all the related connectors are properly inserted and fuse No.17 burnt out.
- · After checking, insert the disconnected connectors again immediately unless otherwise specified.



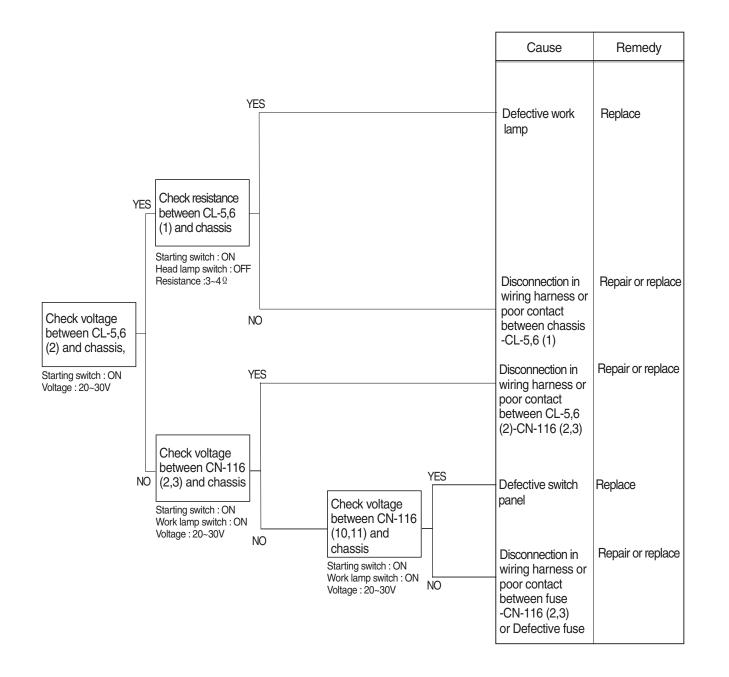


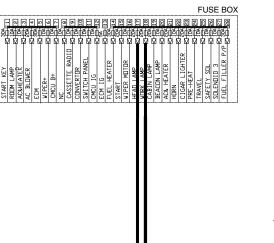


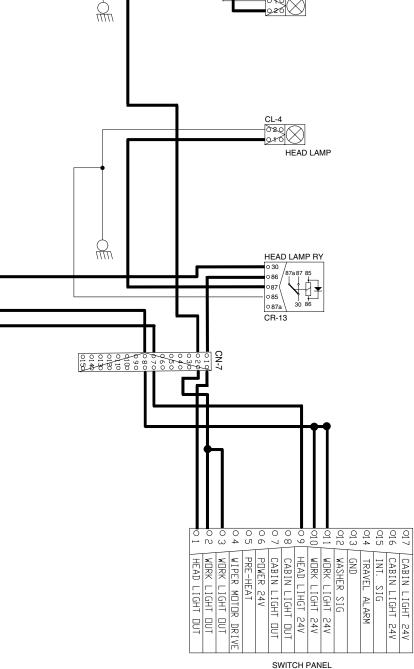
AMP

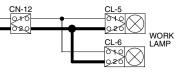
15. WHEN STARTING SWITCH IS TURNED ON, WORK LAMP DOES NOT LIGHTS UP

- · Before disconnecting the connector, always turn the starting switch OFF.
- Before carrying out below procedure, check all the related connectors are properly inserted and fuse
 No.18 burnt out.
- · After checking, insert the disconnected connectors again immediately unless otherwise specified.







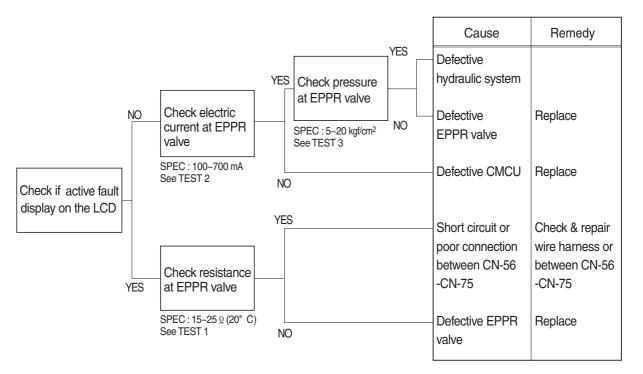


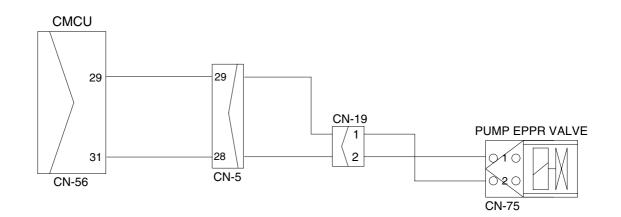
GROUP 4 MECHATRONICS SYSTEM

1. ALL ACTUATORS SPEED ARE SLOW

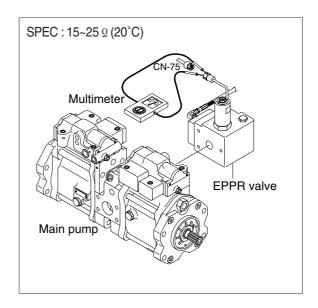
- * Boom, Arm, Bucket, Swing and travel speed are slow, but engine speed is good.
- * Spec : P-mode 1900 \pm 50 rpm S -mode 1800 \pm 50 rpm E-mode 1700 \pm 50 rpm
- * Before carrying out below procedure, check all the related connectors are properly inserted and fault code on the cluster.

1) INSPECTION PROCEDURE

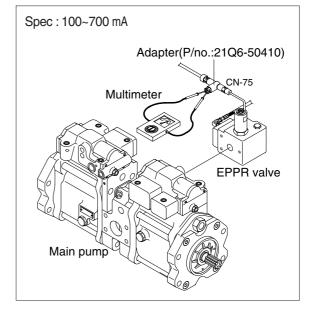




- (1) Test 1 : Check resistance at connector CN-75.
- ① Starting key OFF.
- ② Disconnect connector CN-75 from EPPR valve at main hydraulic pump.
- ③ Check resistance between 2 lines as figure.



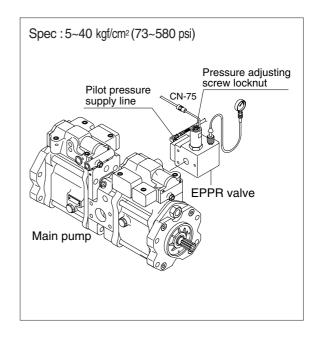
- (2) Test 2 : Check electric current at EPPR valve.
- Disconnect connector CN-75 from EPPR valve.
- ② Insert the adapter to CN-75 and install multimeter as figure.
- ③ Start engine.
- ④ Set H-mode and cancel auto decel mode.
- 5 Position the accel dial at 10.
- 6 If rpm display approx 1800 \pm 50 rpm check electric current at bucket circuit relief position.



- (3) **Test 3** : Check pressure at EPPR valve.
 - ① Remove plug and connect pressure gauge as figure.
 - Gauge capacity : 0 to 50 kgf/cm²

(0 to 710 psi)

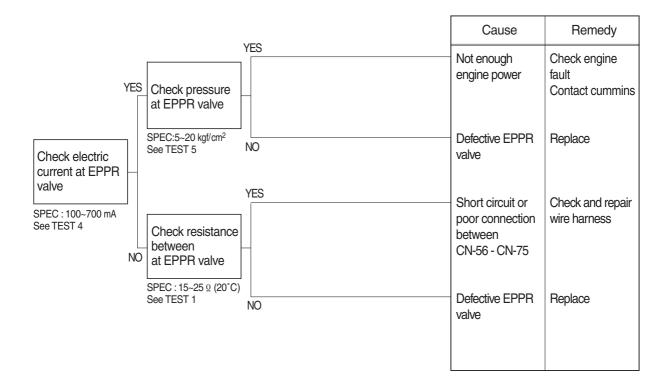
- ② Start engine.
- ③ Set H-mode and cancel auto decel mode.
- 4 Position the accel dial at 10.
- ⑤ If rpm display approx 1800±50 rpm check pressure at relief position of bucket circuit by operating bucket control lever.
- ⑥ If pressure is not correct, adjust it.
- $\bigodot\ensuremath{\textcircled{}}$ After adjust, test the machine.

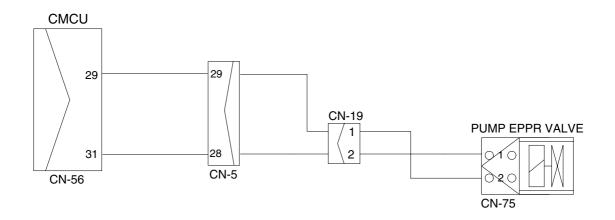


2. ENGINE STALL

* Before carrying out below procedure, check all the related connectors are properly inserted.

1) INSPECTION PROCEDURE

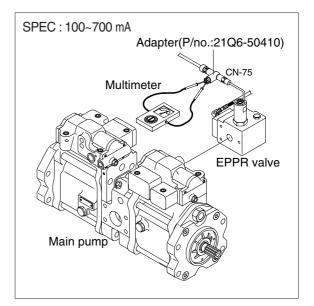


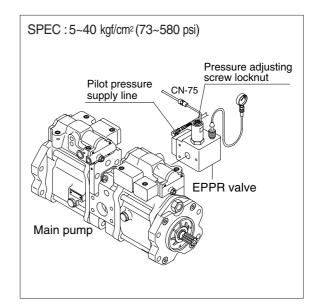


- (1) Test 4 : Check electric current at EPPR valve.
 - ① Disconnect connector CN-75 from EPPR valve.
 - ② Insert the adapter to CN-75 and install multimeter as figure.
 - 3 Start engine.
 - ④ Set H-mode and cancel auto decel mode.
 - 5 Position the accel dial at 10.
 - \bigcirc If rpm display approx 1800 \pm 50 rpm check electric current at bucket circuit relief position.

(2) Test 5 : Check pressure at EPPR valve.

- ① Remove plug and connect pressure gauge as figure.
 - Gauge capacity : 0 to 50 kgf/cm²
 (0 to 710 psi)
- ② Start engine.
- ③ Set H-mode and cancel auto decel
- 4 mode.
- ⑤ Position the accel dial at 10. If rpm display approx 1800±50 rpm check pressure at relief position of bucket circuit
- 6 by operating bucket control lever.
- If pressure is not correct, adjust it.
 After adjust, test the machine.

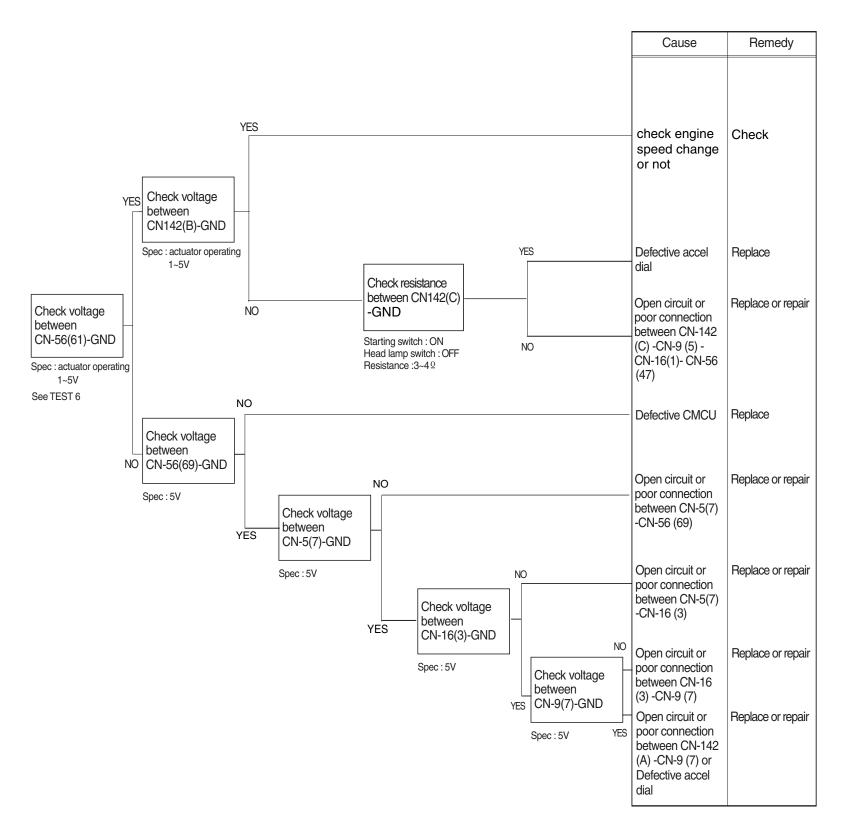


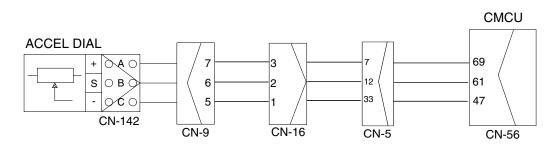


3. MALFUNCTION OF ACCEL DIAL

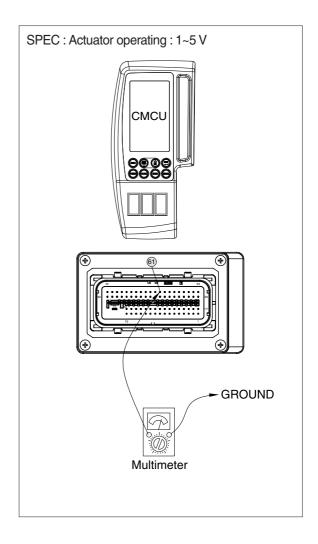
* Before carrying out below procedure, check all the related connectors are properly inserted.

1) INSPECTION PROCEDURE





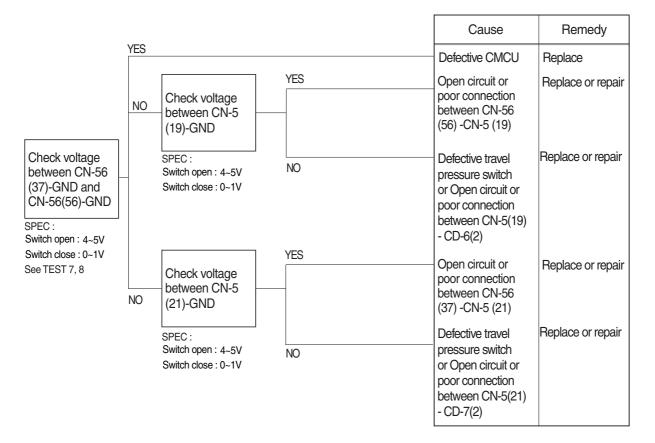
- (1) Test 6 : Check voltage at CN-56(61) and ground.
- ① Prepare 1 piece of thin sharp pin, steel or copper.
- ② Insert prepared pin to rear side of connectors : One pin to (61) of CN-56.
- 3 Starting key ON.
- 4 Check voltage as figure.

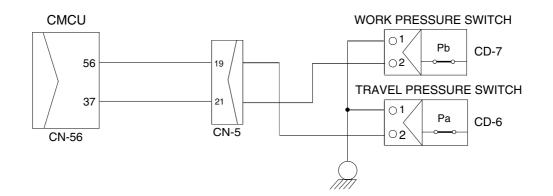


5. AUTO DECEL SYSTEM DOES NOT WORK

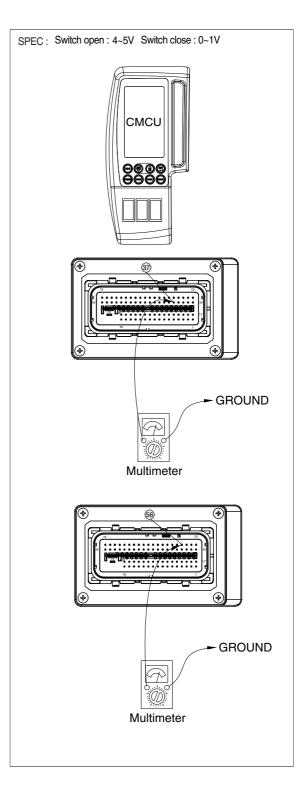
* Before carrying out below procedure, check all the related connectors are properly inserted.

1) INSPECTION PROCEDURE





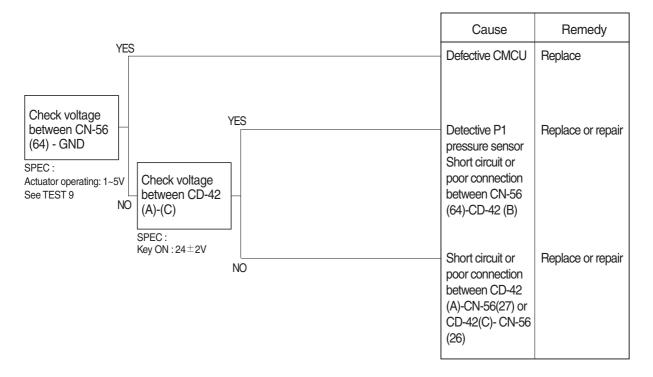
- (1) Test 7 : Check voltage at CN-56(37) and ground.
- ① Prepare 1 piece of thin sharp pin, steel or copper.
- ② Insert prepared pin to rear side of connectors : One pin to (37) of CN-56.
- ③ Starting key ON.
- 4 Check voltage as figure.
- (2) Test 8 : Check voltage at CN-56(56) and ground.
- ① Prepare 1 piece of thin sharp pin, steel or copper
- ② Insert prepared pin to rear side of connectors : One pin to (56) of CN-56.
- 3 Starting key ON.
- ④ Check voltage as figure.

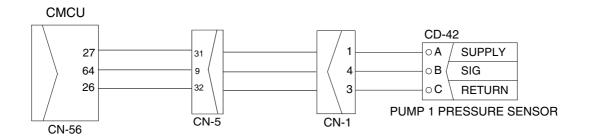


6. MALFUNCTION OF PUMP 1 PRESSURE SENSOR

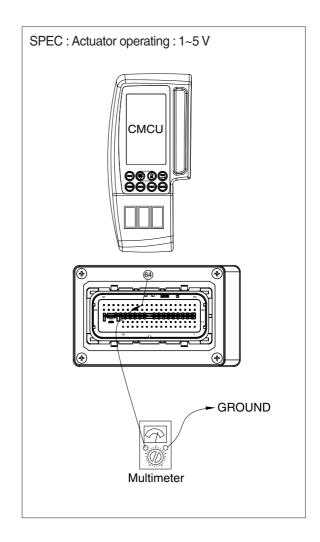
* Before carrying out below procedure, check all the related connectors are properly inserted.

1) INSPECTION PROCEDURE





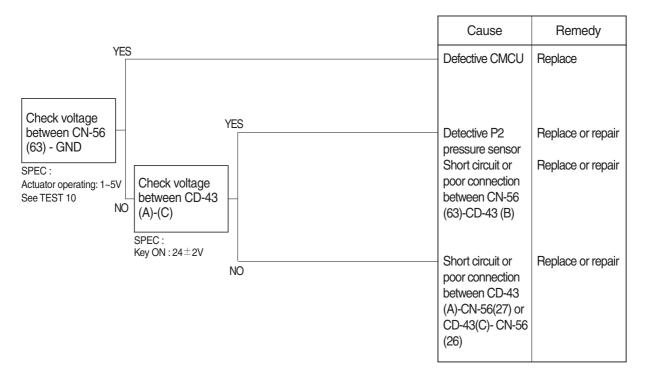
- (1) Test 9 : Check voltage at CN-56(64) and ground.
- ① Prepare 1 piece of thin sharp pin, steel or copper.
- ② Insert prepared pin to rear side of connectors : One pin to (64) of CN-56.
- 3 Starting key ON.
- 4 Check voltage as figure.

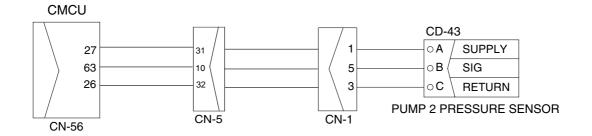


7. MALFUNCTION OF PUMP 2 PRESSURE SENSOR

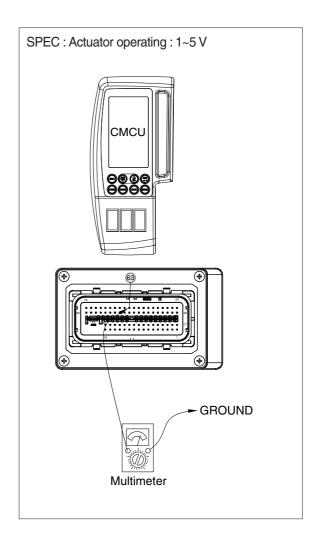
* Before carrying out below procedure, check all the related connectors are properly inserted.

1) INSPECTION PROCEDURE





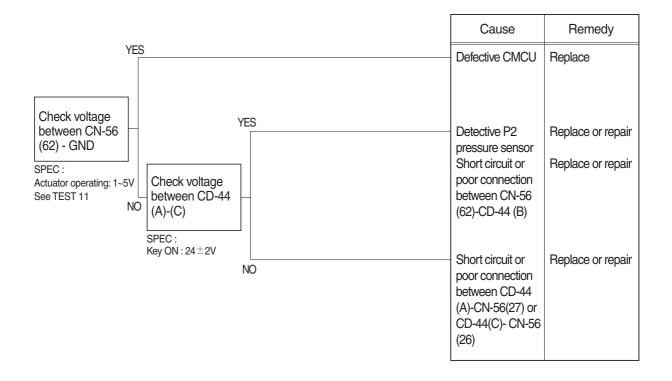
- (1) Test 10 : Check voltage at CN-56(63) and ground.
- ① Prepare 1 piece of thin sharp pin, steel or copper.
- ② Insert prepared pin to rear side of connectors : One pin to (63) of CN-56.
- 3 Starting key ON.
- 4 Check voltage as figure.

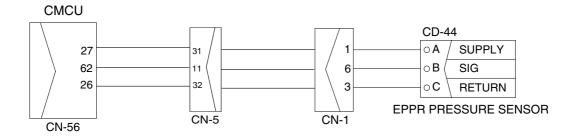


8. MALFUNCTION OF PUMP 3 PRESSURE SENSOR(EPPR PRESSURE)

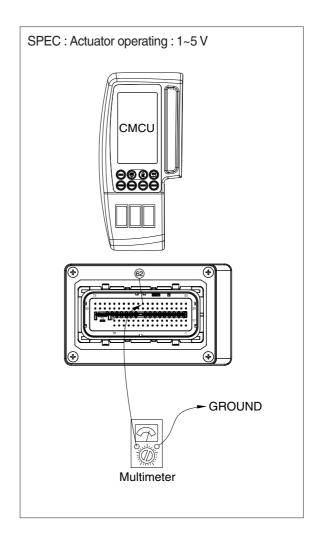
* Before carrying out below procedure, check all the related connectors are properly inserted.

1) INSPECTION PROCEDURE





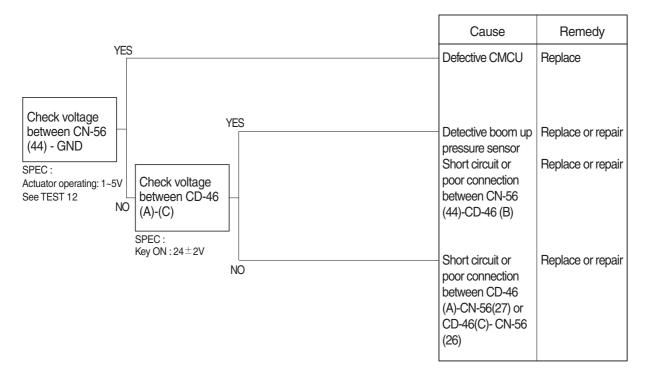
- (1) Test 11 : Check voltage at CN-56(62) and ground.
- ① Prepare 1 piece of thin sharp pin, steel or copper.
- ② Insert prepared pin to rear side of connectors : One pin to (62) of CN-56.
- 3 Starting key ON.
- 4 Check voltage as figure.

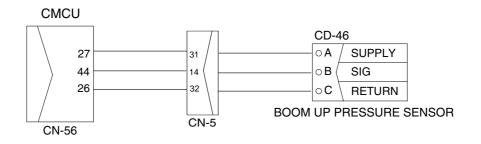


9. MALFUNCTION OF BOOM UP PRESSURE SENSOR

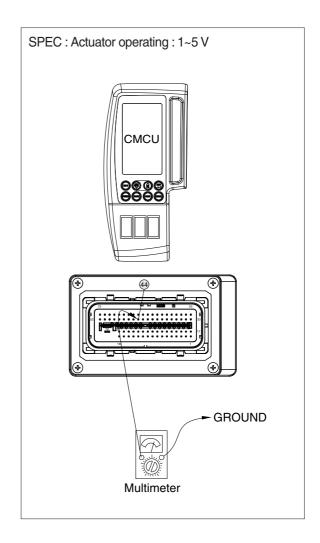
* Before carrying out below procedure, check all the related connectors are properly inserted.

1) INSPECTION PROCEDURE





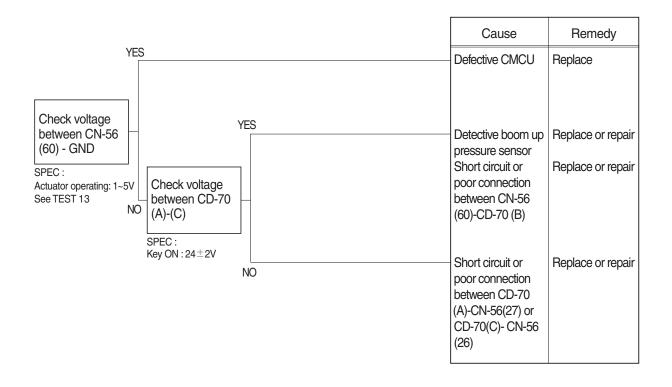
- (1) Test 12: Check voltage at CN-56(44) and ground.
- ① Prepare 1 piece of thin sharp pin, steel or copper.
- ② Insert prepared pin to rear side of connectors : One pin to (44) of CN-56.
- 3 Starting key ON.
- 4 Check voltage as figure.

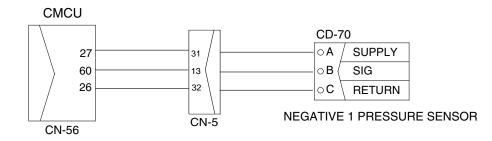


10. MALFUNCTION OF NEGATIVE 1 PRESSURE SENSOR

* Before carrying out below procedure, check all the related connectors are properly inserted.

1) INSPECTION PROCEDURE





- (1) Test 13 : Check voltage at CN-56(60) and ground.
- ① Prepare 1 piece of thin sharp pin, steel or copper.
- ② Insert prepared pin to rear side of connectors : One pin to (60) of CN-56.
- ③ Starting key ON.
- 4 Check voltage as figure.

