# FOREWORD

This Manual (Volume 2) contains diagnostics service procedures of electrical controller of the TOYOTA ELECTRIC POWERED FORKLIFT 7FB10 to 30 series and 7FBJ35.

For maintenance, specifications and repair procedures for the chassis, body and material handling system, refer to Volume 1 (Pub. No. CE315)

Please use these manuals for providing quick, correct servicing of the corresponding forklift models.

This manual deals with the above models as of September 1999. Please understand that disagreement can take place between the descriptions in the manual and actual vehicles due to change in design and specifications. Any change or modifications thereafter will be informed by Toyota Industrial Equipment Parts & Service News.

**TOYOTA MOTOR CORPORATION**

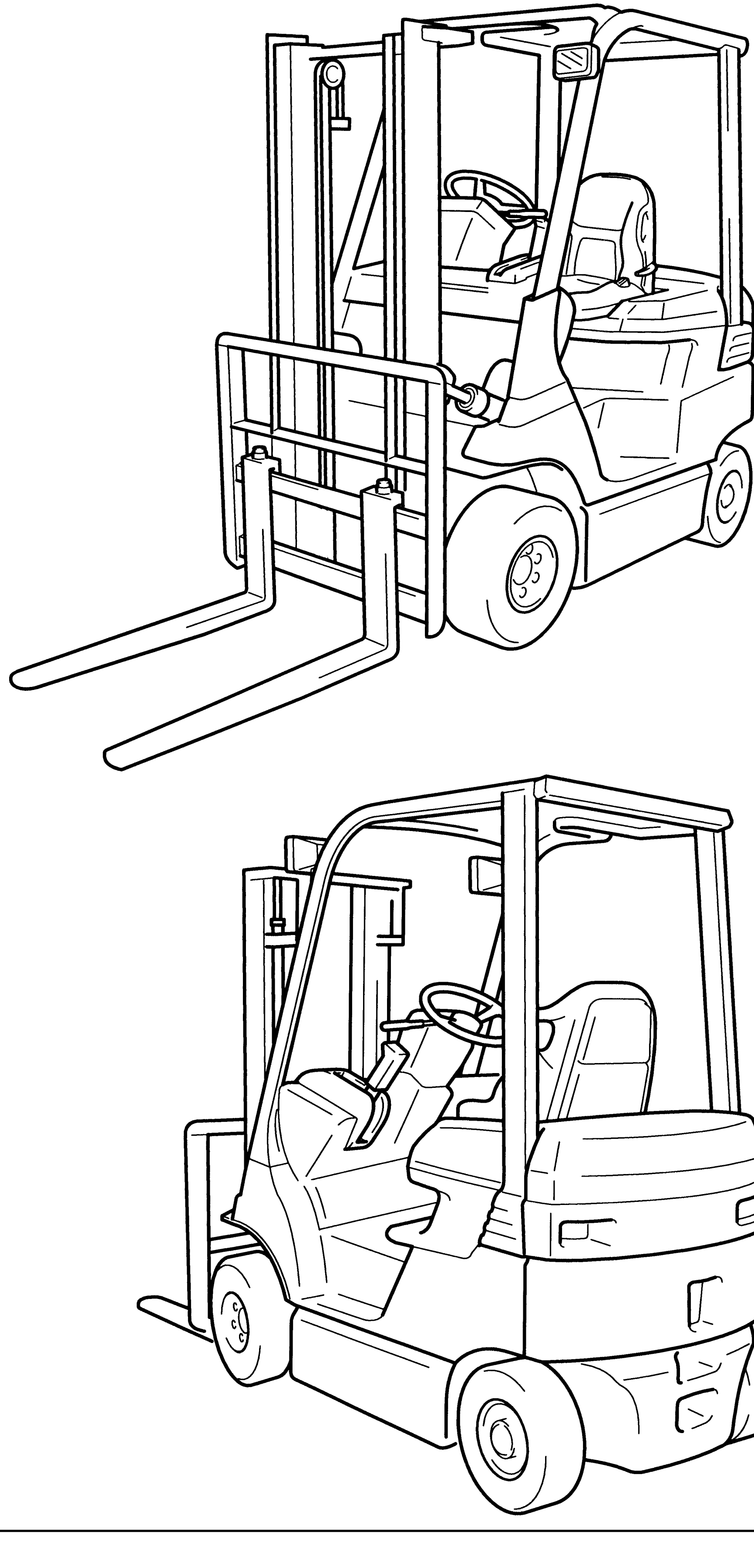
# SECTION INDEX



Sections indicated by solid characters are included in this manual.
Sections indicated by half-tone characters: See vol. 1.

# GENERAL

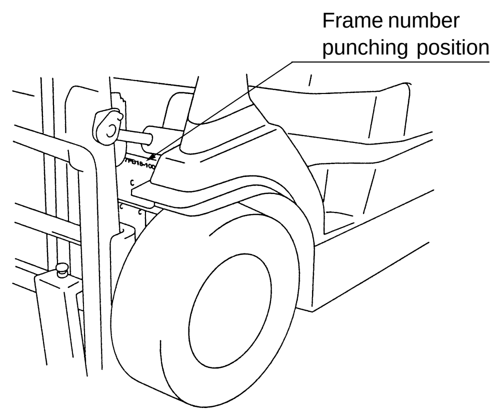
# EXTERIOR VIEWS



# VEHICLE MODEL

| Classification | | Vehicle model | Controller type | Voltage (V) |
|---|---|---|---|---|
| Series | Model | | | |
| 1 ton series | 1.0 ton model | 7FB10 | AC Micon controller | 48 |
| | | 7FBH10 | ↑ | ↑ |
| | 1.35 ton model | 7FB14 | ↑ | ↑ |
| | | 7FBH14 | ↑ | ↑ |
| | 1.5 ton model | 7FB15 | ↑ | ↑ |
| | | 7FBH15 | ↑ | ↑ |
| | | 40-7FB15 | ↑ | ↑ |
| | 1.8 ton model | 7FB18 | ↑ | ↑ |
| | | 7FBH18 | ↑ | ↑ |
| 2 ton series | 2.0 ton model | 7FB20 | ↑ | ↑ |
| | | 7FBH20 | ↑ | ↑ |
| | | 40-7FB20 | ↑ | ↑ |
| | 2.5 ton model | 7FB25 | ↑ | ↑ |
| | | 7FBH25 | ↑ | ↑ |
| | | 40-7FB25 | ↑ | ↑ |
| 3 ton series | 3.0 ton model | 7FB30 | ↑ | 80 |
| | 3.5 ton model | 7FBJ35 | ↑ | ↑ |

# FRAME NUMBER

| | Drive motor model | Vehicle model | Punching format | Punching position |
|---|---|---|---|---|
| 1 ton series | AP11 | 7FB10 | 7FB18–10001 |   |
| | | 7FBH10 | | |
| | | 7FB14 | | |
| | | 7FBH14 | | |
| | | 7FB15 | | |
| | | 7FBH15 | | |
| | | 7FB18 | | |
| | | 7FBH18 | | |
| | AP15 | 40-7FB15 | 7FB25–10001 | |
| 2 ton series | | 7FB20 | | |
| | | 7FBH20 | | |
| | | 7FB25 | | |
| | | 7FBH25 | | |
| | AP15 | 40-7FB20 | 407FB25–10001 | |
| | | 40-7FB25 | | |
| 3 ton series | AP16 | 7FB30 | 7FBJ35–10001 | |
| | | 7FBJ35 | | |

**Note: Ⓔ in place of [–] on vehicles for EEC.**

# OPERATIONAL TIPS

1. Safe operation
   (1) After jacking up, always support with wooden blocks or rigid stands.
   (2) When hoisting the vehicle or its heavy component, use wire rope(s) with a sufficient reserve in load capacity.
   (3) Always disconnect the battery plug before the inspection or servicing of electrical parts.

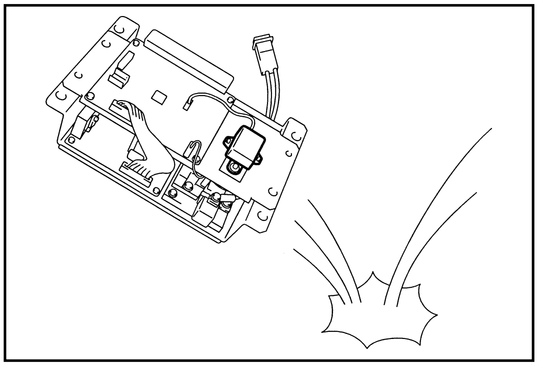
2. Tactful operation
   (1) Prepare the mechanic tools, necessary measuring instruments (circuit tester, megger, oil pressure gauge, etc.) and SSTs before starting operation.
   (2) Before disconnecting wiring, always check the cable color and wiring state.
   (3) When overhauling functional parts, complicated portions or related mechanisms, arrange the parts neatly to prevent confusion.
   (4) When disassembling and inspecting such a precision part as the control valve, use clean tools and operate in a clean location.
   (5) Follow the described procedures for disassembly, inspection and reassembly.
   (6) Replace, gaskets, packing and O-rings with new ones each time they are disassembled.
   (7) Use genuine Toyota parts for replacement.
   (8) Use specified bolts and nuts. Observe the specified tightening torque at the time of reassembly. (Tighten to the center of the specified tightening torque range.)
   If no tightening torque is specified, tighten the bolt or nut according to the standard tightening torque table.

3. Protection of functional parts
   (1) Thoroughly check each connector for any failure in or imperfect connection before reconnecting the battery plug after the end of vehicle inspection or maintenance.
   **Failure in or imperfect connection of connectors related to controllers, especially, may damage elements inside the controllers.**

4. Confirming defect status
   Do not start immediate disassembly or replacement, but first confirm if such disassembly or replacement is actually needed.

5. Handling of waste fluid, etc.
   When draining waste fluid from the vehicle, always receive it with an appropriate container.
   Since careless or arbitrary discharge or disposal of oil, fuel, coolant, oil filter, battery or any other harmful substance may cause adverse affect to people or environmental destruction, sort each waste and always ask an authorized contractor for appropriate disposal.

6. Handling of electronic parts

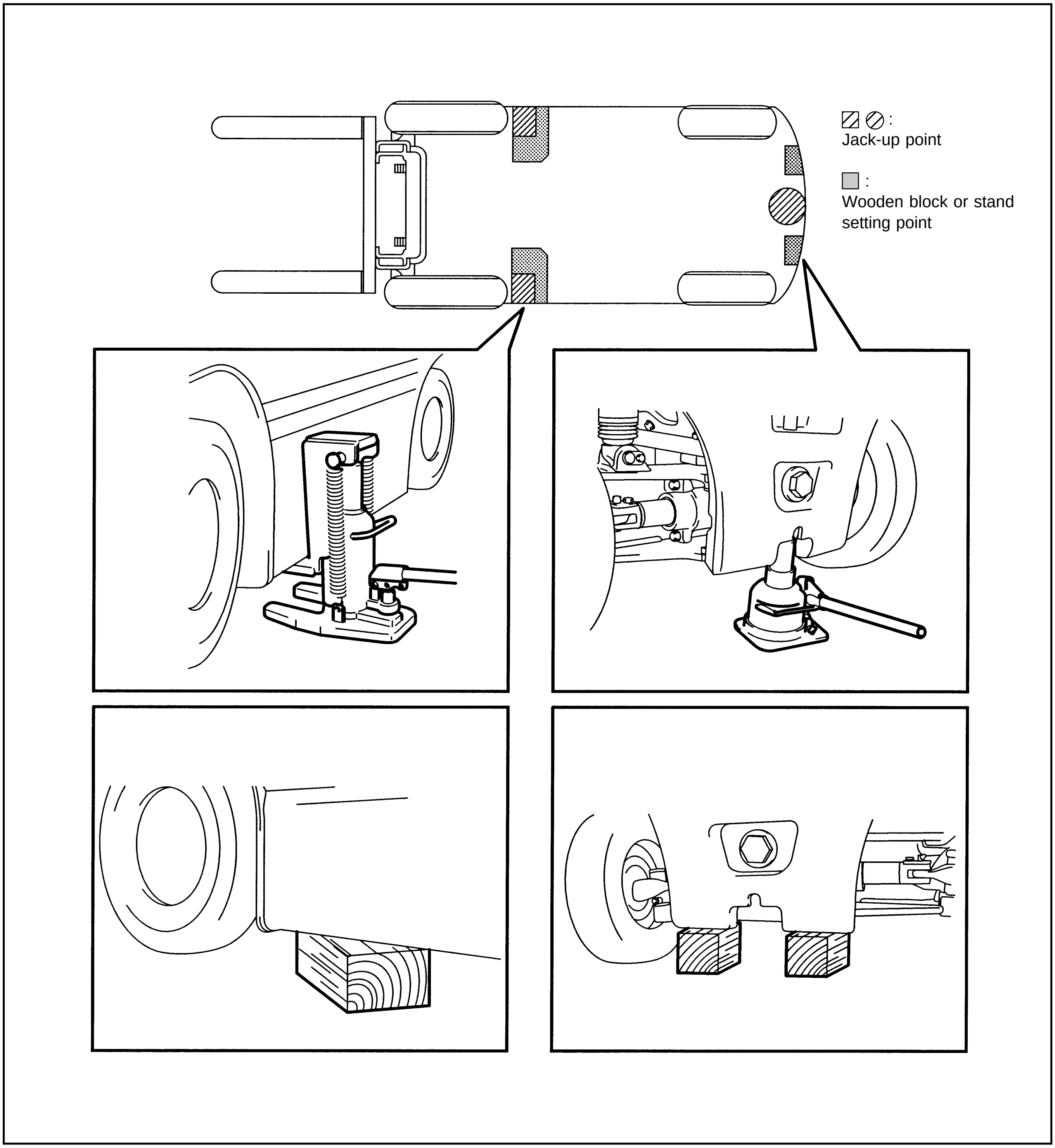


   (1) Never apply impacts to electronic parts such as a microcomputer or relay.
   (2) Never let electronic parts be exposed to a high temperature or humidity.
   (3) Do not touch connector pins since they may be deformed or be damaged due to static electricity.

# JACK-UP POINT

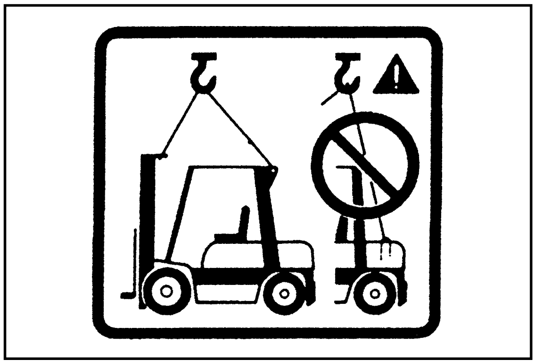
Strictly observe the following instructions when jacking up the vehicle.

- When a load is on the fork, unload it and park the vehicle on a flat floor. Be sure to avoid an inclined or rugged place.
- Use a jack with ample capacity and jack up the vehicle at the specified jack-up point. Jacking up at any other point will be dangerous.
- Never operate while the vehicle is held with a jack. Always support the frame with a wooden block after jacking up.
- In any case, never let a part of the body (including hands and feet) be under the jacked-up vehicle.

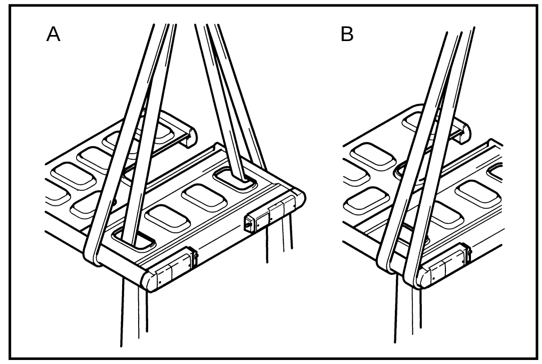


## HOISTING THE VEHICLE

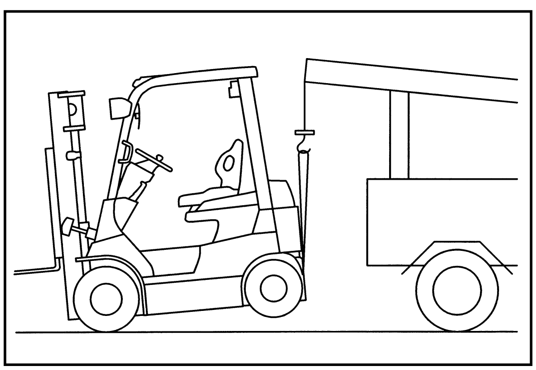
Always hoist each part of the vehicle at the specified position. Never hoist at any other position because it is very dangerous.

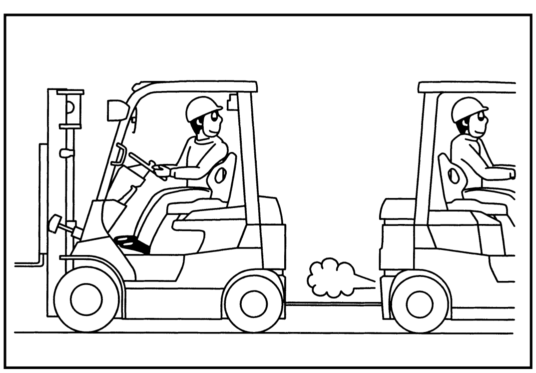


When hoisting the vehicle, sling with a fiber or wire rope at the mast hook hole and the rear end of the head guard.




Slinging the head guard can be done in two illustrated ways.
Case A:
Remove the head guard sheet.
case B:
If the fiber or wire rope comes into contact with a rear combination lamp, remove the lamp ASSY.





## CAUTION FOR TOWING

1. When towing the forklift, always lift the rear wheels away from the ground.

2. The traveling speed in towing must not exceed the maximum traveling speed of the forklift.

3. Always set the key switch to OFF and the direction switch to the neutral position before starting towing.
   In case of towing by connection with a wire rope with the operator on the forklift, however, set the key switch to ON (PS operation) and always set the direction switch to the neutral position.

4. Before towing, either remove the fork or take an action to prevent fork contact with the ground due to bounding.

# CIRCUIT TESTER

Circuit testers are available in both the analog and digital types. They should be used selectively according to the purpose of measurement.

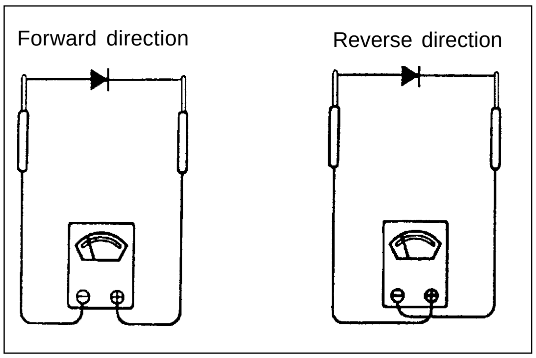
Analog type: This type is convenient for observing movement during operation, but the measured value should only be used for reference or rough judgement.

Digital type: Fairly accurate reading is possible, but it is difficult to observe the variation or movement.

1. Difference in measurement results with the digital type and analog type

   * The result may be different between measurements with the analog type and digital type.
   Always use a circuit tester according to its operation manual.
   Cautions when the polarities are different between the analog type and digital type are described below.

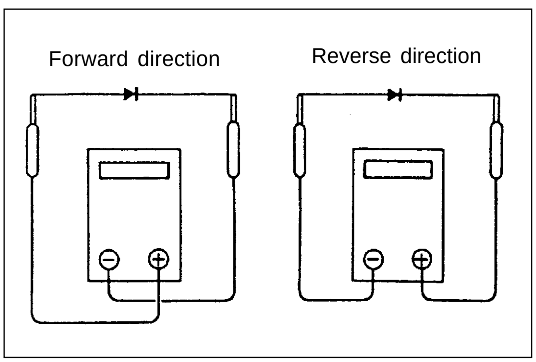
   (1) Analog circuit tester




Measurement result example
Tester range: kΩ range

| | Analog type |
|---|---|
| Forward | Continuity exists |
| | 11 kΩ |
| Reverse | No continuity |
| | ∞ |

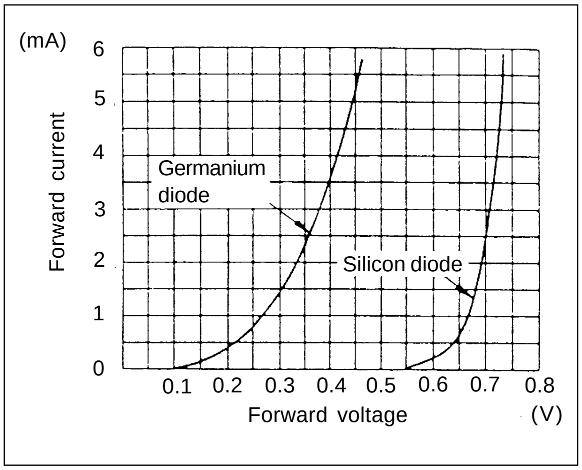
   (2) Digital circuit tester




Measurement result example
Tester range: MΩ range

| | Digital type |
|---|---|
| Forward | No continuity |
| | 1 |
| Reverse | Continuity exists |
| | 2 MΩ |

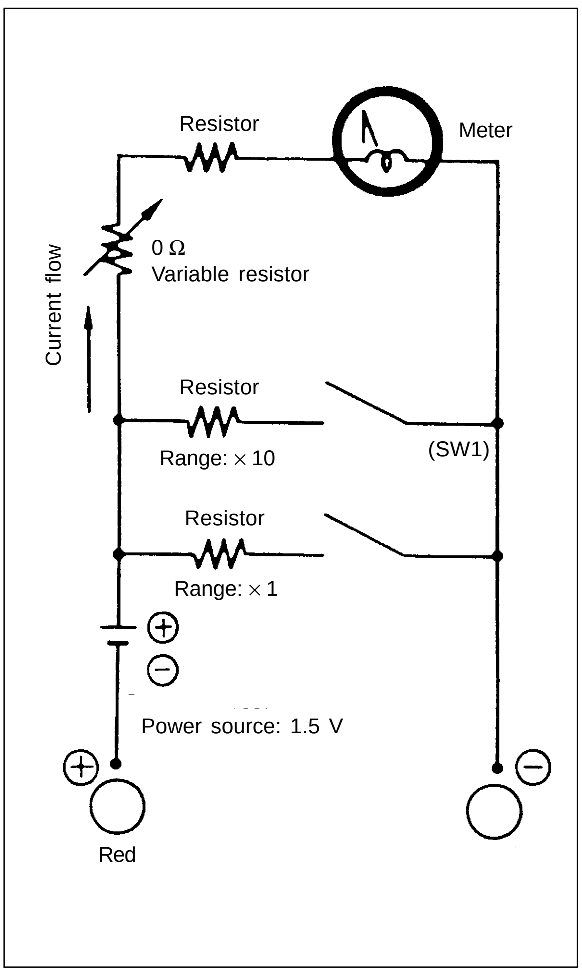
2. Difference in result of measurement with circuit tester
   The circuit tester power supply voltage depends on the tester type. 1.5 V, 3.0 V or 6.0 V is used.
   The resistance of a semiconductor such as a diode varies with the circuit tester power supply voltage.
   The diode characteristics are shown in the figure below.




The resistance values of the same semiconductor measured with two types of circuit testers having different power supply voltages are different.

This manual describes the results of measurement with a circuit tester whose power supply voltage is 3.0 V.

3. Difference in measurement result by measurement range (analog type)
   In the analog type circuit tester, changing the measurement range switches over the internal circuit to vary the circuit resistance. Even when the same diode is measured, the measurement result varies with the measurement range.




Always use the range described in the repair manual for measurement.

# CONTROLLER

## BOARD INSPECTION

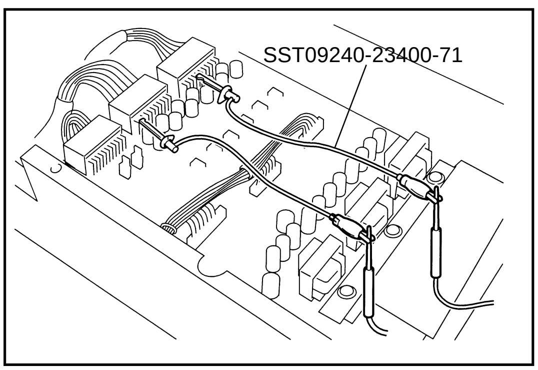
When the cause of a trouble is judged to exist in the CPU board or the DC/MD board, connect SST 09240-23400-71 or 09230-13700-71 to the corresponding connector and measure the applied voltage and resistance at each connector.
Always disconnect the battery plug before measuring the resistance.

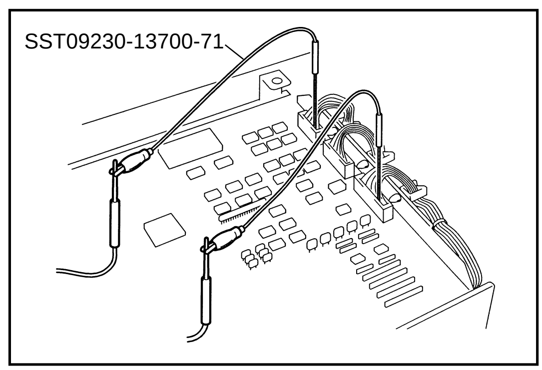
**Caution:**
**Always disconnect the battery plug before removing or installing the CPU board or the DC/MD board.**

**Note:**
**When replacing the CPU or DC/MD board since it is judged as the cause of a trouble as the result of troubleshooting, always measure the applied voltage and resistance of each related portion.**

(1) SST setting method
① Set the key switch to OFF and disconnect the battery plug.
② Connect the SST to the corresponding connector pin.

**Caution:**
**Carefully connect the SST to the correct connector pin by confirming the pin NO. since incorrect connection may damage normal portions.**




Connectors to which SST 09240-24300-71 is applicable

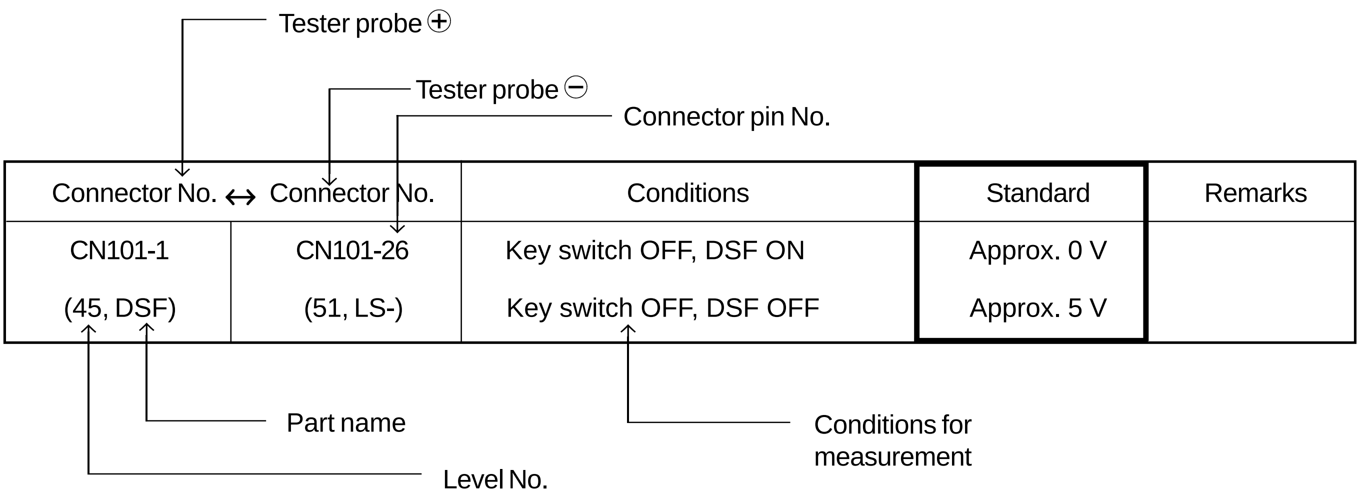
| | |
|---|---|
| CPU board: | CN101 ~ CN104 |
| DC/MD board: | CN111 ~ CN113 |
| SCPU board: | CN140 ~ CN142 |
| DC/SD board: | CN148 |

Connectors to which SST 09230-13700-71 is applicable

| | |
|---|---|
| CPU board: | CN105 ~ CN107 |
| DC/MD board: | CN108 ~ CN110 |
| SCPU board: | CN146, CN144 and CN145 |
| DC/SD board: | CN147 |

(2) Measurement method and standard list

① How to read the list






## Traveling and load handling systems

## CPU board

### CN101 connector basic conditions (battery plug ON, key switch ON)

| Connector No. | ↔ Connector No. | Conditions | Standard | Remarks |
|---|---|---|---|---|
| CN101-1<br>(45, DSF) | CN101-26<br>(51, LS-) | Key switch OFF, DSF ON<br>Key switch OFF, DSF OFF | Approx. 0 V<br>Approx. 5 V | |
| CN101-2<br>(46, DSR) | CN101-26<br>(51, LS-) | Key switch OFF, DSR ON<br>Key switch OFF, DSR OFF | Approx. 0 V<br>Approx. 5 V | |
| CN101-3<br>(65, LSB) | CN101-26<br>(51, LS-) | Key switch OFF, LSB ON<br>Key switch OFF, LSB OFF | Approx. 5 V<br>Approx. 0 V | |
| CN101-4<br>(66, LSPB) | CN101-26<br>(51, LS-) | Key switch OFF, LSPB ON<br>Key switch OFF, LSPB OFF | Approx. 5 V<br>Approx. 0 V | |
| CN101-5<br>(67, LSD) | CN101-26<br>(51, LS-) | Key switch OFF, LSD ON (with shorting connector)<br>Key switch OFF, LSD OFF | Approx. 0 V<br>Approx. 5 V | |
| CN101-6 | | Unused | – | |
| CN101-7 | | Unused | – | |
| CN101-8 | | Unused | – | |
| CN101-9<br>(307, SMTSA) | | Immeasurable | – | |
| CN101-10<br>(308, SMTSK) | | Immeasurable | – | |
| CN101-11<br>(63, LSAT1) | | Unused | – | |
| CN101-12<br>(309, SSTMA) | | Immeasurable | – | |
| CN101-13<br>(310, SSTMK) | | Immeasurable | – | |
| CN101-14<br>(93, M15V) | CN101-26<br>(51, LS-) | | Approx. 15 V | |

| Connector No. | ↔ Connector No. | Conditions | Standard | Remarks |
|---|---|---|---|---|
| CN101-15<br>(146, BIBC) | | Immeasurable | – | |
| CN101-16<br>(61, LSTF) | CN101-26<br>(51, LS-) | Key switch OFF, LSTF ON<br>Key switch OFF, LSTF OFF | Approx. 0 V<br>Approx. 5 V | |
| CN101-17<br>(62, LSTR) | CN101-26<br>(51, LS-) | Key switch OFF, LSTR ON<br>Key switch OFF, LSTR OFF | Approx. 0 V<br>Approx. 5 V | |
| CN101-18<br>(70, SWTK) | CN101-26<br>(51, LS-) | Key switch OFF, SWTK ON<br>Key switch OFF, SWTK OFF | Approx. 0 V<br>Approx. 5 V | |
| CN101-19<br>(90, MH1) | CN101-26<br>(51, LS-) | Lift cylinder at the bottom position | Approx. 0 V | |
| CN101-20<br>(91, MH2-1) | CN101-26<br>(51, LS-) | Lift cylinder at the bottom position | Approx. 5 V | |
| CN101-21<br>(92, MH2-2) | CN101-26<br>(51, LS-) | Lift cylinder at the bottom position | Approx. 5 V | |
| CN101-22<br>(69, LSAT2) | | Unused | – | |
| CN101-23 | | Unused | – | |
| CN101-24<br>(LSOPT2) | | Unused | – | |
| CN101-25<br>(145, BIBD) | | Immeasurable | – | |
| CN101-26<br>(51, LS-) | CN101-26<br>(51, LS-) | | Approx. 0 V | |
| CN101-27<br>(OPTO) | | Unused | – | |
| CN101-28 | | Unused | – | |
| CN101-29 | | Unused | – | |
| CN101-30 | | Unused | – | |
| CN101-31 | | Unused | – | |
| CN101-32<br>(60, LSL) | CN101-26<br>(51, LS-) | Key switch OFF, LSL ON<br>Key switch OFF, LSL OFF | Approx. 5 V<br>Approx. 0 V | |
| CN101-33 | | Unused | – | |
| CN101-34 | | Unused | – | |

**CN102 connector basic conditions (battery plug ON, key switch ON)**

| Connector No. ↔ | Connector No. | Conditions | Standard | Remarks |
|---|---|---|---|---|
| CN102-1<br>(64, SWAC) | CN101-22<br>(69, LSAT2) | Key switch OFF, SWAC ON<br>Key switch OFF, SWAC OFF | Approx. 0 V<br>4 V ~ 5 V | |
| CN102-2<br>(52, POTA) | CN101-22<br>(69, LSAT2) | Key switch OFF, accelertor pedal full depression | 0.5 V ~ 3 V | |
| CN102-3<br>(AOPT) | | Unused | – | |
| CN102-4<br>(56, POTT) | CN101-22<br>(69, LSAT2) | Variation upon changeover from forward to backward tilting | 0.5 V ~ 4 V | |
| CN102-5<br>(59, SPL) | CN101-22<br>(69, LSAT2) | | 0.5 V ~ 4 V | |
| CN102-6<br>(81, SSD1) | | Traveling in stopped state | Approx. 15 V<br>or 0 V | |
| CN102-7<br>(82, SSD2) | | Traveling in stopped state | Approx. 15 V<br>or 0 V | |
| CN102-8<br>(84, SSP+) | CN101-22<br>(51, LS-) | | Approx. 0 V | |
| CN102-9<br>(85, SSP-) | CN102-8<br>(84, SSP+) | Resistance measurement with battery OFF | Approx. 600 Ω | |
| CN102-10<br>(86, TD+) | CN101-22<br>(51, LS-) | | Approx. 4.6 V | |
| CN102-11<br>(87, TD-) | CN101-22<br>(51, LS-) | | 1 V ~ 4 V | |
| CN102-12<br>(88, TP+) | CN101-22<br>(51, LS-) | | Approx. 5 V | |
| C102-13<br>(89, TP-) | CN101-22<br>(51, LS-) | | 1 V ~ 4 V | |
| CN102-14<br>(53, POTA+) | CN101-22<br>(51, LS-) | | Approx. 4.6 V | |
| CN102-15<br>(54, AOPT+) | | Unused | – | |
| CN102-16<br>(57, POTT+) | CN101-22<br>(51, LS-) | | Approx. 4.6 V | |
| CN102-17<br>(58, SPL+) | CN101-22<br>(51, LS-) | | Approx. 5 V | |
| CN102-18<br>(80, SSD+) | CN101-22<br>(51, LS-) | | Approx. 14 V | |
| CN102-19<br>(83, SSD-) | CN101-22<br>(51, LS-) | | Approx. 0 V | |
| CN102-20 | | Unused | – | |
| CN102-21 | | Unused | – | |
| CN102-22<br>(51, POT-) | CN101-22<br>(51, LS-) | | Approx. 0 V | |

**CN103 connector basic conditions (battery plug OFF, key switch ON)**

| Connector No.↔ | Connector No. | Conditions | Standard | Remarks |
|---|---|---|---|---|
| CN103-1<br>(3, SOLL+) | CN103-2<br>(4, SOLL-) | Measurement with ⊖ probe in contact with CN103-2 | Approx. 11 V | |
| CN103-2<br>(4, SOLL-) | CN103-1<br>(3, SOLL+) | Resistance measurement with battery OFF | Approx. 10 Ω | |
| CN103-3<br>(41, B48V) | CN104-10<br>(N2, N2) | 1·2 ton series<br>3 ton, J3.5 ton | Approx. 48 V<br>Approx. 80 V | |
| CN103-4<br>(43, VBKY) | CN104-10<br>(N2, N2) | Key switch OFF<br>Key switch ON<br>1·2 ton series<br>3 ton, J3.5 ton | Approx. 0 V<br><br>Approx. 48 V<br>Approx. 80 V | |
| CN103-5<br>(5, SOLT+) | CN103-6<br>(6, SOLT-) | Measurement during forward tilting with ⊖ probe in contact with CN103-6 | Approx. 11 V | |
| CN103-6<br>(6, SOLT-) | CN103-5<br>(5, SOLT+) | Resistance measurement with battery OFF | Approx. 10 Ω | |
| CN103-7<br>(41, VBBT) | CN104-10<br>(N2, N2) | | Approx. 48 V | |
| CN103-8<br>(44, VBMB) | CN104-10<br>(N2, N2) | 1·2 ton series<br>3 ton, J3.5 ton<br>Key switch OFF | Approx. 48 V<br>Approx. 80 V<br>Approx. 0 V | |
| CN103-9 | | Unused | – | |
| CN103-10<br>(16, D15V) | CN104-10<br>(N2, N2) | | 14 V ~ 15 V | |
| CN103-11 | | Unused | – | |
| CN103-12<br>(14, GNDD) | CN104-10<br>(N2, N2) | | Approx. 0 V | |
| CN103-13<br>(144, SMTDK) | | Immeasurable | – | |
| CN103-14<br>(143, SDTMK) | | Immeasurable | – | |
| CN103-15<br>(142, SDTMA) | | Immeasurable | – | |
| CN103-16<br>(141, SMTDA) | | Immeasurable | – | |

**CN104 connector basic conditions (battery plug ON, key switch ON)**

| Connector No.↔ | Connector No. | Conditions | Standard | Remarks |
|---|---|---|---|---|
| CN104-1<br>(N2, N2C) | CN104-10<br>(N2, N2) | | Approx. 0 V | |
| CN104-2<br>(54, CSBATT) | CN104-10<br>(N2, N2) | | Approx. 7 V | |
| CN104-3 | | Unused | – | |
| CN104-4<br>(18, B80V) | CN104-10<br>(N2, N2) | 1·2 ton series<br>3 ton, J3.5 ton | Approx. 0 V<br>Approx. 80 V | |
| CN104-5<br>(75, CSD+) | CN104-10<br>(N2, N2) | | 14 V ~ 15 V | |
| CN104-6<br>(75, CSP+) | CN104-10<br>(N2, N2) | | 14 V ~ 15 V | |

| Connector No. | ↔ Connector No. | Conditions | Standard | Remarks |
|---|---|---|---|---|
| CN104-7<br>(71, CSDA) | CN104-10<br>(N2, N2) | | Approx. 7 V | |
| CN104-8<br>(72, CSDB) | CN104-10<br>(N2, N2) | | Approx. 7 V | |
| CN104-9<br>(13, C20V) | CN104-10<br>(N2, N2) | | Approx. 21 V | |
| CN104-10<br>(N2, N2) | CN104-10<br>(N2, N2) | | Approx. 0 V | |
| CN104-11<br>(2, MB-) | CN104-13<br>(1, MB+) | Resistance measurement with battery OFF | Approx. 20 Ω | |
| CN104-12<br>(P2, VBP2) | CN104-10<br>(N2, N2) | | Approx. 50 V | |
| CN104-13<br>(1, MB+) | CN104-11<br>(2, MB-) | Measurement with ⊖ probe in contact with CN104-11 | Approx. 11 V | |
| CN104-14<br>(44, VBMB) | CN104-10<br>(N2, N2) | 1·2 ton series<br>3 ton, J3.5 ton | Approx. 48 V<br>Approx. 80 V | |
| CN104-15<br>(41, B48V) | CN104-10<br>(N2, N2) | 1·2 ton series<br>3 ton, J3.5 ton | Approx. 48 V<br>Approx. 80 V | |
| CN104-16<br>(16, D15V) | CN104-10<br>(N2, N2) | | 14 V ~ 15 V | |
| CN104-17<br>(15, C15V) | CN104-10<br>(N2, N2) | | 14 V ~ 15 V | |
| CN104-18<br>(73, CSPA) | CN104-10<br>(N2, N2) | | Approx. 7 V | |
| CN104-19<br>(74, CSPB) | CN104-10<br>(N2, N2) | | Approx. 7 V | |
| CN104-20<br>(78, THCD) | CN104-10<br>(N2, N2) | | 1 V ~ 4 V | |
| CN104-21<br>(77, THC+) | CN104-10<br>(N2, N2) | | Approx. 5 V | |
| CN104-22<br>(44, VBMB) | CN104-10<br>(N2, N2) | | Approx. 50 V | |
| CN104-23<br>(14, GNDD) | CN104-10<br>(N2, N2) | | Approx. 0 V | |
| CN104-24<br>(14, GNDC) | CN104-10<br>(N2, N2) | | Approx. 0 V | |
| CN104-25<br>(79, THCP) | CN104-10<br>(N2, N2) | | 1 V ~ 4 V | |
| CN104-26 | | Unused | – | |
| CN104-27<br>(76, CSD-) | CN104-10<br>(N2, N2) | | Approx. 0 V | |
| CN104-28<br>(76, CSP-) | CN104-10<br>(N2, N2) | | Approx. 0 V | |

**CN105 connector basic conditions (battery plug ON, key switch ON, direction lever at N, and motor cable disconnection)**

| Connector No.↔ | Connector No. | Conditions | Standard | Remarks |
|---|---|---|---|---|
| CN105-1<br>(38, FAN+) | CN104-10<br>(N2, N2) | | Approx. 5 V | |
| CN105-2<br>(38, FAN+) | CN104-10<br>(N2, N2) | | Approx. 5 V | |
| CN105-3<br>(36, FANCD) | CN104-10<br>(N2, N2) | | Approx. 5 V<br>(Approx. 4.5 V) | Fan stopped<br>(fan ON) |
| CN105-4<br>(37, FANCP) | CN104-10<br>(N2, N2) | | Approx. 5 V<br>(Approx. 4.5 V) | Fan stopped<br>(fan ON) |
| CN105-5 | | Unused | Approx. 6 V | |
| CN105-6<br>(39, DDC) | CN104-10<br>(N2, N2) | | Approx. 4 V | |
| CN105-7<br>(40, PDC) | CN104-10<br>(N2, N2) | | Approx. 4 V | |
| CN105-8<br>(94, CKFAND+) | CN104-10<br>(N2, N2) | | Approx. 0 V<br>(Approx. 0.5 V) | Fan stopped<br>(fan ON) |
| CN105-9<br>(97, CKFAND-) | | Immeasurable | – | |
| CN105-10<br>(98, CKFANP+) | CN105-11<br>(99, CKFANP-) | | Approx. 0 V<br>(Approx. 0.5 V) | Fan stopped<br>(fan ON) |
| CN105-11<br>(99, CKFANP-) | | Immeasurable | – | |
| CN105-12 | | Unused | – | |
| CN105-13 | | Unused | – | |
| CN105-14<br>(100, CHGFAN) | CN104-10<br>(N2, N2) | | Approx. 5 V | |

**CN106 connector basic conditions (battery plug ON, key switch ON, direction lever at N, and motor cable disconnection)**

| Connector No. | ↔ Connector No. | Conditions | Standard | Remarks |
|---|---|---|---|---|
| CN106-1 (33, TMPU+) | CN104-10 (N2, N2) | | Approx. 5 V | |
| CN106-2 (27, TMPAU-) | CN104-10 (N2, N2) | | Approx. 5 V | |
| CN106-3 (28, TMPBU-) | CN104-10 (N2, N2) | | Approx. 5 V | |
| CN106-4 (29, TMPCU-) | CN104-10 (N2, N2) | | Approx. 5 V | |
| CN106-5 (30, TMPAD-) | CN104-10 (N2, N2) | | Approx. 5 V | |
| CN106-6 (31, TMPBD-) | CN104-10 (N2, N2) | | Approx. 5 V | |
| CN106-7 (32, TMPCD-) | CN104-10 (N2, N2) | | Approx. 5 V | |
| CN106-8 (33, TMPD+) | CN104-10 (N2, N2) | | Approx. 5 V | |
| CN106-9 (35, CKPV) | CN104-10 (N2, N2) | | Approx. 10 V | |
| CN106-10 | | Unused | – | |
| CN106-11 | | Unused | – | |

**CN107 connector basic conditions (battery plug ON, key switch ON, direction lever at N, and motor cable disconnection)**

| Connector No. | ↔ Connector No. | Conditions | Standard | Remarks |
|---|---|---|---|---|
| CN107-1 (26, TMDU+) | CN104-10 (N2, N2) | | Approx. 5 V | |
| CN107-2 (20, TMDAU-) | CN104-10 (N2, N2) | | Approx. 5 V | |
| CN107-3 (21, TMDBU-) | CN104-10 (N2, N2) | | Approx. 5 V | |
| CN107-4 (22, TMDCU-) | CN104-10 (N2, N2) | | Approx. 5 V | |
| CN107-5 (23, TMDAD-) | CN104-10 (N2, N2) | | Approx. 5 V | |
| CN107-6 (24, TMDBD-) | CN104-10 (N2, N2) | | Approx. 5 V | |
| CN107-7 (25, TMDCD-) | CN104-10 (N2, N2) | | Approx. 5 V | |
| CN107-8 (26, TMDD+) | CN104-10 (N2, N2) | | Approx. 5 V | |
| CN107-9 (34, CKDV) | CN104-10 (N2, N2) | | Approx. 10 V | |
| CN107-10 | | Unused | – | |

# DC/MD board

**CN111 connector basic conditions**
**(battery plug ON, key switch ON, direction lever at neutral, and motor cable disconnection)**

| Connector No. ↔ | Connector No. | Conditions | Standard | Remarks |
|---|---|---|---|---|
| CN111-1 (150, TMDAU1+) | CN111-14 (P3, TMDAU-SD) | | 13 V ~ 15 V | |
| CN111-2 (152, TMDAD1+) | CN111-15 (N2, TMDAD-SD) | | 13 V ~ 15 V | |
| CN111-3 (154, TMDBU1+) | CN111-16 (P5, TMDBU-SD) | | 13 V ~ 15 V | |
| CN111-4 (153, TMDAU-G) | CN111-14 (P3, TMDAU-SD) | | 13 V ~ 15 V | |
| CN111-5 (153, TMDAD-G) | CN111-15 (N2, TMDAD-SD) | | 13 V ~ 15 V | |
| CN111-6 (155, TMDBU-G) | CN111-16 (P5, TMDBU-SD) | | 13 V ~ 15 V | |
| CN111-7 (157, TMDBD-G) | CN111-24 (N2, TMDBD-SD) | | 13 V ~ 15 V | |
| CN111-8 (159, TMDCU-G) | CN111-25 (P7, TMDCU-SD) | | 13 V ~ 15 V | |
| CN111-9 (161, TMDCD-G) | CN111-26 (N2, TMDCD-SD) | | 13 V ~ 15 V | |
| CN111-10 | | Unused | – | |
| CN111-11 (156, TMDBD1+) | CN111-24 (N2, TMDBD-SD) | | 13 V ~ 15 V | |
| CN111-12 (158, TMDCU1+) | CN111-25 (P7, TMDCU-SD) | | 13 V ~ 15 V | |
| CN111-13 (160, TMDCD1+) | CN111-26 (N2, TMDCD-SD) | | 13 V ~ 15 V | |
| CN111-14 (P3, TMDAU-SD) | | Immeasurable | – | |
| CN111-15 (N2, TMDAD-SD) | | Immeasurable | – | |
| CN111-16 (P5, TMDBU-SD) | | Immeasurable | – | |
| CN111-17 (150, TMDAU2+) | CN111-14 (P3, TMDAU-SD) | | 13 V ~ 15 V | |
| CN111-18 (152, TMDAD2+) | CN111-15 (N2, MDAD-SD) | | 13 V ~ 15 V | |
| CN111-19 (154, TMDBU2+) | CN111-16 (P5, TMDBU-SD) | | 13 V ~ 15 V | |
| CN111-20 (156, TMDBD2+) | CN111-24 (N2, TMDBD-SD) | | 13 V ~ 15 V | |
| CN111-21 (158, TMDCU2+) | CN111-25 (P7, TMDCU-SD) | | 13 V ~ 15 V | |
| CN111-22 (160, TMDCD2+) | CN111-26 (N2, TMDCD-SD) | | 13 V ~ 15 V | |
| CN111-23 | | Unused | – | |

| Connector No.↔ Connector No. | | Conditions | Standard | Remarks |
|---|---|---|---|---|
| CN111-24 (N2, TMDBD-SD) | | Immeasurable | – | |
| CN111-25 (P7, TMDCU-SD) | | Immeasurable | – | |
| CN111-26 (N2, TMDCD-SD) | | Immeasurable | – | |

**CN112 connector basic conditions**
**(battery plug ON, key switch ON, direction lever at neutral, and motor cable disconnection)**

| Connector No.↔ Connector No. | | Conditions | Standard | Remarks |
|---|---|---|---|---|
| CN112-1 (162, TMPAU1+) | CN112-14 (P12, TMPAU-SD) | | 13 V ~ 15 V | |
| CN112-2 (164, TMPAD1+) | CN112-15 (N2, TMPAD-SD) | | 13 V ~ 15 V | |
| CN112-3 (166, TMPBU1+) | CN112-16 (P14, TMPBU-SD) | | 13 V ~ 15 V | |
| CN112-4 (163, TMPAU-G) | CN112-14 (P12, TMPAU-SD) | | 13 V ~ 15 V | |
| CN112-5 (165, TMPAD-G) | CN112-15 (N2, TMPAD-SD) | | 13 V ~ 15 V | |
| CN112-6 (167, TMPBU-G) | CN112-16 (P14, TMPBU-SD) | | 13 V ~ 15 V | |
| CN112-7 (169, TMPBD-G) | CN112-24 (N2, TMPBD-SD) | | 13 V ~ 15 V | |
| CN112-8 (171, TMPCU-G) | CN112-25 (P16, TMPCU-SD) | | 13 V ~ 15 V | |
| CN112-9 (173, TMPCD-G) | CN112-26 (N2, TMPCD-SD) | | 13 V ~ 15 V | |
| CN112-10 | | Unused | – | |
| CN112-11 (168, TMPBD1+) | CN112-24 (N2, TMPBD-SD) | | 13 V ~ 15 V | |
| CN112-12 (170, TMPCU1+) | CN112-25 (P16, TMPCU-SD) | | 13 V ~ 15 V | |
| CN112-13 (172, TMPCD1+) | CN112-26 (N2, TMPCD-SD) | | 13 V ~ 15 V | |
| CN112-14 (P12, TMPAU-SD) | | Immeasurable | – | |
| CN112-15 (N2, TMPAD-SD) | | Immeasurable | – | |
| CN112-16 (P14, TMPBU-SD) | | Immeasurable | – | |
| CN112-17 (162, TMPAU2+) | CN112-14 (P12, TMPAU-SD) | | 13 V ~ 15 V | |
| CN112-18 (164, TMPAD2+) | CN112-15 (N2, TMPAD-SD) | | 13 V ~ 15 V | |
| CN112-19 (166, TMPBU2+) | CN112-16 (P14, TMPBU-SD) | | 13 V ~ 15 V | |
| CN112-20 (168, TMPBD2+) | CN112-24 (N2, TMPBD-SD) | | 13 V ~ 15 V | |

| Connector No. | ↔ Connector No. | Conditions | Standard | Remarks |
|---|---|---|---|---|
| CN112-21 (170, TMPCU2+) | CN112-25 (P16, TMPCU-SD) | | 13 V ~ 15 V | |
| CN112-22 (172, TMPCD2+) | CN112-26 (N2, TMPCD-SD) | | 13 V ~ 15 V | |
| CN112-23 | | Unused | – | |
| CN112-24 (N2,TMPBD-SD) | | Immeasurable | – | |
| CN112-25 (P16, TMPCU-SD) | | Immeasurable | – | |
| CN112-26 (N2, TMPCD-SD) | | Immeasurable | – | |

**CN113 connector basic conditions**
**(battery plug ON, key switch ON, direction lever at neutral, and motor cable disconnection)**

| Connector No. | ↔ Connector No. | Conditions | Standard | Remarks |
|---|---|---|---|---|
| CN113-1 (41, B48V) | CN113-18 (N2, N2) | 1·2 ton series<br>3 ton, J3.5 ton | Approx. 48 V<br>Approx. 80 V | |
| CN113-2 (44, VBMB) | CN113-18 (N2, N2) | 1·2 ton series<br>3 ton, J3.5 ton | Approx. 48 V<br>Approx. 80 V | |
| CN113-3 | | Unused | – | |
| CN113-4 (7, FAND+) | CN113-18 (N2, N2) | | Approx. 0 V<br>(Approx. 24 V) | Fan stopped<br>(fan ON) |
| CN113-5 (8, FAND-) | | Immeasurable | – | |
| C113-6 (9, FANP+) | CN113-18 (N2, N2) | | Approx. 0 V<br>(Approx. 24 V) | Fan stopped<br>(fan ON) |
| CN113-7 (10, FANP-) | | Immeasurable | – | |
| CN113-8 | | Unused | – | |
| CN113-9 | | Unused | – | |
| CN113-10 | | Unused | – | |
| CN113-11 | | Unused | – | |
| CN113-12 (14, GNDD) | CN113-18 (N2, N2) | | Approx. 0 V | |
| CN113-13 (14, GNDC) | CN113-18 (N2, N2) | | Approx. 0 V | |
| CN113-14 (15, D15V) | CN113-18 (N2, N2) | | 14 V ~ 15 V | |
| CN113-15 (15, C15V) | CN113-18 (N2, N2) | | 14 V ~ 15 V | |
| CN113-16 (13, C20V) | CN113-18 (N2, N2) | | Approx. 21 V | |
| CN113-17 (N2, N2) | | Immeasurable | – | |
| CN113-18 (N2, N2) | | Immeasurable | – | |

# MMP board

## CN114 to CN125 connectors basic conditions (battery plug ON, key switch ON)

| Connector No. | ↔ Connector No. | Conditions | Standard | Remarks |
|---|---|---|---|---|
| CNOOO-1<br>(TM∗∗∗2+) | CNOOO-3<br>(TM∗∗∗-SD) | | 14 V ~ 15 V | |
| CNOOO-2<br>(TM∗∗∗1+) | CNOOO-3<br>(TM∗∗∗-SD) | | 14 V ~ 15 V | |
| CNOOO-3<br>(TM∗∗∗-SD) | – | | – | |
| CNOOO-4<br>(TM∗∗∗-G) | CNOOO-3<br>(TM∗∗∗-SD) | | 13 V ~ 15 V | |

# PS system

## SCPU board

### CN140 connector: For software writing and not connected

### CN141 connector basic conditions (battery plug ON, key switch ON)

| Connector No. | ↔ Connector No. | Conditions | Standard | Remarks |
|---|---|---|---|---|
| CN141-1 (SSTXA) | | Immeasuable | – | |
| CN141-2 (SXTSA) | | Immeasurable | – | |
| CN141-3 (309, SSTMA) | | Immeasurable | – | |
| CN141-4 (307, SMTSA) | | Immeasurable | – | |
| CN141-5 (324, SS+) | CN141-15 (325, SS-) | Traveling stopped<br>Battery plug OFF and traveling stopped | 0 V<br>0 V, 620 Ω | |
| CN141-5 (324, SS+) | CN141-15 (325, SS-) | Battery plug OFF and traveling stopped | 620 Ω | |
| CN141-6 (312, STS1) | | Immeasurable | – | |
| CN141-7 (313, STS2) | | Immeasurable | – | |
| CN141-8 (314, STSC) | | Immeasurable | – | |
| CN141-9 (SSTXK) | | Immeasurable | – | |
| CN141-10 (SXTSK) | | Immeasurable | – | |
| CN141-11 (310, SSTMK) | | Immeasurable | – | |
| CN141-12 (308, SMTSK) | | Immeasurable | – | |
| CN141-13 (138, SL/L-) | CN141-16 (315, STS-) | | Approx. 5 V | |
| CN141-14 (137, SL/L+) | CN141-16 (315, STS-) | | Approx. 5 V | |
| CN141-15 (325, SS-) | CN146-6 (312, STS1) | Traveling stopped | Approx. 2.5 V | |
| CN141-16 (315, STS-) | CN146-6 (312, STS1) | | 0 V | |
| CN141-17 (311, STS+) | CN141-16 (315, STS-) | | Approx. 15 V | |
| CN141-18 | | Unused | – | |

**CN142 connector basic conditions (battery plug ON, key switch ON)**

| Connector No. | ↔ Connector No. | Conditions | Standard | Remarks |
|---|---|---|---|---|
| CN142-1 (POTOPT) | | Unused | – | |
| CN142-2 (319, POTS) | CN142-8 (314, STSC) | Vehicle frame in horizontal state | Approx. 3.2 V | |
| CN142-3 (317, POTH) | CN142-8 (314, STSC) | Steering wheel in neutral position | Approx. 2.0 V | |
| CN142-4 | | Unused | – | |
| CN142-5 | | Unused | – | |
| CN142-6 | | Unused | – | |
| CN142-7 (POTOPT-) | | Unused | – | |
| CN142-8 (320, SPOT-) | CN146-6 (312, STS1) | | 0 V | |
| CN142-9 (POTOPT+) | | Unused | – | |
| CN142-10 (318, POTS+) | CN142-8 (314, STSC) | | Approx. 5 V | |
| CN142-11 (316, P0TH+) | CN142-8 (314, STSC) | | Approx. 5 V | |
| CN142-12 | | Unused | – | |

**CN144 connector basic conditions (battery plug ON, key switch ON)**

| Connector No. | ↔ Connector No. | Conditions | Standard | Remarks |
|---|---|---|---|---|
| CN144-1 (321, SYR+) | CN144-2 (323, SYR-) | | Approx. 5 V | |
| CN144-2 (323, SYR-) | CN146-6 (353, GNDSC) | | 0 V | |
| CN144-3 (322, SYR) | CN144-2 (323, SYR-) | | Approx. 2.5 V | |

**CN145 connector basic conditions (battery plug ON, key switch ON)**

| Connector No. | ↔ Connector No. | Conditions | Standard | Remarks |
|---|---|---|---|---|
| CN145-1 (340, TMPSG) | | Immeasurable | – | |
| CN145-2 (P24, SH+) | | Immeasurable | – | |
| CN145-3 (N1, SH-) | CN148-7 (N1, N1) | | 0 V | |

**CN146 connector basic conditions (battery plug ON, key switch ON)**

| Connector No. | ↔ Connector No. | Conditions | Standard | Remarks |
|---|---|---|---|---|
| CN146-1 (PS15V) | | Immeasurable | – | |
| CN146-2 (44, VBMB) | CM146-6 (353, GNDSC) | Key switch OFF | Approx. 48 V (Approx. 80 V) | 1·2 ton series (3 ton, J3.5 ton) |
| CN146-3 (350, PS20V) | CN146-4 (351, GNDPS) | | Approx. 21 V | |
| CN146-4 (351, GNDPS) | | Immeasurable | – | |
| CN146-5 (352, SC15V) | CN146-6 (353, GNDSC) | | Approx. 15 V | |
| CN146-6 (353, GNDSC) | CN148-7 (N1, N1) | | 0 V | |
| CN146-7 (331, DRSOL+) | | Immeasurable | – | |
| CN146-8 (332, DRSOL-) | | Immeasurable | – | |
| CN146-9 (333, CKSOLS) | | Immeasurable | – | |
| CN146-10 (334, CKSOLST) | | Immeasurable | – | |
| CN146-11 (335, SGSOLS) | CN146-6 (353, GNDSC) | | 0 V | |
| CN146-12 (336, SGSOLST) | CN146-6 (353, GNDSC) | | Approx. 15 V | |
| CN146-13 (337, RESOL) | CN146-6 (353, GNDSC) | | Approx. 15 V | |
| CN146-14 | | Unused | – | |

## DC/SD board

### CN147 connector basic conditions (battery plug ON, key switch ON)

| Connector No. | ↔ Connector No. | Conditions | Standard | Remarks |
|---|---|---|---|---|
| CN147-1 | | Unused | | Measurement unnecessary |
| CN147-2 (44, VBMB) | CN147-6 (353, GNDSC) | Key switch ON | Approx. 48 V (Approx. 80 V) | 1·2 ton series (3 ton, J3.5 ton) |
| CN147-3 (350, PS20V) | CN147-4 (351, GNDPS) | | Approx. 21 V | |
| CN147-4 (351, GNDPS) | | Immeasurable | | |
| CN147-5 (352, SC15V) | CN147-6 (353, GNDSC) | | Approx. 15 V | |
| CN147-6 (353, GNDSC) | CN148-7 (351, GNDPS) | | 0 V | |
| CN147-7 (331, DRSOL+) | | Immeasurable | – | |
| CN147-8 (332, DRSOL-) | | Immeasurable | – | |
| CN147-9 (333, CKSOLS) | CN147-6 (353, GNDSC) | | – | |
| CN147-10 (334, CKSOLST) | CN147-6 (353, GNDSC) | | – | |
| CN147-11 (335, SGSOLS) | CN147-6 (353, GNDSC) | | – | |
| CN147-12 (336, SGSOLST) | CN147-6 (353, GNDSC) | | Approx. 15 V | |
| CN147-13 (337, RESOL) | CN147-6 (353, GNDSC) | | Approx. 15 V | |
| CN147-14 (CKT-G) | | Unused | – | |

**CN148 connector basic conditions (battery plug ON, key switch ON)**

| Connector No. | ↔ Connector No. | Conditions | Standard | Remarks |
|---|---|---|---|---|
| CN148-1<br>(327, SOLS+) | CN148-6<br>(328, SOLS-) | Key switch ON<br>Key switch OFF | Approx. 12 V<br>0 V<br>Approx. 6 Ω | |
| CN148-2<br>(329, SOLST+) | CN148-5<br>(330, SOLST-) | Key switch OFF | 0 V<br>Approx. 10 Ω | |
| CN148-3<br>(44, VBMB) | CN148-7<br>(N1, N1) | Key switch ON<br><br>Key switch OFF | Approx. 48 V<br>(Approx. 80 V)<br>0 V | 1.2 ton series<br>(3 ton, J3.5 ton) |
| CN148-4<br>(CK20V) | | Immeasurable | – | |
| CN148-5<br>(330, SOLST-) | CN148-7<br>(N1, N1) | | Approx. 12 V | |
| CN148-6<br>(328, SOLS-) | CN148-7<br>(N1, N1) | | 0 V | |
| CN148-7<br>(N1, N1) | | Immeasurable | – | |
| CN148-8 | | Immeasurable | – | |

**CN149 connector basic conditions (battery plug ON, key switch ON)**

| Connector No. | ↔ Connector No. | Conditions | Standard | Remarks |
|---|---|---|---|---|
| CN149-1<br>(340, TMPSG) | | Immeasurable | – | |

**CN51 connector basic conditions (battery plug ON, key switch ON)**

| Connector No. | ↔ Connector No. | Conditions | Standard | Remarks |
|---|---|---|---|---|
| CN51-1<br>(P21, VBP21) | CN51-4<br>(N1, TMPS) | | Approx. 48 V<br>(Approx. 80 V) | 1.2 ton series<br>(3 ton, J3.5 ton) |
| CN51-2<br>(P21, VBP21) | CN51-4<br>(N1, TMPS) | | Approx. 48 V<br>(Approx. 80 V) | 1.2 ton series<br>(3 ton, J3.5 ton) |
| CN51-3<br>(P23, P23) | CN51-4<br>(N1, TMPS) | PS motor stopped | Approx. 48 V<br>(Approx. 80 V) | 1.2 ton series<br>(3 ton, J3.5 ton) |
| CN51-4<br>(N1, N1) | CN148-7<br>(N1, N1) | | 0 V | 1.2 ton series<br>(3 ton, J3.5 ton) |

# MULTI-DISPLAY FUNCTIONS



4

# GENERAL

1. An LED display and hour meter are installed on the standard specification vehicle.

2. A plug-in analyzer (SST) is provided for the standard vehicle with the LED display.
   The plug-in analyzer has the following functions:
   - Indicating the status of vehicle's electrical system operation
   - Indicating the information on errors detected by controllers
   - Tuning of vehicle function setting

3. Use of the plug-in analyzer functions allows control system inspection and supports troubleshooting for quick, easy servicing and vehicle setting according to customer needs.

4. An LCD display is provided as a set on a vehicle with optional SAS features.

5. Differences of functions between the standard vehicle with the LED display and the vehicle with the optional LCD display are listed below. Since the plug-in analyzer is not mounted on the vehicle, it has nothing to do with the function table below.

○ : Available  – : Not available

| Function | Vehicle type | LED display and hour meter (standard) | LCD display (option) |
|---|---|---|---|
| Status display functions | Battery charge indicator | ○ | ○ |
| | Speedometer | – | ○ |
| | Two-traveling-speed control set indicator | – | ○ |
| | Swing lock indicator | – | ○ |
| | Parking brake ON indicator | – | ○ |
| | Power select indicator | – | ○ |
| Level setting function | Power select | – *1 | ○ |
| | Traveling power control level setting | – | ○ |
| | Load handling power control level setting | – | ○ |
| | Two-traveling-speed control level setting | – | ○ |
| Integrating functions | Key ON hour meter | ○ *2 | ○ |
| | Traveling/load handling motor ON hour meter | – | ○ |
| | Traveling motor ON hour meter | – | ○ |
| | Material handling motor ON hour meter | – | ○ |
| | Lap hour meter | – | ○ |
| | Odometer | – | ○ |
| | Trip meter | – | ○ |
| | Calendar and clock | – | ○ |
| Alarm functions | Battery overdischarge alarm | ○ | ○ |
| | Low battery charge alarm | ○ | ○ |
| | Battery electrolyte level alarm | – | ○ |
| | Overheat alarm | – | ○ |
| | Parking brake non-release alarm | – | ○ |
| | Parking brake application failure alarm | – | ○ *3 |
| | Return-to-neutral alarm | – | ○ |
| | Over-speed alarm | – | ○ |
| | Diagnostic display | ○ | ○ |

*1: A selector switch is provided on the instrument panel on the standard vehicle (with LED display).
*2: This represents the hour meter provided separately from the LED display on the standard vehicle.
*3: This function is provided only on the vehicle with the deadman switch (option).

# ABBREVIATIONS INDICATED ON PLUG-IN ANALYZER·MULTI-DISPLAY

| Abbreviation | Meaning | Abbreviation | Meaning |
|---|---|---|---|
| AOPT | Analog input voltage | SPL | Load sensor |
| C/R | Controller | SS1 | Steering angle sensor |
| CSBATT | Battery current | SSC | Steering angle sensor |
| DM | Drive motor | SSD1 | Traveling motor rpm sensor (1) |
| DSF | Forward direction switch | SSD2 | Traveling motor rpm sensor (2) |
| DSR | Reverse direction switch | SSOL | Swing solenoid |
| FAND | Traveling system fan | SSP | Pump motor rpm pulse sensor |
| FANP | Material handling system fan | STS | Steering angle sensor |
| H/M | Hour meter | STS1 | Steering angle sensor No. 1 |
| K-DIFF | Deviation of steering angle knob position | STS2 | Steering angle sensor No. 2 |
| K-POS | Steering angle knob position | STSC | Steering angle sensor for straight traveling |
| KSOL | Knob position conecting solenoid | | |
| LOAD | Material handling hydraulic pressure | SWAC | Accelerator switch |
| LSAT1 | Attachment switch No.1 | SWG | Swing angle sensor |
| LSAT2 | Attachment switch No.2 | SWTK | Tilt knob switch |
| LSB | Brake switch | TD | Drive motor temperature |
| LSD | Deadman seat switch | TEMP | Temperature on CPU board |
| LSL | Lift switch | THCD | Main traveling circuit temperature |
| LSOPT1 | Option limit switch No. 1 | THCP | Main load handling circuit temperature |
| LSOPT2 | Option limit switch No. 2 | TILTF | Forward tilt |
| LSTF | Forward tilt switch | TILTL | Tilt neutral position |
| LSTR | Backward tilt switch | TIRE | Tire angle sensor voltage |
| MH | Lifting height switch | TP | Material handling pump motor temperature |
| P/C | Power control | | |
| PM | Pump motor | VBBT | Battery voltage |
| POTA | Accelerator potentiometer | VBMB | Main battery input voltage |
| POTT | Tilt angle potentiometer | VBKY | Voltage after key switch |
| SPDM | Main vehicle speed | YAW | Yaw rate sensor voltage |
| SPDS | PS vehicle speed | | |

4

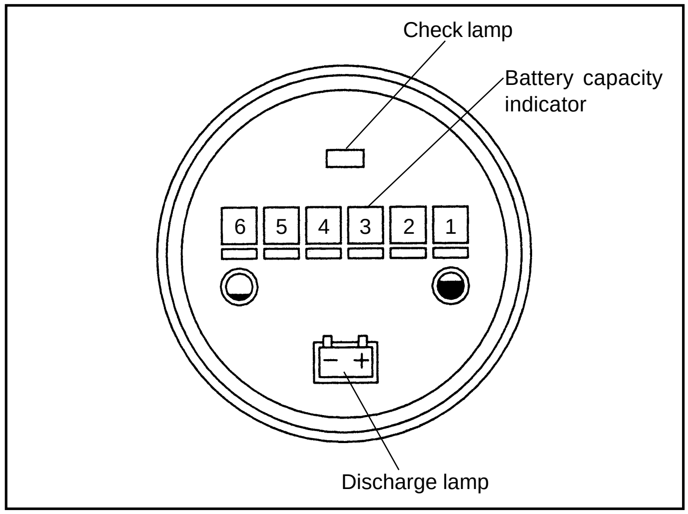
# LED DISPLAY

## GENERAL

The LED display has two main functions: battery charge indication and diagnostic display. It acts as the battery charge indicator while the vehicle is operating normally. When an error occurs in the vehicle electrical system, it is automatically switched to diagnostic display to warn the operator of an error and make the controller automatically control traveling and material handling to ensure safety.

### Battery Charge Indication and Alarm Functions

1. The LED display appearance and the function of each LED are as illustrated.




2. The battery charge is indicated by ON/OFF of each LED as listed below.

3. Upon key switch ON, all LEDs come on for 2 seconds to enable defective LED check. If normal, the display indicates the remaining battery charge. If any abnormality is found, the display indicates the diagnostic result (which will be explained later).

4. The number of lighting LEDs decreases as the battery charge drops. When the discharge level decreases to the set level (initial setting: approx. 80% of full capacity), the discharge lamp on the display is lit to warn the operator of the low level status.

5. When the battery charge drops further from the discharge alarm level to another the set level (initial setting: approx. 90% of full capacity), material handling during traveling is disabled.

   * The setting can be varies in the tuning mode of the SST plug-in analyzer. (See the Material Handling Restriction Level Setting on page 4-27).

   **Setting ranges:**
   **Discharge lamp ON: 80% to 100%**
   **Material Handling Restriction: 90% to 100%**

| Battery discharge level | LED indication (○: ON, ×: OFF) | | | | | | Discharge lamp | Material handling restriction |
|---|---|---|---|---|---|---|---|---|
| | 6 | 5 | 4 | 3 | 2 | 1 | | |
| 0~19% | ○ | ○ | ○ | ○ | ○ | ○ | × | × |
| 20~34% | ○ | ○ | ○ | ○ | ○ | × | × | × |
| 35~49% | ○ | ○ | ○ | ○ | × | × | × | × |
| 50~64% | ○ | ○ | ○ | × | × | × | × | × |
| 65~79% | ○ | ○ | × | × | × | × | × | × |
| 80~89% | ○ | ○ | × | × | × | × | ○* | × |
| 90~99% | ○ | × | × | × | × | × | ○ | ON* |
| 100% | × | × | × | × | × | × | ○ | ON |

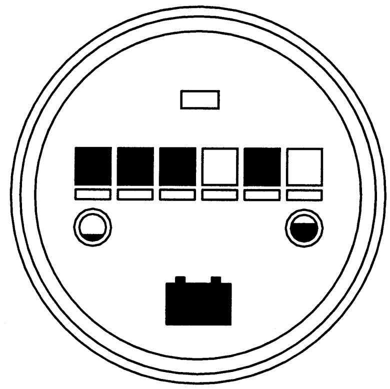
## DIAGNOSIS FUNCTION

1. As with conventional vehicles, diagnostic functions are provided.

2. When a traveling, material handling or PS circuit defect or a sensor defect is found, the check lamp is lit to warn the operator of the abnormality. The lighting pattern of battery charge LEDs shows the defect position (See the Diagnosis Code List).

□: ON

■: OFF



Example of display of diagnosis



3. The diagnostic display indicates all faulty positions detected by the controller repeatedly at intervals 3 seconds.

Example: The controller detected three errors simultaneously, A1, C0 and C2

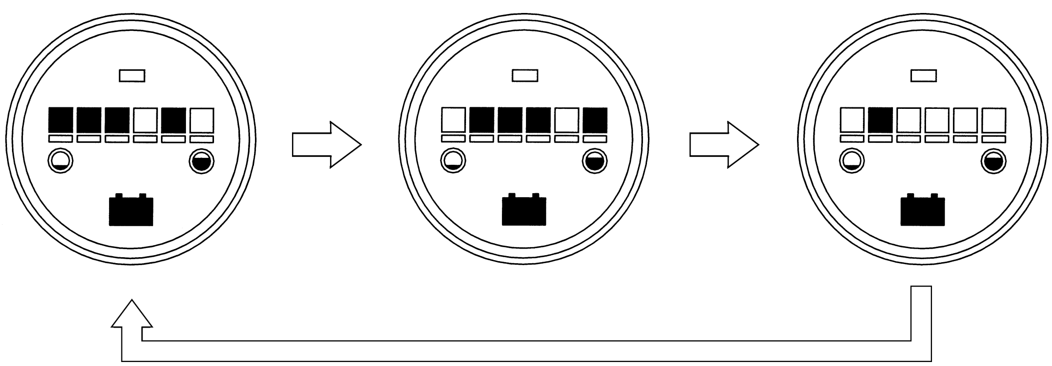
□: ON

■: OFF

"A1" output for 3 seconds

"C0" output for 3 seconds

"C2" output for 3 seconds



The error code output cycle repeats itself.

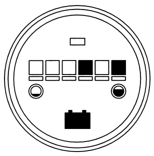
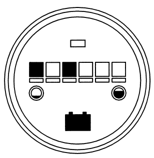
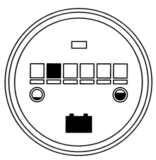
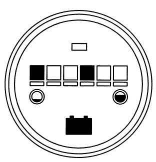
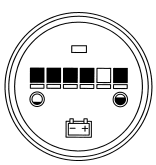
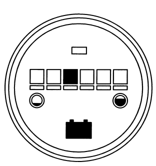
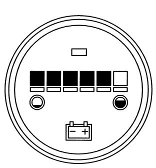
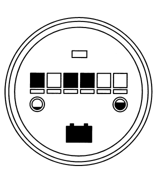
4. The controller stores up to 10 errors detected up to the time. Connect the SST plug-in analyzer to call and check the diagnosis error codes stored in the controller. For details, see the Plug-in Analyzer section of this manual.

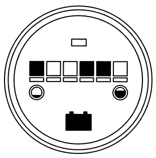
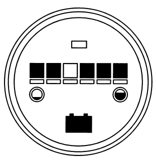
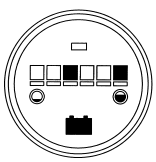
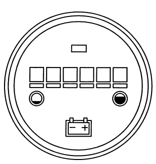
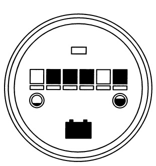
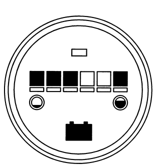
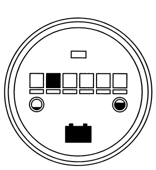
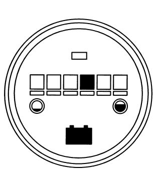
5. When repair is completed according to the indicated diagnosis code, clear all of the stored diagnosis codes using the SST plug-in analyzer.
This enables the operator to distinguish between old and new diagnosis codes.

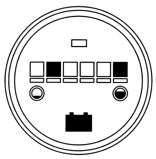
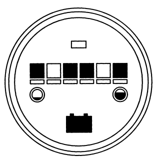
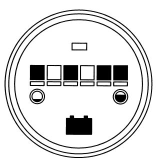
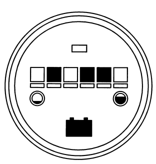
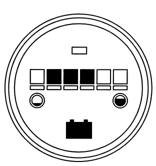
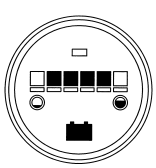
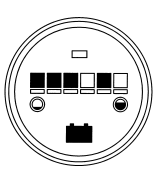
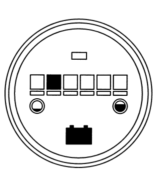
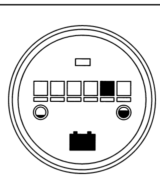
6. When an error code is indicated on the display, make a prompt repair by referring to the troubleshooting procedure for each indicated diagnosis code described later (Section 5) in this manual.

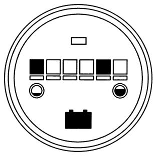
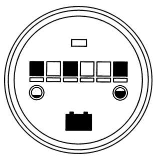
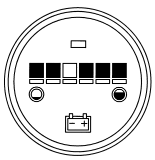
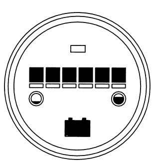
## DIAGNOSIS CODE LIST

□:ON ■:OFF * Diag memory: Indicated by the SST plug-in analyzer.

| LED display indication | Diag memory* | Faulty position | Error mode | Phenomenon on vehicle |
|---|---|---|---|---|
|  | 65–2 | PS circuit | PS contactor defect | PS not operable |
|  | 67–1 | | Mode switch defect | Fixed to S mode and not variable |
|  | A0–1 | Main traveling circuit | Overheat | Drive output restriction |
| | A0–2 | Main load handling circuit | Overheat | Material handling output restriction |
|  | A0–4 | Traveling system fan | Fan defect signal | Drive output restriction |
| | A0–5 | Material handling system fan | Fan defect signal | Material handling output restriction |
|  | A1 | Controller | High controller voltage | Both traveling and material handling disabled |
|  | A2 | CPU board | Overheat | Drive output restriction |
|  | A3–1 | Battery power supply | Incorrect battery connection (CHG) | MB not closed. |
| | A3–2 | Battery power supply | Incorrect battery connection (wrong voltage) | MB not closed. |
|  | A4 | Accelerator switch | Switch defect | Traveling disabled. |

| LED display indication | Diag memory* | Faulty position | Error mode | Phenomenon on vehicle |
|---|---|---|---|---|
|  | A6–1<br>A6–3<br>A6–5<br>A6–6 | Material handling limit switch<br>Material handling limit switch<br>Material handling limit switch<br>Material handling limit switch | LSL1 defect<br>LSTF, LSTR defect<br>LSAT1 defect<br>LSAT2 defect | Material handling disabled. |
|  | A8 | Traveling and material handling fuse | Blown fuse (F1) | Indication only |
|  | AA | CPU board | Temperature sensor defect | Indication only |
|  | AF–1<br>AF–2<br>AF–3 | CPU board | CPU board defect | Both traveling and material handling disabled |
| | AF–4 | | | Both traveling and material handling disabled |
|  | C0–1<br>C0–3<br>C0–4 | Main traveling circuit<br>Drive circuit | Main circuit defect<br>Driving power supply defect<br>Driving circuit defect | Traveling disabled |
|  | C1 | Drive current sensor | Sensor defect | Traveling disabled |
|  | C2–1 | Drive motor | Motor overheat | Limited drive output |
|  | C2–2 | Drive motor temperature sensor | Temperature sensor defect | Limited drive output |

| LED display indication | Diag memory* | Faulty position | Error mode | Phenomenon on vehicle |
|---|---|---|---|---|
|  | C3 | Main drive circuit temperature sensor | Temperature sensor defect | Limited drive output |
|  | C4–1 | Accelerator potentiometer | Accelerator potentiometer defect | Traveling disabled |
| | C4–2 | | | No traveling is allowed. Traveling disabled |
| | C4–3 | | | Traveling disabled |
| | C4–4 | | | Maximum speed not attained |
|  | C7 | Direction switch | Switch defect | Traveling disabled |
|  | C8–1 | Drive rpm sensor | Rpm sensor (1) defect | Traveling disabled, but enabled by turning the key switch OFF and then ON |
| | C8–2 | Drive rpm sensor | Rpm sensor (2) defect | |
|  | CB–1 | MB | MB defect | Indication only |
| | CB–2 | | Fused MB | Indication only |
|  | E0–1 | Main material handling circuit | Main load handling circuit defect | Material handling disabled |
| | E0–3 | Material handling power supply | Material handling power supply defect | |
| | E0–4 | Material handling circuit | Material handling circuit defect | |
|  | E1 | Material handling current sensor | Current sensor defect | Material handling disabled |
|  | E2–1 | Material handling motor | Motor overheat | Material handling output restriction |
|  | E2–2 | Material handling motor temperature sensor | Temperature sensor defect | Material handling output restriction |

| LED display indication | Diag memory* | Faulty position | Error mode | Phenomenon on vehicle |
|---|---|---|---|---|
|  | E3 | Main material handling circuit temperature sensor | Temperature sensor defect | Material handling output restriction |
|  | E8 | Material handling pump rpm sensor | Rpm sensor defect | Material handling disabled |
|  | EF–1 | EEP–ROM | EEP–ROM | Operation at default setting |
| | EF–2 | | | |
| | EF–3 | CPU | CPU defect | Indication only |
|  (Flahing) | – | Parking brake OFF alarm | When the operator leaves the vehicle without applying the parking brake | Traveling, material handling and ESP stop. (Beep only) |
| | | Return to neutral | When accelerator switch is on. When accelerator switch returns on while direction switch is ON. | No travel *1 |
| | | Warning for parking brake lever return | When parking brake switch is OFF while travel. | (Beep only) *1 |

*1 No alarm buzzer sounds on a vehicle with the LED display.

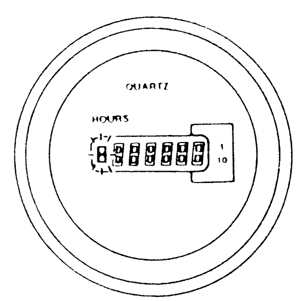
## Hour Meter

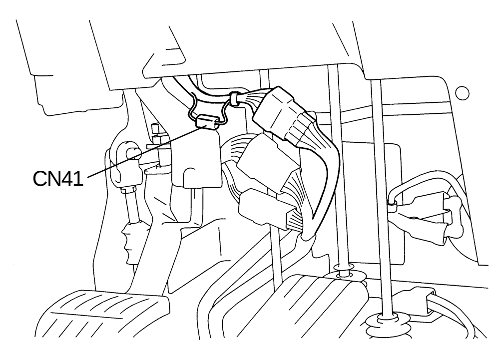
1. An hour meter is standard equipment on all vehicles. While a round hour meter is equipped on standard vehicles (with LED display), the function is included in the LCD display on vehicles with the optional LCD.

2. The hour meter starts upon key switch ON. The minimum unit of indication is 0.1 hour.

3. Since the hour meter is not activated at the time of shipment from the factory, connect CN41 hour meter starting connector before starting operation at each customer.

**Note:**
**Connection of the hour meter has nothing to do with the controller functions (lift interrupt for example).**



## Lift Interrupt Function and Cancellation Procedure

The lift interrupt function is enabled at the time of shipment from the factory to disable Material handling during traveling. Cancel the lift interrupt function as follows for vehicle demonstration or according to the request from a user:

1. Place the vehicle stationary, set the mast in the vertical position, set the folk at the bottom position, chock wheels and apply the parking brake.

2. Turn the key switch OFF.

3. Operate the lift lever momentarily to the UP side.

4. Operate the tilt lever momentarily to the backward tilt side.

5. Operate the lift and tilt levers to the UP and backward tilt sides, respectively, for 2 seconds or more and hold them there.

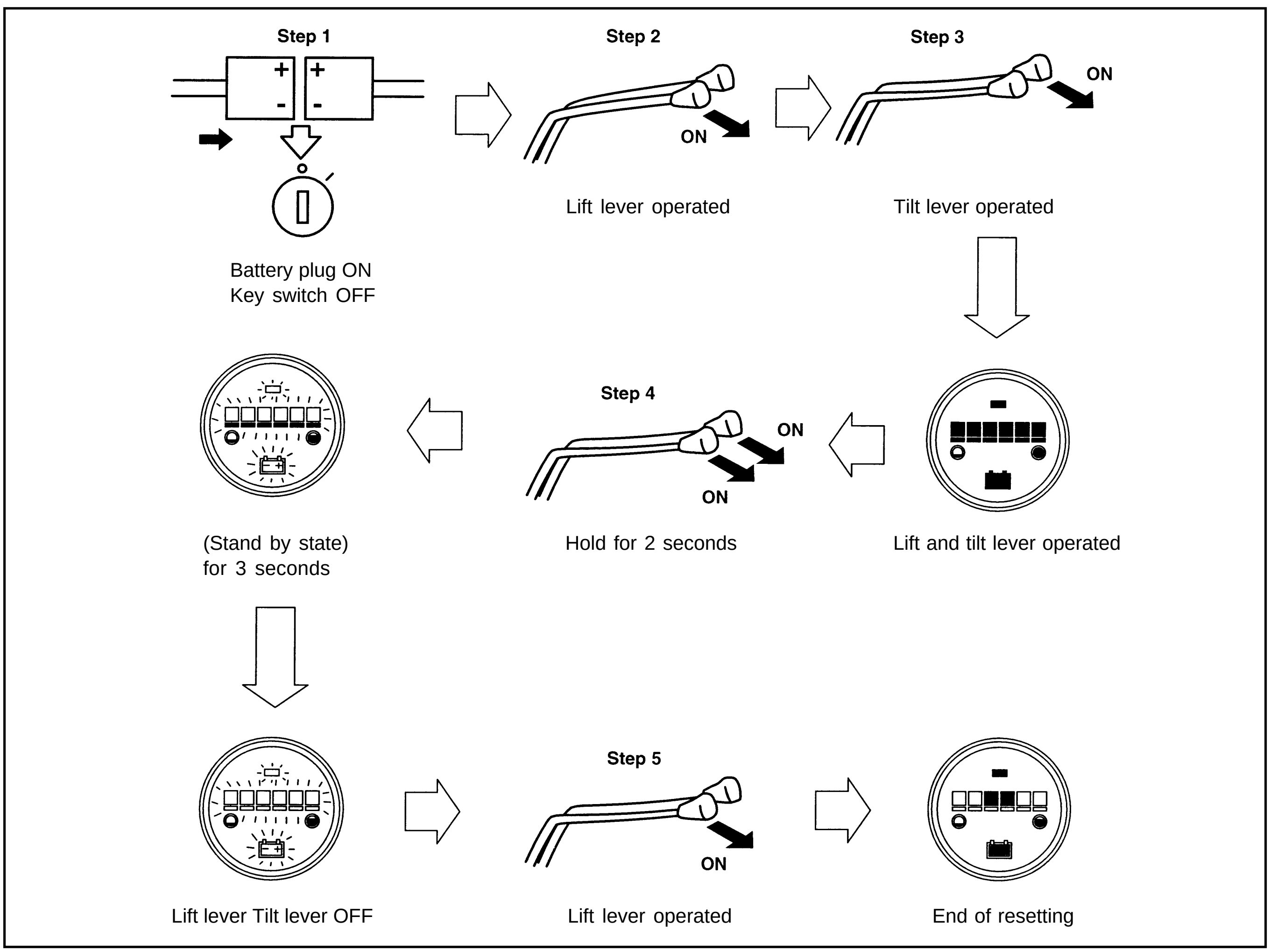
6. Leave the vehicle without any operation for 3 seconds or more.

7. Operate both the lift and tilt levers momentarily to the OFF positions.

8. Operate the lift lever momentarily to the UP side.

   **Note:**
   **Accurately perform each operation.**

9. Cancellation of the lift interrupt function is completed.



# PLUG-IN ANALYZER (SST)

## GENERAL

1. For a standard vehicle with an LED display, use the SST plug-in analyzer to indicate the status of each electrical system operation such as traveling, Material handling, EPS or acceleration, to read the information on errors detected by the controller, and to perform tuning to set vehicle functions.

2. The plug-in analyzer enables quick, easy servicing and vehicle tuning to match customer needs.

3. The plug-in analyzer supports the operator in checking the control system and troubleshooting through communication with the traveling/material handling controller.

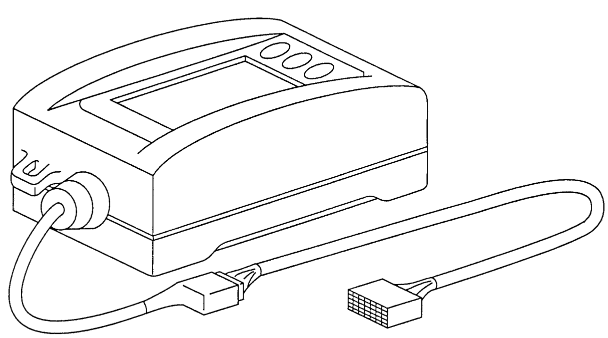
4. The plug-in analyzer functions for the electrical system are the same as those on the vehicle with the LCD display (option).

   **Note:**
   **The plug-in analyzer, however, cannot check SAS functions.**

**Plug-in Analyzer Function List**

| Function | Description | When used | | |
|---|---|---|---|---|
| | | Vehicle delivery | Board replace-ment | Others |
| ANALYZER | Indicating electrical system status and reading information on errors detected by controllers | — | — | Upon vehicle defect detection |
| TUNNING | Fine adjustment of traveling and load handling functions | — | ○ *1 | As requested by the customer |
| OPTION SET | Setting for a Japanese battery or a locally purchased battery. | — | ○ *1 | — |

*1: Board: Control board for the traveling/material handling controller



## SCREEN DISPLAY LIST

| | | |
|---|---|---|
| ANALYZER | DIAG MEMORY | Checking past diagnostic results in memory |
| | I/O MONITOR1 | Checking temperatures and voltages of functional components |
| | I/O MONITOR2 | Checking ON/OFF of traveling switches |
| | I/O MONITOR3 | Checking ON/OFF of material handling and mast control switches |
| | I/O MONITOR4 | Checking ON/OFF of other (attachment) switches |
| | ACTIVE TEST | Test switches by forcible ON/OFF operations. |
| TUNING | NO.1 | Setting regenerative braking torque (switch back) |
| | NO.2 | Setting regenerative braking torque (accelerator off) |
| | NO.3 | Lift interrupt level setting *1 |
| | NO.4 | Correction battery charge indication |
| | NO.5 | Maximum speed limiter |
| | NO.6 | Setting pump motor rpm upon attachment switch ON |
| | NO.7 | Setting pump motor rpm upon tilt switch ON |
| | NO.8 | Spare |
| | NO.9 | Spare |
| | NO.10 | Spare |
| | NO.11 | Spare |
| | NO.12 | Spare |
| OPTION SET | NO.1 | Selecting calculation for battery charge indication (selection of battery setting) |
| | NO.2 | Spare |
| | NO.3 | Spare |
| | NO.4 | Spare |
| | NO.5 | Spare |
| | NO.6 | Spare |
| | NO.7 | Spare |
| TESTER SET | ONTRAST SET | Adjusting LCD contrast |
| | LANGUAGE SET | Unused *2 |

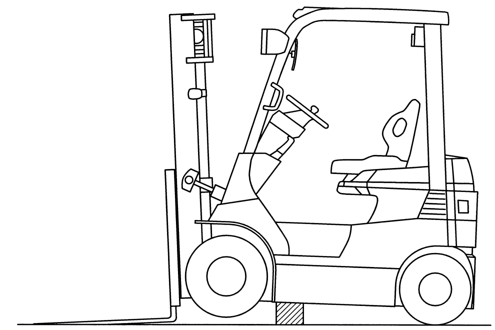
*1: This means that material handling operation is restricted (disabled during traveling) upon battery overdischange.

*2: Whichever you select on the LANGUAGE SET screen, the indication will be in English.

## PLUG-IN ANALYZER CONNECTION METHOD

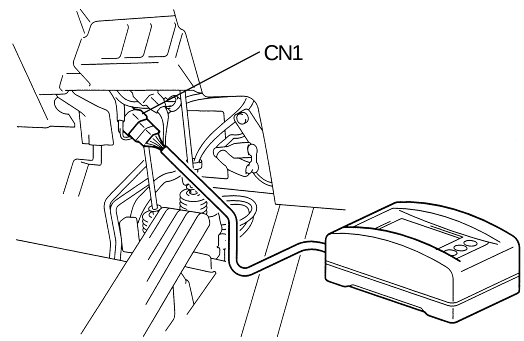
### Preparation

**Caution:**
**Always jack up the drive wheels (front tires) until they leave the ground and stabilize the vehicle by supporting it with wooden blocks under both side frames at the front. Lower the fork fully.**



1. Turn the key switch to OFF and disconnect the battery plug.

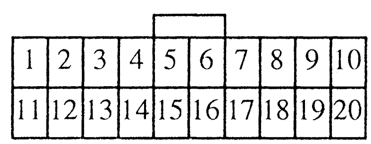
2. Remove the lower panel and disconnect the harness connector (CN1) between the LED display and controller.




3. Connect the extension harness to the disconnected connector on the controller side.

4. Check voltages between extension harness connector terminals as follows:
   1) Connect the battery plug.
   2) Use a circuit tester and measure voltages between extension connector terminals as listed below.

| Terminal No. (+) — (–) | Standard voltage |
|---|---|
| (1) — (13) | Approx. 15 V |
| (7) — (13) | Approx. 5 V |
| (8) — (13) | Approx. 0 V |
| (17) — (13) | Approx. 0 V |
| (18) — (13) | Approx. 0 V |



Analyzer CN (REC)

**Note:**
**(1) Turn the key switch to OFF.**
**(2) If any measured voltage does not satisfy the standard, do not connect the plug-in analyzer.**

5. Disconnect the battery plug and then connect the plug-in analyzer to the extension harness.

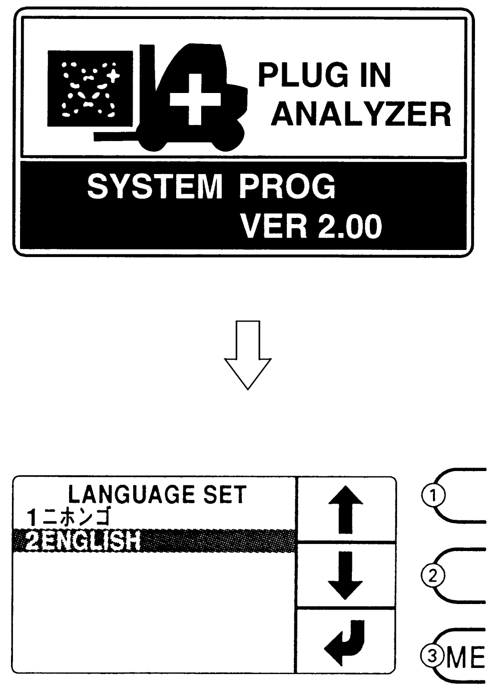
6. Connect the battery plug and turn the key switch to ON.

**Note:**
**(1) If nothing is indicated on the plug-in analyzer after turning the key switch to ON, check each of the plug-in analyzer, harness, connector and controller.**
**(2) Error code EE-1 is stored and indicated if the result of voltage measurement in step 4 above does not satisfy the standard.**

7. The plug-in analyzer displays the controller version for approx. 15 seconds, followed by the step below.

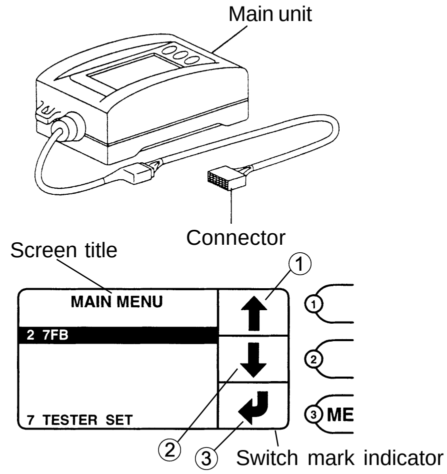
   When the display indication is normal:
   The screen automatically changes to the LANGUAGE SET screen.

   When an error code is indicated:
   Press the MODE switch for transition to the LANGUAGE SET screen.




**Caution:**
- **If you connect the LED display after use of the plug-in analyzer, with the battery plug kept connected, the controller stores EE-1 or EE-2 as error codes. Always disconnect and connect the wiring after turning the key switch to OFF and disconnecting the battery plug.**
- **Do not apply strong impact by dropping or crashing the plug-in analyzer.**
- **Do not expose the plug-in analyzer to strong sunlight for a long period of time.**
- **Always operate each switch with a finger. If you use a sharp edged substance, the switch may be damaged.**
- **For defects of the plug-in analyzer, see the troubleshooting section appearing later in this manual.**

## OPERATION PANEL OF PLUG-IN ANALYZER AND SWITCH FUNCTIONS

| Operation panel of plug-in analyzer | Switch | Indication | Description |
|---|---|---|---|
|  | ① | ↑ | Moves the cursor to the upper item. |
| | | ↔ | Moves the cursor to the right or left. |
| | | CLR | Clears the diag memory. |
| | | TUNE | Changes the tuning level. |
| | ② | ↓ | Moves the cursor to the lower item or to the next page. |
| | ③ | ↵ | Enters the selected item. |

In some cases, the indication for switch operation may be different from the above and blank. Switch operation in such a case will result in the following:

- Switch ①: Pressing this switch while nothing is indicated is ignored. (Unused)
- Switch ②: Pressing this switch while nothing is indicated is ignored. (Unused)
- Switch ③: Press this switch to return to the respective screen.

## EXPLANATION ON OPERATION

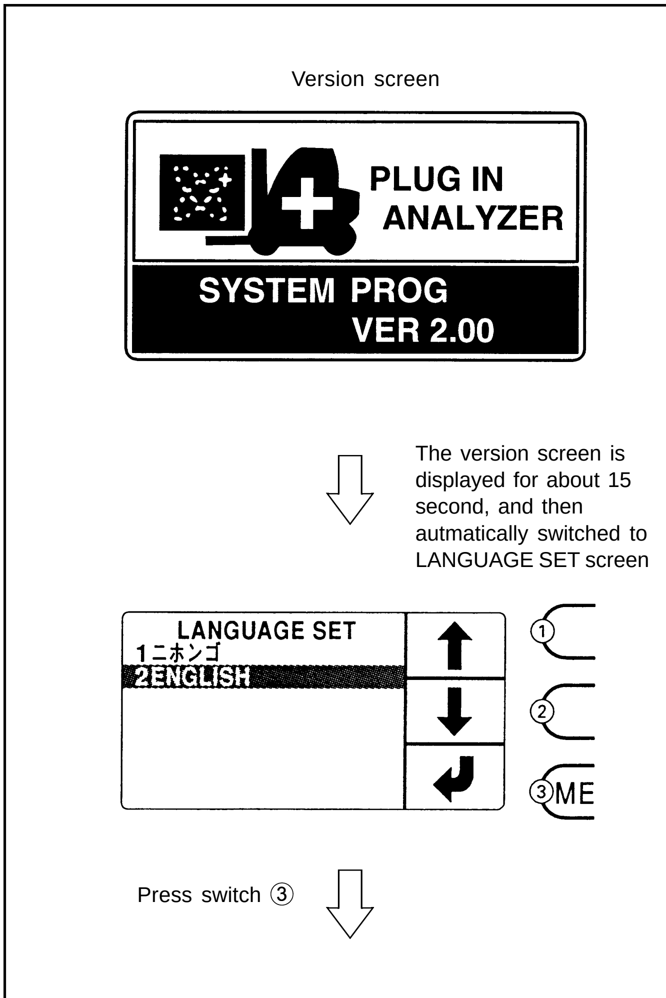
### Menu (Function) Selection

Handle the plug-in analyzer as explained below after connecting it as described earlier.

1. Connect the plug-in analyzer and turn the key switch to ON. (See page 4-13.)

2. The initial screen appears for 15 seconds. Then the screen automatically displays the LANGUAGE SET screen.
   Press switch ③ while the initial screen is displayed also changes the screen display.
   This display occurs only when the plug-in analyzer is operated for the first time after purchase and will not occur any more.

3. Default value of the LANGUAGE SET screen is 2. ENGLISH. Although the cursor may be moved, the indication will be in English for each position, which is not a trouble.
   This menu appears only when nothing is set on the LANGUAGE SET screen.



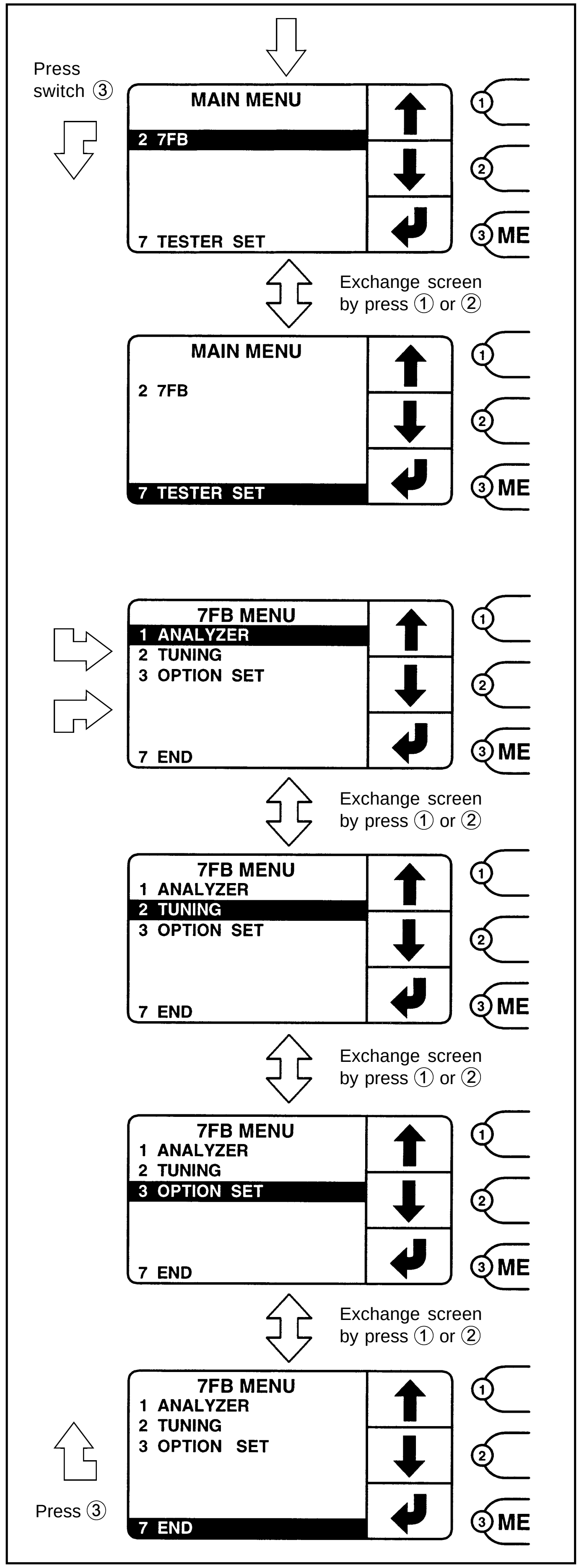
4. Press switch ③ to call the MAIN MENU screen.

5. On the MAIN MENU screen, items 2 and 7 are indicated and "2. 7FB" is selected.
   (1) 2. 7FB function
   When this item is selected and entered, 7FB MENU screen appears.
   (2) 7. TESTER SET
   While the contrast set and language set functions are indicated as tester set functions, only the contrast set function is used.

6. Press switch ③ here to select the 7FB function, and the 7FB MENU screen appears.

   "7FB MENU"
   (1) 1. ANALYZER
   This function indicates the operation status of the electrical system and reads the information on errors detected by the controller.
   (2) TUNING
   This function is for fine adjustment related to traveling and material handling.
   (3) OPTION SET
   This function controls the controller according to the option setting. For a vehicle with the LED display, use this function to set the battery type (Japanese or locally purchased).

7. Select the desired function menu by operating switches ① and ② and press switch ③ (enter) for transition to the function menu or the setting screen.



# ANALYZER

## GENERAL

1. The analyzer function of the plug-in analyzer allows the operation status of the electrical system including main traveling and material handling circuits, operating systems such as the accelerator, and functions of sensors to be checked, which are useful for troubleshooting.

2. The analyzer functions enable quick, easy servicing.

3. The plug-in analyzer supports control system inspection and troubleshooting through communication with the traveling/material handling controller.

4. Analyzer functions are as follows:
   (1) Diagnosis memory function (DIAG MEMORY)
   The controller stores up to 10 error codes (diagnosis codes) related to the electrical system detected in the past. The diagnosis function reads the stored error codes and indicates them on the display.
   (2) In/out monitor function (I/O MONITOR)
   This function indicates analog input values to individual sensors in the traveling and material handling systems on the display. Monitoring the display enables the quality of each circuit/sensor to be judged.
   ① I/O MONITOR 1
   Indicates the temperature and analog input voltage at the respective terminal of each electrical component detected by the controller.
   ② I/O MONITOR 2
   Indicates the ON/OFF status of traveling-related switches and the analog input voltages of sensors.
   ③ I/O MONITOR 3
   Indicates the ON/OFF status of material handling switches and analog input voltages of sensors.
   ④ I/O MONITOR 4
   Indicates the ON/OFF status of other switches.
   (3) Active test (ACTIVE TEST)
   In the active test mode, the controller forcibly outputs an operation signal (ON or OFF signal) to the selected item for functional inspection.
   (4) One most recent error code at the time is indicated in the right upper portion of each I/O MONITOR or ACTIVE TEST screen.

## ANALYZER SCREEN LIST

| Analyzer screen | Indication: 1st indication | Indication: 2nd indication | Description |
|---|---|---|---|
| 1. DIAG MEMORY<br>• Diagnosis | DIAG–1 ~ DIAG–10 | | Refer to the Diagnosis List. |
| 2-1. I/O MONITOR1<br>• Voltage<br>• Temperature | THCD | +25 | Main traveling circuit temperature (°C) |
| | THCP | +25 | Main material handling circuit temperature (°C) |
| | TD | +25 | Drive motor temperature (°C) |
| | TP | +25 | Material handling motor temperature (°C) |
| | TEMP | +25 | Temperature on CPU board (°C) |
| | VBBT | 50.0 | Battery voltage (V) |
| | VBKY | 50.0 | Voltage after key switch (V) |
| | VBP4 | 50 | Voltage at P4 terminal (V) |
| | VBMB(M) | 50 | Main battery input voltage (V) |
| 2-2. I/O MONITOR2<br>• Traveling system | POTA | 0.70 | Accelerator potentiometer voltage (V) |
| | SWAC | OFF | Accelerator switch (OFF/ON) |
| | DSF | OFF | Forward switch (OFF/ON) |
| | DSR | OFF | Reverse switch (OFF/ON) |
| | LSB | ON | Brake switch (OFF/ON) |
| | LSD | OFF | Deadman switch (OFF/ON) |
| | SSD1 | 00 | Drive motor rpm sensor 1 (pulse count) |
| | SSD2 | 00 | Drive motor rpm sensor 2 (pulse count) |
| | SPDM | 0.0 | Main vehicle speed (km/h) |
| 2-3. I/O MONITOR3<br>• Material handling system | LSL | OFF | Lift switch (OFF/ON) |
| | LSTF | OFF | Forward tilt switch (OFF/ON) |
| | LSTR | OFF | Backward tilt switch (OFF/ON) |
| | LSAT1 | OFF | Attachment switch 1 (OFF/ON) |
| | LSAT2 | OFF | Attachment switch 2 (OFF/ON) |
| | SSP | 00 | Pump motor rpm sensor: Number of pulses |
| 2-4. I/O MONITOR4<br>• Others | CSBATT | 2.50 | Battery current sensor voltage |
| | AOPT | 0.00 | Spare |
| | LSOPT | OFF | Spare |
| 3. ACTIVE TEST<br>• Operation test | LSOPT | OFF | Spare |
| | FAND | OFF/ON (0) | Traveling circuit fan (Value in ( ) is the controller input value.) |
| | FANP | OFF/ON (0) | Material handling circuit fan (Value in ( ) is the controller input value.) |
| 7. END | Return to 7FB MENU screen. | | |

**Note:**
**The 2nd indication is an example when the key switch is ON, lever is at the neutral position and the vehicle is stopping, which is not the standard. Pay special attention to the values of I/O MONITOR1 of the 2nd indication, which largely vary according to the vehicle status at measurements.**

## BASIC OPERATION ON ANALYZER SCREEN

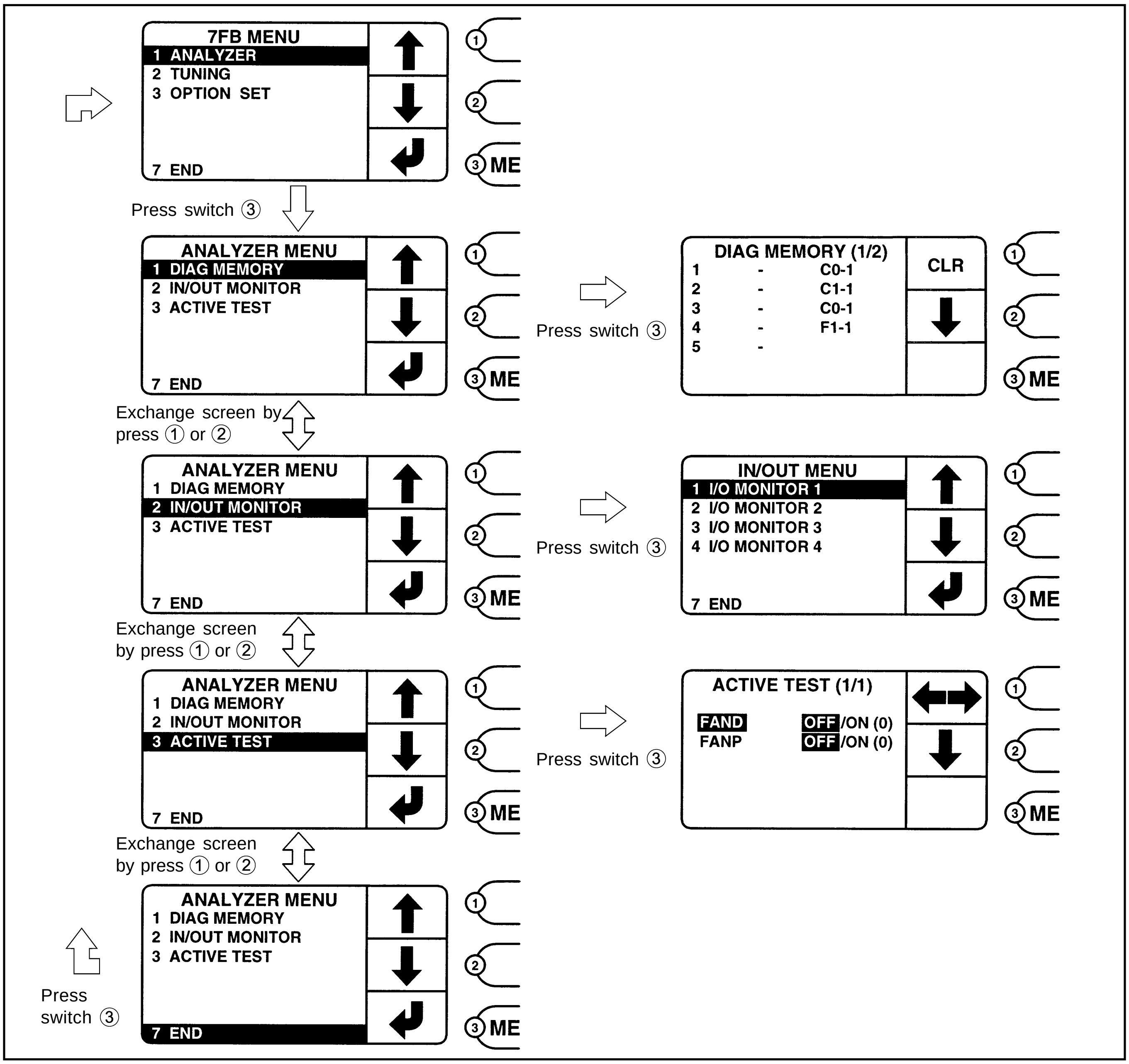
1. Connect the plug-in analyzer according to the Plug-in Analyzer Connection Method on page 4-12.

2. Display the 7FB MENU screen.

3. Check that 1. ANALYZER is selected (highlighted) on the menu and press switch ③ (enter) to display the ANALYZER MENU screen. (See page 4-15.)

4. Select the desired test screen by operating switches ① and ② and press switch ③ (enter) to display the selected screen.
   - Switch ①: Moves the cursor to the upper row to select the upper test item.
   - Switch ②: Moves the cursor to the lower row to select the lower test item.
   - Switch ③: Enters (Displays the test screen for the selected item.)

**Note:**
**Select 7. END on the ANALYZER MENU screen and press switch ③ to display the 7FB MENU screen again.**



## DIAG MEMORY

## GENERAL

1. The controller stores up to 10 most recent errors. On the DIAG MEMORY screen, the stored diagnosis codes are read and displayed on two pages.

2. The most recent diagnosis code is indicated as 1. The second one as 2, the third as 3 and so on down to 10.

3. Peform troubleshooting for the faulty portion by referring to “Section 5. Troubleshooting”.

### Operation Procedure

1. Display the ANALYZER MENU screen.

2. Check that 1. DIAG MEMORY is highlighted and press switch ③ (enter) to enable the diag memory function, which indicates diagnosis codes detected in the past sequentially starting from the most recent one.

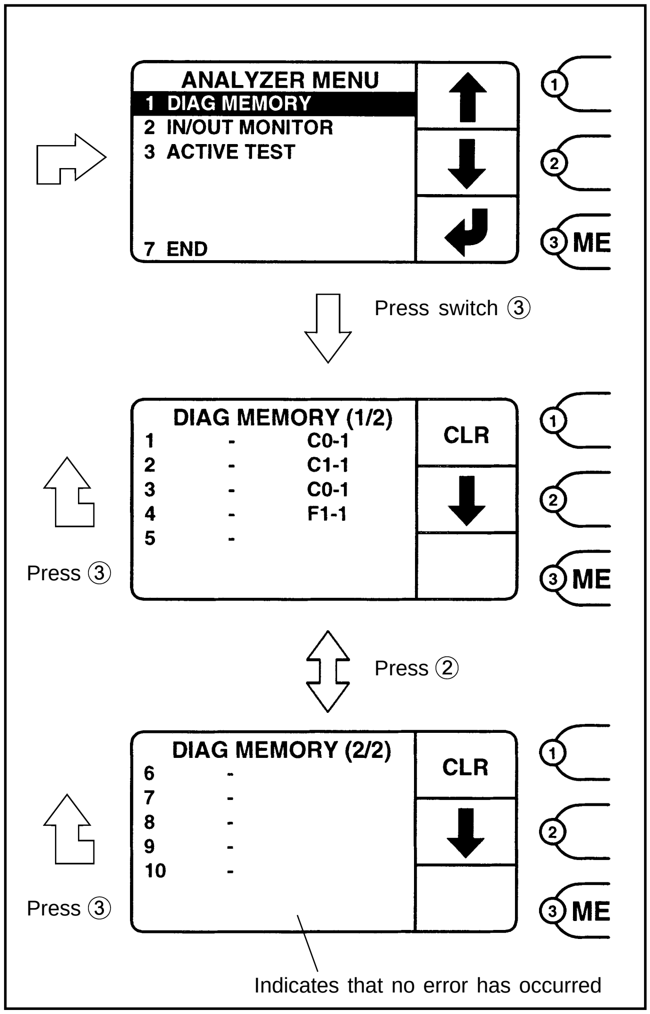
   **Note:**
   **For diagnosis codes, see Diagnosis Code List on page 4-6 and take the action for correcting the problem by referring to the “Troubleshooting” section.**

3. Functions of switches on 1. DIAG MEMORY screen are as follows:
   - Switch ① (CLR)
     Press this switch to clear all error codes stored in the memory. Keep switch ① pressed for 2 seconds. When the switch is accepted, beep sound is heard twice. A beep sound is generated after the end of clearing error codes in the memory.

   **Caution:**
   **While the plug-in analyzer is connected, the error code can be cleared only once. (Disconnect the battery plug once to clear another code.)**
   **Once cleared, the CLR indication disappears and switch ① operation becomes invalid.**

   - Switch ②
     Use this switch for switching over between pages 1/2 and 2/2.
   - Switch ③
     Press this switch to return to the ANALYZER MENU screen.

   **Note:**
   **Each field where only “–“ is indicated shows that no error has been detected thereafter.**
   **It is impossible to directly jump to another test screen from the DIAG MEMORY screen. Always return to the ANALYZER MENU screen first and then go to the desired test screen.**



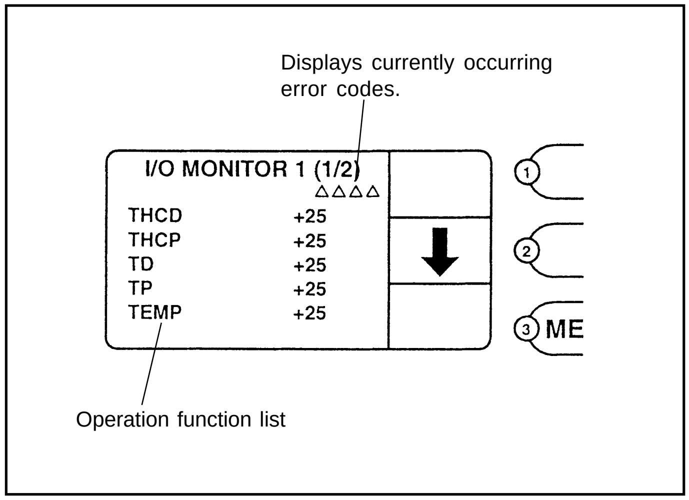
# IN/OUT MONITOR MENU

## GENERAL

1. The IN/OUT MONITOR function displays the ON/OFF status of each switch and analog input value from each sensor in the traveling, material handling and EPS systems on the analyzer screen.

2. Monitor the displayed switch status and analog input value for judgment on the quality of each switch and sensor.

3. For detailed items that can be monitored, see the “ANALYZER screen List” on page 4-18.




## Operation Procedure

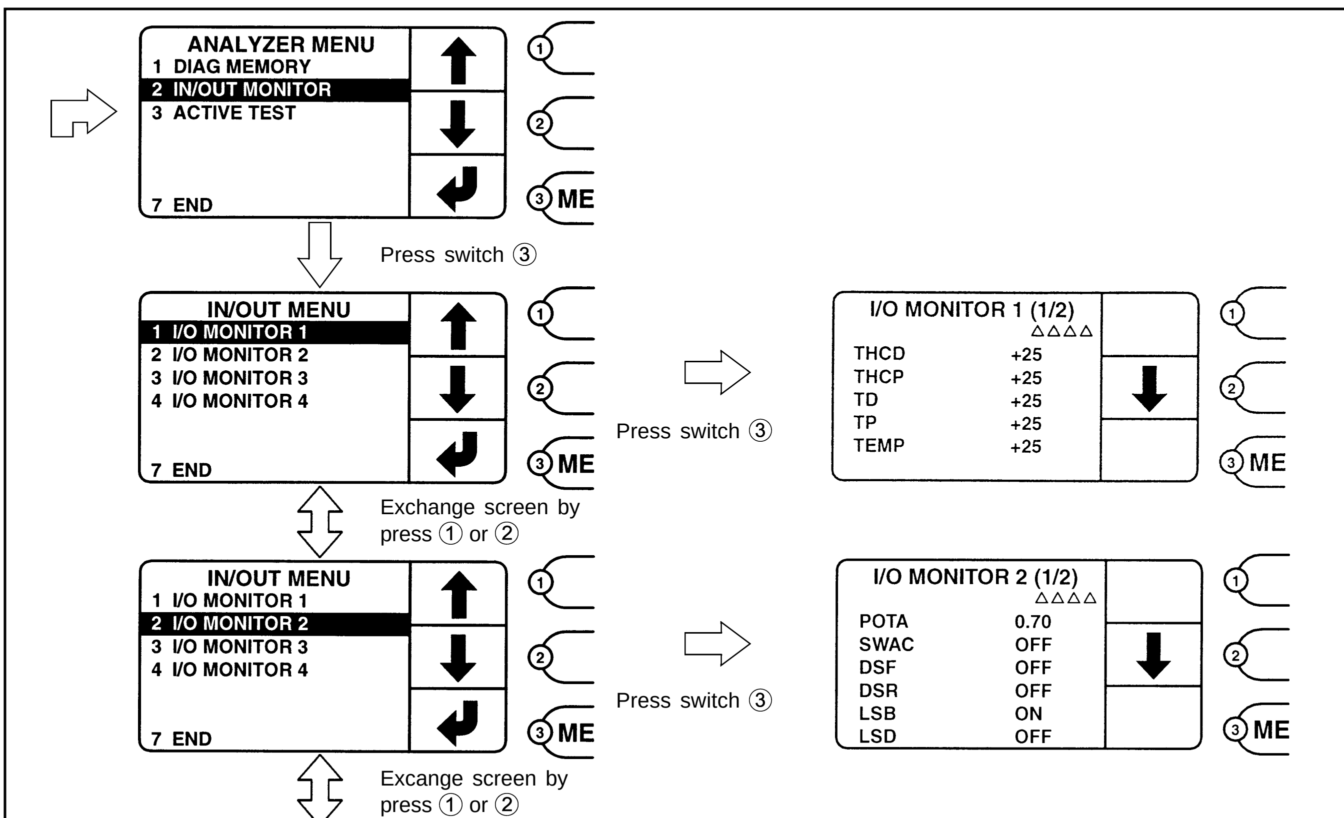
1. Display the ANALYZER MENU screen.

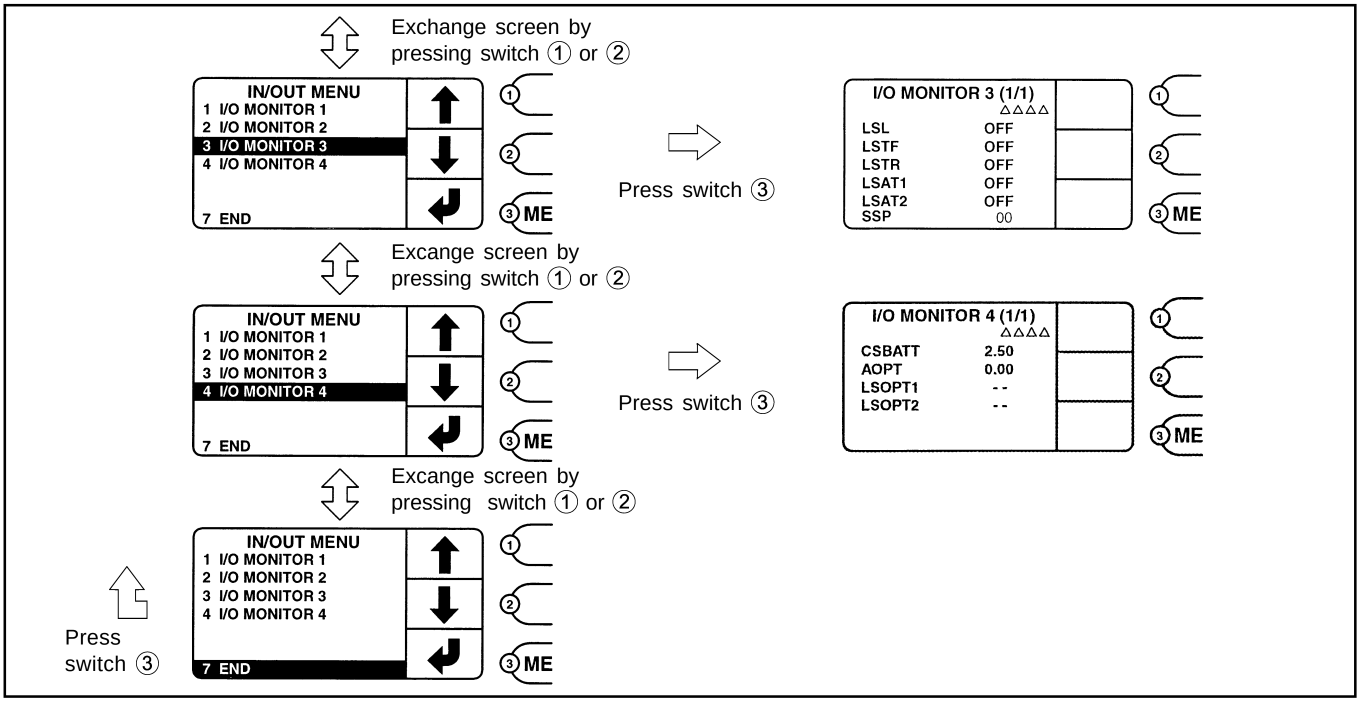
2. Press switch ② once.

3. Check that 2. IN/OUT MONITOR is highlighted and press switch ③ (enter) to display the IN/OUT MENU screen.

4. Select a desired item from I/O MONITOR 1 through 4 using switches ① and ② and press switch ③ to display the respective function screen.

   **Note:**
   **It is impossible to directly jump to another test screen from the IN/OUT MONITOR function screen. Return to the ANALYZER MENU screen once and go to the desired test screen then.**






## I/O MONITOR 1

This function indicates the temperature of each electrical component and the voltage at the respective terminal.

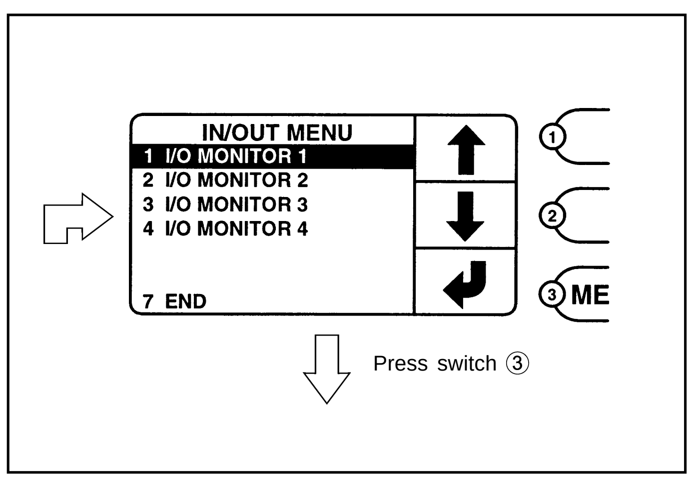
## Operation Procedure

1. Indicate the IN/OUT MENU screen.

2. Check that the I/O MONITOR1 is highlighted and press switch ③ to indicate the I/O MONITOR1 screen.

3. Functions of switches on this screen are as follows:
   - Switch ① : Unused (no indication)
   - Switch ② : Selects page 1/2 or 2/2 of I/O MONITOR1 screen.
   - Switch ③ : Changes the screen from I/O MONITOR1 to the IN/OUT MENU screen.

   **Note:**
   **It is impossible to directly jump from I/O MONITOR1 MENU screen to another test screen. Return to the IN/OUT MENU screen or ANALYZER MENU screen once and go to the desired test screen then.**



## I/O MONITOR 1 (1/2) screen

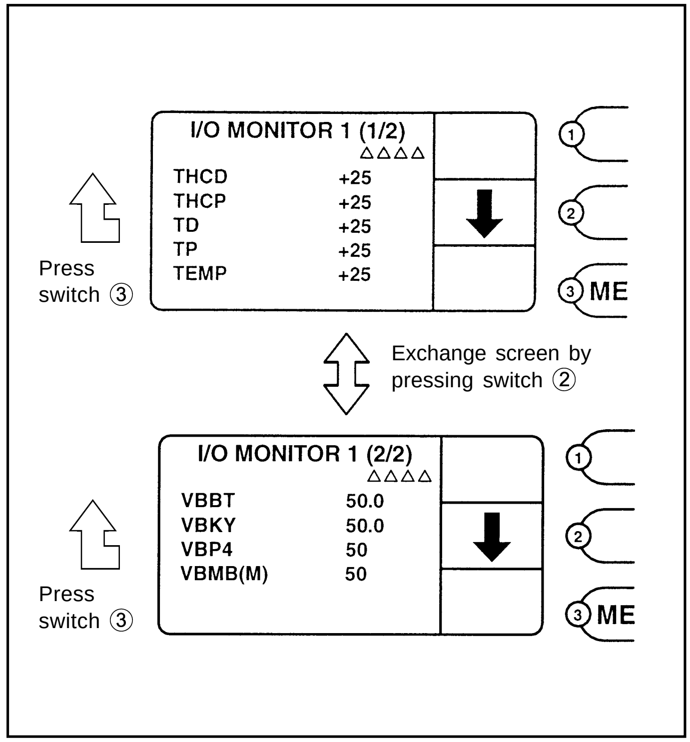
① THCD: Main traveling circuit temperature (°C)
- Temperature of the element on main traveling circuit

② THCP: Main material handling circuit temperature (°C)
- Temperature of the element on main material handling circuit

③ TD: Drive motor temperature (°C)
- Temperature of the drive motor

④ TP: Pump motor temperature (°C)
- Temperature of the material handling motor

⑤ TEMP: Temperature on the CPU board (°C)
- Temperature on the CPU board




## I/O MONITOR 1 (2/2) screen

① VBBT: Battery voltage (V)
- Voltage before the key switch

② VBKY: Battery voltage (V)
- Voltage after the key switch

③ VBP4: Voltage at P4 terminal (V)
- Voltage measured at terminal P4

④ VBMB(M): Main battery input voltage (V)
- Voltage after the MB contactor

## I/O MONITOR 2

This function indicates the ON/OFF status of each traveling-related switch and analog input voltage of each sensor.

### Operation Procedure

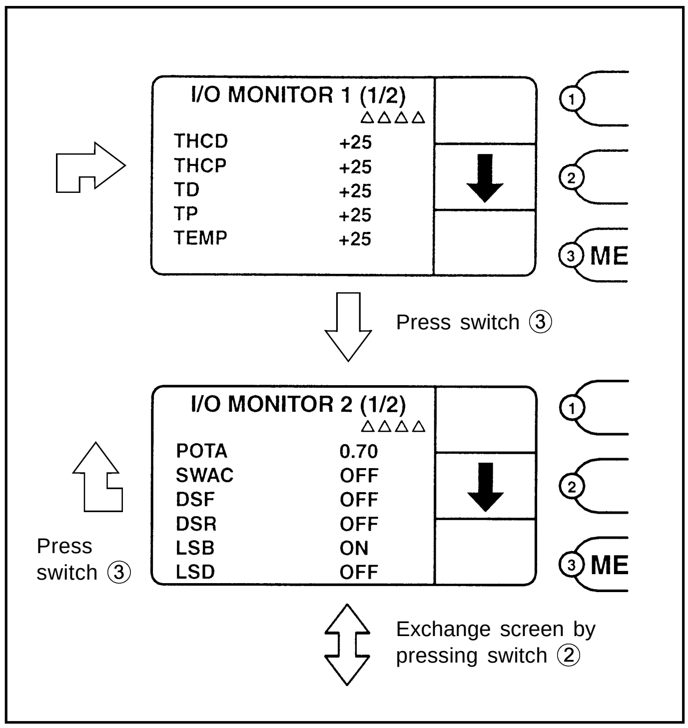
1. Display the IN/OUT MENU screen.

2. Check that the I/O MONITOR2 is highlighted and press switch ③ to display I/O MONITOR2 screen.

3. Functions of switches on this screen are as follows:
   - Switch ① : Unused (no indication)
   - Switch ② : Selects page 1/2 or 2/2 of I/O MONITOR2 screen.
   - Switch ③ : Changes the screen from I/O MONITOR2 to the IN/OUT MENU screen.

   **Note:**
   **It is impossible to directly jump from each I/O MONITOR2 screen to another test screen. Return to the IN/OUT MENU screen or ANALYZER MENU screen once and go to the desired test screen then.**

### I/O MONITOR 2 (1/2) screen




① POTA: Accelerator potentiometer voltage (V)
   1) When accelerator pedal is not operated (SWAC: OFF)
      Standard value: 0.3 - 2.4 V
   2) Standard voltage when accelerator pedal is depressed to stroke end: 1.7 - 4.7 V
   3) If 2) - 1) = 1.4 V or more, function is normal.

② SWAC: Accelerator switch (ON/OFF)
   - Switch ON/OFF quality judgment by operating the accelerator pedal
     The quality is OK if OFF when the accelerator pedal is released, and ON when the pedal is depressed.

③ DSF: Forward switch (ON/OFF)
   - Switch ON/OFF quality judgment by operating the direction lever to the forward position
     The quality is OK if OFF when the direction lever is at the neutral position, and ON when it is at the forward position.

④ DSR: Reverse switch (ON/OFF)
   - Switch ON/OFF quality judgment by operating the direction lever to the reverse position
     The quality is OK if OFF when the direction lever is at the neutral position, and ON when it is at the backward position.

⑤ LSB: Brake switch (ON/OFF)
   - Switch ON/OFF quality judgment by operating the brake pedal
     The quality is OK if ON when brake pedal is released, and OFF when the pedal is depressed.

⑥ LSD: Deadman switch (ON/OFF)
   - Switch ON/OFF quality judgment by sitting on and leaving the operator's seat
     The quality is OK if ON when the operator sits on the operator's seat, and OFF when the operator leaves the seat.

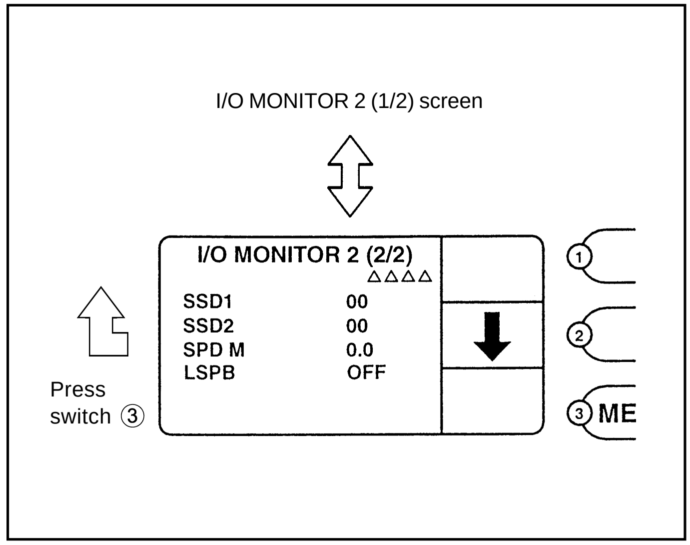
## I/O MONITOR 2 (2/2) screen

Use this function for checking the vehicle speed sensor defect detecting circuit.

① SSD1: Traveling rpm sensor 1 (pulse count)
② SSD2: Traveling rpm sensor 2 (pulse count)
③ SPD M: Main vehicle speed (km/h)

- Check each rpm sensor and the main vehicle speed under actual traveling state with the wheels jacked up.

  When vehicle is stopping:
  SSD1: 00
  SSD2: 00
  SPD: 0.0
  During acceleration after starting the vehicle
  The quality is OK if both the pulse counts from SSD1 and SSD2 increases and the SPD value increase with the vehicle speed.




## I/O MONITOR 3

This function displays the ON/OFF status of each material handling switch and the analog input voltage from each sensor.

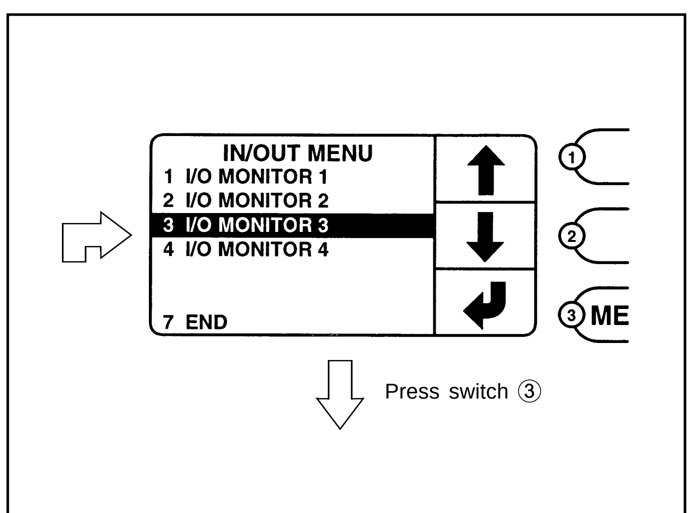
## Operation Procedure

1. Display the IN/OUT MENU screen.

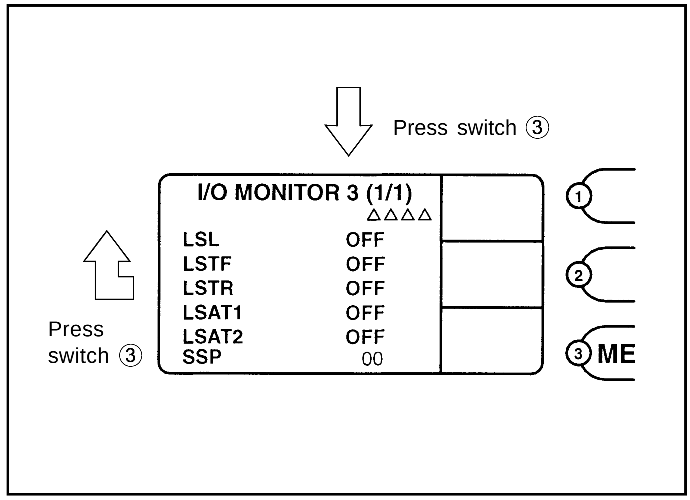
2. Check that I/O MONITOR3 is highlighted and press switch ③ to display I/O MONITOR3 screen.

3. Functions of switches on this screen are as follows:
   - Switch ① : Unused (no indication)
   - Switch ② : Unused (no indication)
   - Switch ③ : Changes the screen from I/O MONITOR3 to the IN/OUT MENU screen.

   **Note:**
   **It is impossible to directly jump from each I/O MONITOR3 screen to another test screen. Return to the IN/OUT MENU screen or ANALYZER MENU screen once and go to the desired test screen then.**



## I/O MONITOR 3 screen




① LSL: Lift switch (ON/OFF)
- Switch ON/OFF quality judgment by operating the lift lever
  The ON/OFF quality is OK if OFF when the material handling lever is at the neutral position, and ON when it is operated to the UP side.

② LSTF: Tilt forward switch (ON/OFF)
- Switch ON/OFF quality judgment by operating the tilt lever to the forward side
  It is judged OK if OFF when the tilt lever is at the neutral position, and ON when it is operated to the forward side.

③ LSTR: Tilt backward switch (ON/OFF)
- Switch ON/OFF quality judgment by operating the tilt lever to the backward side
  The quality is OK if OFF when the tilt lever is at the neutral position, and ON when it is operated to the backward side.

④ LSAT1: Attachment switch No. 1 (ON/OFF)
- Switch ON/OFF quality judgment by operating attachment lever No. 1

**Note:**
**ON/OFF is not indicated for a vehicle without attachment.**

The quality is judged OK if OFF when the attachment lever No. 1 is at the neutral position, and ON when it is operated.

⑤ LSAT2: Attachment switch No.2 (ON/OFF)
- Switch ON/OFF quality judgment by operating the attachment lever No. 2

**Note:**
**ON/OFF is not indicated for a vehicle without attachment.**

The quality is OK if OFF when the attachment lever No. 2 is at the neutral position, and ON when it is operated.

⑥ SSP: Pump motor rpm sensor (number of pulses)
- Perform material handling and check if the number of pulses is detected.

## I/O MONITOR 4

This function displays the analog input voltage from any other switch or sensor.

### Operation Procedure

1. Display the IN/OUT MENU screen.

2. Check that I/O MONITOR4 is highlighted and press switch ③ to display the I/O MONITOR4 screen.

3. Functions of switches on this screen are as follows:
   - Switch ① : Unused (no indication)
   - Switch ② : Unused (no indication)
   - Switch ③ : Changes the screen from I/O MONITOR4 to the IN/OUT MENU screen.

   **Note:**
   **It is impossible to directly jump from I/O MONITOR4 screen to another test screen. Return to the IN/OUT MENU screen or ANALYZER MENU screen once and go to the desired test screen then.**

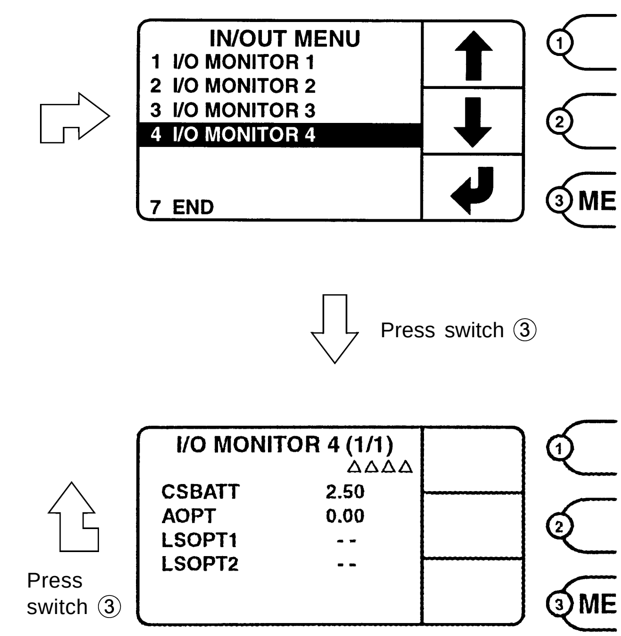
### I/O MONITOR 4 (1/1) screen

① CSBATT: Battery current sensor voltage (V)
- Voltage of the sensor that detects the battery curent.

② AOPT: Spare

③ LSOPT1: Spare

④ LSOPT2: Spare



## ACTIVE TEST

This function outputs electrical switch ON/OFF signals and compares controller input signals with those signals.

### Operation Procedure

1. Display the ANALYZER MENU screen.

2. Press switch ② twice.

3. See that 3. ACTIVE TEST is highlighted and press switch ③. Switch operation test function is activated and the ACTIVE TEST screen is displayed.

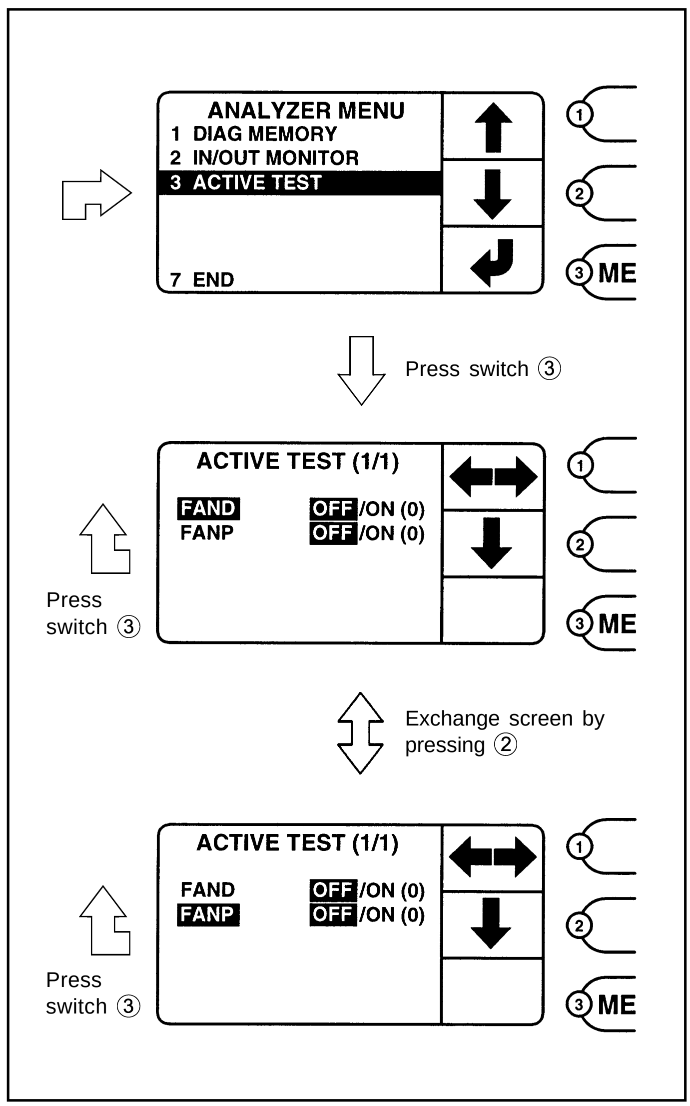
4. Functions of switches on this screen are as follows:
   - Switch ① : Forced ON or OFF
     ON and OFF are alternated each time the switch is pressed.
   - Switch ② : Selects an item.
   - Switch ③ : Causes exit from the active test mode to return to the ANALYZER MENU screen.

   **Note:**
   **It is impossible to directly jump from the ACTIVE TEST screen to another test screen. Return to the ANALYZER MENU screen once and go to the desired test screen then.**

## ACTIVE TEST SCREEN

① FAND: Traveling circuit fan
Traveling circuit fan: ON (1)
Traveling circuit fan: OFF (0)
- Operation of the traveling circuit fan is checked by forced output of the ON/OFF signal.
  Operation is OK if the fan rotates when the ON (1) signal is output and stops when the OFF (0) signal is output.

② FANP: Material handling circuit fan
Material handling circuit fan: ON (1)
Material handling circuit fan: OFF (0)
- The fan operation is checked by forced output of the ON/OFF signal.
  Operation is OK if the fan rotates when the ON (1) signal is output, and stops when the OFF (0) signal is output.



# TUNING

## GENERAL

When the user requests to limit the maximum speed or weaken the regenerative braking force, use the plug-in analyzer and change the setting level.
Twelve tuning items including spares are provided.

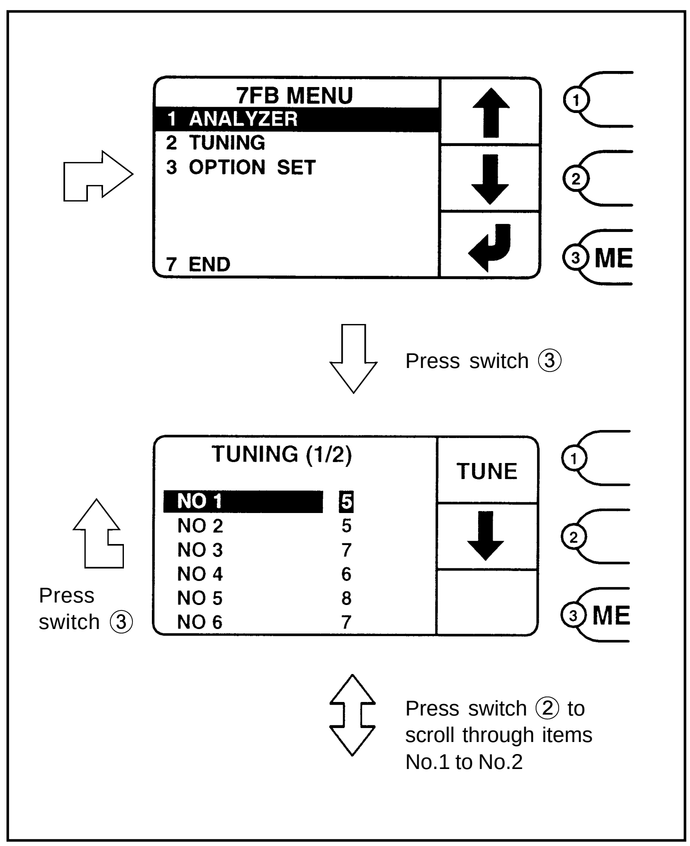
### Tuning Mode List

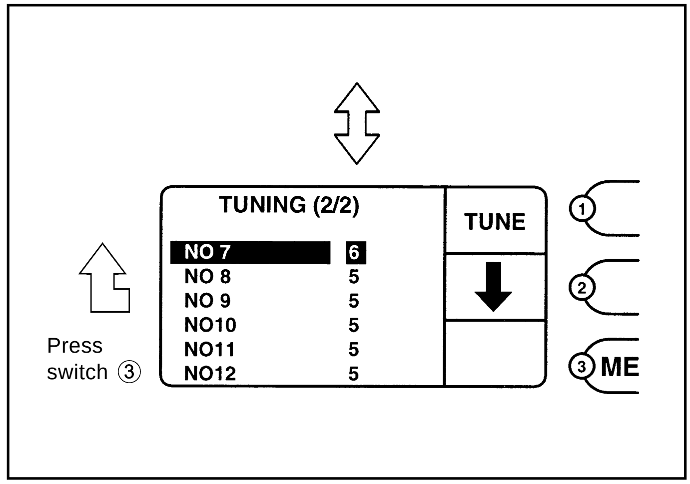
| | | |
|---|---|---|
| TUNING | NO.1 | Setting regenerative braking torque (switch back) |
| | NO.2 | Setting regenerative braking torque (accelerator off) |
| | NO.3 | Lift interrupt level setting |
| | NO.4 | Battery charge indicator correction |
| | NO.5 | Maximum speed limiter |
| | NO.6 | Pump motor rpm setting upon attachment switch ON |
| | NO.7 | Pump motor rpm setting upon tilt switch ON |
| | NO.8 | Spare |
| | NO.9 | Spare |
| | NO.10 | Spare |
| | NO.11 | Spare |
| | NO.12 | Spare |

## Operation Procedure on TUNING screen

1. Connect the plug-in analyzer and select the 7FB MENU screen. (See page 4-13.)
2. Press switch ② once on the 7FB MENU screen. Check that 2. TUNING is highlighted.
3. Press switch ③ (enter) to display the TUNING screen.
4. Select a tuning item using switches ① and ②, and then press switch ③ to enter the setting screen.
5. Functions of operation switches on the tuning function setting screen are as follows:
   - Switch ① : Changes the tuning level.
   - Switch ② : Selects a tuning item.
   - Switch ③ : Enters the selected level and returns to the 7FB MENU screen.

   **Note:**
   **Select a tuning level from levels 1 to 8. For the contents of tuning items and default values, see the next page.**





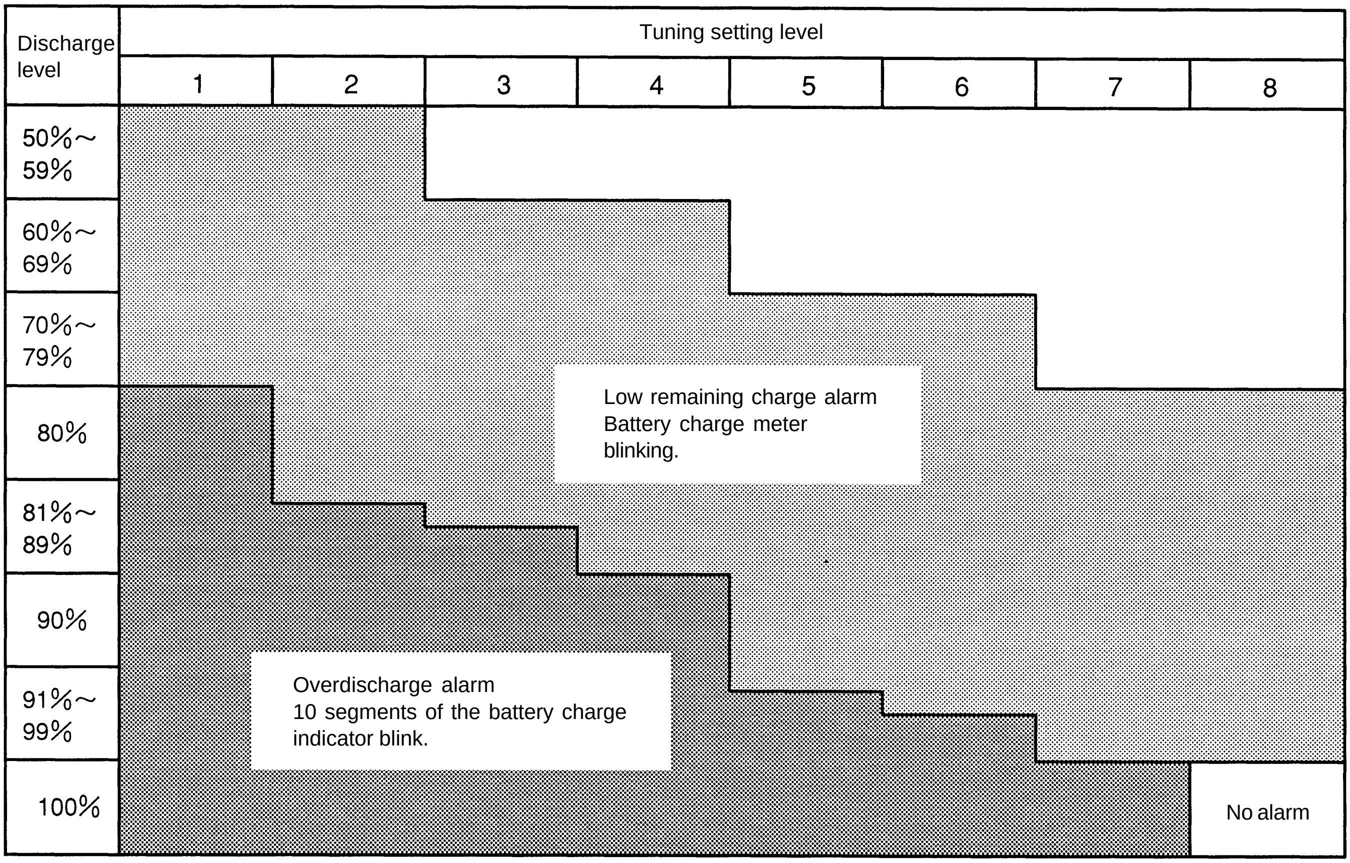

**Tuning Item List**

| Tuning No. | Item | Level (●: Default setting position) | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| 1 | Setting regenerative braking torque (switch back)<br>Adjustment of regenerative braking torque during switch back operation | Weak | | | | ● | | | Strong |
| 2 | Setting regenerative braking torque (accelerator off)<br>Changing the regenerative braking torgue when acceleration is OFF | None | Weak | | | ● | | | Strong |
| 3 | Lift interrupt level setting<br>Adjustment of overcharge alarm activation timing (prohibiting simultaneous traveling and material handling) | Small | | | | | | Large ● | Invalid |
| 4 | Battery charge indication correction<br>Correction of decrease in battery charge indication | Slow decrease | | | | | ● | Quick decrease | |
| 5 | Maximum speed limiter<br>Adjustment of maximum vehicle speed | Low speed | | | | High speed | | | None ● |
| 6 | Attachment power control No.1<br>Adjustment of pump motor rpm upon attachment switch No.1 ON | Low speed | | | | | | High speed ● | |
| 7 | Tilt power control<br>Adjustment of pump motor rpm upon tilt switch ON (The mast control speed of SAS function cannot be adjusted.) | Low speed | | | | | ● | High speed | |
| 8 | Spare | | | | | | | | |
| 9 | Spare | | | | | | | | |
| 10 | Spare | | | | | | | | |
| 11 | Spare | | | | | | | | |
| 12 | Spare | | | | | | | | |

<Reference>
Lift interrupt setting level: For the battery alarm tuning level setting method and levels, see the figure on the next page.

### Remaining Battery Charge Alarm and Battery Overdischarge Alarm Setting

⑦ : Initial setting position




How to read the figure:

- Level 7 is the initial setting level upon factory shipment.

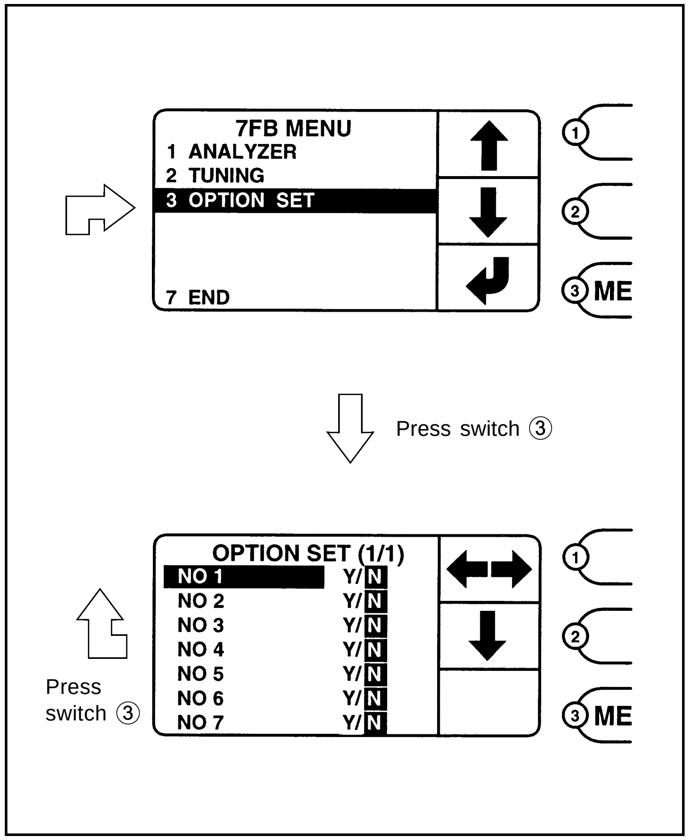
# OPTION SET

## GENERAL

Use the Option Set function to adjust the controller and display control to match option setting of the vehicle. Seven option setting items including spares are provided. For a vehicle with the LED display, it is possible to set only whether or not the battery has been mounted on the vehicle. In this case, six remaining items are reserved as spares.

### Operation Procedure on OPTION SET screen

1. Connect the plug-in analyzer and select the 7FB MENU screen. (See page 4-13.)
2. Press swi!tch ② once on the 7FB MENU screen. Check that 3. OPTION SET is highlighted.
3. Press switch ③ (enter) to display the OPTION SET screen.
4. Functions of switches on the OPTION SET screen are as follows:
   - Switch ① : Changes the setting from Y to N or from N to Y.
   - Switch ② : Selects a setting item.
   - Switch ③ : Enters the selected item and returns to 7FB MENU screen.




**Caution:**
**Item 1 is to set whether local battery installation on the vehicle is needed or not. Six remaining items, 2 to 7, are reserved as spares, which do not need any setting.**

- **Battery-less vehicle: Select Y. (When a locally purchased battery is to be mounted)**
- **Vehicle mounted with a battery: Select N. (When the battery is mounted in Japan before shipment)**

# TESTER SET

## GENERAL

Although the CONTRAST SET and LANGUAGE SET functions are displayed on the TESTER SET MENU screen, only the CONTRAST SET function is used.

1. CONTRAST SET
   This adjusts the contrast of the LCD display.

2. LANGUAGE SET
   This is not used. Though this function may be selected by moving the cursor on the menu, the display is always made in English. It is, however, recommended to select 2. ENGLISH.

## Operation Procedure on TESTER SET MENU screen

Since only the contrast set function is used on this menu, only that function is explained here.

1. Connect the plug-in analyzer to display the MAIN MENU screen. (See page 4-13.)

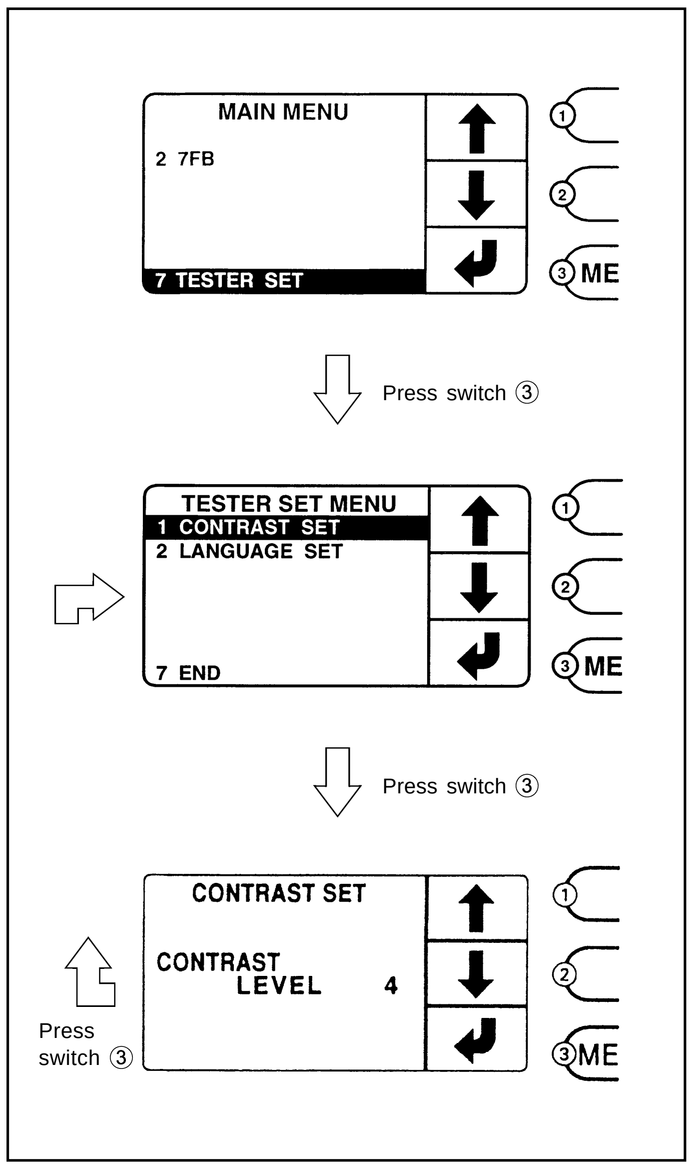
2. Press switch ② once on the MAIN MENU screen. Check that 7. TESTER SET is highlighted.

3. Press switch ③ (enter) to display the TESTER SET MENU screen.
   If you select 7. END on this screen, the screen changes to the MAIN MENU screen.

4. Select the desired tester set item using switches ① and ②, and then press switch ③ (enter) to determine the setting screen. (The function used here is only the LCD display contrast.)

5. Check that 1. CONTRAST SET is highlighted and press switch ③ to display the CONTRAST SET MENU screen.

6. Functions of switches on the CONTRAST SET screen are as follows:
   - Switch ① : Increases the level (darker).
   - Switch ② : Decreases the level (lighter).
   - Switch ③ : Enters the selected level and returns to the TESTER SET MENU screen.

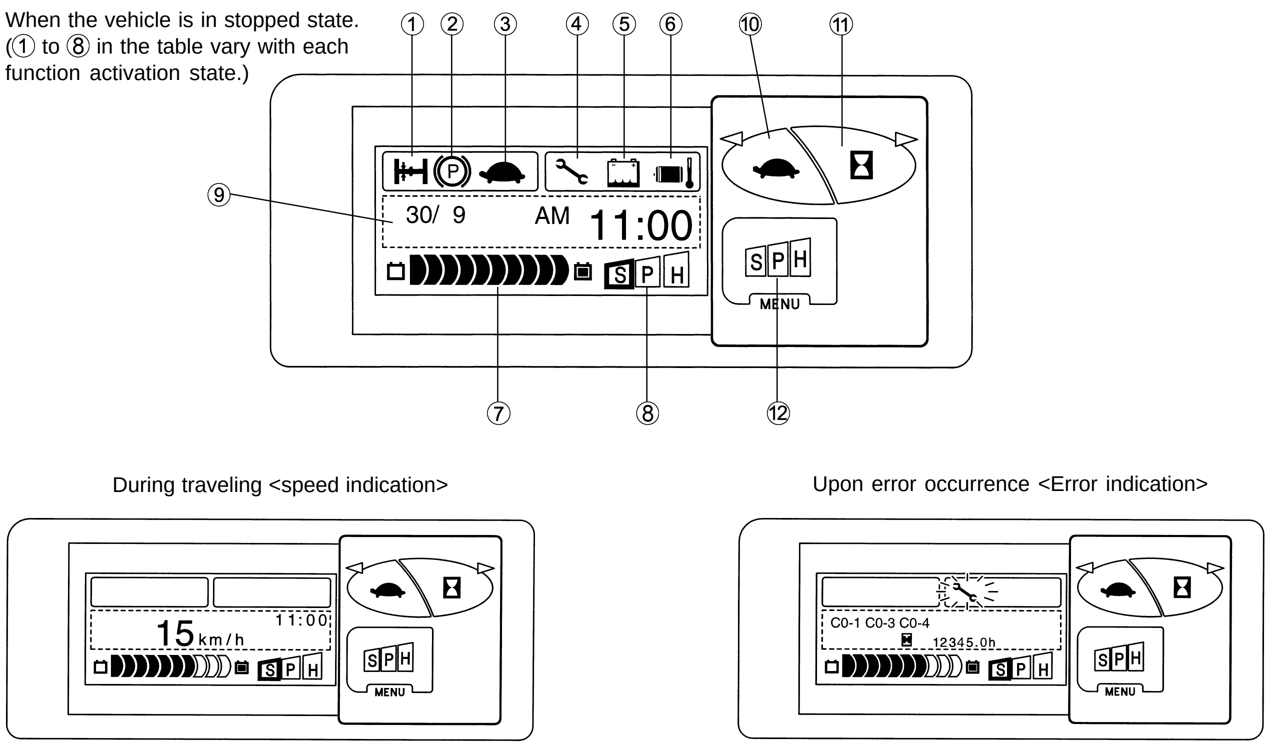


# MULTI-SCREEN, MULTI-DISPLAY (OPTION)

## GENERAL

1. The multi-screen, multi-display is capable of indicating various types of vehicle information by switching the screen according to the displayed contents.

2. Easier recognition and operation on multi-display
   (1) Adoption of white back light and color filter
   (2) Display of battery charge indication and various indicators in fixed positions
   (3) Large switches and addition of function marks




| No. | Item | No. | Item |
|---|---|---|---|
| ① | Swing lock indicator | ⑧ | Power select indicator |
| ② | Parking brake ON indicator | ⑨ | Multiplex screen display area |
| ③ | 2-speed travel speed set indicator | ⑩ | 2-speed travel speed control set switch |
| ④ | Diagnosis digital indicator | ⑪ | Hour meter selector switch |
| ⑤ | Battery electrolyte level alarm indicator | ⑫ | Power select switch |
| ⑥ | Overheat alarm indicator | | |
| ⑦ | Battery charge indication | | |

① Swing lock indicator
This indicator comes on when the rear wheel swing lock is activated. It automatically goes out when the swing lock is released.

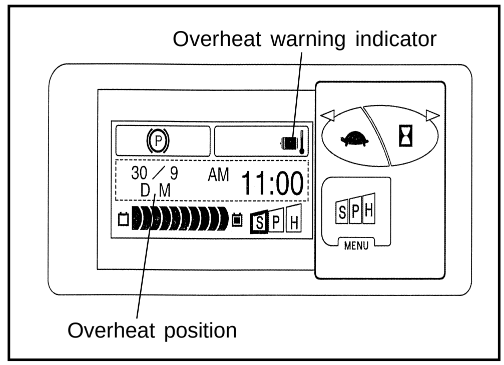
② Parking brake ON indicator
This indicator comes on upon activation of the parking brake. If the operator fails to release the parking brake during forward or reverse traveling, alarm sounds (beeps) to warn the operator. For a vehicle with the optional deadman switch, the indicator comes on when no operator is sitting on the operator's seat.

③ 2-speed travel speed set indicator
This indicator repeats on or off each time the 2-speed travel speed control switch is pressed. When this indicator is on, the 2-speed travel speed control is activated to limit the maximum vehicle speed to the set level. For the level setting method, see the “2-speed Travel Speed Control Level Set Screen” on page 4-40.

④ Diagnosis digital indicator
This indicator blinks when an abnormality occurs in the vehicle to activate the diagnosis function. An abnormality code appears on the display with alarm sounding to warn the operator of the abnormality. Up to 3 abnormality codes are displayed at a time. When more than 3 abnormalitys occur at a time, up to 6 abnormality codes are displayed with switching at intervals of 2 seconds.
When the SAS function matching is not complete, this indicator comes on to warn the serviceman. If it is on, carry out matching by referring to the Matching section.

⑤ Battery electrolyte level alarm indicator
This indicator comes on, when the battery electrolyte decreases to the specified level by evaporation or other reasons, to warn the operator of the low electrolyte level.

⑥ Overheat alarm indicator
When the controller, drive motor or material handling motor temperature rises beyond the specified level, the overheat alarm indicator blinks with alarm sounding to warn the operator. While the overheat alarm indicator is blinking, the vehicle operation is restricted and the overheated component is indicated on the display.
Indication contents:
C/R : Controller
DM : Drive motor
PM : Pump motor



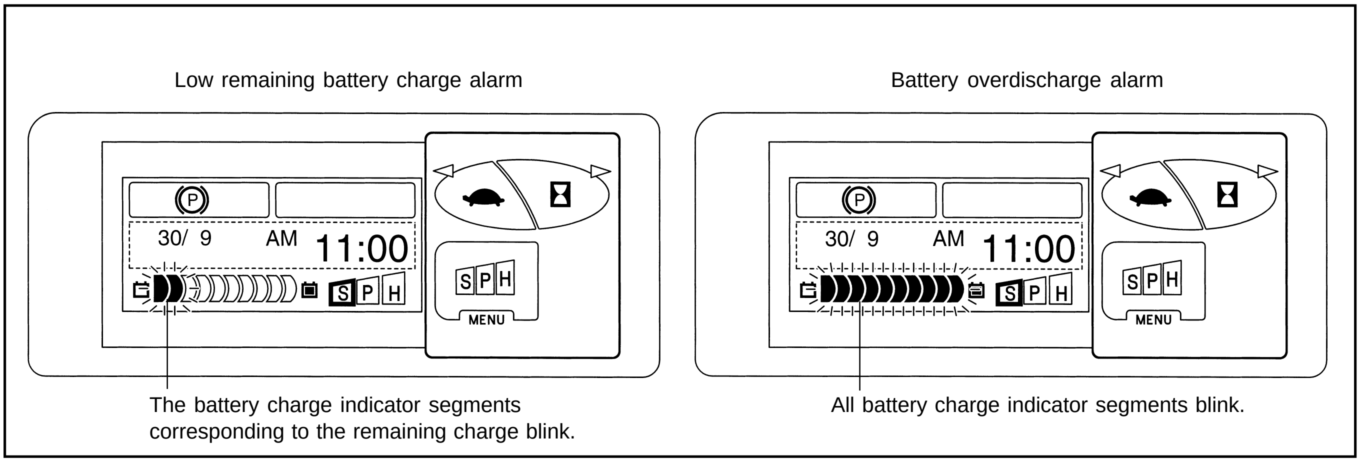

**Vehicle Operation Restriction at Overheating**
DM: Drive motor

| Selected mode | Content of control | |
|---|---|---|
| | Primary control | Secondary control |
| H mode | 1. Character indication, blinking indicator<br>2. Intermittent buzzer sounding for 5 seconds<br>3. Switching to S mode | 1. Character indication, blinking indicator<br>2. Continuous beeping buzzer sounding<br>3. Switching to half speed |
| P mode | 1. Character indication, blinking indicator<br>2. Continuous beeping buzzer sounding<br>3. Switching to half speed | |
| S mode | 1. Character indication, blinking indicator<br>2. Continuous beeping buzzer sounding<br>3. Switching to half speed | |

| Indication | Content of control | |
|---|---|---|
| CR: Contorller | Main drive circuit and CPU temperature | 1. Character indication, blinking indicator<br>2. Intermittent buzzer sounding for 5 seconds<br>3. Switching to half throttle |
| | Main material handling circuit | 1. Character indication, blinking indicator<br>2. Intermittent buzzer sounding for 5 seconds<br>3. Performance upon 100% discharge |
| PM: Pump motor | All SPH mode | 1. Character indication, blinking indicator<br>2. Continuous beeping buzzer sounding<br>3. Performance upon 100% discharge |

⑦ Battery charge indicator
This indicator indicates the remaining battery charge in 10 stages.
A: Low remaining battery charge alarm
The battery charge indicator blinks when the remaining battery charge drops to the set level* or below. When the key switch is turned from OFF to ON in this state, the alarm sounds for 5 seconds to warn the operator of the low battery charge.
B: Battery overdischarge alarm (lift interrupt function)
When the remaining battery charge drops further from tha remaining charge warning level to the set level*, all segments of the battery charge indicator start blinking to warn the operator. Then, material handling during traveling is disabled.

**Note:**
**Use the tuning mode of the mask feature to set the desired level. (See page 4-66.)**




⑧ Power select indicator (traveling and material handling)
The currently selected mode is indicated by enclosing S, P or H with a square. Press the power select switch on the normal function menu to change the mode setting.
When all of S, P and H are enclosed in squares, the control is performed in the mode set on the Power Control Function Set Menu screen. (See page 4-41.)

⑨ Multi-screen display area
The date and time are normally indicated in this area. This area is also used for various purposes such as function setting and abnormality code display by the diagnosis function.

⑩ 2-speed travel speed control set switch
Press this switch on the normal function screen to set or clear 2-speed travel speed control.

⑪ Hour meter selector switch
This switch changes the screen of multi-hour-meter function.

⑫ Power select switch
This switch selects the operating mode from S, P and H. Press this switch on the normal function screen to shift the position of the square indicating the currently selected mode sequentially to the right. Press the switch continuously for 2 seconds to set the level of each function.

# SCREEN DISPLAY (LIST)

## Normal Function Screen

Input of password

Press switch ③ for 2 sec.

· For user setting

| | |
|---|---|
| 2-speed travel speed ON/OFF | ON or OFF setting of 2-speed travel speed control |
| Switching over hour meter display | Checking traveling or material handling system ON time |
| Power select | Power mode selection |

· For user setting

| | |
|---|---|
| Traveling speed level | Setting of 2-speed travel speed control level |
| Speed alarm | Traveling speed setting for overspeed alarm |
| Power control select | Fine adjustment of power control level |
| Clock set | Adjustment of indicated time |

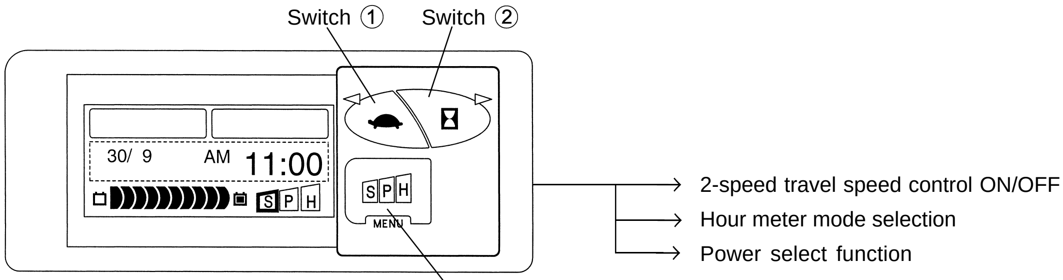
## Mask Function Screen

· For setting by dealer or serviceman

| | | |
|---|---|---|
| ANALYZER | DIAG MEMORY | Checking past diagnosis codes stored in memory |
| | I/O MONITOR1 | Checking the temperature and voltage of each functional part |
| | I/O MONITOR2 | Checking traveling-related sensors |
| | I/O MONITOR3 | Checking material handling and mast control sensors |
| | I/O MONITOR4 | Knob position correction control and checking other sensors |
| | ACTIVE TEST | Forced ON/OFF test of each switch |
| TUNING | NO.1 | Setting regenerative braking torque (switch back) |
| | NO.2 | Setting regenerative braking torque (accelerator off) |
| | NO.3 | Lift interrupt level setting |
| | NO.4 | Battery charge indication correction |
| | NO.5 | Maximum speed limiter |
| | NO.6 | Setting pump motor rpm upon attachment switch ON |
| | NO.7 | Setting pump motor rpm upon tilt switch ON |
| | NO.8 | Spare |
| | NO.9 | Spare |
| | NO.10 | Spare |
| | NO.11 | Spare |
| | NO.12 | Spare |
| OPTION SET | DEMO MODE | Enabling simultaneous traveling and material handling before starting the hour meter |
| | H/M START | Starting integration by hour meter |
| | P/C LOCK | Disabling setting the traveling/lift power control, 2-speed travel speed control and speed alarm level |
| | DESTI | Changing display indications to match each destination |
| | B LEVEL | Setting the battery electrolyte level alarm function |
| | MPH | Selecting the traveling speed display |
| | C/CNT RES | Clearing the battery charge counter to 0 |
| | BATTERY | Setting the calculation constant for battery charge indication |
| | SHOU-TOKU | Speed limit setting for a small-sized special vehicle |
| | AUTO P-OFF | Setting the auto power OFF function |
| | PARKING ERR | Setting of Parking Brake Warning Function |
| | TILT CONT | Setting the mast forward tilt angle limit |
| | SWG W-LOCK | Unused |
| | TILT F-LIM | Setting the mast forward/backward tilt speed control function |
| MATCHING | TILTL | Horizontal matching for tilt angle sensor |
| | TILTF | Forward tilt position matching for tilt angle sensor |
| | LOAD | Pressure sensor no-load matching |
| | TIRE | Straight direction matching for tire angle sensor |
| | SWG | Unused |
| WHEEL DIA | WHEEL DIA | Tire constant setting |

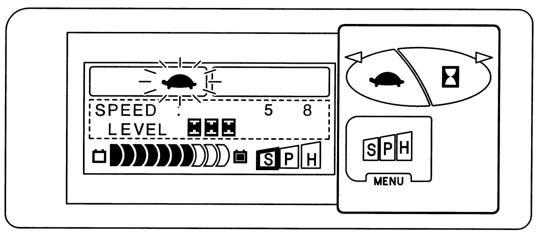
## NORMAL FUNCTION SCREEN

## OPERATION PROCEDURE



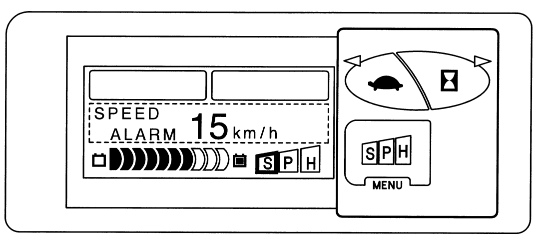

Standard mode screen

Press the switch ③ for more than two seconds



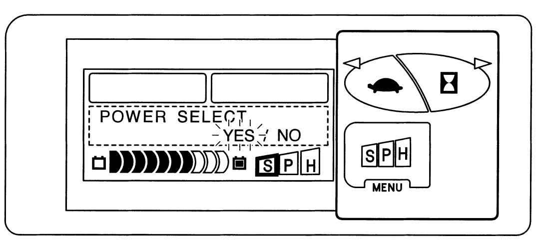

2-speed traveling speed control level setting screen

Press switch ③



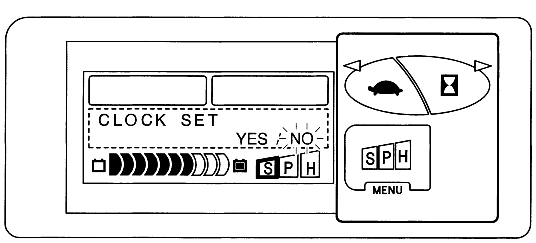

Over speed alarm setting screen

Press switch ③




Control setup selection screen

Press switch ③



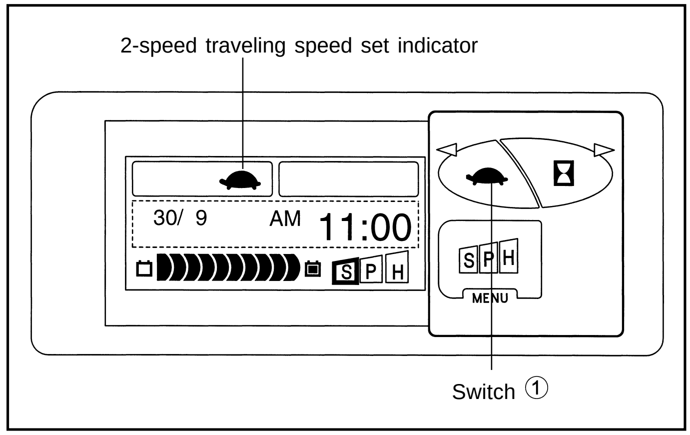

Press switch ③

Clock setup selection screen

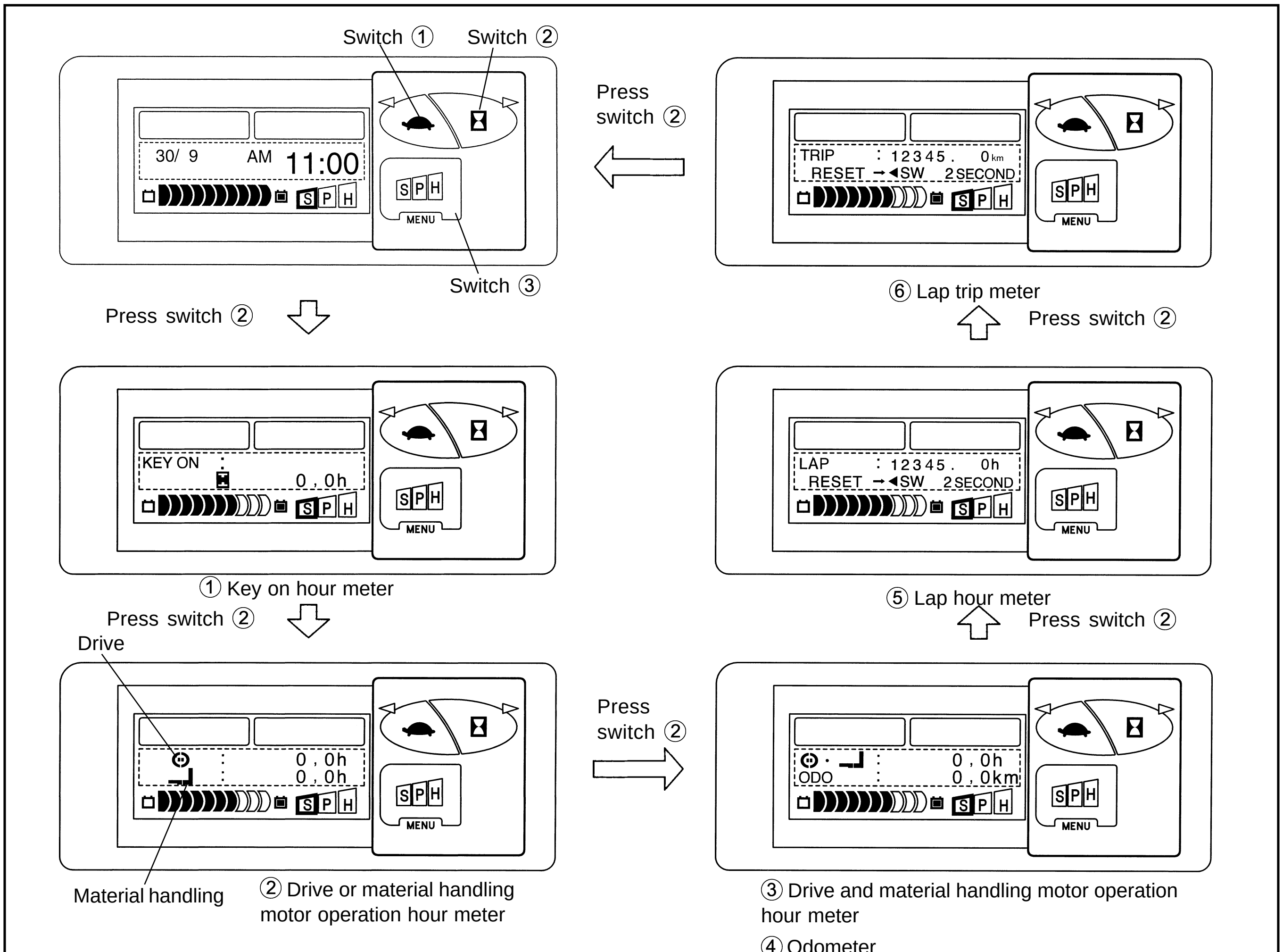
*: Upon returning to the normal screen after transition to each function setting screen, the power select mode is set to the S mode. Select the mode if any other mode is required.

## NORMALLY INDICATED SCREEN

1. Selecting 2-speed travel speed control ON/OFF
   Press switch ① to enable or disable the 2-speed travel speed control indicator. When the indicator is displayed, the 2-speed travel speed control is enabled.

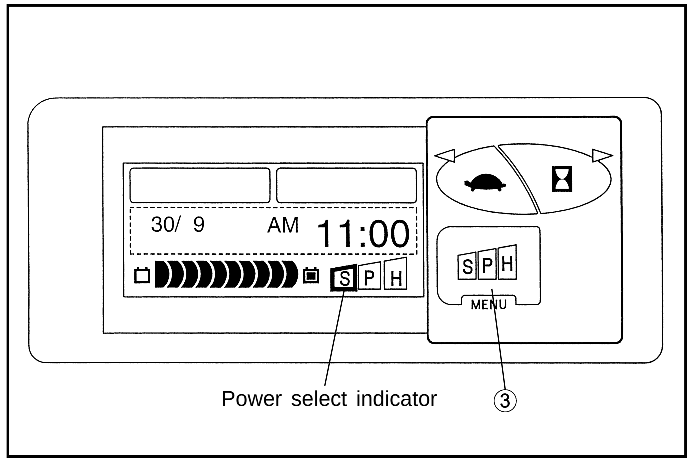



2. Selection of hour meter type to be displayed
   Press switch ② to select the hour meter type to be displayed.
   ① Key ON hour meter: Indicate the total key ON hours.
   ② Traveling/material handling hour meter: Drive/pump motor ON hours
   ③ Traveling and material handling hour meter: Total of drive and pump motor ON hours
   ④ Odometer: Total traveling distance
   ⑤ Hour meter lap: Lap time at key ON
   ⑥ Trip meter: Trip traveling distance

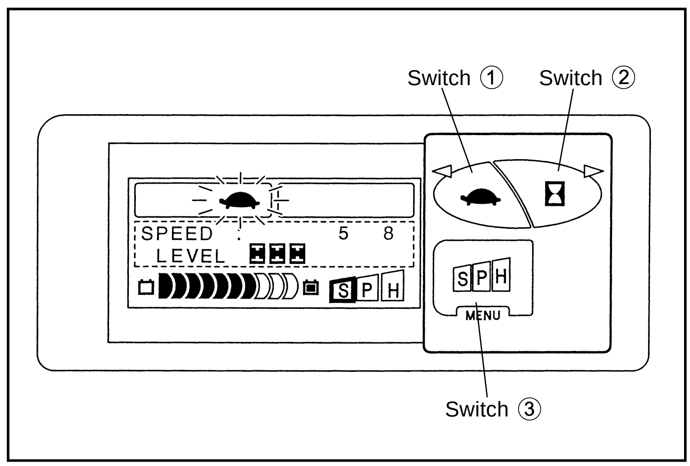



The lap time and trip meter can be reset by pressing switch ① for 2 seconds or more.

3. Selecting the power select mode ( S , P or H ) Press switch ③ on the normal function screen to select the desired power mode by shifting to the corresponding indicator position.
   S : Standard performance of conventional vehicles
   P : Maintaining the maximum performance of conventional vehicle
   H : Improving loaded performance by 20% to 30%
   - Pattern 1: When nothing is set on the power control level set screen
     Each time switch ③ is pressed, the selected mode position shifts to the right in the order shown below:
     S → P → H → S and so on
   - Pattern 2: When setting is made on the POWER CONTROL LEVEL SET screen
     Each time switch ③ is pressed, the selected mode shifts to the right as shown below:
     S → P → H → S P H → S → P ·and so on
     When all modes are enclosed in squares, the control is made by the mode selected on the POWER CONTROL LEVEL SET screen.




4. Switching to 2-speed travel speed control level, overspeed alarm level, power control (traveling, material handling) level or clock set function
   - Press switch ③ on the normal function screen for 2 seconds or more to display the 2-SPEED TRAVEL SPEED CONTROL LEVEL SET screen.




**2-SPEED TRAVEL SPEED CONTROL LEVEL SET SCREEN**

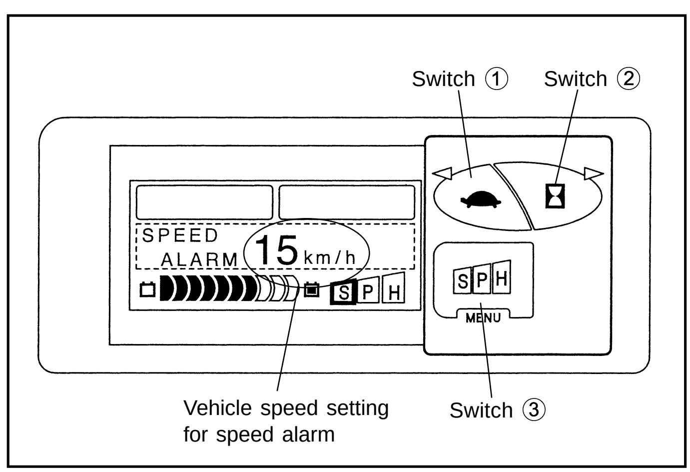
Use this screen to set the 2-speed travel speed control level.

1) Press switch ① to decrease the 2-speed travel speed control level.
2) Press switch ② to increase the 2-speed travel speed control level.
3) Press switch ③ to go to the next screen, (OVER-SPEED ALARM SET screen).

**OVER-SPEED ALARM SET SCREEN**

This screen sets the traveling speed level for overspeed alarming. To call the OVER-SPEED ALARM SET screen from the 2-SPEED TRAVEL SPEED CONTROL LEVEL SET screen, press switch ③ once.

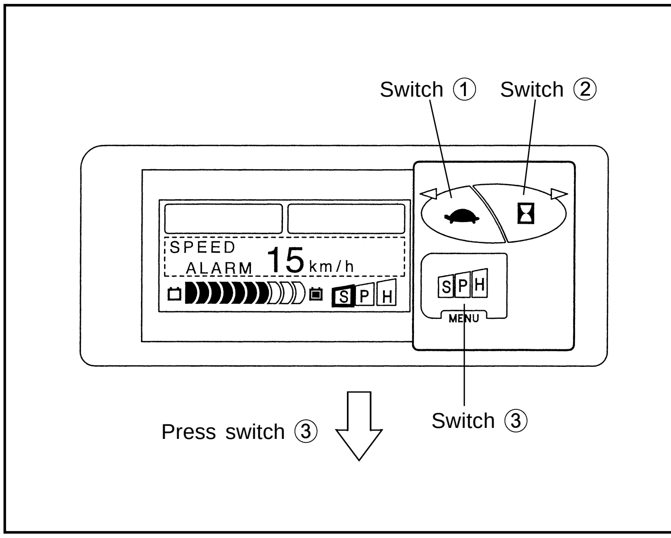
1) Press switch ① to decrease the set traveling speed.
2) Press switch ② to increase the set traveling speed.
3) Press switch ③ to go to the next screen, POWER CONTROL FUNCTION SET screen.



## POWER CONTROL FUNCTION SET SCREEN

This screen sets the drive and lift power control levels independently.
Press switch ③ on the OVER-SPEED ALARM SET screen to go to the POWER CONTROL FUNCTION SET screen.

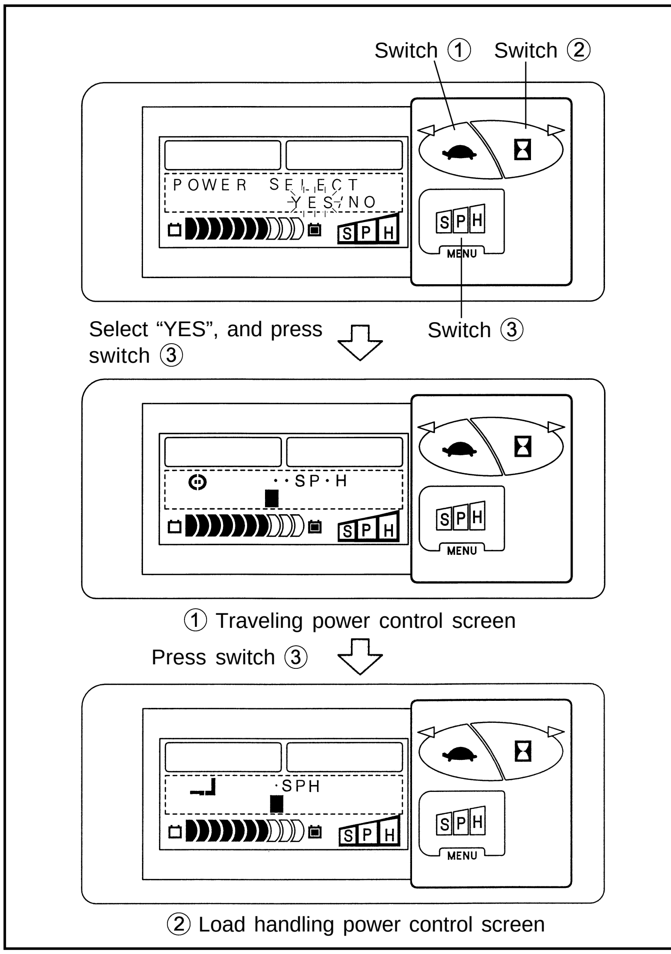
1) Press switch ① on the POWER CONTROL FUNCTION SET screen, select “Y” and press switch ③ to go to the DRIVE POWER CONTROL screen.




(1) DRIVE POWER CONTROL screen
- Press switch ① to decrease the set level.
- Press switch ② to increase the set level.
- Press switch ③ to go to the next menu, LIFT POWER CONTROL screen.

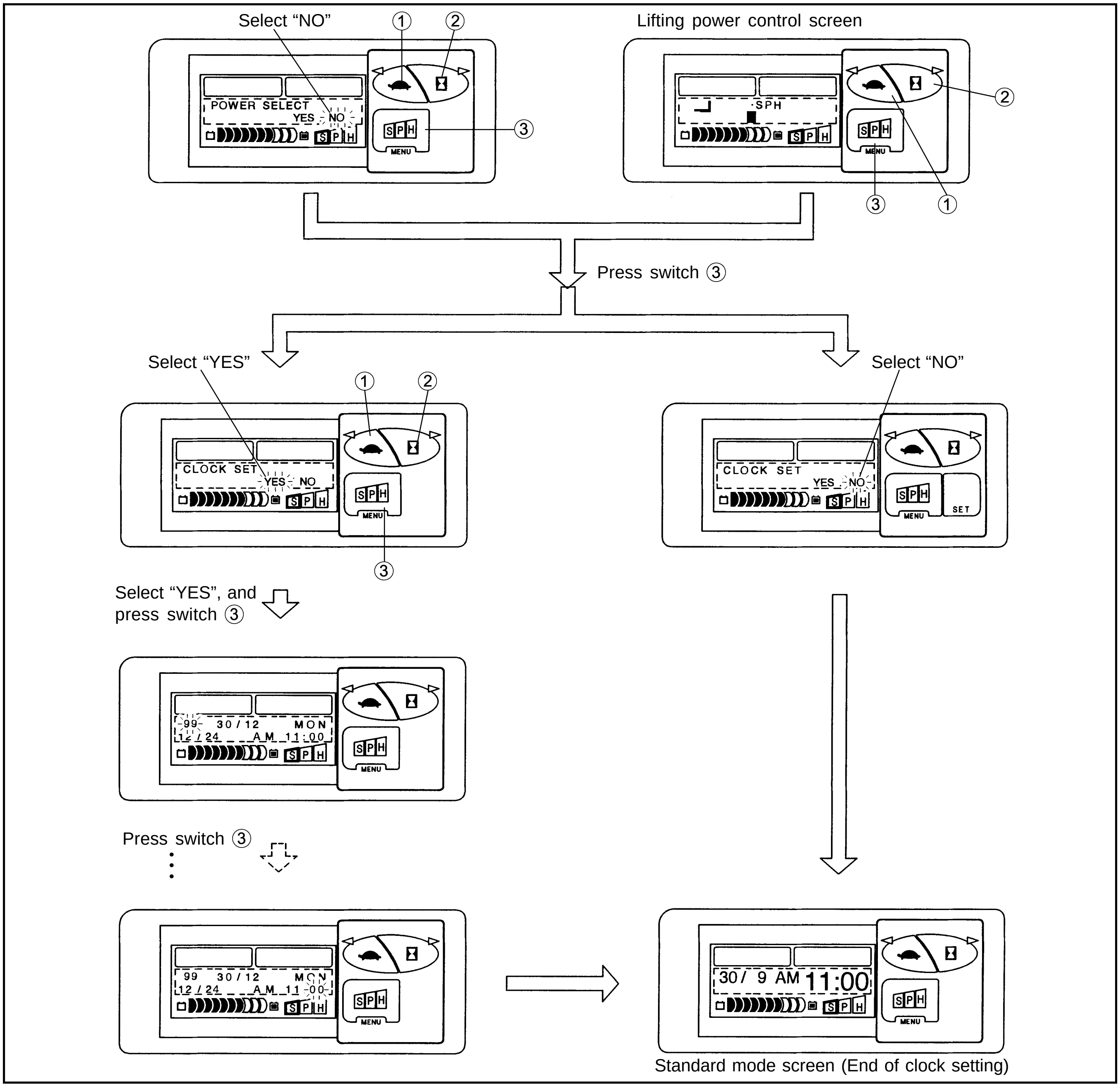
(2) LIFT POWER CONTROL screen
- Press switch ① to decrease the set level.
- Press switch ② to increase the set level.
- Press switch ③ to go to the next menu, CLOCK SET screen.

2) Press switch ② on the POWER CONTROL FUNCTION SET screen, select “N” and press switch ③ to go to the Clock Set Screen.



## CLOCK SET SCREEN

The year, month, day, day of week, time and 12/24-hour system can be set independently.
Press switch ② on the POWER CONTROL FUNCTION SET screen, select "NO" and press switch ③ to open the CLOCK SET screen.

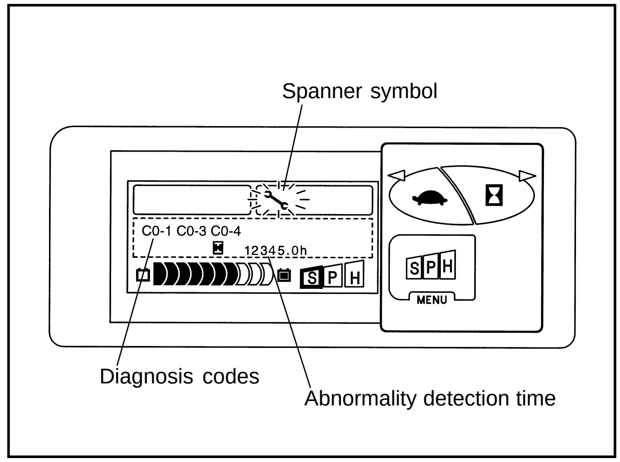



1. Press switch ① on the CLOCK SET screen, select "YES" and press switch ③ to open the CLOCK SET screen.
   (1) CLOCK SET screen
   - Press switch ① to decrease the set value (blinking).
   - Press switch ② to increase the set value (blinking).
   - Press switch ③ to set the currently selected item (blinking) and go to the next item.
   - Press switch ③ when Minute is selected on the CLOCK SET screen to return to the normal function screen.

2. Press switch ② on the CLOCK SET screen, select "NO" and press switch ② to return to the normal function screen.

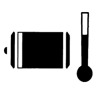
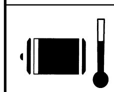
## DIAGNOSIS

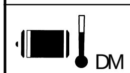
1. When diagnosis is activated, a spanner symbol appears on the display with alarm sounding to warn the operator of an abnormal state of the vehicle.
2. Also, one or up to 3 diagnosis codes appear to indicate the trouble positions.
3. The battery charge can be checked even while diagnosis codes are displayed.

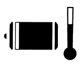



### Diagnosis Code List

| Display indication | Diag memory | Faulty portion | Defect mode | Phenomenon on vehicle |
|---|---|---|---|---|
| 51-1 | 51-1 | Traveling speed sensor | Sensor open | · Swing lock during turning disabled<br>· PS normal (partial function restricted) |
| 51-2 | 51-2 | Traveling speed sensor | Sensor shorted to the ground | · Swing lock during turning disabled |
| 52-1 | 52-1 | Yaw rate sensor | Open | · Swing lock during turning disabled |
| 52-2 | 52-2 | Yaw rate sensor | VCC shorted | · Swing lock during turning disabled |
| 52-3 | 52-3 | Yaw rate sensor | Neutral voltage abnormality | · Swing lock during turning disabled |
| 54-1 | 54-1 | Swing solenoid | Abnormality | Swing lock state holding |
| 54-2 | 54-2 | Swing solenoid | Abnormality | Swing lock state holding |
| 61-1 | 61-1 | Pressure sensor | Open | NL control<br>No forward tilt restriction<br>No automatic leveling control |
| 61-2 | 61-2 | Pressure sensor | VCC shorted | |
| 62-1 | 62-1 | Tilt angle sensor | Open | No forward tilt restriction<br>No automatic leveling control |
| 62-2 | 62-2 | Tilt angle sensor | Open circuit of ground wiring | |
| 63-1 | 63-1 | Tilt switch | Simultaneous ON of forward and backward tilt switches | No forward tilt restriction |
| 63-2 | 63-2 | Tilt switch | Shorting of forward tilt switch for 2 minutes or more | No automatic leveling control |
| 63-3 | 63-3 | Tilt switch | Shorting of backward tilt switch for 2 minutes or more | ( Forward tilting disabled) |
| 64-1 | 64-1 | Lift solenoid | Solenoid open | Interruption of lift solenoid output |
| 64-2 | 64-2 | Lift solenoid | Shorted | |
| 65-1 | 65-1 | Tilt solenoid | Solenoid open | Interruption of tilt solenoid output |
| 65-2 | 65-2 | Tilt solenoid | Shorted | |
| 66-1 | 66-1 | Tilt angle sensor | Tilt matching abnormality | No forward tilt restriction<br>No automatic leveling control |

| Display indication | Diag memory | Faulty portion | Defect mode | Phenomenon on vehicle |
|---|---|---|---|---|
| 67-1 | 67-1 | Lifting height switch W/SAS<br>Mode switch W/O SAS | Switch abnormality | Low lifting height control<br>No forward tilt restriction<br>No automatic leveling control |
| 71-1 | 71-1 | Tire angle sensor | Open | Knob offset occurrence |
| 71-2 | 71-2 | Tire angle sensor | VCC shorted | Knob offset occurrence |
| 72-1 | 72-1 | Steering angle sensor | SS1 abnormality | · Knob offset occurrence<br>· Heavy steering wheel |
| 72-2 | 72-2 | Steering angle sensor | SWS2 abnormality | · Knob offset occurrence<br>· Heavy steering wheel |
| 72-3 | 72-3 | Steering angle sensor | SSC abnormality | Knob offset occurrence |
| 72-4 | 72-4 | Steering angle sensor | Sensor open | · Knob offset occurrence<br>· PS operation disabled |
| 73-1 | 73-1 | Knob deviation solenoid | Solenoid open | Knob offset occurrence |
| 73-2 | 73-2 | Knob deviation solenoid | Solenoid shorted | Knob offset occurrence |
| 74-1 | 74-1 | Tire angle sensor | Matching abnormality | Knob offset occurrence |
|  C/R | A0-1 | Main drive circuit temperature | Overheat | Restricted drive output |
| | A0-2 | Main lift circuit temperature | Overheat | Restricted material handling output |
| A0-4 | A0-4 | Traveling system fan | Shorted | Limited drive output |
| A0-5 | A0-5 | Material handling system fan | Shorted | Restricted lift output |
| A1 | A1 | Controller | High voltage | Traveling and material handling are halted after abnormality indication. |
|  C/R | A2 | CPU temperature | Overheat | Restricted drive output |
| A3-1 | A3-1 | Incorrect battery connection | Charger-related incorrect connection | Stopped traveling and material handling<br>MB does not turn ON. |
| A3-2 | A3-2 | Incorrect battery connection | Incorrect battery voltage | Stopped traveling and material handling<br>MB remains OFF. |
| A4 | A4 | Accelerator switch | Switch abnormality | Traveling disabled after abnormality indication |
| A6-1 | A6-1 | Lift switch | Limit switch LSL1 abnormality | Traveling disabled after abnormality indication |
| A6-3 | A6-3 | Lift switch | Limit switch LSTF, LSTR abnormality | Traveling disabled after abnormality indication |
| A6-5 | A6-5 | Lift switch | Limit switch LSAT1 abnormality | Traveling disabled after abnormality indication |
| A6-6 | A6-6 | Lift switch | Limit switch LSAT2 abnormality | Traveling disabled after abnormality indication |
| A8 | A8 | Traveling/material handling system | Open fuse F1 | Indication only |
| AA | AA | CPU temperature sensor | Temperature sensor abnormality | Indication only |

| Display indication | Diag memory | Faulty portion | Defect mode | Phenomenon on vehicle |
|---|---|---|---|---|
| AF-1 | AF-1 | Main CPU | CPU board abnormality ① | Traveling and Material handling outputs are stopped after abnormality detection. Reset |
| AF-2 | AF-2 | Main CPU | CPU board abnormality ② | |
| AF-3 | AF-3 | Main CPU | CPU board abnormality ③ | |
| AF-4 | AF-4 | Main CPU | CPU board abnormality ④ | Traveling and material handling outputs are stopped after abnormality detection. |
| AF-5 | AF-5 | | CPU board abnormality | Swing control · PS control disabled |
| AF-6 | AF-6 | | ROM abnormality | Swing control · PS control disabled |
| AF-7 | AF-7 | | RAM abnormality | Swing control · PS control disabled |
| AF-8 | AF-8 | | AD converter abnormality | Swing control · PS control disabled |
| C0-1 | C0-1 | Main drive circuit | Main drive circuit abnormality | Traveling disabled after abnormality indication |
| C0-3 | C0-3 | Traveling drive | Power supply abnormality | Traveling drive power supply is stopped. |
| C0-4 | C0-4 | Traveling drive | Circuit abnormality | |
| C1 | C1 | Drive current sensor | Sensor abnormality | Traveling disabled after abnormality indication |
|  | C2-1 | Drive motor | Motor temperature overheating | Limited drive output |
| C2-2 | C2-2 | Drive motor | Temperature sensor abnormality | |
| C3 | C3 | Main drive circuit | Temperature sensor abnormality | Limited drive output |
| C4-1 | C4-1 | Drive accelerator | Accelerator potentiometer abnormality ① | Traveling and material handling disabled |
| C4-2 | C4-2 | Drive accelerator | Accelerator potentiometer abnormality ② | Traveling and material handling disabled |
| C4-3 | C4-3 | Drive accelerator | Accelerator potentiometer abnormality ③ | Traveling and material handling disabled |
| C4-4 | C4-4 | Drive accelerator | Accelerator potentiometer abnormality ④ | Traveling and material handling disabled |
| C7 | C7 | Direction switch | Switch abnormality | Traveling disabled after abnormality detection |
| C8-1 | C8-1 | Drive motor | Rotary sensor abnormality ① | Traveling disabled after abnormality detection |
| C8-2 | C8-2 | Drive motor | Rotary sensor abnormality ② | Traveling resumed by key OFF and then ON |
| CB-1 | CB-1 | MB (main contactor) | Contactor open | Traveling and material handling disabledv |
| CB-2 | CB-2 | MB (main contactor) | Contactor fused | Indication only |
| CF-1 | CF-1 | CPU"ROM" | Write abnormality ① | Traveling and material handling are prohibited after abnormality detection. |
| CF-2 | CF-2 | CPU"ROM" | Write abnormality ② | |
| CF-3 | CF-3 | CPU"ROM" | Write abnormality ③ | |
| CF-4 | CF-4 | CPU"ROM" | Write abnormality ④ | |
| CF-5 | CF-5 | CPU"ROM" | Write abnormality ⑤ | |

| Display indication | Diag memory | Faulty portion | Defect mode | Phenomenon on vehicle |
|---|---|---|---|---|
| E0-1 | E0-1 | Main lift circuit | Main circuit abnormality | Material handling disabled after abnormality indication |
| E0-3 | E0-3 | Lift drive | Power supply abnormality | Stop of lift drive power supply |
| E0-4 | E0-4 | Lift drive | Circuit abnormality | |
| E1 | E1 | Lift current sensor | Sensor abnormality | Material handling disabled after abnormality indication |
|  PM | E2-1 | Lift motor | Motor overheating | Limited lift output |
| E2-2 | E2-2 | Lift motor | Motor temperature sensor abnormality | |
| E3 | E3 | Main lift circuit | Temperature sensor abnormality | Limited lift output |
| E8 | E8 | Lift motor | Rotary sensor abnormality | Stop of material handling operations |
| EE-1 | EE-1 | Communications system between display and main controller | Communication abnormality ① | Indication only |
| EE-2 | EE-2 | Communications system between display and main controller | Communication abnormality ② | Indication only |
| EE-3 | EE-3 | Communications system between display and main controller | Communication abnormality ③ | Indication only (Operate under the default.) |
| EF-1 | EF-1 | Main controller EEP-ROM | EEP-ROM abnormality ① | Operate under the default. |
| EF-2 | EF-2 | Main controller EEP-ROM | EEP-ROM abnormality ② | Operate under the default. |
| EF-3 | EF-3 | Main controller CPU | CPU board abnormality | Indication only |
| EF-5 | EF-5 | PS controller EEP-ROM | EEP-ROM abnormality ① | Swing control·PS control disabled |
| EF-6 | EF-6 | PS controller EEP-ROM | EEP-ROM abnormality ② | Indication only |
| F0-1 | | PS main circuit | Main circuit abnormality | |
| F1-1 | F1-1 | Communications system between main controller and display | Communication abnormality ① | Indication only |
| F1-2 | F1-2 | Communications system between main controller and display | Communication abnormality ② | Indication only |
| FE-1 | FE-1 | Communications system between PS controller and main controller | Communication abnormality ① | Indication only |
| FE-2 | FE-2 | Communications system between PS controller and main controller | Communication abnormality ② | Indication only |
| FE-4 | FE-4 | Main communications system | Communication abnormality ① | · Material handling lock disabled<br>· PS normal control (with partial function restriction) |
| FE-5 | FE-5 | Main communications system | Communication abnormality ② | · PS normal control (with partial function restriction) |
| FE-6 | FE-6 | AFS communications system | Communication abnormality ① | Material handling lock disabled |
| FE-7 | FE-7 | AFS communications system | Communication abnormality ② | Material handling lock disabled |

# MASK FUNCTIONS

## GENERAL

In addition to the functions described in the instruction manual for use by general users, the multi-screen, multi-display provides the following mask functions for use by the service staff for vehicle maintenance and specification setting.
The service functions are protected by the password so that the important internal data will not be damaged by wrong use of service functions by users by mistake.

### Mask Function List

| Function | | Description | When used | | |
|---|---|---|---|---|---|
| | | | Vehicle delivery | Board replacement | Others |
| Analyzer | | Displays the electrical system status and reads the error information detected by controllers | — | — | Upon vehicle abnormality |
| Tuning | | Makes fine adjustment of traveling and material handling functions. | — | ○ *2 | As requested by customer |
| Option Setting | Specification setting | Sets each vehicle option and other specifications. *1 | — | ○ *2·*3 | — |
| | Each control function enable/ disable | Enables or disables each control function | — | ○ *2·*3 | — |
| | Hour meter start | Starts counting by the hour meter. | ○ | ○ *4 | — |
| | Demo mode | Enables or disables the demo mode. (Material handling prohibition during traveling set at the time of delivery) | — | — | New vehicle or before demonstration |
| Matching | | Updates voltage values of sensor signals under the standard vehicle condition. | — | ○ *2 | — |
| Tire constant set | | Makes the speedometer reading appropriate. | — | ○ | — |

*1: This is to match the controller and display control according to the installed option and control functions equipped on the vehicle. Note that this function does not enable or disable the option or control function itself.
*2: Board: Traveling/material handling controller or PS controller control board
*3: Board: Control board for the multi-display

### Traveling, Material handling and EHPS Operations on Each Mode Screen

○: Operable ×: Not operable

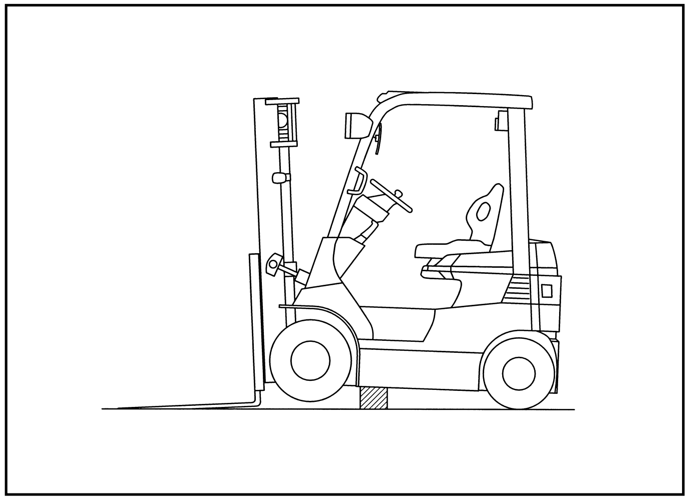
| Mode screen | Traveling | Material handling | EPS | Mode screen | Traveling | Material handling | EPS |
|---|---|---|---|---|---|---|---|
| MASK MENU screen | ○ | ○ | ○ | TUNING screen | ○ | ○ | ○ |
| ANALYZER MENU screen | ○ | ○ | ○ | OPTION SET screen | × | × | ○ |
| ANALYZER MODE, MONITOR1 to MONITOR4 screen | ○ | ○ | ○ | MATCHING screen | ○ | ○* | ○ |
| ANALYZER MODE, ACTIVE TEST screen | ○ | ○ | ○ | TIRE CONSTANT SET screen | ○ | ○ | ○ |

* Only tilt control function disabled

## HOW TO USE THE MASK MENU SCREEN

### Preparation

**Caution:**
**Always jack up the frame until the drive wheels (front tires) leave the ground and support the vehicle with wooden block under both side frames in the front. Fully lower the fork.**



1. See that the battery plug is connected securely and turn the key switch to ON.

2. Operate the mask function according to the password input procedure explained on page 4-49.

# PASSWORD

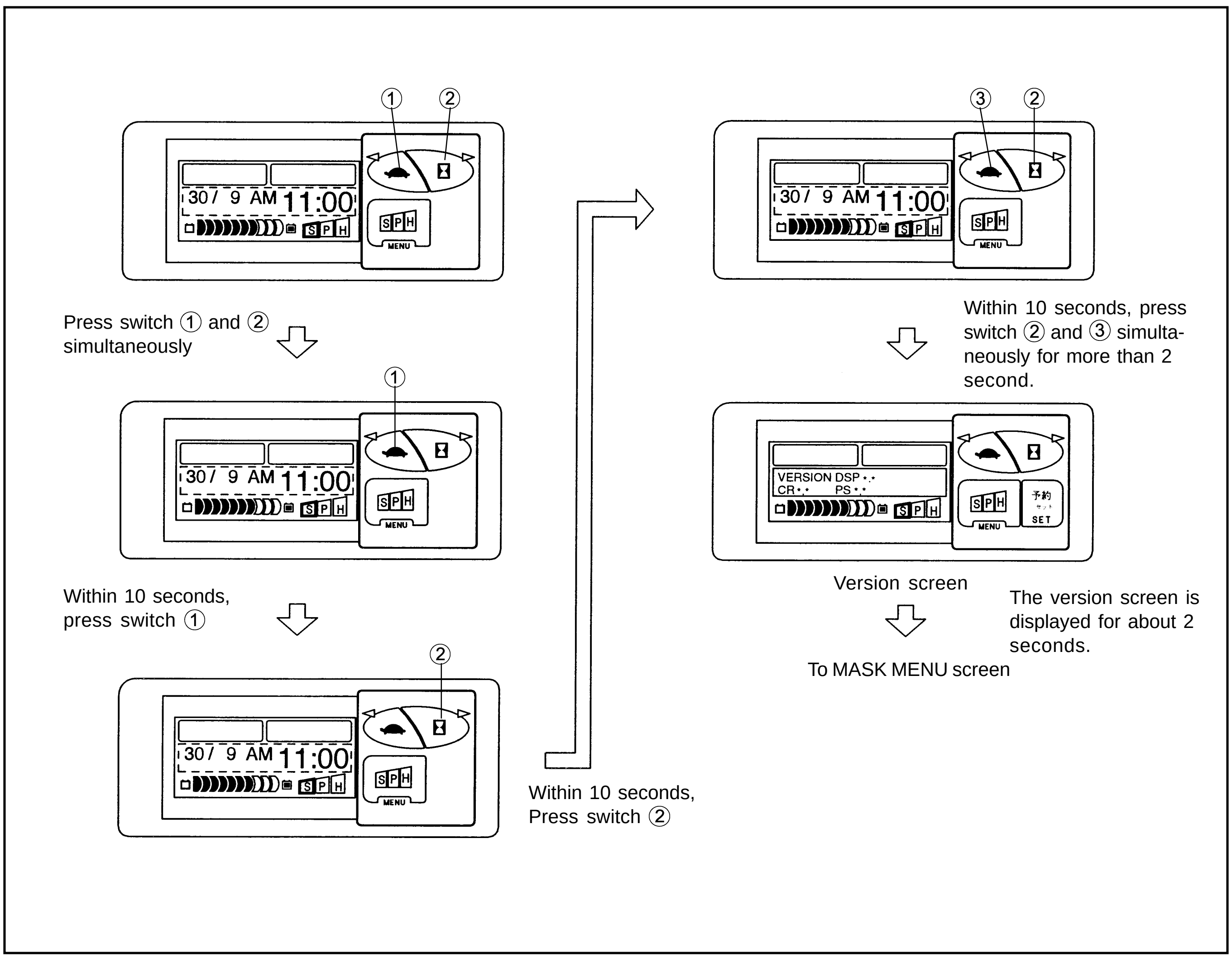
### Notes on password input:

1. Always operate switches displayed on the display with a finger tip. If a sharp edged tool is used, the switch may be damaged.

2. If a wrong input is found midway, turn the key switch to OFF and restart from the beginning. If the MASK MENU cannot be displayed after several attempts, the system may be faulty.

### Password Input Procedure

| Step | Operation | Vehicle operation |
|---|---|---|
| 1 | Press switches ① and ② at a time. | A short high-pitched electronic sound is given off. |
| 2 | Press switch ①. | A short high-pitched electronic sound is given off. |
| 3 | Press switch ②. | A short high-pitched electronic sound is given off. |
| 4 | Simultaneously press switches ② and ③ for 2 seconds or more. (End of password input) | A longer high-pitched electronic sound is given off. |
| 5 | The version screen appears automatically. | |
| 6 | After displaying the version screen for 2 seconds, the MASK MENU screen appears automatically. | |



# OPERATION ON MASK MENU SCREEN

## Operation Procedure

1. Input the password on the normal function menu (as explained on the preceding page) to display the MASK MENU screen.

2. Select a desired function using switches ① and ②. Then, press switch ③ (set) to display the function screen or setting screen of the selected function.

(1) ANALYZER SCREEN
This screen indicates the electrical system status and reads the error information detected by the controller.

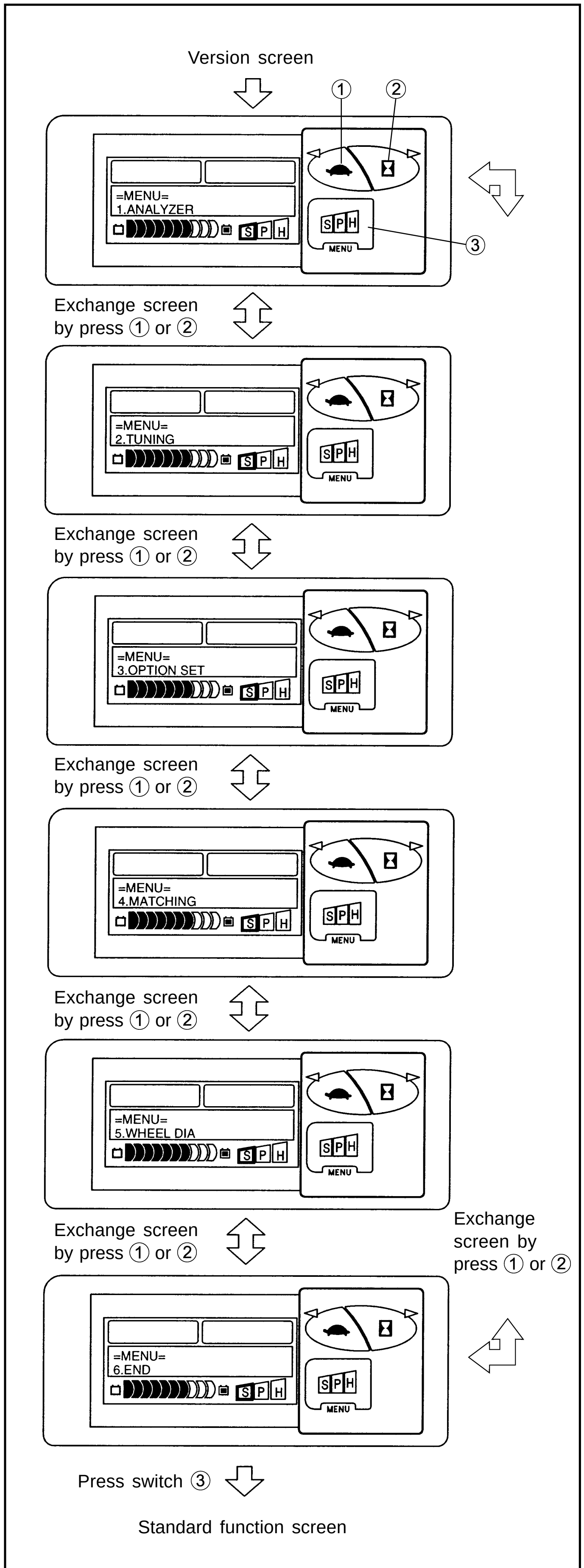
(2) TUNING SCREEN
Use this screen for fine adjustment of control of the traveling and material handling.

(3) OPTION SET SCREEN
Use this screen to match the controller or display control according to the set option or control.

(4) MATCHING SCREEN
This screen updates the signal voltage values stored in the controller (signal voltage values from the SAS function sensors under the standard vehicle condition).

(5) WHEEL DIA SCREEN
This screen rewrites the tire information in the controller for correcting the speed indication and trip meter.

(6) END SCREEN
It is possible to go to the normal function screen from this screen. Press switch ③ on this screen to go to the normal function screen.
Press switch ② to return to the (1) ANALYZER MENU. As an alternative method, turn the key switch to OFF when any menu is displayed to return to the normal function screen.



# ANALYZER

## GENERAL

1. Switching the multi-display to the analyzer mode permits checks of traveling, material handling, EHPS and SAS main circuits, operation systems such as the accelerator and sensor functions as well as detection of problem components.

2. Full utilization of the analyzer functions helps quick, easy servicing.

3. The analyzer supports inspection of the control system and troubleshooting through full communication with the traveling/material handling controller.

4. The analyzer has the following functions:
   (1) Diagnosis memory function (DIAG MEMORY)
   The controller stores up to 10 error codes (diagnosis codes) detected in the electrical system in the past. The diagnosis function reads these error codes and indicates them on the display.
   Each error code is displayed with its detection time as the key ON hour meter reading.

   (2) In/out monitor function (I/O MONITOR)
   This function displays the analog input values from individual sensors in the traveling, material handling, EHPS and SAS systems. Monitoring the displayed values enables the quality of each circuit/sensor to be judged.

   ① I/O MONITOR1
   Displays the temperature and analog input voltage at the respective terminal of each electrical component detected by the controller.

   ② I/O MONITOR2
   Displays each switch ON/OFF state and analog input voltages from sensors for traveling and swing control.

   ③ I/O MONITOR3
   Displays the material handling and mast switch ON/OFF states and analog input voltages from material handling and mast sensors.

   ④ I/O MONITOR4
   Displays the ON/OFF states of knob position correction control and other switches and the analog input voltages from respective sensors.

   (3) Active test (ACTIVE TEST)
   In the active test mode, the controller forcibly outputs an activate signal (ON or OFF signal) to the selected item in order to permit operation check of that function.

# ANALYZER MENU SCREEN LIST

**Note:**
**Values displayed on the second row are examples and not the standard.**

| Analyzer menu screen | Indication | | Description |
|---|---|---|---|
| | 1st row | 2nd row | |
| 1. DIAG MEMORY<br>·Diagnosis code display | DIAG-1<br>DAIG-10 | Error codes are displayed together with detection time information. | Refer to the Diagnosis Code List. |
| 2. I/O MONITOR1 | I/O1-1 | THCD: +25 | Main traveling circuit temperature: °C |
| ·Voltage | I/O1-2 | THCP: +25 | Main material handling circuit temperature: °C |
| ·Temperature | I/O1-3 | TD : +25 | Drive motor temperature: °C |
| | I/O1-4 | TP : +25 | Pump motor temperature: °C |
| | I/O1-5 | TEMP : +25 | Temperature on CPU board: °C |
| | I/O1-6 | VBBT : 50.0 | Battery voltage: V |
| | I/O1-7 | VBKY : 50.0 | Voltage after key switch: V |
| | I/O1-8 | VBP4 : 50 | Voltage at P4 terminal: V |
| | I/O1-9 | VBMB(M): 50 | Voltage after MB contactor (main input): V |
| | I/O1-10 | VBMB(S): 50 | Voltage after MB contactor (PS input): V |
| 3. I/O MONITOR2 | I/O2-1 | POTA : 0.70 | Accelerator potentiometer voltage: V |
| ·Traveling system | | SWAC: 0 | Accelerator switch: 0 (OFF), 1 (ON) |
| ·Swing control | I/O2-2 | DSF : 0 | Forward switch: 0 (OFF), 1 (ON) |
| | | SDR: 0 | Reverse switch: 0 (OFF), 1 (ON) |
| | I/O2-3 | LSB : 1 | Brake switch: 0 (OFF), 1 (ON) |
| | | LSD: 0 | Deadman switch: 0 (OFF), 1 (ON) |
| | I/O2-4 | SSD: 1→00 | Drive motor rpm sensor 1: Number of pulses |
| | | 2→00 | Drive motor rpm sensor 2: Number of pulses |
| | I/O2-5 | SPD: M10.0 | Main traveling speed: km/h |
| | | S10.5 | SKPS traveling speed: km/h |
| | I/O2-6 | YAW : 2.50 | Yaw rate sensor voltage: V |
| | I/O2-7 | SWG: 0.0 | Not used |
| 4. I/O MONITOR3 | I/O3-1 | LSL : 1 | Lift switch: 0 (OFF), 1 (ON) |
| ·Material handling system | | SWTK: 0 | Tilt knob switch: 0 (OFF), 1 (ON) |
| ·Mast control | I/O3-2 | LSTF : 1 | Forward tilt switch: 0 (OFF), 1 (ON) |
| | | LSTR: 0 | Backward tilt switch: 0 (OFF), 1 (ON) |
| | I/O3-3 | LSAT1: 0 | Attachment switch 1: 0 (OFF), 1 (ON) |
| | | LSAT2: 1 | Attachment switch 2: 0 (OFF), 1 (ON) |
| | I/O3-4 | SSP : 00 | Lift rotary sensor: Number of pulses |
| | I/O3-5 | MH : 001 | Lifting height switch: 0 (OFF), 1 (ON) |
| | I/O3-6 | POTT: 2.50 | Tilt angle sensor voltage: V |
| | I/O3-7 | SPL : 2.50 | Lift sensor voltage: V |
| 5. I/O MONITOR4 | I/O4-1 | STS: 001 | Steering angle sensor: 0 (OFF), 1 (ON) |
| ·Knob position correction control | I/O4-2 | K-POS: 159 (150) | Steering angle knob position: Actual value (target value) |
| ·Others | I/O4-3 | K-DIFF: 100 | Steering angle knob position deviation: |
| | | SOL: 0 | Knob position correction solenoid: 0 (OFF), 1 (ON) |
| | I/O4-4 | TIRE: 2.50 | Tire angle sensor voltage: V |
| | I/O4-5 | CSBATT: 2.50 | Voltage from battery current sensor: V |
| | I/O4-6 | AOPT: 0.00 | Spare |
| | I/O4-7 | SOPT: 1→0 | Spare |
| | | 2→0 | Spare |
| 6. ACTIVE TEST | ACT-1 | FAND: ON/OFF (0) | Drive fan |
| ·Operation test | ACT-2 | FANP: ON/OFF (0) | Lift fan |
| | ACT-3 | SSOL: ON/OFF (0) | Not used |
| | ACT-4 | KSOL: ON/OFF (0) | Knob position correction solenoid |
| 7. END | Return to Mask Menu by pressing switch 3. | | |

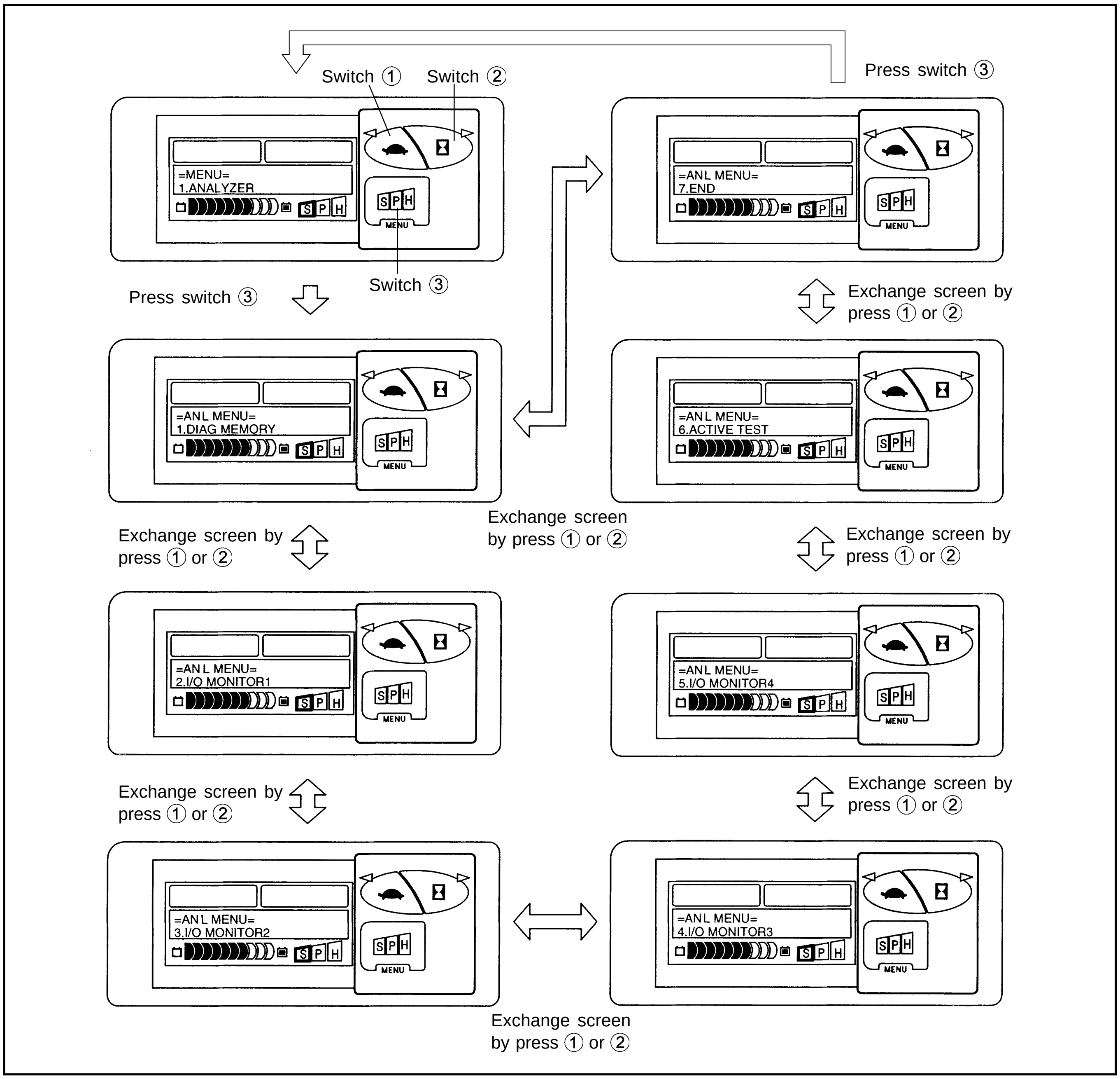
## Operation Procedure

1. Input the password on the normal function menu (as instructed before) to display the MASK MENU screen.

2. Check that 1. ANALYZER is selected (highlighted) on the screen and press switch ③ (enter) to call the ANALYZER MENU screen.

3. Select the menu for the desired test using switches ① and ② and then press switch ③ (enter) to display the set screen.
   - Switch ①: The cursor moves to the preceding item.
   - Switch ②: The cursor moves to the next item.
   - Switch ③: Enters (Changes to the test screen for the selected item.)

**Note:**
**If you select 7. END on the MASK MENU screen and press switch ③, the ANALYZER MENU screen appears again.**



## DIAG MEMORY

The controller stores up to 10 most recent errors. The DIAG MEMORY screen displays these diagnosis codes together with their detection time information (in key ON hour meter reading).
The most recent diagnosis code is displayed as DIAG-1, followed by DIAG-2, DIAG-3 and so on to DIAG-10.

### Operation Procedure

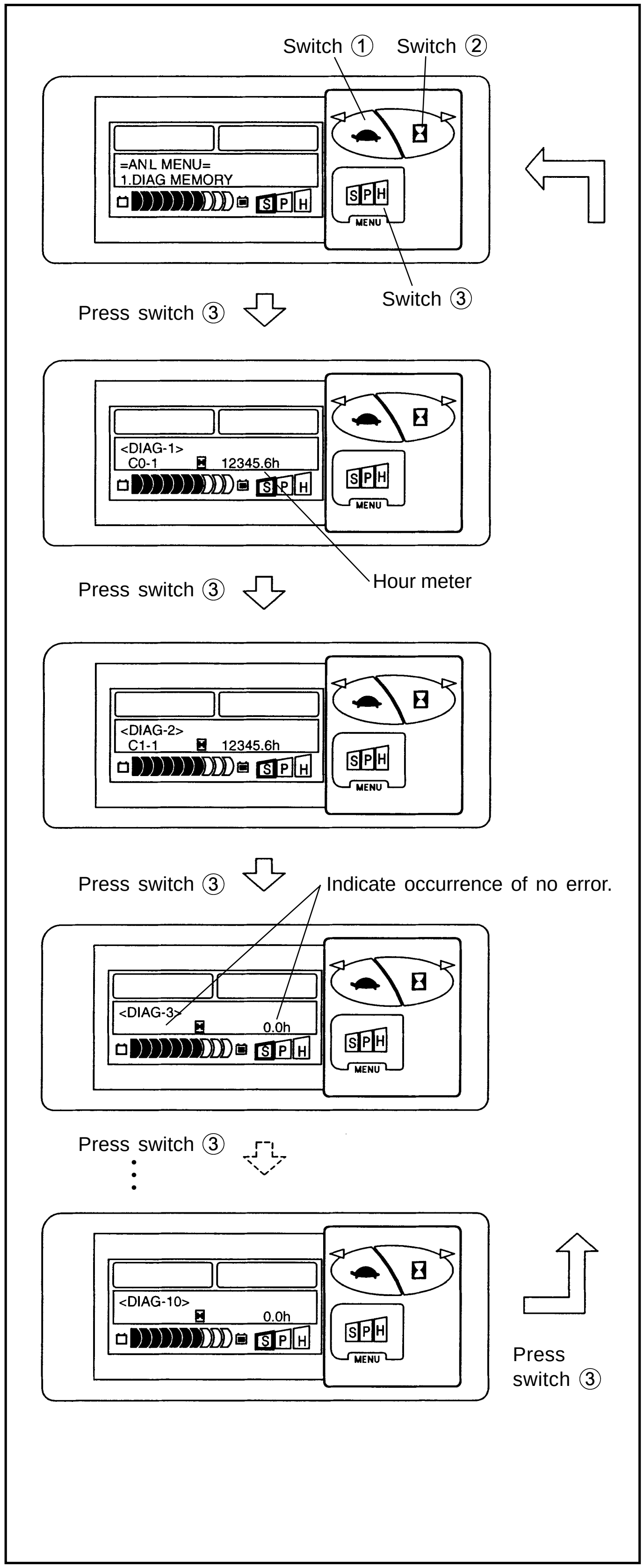
1. Call the ANALYZER MENU screen.

2. Check that 1. DIAG MEMORY is displayed and then press switch ③ (enter) to activate the diag memory function which displays diagnosis codes detected in the past sequentially starting from the most recent one.

3. Functions of switches on the 1. DIAG MEMORY screen are as follows:
   - Switch ①: Not used
   - Switch ②: Not used
   - Switch ③: Displays diagnosis code detected in the past.

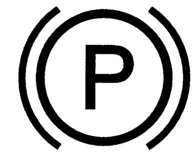
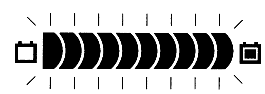
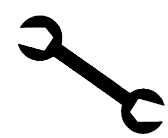
**Note:**
**Press switch ③ on the DIAG-10 screen to return to the ANALYZER MENU screen.**
**When no error codes are displayed on the screen and the hour-meter time is 0.0h, it indicates that no errors occurred in the past after that row.**
**It is impossible to directly jump from the DIAG MEMORY screen to other test screen. Return to the ANALYZER MENU screen once and then go to the desired test screen.**

**Note:**
**As for diagnosis codes, problem components, error modes and phenomena on the vehicle, see pages 4-43 through 4-46.**



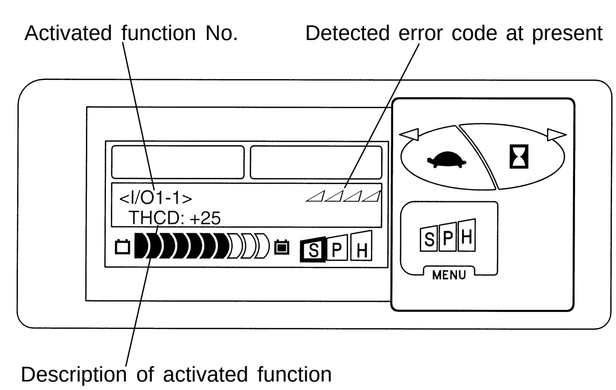
## Vehicle Abnormalities Not Stored in Diag Memory

There are abnormalities that are not stored in the diagnosis memory even if the controller detects them.

| Alarm item | Alarm content | Symbol displayed |
|---|---|---|
| 1. Parking lever ON alarm<br>Alarm occurs upon attempt at traveling with the direction switch at either forward or reverse position while the parking lever is kept applied. | • Alarm indication: Blinking parking brake indicator<br>• Alarm sound (longer high-pitched electronic sound)<br>A short high-pitched electronic sound |  |
| 2. Parking lever OFF alarm<br>Alarm occurs when the operator leaves the operator's seat without applying the parking brake (also without turning the key switch to OFF).<br>This alarm is provided on vehicles with the deadman switch (option). | • Alarm indication: Blinking parking brake indicator<br>• Alarm sound (longer high-pitched electronic sound) | No display |
| 3. Overdischarge alarm (lift interrupt)<br>Overdischarged state of the battery is warned at the level set at the tuning (explained later) to prohibit simultaneous traveling and material handling. | • Alarm indication: Blinking battery charge indicator<br>• Alarm sound (longer high-pitched electronic sound) |  |
| 4. Return to neutral alarm<br>Alarm occurs when the key switch is turned to ON while the direction switch is set at the forward or reverse position. | • Alarm sound (longer high-pitched electronic sound) | No display |
| 5. Mismatching alarm<br>(1) Tilt angle sensor when the fork is horizontal<br>(2) Tilt angle sensor at forward tilt limit angle<br>(3) Pressure sensor in no-load state<br>(4) Tire angle sensor in straight traveling<br>(5) Swing angle sensor when the rear axle in horizontal state | • Alarm indication (spanner symbol) |  |

## I/O MONITOR Function

This function displays the analog input voltage from each of traveling, material handling and SAS sensors. The circuit or sensor quality can be judged by monitoring the displayed value.
During activation of I/O MONITOR function
When any abnormality is detected, it is indicated as an error code on the display.



## I/O MONITOR1

This function displays the temperature of each electrical component and the voltage at the respective terminal.

### Operation Procedure

1. Display the ANALYZER MENU screen.

2. Press switch ② once.

3. Check that the 2. I/O MONITOR1 is displayed and press switch ③ to activate the I/O MONITOR1 function. Press switch ③ each time to sequentially display I/O1-1 through I/O1-10.

4. Functions of switches on this screen are as follows:
   - Switch ①: Unused
   - Switch ②: Unused
   - Switch ③: Sequentially changes the screen from I/O1-1 to I/O1-10.

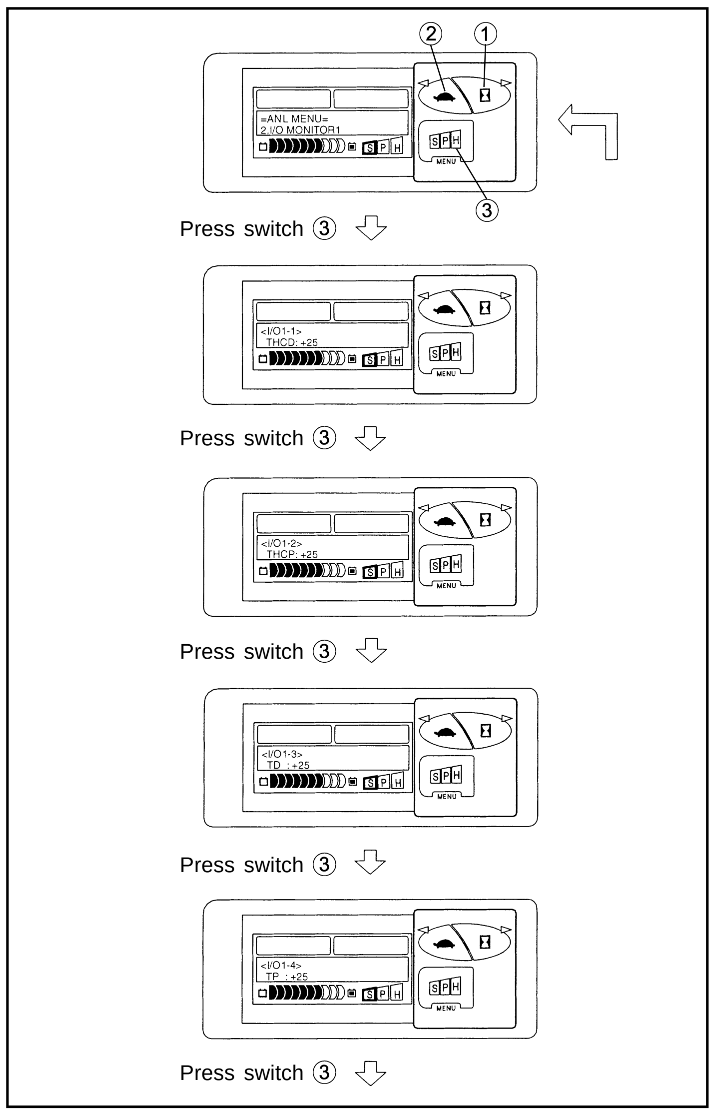
**Note:**
**Press switch ③ on the I/O1-10 screen to return to the ANALYZER MENU screen.**
**It is impossible to directly jump from I/O MONITOR1 function screen to another test screen. Return to the ANALYZER MENU screen once and then go to the desired test menu.**

① I/O1-1 screen
THCD: Main drive circuit temperature (°C)
Temperature of the main traveling circuit

② I/O1-2 screen
THCP: Main material handling circuit temperature (°C)
Temperature of the main material handling circuit

③ I/O1-3 screen
TD: Drive motor temperature (°C)
Temperature at the drive motor.

④ I/O1-4 screen
TP: Pump motor temperature (°C)
Temperature at the pump motor.



⑤ I/O1-5 screen
TEMP: Temperature on the CPU board (°C)
Temperature on the CPU board of the traveling/material handling controller

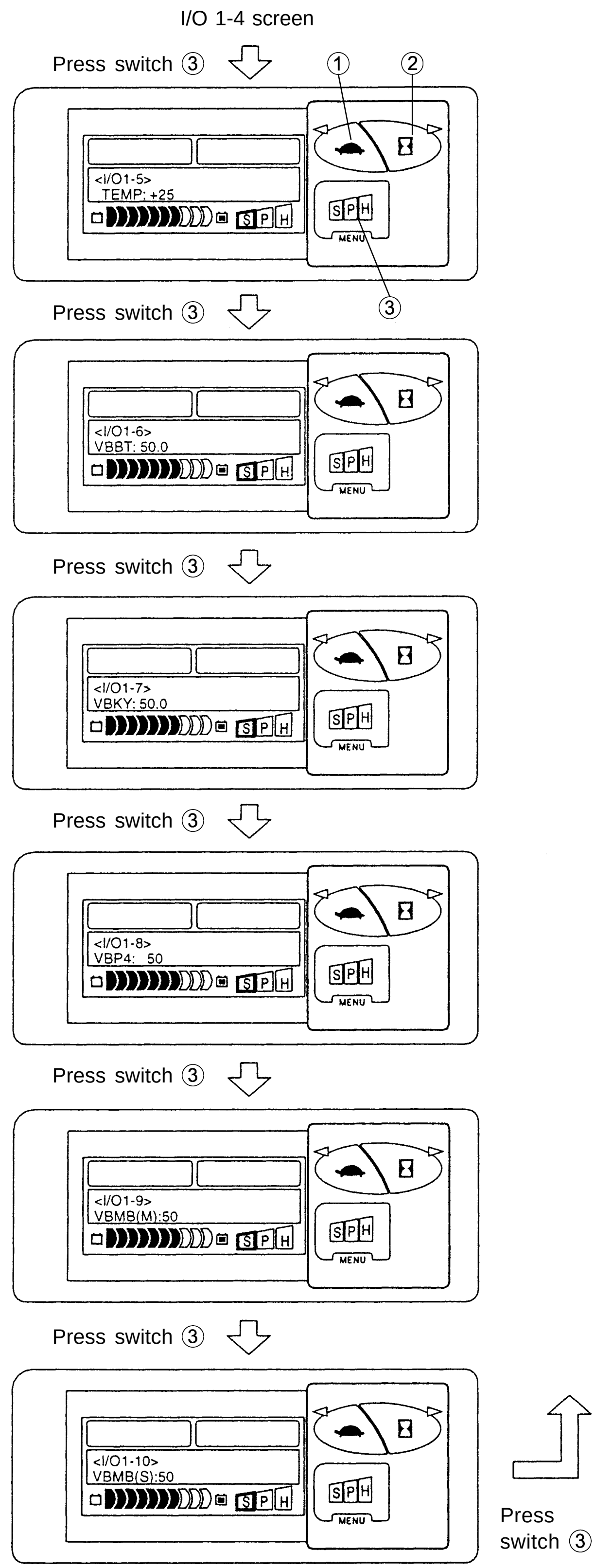
⑥ I/O1-6 screen
VBBT: Battery voltage (V)
Voltage before key switch

⑦ I/O1-7 screen
VBKY: Battery voltage (V)
Voltage after key switch

⑧ I/O1-8 screen
VBP4: Voltage at P4 terminal (V)
Voltage measured at terminal P4

⑨ I/O1-9 screen
VBMB(M): Voltage (V) after (main input) MB contactor
Input voltage to the main controller after the MB contactor

⑩ I/O1-10 screen
VBMB(S): Voltage (V) (PS input) after MB contactor
Input voltage to the PS controller after the MB contactor



## I/O MONITOR2

This function displays the ON/OFF status of traveling and swing switches and analog input voltages of sensors.

## Operation Procedure

1. Display the ANALYZER MENU screen.

2. Press switch ② twice.

3. Check that the 3. I/O MONITOR2 is displayed and press switch ③ to enter the I/O MONITOR2 function and to sequentially display I/O2-1 to I/O2-7 menus.

4. Functions of switches on this screen are as follows:
   - Switch ①: Unused
   - Switch ②: Unused
   - Switch ③: Press switch ③ each time to sequentially change the screen from I/O2-1 to I/O2-7.

**Note:**
**Press switch ③ on the I/O2-7 menu to return to the ANALYZER MENU screen.**
**It is impossible to directly jump from I/O MONITOR2 function screen to another test menu. Return to the ANALYZER MENU screen once and then go to the desired test screen.**

① I/O2-1 menu
- POTA: Accelerator potentiometer voltage (V)
  a Standard voltage when the accelerator pedal is not depressed (SWAC at OFF): 0.3 to 2.4 V
  b Standard voltage when the accelerator pedal is depressed to its stroke end: 1.7 to 4.7 V
  c Normal if b - a = 1.4 V or more

- SWAC: Accelerator switch check
  When accelerator pedal is not operated: 0→OFF
  When accelerator pedal is depressed: 1→ON

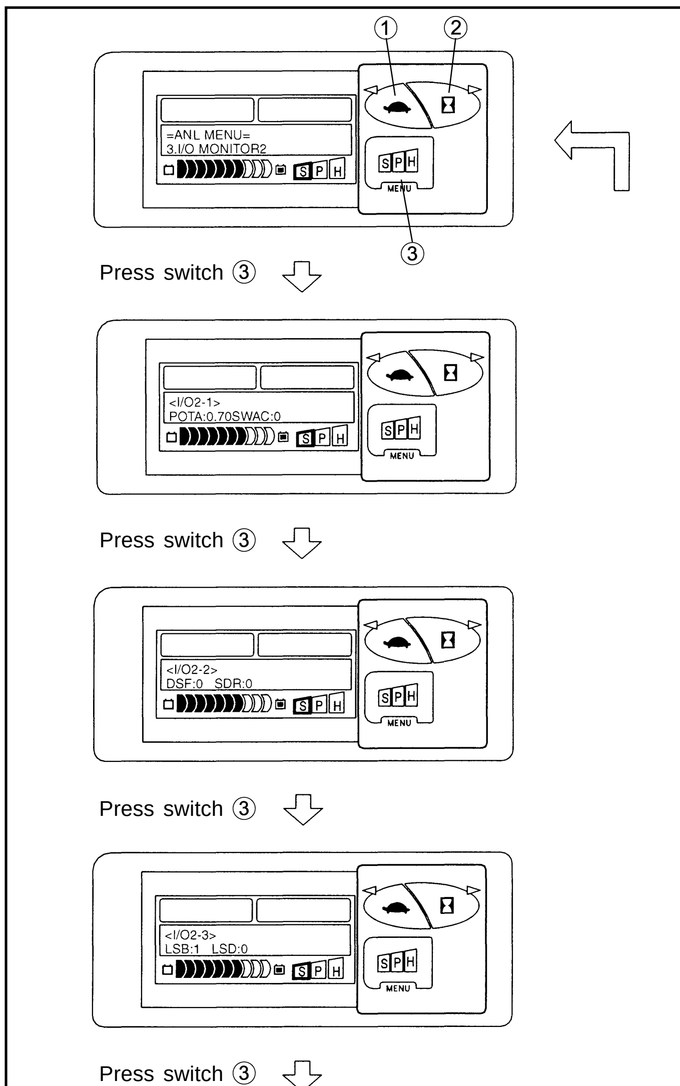
Switch ON/OFF quality judgment by operating the accelerator pedal

② I/O2-2 menu
- Direction switch check
  DSF: Forward switch, DSR: reverse switch

| Indication / Operation | DSF | DSR |
|---|---|---|
| Forward traveling | 1 | 0 |
| Neutral | 0 | 0 |
| Reverse traveling | 0 | 1 |

1 → ON 0 → OFF

Switch ON/OFF quality judgment by operating the direction lever



③ I/O2-3 screen
- LSB: Brake switch check
  When brake pedal is not operated: 1→ON
  When brake pedal is depressed: 0→OFF
  Switch ON/OFF quality judgment by operating the brake pedal
- LSD: Deadman switch check
  When the operator is on the seat: 0→OFF
  When the operator leaves the seat: 1→ON
  Switch ON/OFF quality judgment by sitting on and leaving the operator's seat

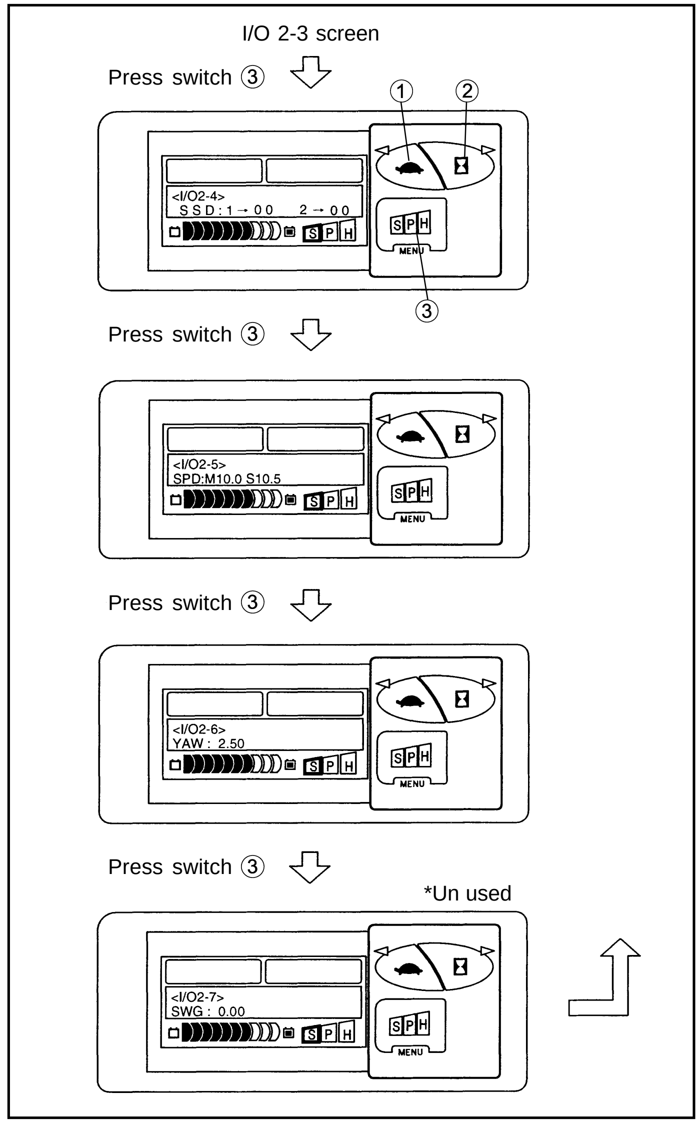
④ I/O2-4 screen
SSD1: Drive motor rpm sensor 1 (number of pulses)
SSD2: Drive motor rpm sensor 2 (number of pulses)
Check the rpm sensors while actually traveling the vehicle. The number of pulse increases with the traveling speed.

⑤ I/O2-5 screen
SPDM: Main traveling speed (km/h)
SPDS: PS traveling speed (km/h)
Check the vehicle speed by actually depressing the accelerator pedal to increase the speed. Check that the measured value changes in proportion to the traveling speed. Also, check that the value detected by the main controller equals the input value to the PS controller.

⑥ I/O2-6 screen
YAW: Yaw rate sensor voltage (V)
Check the input voltage to the yaw rate sensor controller.

**Standard when the vehicle is stopping: 2.50 V**

⑦ I/O2-7
SWG: Unused



## I/O MONITOR3

This function displays the ON/OFF status of material handling and mast control switches and analog input voltages from sensors.

### Operation Procedure

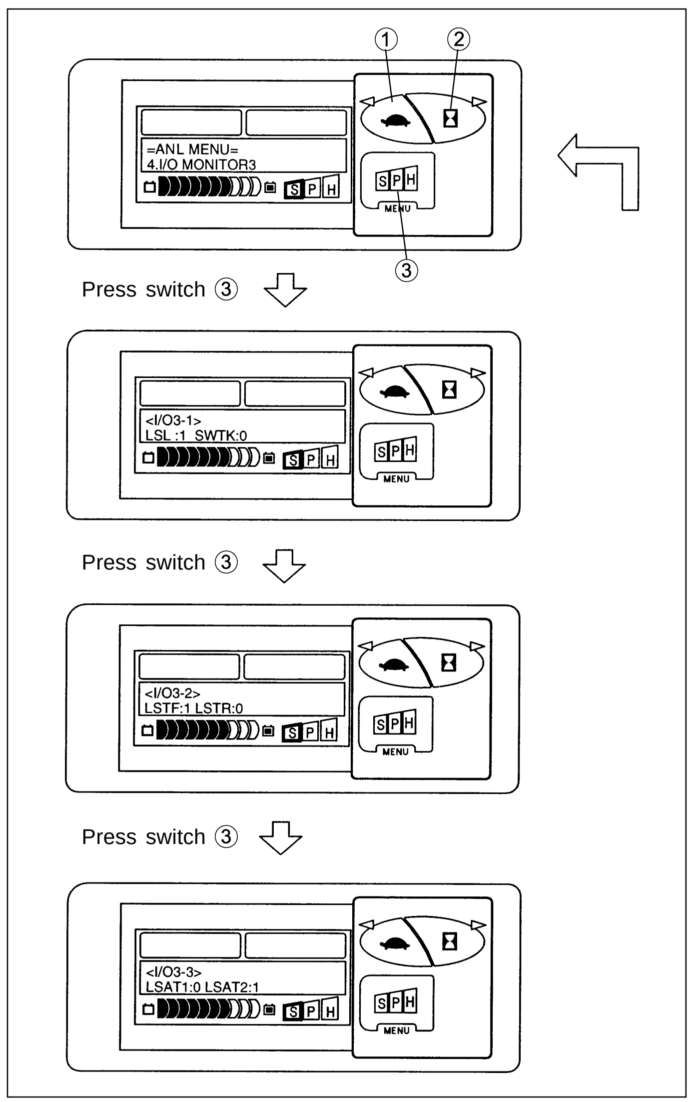
1. Display the ANALYZER MENU screen.
2. Press switch ② three times.
3. Check that the 4. I/O MONITOR3 is displayed and press switch ③ to activate the Input/Output MONITOR3 function and to display I/O3-1 to I/O3-7 on the display.
4. Functions of switches on this screen are as follows:
   - Switch ① : Unused
   - Switch ② : Unused
   - Switch ③ : Sequentially changes the screen from I/O3-1 to I/O3-7.

   **Note:**
   **Press switch ③ on the I/O3-7 screen to return to the ANALYZER MENU screen. It is impossible to directly jump from I/O MONITOR3 function screen to another test screen. Return to the ANALYZER MENU screen once and then go to the desired test screen.**

① I/O3-1 screen
LSL: Lift switch: 0→OFF
1→ON
SWTK: Tilt knob switch: 0→OFF
1→ON
Switch ON/OFF quality judgment by operating the lift lever or tilt knob

② I/O3-2 screen
LSTF: Forward tilt switch: 0→OFF
1→ON
LSTR: Backward tilt switch: 0→OFF
1→ON
Switch ON/OFF quality judgment by operating the tilt lever to forward or backward

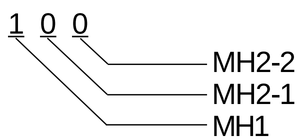
③ I/O3-3 screen
LSAT1: Attachment switch No. 1:
0→OFF
1→ON
LSAT2: Attachment switch No. 2:
0→OFF
1→ON
Switch ON/OFF quality judgment by operating the attachment lever No. 1 or No. 2
For a vehicle without attachment, the input value (ON/OFF) is not displayed.



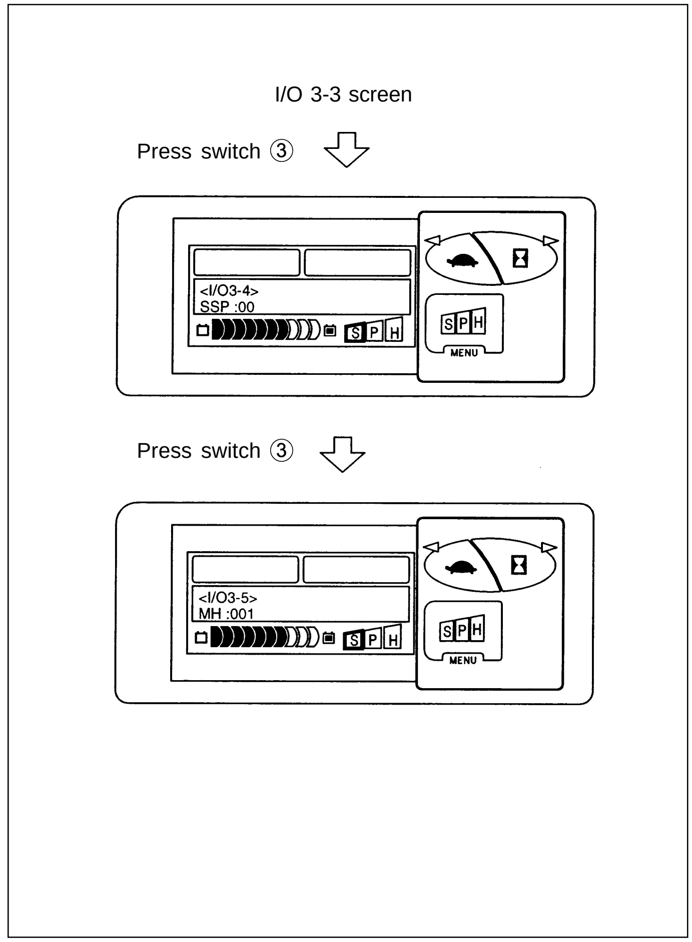
④ I/O3-4 screen
SSP: Pump rpm sensor (number of pulses)
Check that the number of pulses is detected by material handling operation.

⑤ I/O3-5 screen
MH: Lifting height: 1→ON
0→OFF

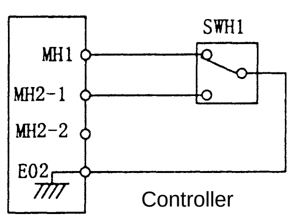
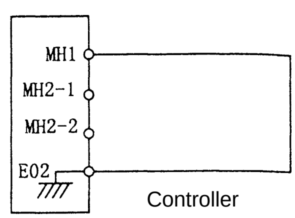
**Note:**
**Example indication**
**(When the number of lifting height switch is 1 and the lifting height is low)**




**Standard: See the table below.**




**Lifting Height Switch (MH) ON/OFF Combination Table**

| | When number of lifting height switch is 1 | | When there is no lifting height switch | | Reference lifting height |
|---|---|---|---|---|---|
| |   | |   | | |
| Low lifting height | MH 1 | ON | MH 1 | ON | 2,000 mm or less |
| | MH 2-1 | OFF | MH 2-1 | OFF | |
| | MH 2-2 | OFF | MH 2-2 | OFF | |
| Medium lifting height | MH 1 | OFF | | | Over 2,000 and below 4,000 mm |
| | MH 2-1 | ON | | | |
| | MH 2-2 | OFF | | | |

⑥ I/O3-6 screen
POTT: Tilt angle sensor voltage (V)
Check the input voltage to the tilt angle sensor controller.

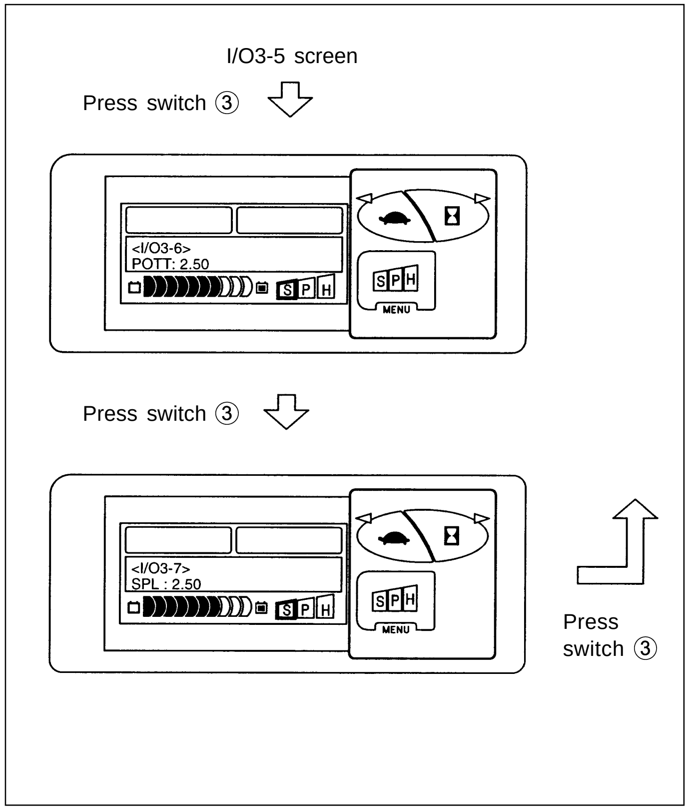
**Standard with mast set to vertical position: 2.5 V**

**Note:**
**Neutral to forward tilt: Input voltage decreases.**
**Neutral to backward tilt: Input voltage increases.**

⑦ I/O3-7 screen
SPL: Lift sensor voltage (V)
Check the input voltage to the lift sensor controller.

**Standard at no-load condition: 2.5 V**

**Note:**
**The input voltage increases as the load increases.**



## I/O MONITOR4

This function displays ON/OFF status of the knob position correction and other switches and analog input voltages from sensors.

### Operation Procedure

1. Display the Analyzer Menu screen.
2. Press switch ② four times.
3. Check that the 4. I/O MONITOR4 is displayed and press switch ③ to activate the I/O MONITOR4 function and to display I/O4-1 to I/O4-7 sequentially.
4. Functions of switches on this screen are as follows:
   - Switch ① : Unused
   - Switch ② : Unused
   - Switch ③ : Press switch ③ to change the screen sequentially from I/O4-1 to I/O4-7.

   **Note:**
   **Press switch ③ on the I/O4-7 screen to return to the ANALYZER MENU screen. It is impossible to directly jump from I/O MONITOR4 function screen to another test screen. Return to the ANALYZER MENU screen once and then go to the desired test screen.**

① I/O4-1 screen
STS: Steering angle sensor: 1→ON
0→OFF

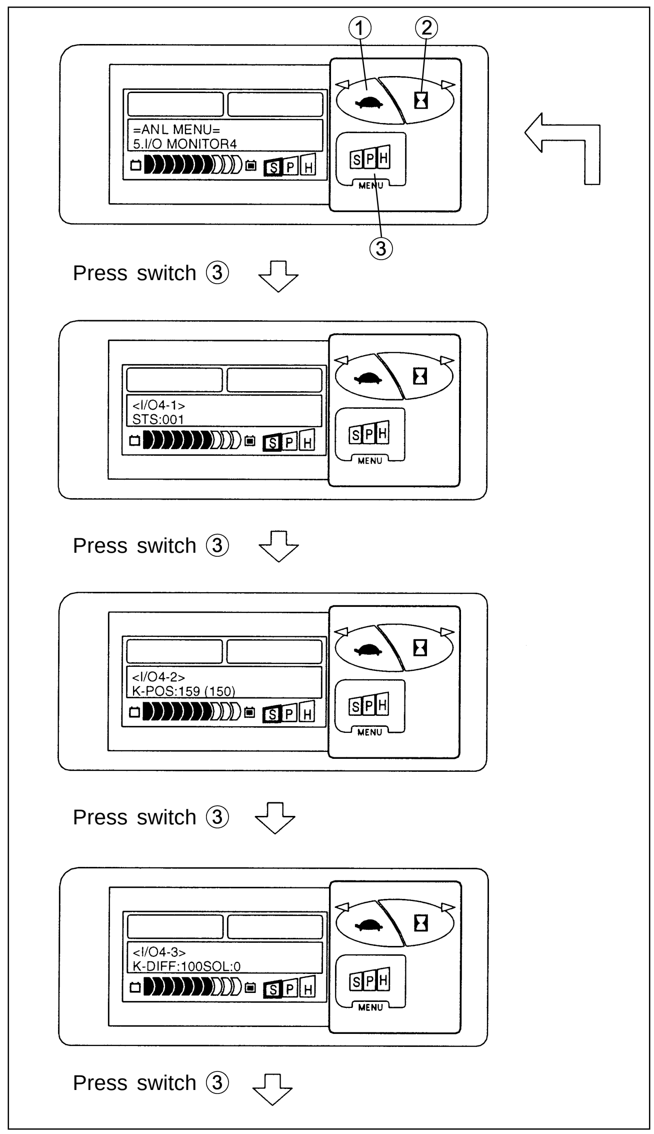
0 0 1
STSC
STS2
STS1

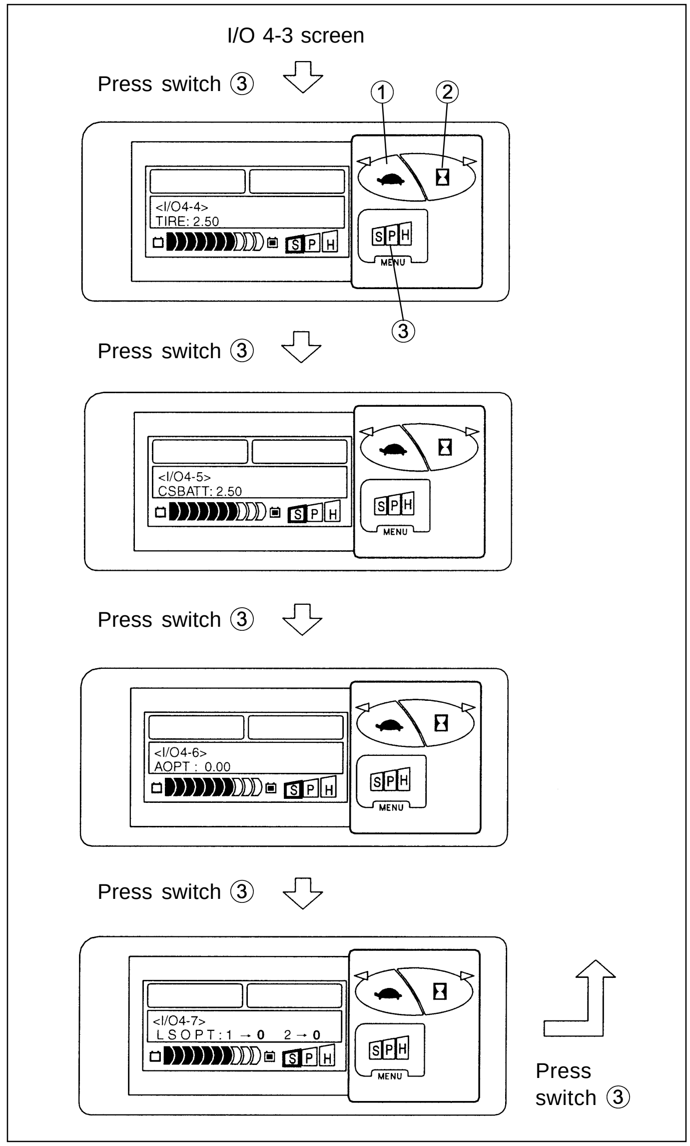
When the steering wheel is rotated to the right or left, STS1 and STS2 repeat ON and OFF. The STS is set to upon one wheel rotation from the straight traveling position as the reference.

② I/O4-2 screen
K-POS: Steering angle knob position: Actual value (target)
Operate the steering wheel and check variation of the value.
**Standard: 80 when the steering wheel is at the neutral position**

Left←Neutral→Right
0 ← 80 → 160

③ I/O4-3 screen
K-DIFF: Steering angle knob position deviation Actual value (target)
SOL: Knob position correcting solenoid:
0→OFF
1→ON
Operate the steering wheel and check that the knob position correcting solenoid turns ON when the steering angle knob position is deviated.
**Caution:**
**The knob position is mainly corrected when returning the steering wheel to the neutral (straight traveling) position.**






④ I/O4-4 screen
TIRE: Tire angle sensor voltage (V)
Operate the steering wheel and check the voltage changes.

**Standard when tire is traveling straight: 2.50 V**

Turn to the left↔Straight traveling↔Turn to the right
Voltage decreases←Standard→Voltage increases

⑤ I/O4-5 screen
CSBATT: Battery current sensor voltage (V)
Indicates the voltage of an input from current sensor to the main controller.

⑥ I/O4-6 screen
AOPT: Spare

⑦ I/O4-7 screen
LSOPT1: Spare
LSOPT2: Spare

## ACTIVE TEST

This function outputs ON/OFF signals to switches in the electrical system and compare controller input signals with those signals.

## Operation Procedure

1. Display the ANALYZER MENU screen.

2. Press switch ② four times.

3. Check that the 5. ACTIVE TEST is displayed and press switch ③ to activate the ACTIVE TEST function to display ACT-1 to ACT-4 screens sequentially.

4. Functions of switches on this screen are as follows:
   - Switch ① : Forced ON
   - Switch ② : Forced OFF
   - Switch ③ : Sequentially changes the screen from ACT-1 to ACT-4.

   **Note:**
   **Press switch ③ on the ACT-4 screen to return to the ANALYZER MENU screen.**
   **It is impossible to directly jump from the ACTIVE TEST FUNCTION screen to another test screen. Return to the ANALYZER MENU screen once and then go to the desired test screen.**

① ACT-1 screen
FAND: Drive circuit fan
(1): Drive circuit fan ON
(0): Drive circuit fan OFF
The traveling system fan operation is checked visually and observing the display while forcibly outputting the ON/OFF signal.

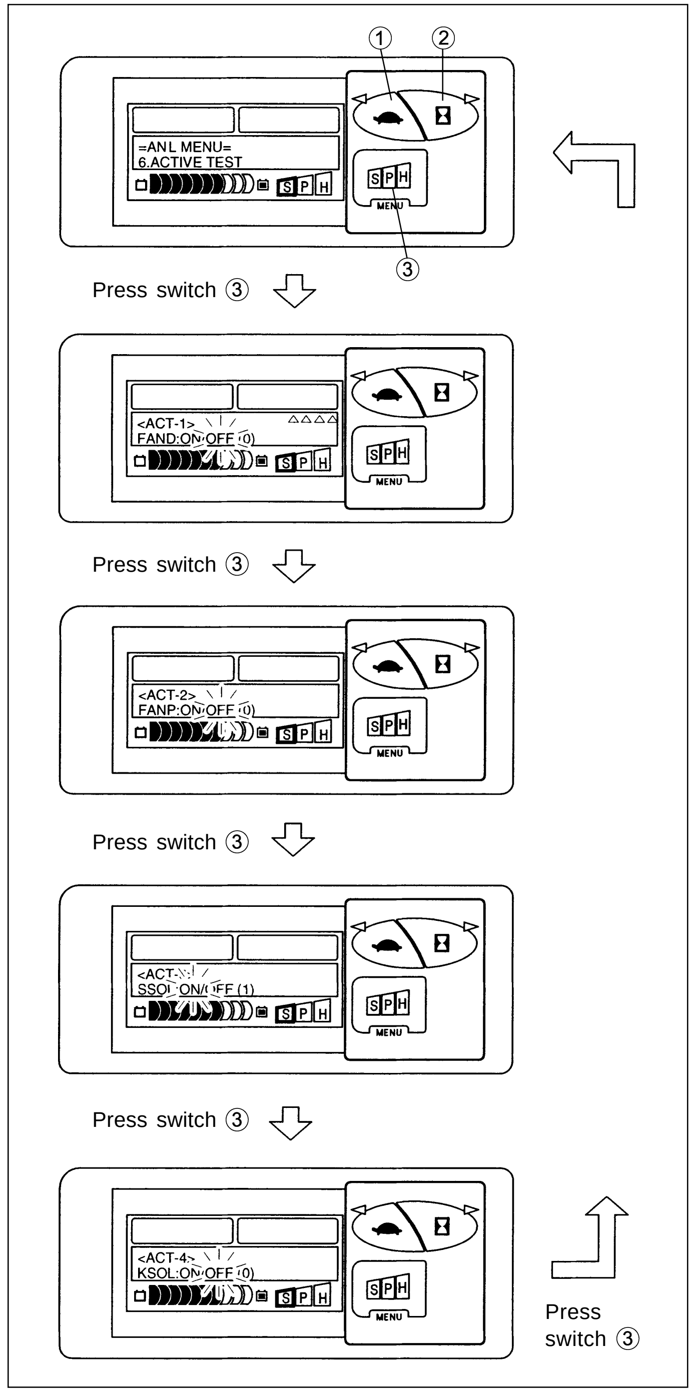
Press switch ① and select ON: Fan rotates and the signal is set to (1).

Press switch ② and select OFF: Rotation stops and the signal is set to (0).

② ACT-2 screen
FANP: Material handling circuit fan
(1): Material handling circuit fan ON
(0): Material handling circuit fan OFF
The material handling system fan operation is checked visually and observing the display while forcibly outputting the ON/OFF signal.

③ ACT-3 screen
SSOL: Rear stabilizer swing control solenoid.
(1): Signal check line ON (error occurrence)
(0): Signal check line OFF (normal)
You can send signals to forcibly turn the rear stabilizer's swing control solenoid ON and OFF. Check the signal check line by watching indications on the display.

④ ACT-4 screen
KSOL: Knob position correcting solenoid
(1): Signal check line ON (error occurrence)
(0): Signal check line OFF (normal)
You can send signals to forcibly turn the active steering synchronizer solenoid ON and OFF. Check the signal check line by watching indications on the display.



# TUNING

## GENERAL

When the user requests to limit the maximum speed or weaken the regenerative braking force, use the Tuning Menu to indicate the set levels and adjust them in the same manner as those for Power Control Level setting.  Twelve tuning items are prepared including spares.

### Tuning Item List

| Tuning No. | Item | Level (●: Default setting position) | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| 1 | Setting regenerative braking torque (switch back)<br>Adjustment of regenerative braking torque at switch back | Weak | | | | ● | | | Strong |
| 2 | Setting regenerative braking torque (accelerator off)<br>Changing the regenerative braking torque when acceleration is OFF | None | Weak | | | ● | | | Strong |
| 3 | Lift interrupt level setting<br>Adjustment of activation timings for remaining battery charge alarm and overdischarge alarm function  (See page 4-67.) | Small | | | | | | Large ● | Invalid |
| 4 | Battery charge indicator correction<br>Correction of decrease in battery charge indication | Slow decrease | | | | | ● | Quick decrease | |
| 5 | Vehicle speed limiter<br>Adjustment of maximum vehicle speed | Low speed | | | | | | High speed | None ● |
| 6 | Attachment power control No.1<br>Adjustment of pump motor revolution at attachment switch No.1 ON | Low speed | | | | | | High speed ● | |
| 7 | Tilt power control<br>Adjustment of pump motor rpm upon tilt switch ON  (The mast control speed of SAS function cannot be adjusted.) | Low speed | | | | | ● | High speed | |
| 8 | Spare | | | | | | | | |
| 9 | Spare | | | | | | | | |
| 10 | Spare | | | | | | | | |
| 11 | Spare | | | | | | | | |
| 12 | Spare | | | | | | | | |

## TUNING Screen Operation Procedure

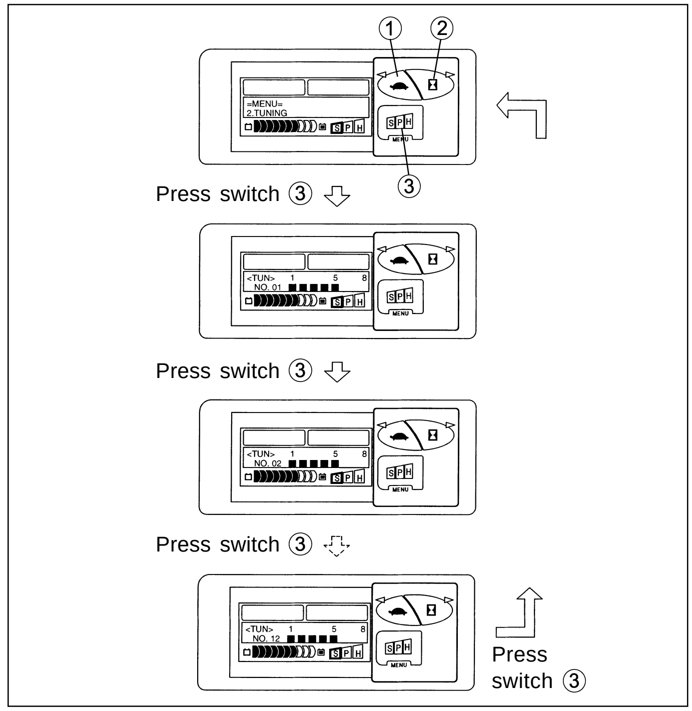
1. Input the password on the normal function screen (see page 4-48) to display the MASK MENU screen.

2. Press switch ② to display 2. TUNING. Press switch ③ (enter) to display the TUNING screen.

3. Select the desired tuning item using switches ③ and ②.

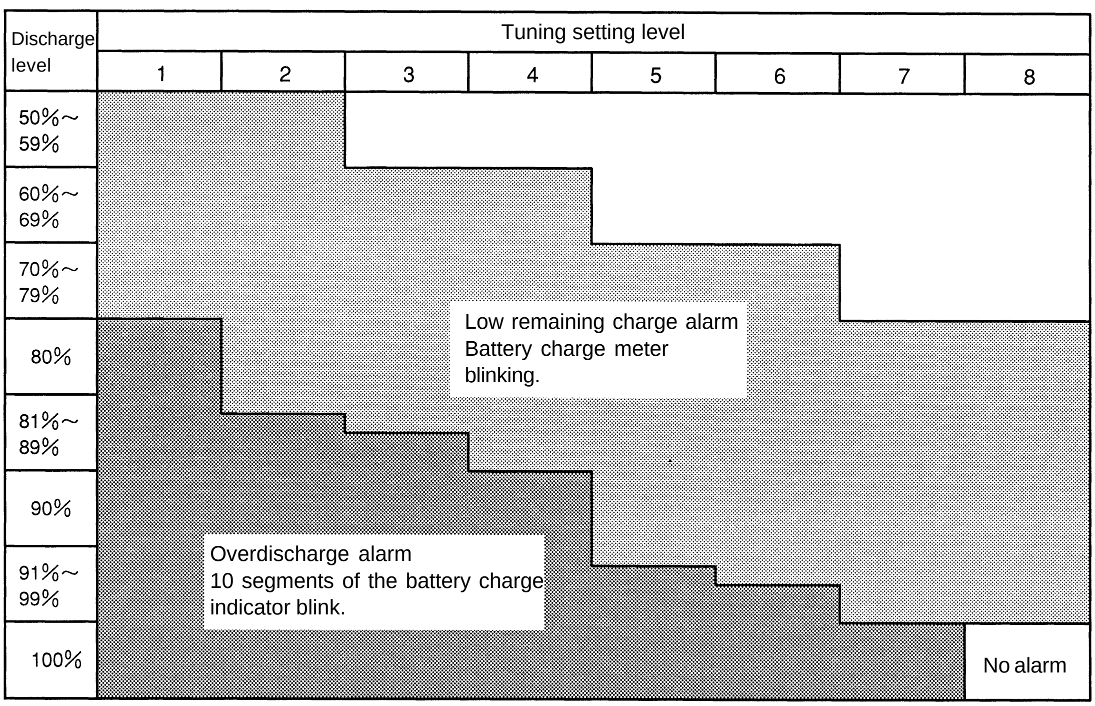
4. Functions of switches on the TUNING screen are as follows:
   - Switch ① : Decreases the tuning level.
   - Switch ② : Increases the tuning level.
   - Switch ③ : Enters (and switches to the next screen)

   **Note:**
   **Press switch ③ on the Tuning No.12 (spare) screen to return to the ANALYZER MENU screen.**




**Low Remaining Battery Charge Alarm and Overdischarge Alarm Setting Levels (Tuning No. 3)**

Level 7 is the initial setting.




How to read the figure:
Example: When set to level 5
The battery charge indicator (10 segments) on the normal function screen is activated when the battery discharge is up to 69%. The low remaining battery charge alarm is activated when the battery discharge level is between 70% and 90% to blink the battery charge indicator. All 10 segments blink in case of overdischarge alarm, which is activated when the degree of battery discharge exceeds 90%.

**Caution:**
**When level 8 is set, the overdischarge alarm (including lift interrupt) does not function. Carefully avoid overdischarge of battery also in view of the battery life.**

# OPTION SET

## Option Set Menu List

| No. | Indication | Description | Selection | |
|---|---|---|---|---|
| | | | Y | N |
| OPT-1 | DEMO MODE | Enables simultaneous traveling and material handling before starting the hour meter. | Enable | Disable |
| OPT-2 | H/M START | Start counting by hour meter. | Counting | No counting |
| OPT-3 | P/C LOCK | Disables setting of levels for traveling/load handling power control, 2-speed travel speed control and overspeed alarm (option). | Enable | Disable |
| OPT-4 | DESTI * | Sets the data according to the destination. Changes the display indication. | Domestic (J) | Overseas (I) |
| OPT-5 | B LEVEL | Enables/disables the battery electrolyte level alarm function. | Enable | Disable |
| OPT-6 | MPH * | Displays the vehicle speed in mph. | Setting to mph | Setting to km/h |
| OPT-7 | C/CNT RES | Resets the charge counter to 0. (Normal charge count) | Reset | Not reset |
| OPT-8 | BATTERY | Adjusts the charge indicator calculation constant. | Battery-less vehicle (L) | Vehicle mounted with battery (W) |
| OPT-9 | SHOU-TOKU * | Limit the vehicle speed for small special vehicle to 15 km/h. | Limited (Y) | Unlimited (N) |
| OPT-10 | AUTO P-OFF | Enables/disables the auto power off function. | Enable (Y) | Disable (N) |
| OPT-11 | PARKING ERR | Enables/disables the parking brake and deadman switch (option) operation indicator. | Enable | Disable |
| OPT-12 | TILT CONT | Enables/disables the mast forward tilt automatic stopping function | Enable | Disable |
| OPT-13 | SWG W-LOCK* | Unused (Set to N.) | Enable | Disable |
| OPT-14 | TILT F-LIM | Enables/disables the mast forward tilt speed limit control. | Enable | Disable |

*: Matched to the specification of the vehicle at the time of vehicle shipment.
For OPT-5 and OPT-11, set again according to the vehicle specifications at the time of CPU board replacment.

**Notes:**

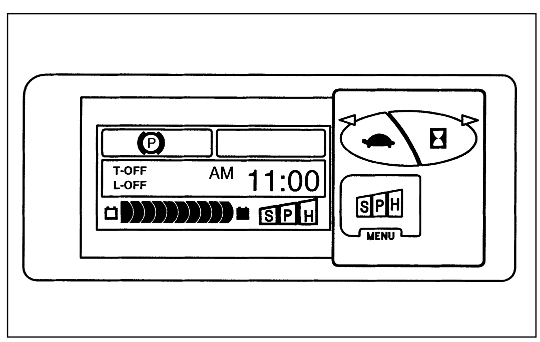
- **These functions are used to adjust the controller and display setup to the availability of optional or control features. They do not enable or disable the actual functioning of the optional or control features.**
- **When the contoller board is replaced, it is necessaly to set again according to the vehicle apecification.**

**Caution:**

- **The Option Set function is used to adjust the controller with the display control according to the options equipped on the vehicle and does not enable or disable the function itself.**
- **When the TILT CONT•SWG W-LOCK is disabled by option setting, the disabled status is displayed for 5 seconds upon key switch ON.**

**Indication contents:**

**T-OFF: TILT CONT (mast forward tilt speed control is disabled)**
**L-OFF: SWG W-LOCK (material handling swing lock is disabled)**



## Operation Procedure Screen

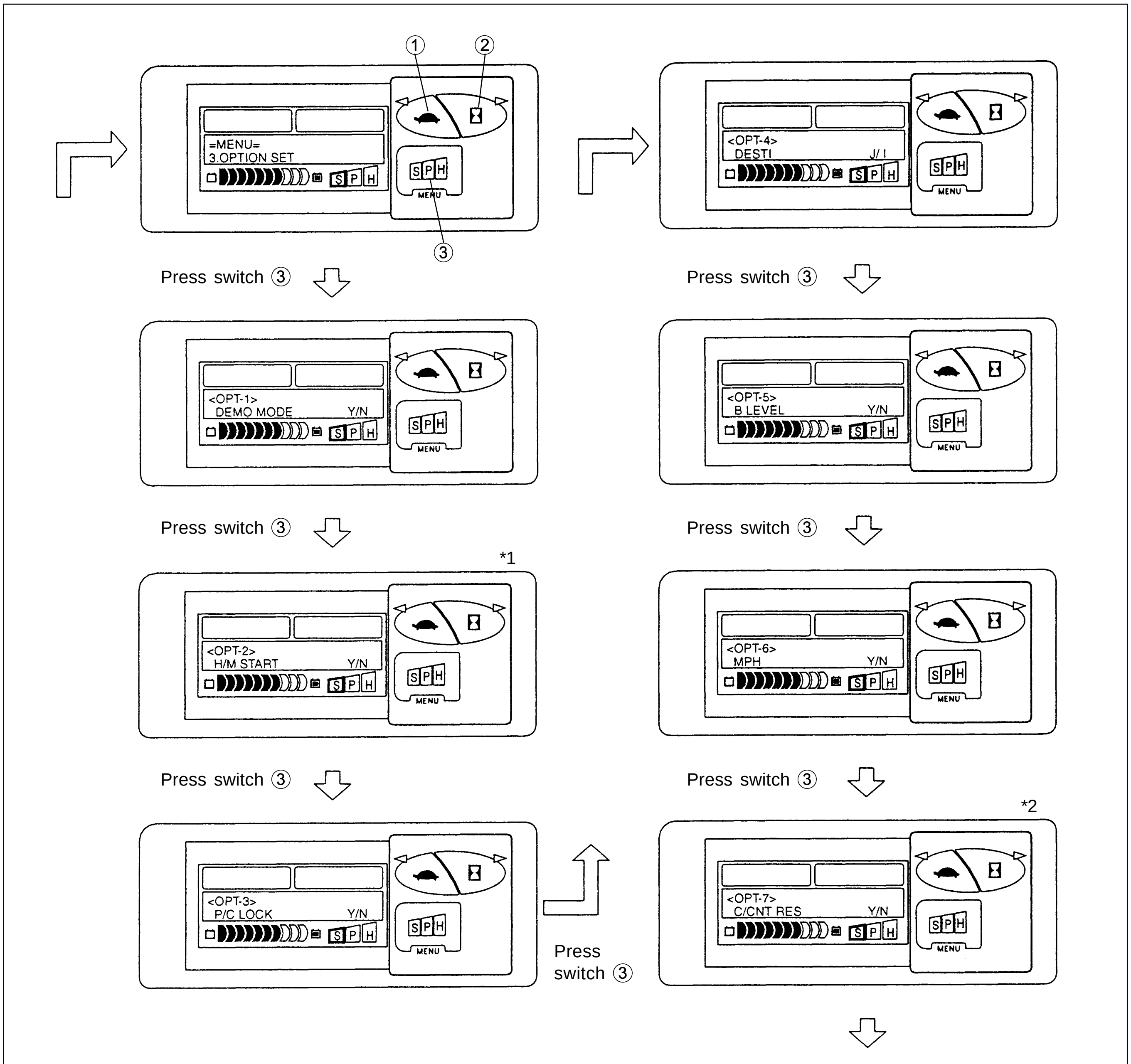
1. Input the password on the normal function screen (see page 4-48) to display the MASK MENU screen.

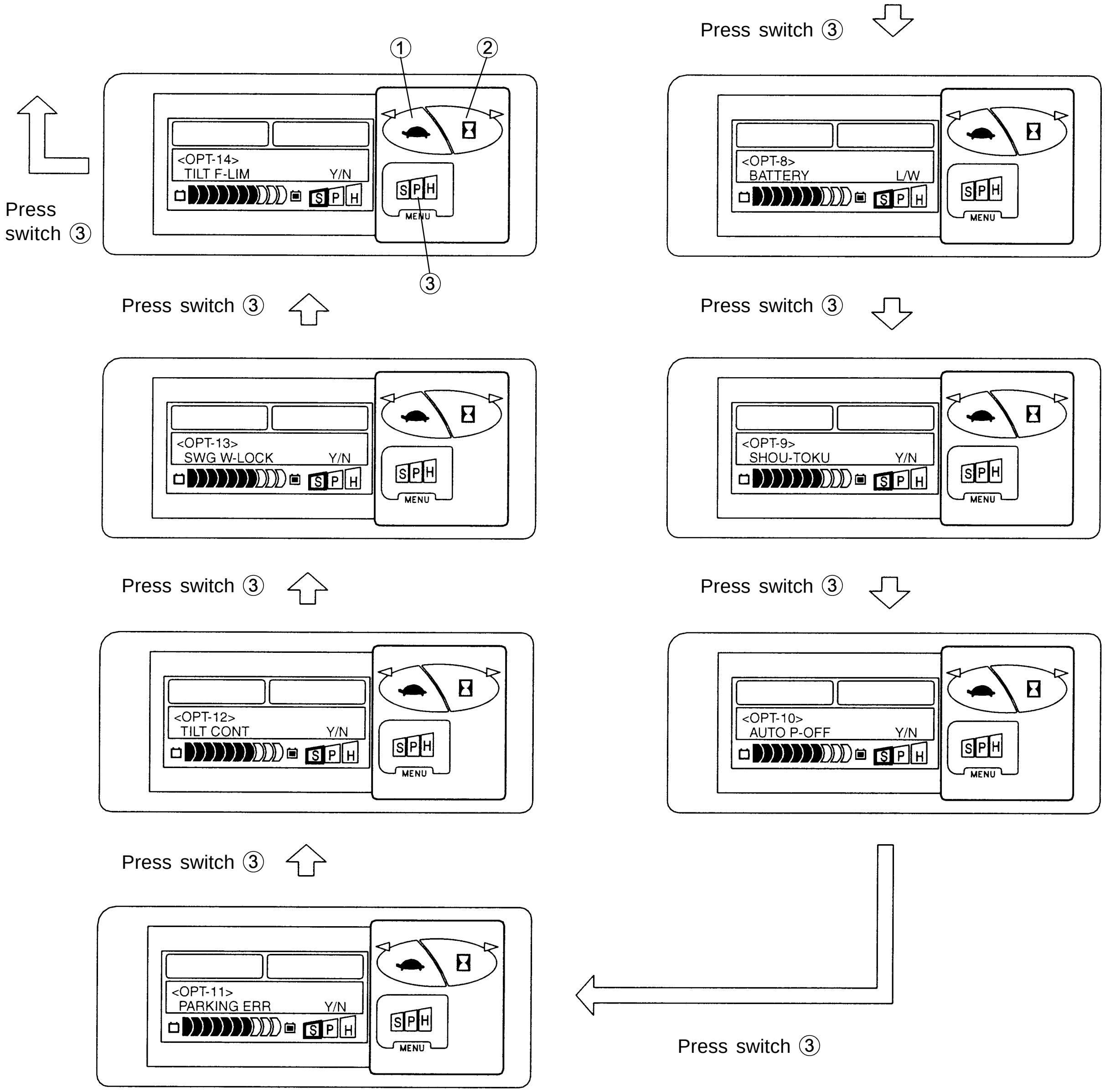
2. Press switch ② twice to display 3. OPTION SET. Press switch ③ (enter) to display the OPTION SET MENU screen.

3. Select a desired option menu item using switches ① and ②.

4. Functions of switches on the OPTION SET MENU screens are as follows:
   - Switch ① : Changes the setting from N to Y.
   - Switch ② : Changes the setting from Y to N.
   - Switch ③ : Enters (changes to the next item setting screen)

**Note:**
**Press switch ③ on the OPT-14 OPTION SET MENU screen to return to the ANALYZER MENU screen.**






*1: Hour meter starting method
1. Press switch ① for 2 seconds or more.
2. Press switch ① while pressing switch ② (held in the state of 1 above).

*2: OPT-7 (C/CNT RES)
Charge counter resetting method
Press switch ① for 2 seconds or more.

# MATCHING

## GENERAL

For the tilt angle, load, tire angle and swing angle sensors among sensors used for SAS functions, the signal voltage values under the mast vertical, no load, tire straight and rear axle horizontal conditions are stored, respectively, in the controller for the control based on these values. When servicing or replacing these sensors, matching (updating the sensor signal voltage to match the standard vehicle condition) is necessary. Also, matching is needed for the tilt angle sensor when the vehicle posture has changed excessively, and for the load sensor when the load under no load condition (no load on fork) is changed because of addition or removal of any attachment.

### Matching Menu List

| No. | Indication | Description | Necessary condition |
|---|---|---|---|
| 1 | TILTL | Stores the tilt angle sensor output value with fork in the horizontal position to the controller. | ①・③・④・⑧ ⑨・⑩・⑪ |
| 2 | TILTF | Stores the tilt angle sensor output value at the mast vertical standard position to the controller. | ①・③・④・⑧ ⑨・⑩・⑪ |
| 3 | LOAD | Stores the pressure sensor output value under no-load condition to the controller. | ①・②・⑤・⑧ ⑨ |
| 4 | TIRE | Stores the tire angle sensor output value while the vehicle is traveling straight to the controller. | ②・⑥ |

Contents of necessary conditions:

① Traveling and material handling controller replacement
② PS controller replacement
③ Tilt angle sensor replacement
④ Length change or replacement of tilt angle sensor rod
⑤ Load sensor replacement
⑥ Removal-reinstallation or replacement of tire angle sensor or sensor cover
⑦ Removal-reinstallation or replacement of swing angle sensor
⑧ Change of attachment
⑨ Mast replacement
⑩ Tilt cylinder replacement
⑪ Tilt angle sensor replacement

## Before Starting Matching

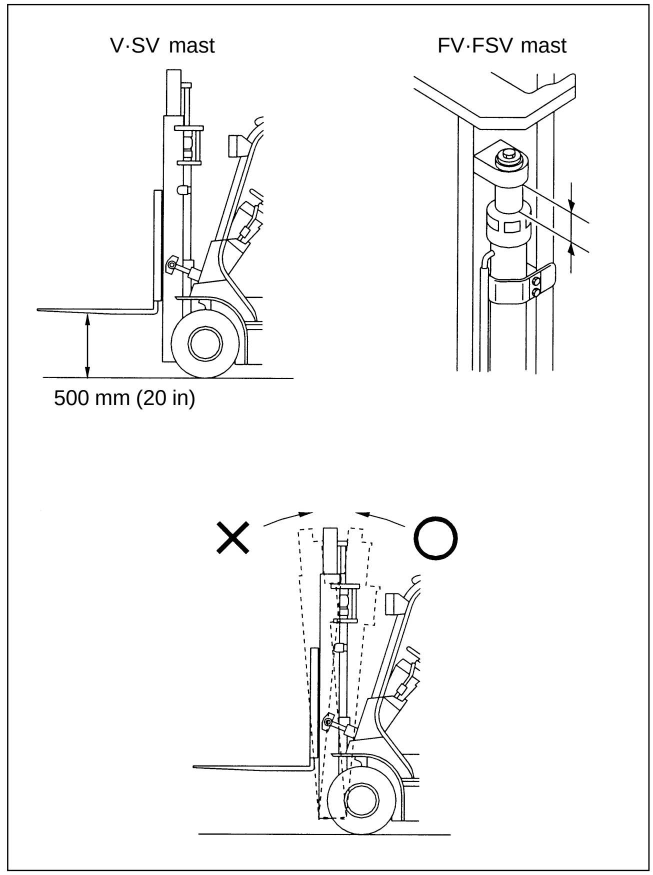
Set the vehicle to the standard vehicle condition before starting matching. The standard vehicle condition means when the vehicle satisfies the conditions described below.

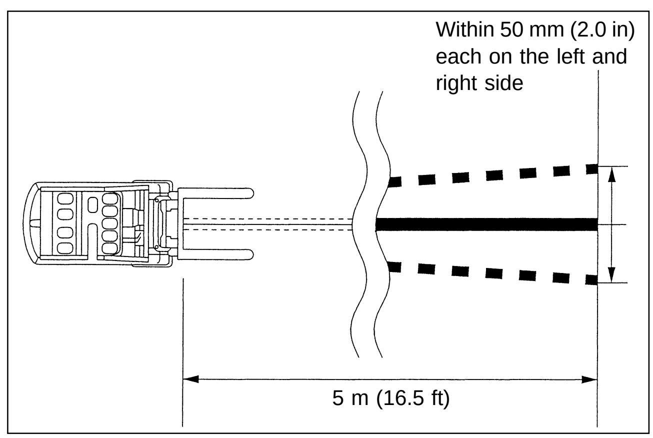
1. Tire inflating pressure check
   Adjust the tire inflating pressure to the specified level.
   If it is insufficient or if there is a difference between the front and rear wheels or between LH and RH wheels, Matching will become inaccurate.

2. Floor levelness check
   If matching is conducted on an inclined or rough floor surface, errors in matching will result. So, perform matching on a flat, horizontal floor (inclination: Within 0.5°).
   Generally the inclination of floors in ordinary plants, warehouses and buildings is within 0.5°, which does not influence matching adversely. Be careful since some parts of floors may be inclined over 0.5° for some reason or other.

3. No-load vertical condition check
   The voltage of the load sensor signal in no-load state is stored in the controller. Therefore, the following conditions must be satisfied:
   - For the V/SV mast, set the fork height to about 500 mm (20 in.) and use a goniometer to see that the mast is vertical.
   - For the FV/FSV mast, set the rear cylinder rod projection to about 100 mm (4 in.) and use a goniometer to see that the mast is vertical.
   - For the vehicle with an attachment, install the attachment.
   - Set the mast vertical by operating tilting it in the forward tilting direction from the backward tilted position.
   - On a vehicle with attachment (U61C671-1·2 or an attachment whose weight exceeds that shown in the table below), set the mast vertical with the attachment at a height of 500 mm (19.7 in) and perform relief at the topmost position. (See the table below showing the Allowable Weight for Installation on Mast.

4. Tire straight traveling condition check
   The signal voltage of tire angle sensor is stored in the controller when the tires are traveling straight. So, fix the steering wheel and see that the leftward or rightward deviation during traveling 5 meters (16.5 ft.) is within 50 mm (2.0 in.).




Allowable Weight for Installation on Mast (kg)

| Mast lifting height | Vehicle model | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | 7FB10 | 7FB14 | 7FB15 | 7FB18 | 40-7FB15 | 7FB20 | 7FB25 | 40-7FB20 | 40-7FB25 | 7FB30 | 7FBJ35 |
| Up to 3000 | 500 | 650 | 650 | 650 | 600 | 950 | 950 | 950 | 950 | 1100 | 1350 |
| Over 3000 up to 4000 | 350 | 550 | 550 | 550 | 450 | 800 | 800 | 750 | 750 | 950 | 1150 |
| Over 4000 up to 5000 | 350 | 500 | 500 | 500 | 400 | 750 | 750 | 700 | 700 | 900 | 1100 |
| Over 5000 up to 6000 | 300 | 450 | 450 | 450 | 350 | 700 | 700 | 700 | 700 | 850 | 1050 |

## Operation Procedure

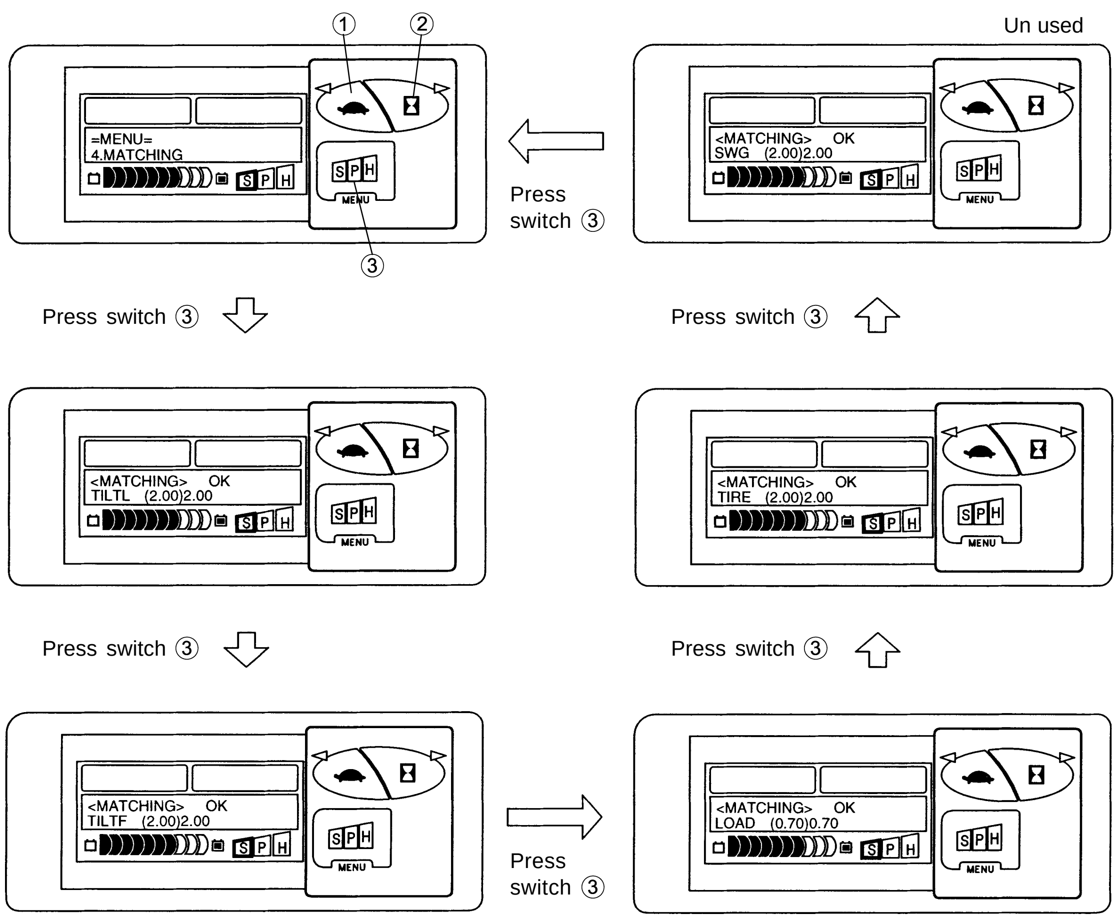
1. Input the password on the normal function menu (see page 4-48) to display the MASK MENU screen.

2. Press switch ② twice to display 3. MATCHING. Press switch ③ (enter) to display the MATCHING SET Screen.

3. Select the desired matching item using switches ① and ②. SWG matching is not used.

4. Functions of switches on the ACTIVE TEST screen are as follows:
   - Switch ① : Unused.
   - Switch ② : Performs matching of the selected item.
   - Switch ③ : Causes transition to the next item.

**Note:**
**Press switch ③ on the SWG MATCHING SET Screen to return to the ANALYZER MENU screen.**



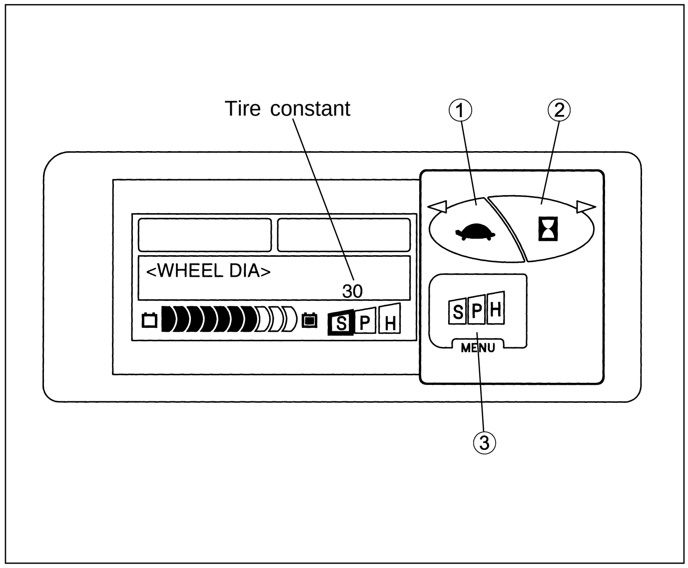

If values in 1 and 2 below are different while the vehicle is in the standard state, the item needs matching. Matching is also needed when the control panel or each sensor is replaced.

1. The value in parentheses is the stored value at present.
2. The value outside the parentheses is the one in the present vehicle state.
3. OK is displayed only when matching is performed (switch ② is pressed).

## WHEEL DIA

It is necessary to input the tire constant to the controller according to the tire radius, for optimizing the speedometer reading. Although the tire constant is set on a new vehicle at shipment from the factory, adjust it whenever the tire size is changed or the tires are worn excessively to a degree affecting the speedometer indication.

### Operation Procedure




1. Input the password on the normal function screen (see page 4-48) to display the MASK MENU screen.

2. Press switch ② four times to display 4. WHEEL DIA. Press switch ③ (set) to display the CONSTANT SETUP screen.

3. Select the desired tire constant value using switches ① and ②. Press switch ③ to enter the value and return to the MASK MENU screen.
   Functions of switches on this screen are as follows:
   - Switch ① : Decreases the tire constant.
   - Switch ② : Increases the tire constant.
   - Switch ③ : Enters the selected value and returns to the ANALYZER MENU screen.

**Tire Constant List**

| Tire type | | | Vehicle model | 7FB10•14 | 7FB15•18 | 7FB20•25<br>40-7FB15 | 40-7FB20•25 | 7FB30<br>7FBJ35 |
|---|---|---|---|---|---|---|---|---|
| Pneumatic | Single | Standard single | Constant | 34 | 34 | 39 | 71 | 82 |
| | | | Size | 6.00-9-10 | 15 (6.00-9-10)<br>18 (21×8-9-10) | 21×8-9-14 | 7.00-12-12 | 28×9-15-14 |
| | | Oversize single | Constant | 55 | 54 | 51 | — | — |
| | | | Size | 6.50-10-12 | 6.50-10-12 | 23×9-10-16 | | |
| | Double | Standard double | Constant | 42 | 41 | — | 79 | 81 |
| | | | Size | 4.50-12-8 | 4.50-12-8 | | 5.50-15-8 | 6.00-15-12 |
| | | Special double | Constant | 38 | 37 | 37 | 81 | 85 |
| | | | Size | 6.00-9-10 | 6.00-9-10 | 6.00-9-10 | 7.00-12-12 | 28×8-15-12 |
| Cushion | Single | Standard single | Constant | 39 | 15 : 39<br>18 : 36 | 35 | 72 | 84 |
| | | | Size | 6.00-9 | 15 (6.00-9)<br>18 (21×8-9) | 21×8-9 | 7.00-12 | 28×9-15 |
| | | Oversize single | Constant | 50 | 48 | 57 | — | — |
| | | | Size | 6.50-10 | 6.50-10 | 23×9-10 | | |
| | Double | Standard double | Constant | 44 | 44 | — | — | 85 |
| | | | Size | 4.50-12 | 4.50-12 | | | 6.00-15 |
| | | Special double | Constant | 42 | 42 | 42 | 75 | 94 |
| | | | Size | 6.00-9 | 6.00-9 | 6.00-9 | 7.00-12 | 7.00-15 |

# ELECTRICAL SYSTEM TROUBLESHOOTING

Page



5

# GENERAL

Troubles can be classified into those indicated by respective error codes on the display and those for which no error code is displayed.

Measuring instruments such as a tester and a megger are used for troubleshooting, but some troubles can be checked by the analyzer mounted on the vehicle.

Description in this manual are for mechanics who have mastered handling of measuring instruments, accurate reading of wiring and connection diagrams and measurement according to connector diagrams. Please use the attached Wiring, Connection and Connector Diagrams.

## Composition of Troubleshooting

1. Drive and Material Handling System Troubleshooting

   (1) When an error code is displayed:

   See “When an error code is displayed” (See page 5-11).

   (2) When no error code is displayed:

   See “When no error code is displayed” (See page 5-91).

2. Failure in Concurrent Traveling and Material Handling (See page 5-105).

3. Steering System Troubleshooting (See page 5-107).

4. Multidisplay - MCS Communication System Troubleshooting

   (1) When an error code is displayed:

   See “When an error code is displayed” (See page 5-109).

   (2) When no error code is displayed:

   See “When no error code is displayed” (See page 5-111).

5. SAS Troubleshooting

   (1) See “When an error code is displayed” (See page 5-113).

   (2) See “When no error code is displayed” (See page 5-162).

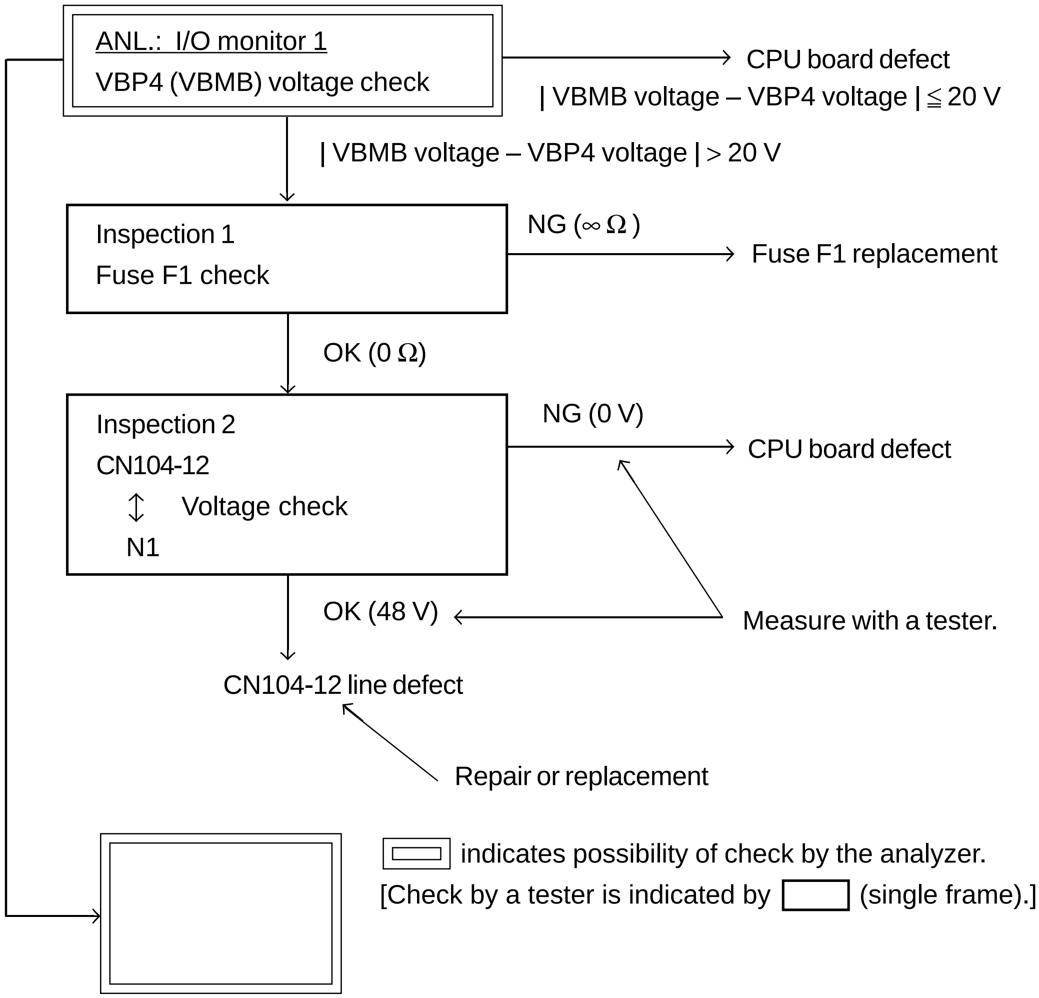
## How to Proceed with Troubleshooting

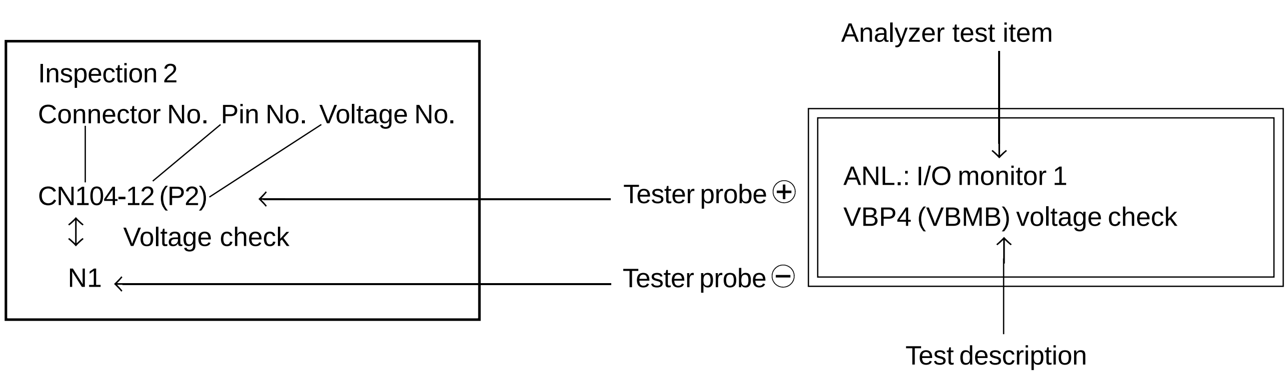
Numerical values shown in the troubleshooting section may differ from those described in the connector list in Section 3.

Values described in the troubleshooting section are as follows:

- Criteria concerning error codes
- Conditions causing troubles (Minimum values for vehicle driving)
- Values depending on flowchart conditions

# HOW TO READ TROUBLESHOOTING CHARTS



# SST SETTING METHODS

Use SSTs for accurate, quick troubleshooting of the electrical system of the 7FB series.
Nine types of SSTs are provided for selective use according to the portion to be checked.
Correct check is impossible if the connection method is wrong.

| | SST 09230-13130-71 Controller check harness | | |
|---|---|---|---|
| 1 | SST1 | 09231-13130-71 | Fan check harness (for CN105) (also for DC/MD board power supply check) |
| 2 | SST2 | 09232-13130-71 | Shorting harness (for CN20, 52, 55, 58, 86, 90 and 94) |
| 3 | SST3 | 09233-13130-71 | MOS drive signal check harness 1 (for CN111 and 112) |
| 4 | SST4 | 09234-13130-71 | MOS drive signal check harness 2 (for CN106 and 107) |
| 5 | SST5 | 09235-13130-71 | Swing and knob offset solenoid check harness (for CN146) |
| 6 | SST6 | 09236-13130-71 | Traveling motor rpm sensor check harness (for CN57) |
| 7 | SST7 | 09237-13130-71 | Steering sensor check harness (for CN19) |
| 8 | SST8 | 09238-13130-71 | Acceleration potentio meter check harness (for CN25) |
| 9 | SST9 | 09239-13130-71 | Signal sub-harness (for CN106 and 107), Used in connection with SST1 or SST4. |

Perform quick troubleshooting by referring to the SST setting method on the next page.

**Caution:**

- **Always disconnect the battery plug before setting or disconnecting an SST. Otherwise, board damage may be caused.**
- **Error code CB-2 appears when the key switch is turned to OFF once and to ON again during inspection, with SST1 and SST9 connected to the CPU board or SST3 connected to the DC/MD board. This error code is detected due to SST connection and is not related to actual abnormal ity. Neglect CB-2 indication and continue inspection.**
- **Capacitor CO may not be discharged fully when any SST is connected. Before connecting and disconnecting the board connector, measure the voltage between P4 and N1. If not discharged, fully discharge CO before starting operation.**

1. SST1·SST9 setting method

   *SST 1 is used for two different types of check.

(1) Disconnect CN105, 106 and 107 connectors from the CPU board.

(2) Set the SST1 main connector to CN105.

(3) Set the SST9 connector (for CN106 and 107) to CN106 and 107 on the CPU board.

(4) Connect the 3-pin connector of SST1 to the 3-pin connector of SST9.

<For fan signal line check>

(5) Connect connector Ⓐ and connector ② and check the fan ON/OFF signal by the analyzer "ACTIVE TEST".

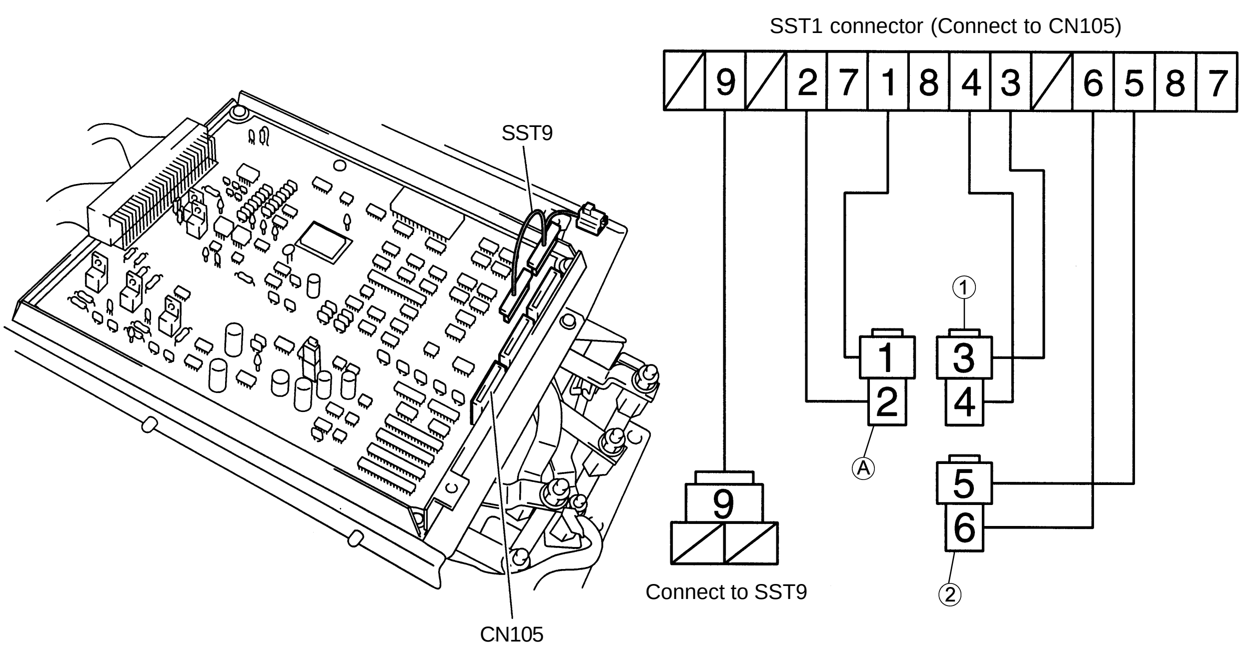
(6) The traveling or material handling system fan is selected by the switch on the display.



<For DC/MD board check>

(5) Connect connectors Ⓐ and ① and check the power ON/OFF by the analyzer "ACTIVE TEST".

(6) The traveling or material handling signal is selected by the switch on the display.




2. SST2·SST8 setting method

SST2·SST8 is a shorting connector for shorting between corresponding connector pins. Check the pin No. carefully since connection with an incorrect pin will cause damage to the board.

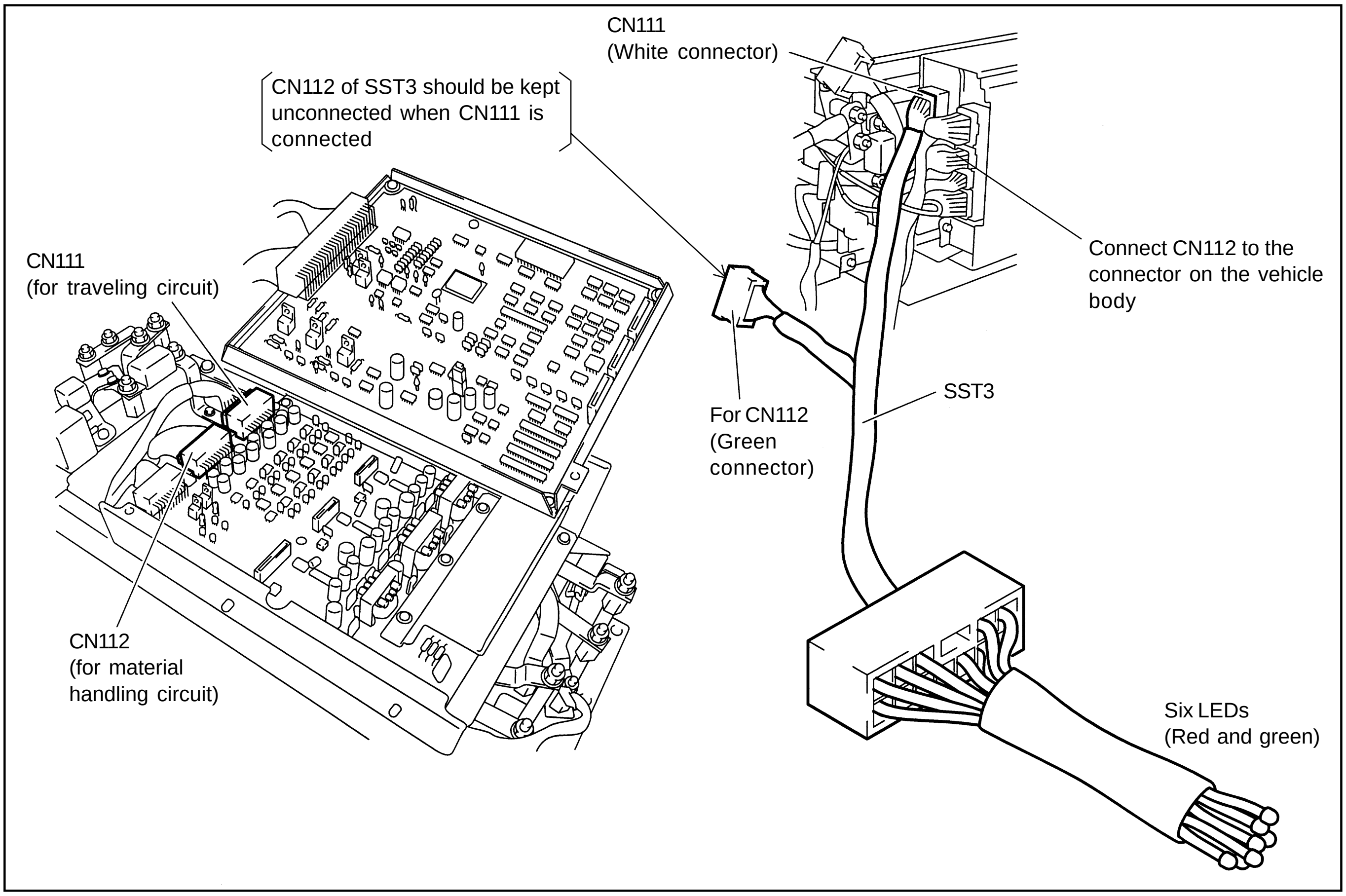
3. SST3 setting method

(1) Jack up the front portion of the vehicle to let the drive wheels float.

(2) Disconnect the drive motor cable (from P7, P8 and P9) and the pump motor cable (from P14, P15 and P16).

(3) Disconnect CN111 (for traveling circuit) and CN112 (for material handling circuit), and set SST3.

*SST3 must be connected to either CN111 or CN112, and must not be connected to both of them at a time.




When set to CN111 connector:

(4) Shift the direction lever to forward or reverse.
All LEDs are lit.

(5) Depress the accelerator pedal.
When the accelerator pedal is depressed, six LEDs repeat blinking. A pair of red and green LEDs correspond to the transistor operation for one phase, and the six LEDs in total correspond to the transistor operation for three phases. The speed of blinking varies with the degree of accelerator pedal depression.
When either LED is off, either the signal from the CPU board or the signal from the DC/MD board is defective. The blinking sequence for three phases is reverse between forward traveling and backward traveling.

When set to CN112 connector

(4) Operate the lift lever to the UP position, and check the LED ON/OFF state.

4. SST4·SST9 setting method

The traveling/material handling motor drive instruction signal is checked by reversal between the traveling and material handling systems. The material handling lever operation for checking the traveling circuit is not an error.
SST4 and SST9 are used for judging the quality of the instruction signal from the CPU board to the DC/MD board and the drive signal from the DC/MD board to the MOS when any abnormality is found in the check using SST3.
Pay special attention to the operation because SST4 and SST9 are set while SST3 is set. (Especially pay attention to battery plug ON/OFF and motor cable disconnection.)

To check the traveling circuit (Parenthesized portions apply to checking the material handling circuit.)

(1) Disconnect the CN106 and 107 connectors on the CPU board and the CN110 (CN109) connector on the DC/MD board.

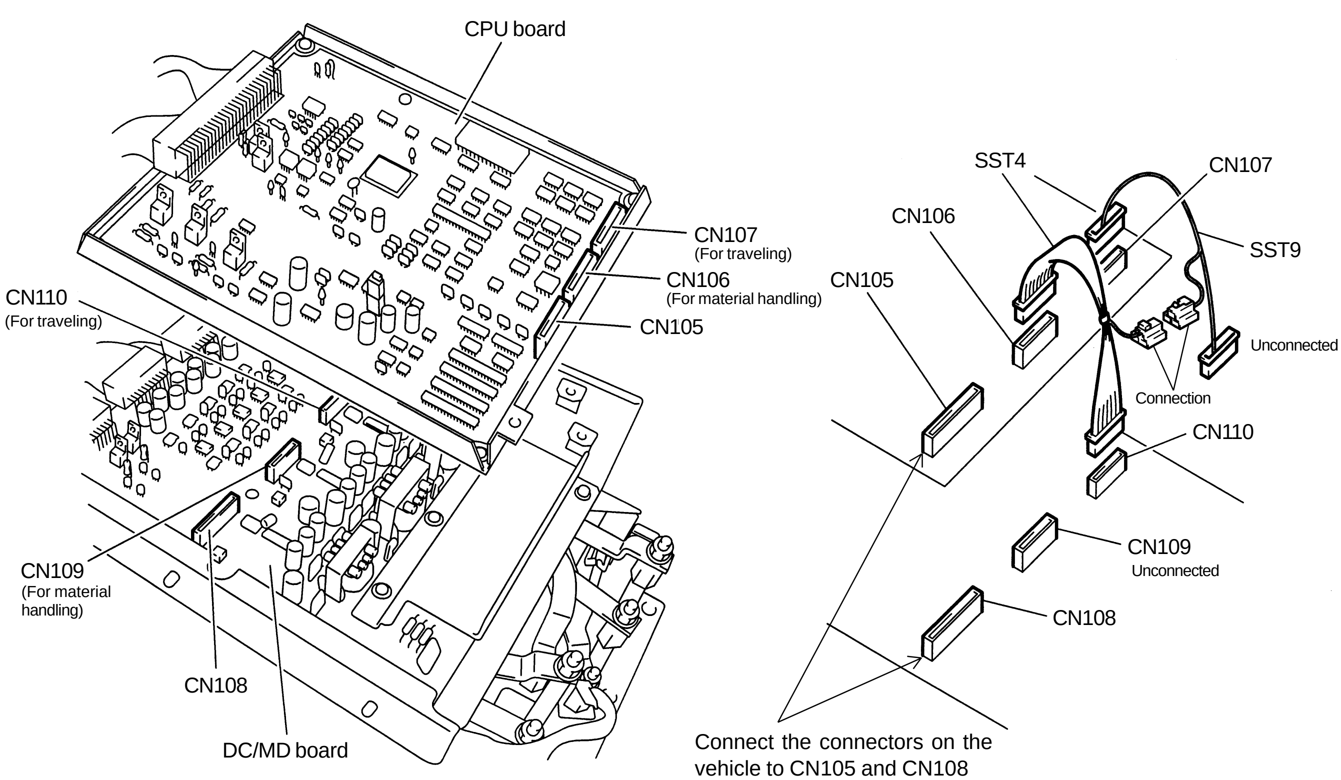
(2) Connect the 11-pin (10-pin) connector of SST4 to the CN106 (CN107) connector on the CPU board, and connect the 10-pin (11-pin) connector of SST4 to the CN110 (CN109) connector on the DC/MD board.

(3) Connect the 10-pin (11-pin) connector of SST9 to the CN107 (CN106) connector on the CPU board. The 11-pin (10-pin) connector of SST9 is left unconnected.

(4) Connect the 3-pin connector of SST4 to the 3-pin connector of SST9.

(5) In case of traveling circuit check: Operate the material handling lever with the battery plug ON and key switch ON, and check the LED blinking state.
In case of material handling circuit checking: Operate the direction lever with the battery plug ON and key switch ON and depress the accelerator pedal to check the LED blinking state.

<For traveling circuit check>



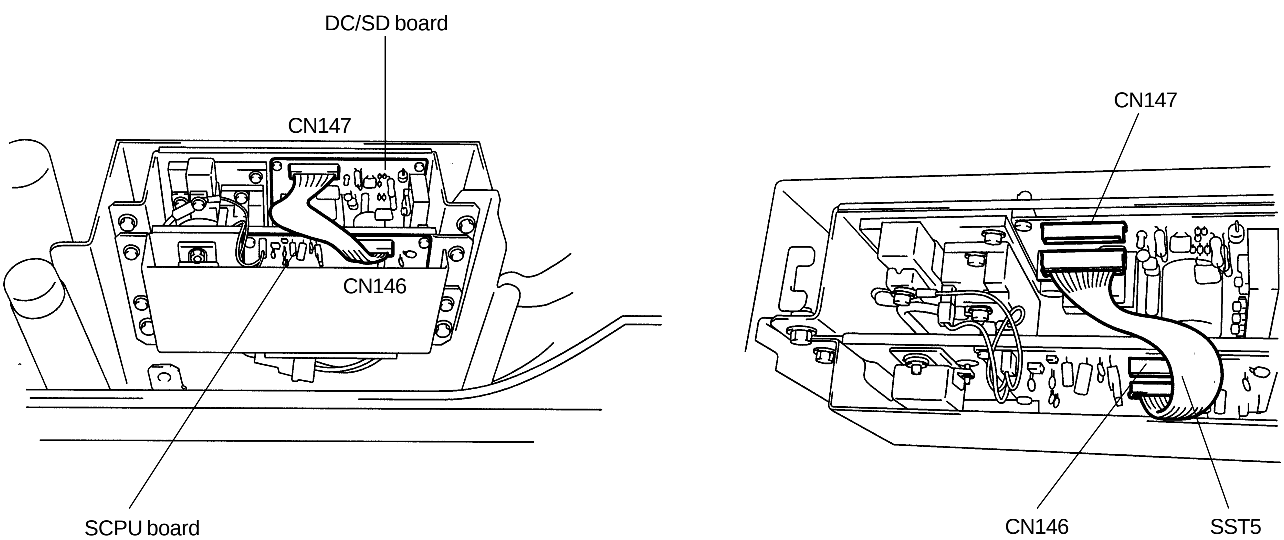
5. SST5 setting method

SST5 is used for judging the quality of the spring solenoid valve and steering angle correction solenoid valve drive signals.
It is used to check whether the drive signal from the SCPU board in the PS controller or the drive signal from the DC/SD board is defective.

(1) Disconnect the wiring between CN146 and CN147, and set SST5.

Always connect the connector connected with more number of cables to the SCPU board (CN146). Since the number of pins and the shape are the same at both ends of SST5, carefully avoid wrong connection.

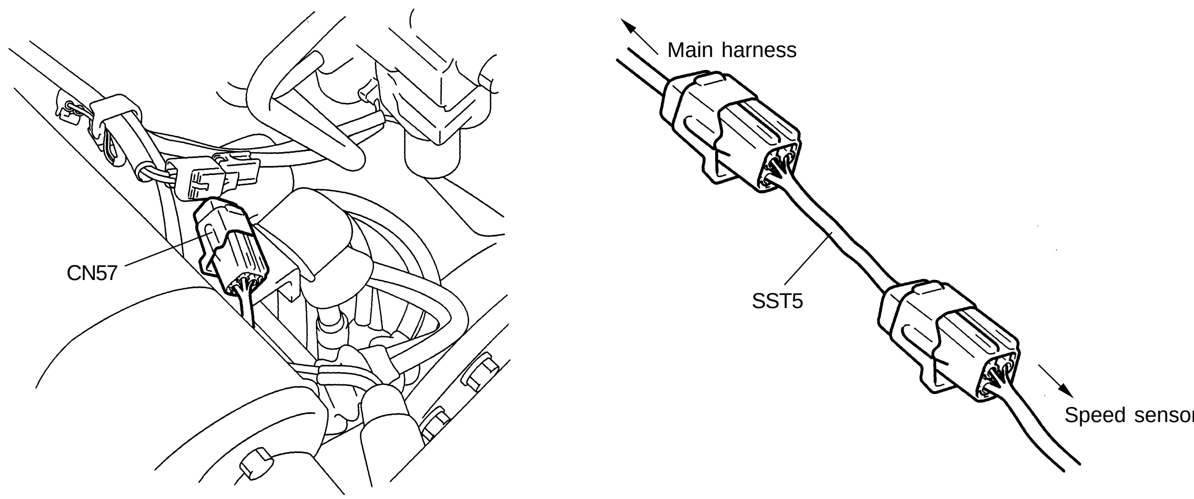
(2) Check the ON state of each solenoid in the ANL.ACTIVE mode.




- Carefully avoid wrong connection of CN146 and 147.
- Though error codes 54-2 and 73-2 are displayed upon key switch ON, it does not indicate an abnormality.

6. SST6 setting method

SST6 is for checking the drive motor speed sensor signal.
Two drive motor speed sensors are used: SSD1 and SSD2.
Individual speed sensor quality judgment is impossible. Set SST6 and judge by analyzer "ACTIVE TEST".
SST6 is for checking by reversing the SSD1 and SSD2 output signals.




(1) Disconnect the CN57 connector and set SST6.

(2) Check the speed sensor by using ANL.I/O monitor 2.

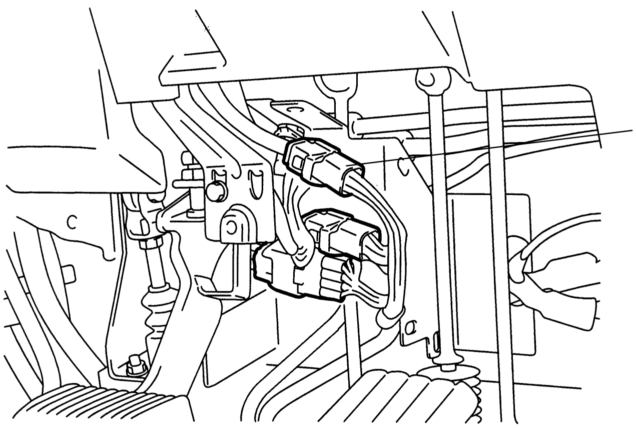
7. SST7 setting method

SST7 is used for judging the steering sensor signal quality.
When SST7 is connected, the output signals from STS1 and STS2 are reversed, and the STSC signal is set to ON.

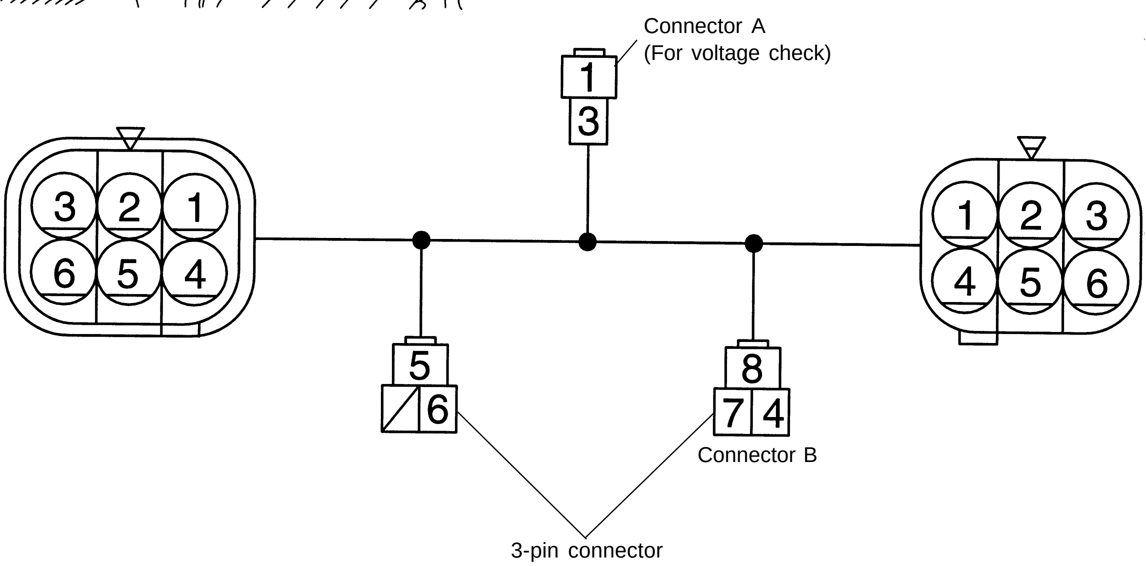
(1) Disconnect the CN19 connector and set SST7 (The 3-pin connector must be connected before reconnection).

(2) Check the steering angle sensor by using ANL.I/O monitor 4.

(3) Voltage check (connector B side) the steering angle sensor with a circuit tester.




Steering angle sensor check
CN19-4 ⊕ – CN19-3 ⊖
(CNB-8 ⊕ – CNA-1 ⊖)
CN19-5 ⊕ – CN19-3 ⊖
(CNB-7 ⊕ – CNA-1 ⊖)
CN19-6 ⊕ – CN19-3 ⊖
(CNB-4 ⊕ – CNA-1 ⊖)



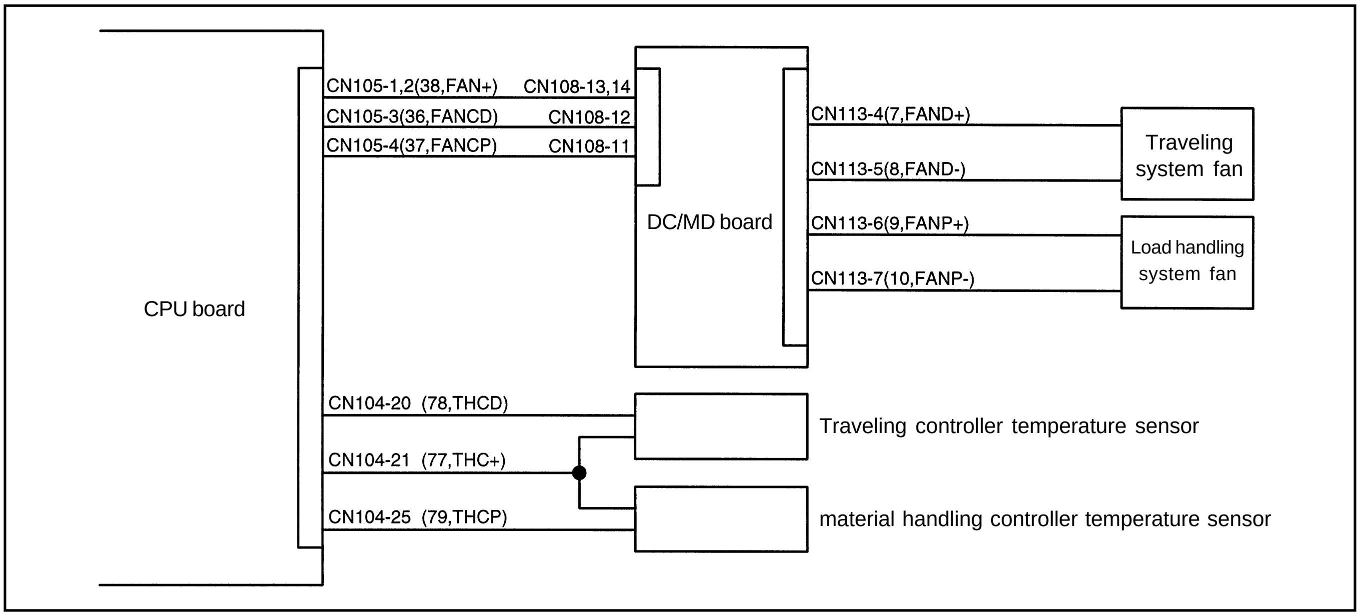
# TRAVELING AND MATERIAL HANDLING SYSTEMS TROUBLESHOOTING

## WHEN AN ERROR CODE IS DISPLAYED

**Safety Monitor ( blinking)**

**A0-1, A0-2: Abnormal Controller Temperature Rise (Overheat)**

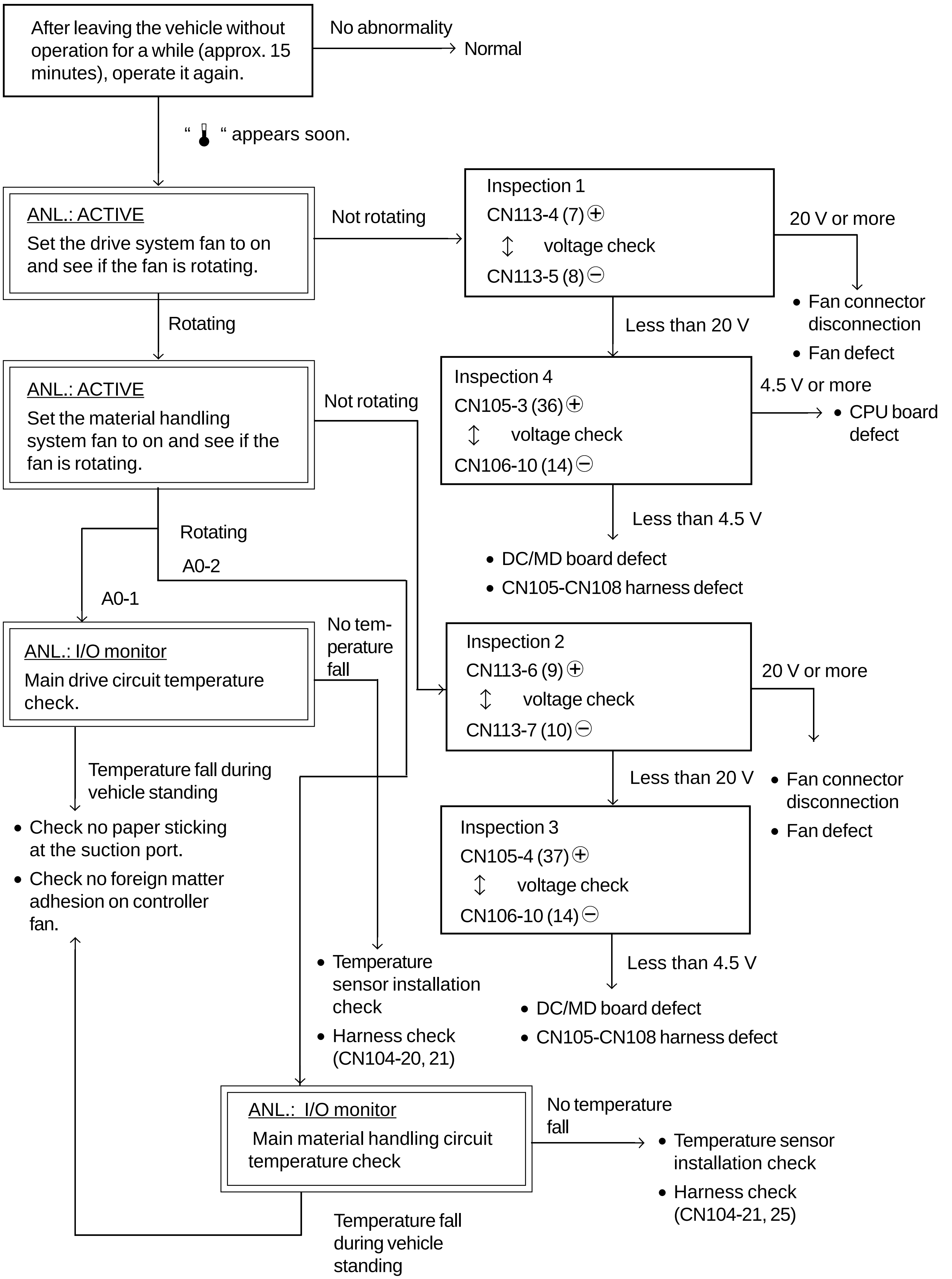
## Related portion




## Estimated causes

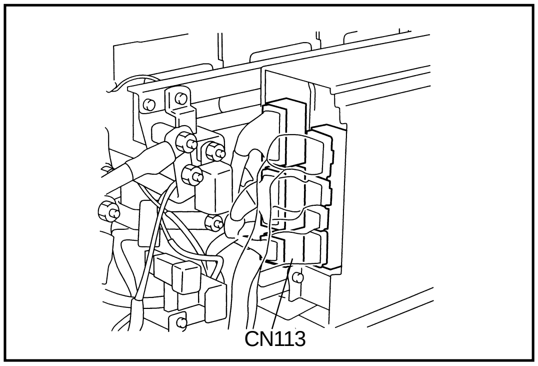
| | |
|---|---|
| ① | Overheat (from continuous overloaded operation) |
| ② | Fan abnormality |
| ③ | Clogged fin |

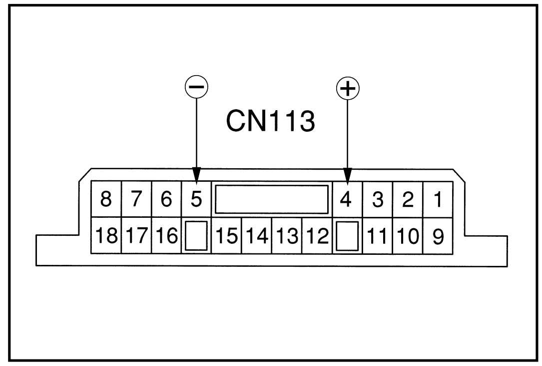
*** If A0-4 or A0-5 is displayed, carry out troubleshooting with priority given to A0-4 or A0-5.**


After leaving the vehicle without operation for a while (approx. 15 minutes), operate it again.
No abnormality
Normal
“ “ appears soon.
ANL.: ACTIVE
Set the drive system fan to on and see if the fan is rotating.
Not rotating
Inspection 1
CN113-4 (7) ⊕
voltage check
CN113-5 (8) ⊖
20 V or more
• Fan connector disconnection
• Fan defect
Rotating
Less than 20 V
ANL.: ACTIVE
Set the material handling system fan to on and see if the fan is rotating.
Not rotating
Inspection 4
CN105-3 (36) ⊕
voltage check
CN106-10 (14) ⊖
4.5 V or more
• CPU board defect
Less than 4.5 V
• DC/MD board defect
• CN105-CN108 harness defect
Rotating
A0-2
A0-1
ANL.: I/O monitor
Main drive circuit temperature check.
No temperature fall
Inspection 2
CN113-6 (9) ⊕
voltage check
CN113-7 (10) ⊖
20 V or more
• Fan connector disconnection
• Fan defect
Less than 20 V
Temperature fall during vehicle standing
• Check no paper sticking at the suction port.
• Check no foreign matter adhesion on controller fan.
Inspection 3
CN105-4 (37) ⊕
voltage check
CN106-10 (14) ⊖
Less than 4.5 V
• DC/MD board defect
• CN105-CN108 harness defect
• Temperature sensor installation check
• Harness check (CN104-20, 21)
ANL.: I/O monitor
Main material handling circuit temperature check
No temperature fall
• Temperature sensor installation check
• Harness check (CN104-21, 25)
Temperature fall during vehicle standing

Inspection 1:
CN113-4 – CN113-5 voltage check
Battery plug ON, key switch ON

| | |
|---|---|
| Measurement terminals | CN113-4 (7) ⊕ – CN113-5 (8) ⊖ |
| Tester range | 50 V |
| Standard | 20 V or more |

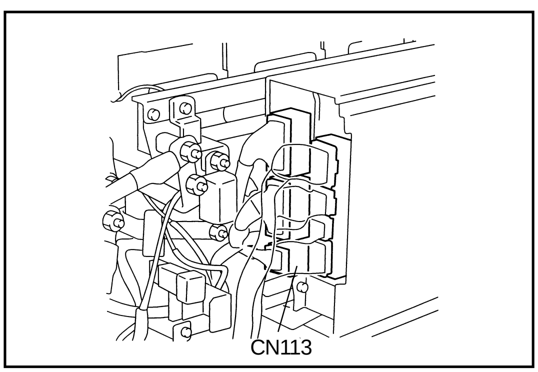


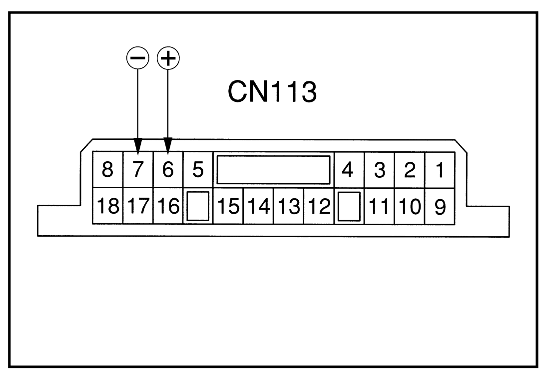




Less than 20 V → To Inspection 4
20 V or more → Fan connector disconnection, fan defect

Inspection 2:
CN113-6 – C113-7 voltage check
Battery plug ON, key switch ON

| | |
|---|---|
| Measurement terminals | CN113-6 (9) ⊕ – CN113-7 (10) ⊖ |
| Tester range | 50 V |
| Standard | 24 V |

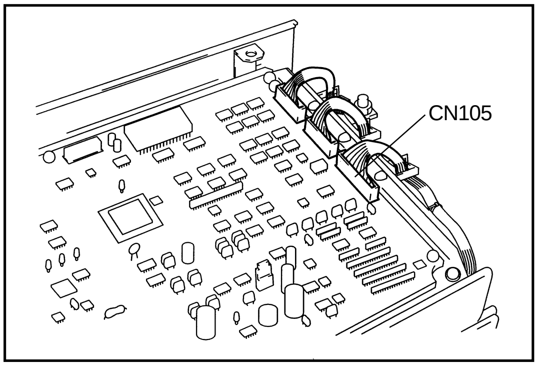


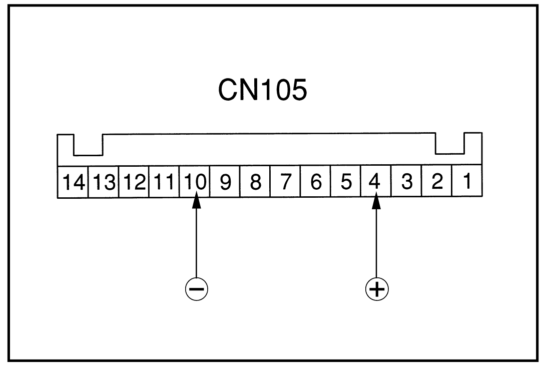




Less than 20 V → To Inspection 3
20 V or more → Fan connector disconnection, fan defect

Inspection 3:
CN105-4 (37) – C106-10 (14) voltage check
Battery plug ON, key switch ON

| Measurement terminals | CN105-4 (37) ⊕ – CN106-10 (14) ⊖ |
|---|---|
| Tester range | 10 V |
| Standard | 4.5 V |

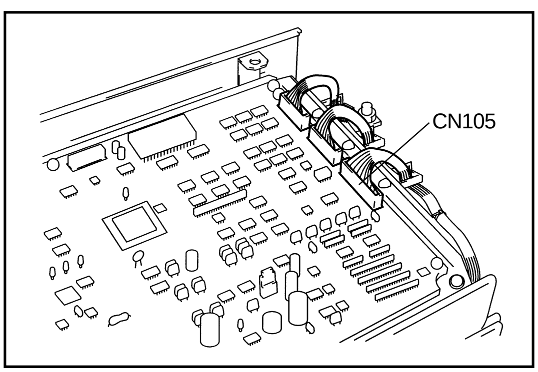


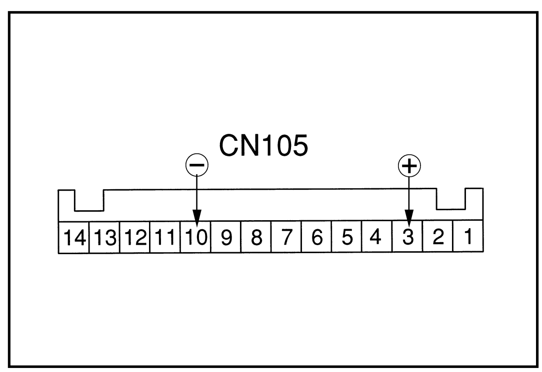




Less than 4.5 V → DC/MD board defect, CN105-CN108 harness defect
4.5 V or more → CPU board defect

Inspection 4:
CN105-3 (36) – CN106-10 (14) voltage check
Battery plug ON, key switch ON

| Measurement terminals | CN105-3 (36) ⊕ – CN106-10 (14) ⊖ |
|---|---|
| Tester range | 10 V |
| Standard | 4.5 V |

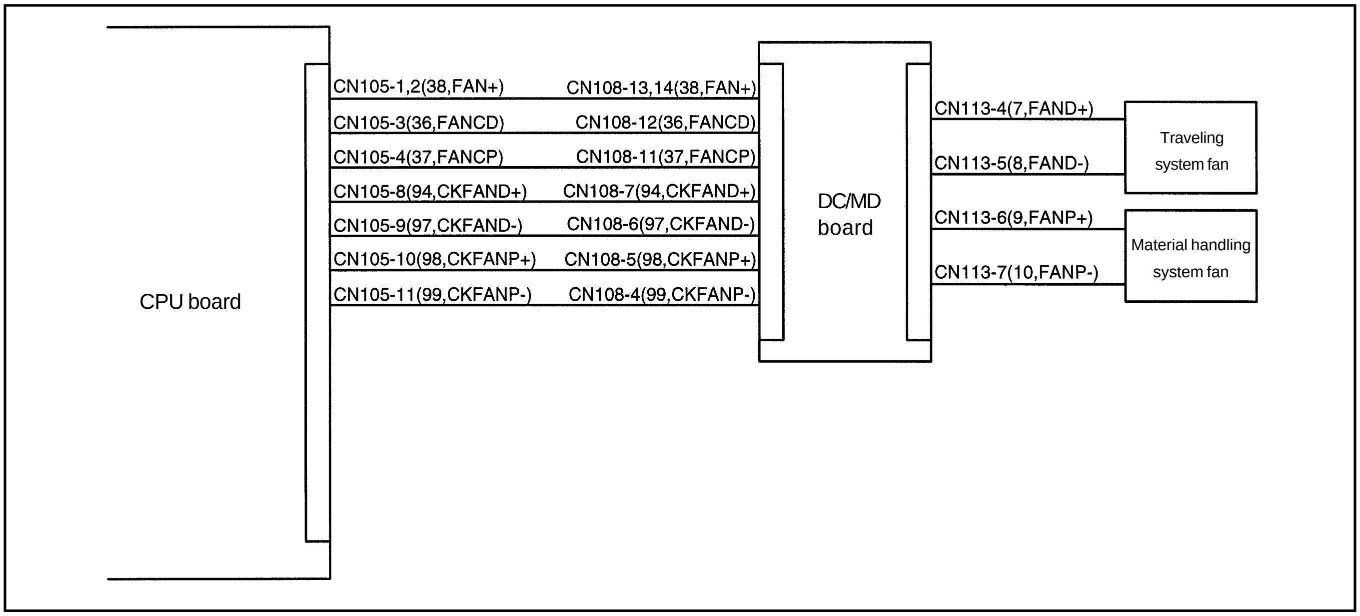



Less than 4.5 V → DC/MD board defect, CN105-CN108 harness defect
4.5 V or more → CPU board defect

# Error Code: A0-4 (for Drive Circuit) • A0-5 (for Material Handling Circuit): Fan Abnormality

## Related portion




## Estimated causes

① Fan abnormality
② Harness open circuit
③ DC/MD board defect

*** If error code C0 is also displayed, prefer C0.**

The troubleshooting procedure below is for A0-4 (for drive circuit). The procedure for A0-5 (for material handling circuit) is similar.

<u>ANL.: ACTIVE</u>
Disconnect the fan connector and set the drive system fan to ON.

Check signal: 1 (ON) → Fan defect

Check signal: 0 (OFF) ↓

Inspection 1
<u>ANL.: ACTIVE</u>
Disconnect the fan connector and connect SST1 to CN105.
Select drive system fan ON.

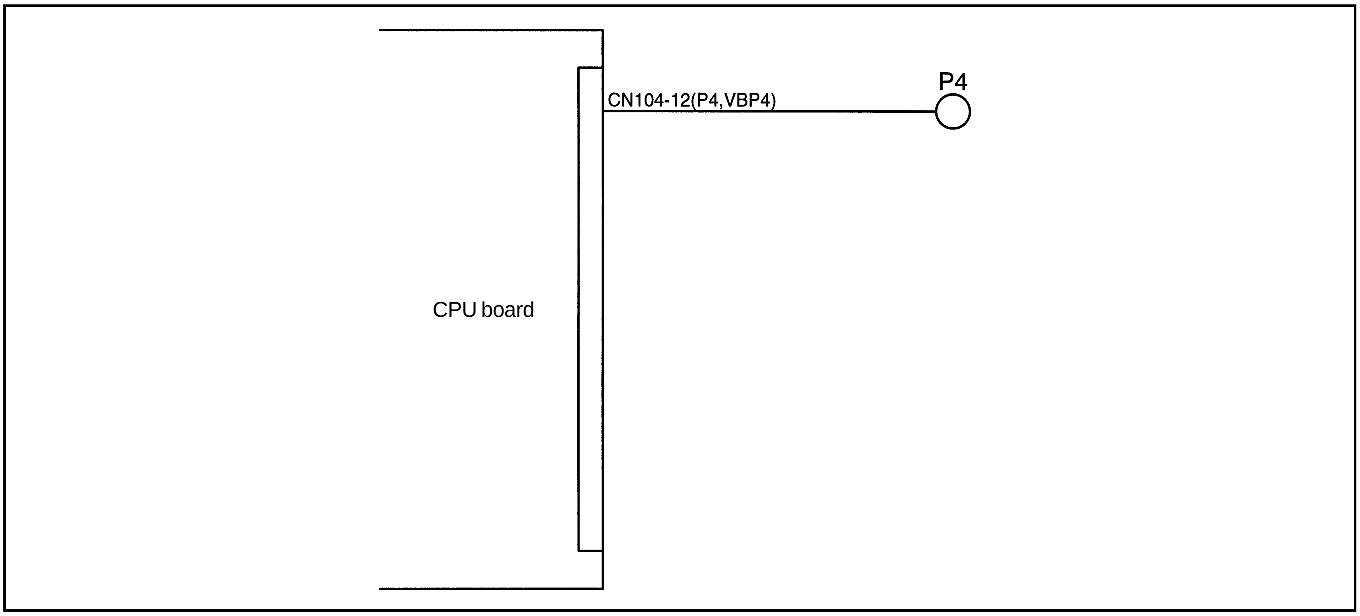
Check signal: 1 (ON) →
- DC/MD board defect
- Harness (CN105-CN108) open circuit

Check signal: 0 (OFF) ↓

- CPU board defect

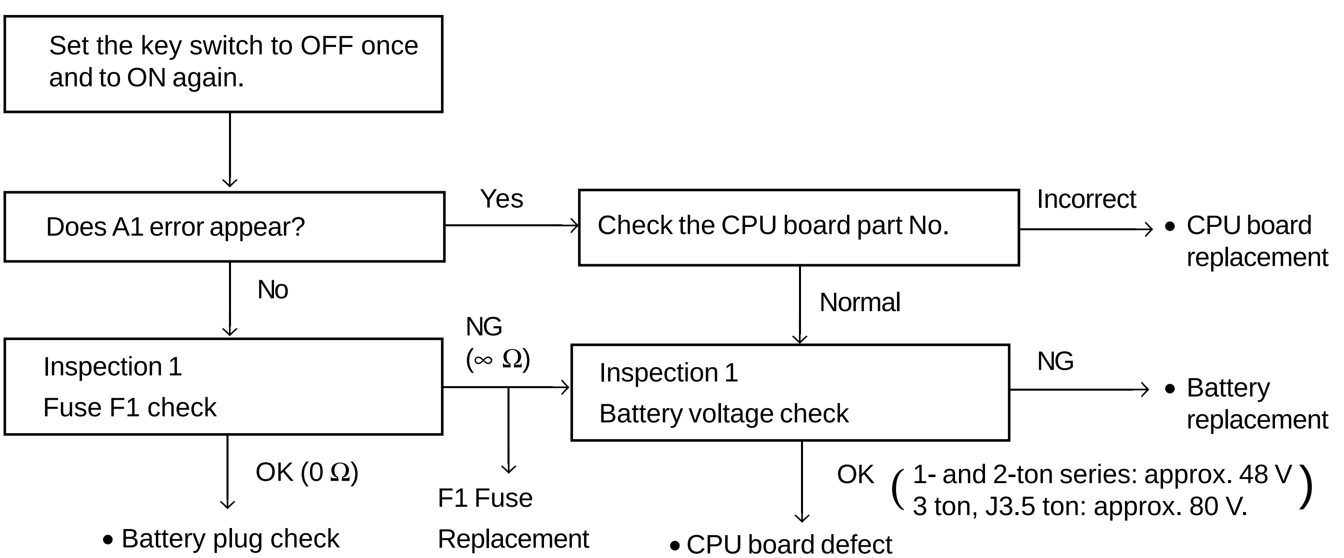
## Error Code A1: High Controller Voltage

### Related portion



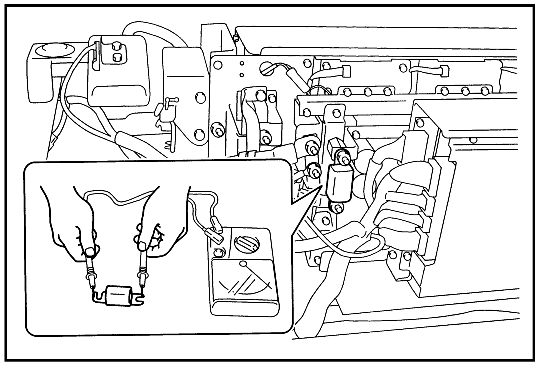

### Estimated causes

① Fuse F1 blown during regeneration (changes to A8 display after key switch ON and OFF)
② Battery plug disconnection during regeneration
③ Wrong CPU board part No.
④ Battery overvoltage



Inspection 1:
Fuse F1 check
Battery plug OFF

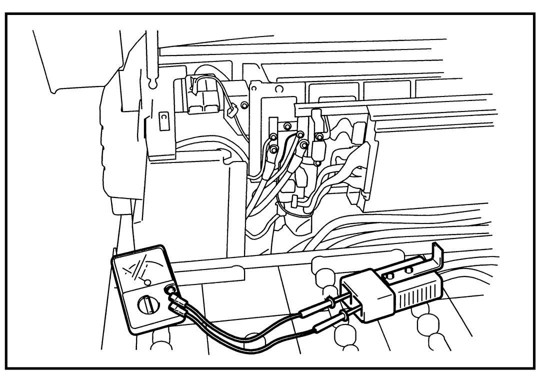
| | |
|---|---|
| Measurement terminals | Both terminals of fuse F1 |
| Tester range | Ω x 1 |
| Standard | 0 Ω |



OK (0 Ω) → Battery plug check
NG (∞ Ω) → F1 fuse Replacement

Inspection 2:
Battery voltage check
Battery plug OFF

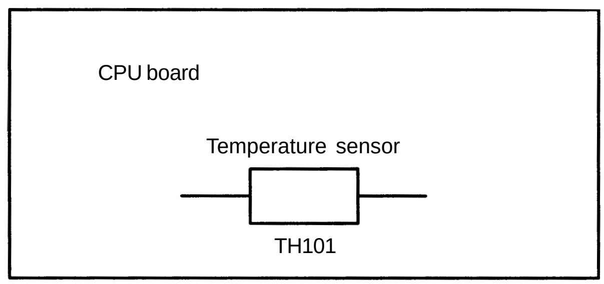
| | |
|---|---|
| Measurement terminals | Both terminals of battery plug |
| Tester range | 200 V |
| Standard | 1- and 2-ton series: approx. 48 V<br>3 ton, J3.5 ton: approx. 80 V |



**Safety monitor ( blinking)**

**A2: Abnormal temperature rise of CPU board**

## Related portion




## Estimated causes

① The temperature around the CPU board is 80°C or above.
② Overheat (from continuous overloaded operation)
③ Temperature sensor defect (CPU board defect)

- **When the diagnosis memory displays A0, perform troubleshooting for error code A0-1 or -2.**

<u>ANL.: I/O monitor 1</u>
CPU board temperature check

80°C or more → Stand the vehicle for a while (approx. 30 minutes).

Less than 80°C ↓

Vehicle is operated continuously in an overloaded state.

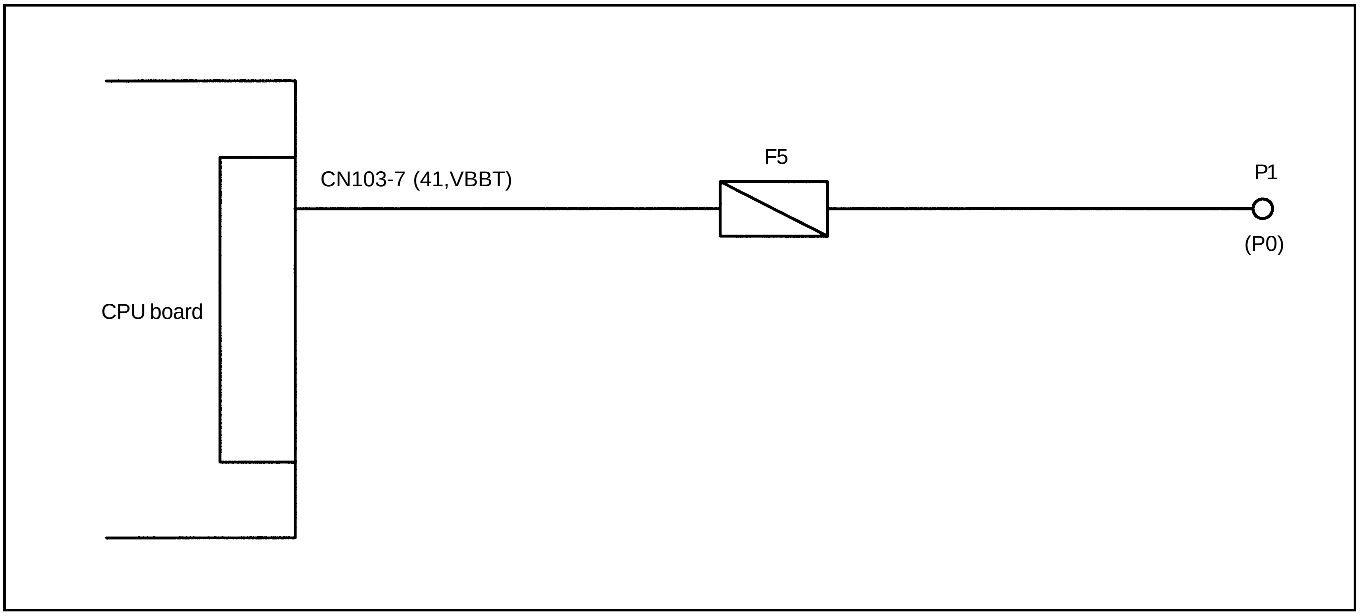
Yes → Stop the vehicle operation and perform a confirming test with the standard load after lapse of 30 minutes.

No ↓

CPU board defect

# Error Code A3-1: Incorrect Charging Plug Connection

## Related portion




## Estimated causes

① Reverse connection of charger (Separate charger plug connection to the controller side)

② Incorrect battery voltage

Is the charger plug connected to the controller side connector?

Yes → Disconnect the charger plug.

No ↓

Is the battery for the 3-ton series installed on a 1- or 2-ton series vehicle?

Yes → Replace the battery with the correct one.

No ↓

Inspection 1
P1 (P0)
↕ voltage check
N1

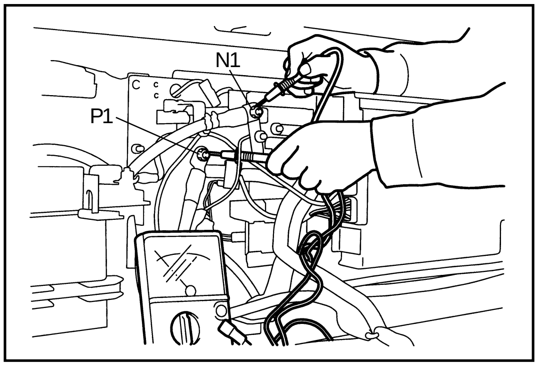
Less than 65 V → CPU board defect

65 V or more ↓

Check the battery voltage and replace the battery with a correct one.

Inspection 1:
P1 (P0)-N1 voltage check
Battery plug ON, key switch ON

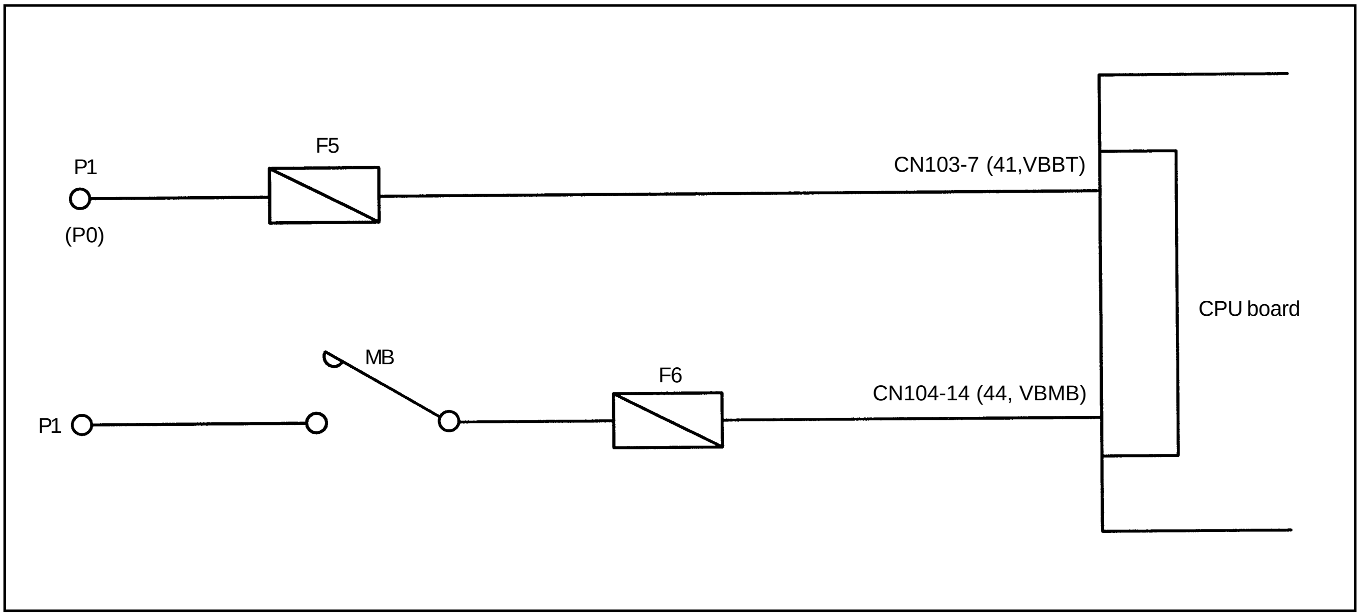
| | |
|---|---|
| Measurement terminals | P1 (P0) ⊕ – N1 ⊖ |
| Tester range | 200 V |
| Standard | Battery voltage |




65 V or more → Check the battery voltage, and replace the battery with a correct one if incorrect.
Less than 65 V → CPU board defect

## A3-2: Incorrect Battery Connection

### Related portion



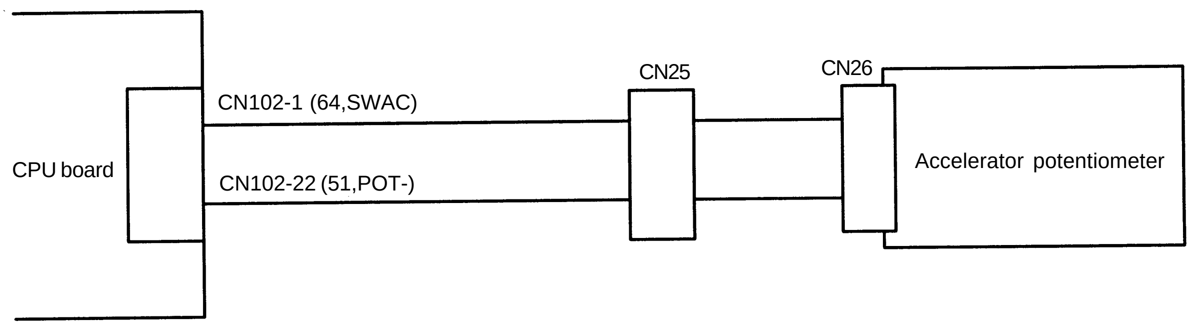

### Estimated causes

① Incorrect CPU board

- The CPU board for the 1- and 2-ton series is installed on a 3-ton vehicle.
- The CPU board for the 3-ton, J3.5-ton is installed on a 1- or 2-ton vehicle.

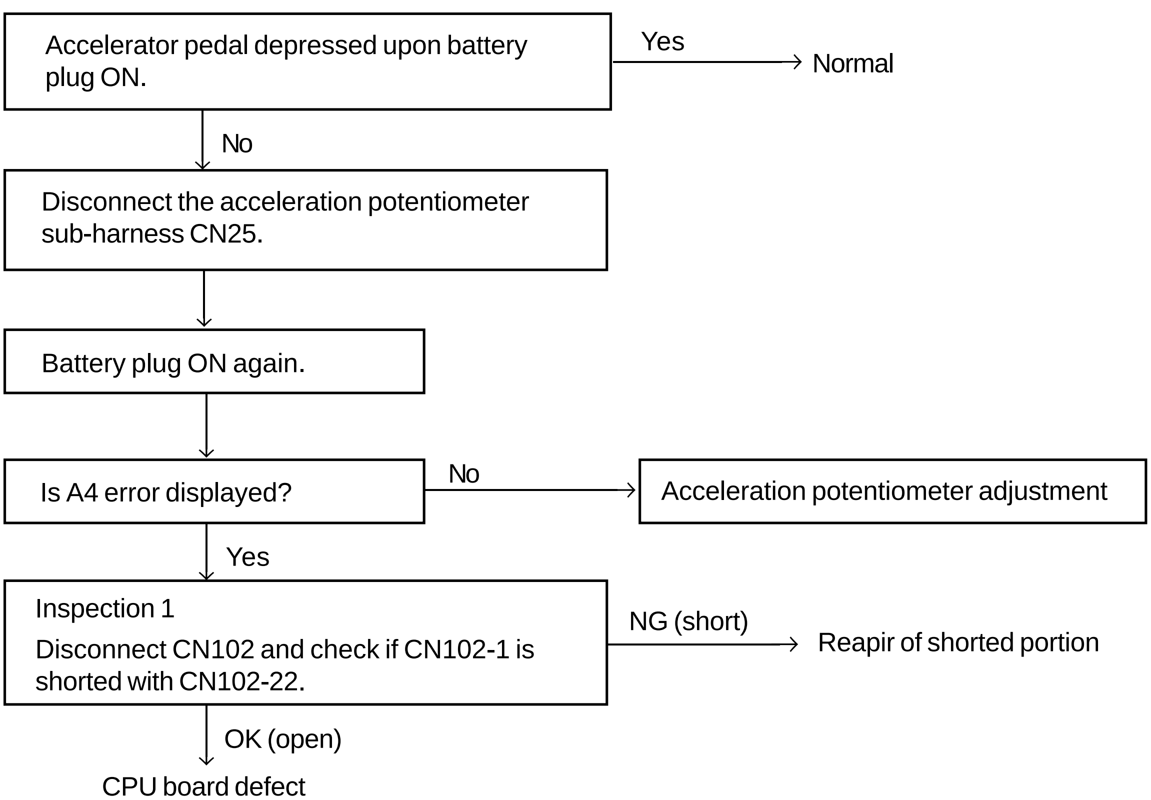
## Error Code A4: Acceleration Switch Abnormality

### Related portion



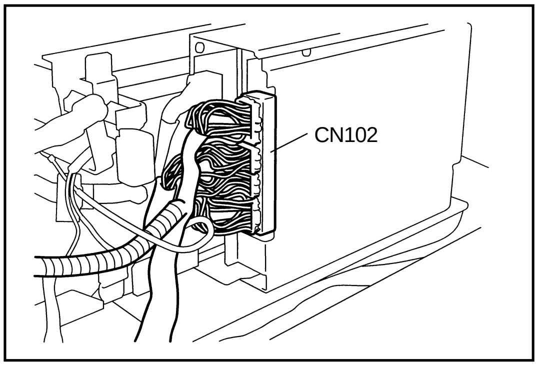

### Estimated causes

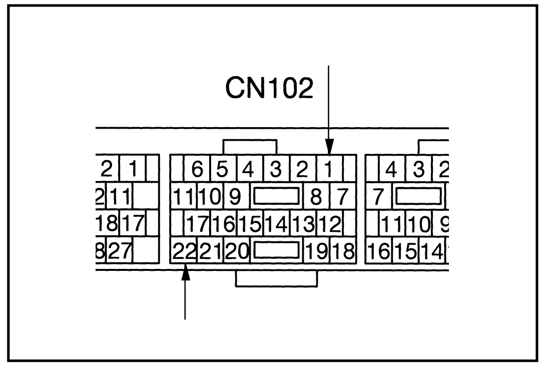
① Accelerator pedal depressed upon battery plug ON
② Acceleration potentiometer adjustment defect
③ Harness short circuit



Inspection 1:
CN102 short circuit check
Battery plug OFF, CN102 connector disconnection

| | |
|---|---|
| Measurement terminals | CN102-1 (64) – CN102-22 (69) |
| Tester range | Ω x 1 |
| Standard | Open (∞ Ω ) |

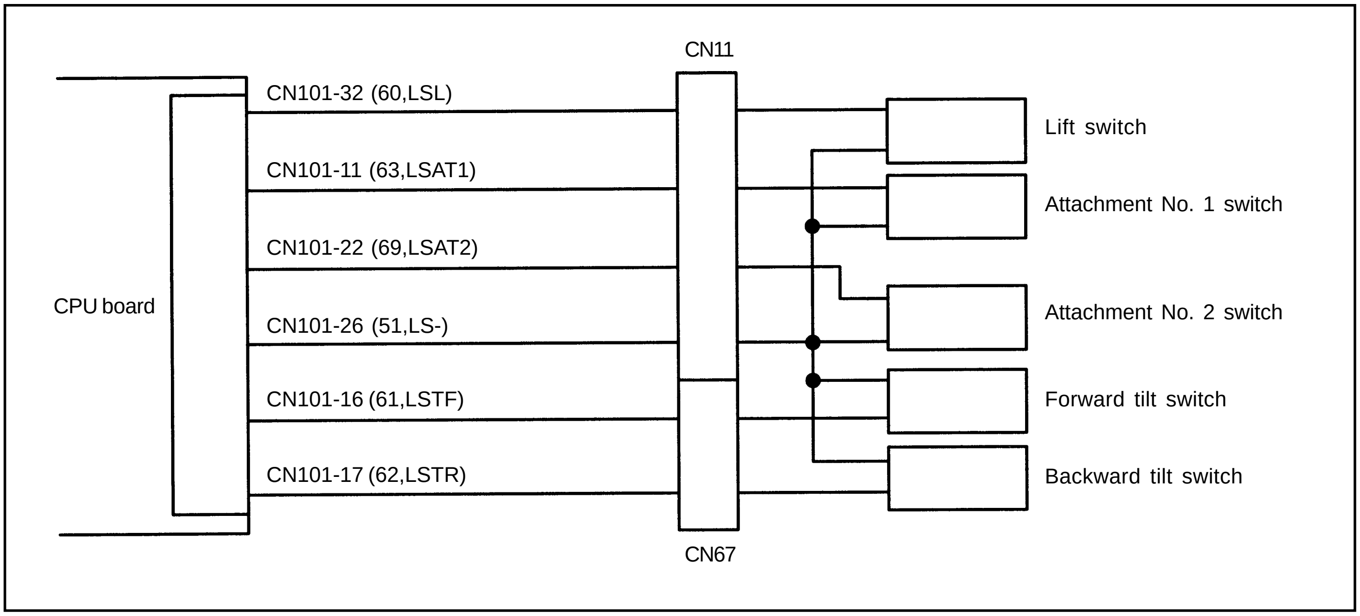



OK (open) → CPU board defect
NG (short) → Shorted portion repair

## A6-1, A6-3, A6-5, A6-6: Material Handling limit Switch Abnormality

### Related portion




### Estimated causes

① Lift or tilt (attachment) switch ON upon battery plug ON
② Lift or tilt (attachment) switch adjustment error
③ Harness short circuit

Lift or tilt (attachment) lever laid down upon battery plug ON → Yes → Normal

*** A6-1, -5 or -6 is displayed: CN1**
**A6-3 is displayed: CN67**

↓ No

Disconnect material handling switch sub-harness CN11 and CN67, and set the battery plug to ON again.

↓

Is A6 error displayed? → No → Limit switch adjustment

↓ Yes

Inspection 1
Check if the following terminals are shorted:
CN101-32 (60), CN101-11 (63), CN101-22 (69), check CN101-16 (61), CN101-17 (62) – CN101-26 (51) for short circuit.

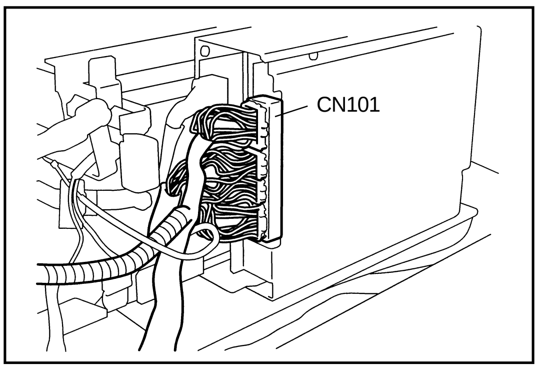
→ NG (short) → Reapir of shorted portion

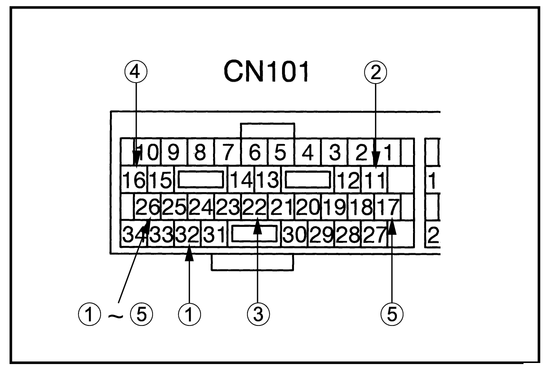
↓ OK (open)

CPU board defect

Inspection 1:
CN101 short circuit check
Battery plug OFF

| | |
|---|---|
| Measurement terminals | ① CN101-32 (60) – CN101-26 (51)<br>② CN101-11 (63) – CN101-26 (51)<br>③ CN101-22 (69) – CN101-26 (51)<br>④ CN101-16 (61) – CN101-26 (51)<br>⑤ CN101-17 (62) – CN101-26 (51) |
| Tester range | Ω x 1 |
| Stanard | Open (∞ Ω) |

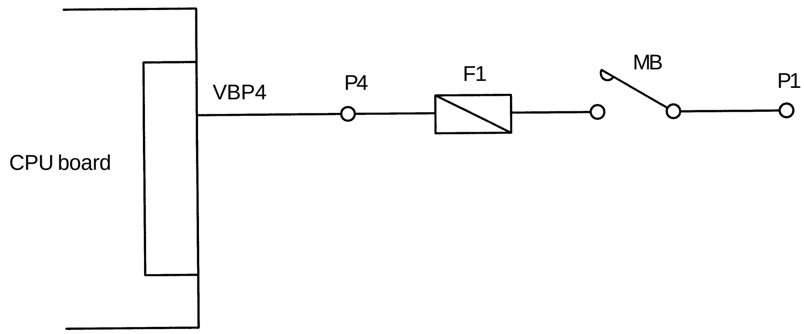



OK (open) → CPU board defect
NG (shorted) → Shorted portion repair

## Error Code A8: Blown Fuse F1

### Related portion




### Estimated causes

① Blown fuse F1
② Harness open circuit

*** If CB-1 is also displayed, prefer CB-1.**

ANL.: I/O monitor 1
VBP4 (VBMB) voltage check

| VBMB voltage - VBP4 voltage | ≦ 20 V → Is any error being displayed?
- Yes → CPU board defect
- (No) → • Fuse F1 installation defect

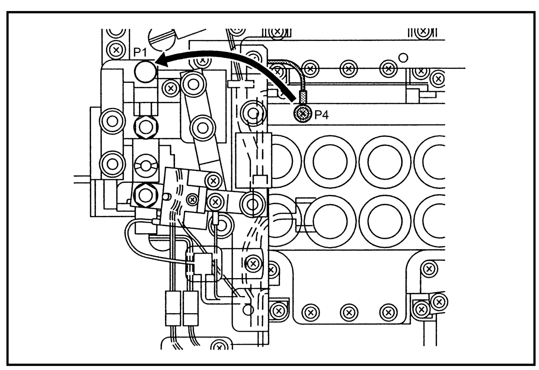
| VBMB voltage - VBP4 voltage | > 20 V ↓

Inspection 1. Fuse F1 check

NG (∞ Ω) → Fuse F1 replacement

OK (0 Ω) ↓

Disconnect the P4 harness and connect it to the P1 terminal. ⇨




ANL.: I/O monitor 1
VBP4 (VBMB) voltage check

| VBMB voltage - VBP4 voltage | ≦ 20 V → • Check copper bar terminals at P1 to P4 lines.

|VBMB voltage – VBP4 voltage | > 20 V ↓

Inspection 2
CN104-12 (P2)
↕ voltage check
N1

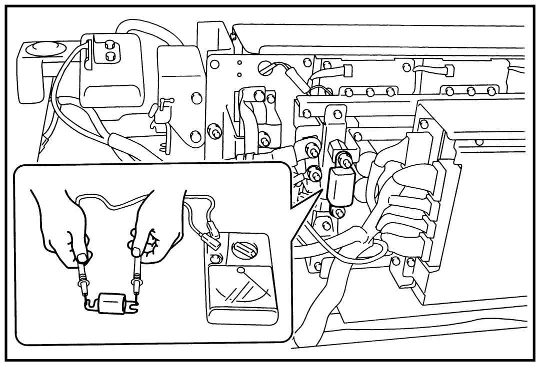
| VBMB voltage – check voltage | ≦ 20 V → • CPU board defect

| VBMB voltage - check voltage | > 20 V ↓

CN104-12 line harness defect

Inspection 1:
Fuse F1 check
Battery plug OFF

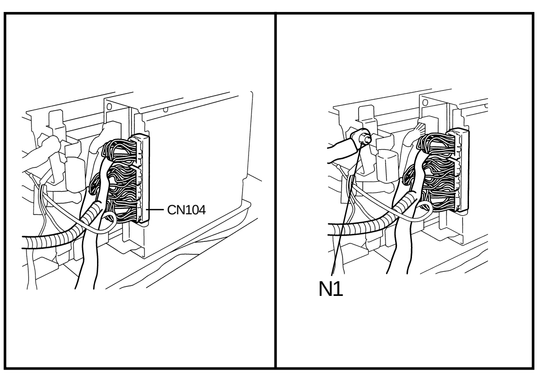
| | |
|---|---|
| Measurement terminals | Both ends of fuse F1 |
| Tester range | Ω x 1 |
| Standard | 0 Ω |

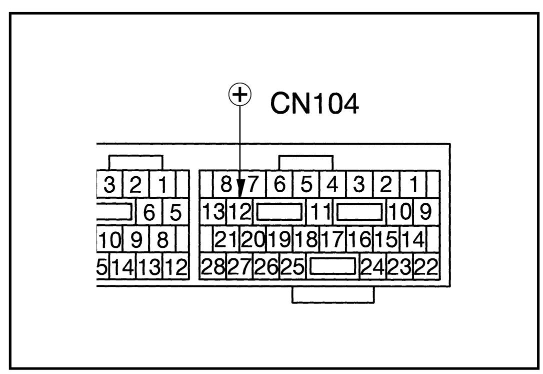


OK (0 Ω) → To inspection 2
NG (∞ Ω) → Fuse F1 replacement

Inspection 2:
CN104-12 – N1 voltge check
Battery plug ON, key switch ON

| | |
|---|---|
| Measurement terminals | CN104-12 (P2) ⊕ – N1 ⊖ |
| Tester range | 200 V |
| Standard | \| VBMB – check voltage \| > 20 V |

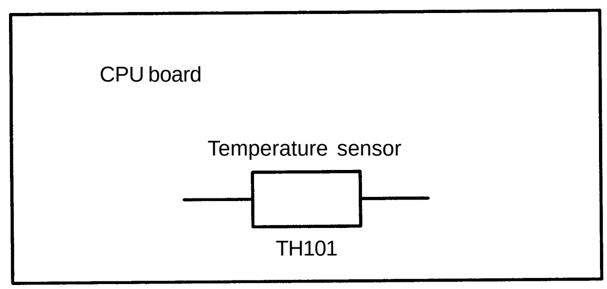



OK (| VBMB - check voltage | > 20 V) → CN104-12 line harness defect
NG (| VBMB - check voltage | ≦ 20 V) → CPU board defect

## Error Code AA: CPU Board Temperature Sensor Abnormality

### Related portion




### Estimated causes

| | |
|---|---|
| ① | CPU board defect |
| ② | CPU board replacement as the action upon code AA display |

## Error Code AF: CPU Abnormality

### Related portion

| |
|---|
| CPU board |

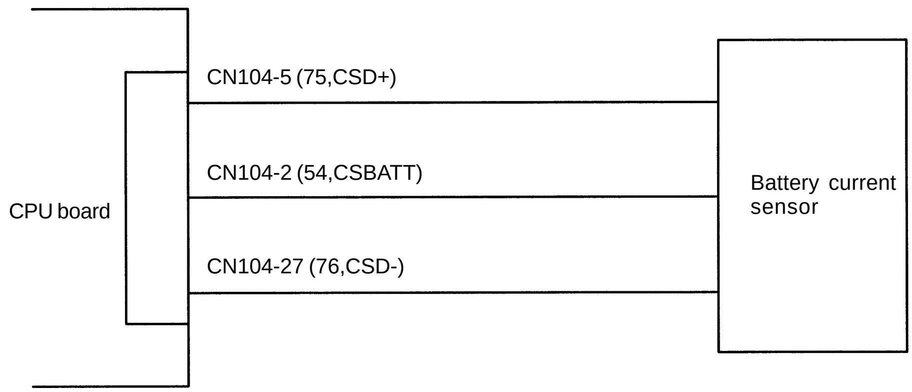
### Estimated causes

| | |
|---|---|
| ① | CPU board defect |

*** If code AF is displayed, replace the CPU board since it is defective.**

## Error Code C0-1: Main Drive Circuit Abnormality

### Related portion




### Estimated causes

| | |
|---|---|
| ① TMD (MOS) defect | ③ DC/MD board defect |
| ② Battery current sensor defect | ④ Short-circuiting of motor cable |

ANL.: I/O monitor 4
Check the battery current with battery plug ON, the key switch ON and the vehicle in stopped state.

Other than 1 to 4 V →

Battery current sensor connector inspection

CS BATT Abnormal → Repair

Normal ↓

Inspection 4
CN104-2 (54)
↕ voltage check
CN104-27 (76)

Other than 3 to 11 V →
- Harness defect
- Battery current sensor defect

Within 3 to 11 V →
- CPU board defect

*** The battery current is monitored after converting it to voltage.**

Within 1 to 4 V ↓

⚠ **Be sure to disconnect the drive and pump motor cables beforehand.**
Set SST3 to CN111 (See page 5-6.)

↓

Inspection 1
Turn direction and accelerator switches ON and check LEDs on SST3.

LEDs partially OFF *2 →

Set SST4 between CN106 and CN110 (See page 5-7.)

↓

Operate (ON) the lift lever and check LEDs on the SST.

All LEDs ON (blinking) *1 →
- CPU board defect

LEDs partially OFF *2 →
- DC/MD board defect

All LEDs ON (blinking) *1 ↓

Inspection 2
Turn direction and accelerator switches ON and check voltages at motor cable terminals,
P7, P8 or P9
↕ voltage check
N1

OK (approx. 1/2 of the battery voltage) →
- Drive motor defect
- Drive motor cable defect

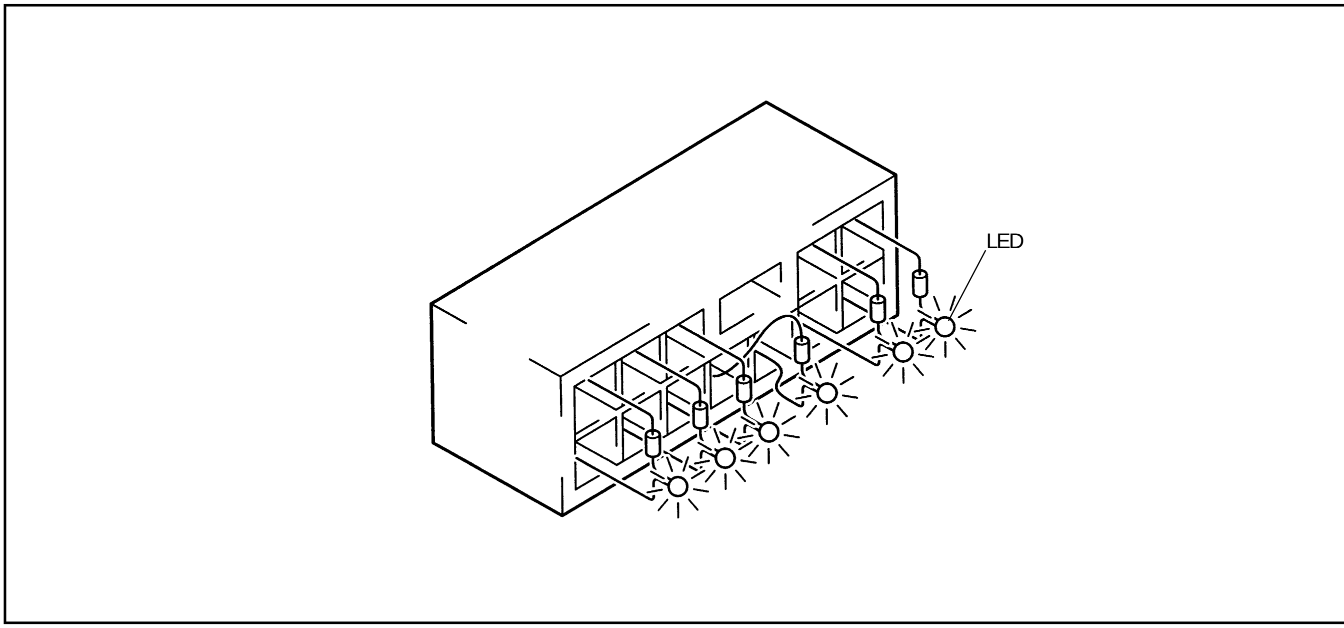
NG
1- and 2-ton series: 0 or approx. 48 V
3-ton, J3.5-ton: 0 or approx. 80 V
→ TMD inspection (Inspection 3)

***1. All LEDs ON (blinking): All LEDs repeat ON and OFF according to the MOS ON sequence.**

***2. LEDs partially OFF: One or more of six LEDs are kept off.**

Inspection 1: SST LEDs ON Check

Abnormal positions of signal circuits to the TMD can be judged by observing ON or OFF of the SST LEDs.

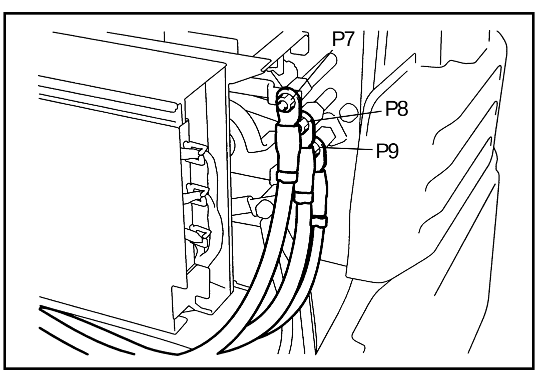


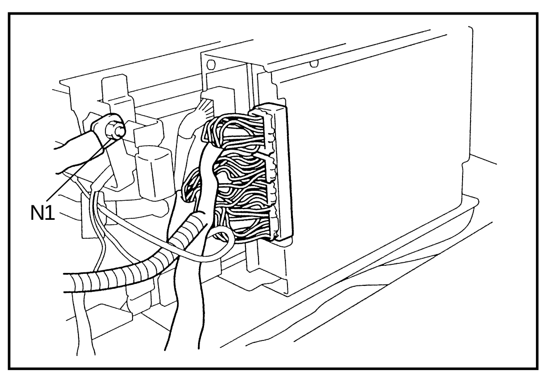

All LEDs ON (blinking) → Go to Inspection 2.
LEDs partially OFF → Set the SST4 between CN106 and CN110.

Inspection 2: Motor Cable Voltage Check

Battery plug ON, key switch ON

| | |
|---|---|
| Measurement terminals | P7-N1, P8-N1, P9-N1 |
| Tester range | 200 V |
| Standard | Approx. 1/2 of the battery voltage |

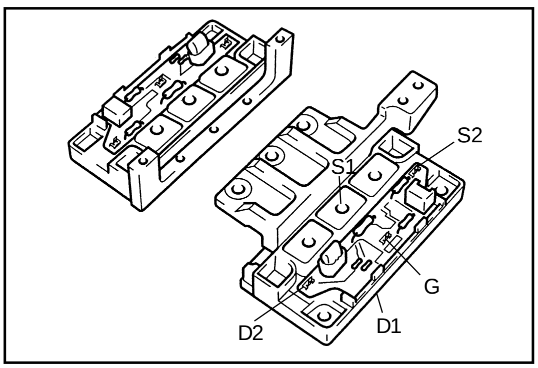



NG (1- to 2-ton series: 0 or approx. 48 V, 3-ton, J3.5-ton: 0 or approx. 80 V) → TMD inspectio 3
OK (approx. 1/2 of the battery voltage) → Drive motor cable defect or drive motor defect

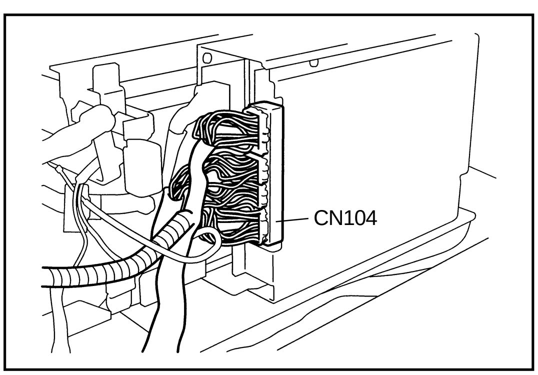
Inspection 3: Individual TMD inspection
Remove each TMD and inspect the respective TMD.

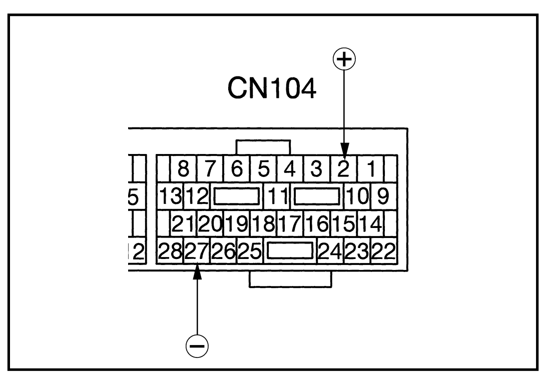
| | |
|---|---|
| Measurement terminals | D1 (D2) ⊕ – S1 (S2) ⊖<br>D1 (D2) ⊕ – G ⊖<br>S1 (S2) ⊕ – D1 (D2) ⊖<br>S1 (S2) ⊕ – G ⊖<br>G ⊕ – D1 (D2) ⊖<br>G ⊕ – S1 (S2) ⊖ |
| Tester range | Ω x 1k |
| Standard | D1 (D2) – S1 (S2) : Approx. 2 kΩ<br>D1 (D2) – G : Approx. 12 kΩ<br>S1 (S2) – D1 (D2) : ∞<br>S1 (S2) – G : Approx. 10 kΩ<br>G – D1 (D2) : ∞<br>G – S1 (S2) : Approx. 1 kΩ |




Inspection 4. Current sensor signal voltage check
Battery plug ON, key switch ON

| | |
|---|---|
| Measurement terminals | CN104-2 (54) ⊕ – CN104-27 (76) ⊖ |
| Tester range | 50 V |
| Standard | Between 3 and 11 V |

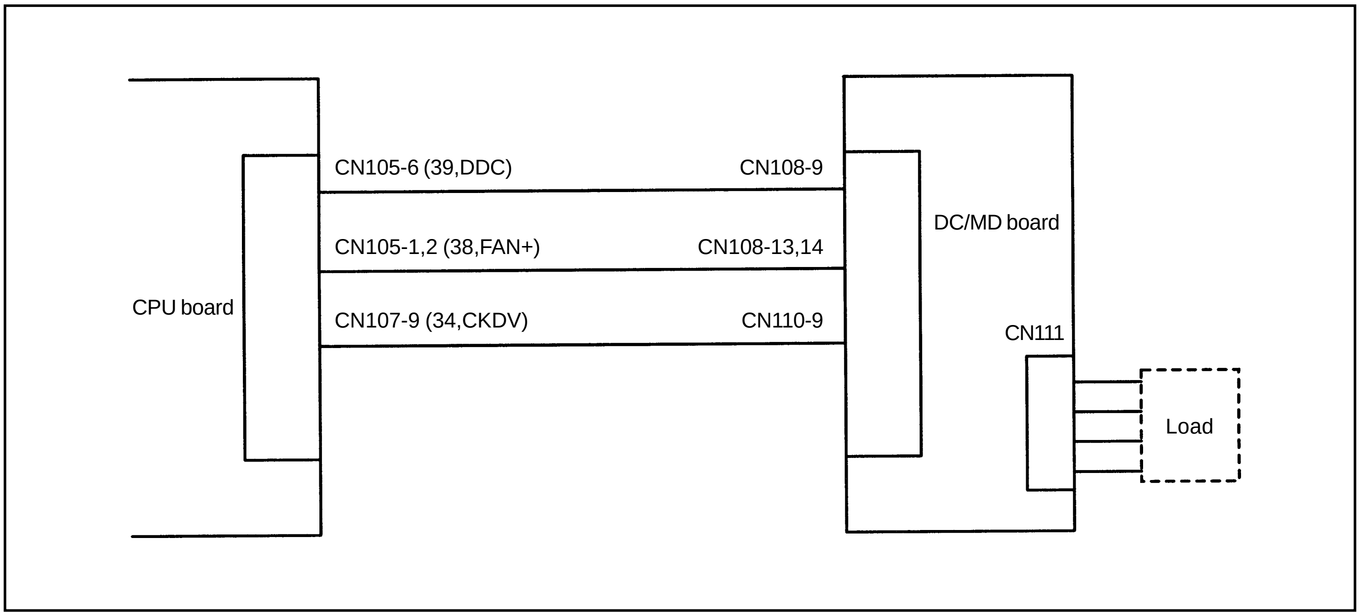



(Between 3 and 11 V) → CPU board defect
(Not between 3 and 11 V) → Harness defect, battery current sensor defect

## Error Code C0-3: Travel Drive Power Supply Abnormality

### Related portion




### Estimated causes

① Short-circuiting of load
② DC/MD board defect
③ Open circuit of harness

Turn the battery plug OFF and disconnect CN111. Turn the battery plug ON.

↓

Does C0-3 disappear?

→ Change to C0-4: Connect CN111 and check that the error code changes again to C0-3.

- ↓ Battery plug OFF: Disconnect harness CN117 through CN119. Turn battery plug and key switch ON.
  - → Change to C0-4: Inspect the TMD A assy to which harnesses CN117 through CN119 are connected.
  - ↓ Remains as C0-3 as it is: Inspect the TM assy to which harnesses CN114 through CN116 are connected.

↓ No

ANL.: ACTIVE
Set SST1 to CN105. Check the drive fan check signal. (See page 5-5.)

→ Check signal: 0
- CPU board defect

↓ Check signal: 1

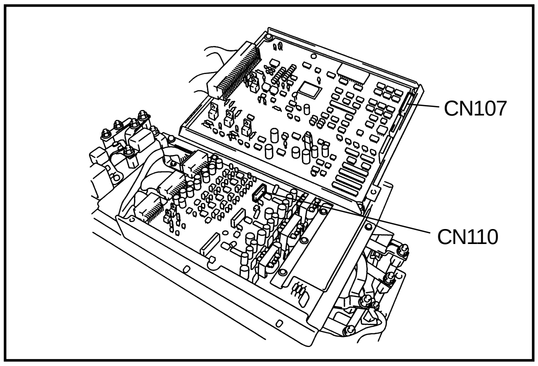
Inspection 1
CN107-9 (34)
↕ continuity check
CN110-9 (34)

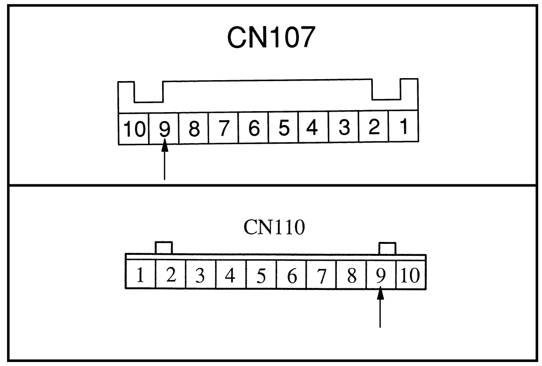
↓ 0 Ω
- DC/MD board defect
- Harness defect (between CN105 and CN108)

↓ ∞ Ω
- Battery plug check (CN107-CN110)

Inspection 1:
Active Check Between CN107-9 and CN110-9
Battery plug OFF

| | |
|---|---|
| Measurement terminals | CN107-9 (34) – CN110-9 (34) (REC) |
| Tester range | Ω x 1 |
| Standard | 0 Ω |

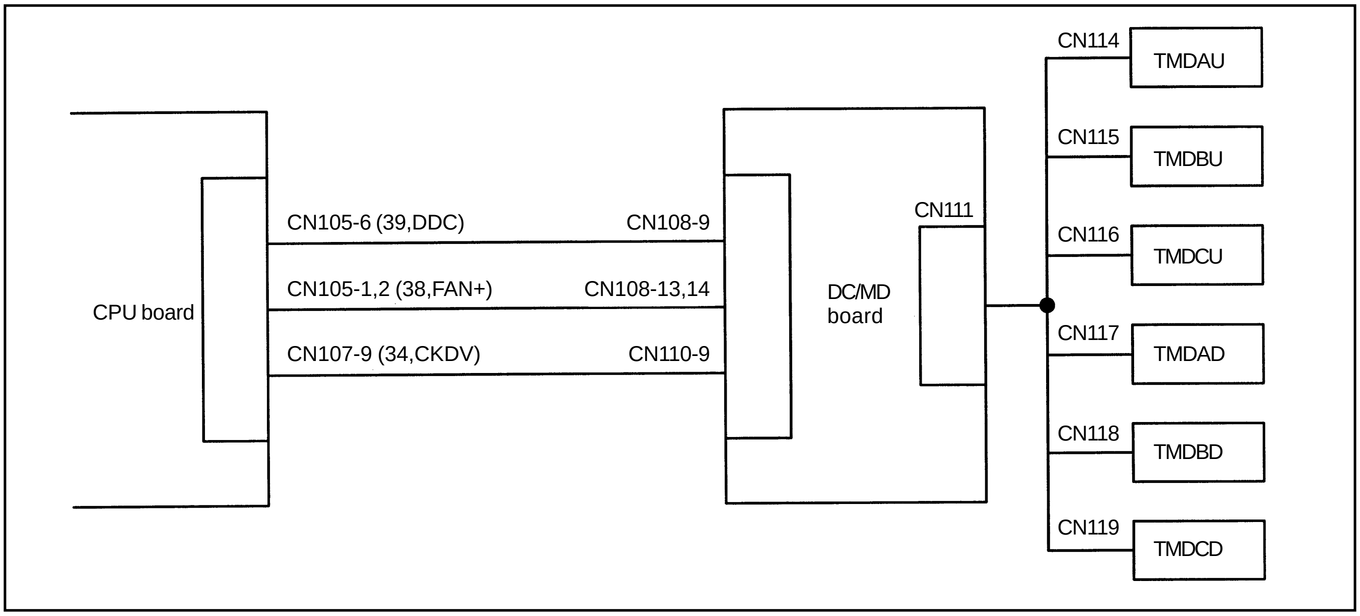



OK (0 Ω) → DC/MD board defect or harness defect (between CN105 and CN108)
NG (∞ Ω) → Harness defect (between CN107 and CN110)

# Error Code C0-4: Travel Drive Circuit Abnormality

## Related portion




## Estimated causes

① DC/MD board defect
② Open circuit of internal harness
③ Disconnected MMP connector

Connect SST3 to CN111.

↓

Error check

→ C0-4 error occurs. → Inspection 1: CN107-9 (34) ↕ continuity check CN110-9 (34)

- OK (0 Ω):
  - DC/MD board defect
  - Harness defect (between CN105 and CN108)
- NG (∞ Ω):
  - Harness defect (between CN107 and CN110)

↓ No C0-4 error

Check if CN114 through CN119 are firmly connected.

↓

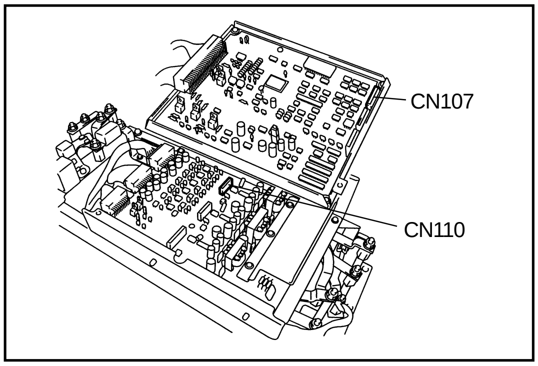
If C0-4 error still occurs.

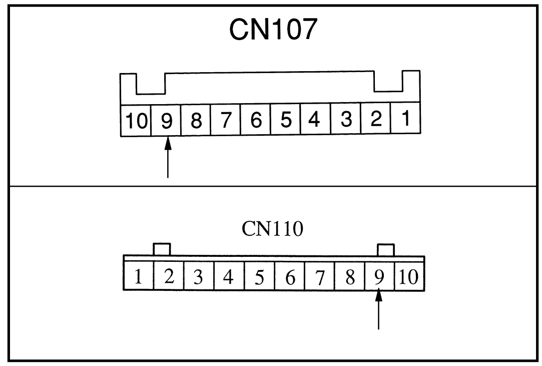
↓

Internal harness defect

Inspection 1:
Continuity Check Between CN107 and CN110
Battery plug OFF

| | |
|---|---|
| Measurement terminals | CN107-9 (34) – CN110-9 (34) (REC) |
| Tester range | Ω x 1 |
| Standard | 0 Ω |

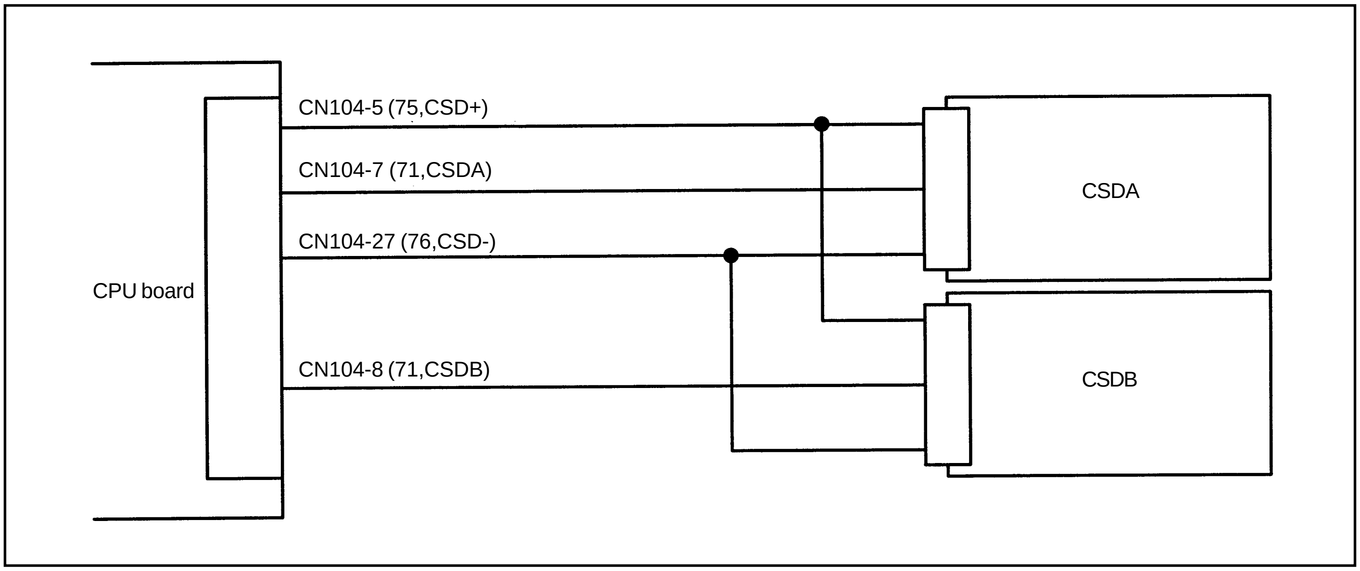



OK (0 Ω) → DC/MD board defect or harness defect (between CN105 and CN108)
NG (∞ Ω) → Harness defect (between CN107 and CN110)

# Error Code C1: Drive Current Sensor Abnormality

## Related portion




## Estimated causes

| | |
|---|---|
| ① Current sensor defect | ③ CPU board defect |
| ② Open circuit of harness | ④ Poor electrical contact of contactor |

Visually check the CSDA and CSDB connectors.

NG → Repair or replacement

*** Connector connection status:**

- Pin locking condition
- Check for disconnection when the harness is pulled slightly.

OK ↓

**Inspection 1**
Turn the key switch ON.
CN104-7 (71)
↕ voltage check
N1

NG (other than 7 V ± 0 .5 V) → **Inspection 3**

**Inspection 3**
Exchange the CSDA and CSDB.
CN104-7 (71)
↕ voltage check
N1

NG (other than 7 V ± 0.5 V) → • Harness defect

OK (7 V ± 0.5 V) ↓ • CSDA defect

Inspection 1: OK (7 V ± 0.5 V) ↓

**Inspection 2**
Turn the key switch ON.
CN104-8 (72)
↕ voltage check
N1

NG (other than 7 V ± 0.5 V) → **Inspection 4**

OK (7 V ± 0.5 V) ↓ • CPU board defect

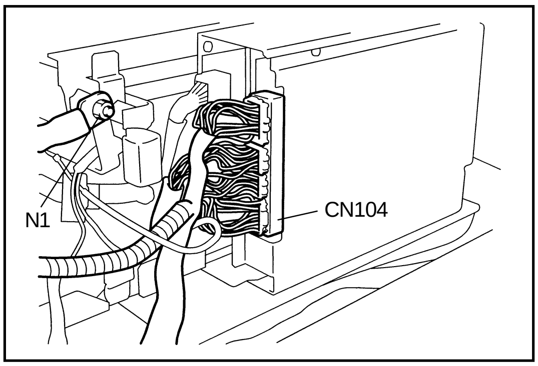
**Inspection 4**
Exchange the CSDA and CSDB.
CN104-8 (72)
↕ voltage check
N1

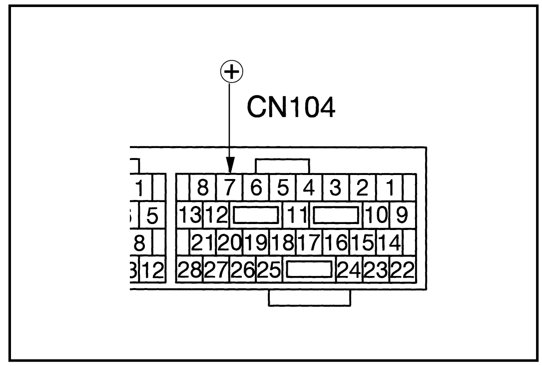
NG (other than 7 V ± 0.5 V) → • Harness defect

OK (7 V ± 0.5 V) ↓ • CSDB defect

Inspection 1:
CN104-N1 Voltage Check 1
Battery plug ON, key switch ON

| Measurement terminals | CN104-7 (71) ⊕ – N1⊖ |
|---|---|
| Tester range | DC 10 V |
| Standard | 7 V ± 0.5 V |

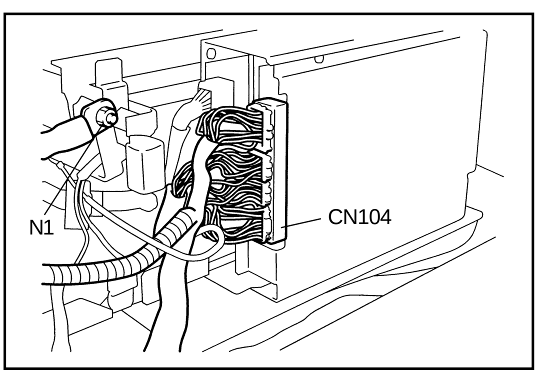


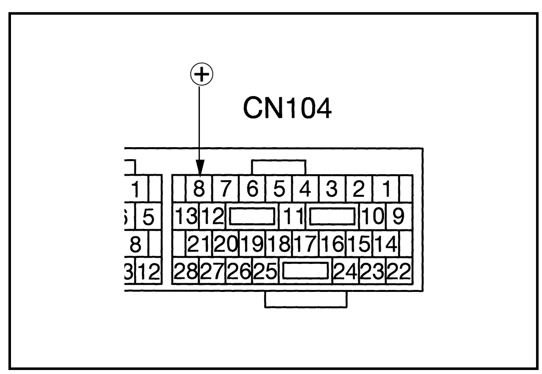




OK (7 V ± 0.5 V) → Go to Inspection 2.
NG (other than 7 V ± 0.5 V) → Go to Inspection 3.

Inspection 2:
CN104 – N1 Voltage Check 2
Battery plug ON, key switch ON

| Measurement terminals | CN104-8 (72) ⊕ – N1⊖ |
|---|---|
| Tester range | DC 10 V |
| Standard | 7 V ± 0.5 V |

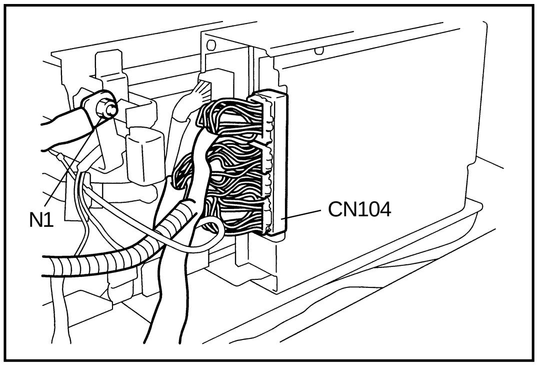


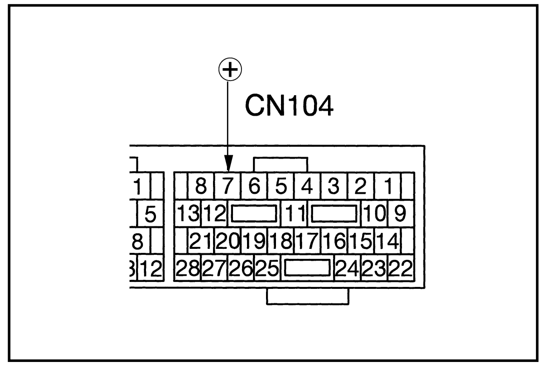




OK (7 V ± 0.5 V) → CPU board defect
NG (other than 7 V ± 0.5 V) → Go to Inspection 4.

Inspection 3:
CN104-N1 Voltage Check 3
Battery plug ON, key switch ON, exchange CSDA and CSDB

| | |
|---|---|
| Measurement terminals | CN104-7 (71) ⊕ – N1⊖ |
| Tester range | DC 10 V |
| Standard | 7 V ± 0.5 V |

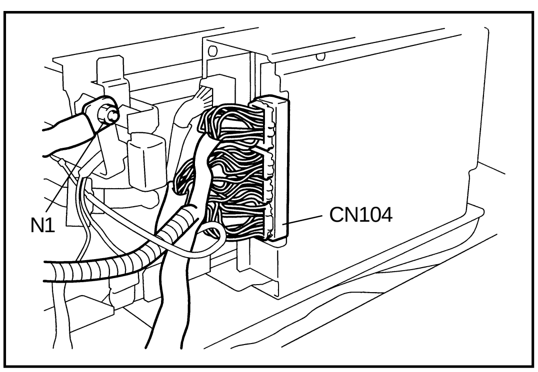


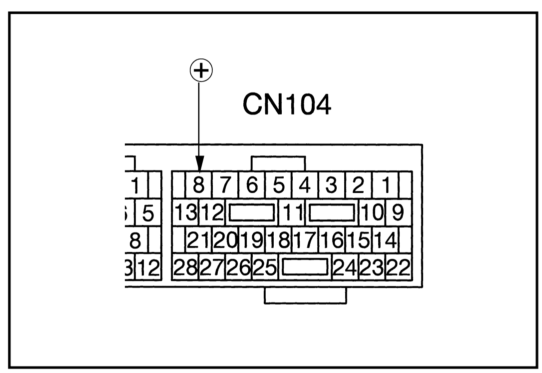




OK (7 V ± 0.5 V) → CSDA defect
NG (other than 7 V ± 0.5 V) → Harness defect

Inspection 4:
CN104 – N1 Voltage Check 4
Battery plug ON, key switch ON, exchange CSDA and CSDB

| | |
|---|---|
| Measurement terminals | CN104-8 (72) ⊕ – N1 ⊖ |
| Tester range | DC 10 V |
| Standard | 7 V ± 0.5 V |



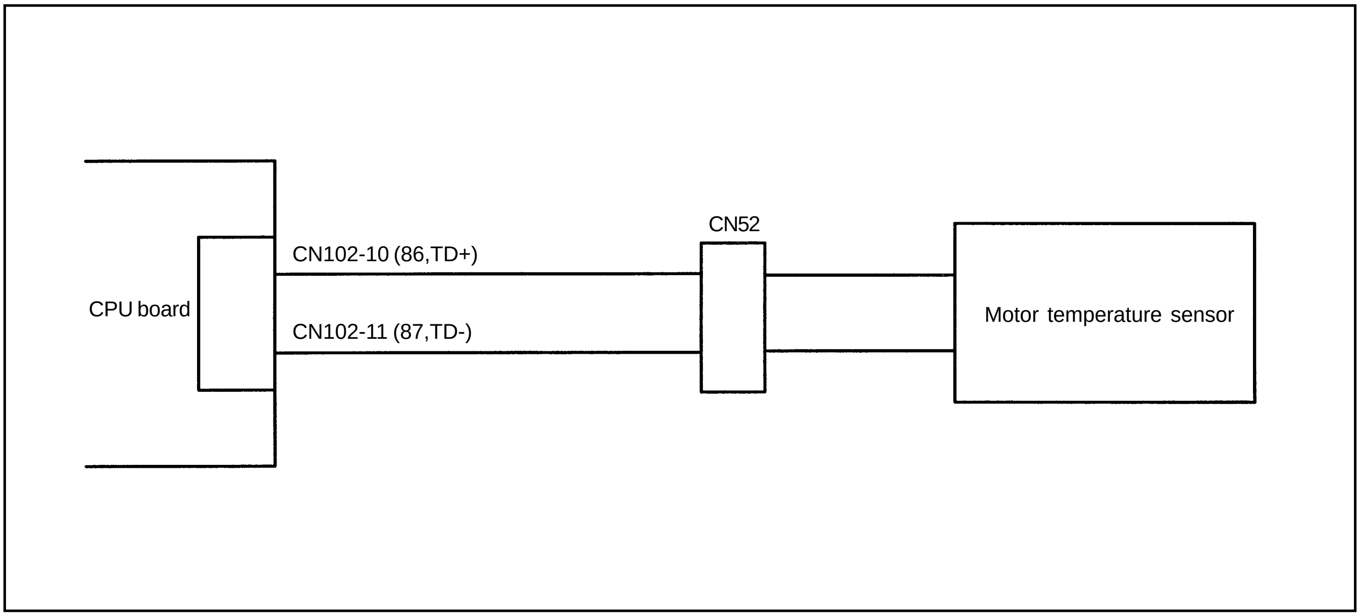

OK (7 V ± 0.5 V) → CSDB defect
NG (other than 7 V ± 0.5 V) → Harness defect

**Safety monitor ( Blinking): Drive motor overheat (C2-1)**

Leave the vehicle as it is for a while (about 30 minutes).

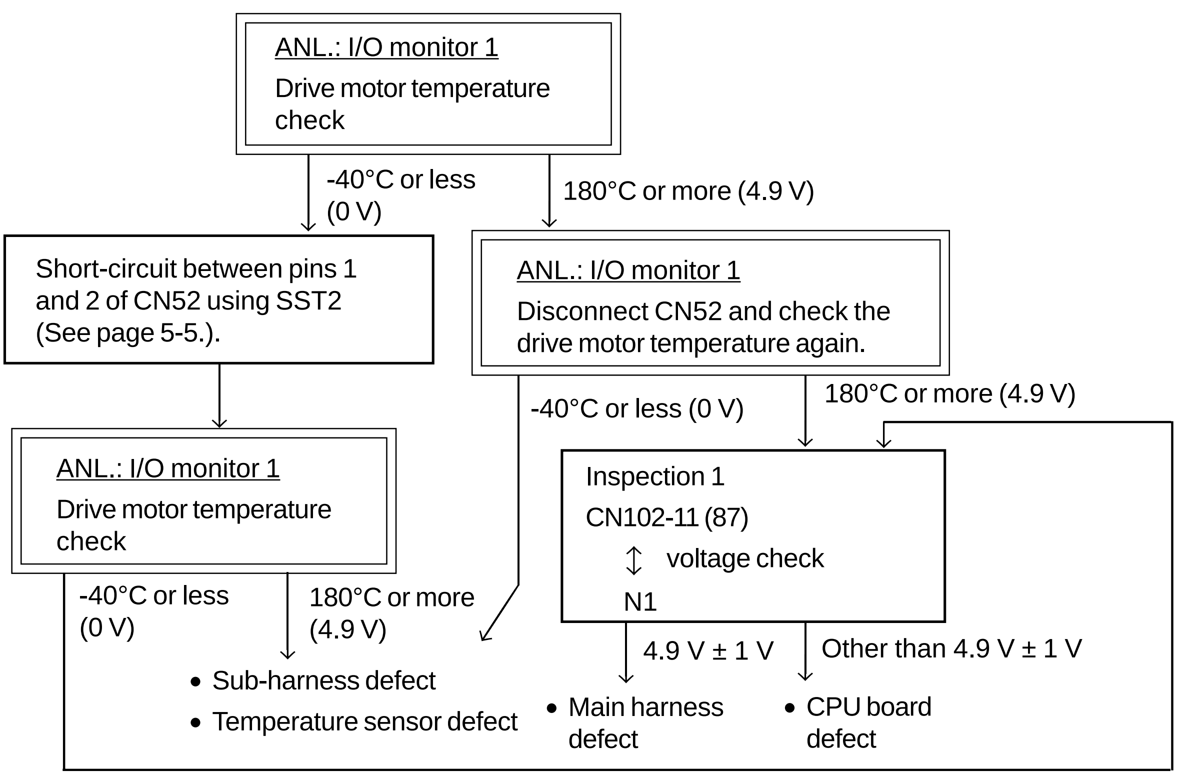
## Error Code C2-2: Drive Motor Temperature Sensor Abnormality

### Related portion



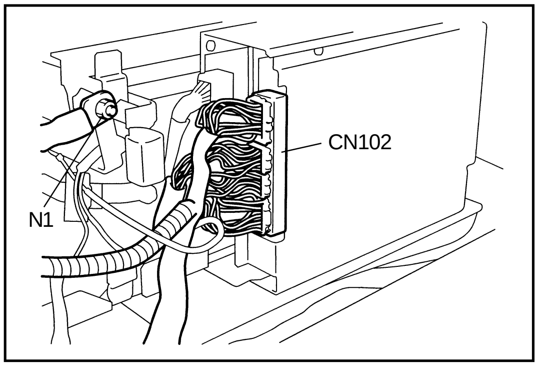

### Estimated causes

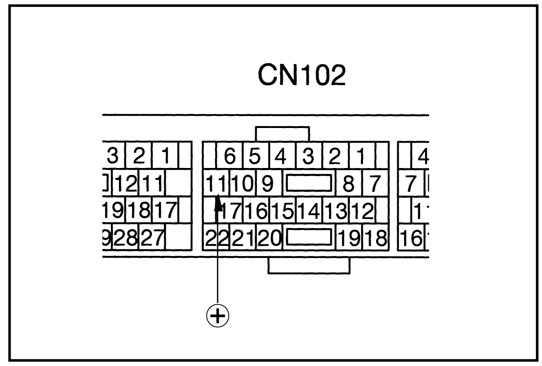
① Temperature sensor defect
② Harness defect



Inspection 1:
CN102 – N1 Voltage Check
Battery plug ON, key switch ON

| | |
|---|---|
| Measurement terminals | CN102-11 (87) ⊕ – N1 ⊖ |
| Tester range | DC 10 V |
| Standard | 4.9 V ± 1 V |

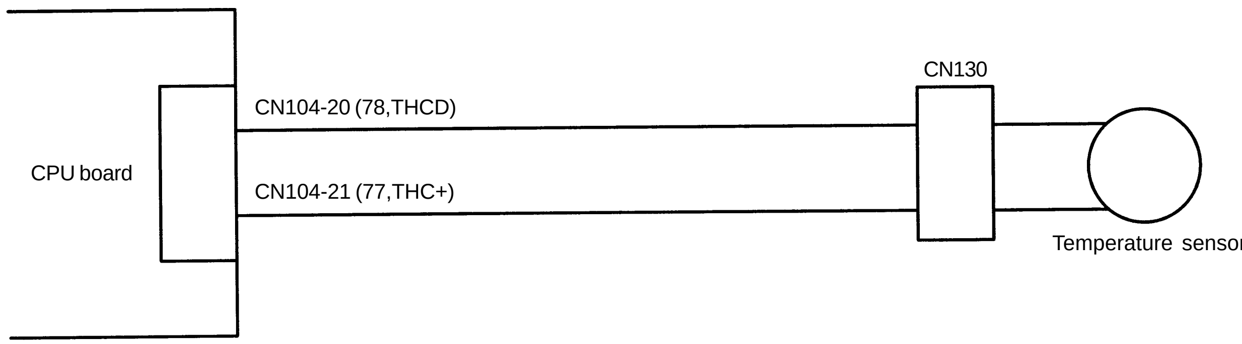



OK (4.9 V ± 1 V) → Main harness defect
NG (other than 4.9 V ± 1 V) → CPU board defect

# Error Code C3: Drive Main Circuit Temperature Sensor Abnormality

## Related portion




## Estimated causes

① Disconnected connector or open circuit of harness
② Temperature sensor defect

**ANL.: I/O monitor 1**
Disconnect CN130 and check the drive main circuit temperature sensor.

- 197°C or more (4.8 V or more)
  - Check short-circuiting between CN104-20 and -21.
- Less than -40°C (less than 0.1 V) →

**ANL.: I/O monitor 1**
Disconnect CN130 and check the drive main circuit temperature sensor.

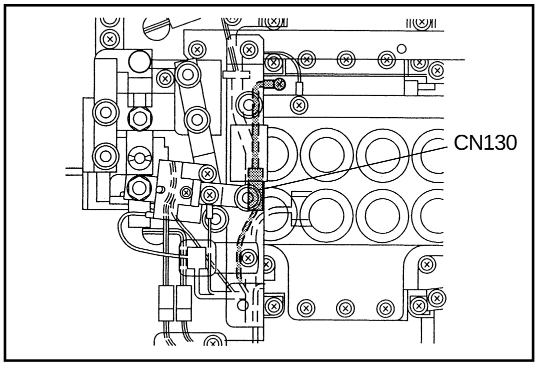
- 197°C or more (4.8 V or more)
  - Temperature sensor defect
- Less than -40°C (less than 0.1 V) →

**Inspection 1**
Check temperature of CN130 on the temperature sensor side.

- OK (approx. 11 ~ 12 kΩ (at 25°C) )
  - Open circuit of CN104-20 or CN104-21
- NG (200 kΩ or more)
  - Temperature sensor defect

Inspection 1:
Temperature Sensor Resistance Check
Battery plug OFF

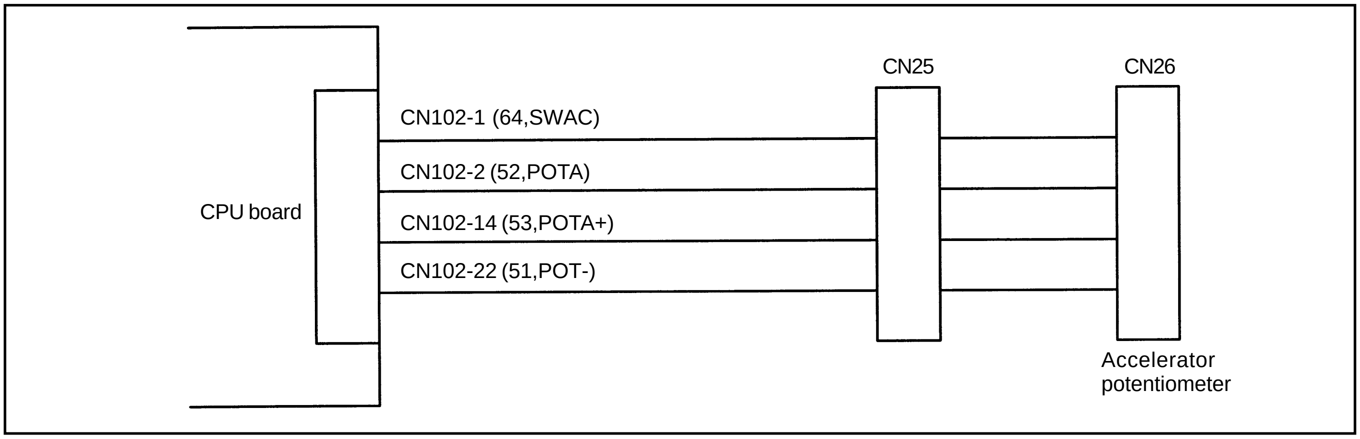
| | |
|---|---|
| Measurement terminals | Both terminals of CN130 connector (temperature sensor side) |
| Tester range | kΩ x 1 |
| Standard | Approx. 11 ~ 12 kΩ (at 25°C) |




OK (approx. 11 ~ 12 kΩ) → Open circuit of CN104-20 or CN104-21 harness
NG (200 kΩ or more) → Temperature sensor defect

## Error Code C4: Acceleration Potentiometer Abnormality

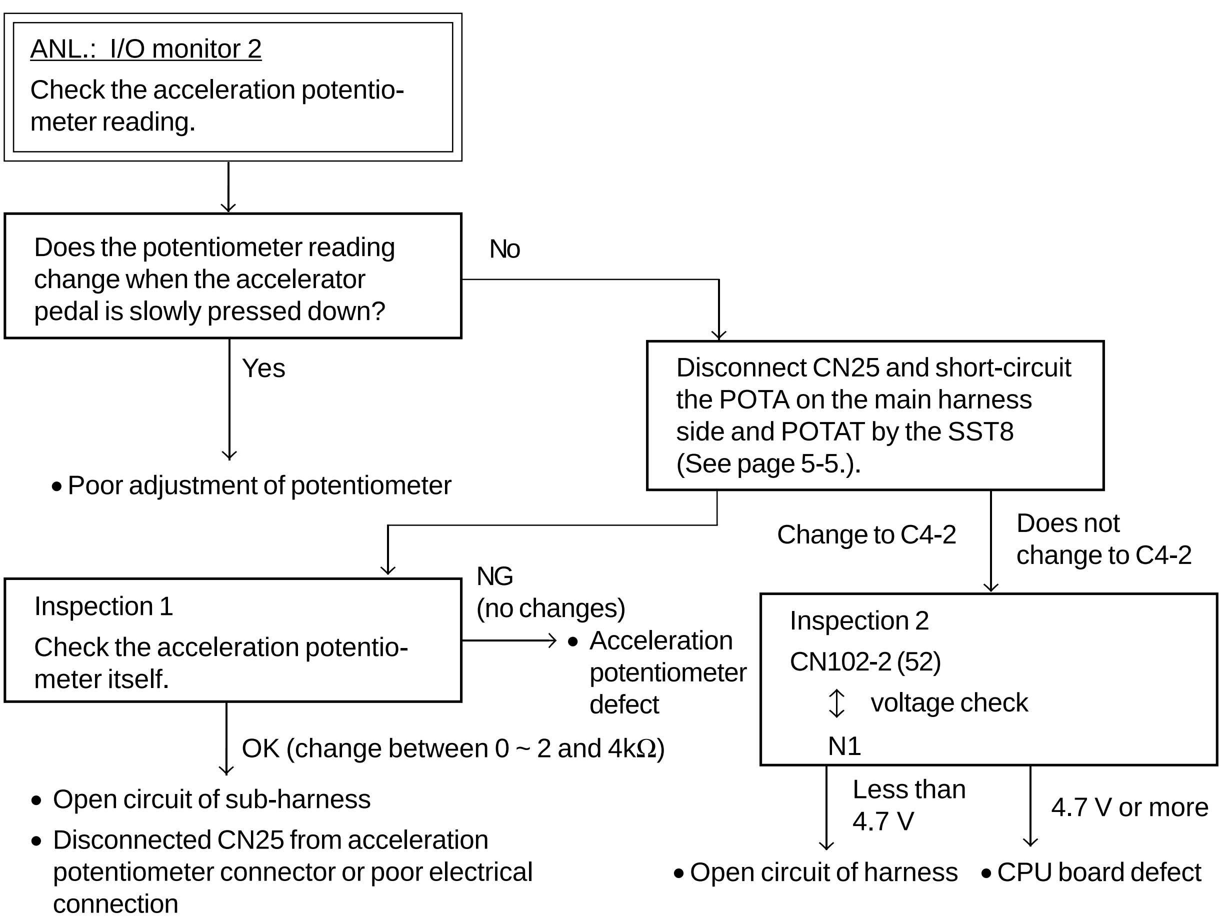
### Related portion




### Estimated causes

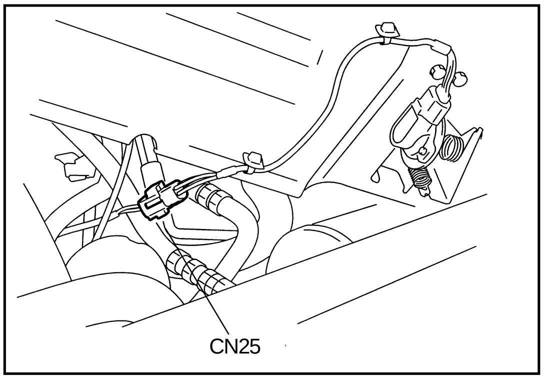
① Poor adjustment or mounting of acceleration potentiometer
② Acceleration potentiometer defect
③ Open circuit of harness

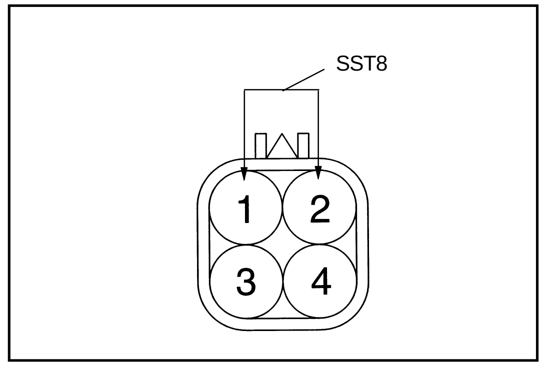
**<For diag memory C4-1>**



Inspection 1:
Acceleration Potentiometer Individual Check

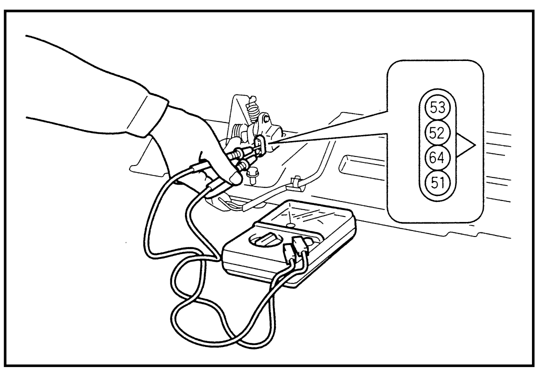
**SST Setting Procedure**
Battery plug OFF
Disconnect connector CN25 and set the SST8 to the connector on the main harness side.




Battery plug OFF, acceleration potentiometer connector disconnection

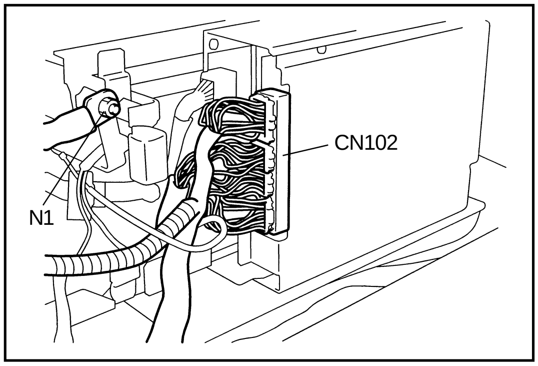
| | |
|---|---|
| Measurement terminals | CN26-3 (52) – CN26-4 (53) |
| Tester range | Ω x 1 |
| Standard | Change between 0 ~ 2 and 4kΩ |

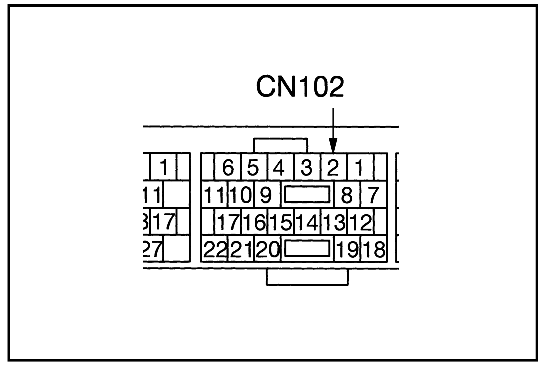



OK (change between 0 ~ 2 and 4kΩ) → Open circuit of sub-harness or disconnected CN25 or CN26
NG (no change) → Acceleration potentiometer defect

Inspection 2:
CN102 – N1 Voltage Check
Battery plug ON, key switch ON

| | |
|---|---|
| Measurement terminals | CN102-2 (52) ⊕ – N1 ⊖ |
| Tester range | DC 10 V |
| Standard | Less than 4.7 V |




Less than 4.7 V → Open circuit of main harness
4.7 V or more → CPU board defect

**<For diag memory C4-2 or C4-3>**

Does the error code change when CN25 is disconnected?

Change to C4-1

- Sub-harness check
- Acceleration potentiometer inspection

Does not change to C4-1

Inspection 1
CN102-2 (52)
↕ voltage check
N1

0.2 V or more

- Leak from main harness

Less than 0.2 V

- CPU board defect

**<For diag memory C4-4>**

ANL.: I/O monitor 2
Check potentiometer reading when accelerator switch is turned ON and OFF.

1.4 V or more at accelerator switch OFF → ON

Does the error code change when CN25 is disconnected?

Change to C4-1

- Sub-harness check
- Acceleration potentiometer inspection (See Inspection 1 on page 5-46)

Does not change to C4-1

Inspection 1
CN102-2 (52)
↕ voltage check
N1

0.2 V or more

- Leak from main harness

Less than 0.2 V

- CPU board defect

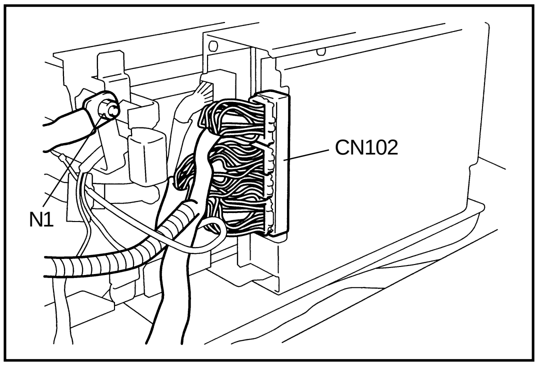
1.4 V or more at accelerator switch ON → OFF

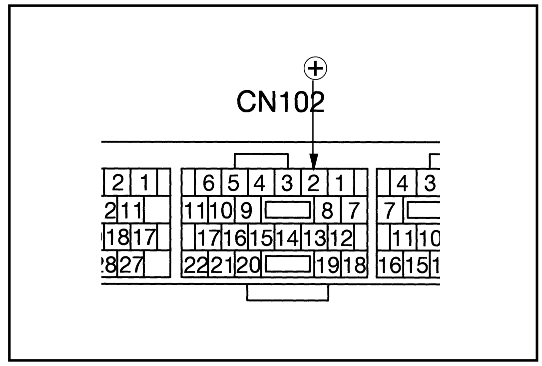
- Open circuit or instantaneous disconnection of switch harness CN102-1
- Acceleration potentiometer replacement (See Inspection 1 on page 5-46)

Inspection 1:
Check voltage between CN102-2 and N1. See Inspection 1 of Diag memory C4-2.

Inspection 1:
CN102-2 – N1 Voltage Check
Battery plug ON, key switch ON

| | |
|---|---|
| Measurement terminals | CN102-2 (52) ⊕ – N1⊖ |
| Tester range | DC 10 V |
| Standard | 0.2 V or more |

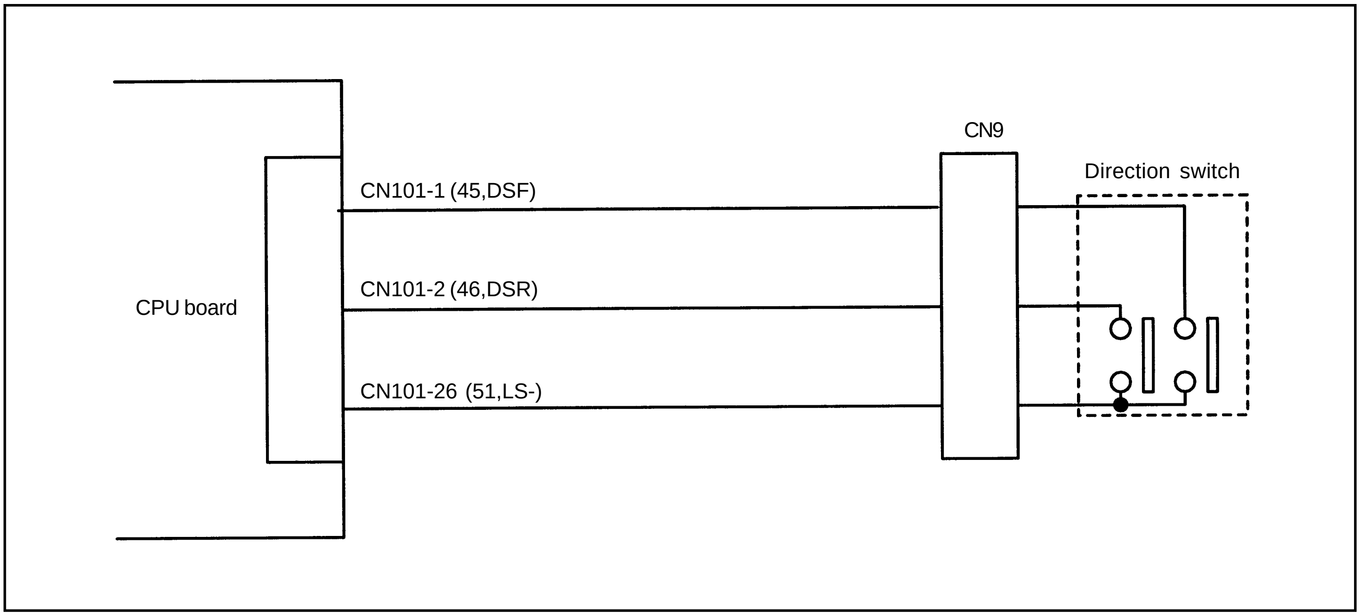



0.2 V or more → Leak from main harness
Less than 0.2 V → CPU board defect

## Error Code C7: Direction Switch Abnormality

### Related portion




### Estimated causes

① Short-circuiting of direction switch
② Short-circuiting of harness

<u>ANL.: I/O monitor 2</u>
Disconnect CN9 and conduct the ON/OFF check with direction switch at the neutral state.

Turns OFF → • Direction switch inspection

DSF or DSR turns ON ↓

Inspection 1
CN101-1 (45) (at $DS_F$ ON)
CN101-2 (46) (at $DS_R$ ON)
↕ voltage check
N1

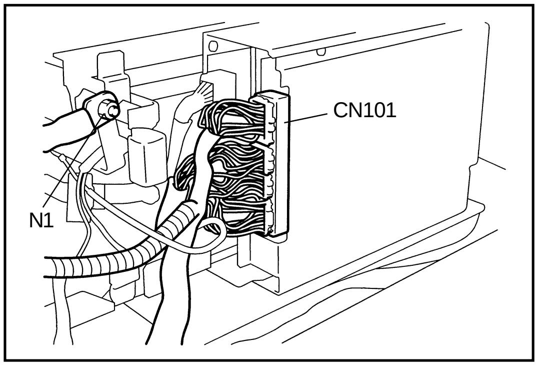
NG (0 V) → • Short-circuiting of main harness

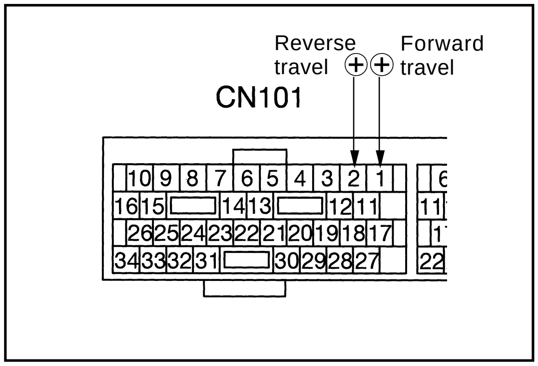
OK (approx. 5 V) ↓

• CPU board defect

Inspection 1:
CN101 – N1 Voltage Check
Battery plug ON, key switch ON

| | |
|---|---|
| Measurement terminals | Forward: CN101-1 (45) ⊕ – N1 ⊖<br>Backward: CN101-2 (46) ⊕ – N1 ⊖ |
| Tester range | DC 10 V |
| Standard | Approx. 5 V |



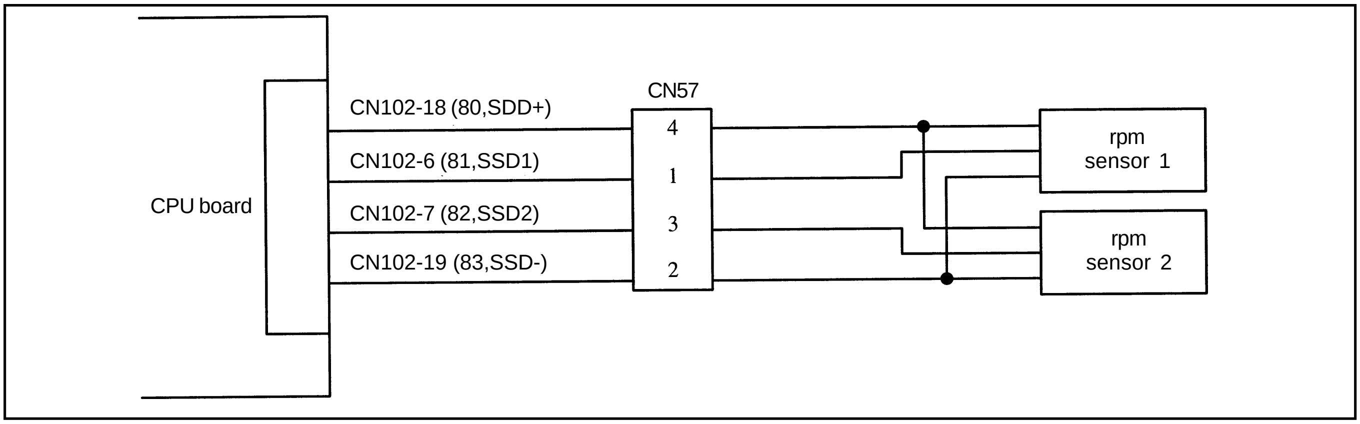




OK (approx. 5 V) → CPU board defect
NG (0 V) → Short-circuiting of main harness

## Error Code C8: Drive Rotary Sensor Abnormality

## Diagnosis memory C8-1·C8-2

## Related portion




## Estimated causes

① Rotary sensor defect
② Open circuit of harness
③ CPU board defect

* **Make sure to jack up the vehicle front and support the frame by woods to float the front wheels, before beginning the troubleshooting.**

<u>ANL.: I/O monitor 2</u>
Check rotary sensor readings during driving.

Check which sensor reads 0

Set the SST6.
(See page 5-9.)

Same sensor reads 0

Short-circuit the connector pin of which SSD1 or SSD2 reading of 0 remains at the same sensor with the SSD pin - using SST2 (harness for short-circuiting).
(See page 5-5.)

Sensor reading 0 changed

- Open circuit of sub-harness
- Rotary sensor defect

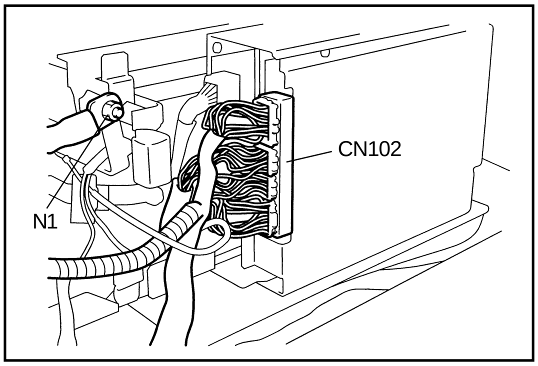
Inspection 1
CN102-6 (81) (SSD1)
CN102-7 (82) (SSD2)
↕ voltage check
N1

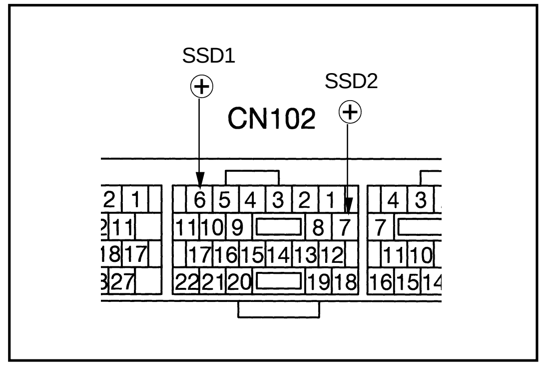
0 V
- CPU board defect

Approx. 15 V
- Main harness open circuit

Inspection 1:
CN102 – N1 Voltage Check
Battery plug ON, key switch ON

| | |
|---|---|
| Measurement terminals | SSD1: CN102-6 (81) ⊕ – N1 ⊖<br>SSD2: CN102-7 (82) ⊕ – N1 ⊖ |
| Tester range | DC 10 V |
| Standard | 0 V |

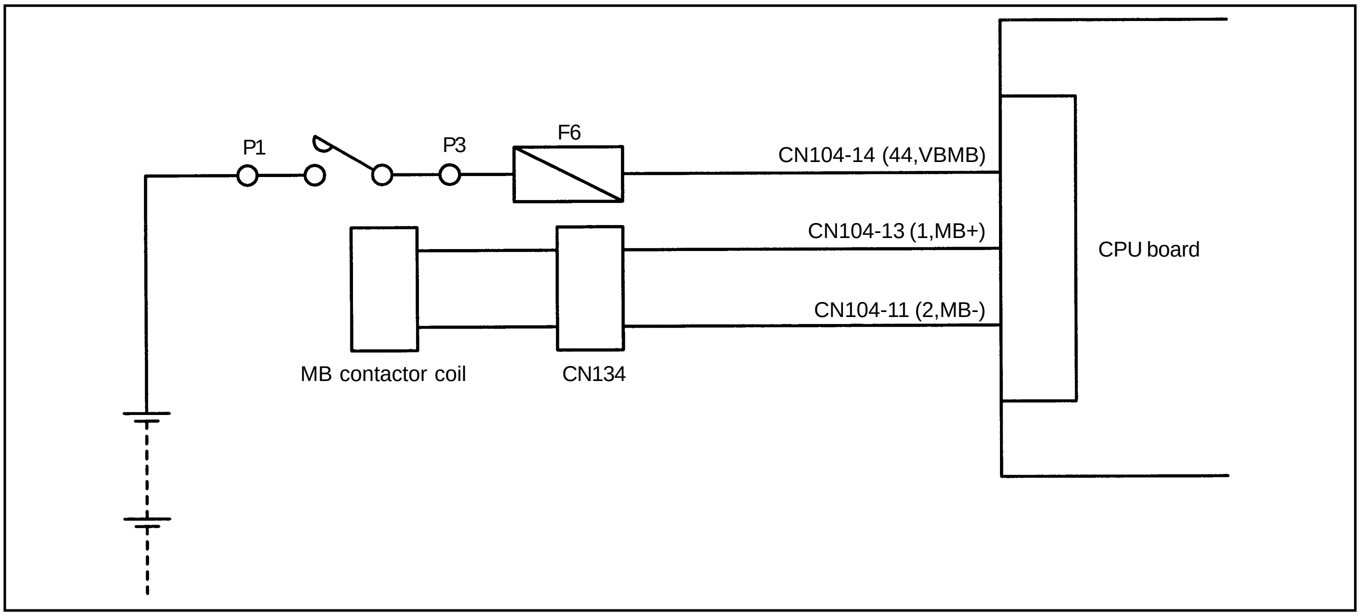



NG (approx. 15 V) → Open circuit of main harness
OK (0 V) → CPU board defect

## Error Code CB-1: MB Abnormality (Open)

### Related portion




### Estimated causes

① Blown off F6 fuse
② MB ON defect
③ Open circuit of harness

Is the MB ON sound heard at key switch ON?

- No → Go to Ⓐ on the next page.
- Yes ↓

Inspection 1
F6 fuse check

- NG (∞ Ω) → F6 Replacement
- OK (0 Ω) ↓

Inspection 2
P3
↕ voltage check
N1

- NG (0 V) → Inspection 4
- OK ↓

Inspection 3
CN104-14 (44)
↕ voltage check
CN104-10 (N2)

- NG (0 V) → • Harness check
- OK (1- to 2-ton series: approx. 48 V, 3-ton, J3.5 ton: approx. 80 V) → • CPU board defect

Inspection 4
P1
↕ voltage check
N1

- NG (0 V) →
  - Battery cable defect
  - Poor electric connection of copper bar
- OK (1- to 2-ton series: approx. 48 V, 3-ton, J3.5 ton: approx. 80 V) →
  - Poor electric connection of MB contactor

Ⓐ

**Inspection 5**
Disconnect the connector of MB contactor and check voltage between connector pins on the CPU side.

- NG (less than 9 V) → Inspection 7
- OK (9 V or more) → Inspection 6

**Inspection 7**
P3
↕ voltage check
Casing of Q201 on the CPU board.

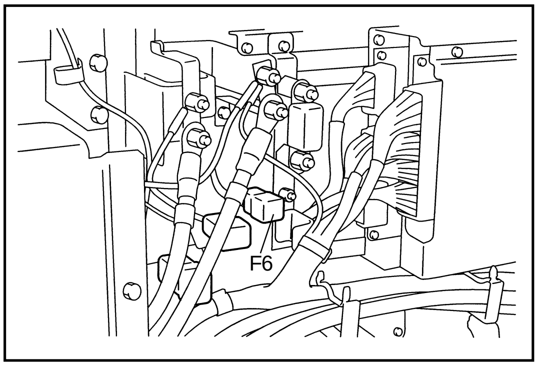
- OK (9 V or more) → • Harness defect between CN104 and two MB contactor connectors
- NG (less than 9 V) → • CPU board defect

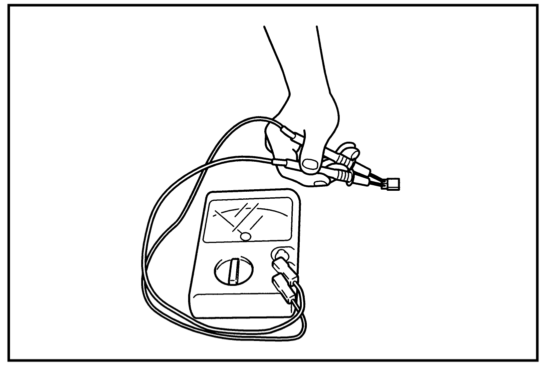
**Inspection 6**
Check resistance of the MB contactor coil.

- NG (∞ Ω) → • Open circuit of MB contactor coil
- OK (approx. 20 Ω) → • MB contactor defect

Inspection 1:
F6 Fuse Check
Battery plug OFF, removed F6 fuse

| | |
|---|---|
| Measurement terminals | Both ends of F6 fuse |
| Tester range | Ω x 1 |
| Standard | 0 Ω |

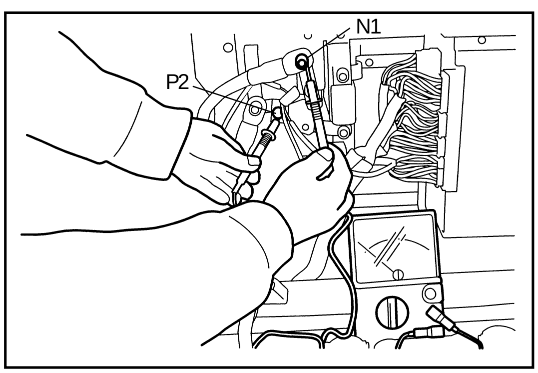


OK (0 Ω) → Go to Inspection 2.
NG (∞ Ω) → F6 fuse replacement

Inspection 2:
P2 – N1 Voltage Measurement
Battery plug ON, key switch ON

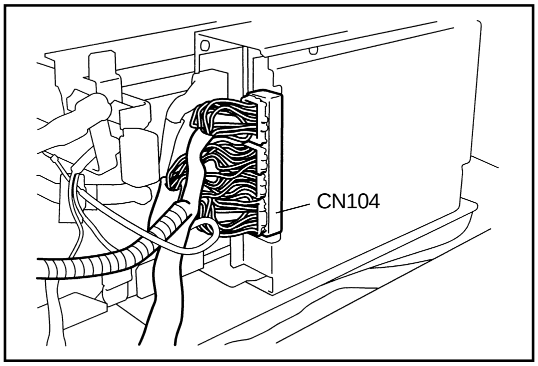
| | |
|---|---|
| Measurement terminals | P2 ⊕ – N1 ⊖ |
| Tester range | DC 200 V |
| Standard | 1- to 2-ton series: approx. 48 V,<br>3-ton, J3.5 ton: approx. 80 V (battery voltage) |

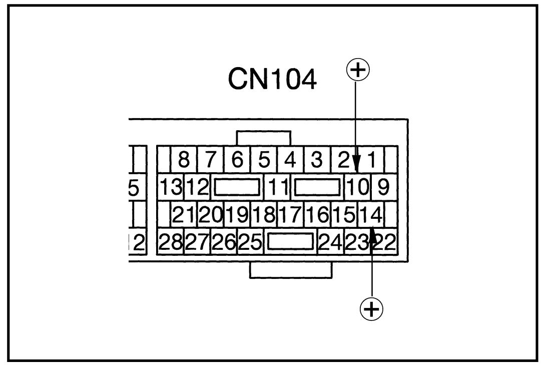



OK (battery voltage) → Go to Inspection 3.
NG (0 V)→ Go to Inspection 4.

Inspection 3:
CN104 – CN104 (N2) Voltage Check
Battery plug ON, key switch ON

| | |
|---|---|
| Measurement terminals | CN104-14 (44) ⊕ – CN104-10 (N2) ⊖ |
| Tester range | DC 200 V |
| Standard | 1- to 2-ton series: approx. 48 V,<br>3-ton, J3.5 ton: approx. 80 V (battery voltage) |

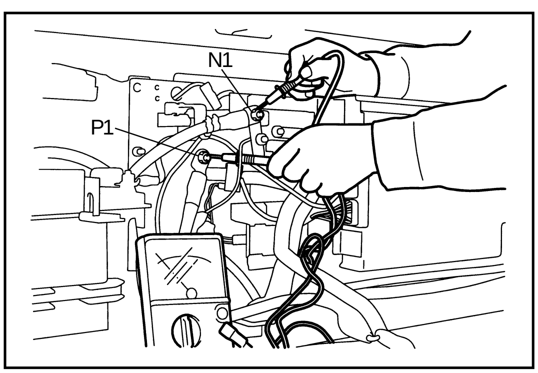



OK (battery voltage) → CPU board defect
NG (0 V) → Harness defect

Inspection 4:
P1 – N1 Voltage Check
Battery plug ON, key switch ON

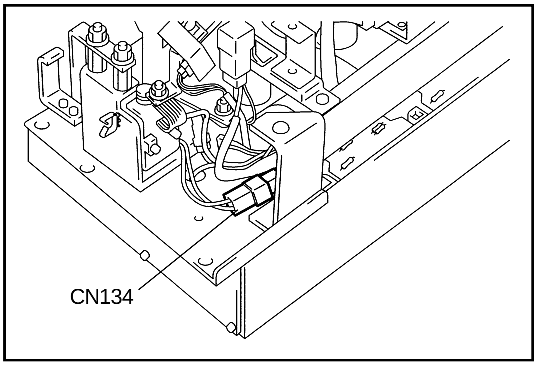
| | |
|---|---|
| Measurement terminals | P1 ⊕ – N1 ⊖ |
| Tester range | DC 200 V |
| Standard | 1- to 2-ton series: approx. 48 V,<br>3-ton, J3.5 ton: approx. 80 V (battery voltage) |

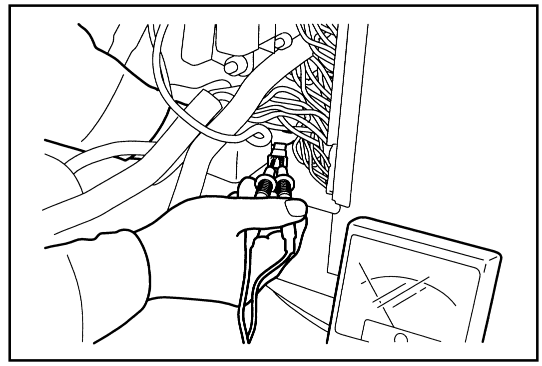



OK (battery voltage) → Poor electrical contact of MB contactor
NG (0 V)→ Battery cable defect or poor electrical connection of copper bar

Inspection 5:
MB Contactor Signal Voltage Check
Disconnected MB contactor connector (CN134), battery plug ON, key switch ON

| | |
|---|---|
| Measurement terminals | CN134-1 (W-R) ⊕ – CN134-2 (A-R) ⊖ |
| Tester range | DC 10 V |
| Standard | 9 V or more |

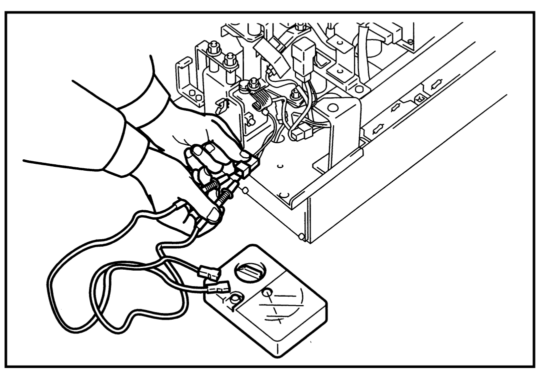


OK (9 V or more) → Go to Inspection 6.
NG (less than 9 V) → Go to Inspection 7.

Inspection 6:
MB Contactor Coil Resistance Check
Battery plug OFF

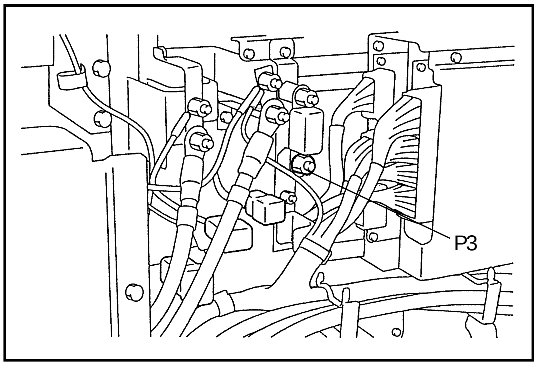
| | |
|---|---|
| Measurement terminals | Both terminals of CN134 (on contactor side) |
| Tester range | Ω x 1 |
| Standard | Approx. 20 Ω |

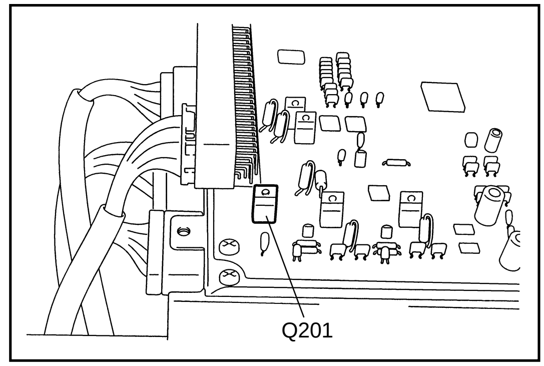


OK (approx. 20 Ω) → MB contactor defect
NG (∞ Ω) →Open circuit of MB contactor coil

Inspection 7. Voltage measurement between P3 and Q201 on CPU board

| | |
|---|---|
| Measurement terminals | P3 ⊕ – Q201 on CPU board ⊖ |
| Tester range | DC 50 V |
| Standard | 9 V or more |

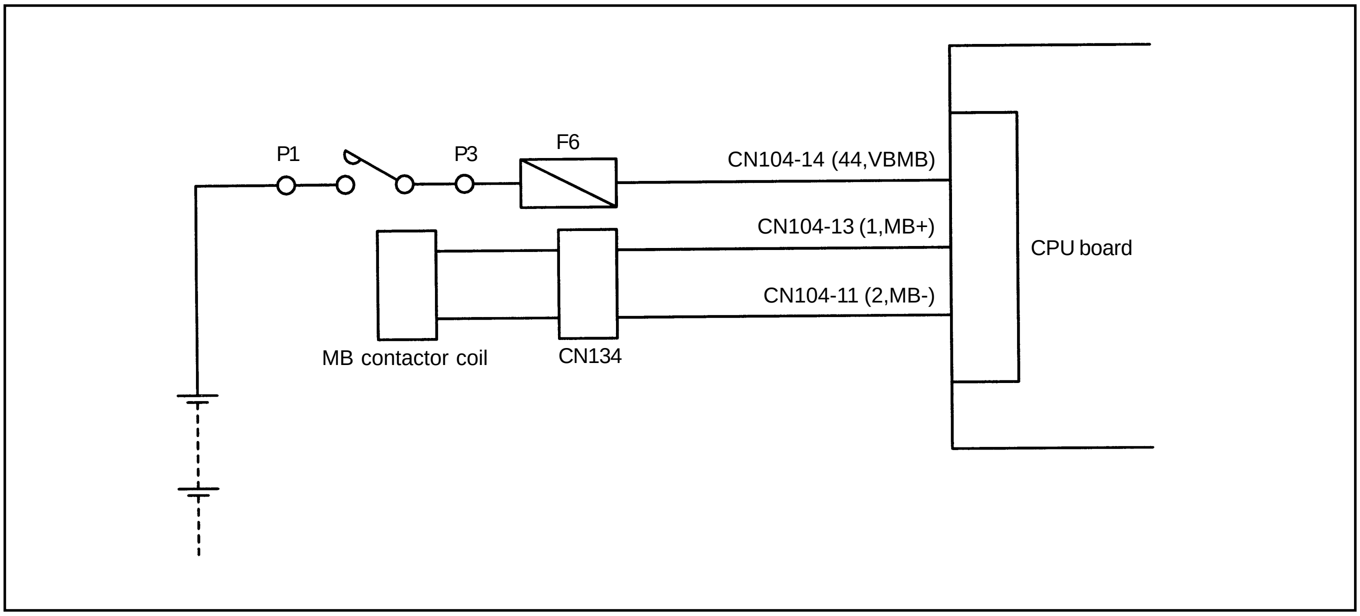



OK (9 V or more) → Harness defect between CN104 and MB connector
NG (less than 9 V) → CPU board defect

## Error Code CB-2: MB Fusing

### Related portion




### Estimated causes

① Fusing of MB
② No revolution of material handling motor (material handling main circuit abnormality)

Are ON/OFF sounds heard at turning key switch ON and OFF?

No →

Inspection 2
Check the MB contactor signal voltage at key switch OFF.

NG (8 to 10 V)
- CPU board defect

OK (0 V)
- MB contactor defect

Yes ↓

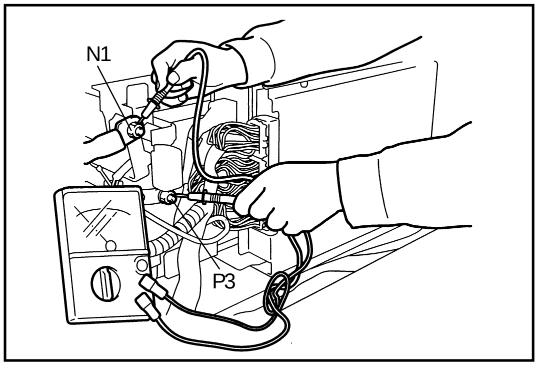
Inspection 1
P3
↕ voltage check
N1
when the key switch is turned OFF.

No voltage change upon key switch OFF
- Main material handling circuit abnormality
- Occurrence an error causing material handling prohibition

Becomes 15 V or less 5 sec after key switch OFF
- CPU board defect

Inspection 1:
P3 – N1 Voltage Check
Battery plug ON, voltage check at key switch OFF

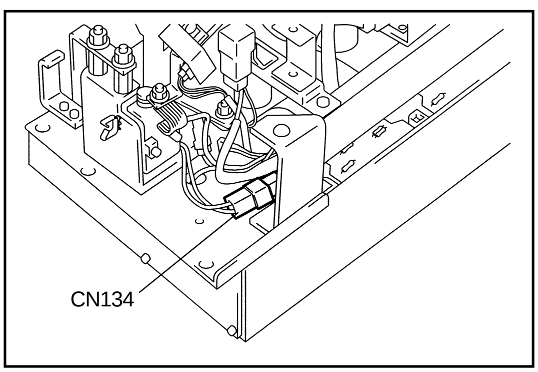
| | |
|---|---|
| Measurement terminals | P3 ⊕ – N1⊖ |
| Tester range | DC 200 V |
| Standard | Becomes 15 V or less 5 sec after key switch OFF |

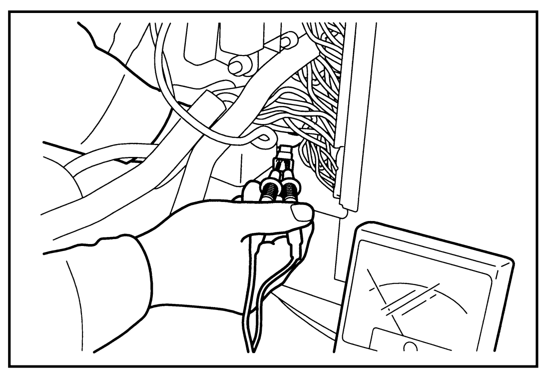



Becomes 15 V or less 5 sec after key switch OFF → CPU board defect
Voltage does not change after key switch OFF→ Material handling circuit defect or occurrence of an error prohibiting material handling

Inspection 2:
MB Contactor Signal Voltage Check
Battery plug ON, key switch ON

| | |
|---|---|
| Measurement terminals | CN134-1 (1) ⊕ – CN134-2 (2) ⊖ |
| Tester range | DC 10 V |
| Standard | 0 V |



OK (0 V) → MB contactor defect
NG (8 V to 10 V) → CPU board defect

## Error Code CF1-CF5: CPU Abnormal

### Related portion

| |
|---|
| CPU Board |

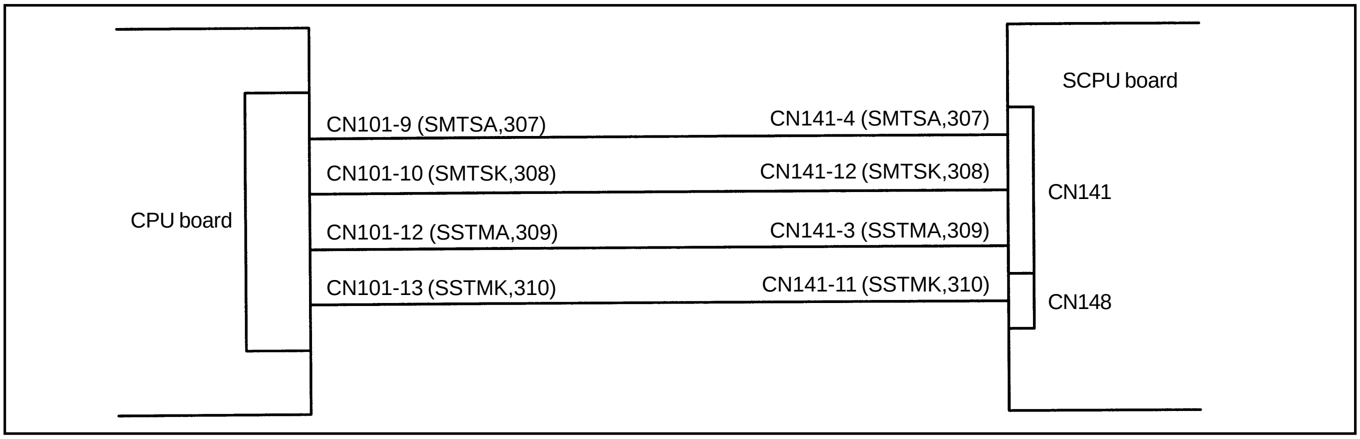
### Estimated causes

| |
|---|
| ① CPU Board faulty |

*** In case CF1-CF5 indicated, replace CPU board due to fault.**

## Error Code FE: Communication from PS Controller Abnormality

### Related portion




### Estimated causes

① SCPU board defect
② Disconnected PS controller
③ Open circuit of harness

*** If the CB-1 error is occurring simultaneously, give priority to clearing the CB-1 error.**

<For FE-1>

Has the battery plug been turned ON with the PS controller disconnected?
- Yes → Mount the PS controller.
- No ↓

Is FE-1 currently indicated?
- No → • Check if CN101 and CN141 are connected firmly.
- Yes ↓

Inspection 1
① CN101-12 (309)
② CN101-13 (310)
↕ voltage check
CN101-26 (51)

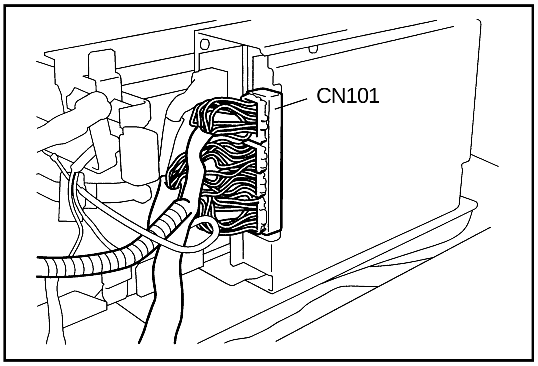
- Voltages of ① and ② are the same. → Inspection 2
- Voltages of ① and ② are different. → • CPU board defect

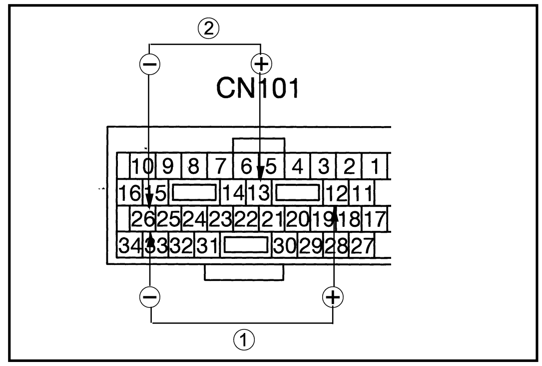
Inspection 2
③ CN141-3 (309)
④ CN141-11 (310)
↕ voltage check
CN141-16 (315)

- Voltages of ③ and ④ are the same. → • SCPU board defect
- Voltages of ③ and ④ are different. → • CPU board defect

Inspection 1:
<For FE-1>: CPU Board – SCPU Board Signal Voltage Check 1
Battery plug ON, key switch ON

| | |
|---|---|
| Measurement terminals | ① CN101-12 (309) ⊕ – CN101-26 (51) ⊖<br>② CN101-13 (310) ⊕ – CN101-26 (51) ⊖ |
| Tester range | DC 200 V |
| Standard | Measured voltages of ① and ② are the same. |

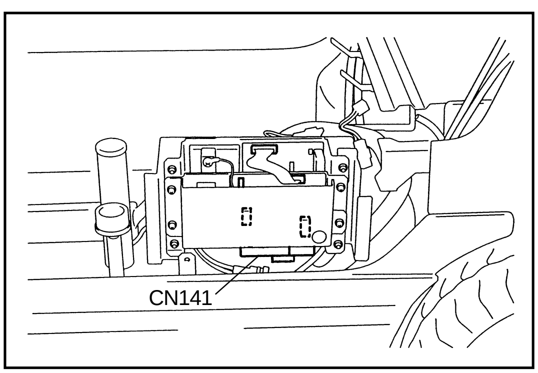


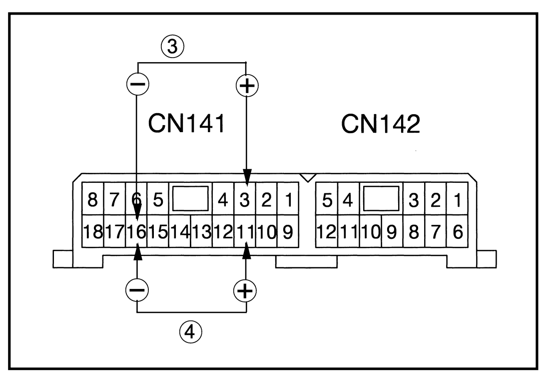




(Voltages of ① and ② are the same) → Go to Inspection 2.
(Voltages of ① and ② are different) → CPU board defect

Inspection 2:
<For FE-1>: CPU Board – SCPU Board Signal Voltage Check 2
Battery plug ON, key switch ON

| | |
|---|---|
| Measurement terminals | ③ CN141-3 (309) ⊕ – CN141-16 (315) ⊖<br>④ CN141-11 (310) ⊕ – CN141-16 (315) ⊖ |
| Tester range | DC 200 V |
| Standard | Measured voltages of ③ and ④ are the same. |




(Voltages of ③ and ④ are the same) → SCPU board defect
(Voltages of ③ and ④ are different) → Harness defect

<For FE-2>

When FE-2 is indicated to the diag memory:

- Check the connection status of connectors CN101 and CN141.
- Check the harness between connectors CN101 and CN141.

↓ If results of both checks are OK:

- SCPU board defect

<For FE-4>

Is FE-4 currently indicated?

No → • Check if CN101 and CN141 are connected firmly.

Yes ↓

Inspection 1
⑤ CN101-9 (307)
⑥ CN101-10 (308)
↕ voltage check
CN101-26 (51)

Voltages of ⑤ and ⑥ are the same. → • CPU board defect

Voltages of ⑤ and ⑥ are different. ↓

Inspection 2
⑦ CN141-4 (307)
⑧ CN141-12 (308)
↕ voltage check
CN141-16 (315)

Voltages of ⑦ and ⑧ are the same. → • Harness defect

Voltages of ⑦ and ⑧ are different. ↓

- SCPU board defect

<For FE-5>

When FE-5 is indicated to the diag memory:

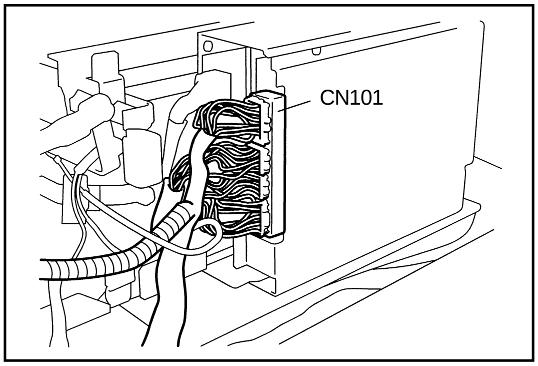
- Check the connection status of connectors CN101 and CN141.
- Check the harness between connectors CN101 and CN141.

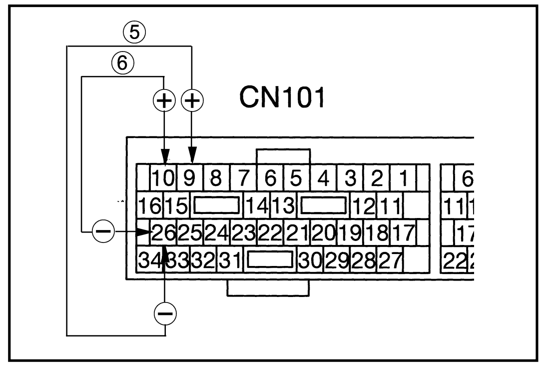
↓ If results of both checks are OK:

- CPU board defect

Inspection 1:
<For FE-1>: CPU Board – SCPU Board Signal Voltage Check 3
Battery plug ON, key switch ON

| | |
|---|---|
| Measurement terminals | ⑤ CN101-9 (307) ⊕ – CN101-26 (51) ⊖<br>⑥ CN101-10 (308) ⊕ – CN101-26 (51) ⊖ |
| Tester range | DC 200 V |
| Standard | Measured voltages of ⑤ and ⑥ are the same. |

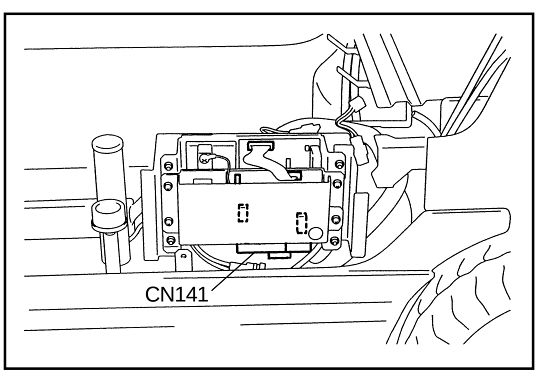


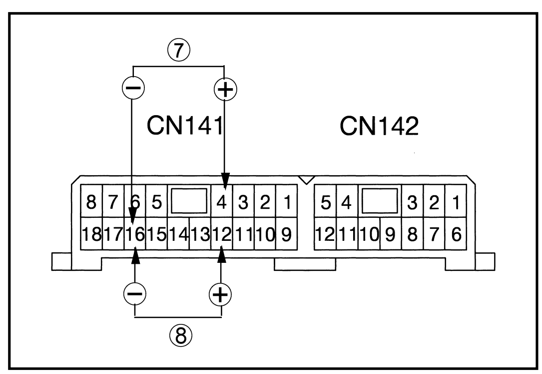




(Voltages of ⑤ and ⑥ are the same) → CPU board defect
(Voltages of ⑤ and ⑥ are different) → Go to Inspection 2.

Inspection 2:
<For FE-4>: CPU Board – SCPU Board Signal Voltage Check 4
Battery plug ON, key switch ON

| | |
|---|---|
| Measurement terminals | ⑦ CN141-4 (307) ⊕ – CN141-16 (315) ⊖<br>⑧ CN141-12 (308) ⊕ – CN141-16 (315) ⊖ |
| Tester range | DC 200 V |
| Standard | Measured voltages of ⑦ and ⑧ are the same. |

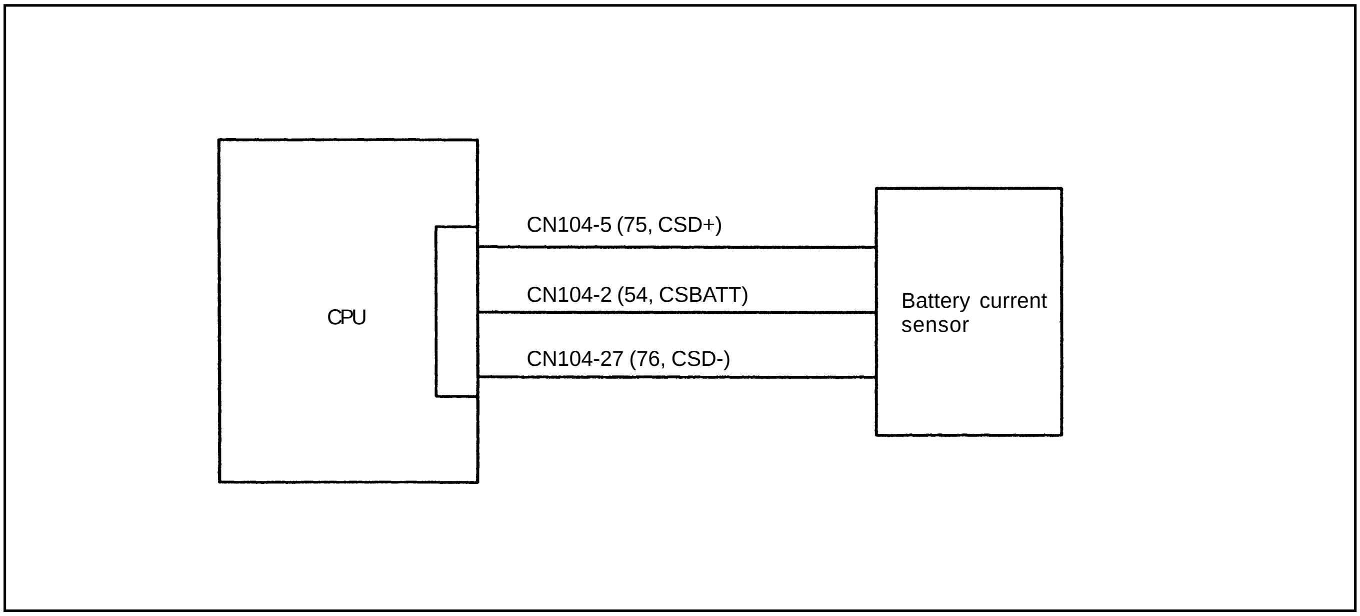



(Voltages of ⑦ and ⑧ are the same) → Harness defect
(Voltages of ⑦ and ⑧ are different) → SCPU board defect

## Error Code E0-1: Material Handling Main Circuit Abnormality

### Related portion




### Estimated causes

① TMP (MOS) defect
② Battery current sensor defect
③ DC/MD board defect

ANL.: I/O monitor 4

Check the battery current with battery plug ON, key switch ON and the vehicle stopping.

Other than 1 V to 4 V →

Inspect the battery current sensor connector.

CS BATT Abnormal → Repair

Normal ↓

Inspection 4

CN104-2 (54)

↕ voltage check

CN104-27 (76)

Other than 3 V to 11 V →

- Harness defect
- Battery current sensor defect

Within 3 V to 11 V ↓

- CPU board defect

*** Battery current is indicated after conversion into voltage.**

Within 1 V to 4 V ↓

⚠ **Make sure to disconnect the drive and pump motor cables beforehand.**

Set the SST3 to connector CN112. (See page 5-6.)

↓

Inspection 1

Turn the lift switch ON and check the status of SST LEDs.

LEDs partially OFF *2 →

Set SST4 between CN107 and CN109. (See page 5-7.)

↓

Operate the direction lever (ON) and check the LED status on the SST.

All LEDs ON (blinking) *1 ↓

- CPU board defect

LEDs partially OFF *2 ↓

- DC/MD board defect

All LEDs ON (linking) *1 ↓

Inspection 2

Turn the lift switch ON and check voltages at motor cables.

P14, P15 or P16

↕ voltage check

N1

OK (approx. 1/2 of the battery voltage) →

- Motor defect
- Pump motor cable defect

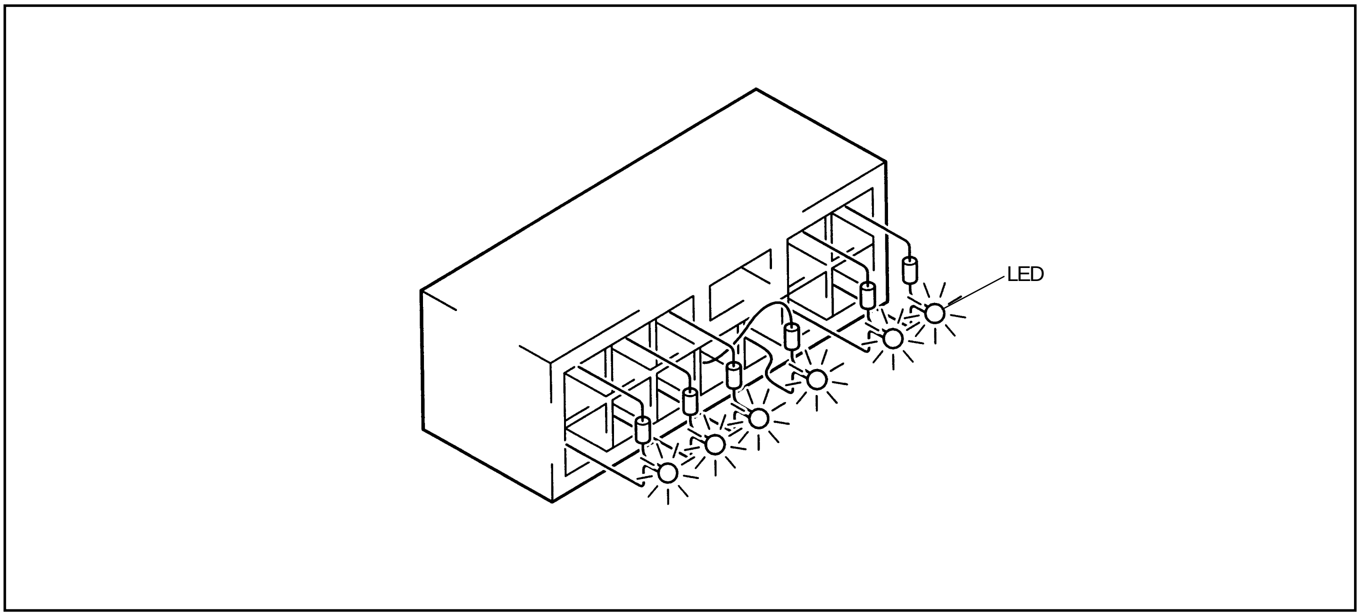
NG (1- and 2-ton series: 0 or approx. 48 V, 3-ton, J3.5 ton: 0 or approx. 80 V) ↓

- TMP inspection (Inspection 3)

***1. All LEDs ON (blinking): All LEDs repeat ON and OFF according to the MOS ON sequence.**

***2. LEDs partially OFF: One or more of six LEDs are kept off.**

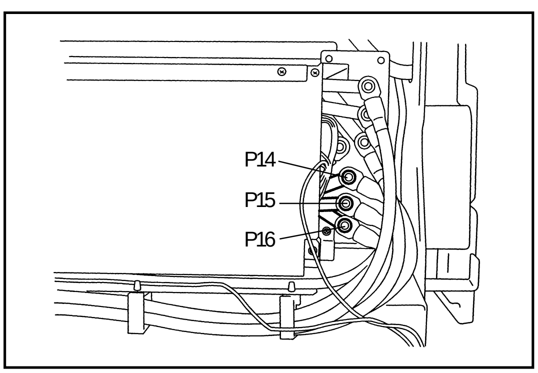
Inspection 1:
SST3 LED Status Check
An abnormal position of the signal circuit to the TMP can be determined by observing ON or OFF of LEDs on SST3.

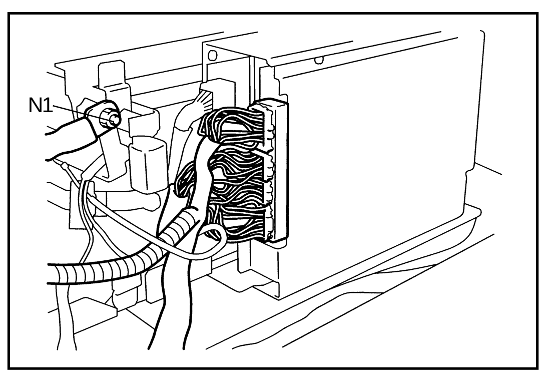



All LEDs ON (blinking) → Go to Inspection 2.
LEDs partially OFF → Set the SST between CN107 and CN109.

Inspection 2:
Motor Cable Voltage Check
Battery plug ON, key switch ON

| | |
|---|---|
| Measurement terminals | P14, P15, P16 ⊕ – N1 ⊖ |
| Tester range | DC 200 V |
| Standard | Approx. 1/2 of the battery voltage |

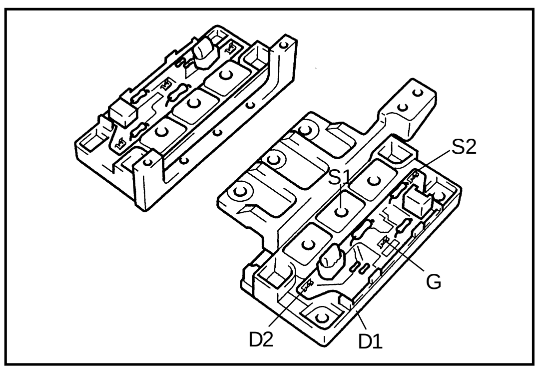



NG (1- to 2-ton series: 0 or approx. 48 V, 3-ton, J3.5 ton: 0 or approx. 80 V) → TMP inspection (Inspection 3)
OK (approx. 1/2 of the battery voltage) → Pump motor cable or pump motor defect

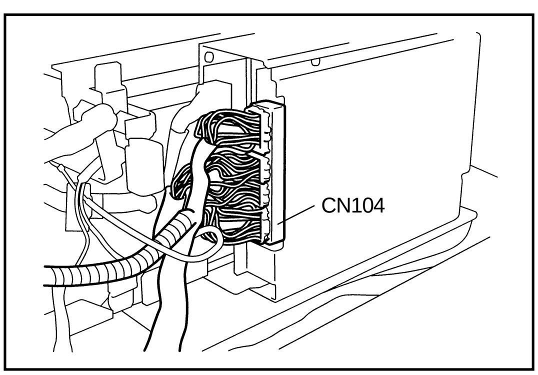
Inspection 3:
TMP Itself Inspection
Disconnect each TMP and inspect.

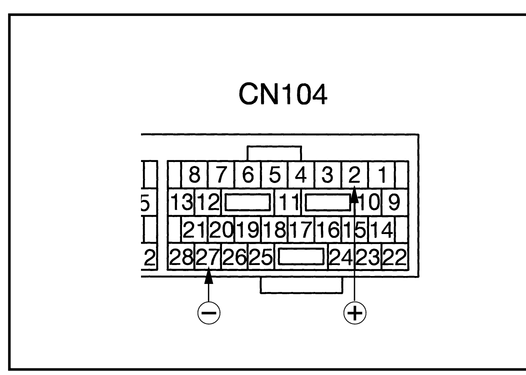
| | |
|---|---|
| Measurement terminals | D1 (D2) ⊕ – S1 (S2) ⊖<br>D1 (D2) ⊕ – G ⊖<br>S1 (S2) ⊕ – D1 (D2) ⊖<br>S1 (S2) ⊕ – G ⊖<br>G ⊕ – D1 (D2) ⊖<br>G ⊕ – S1 (S2) ⊖ |
| Tester range | Ω x 1 k |
| Standard | D1 (D2) – S1 (S2): Approx. 2 kΩ<br>D1 (D2) – G : Approx. 12 kΩ<br>S1 (S2) – D1 (D2) : ∞<br>S1 (S2) – G : Approx. 10 kΩ<br>G – D1 (D2) : ∞<br>G – S1 (S2) : Approx. 1 kΩ |




Inspection 4. Current sensor signal voltage check
Battery plug ON, key switch ON

| | |
|---|---|
| Measurement terminals | CN104-2 (54) ⊕ – CN104-27 (76) ⊖ |
| Tester range | 50 V |
| Standard | Between 3 and 11 V |

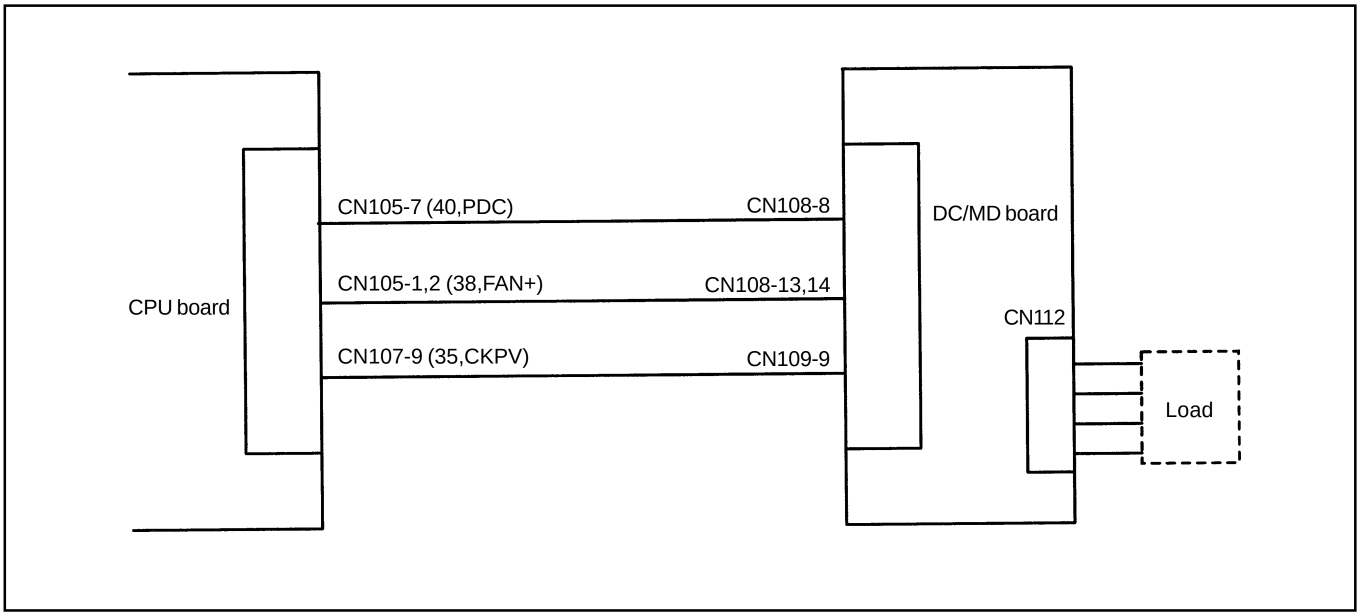



(Between 3 and 11 V) → CPU board defect
(Not between 3 and 11 V) → Harness defect, battery current sensor defect

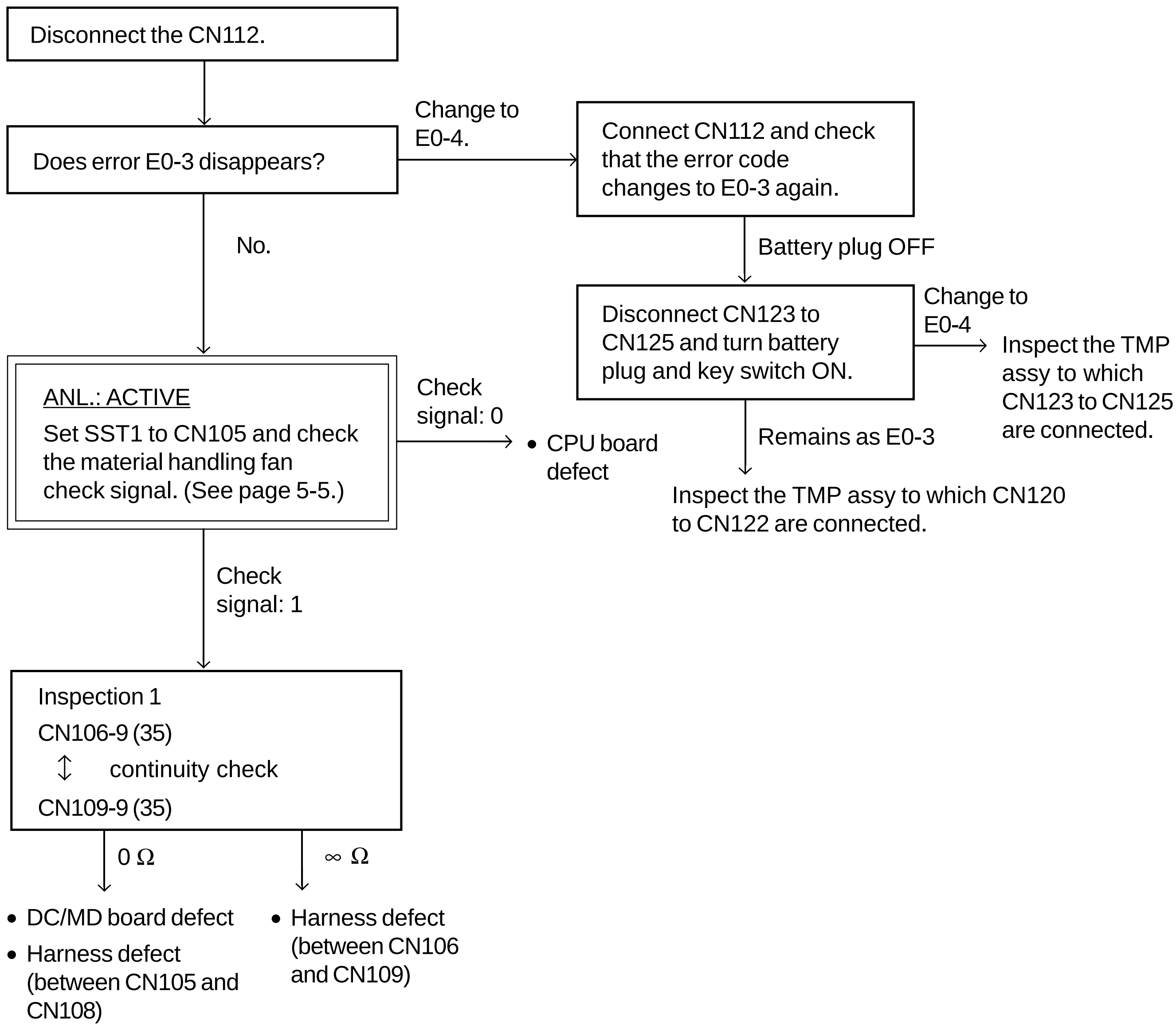
# Error Code E0-3: Material Handling Drive Power Supply Abnormality

## Related portion



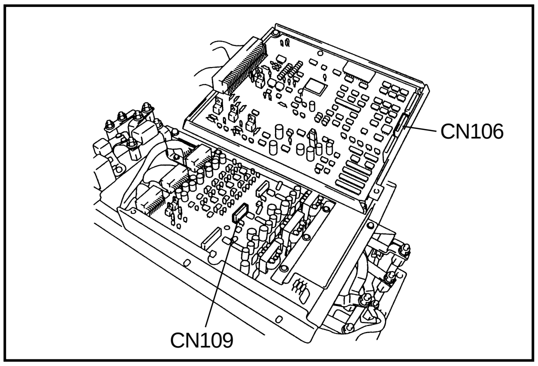

## Estimated causes

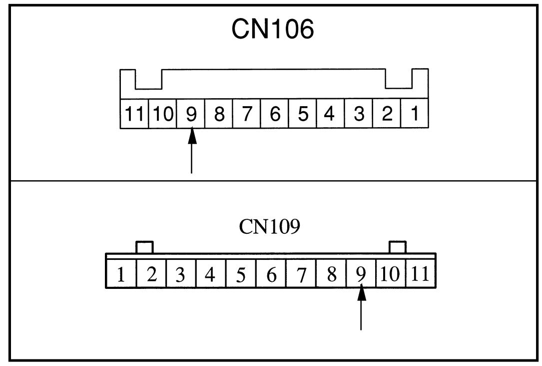
① Short-circuiting of load
② DC/MD defect
③ Open circuit of harness


Disconnect the CN112.
Does error E0-3 disappears?
Change to E0-4.
Connect CN112 and check that the error code changes to E0-3 again.
Battery plug OFF
Disconnect CN123 to CN125 and turn battery plug and key switch ON.
Change to E0-4
Inspect the TMP assy to which CN123 to CN125 are connected.
Remains as E0-3
Inspect the TMP assy to which CN120 to CN122 are connected.
No.
ANL.: ACTIVE
Set SST1 to CN105 and check the material handling fan check signal. (See page 5-5.)
Check signal: 0
• CPU board defect
Check signal: 1
Inspection 1
CN106-9 (35)
continuity check
CN109-9 (35)
0 Ω
∞ Ω
• DC/MD board defect
• Harness defect (between CN105 and CN108)
• Harness defect (between CN106 and CN109)

Inspection 1:
CN106-9 – CN109-9 Active Check
Battery plug OFF

| | |
|---|---|
| Measurement terminals | CN106-9 (35) – CN109-9 (35) (REC) |
| Tester range | Ω x 1 |
| Standard | 0 Ω |

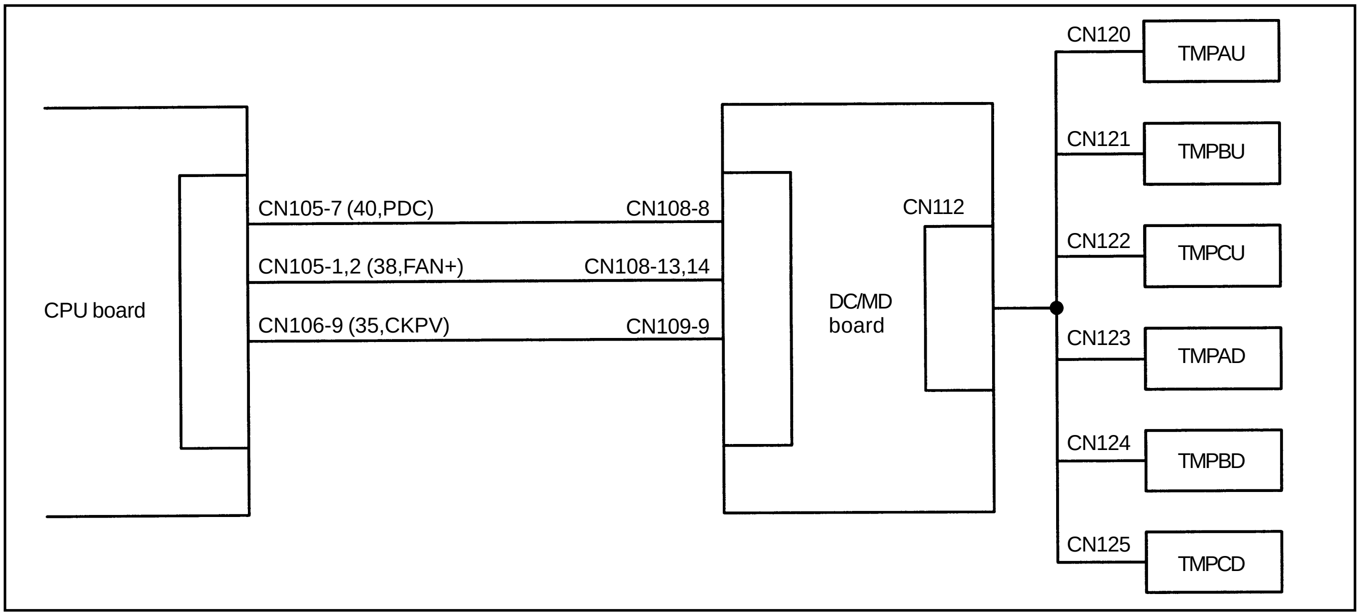



OK (0 Ω) → DC/MD board or harness defect (between CN105 and CN108)
NG (∞ Ω ) → Harness defect (between CN106 and CN109)

## Error Code E0-4: Material Handling Drive Circuit Abnormality

### Related portion




### Estimated causes

① DC/MD board defect
② Open circuit of internal harness
③ Disconnected MMP connector

Connect the SST3 of CN112.

↓

Error check

- E0-4 occurs → Inspection 1: CN106-9 (35) ↕ continuity check CN109-9 (35)
  - OK (0 Ω) → • DC/MD board defect
  - NG (∞ Ω) → • Harness defect (between CN106 and CN109)
- No E0-4 error ↓

Check if CN120 through CN125 are connected firmly.

↓

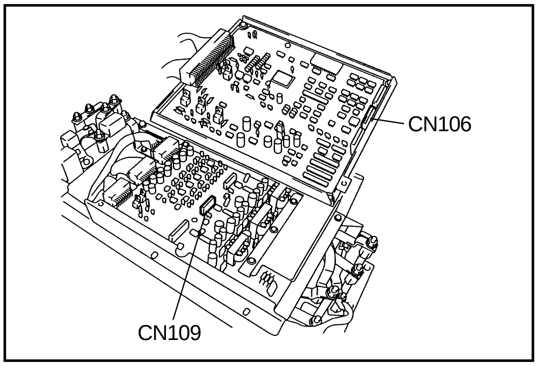
Check if E0-4 error still occurs.

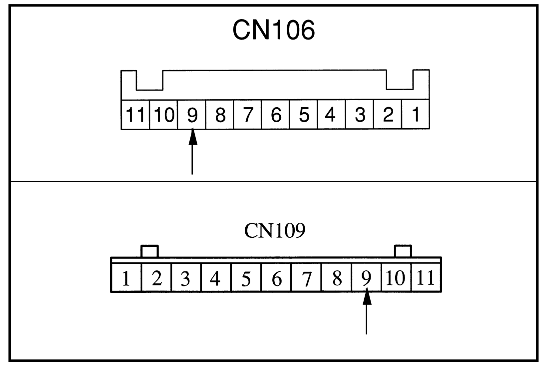
↓

• Internal harness defect

Inspection 1:
CN106 – CN109 Active Check
Battery plug OFF

| | |
|---|---|
| Measurement terminals | CN106-9 (35) – CN109-9 (35) (REC) |
| Tester range | Ω x 1 |
| Standard | 0 Ω |

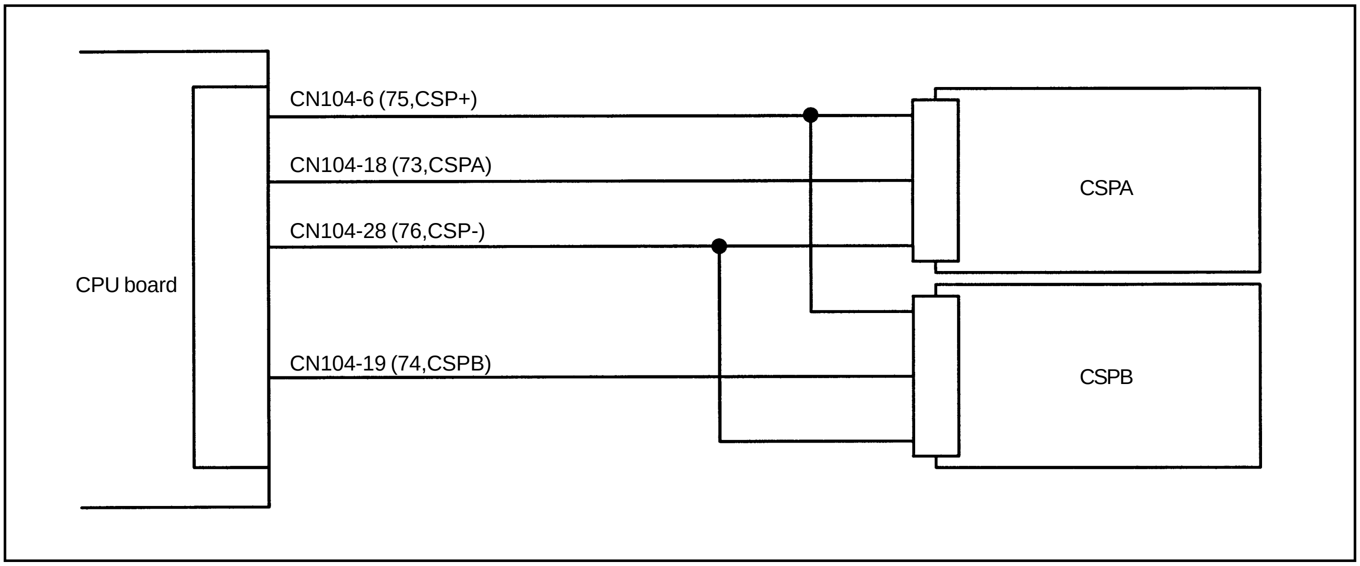



OK (0 Ω) → DC/MD board defect
NG (∞ Ω ) → Harness defect (between CN106 and CN109)

# Error Code E1: Material Handling Sensor Abnormality

## Related portion




## Estimated causes

① Current sensor defect
② Open circuit of harness
③ CPU board defect
④ Poor electrical connection of connector

Visually check the CSPA and CSPB connectors.

NG → • Repair or replacement

∗ Check the connector connection status:
• Pin locking status
• Check if the connector is disconnected when the harness is pulled lightly.

OK ↓

Inspection 1
Turn key switch ON
CN104-18 (73)
↕ voltage check
N1

NG (other than 7 V ± 0.5 V) → Inspection 3

OK (7 V ± 0.5 V) ↓

Inspection 2
Turn key switch ON
CN104-19 (74)
↕ voltage check
N1

NG (other than 7 V ± 0.5 V) → Inspection 4

OK (7 V ± 0.5 V) ↓

• CPU board defect

Inspection 3
Exchange the CSPA and CSPB
CN104-18 (73)
↕ voltage check
N1

NG (other than 7 V ± 0.5 V) → • Harness defect

OK (7 V ± 0.5 V) ↓

• CSPA defect

Inspection 4
Exchange the CSPA and CSPB
CN104-19 (74)
↕ voltage check
N1

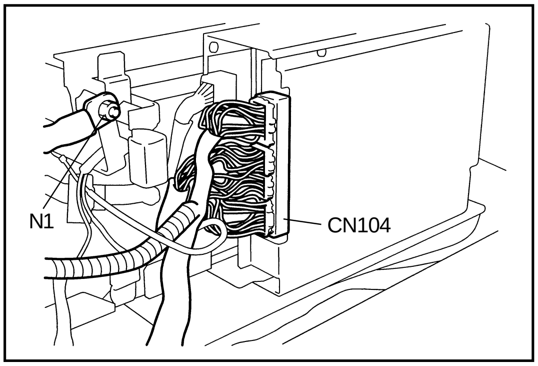
NG (other than 7 V ± 0.5 V) → • Harness defect

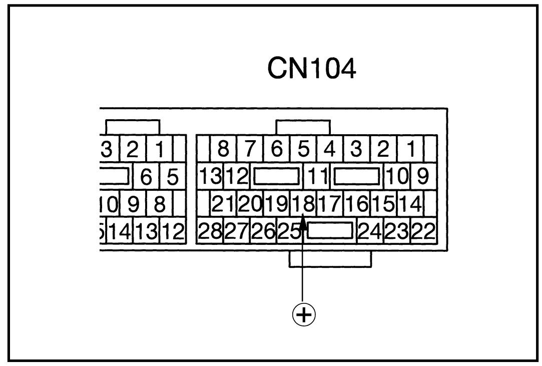
OK (7 V ± 0.5 V) ↓

• CSPB defect

Inspection 1:
CN104 – N1 Voltage Check 1
Battery plug ON, key switch ON

| Measurement terminals | CN104-18 (73) ⊕ – N1 ⊖ |
|---|---|
| Tester range | DC 10 V |
| Standard | 7 V ± 0.5 V |

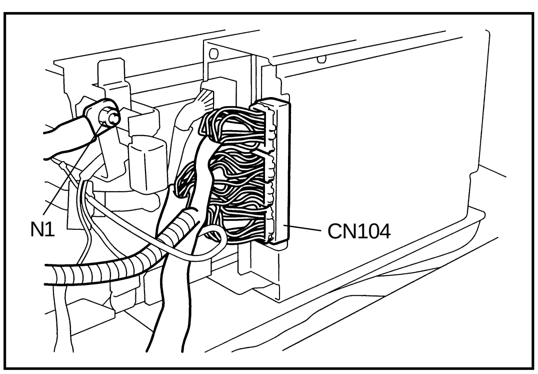


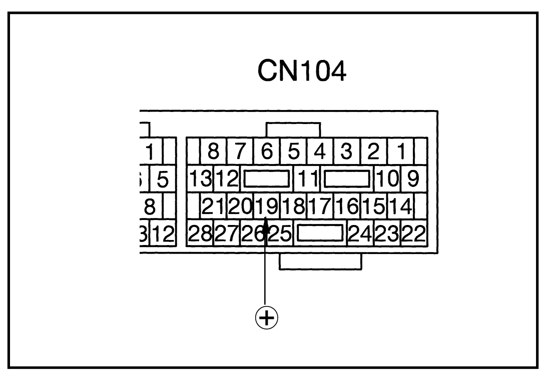




OK (7 V ± 0.5 V) → Go to Inspection 2.
NG (other than 7 V ± 0.5 V) → Go to Inspection 3.

Inspection 2:
CN104 – N1 Voltage Check 2
Battery plug ON, key switch ON

| Measurement terminals | CN104-19 (74) ⊕ – N1 ⊖ |
|---|---|
| Tester range | DC 10 V |
| Standard | 7 V ± 0.5 V |

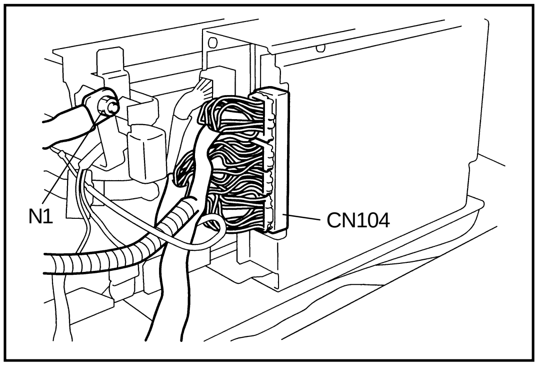


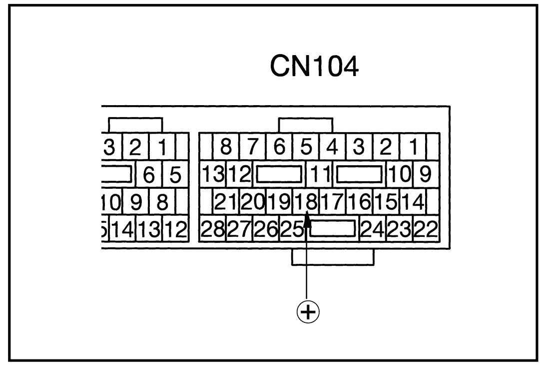




OK (7 V ± 0.5 V) → CPU board defect
NG (other than 7 V ± 0.5 V) → Go to Inspection 4.

Inspection 3:
CN104 – N1 Voltage Check 3
Battery plug ON, key switch ON, exchange CSPA and CSPB

| | |
|---|---|
| Measurement terminals | CN104-18 (73) ⊕ – N1 ⊖ |
| Tester range | DC 10 V |
| Standard | 7 V ± 0.5 V |

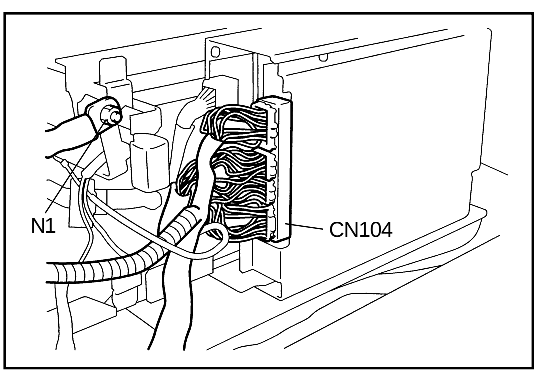


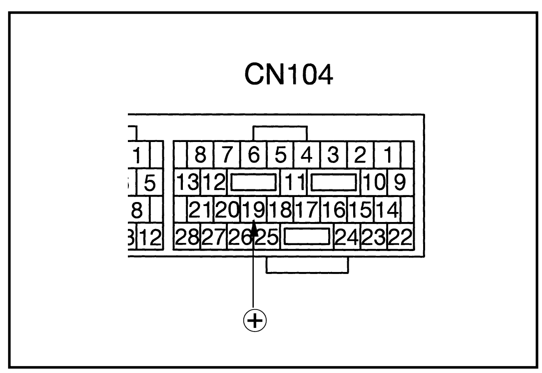




OK (7 V ± 0.5 V) → CSPA defect
NG (other than 7 V ± 0.5 V) → Harness defect

Inspection 4:
CN104 – N1 Voltage Check 4
Battery plug ON, key switch ON, exchange CSPA and CSPB

| | |
|---|---|
| Measurement terminals | CN104-19 (74) ⊕ – N1 ⊖ |
| Tester range | DC 10 V |
| Standard | 7 V ± 0.5 V |




OK (7 V ± 0.5 V) → CSPB defect
NG (other than 7 V ± 0.5 V) → Harness defect

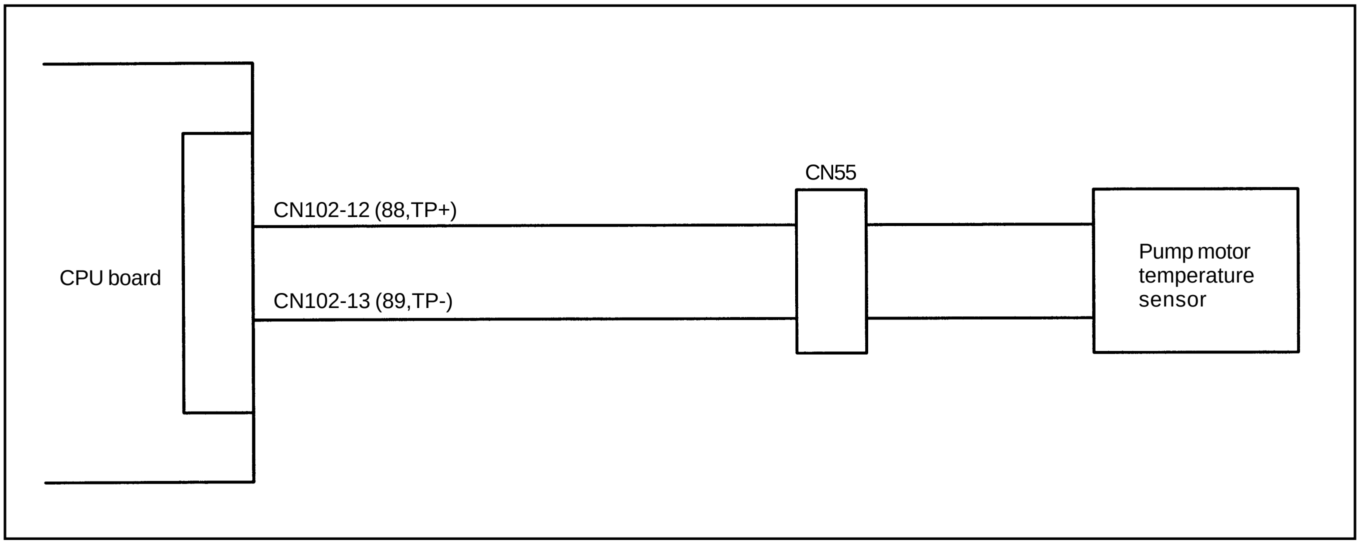
Safety monitor → Material handling motor overheat (E2-1)

( Blinking)

Leave the vehicle as it is for a while (about 30 minutes).

# Error Code E2-2: Material Handling Motor Temperature Sensor Abnormality

## Related portion




## Estimated causes

① Temperature sensor defect
② Open circuit of harness

ANL.: I/O monitor-1
Check the material handling motor temperature using the analyzer (I/O monitor).

-40°C or less (0 V)

Short-circuit the circuit between CN55-1 and -2 using SST8. (See page 5-5.)

ANL.: I/O monitor-1
Check the material handling motor temperature using the analyzer (I/O monitor).

-40°C or less (0 V)

180°C or more (4.9 V)

180°C or more (4.9 V)

ANL.: I/O monitor-1
Disconnect CN55 and check the pump motor temperature again.

-40°C or less (0 V)

180°C or more (4.9 V)

Inspection 1
CN102-13 (89)
↕ voltage check
N1

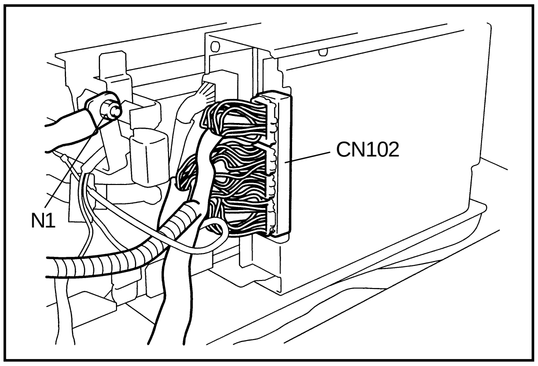
4.9 V ± 1 V

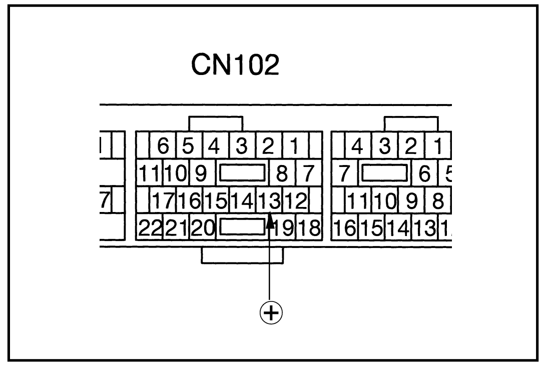
Other than 4.9 V ± 1 V

- Main harness defect
- CPU board defect
- Sub-harness defect
- Temperature sensor defect

Inspection 1:
CN102 – N1 Voltage check
Battery plug ON, key switch ON

| Measurement terminals | CN102-13 (89) ⊕ – N1 ⊖ |
|---|---|
| Tester range | DC 10 V |
| Standard | 4.9 V ± 1 V |

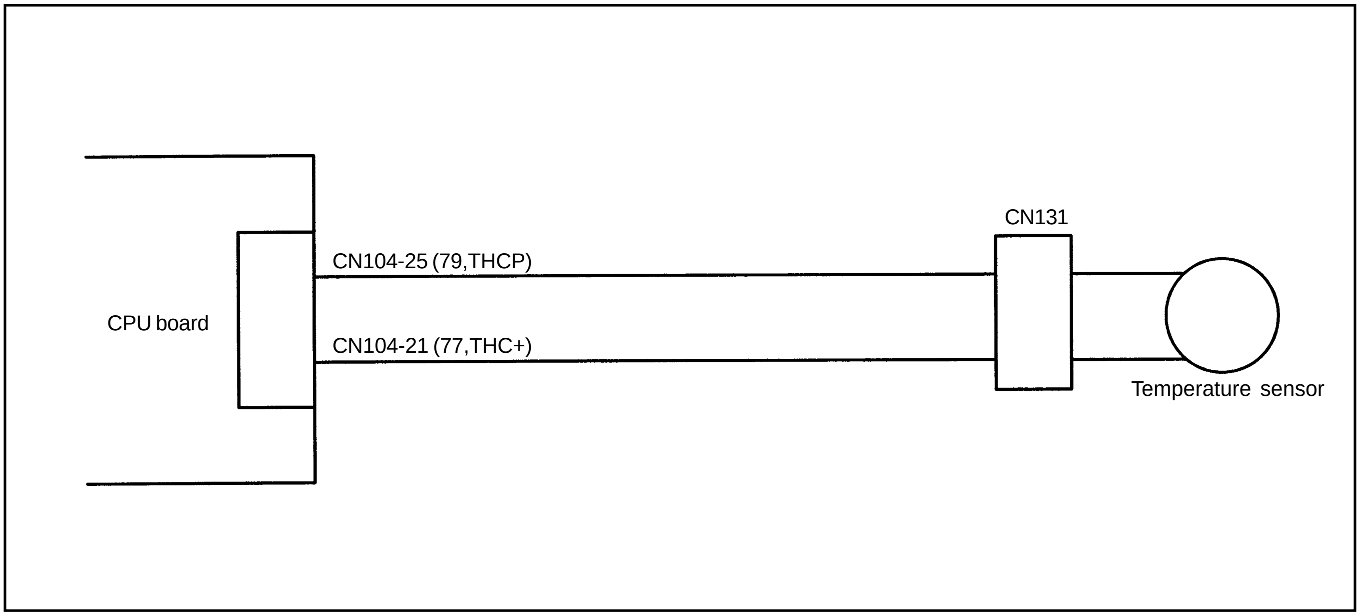



OK (4.9 V ± 1 V) → Main harness defect
NG (other than 4.9 V ± 1 V) → CPU board defect

## Error Code E3: Material Handling Main Circuit Temperature Sensor Abnormality

### Related portion




### Estimated causes

① Disconnected connector or open circuit of harness
② Temperature sensor defect

**ANL.: I/O monitor 1**
Disconnect CN131 and check the material handling main circuit temperature sensor reading.

- 197°C or more (4.8 V) → • Check short-circuiting between CN104-25 and -21.
- -40°C or less (0.1 V) ↓

**ANL.: I/O monitor 1**
Connect CN131 and check the material handling main circuit temperature sensor reading.

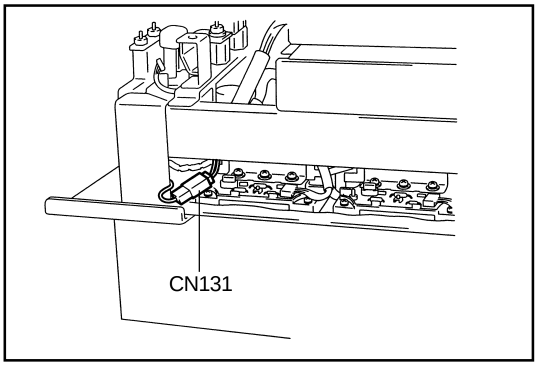
- 197°C or more (4.8 V) → • Temperature sensor defect
- -40°C or more (0.1 V) ↓

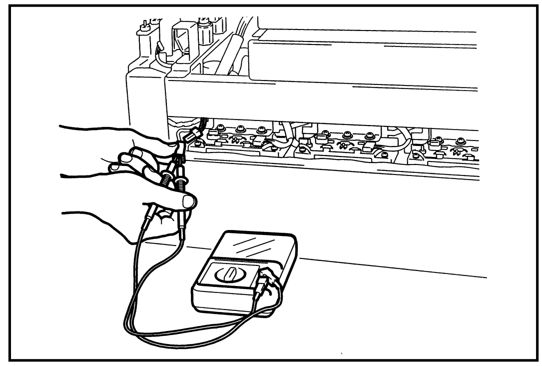
**Inspection 1**
Check resistance of CN131 on the temperature sensor side.

- OK (approx. 11 ~ 12 kΩ (at 25°C)) → • Open circuit of CN104-25 or CN104-21
- NG (200 kΩ or more ) ↓
  • Temperature sensor defect

Inspection 1:
Temperature Sensor Resistance Check
Battery plug OFF

| | |
|---|---|
| Measurement terminals | Both terminals of CN131 connector (temperature sensor side) |
| Tester range | kΩ x 1 |
| Standard | Approx. 11 ~ 12 kΩ (at 25°C) |

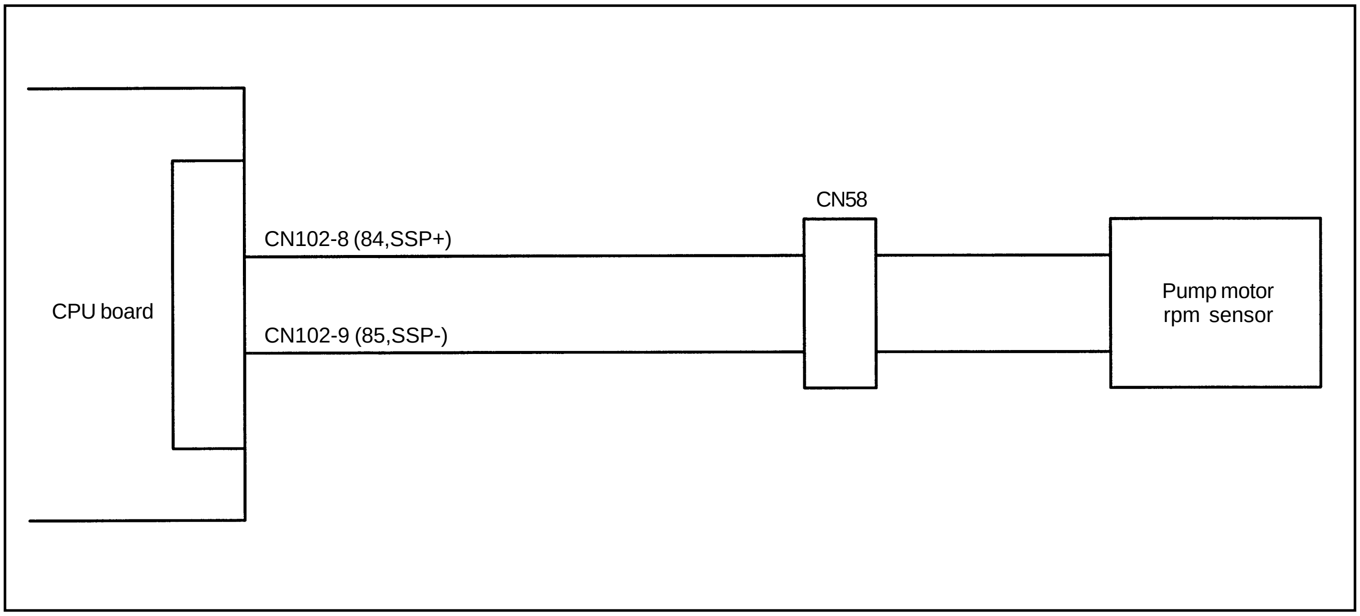


OK (Approx. 11 ~ 12 kΩ) → Open circuit of CN104-25 or CN104-21 harness
NG (200 kΩ or more) → Temperature sensor defect

## Error Code E8: Material Handling Rotary Sensor Abnormality

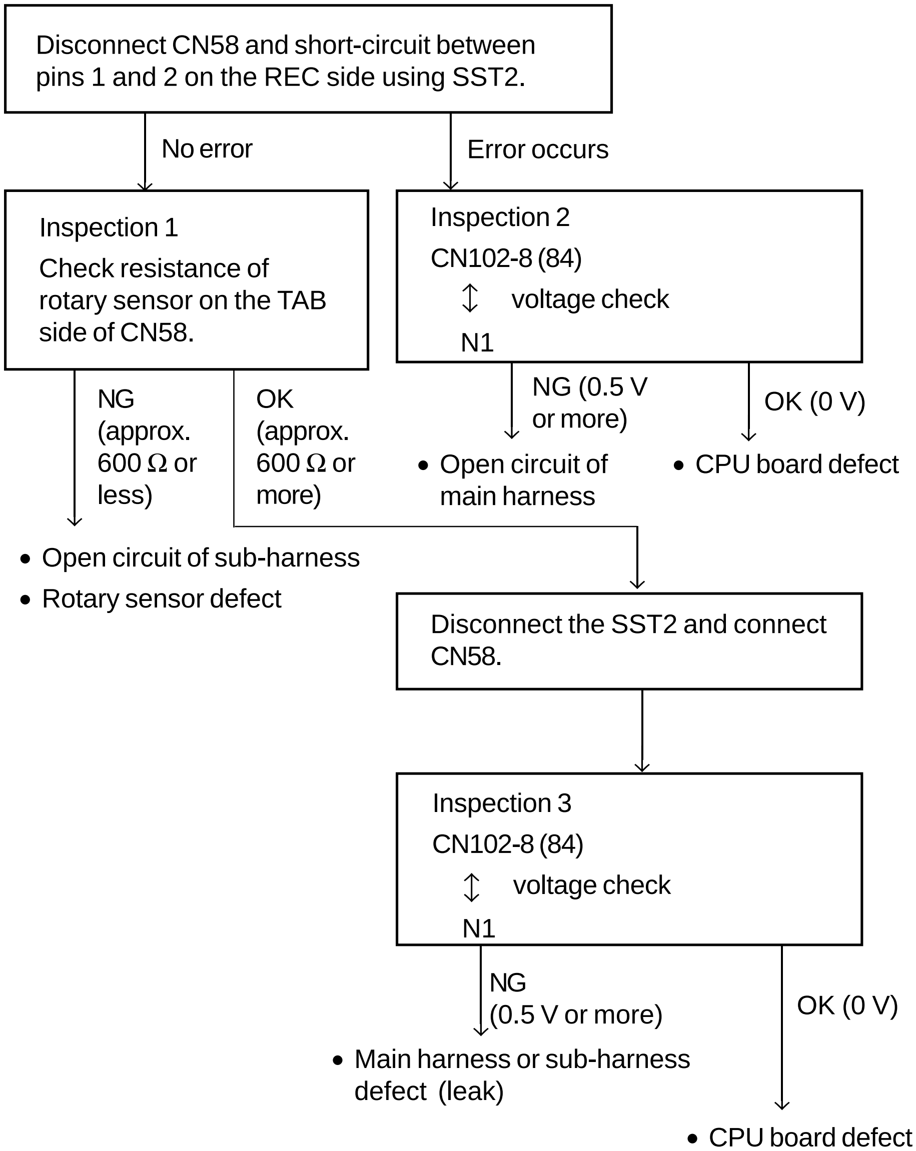
### Related portion




### Estimated causes

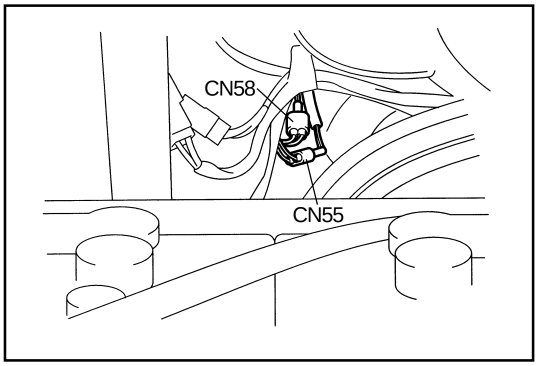
| | |
|---|---|
| ① | Material handling rotary sensor defect |
| ② | Open circuit of harness |
| ③ | CPU board defect |

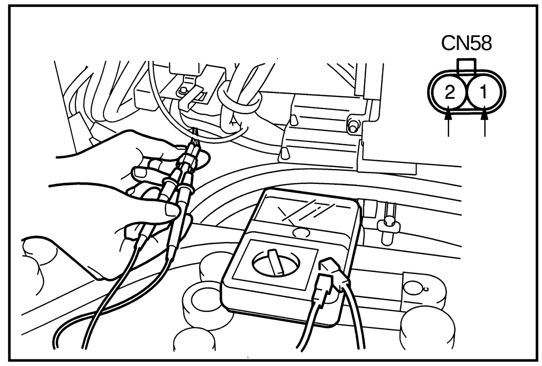
*** Do not come near the mast during the troubleshooting.**


Disconnect CN58 and short-circuit between pins 1 and 2 on the REC side using SST2.
No error
Error occurs
Inspection 1
Check resistance of rotary sensor on the TAB side of CN58.
Inspection 2
CN102-8 (84)
voltage check
N1
NG (approx. 600 Ω or less)
OK (approx. 600 Ω or more)
NG (0.5 V or more)
OK (0 V)
• Open circuit of main harness
• CPU board defect
• Open circuit of sub-harness
• Rotary sensor defect
Disconnect the SST2 and connect CN58.
Inspection 3
CN102-8 (84)
voltage check
N1
NG (0.5 V or more)
OK (0 V)
• Main harness or sub-harness defect (leak)
• CPU board defect

Inspection 1:
Rotary Sensor Resistance Check
Battery plug OFF, CN58 disconnection

| Measurement terminals | CN58-1 (85) – CN58-2 (84) |
|---|---|
| Tester range | Ω x 1 |
| Standard | Approx. 600 Ω or less |

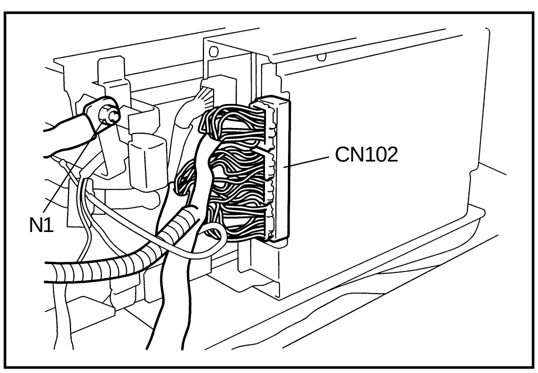


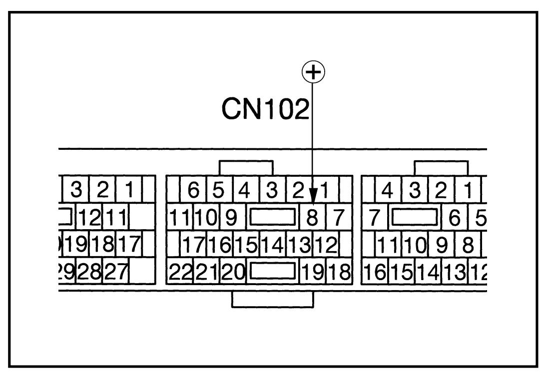




OK (approx. 600 Ω or less) → Remove SST2, connect CN58 and then go to Inspection 3.
NG (approx. 600 Ω or more) → Open circuit of sub-harness or rotary sensor defect.

Inspection 2:
CN102 – N1 Voltage Measurement
Battery plug ON, CN58 disconnection

| Measurement terminals | CN102-8 (84) ⊕ – N1 ⊖ |
|---|---|
| Tester range | DC 10 V |
| Standard | Approx. 0 V |

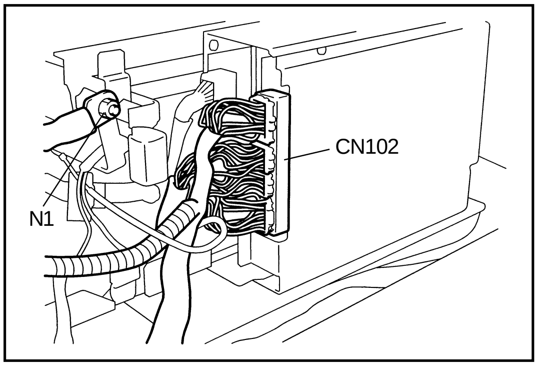


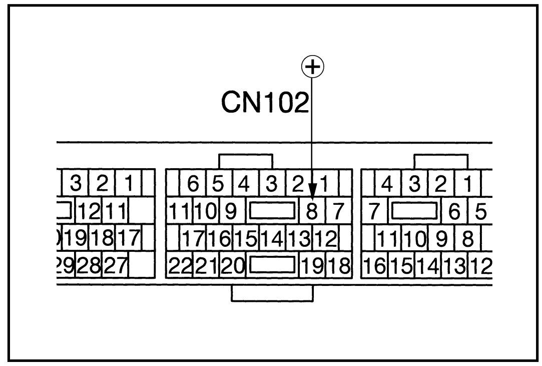




OK (0 V) → CPU board defect
NG (0.5 V or more) → Open circuit of main harness

Inspection 3:
CN102 – N1 Voltage Measurement
Battery plug ON, key switch ON, CN58 must be connected

| | |
|---|---|
| Measurement terminals | CN102-8 (84) ⊕ – N1 ⊖ |
| Tester range | DC 10 V |
| Standard | Approx. 0 V |

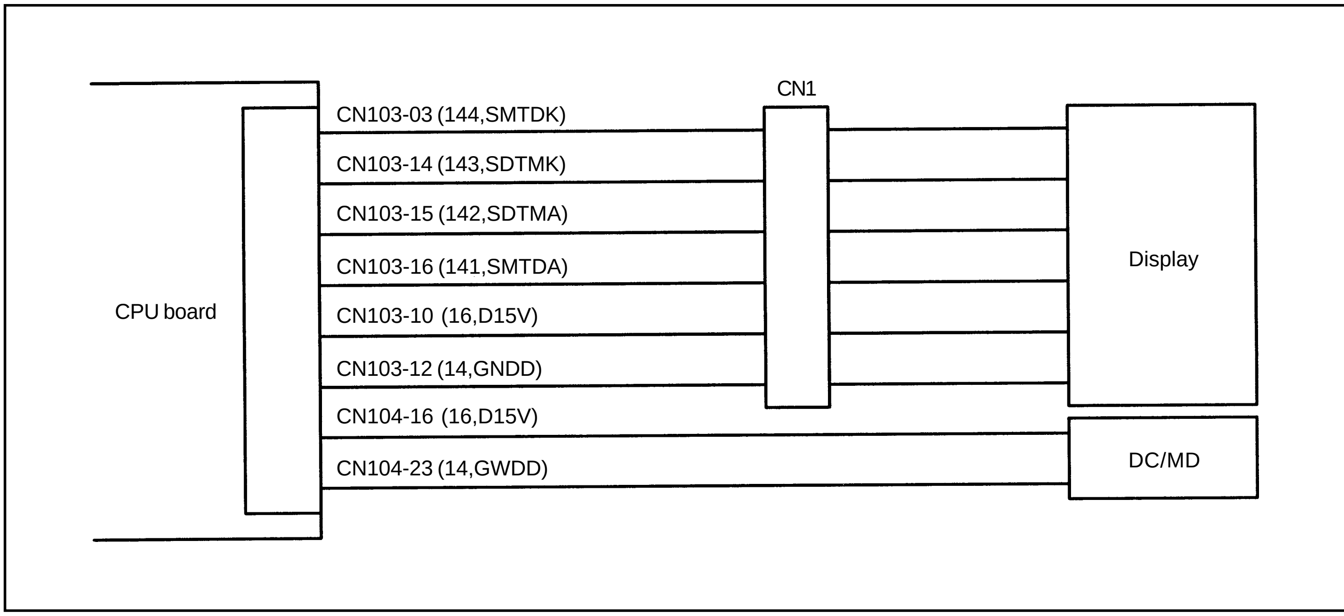



OK (approx. 0 V) → CPU board defect
NG (0.5 V or more) → Main harness or sub-harness defect (leak)

## Error Code EE: Communications from LCD Display Abnormality

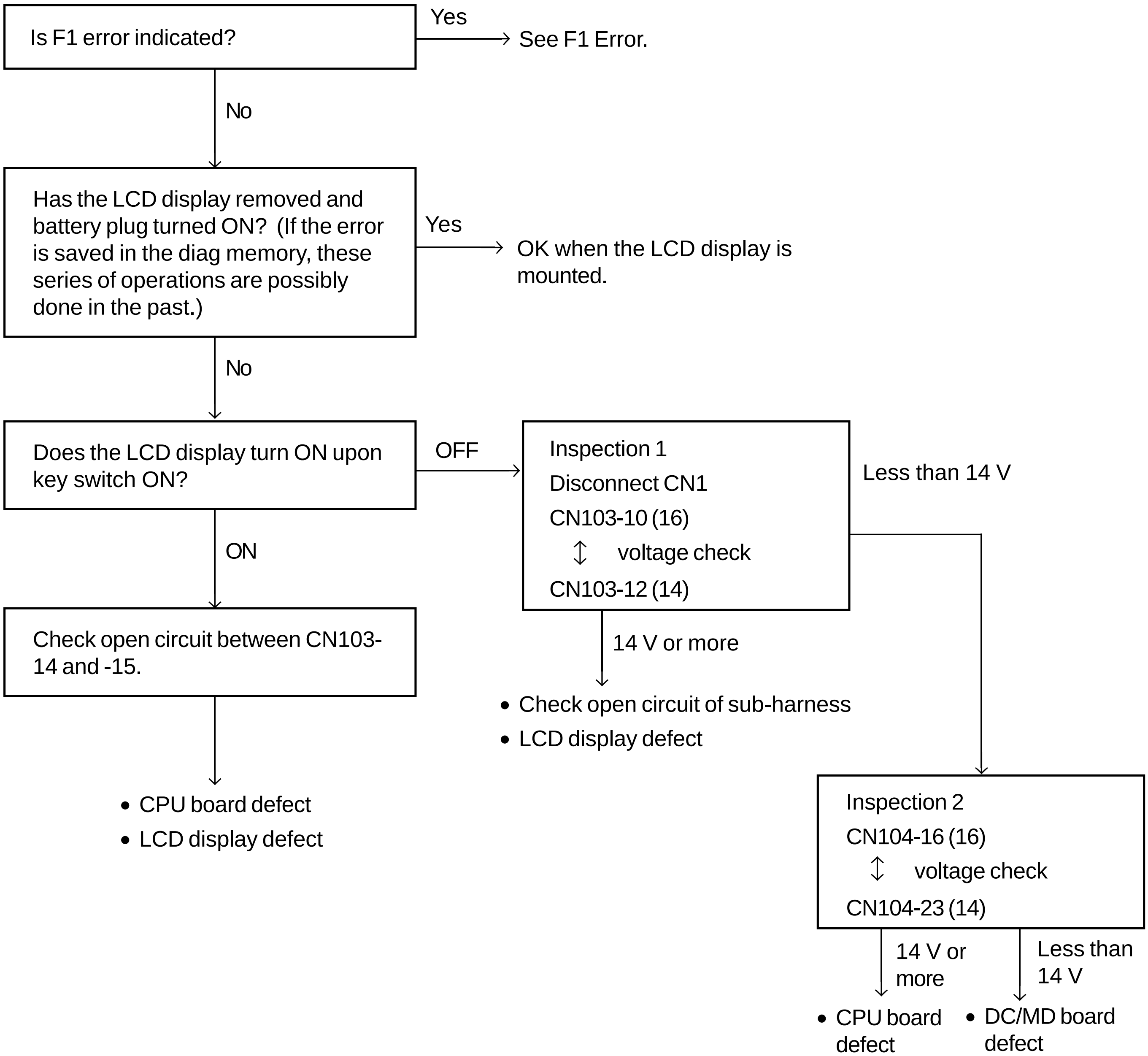
### Related portion




### Estimated causes

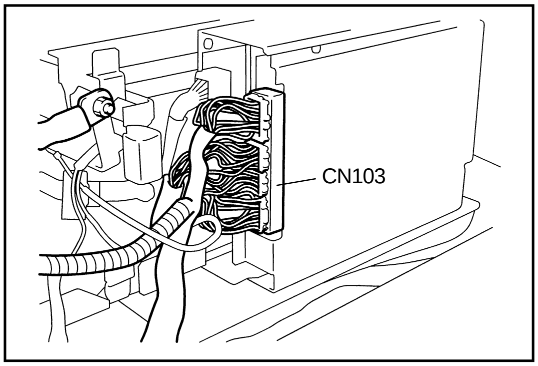
| | |
|---|---|
| ① | Display defect |
| ② | No indication on display |
| ③ | Open circuit of harness |
| ④ | Display power supply defect |

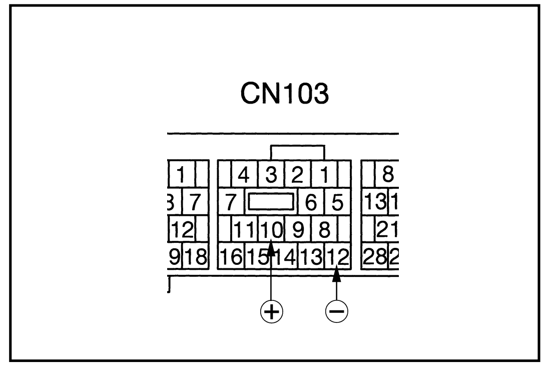
<For EE-1>


Is F1 error indicated?
Yes
See F1 Error.
No
Has the LCD display removed and battery plug turned ON? (If the error is saved in the diag memory, these series of operations are possibly done in the past.)
Yes
OK when the LCD display is mounted.
No
Does the LCD display turn ON upon key switch ON?
OFF
Inspection 1
Disconnect CN1
CN103-10 (16)
voltage check
CN103-12 (14)
Less than 14 V
14 V or more
• Check open circuit of sub-harness
• LCD display defect
ON
Check open circuit between CN103-14 and -15.
• CPU board defect
• LCD display defect
Inspection 2
CN104-16 (16)
voltage check
CN104-23 (14)
14 V or more
• CPU board defect
Less than 14 V
• DC/MD board defect

Inspection 1. Display signal voltage check 1
Battery plug ON, key switch ON

| Measurement terminals | CN103-10 (16) ⊕ – CN103-12 (14) ⊖ |
|---|---|
| Tester range | DC50 V |
| Standard | 14 V or more |

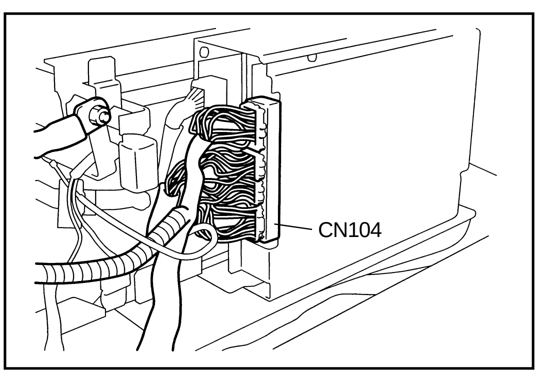


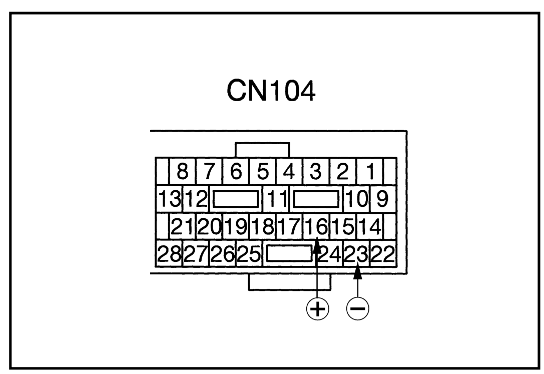




14 V or more → Sub-harness open-circuit check, LCD display defect
Less than 14 V → To inspection 2

Inspection 2. Display signal voltage check 2
Battery plug ON, key switch ON

| Measurement terminals | CN104-16 (16) ⊕ – CN104-23 (14) ⊖ |
|---|---|
| Tester range | DC50 V |
| Standard | 14 V or more |



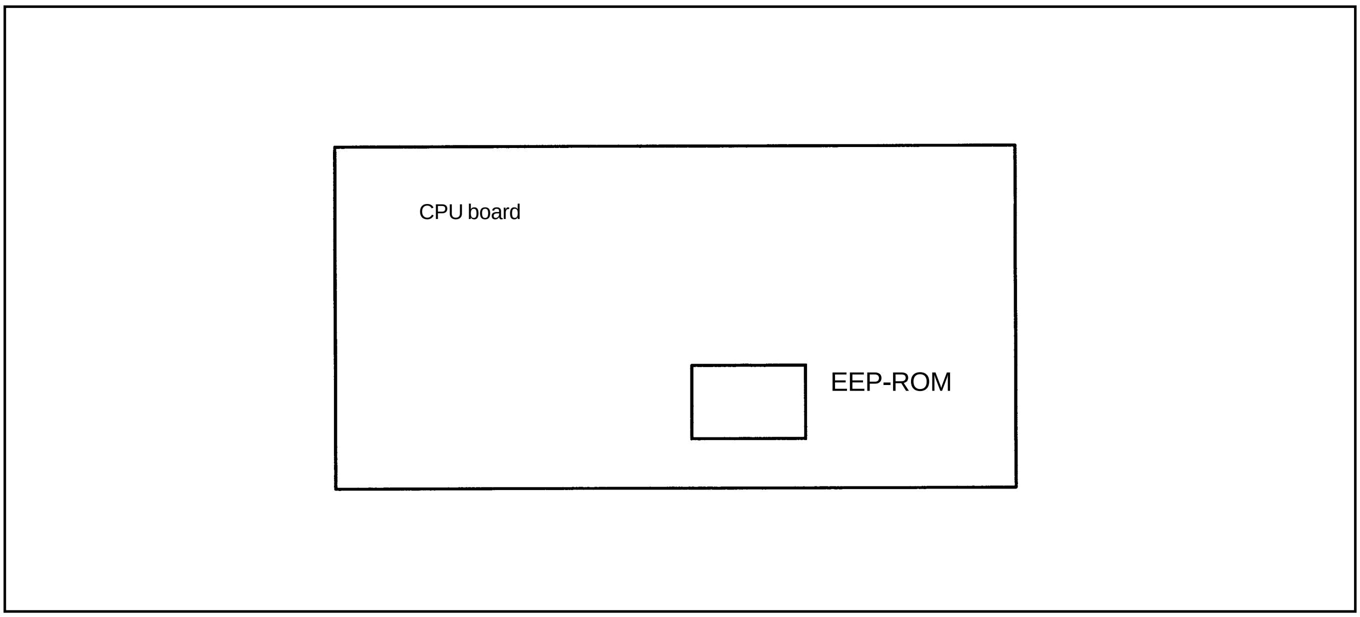

14 V or more → CPU board defect
Less than 14 V → DC/MD board defect

## Error Code EE-2·EE-3:

Check the following circuuits of connector CN103 and harnesses:
- Check connectors of CN103-14 through -16 and harnesses. If connectors and harnesses are normal, replace the LCD display.

## Error Code EF: EEP-ROM

## Related portion



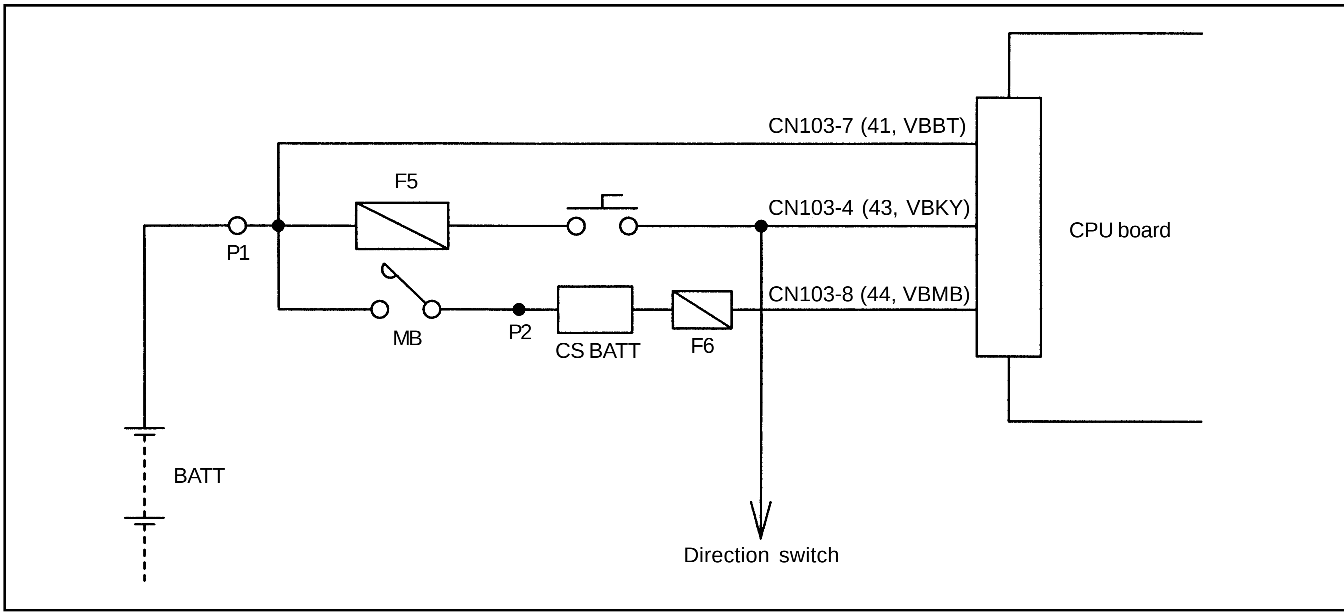

*** When an error code EF is indicated, replace the CPU board.**

[ EF-1, EF-2, EF-3: CPU board defect of drive or material handling circuit
EF-5, EF-6: SCPU board defect in PS controller ]

## WHEN NO ERROR CODE IS DISPLAYED

1. Vehicle does not move at all (disabled travel, mateerial handling and PS operations)

### Related portion




### Estimated causes

| | |
|---|---|
| ① Blown F5 fuse | ④ Main harness defect |
| ② Blown F6 fuse | ⑤ DC/MD board defect |
| ③ Blown F1 fuse | |

Is the MB contactor ON sound heard when the key switch is turned ON?

Yes →

ANL.: I/O monitor 1

Check the main VBMB voltage (battery voltage).

20 V or more →

- Check F1 and F3 fuses.

Less than 20 V ↓

Inspection 3

Check the F6 fuse.

NG →

- F6 fuse replacement

OK ↓

Inspection 4

CN103-8 (44) ⊕

↕ voltage check

N1 ⊖

OK (20 V or more) →

- CPU board defect

NG (less than 20 V) ↓

- Main harness defect

No ↓

Inspection 1

P1 ⊕

↕ voltage check

N1 ⊖

NG (other than OK values) ↓

- Battery defect
- Battery plug defect

OK (1- and 2-ton series: approx. 48 V, 3-ton, J3.5 ton: approx. 80 V) ↓

Inspection 2

Check the F5 fuse.

NG (∞ Ω) →

- F5 fuse replacement

OK ↓

Inspection 5

CN103-7 (41) ⊕

CN103-4 (44) ⊕

↕ voltage check

N1 ⊖

NG (other than OK condition) →

- Main harness defect

OK (voltage between CN103-7 (41) and N1 is 20 V or more and voltage difference between CN103-7 (41) or CN103-4 (43) and N1 is within 15 V) ↓

Check if CN113 is connected firmly.

NG →

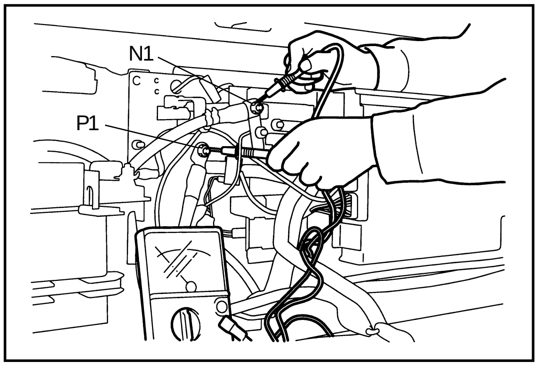
- Connect CN113 correctly.

OK ↓

- DC/MD defect

Inspection 1:
P1 – N1 Voltage Check
Battery plug ON

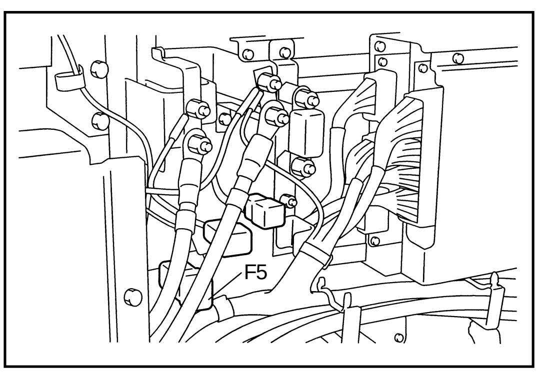
| Measurement terminals | P1 ⊕ – N1 ⊖ |
|---|---|
| Tester range | DC 200 V |
| Standard | 1 and 2 ton series: approx. 48 V,<br>3-ton, J3.5 ton: approx. 80 V |

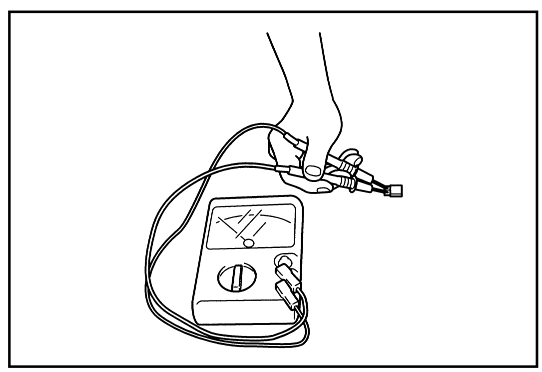



OK (1- and 2-ton series: approx. 48 V, 3-ton series: approx. 80 V) → Go to Inspection 2.
NG (other than OK values) → Battery defect, battery plug defect

Inspection 2:
F5 Fuse Check
Battery plug OFF, removed F5 fuse

| Measurement terminals | Both terminals of fuse F5 |
|---|---|
| Tester range | Ω x 1 |
| Standard | 0 Ω |

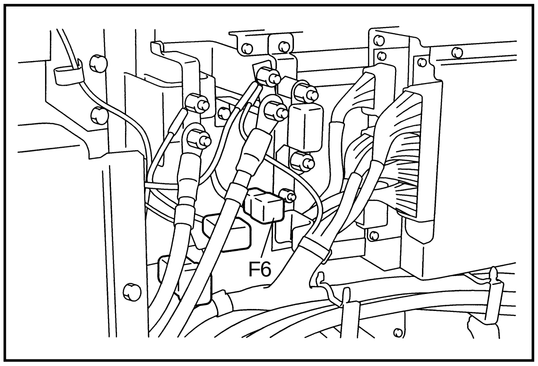


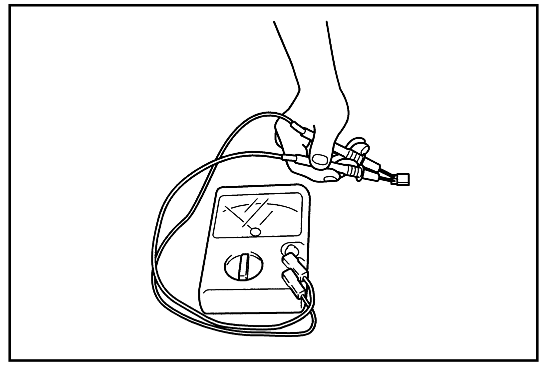



OK (0 Ω) → Go to Inspection 5.
NG (∞ Ω) → F5 fuse replacement

Inspection 3:
F6 Fuse Check
Battery plug OFF, removed F6 fuse

| Measurement terminals | Both terminals of fuse F6 |
|---|---|
| Tester range | Ω x 1 |
| Standard | 0 Ω |

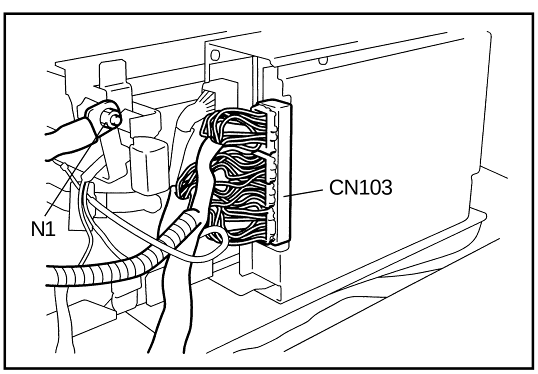


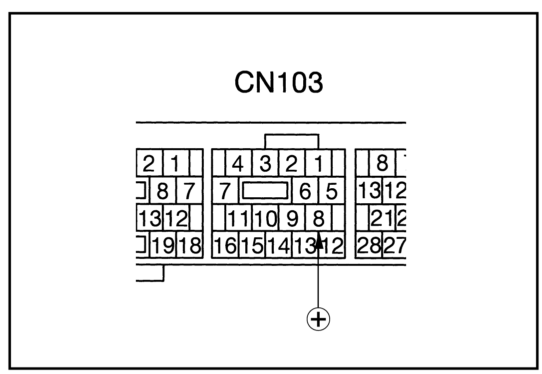



OK (0 Ω) → Go to Inspection 4.
NG (∞ Ω) → F6 fuse replacement

Inspection 4:
Voltage Check After F6 Fuse Check
Battery plug ON

| Measurement terminals | C103-8 (44) ⊕ – N1 ⊖ |
|---|---|
| Tester range | DC 200 V |
| Standard | 20 V or more |

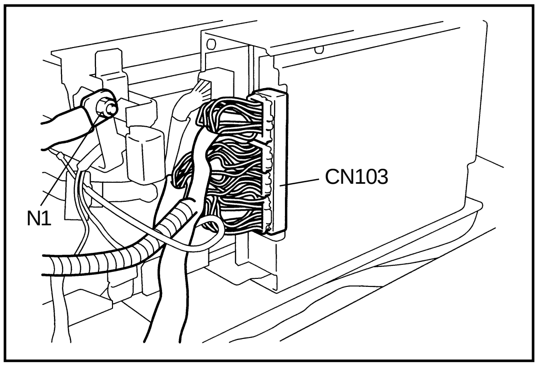


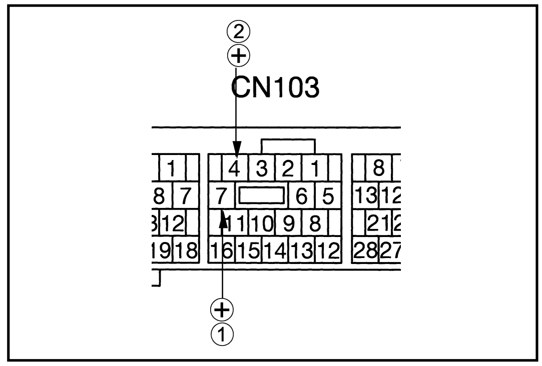




OK (20 V or more) → CPU board defect
NG (less than 20 V) → Main harness defect

Inspection 5:
Input Voltage to CPU Board Check
Battery plug ON, key switch ON

| | |
|---|---|
| Measurement terminals | ① CN103-7 (41) ⊕ – N1 ⊖<br>② CN103-4 (44) ⊕ – N1 ⊖ |
| Tester range | DC 200 V |
| Standard | Voltage between level No. 41 and N1 is 20 V or more and voltage difference between level No. 41 or No. 44 and N1 is within 15 V. |

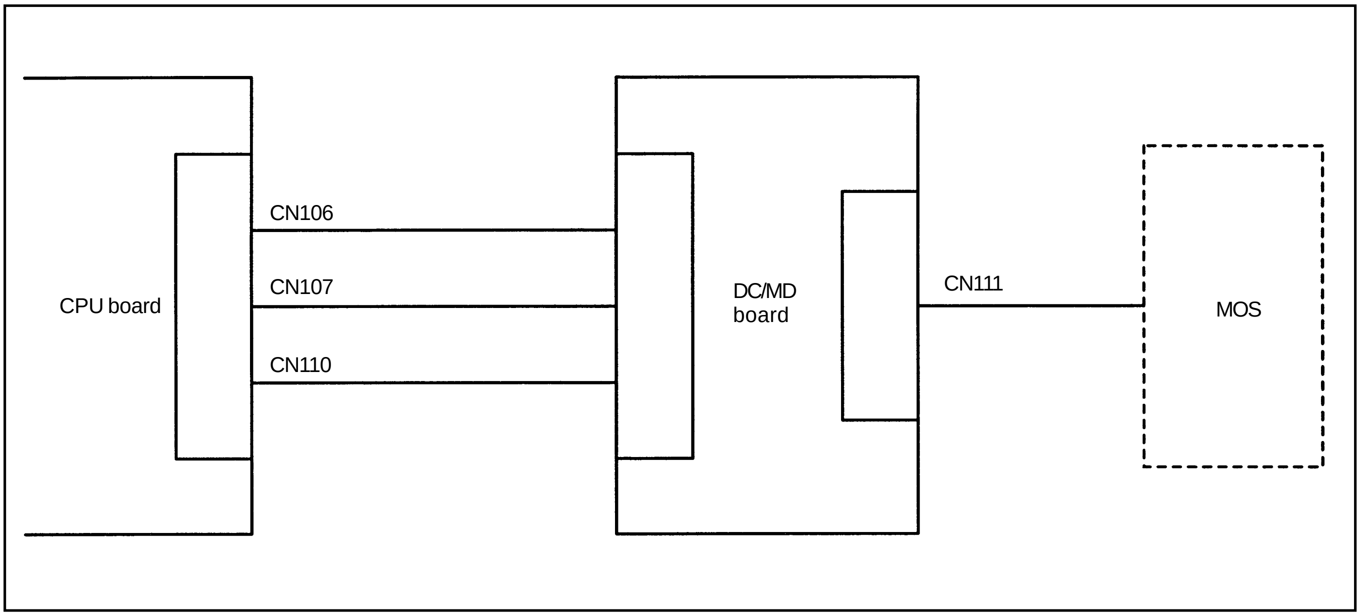



OK (within standard) → Check if CN113 connector is connected firmly.
NG (outside of the standard) → Main harness defect

2. Failure in Traveling Only or Wobbling

## Related portion




## Estimated causes

| | |
|---|---|
| ① Direction switch defect | ⑤ Drive motor cable defect |
| ② Acceleration potentiometer defect | ⑥ CPU board defect |
| ③ TMD (MOS) defect | ⑦ DC/MD board defect |
| ④ Drive motor defect | |

ANL.: I/O monitor 2

Check direction switch and acceleration potentiometer value.

Direction switch cannot be turned ON and OFF.

Acceleration potentiometer value remains unchanged.

- Inspection and replacement of direction switch
- Inspection and replacement of acceleration potentiometer

Direction switch: Turned ON and OFF normally.

Acceleration potentiometer value: Varies.

Was direction switch operated or accelerator pedal depressed upon key switch ON?

Yes

- Set the direction switch to neutral and the accelerator switch to OFF before key switch ON.

No

ANL.: I/O monitor 2

Sit down on the seat and check the deadman switch.

OFF "0"

- Check the deadman switch. A shorting connector is located in the rear left portion under the head guard on a vehicle L/ deadman switch.

ON "1"

Disconnect the drive motor cable and set SST3 to connector CN111. (*1) (See page 5-6.)

Turn direction and accelerator switches ON, and check LEDs on SST3.

LED Partially OFF *3

Set SST4 between connectors CN106 and CN110. (See page 5-7.)

Operate the lift lever and check LEDs on SST3. (See page 5-6.)

LEDs Partially OFF *3

- DC/MD board defect

All LEDs ON (blinking) *2

- CPU board defect

All LEDs ON (blinking) *2

Inspection 1

Check voltages upon turning direction and accelerator switches ON.

P7·P8·P9
↕ voltage check
N1

NG (outside the standard)

- Drive motor defect
- Drive motor cable defect

OK (1- and 2-ton series: 0 V to 48 V 3-ton, J3.5 ton: 0 V to 80 V)

- TMD (MOS) defect

***1. Be sure to disconnect cables from the drive and pump motors.**

***2. All LEDs ON (blinking): All LEDs repeat ON and OFF according to the MOS ON sequence.**

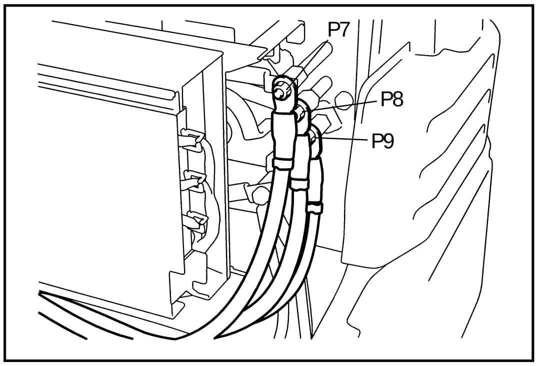
***3. LEDs partially OFF: One or more of six LEDs are kept off.**

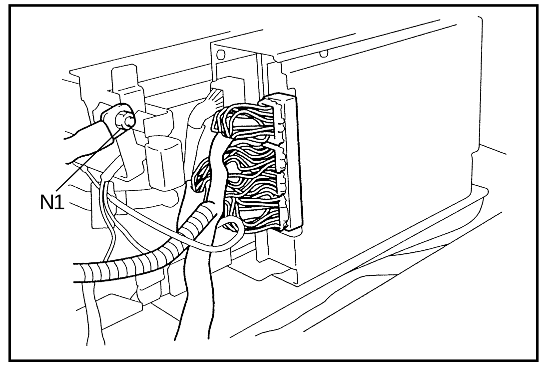
Inspection 1:

Motor voltage check

Battery plug ON, key switch ON

| | |
|---|---|
| Measurement terminals | P7 • P8 • P9 ⊕ – N1 ⊖ |
| Tester range | DC 200 V |
| Standard | 1- and 2- ton series: 0 V to 48 V, 3-ton, J3.5 ton: 0 V to 80 V |



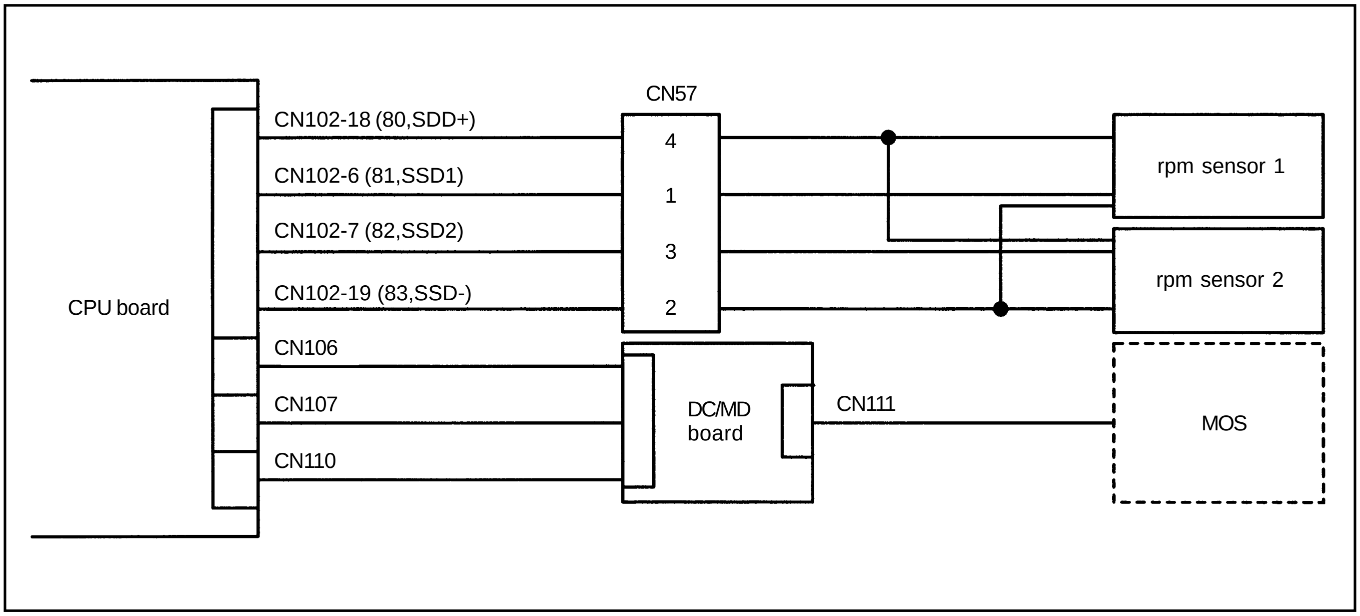




OK (within the standard) → TMD (MOS) defect

NG (outside the standard) → Drive motor or drive motor cable defect

3. Vehicle Can Travel Only Slowly.

## Related portion




## Estimated causes

| | |
|---|---|
| ① CPU board defect | ⑤ TMD (MOS) defect |
| ② Main harness defect | ⑥ Drive motor defect |
| ③ Acceleration potentiometer defect | ⑦ Drive motor cable defect |
| ④ Brake switch defect | ⑧ DC/MD board defect |

ANL.: I/O monitor 2
Lift the vehicle to make front wheels float and check the rotary sensor reading in the traveling state.

Sensor readings other than 0

ANL.: I/O monitor 2
Check the acceleration potentiometer value.

Less than 2.0 V

- Acceleration potentiometer defect

2.0 V when accelerator pedal is fully depressed

ANL.: I/O monitor 2
Brake switch check

ON

- Brake switch defect

OFF

Disconnect the drive and pump motor cables. Set SST3 to connector CN111. (See page 5-6.)

**Always disconnect the motor cable**

Check LEDs of SST3 when the direction and accelerator switches are turned ON.

Partially OFF *2

All LEDs ON *1 (blinking)

Inspection 2
Check voltages at motor cable terminals when direction and accelerator switches are turned ON.
P7・P8・P9
↕ voltage check
N1

NG (outside the standard)

- Drive motor defect
- Drive motor cable defect

OK
1- and 2-ton series: 0 V to 48 V
3-ton, J3.5 ton: 0 V to 80 V

- TMD (MOS) defect

Set SST4 between connectors CN106 and CN110. (See page 5-7.)

Operate the lift lever and check LEDs of SST3.

All LEDs ON (blinking) *1

- CPU board defect

Partially OFF *2

- DC/MD board defect

Sensor reading: 0

Disconnect connector CN57 and set SST2 between the connector pin of which sensor reading is 0 and the CN57-2. (REC side connector)
SSD1: CN57-1 and CN57-2
SSD2: CN57-3 and CN57-2

Inspection 1
CN102-6 (81)
CN102-7 (82)
↕
N1

0 V

- CPU defect

Approx. 15 V

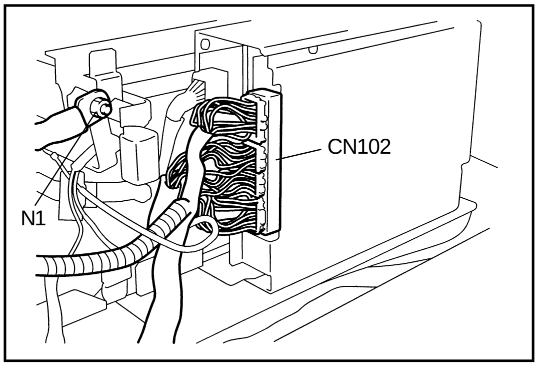
- Main harness open circuit

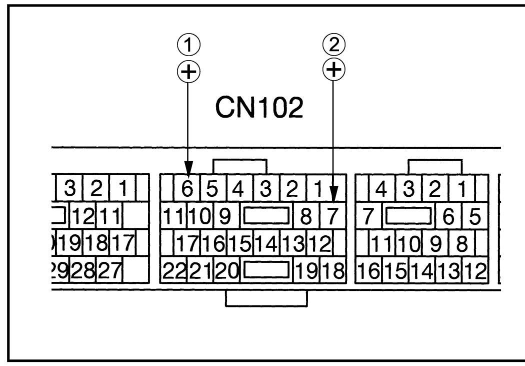
***1. All LEDs ON (blinking):**
**All LEDs repeat ON and OFF according to the MOS ON sequence.**

***2. LEDs partially OFF:**
**One or more of six LEDs are kept off.**

Inspection 1:
Rotary sensor signal voltage check
Battery plug ON, key switch ON

| | |
|---|---|
| Measurement terminals | ① CN102-6 (81) ⊕ – N1 ⊖<br>② CN102-7 (82) ⊕ – N1 ⊖ |
| Tester range | DC 200 V |
| Standard | Approx. 15 V |

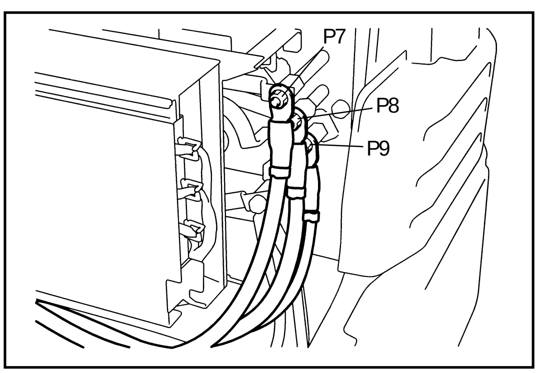


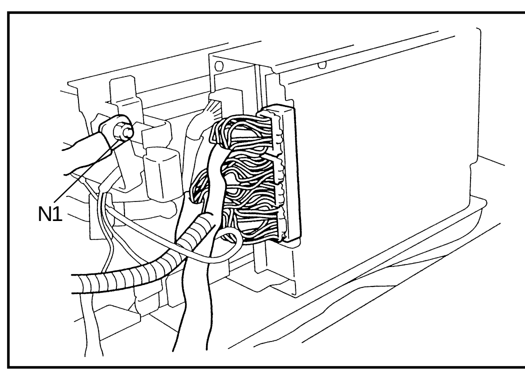




OK (approx. 15 V) → Main harness open circuit
NG (0 V) → CPU board defect

Inspection 2:
Motor voltage check
Battery plug ON, key switch ON

| | |
|---|---|
| Measurement terminals | P7•P8•P9 ⊕ – N1 ⊖ |
| Tester range | DC 200 V |
| Standard | 1- and 2-ton series: 0 V to 48 V, 3-ton, J3.5 ton: 0 V to 80 V |

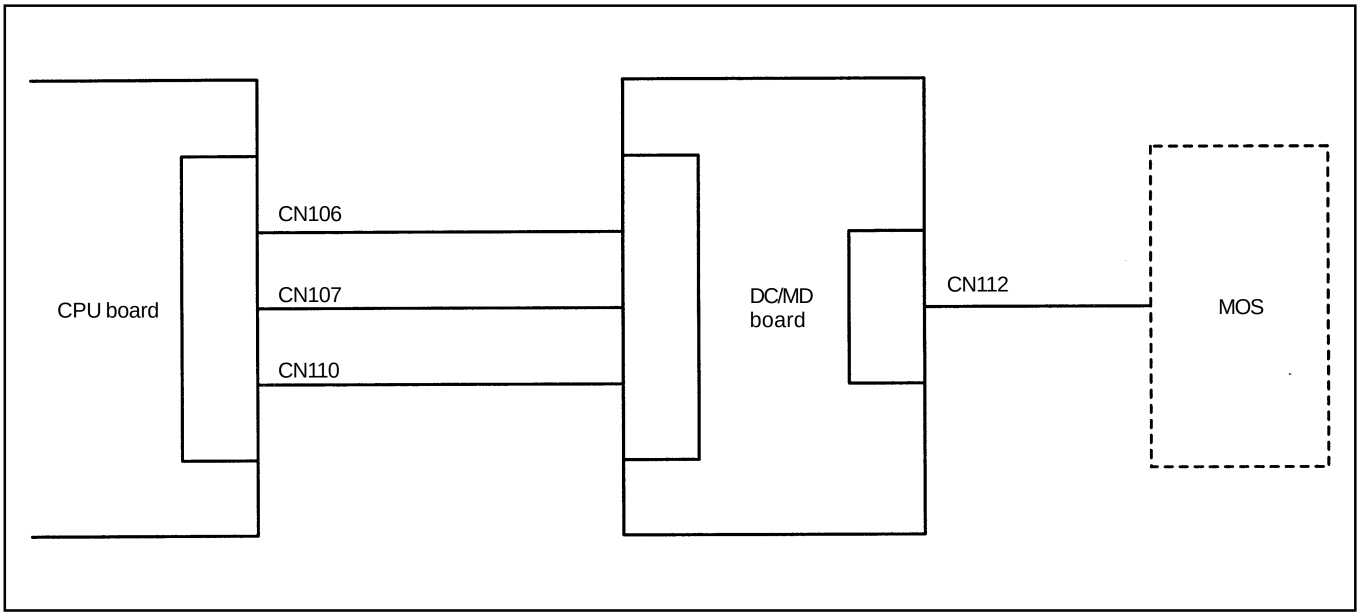



OK (1- and 2-ton series: 0 V to 48 V, 3-ton series: 0 V to 80 V) → TMD (MOS) defect
NG (outside the standard) → Drive motor or drive motor cable defect

4. Failure in Material Handling Only or Wobbling

## Related portion




## Estimated causes

| | |
|---|---|
| ① Lift/tilt switch defect | ④ Pump motor defect |
| ② TMD (MOS) defect | ⑤ Pump motor cable defect |
| ③ CPU board defect | ⑥ DC/MD board defect |

ANL.: I/O monitor 3
Lift and tilt switch check

Cannot be turned ON or OFF.

- Inspection and replacement of lift switch
- Inspection and replacement of tilt switch

Turned ON and OFF normally.

***1. Always disconnect the drive and pump motor cables.**

Disconnect the pump motor cable and set SST3 to connector CN112. (*1)
(See page 5-6.)

Turn lift switch ON and check LEDs of SST3.

LEDs Partially OFF *2

Set SST4 between connectors CN107 and CN109.
(See page 5-7.)

Check SST3 LEDs after turning direction and accelerator switches ON.

Partially OFF

- DC/MD board defect

All LEDs ON (blinking)

- CPU board defect

All LEDs ON (blinking) *1

Inspection 1
Check voltages when the lift switch is turned ON.
P14•P15•P16
↕ voltage check
N1

OK (1- and 2-ton series: 0 V to 48 V, 3-ton series: 0 V to 80 V)

- TMP (MOS) defect

NG (outside the standard)

Make the front tires float and connect the drive motor cable to the pump motor terminals (P14, P15 and P16).

***1. All LEDs ON (blinking): All LEDs repeat ON and OFF according to the MOS ON sequence.**

***2. LEDs partially OFF: One or more of six LEDs are kept off.**

Check if tires rotate when lift switch is turned ON.

No

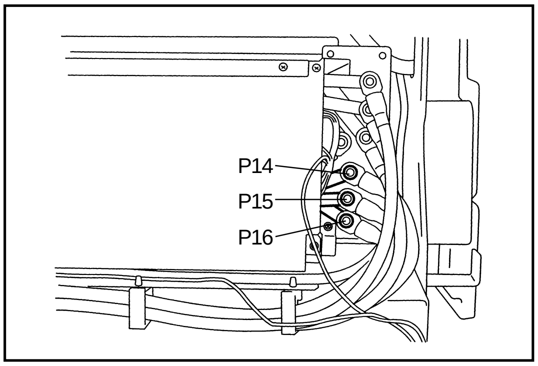
- CPU board defect

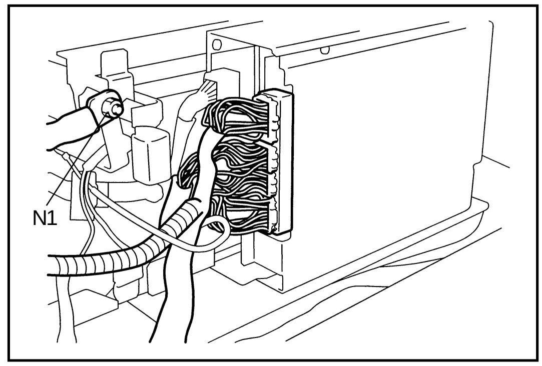
Yes

- Pump motor defect
- Pump motor cable defect

Inspection 1:
Pump motor voltage check
Battery plug ON, key switch ON

| | |
|---|---|
| Measurement terminals | P14•P15•P16 ⊕ – N1 ⊖ |
| Tester range | DC 200 V |
| Standard | 1- and 2-ton series: 0 V to 48 V, 3-ton, J3.5 ton: 0 V to 80 V |

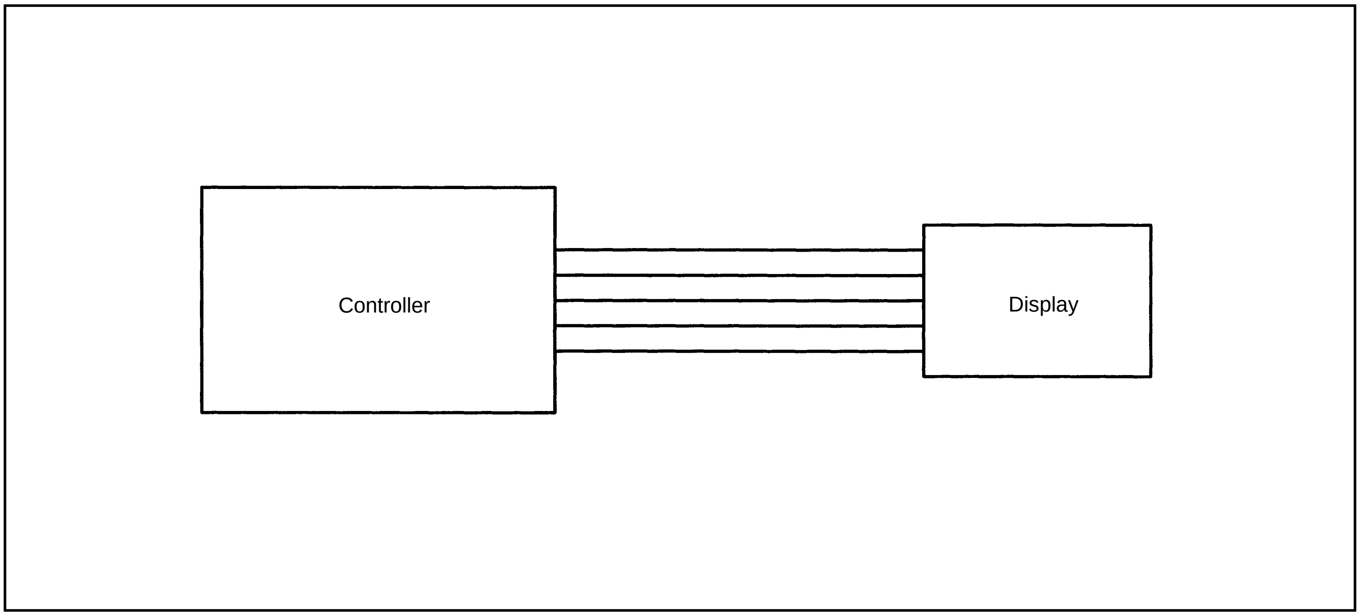



OK (within the standard) → TMD (MOS) defect
NG (outside the standard) → Connect the drive motor cable and check if tires rotate.

# FAILURE IN CONCURRENT TRAVELING AND MATERIAL HANDLING

## Related portion




## Estimated causes

① Hour-meter not started
② Lift interrupt activated
③ Overcharged battery

**Is the hour-meter started?**

- No → Start the hour-meter or set to the demo mode.
- Yes ↓

**Does the battery charge indicator blink when material handling is attempted during traveling?**

- Yes → The lift interrupt device is activated. Charge the battery.
- No ↓

**Does the alarm sound when material handling is attempted during traveling?**

- Yes →
  - The battery charge meter is not matching correctly. Correctly set the battery charge meter.
  - The remaining battery charge is insufficient. Recharge the battery.
- No ↓

**Is independent operation possible?**

- No → See the troubleshooting procedure for “failure in. Traveling Only ---” or “Failure in Material Handling Only ---”.
- ↓

**<u>ANL.: I/O monitor 1</u>**

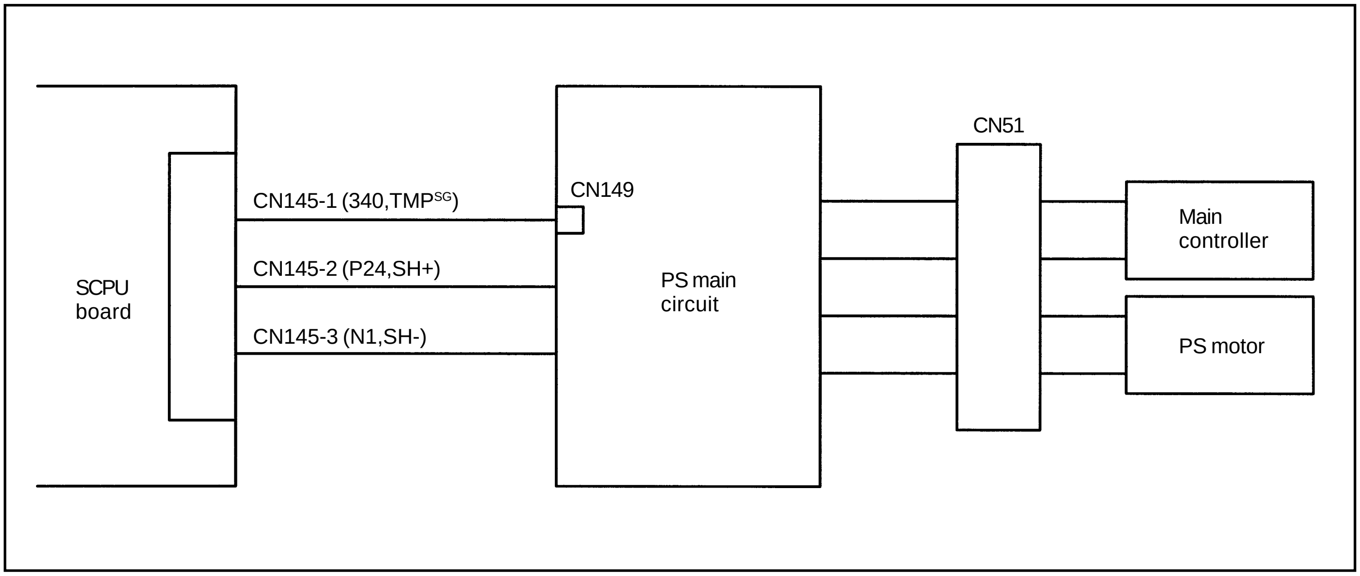
**Battery voltage check (main BMB).**

- Less than 25 V → Charge the battery.
- 25 V or more ↓
  - CPU board defect

# STEERING SYSTEM TROUBLESHOOTING

## Error code F0: PS Main Circuit Abnormality

### Related portion




### Estimated causes

① TMPS defect
② SCPU board defect
③ Poor electrical contact of CN149

Disconnect connector CN51.

F0 cleared. →
- Poor electrical connection of connector CN149
- TMPS inspection → For TMPS defect: Inspection 2

F0 remains. ↓

Inspection 1
Check resistance between shunt and CN145-2.

NG (approx. ∞ Ω) →
- Harness defect

OK (approx. 0 Ω) ↓
- CPU board defect

For TMPS defect

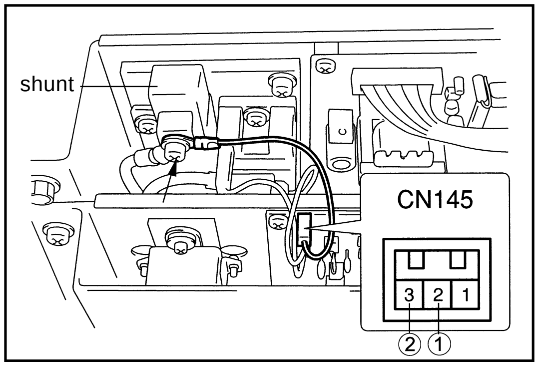
Inspection 2
Disconnect connector CN149 after turning key switch to ON.
CN149-1 (340)
↕ voltage check
SH (shunt) ⊖ level side

NG (outside 0.5 V to 4 V) →
- SCPU board defect

OK (0.5 V to 4 V) ↓
- Normal SCPU board

Inspection 1:
Resistance check between shunt and CN145
Battery plug OFF

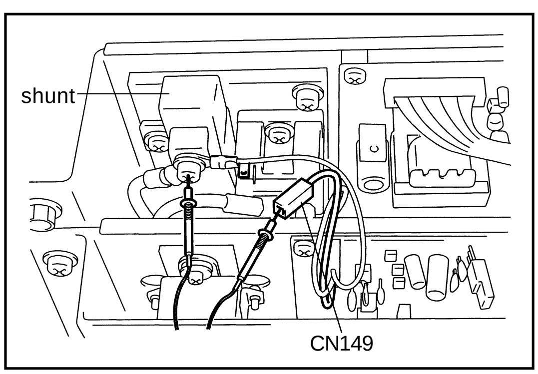
| | |
|---|---|
| Measurement terminals | ① CN145-2 (P24) – SH (shunt)<br>② CN145-3 (N1) – SH (shunt) |
| Tester range | Ω x 1 |
| Standard | Approx. 0 Ω |




OK (approx. 0 Ω) → SCPU board normal
NG (approx. ∞ Ω) → Harness defect

Inspection 2:
Shunt voltage check
Battery plug ON, key switch ON

| | |
|---|---|
| Measurement terminals | CN149-1 (340) (REC side) ⊕ – SH (shunt) ⊖ |
| Tester range | DC 10 V |
| Standard | 0.5 V to 4 V |



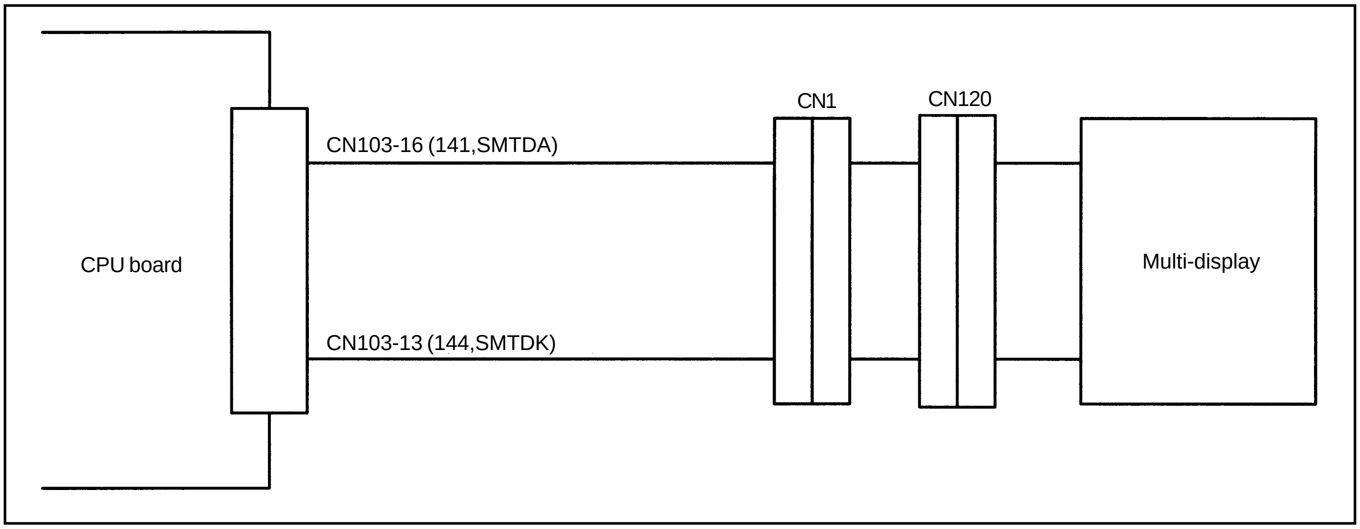

OK (0.5 V to 4 V) → SCPU board normal
NG (outside the standard) → SCPU board defect

# MULTI-DISPLAY – MCS COMMUNICATION SYSTEM TROUBLESHOOTING

## WHEN AN ERROR CODE IS DISPLAYED

### Error code F1: Multi-display – MCS communication system

### Related portion




### Estimated causes

| | |
|---|---|
| ① Open circuit between CN103 and multi-display | ③ Multi-display defect |
| ② Poor electrical contact of CN103, CN1 or CN120 | ④ CPU board defect |

## Error code F1-1: No communication between multi-display and MCS

Check connector CN103 and its harness. Also, check multi-display connector and its harness.

NG → Test again after correction

OK ↓

- CPU board or multi-display board defect

## Error code F1-2: Defective communication data between multi-display and MCS

Check connector CN103 and its harness. Also, check multi-display connector and its harness.

NG → Test again after correction

OK ↓

- CPU board defect
- Multi-display board defect

## Error code F1-3: Improper communication data between multi-display and MCS

Check connector CN103 and its harness. Also, check multi-display connector and its harness.

NG → Test again after correction

OK ↓

- CPU board defect
- Multi-display board defect

## WHEN NO ERROR CODE IS DISPLAYED

When an F1-1 occurs, error code F1-1 remains on the multi-display regardless of ON or OFF of the key switch, since no communication data is sent from CPU to the multi-display.
(The power for the multi-display is directly supplied from the CPU.)

1. No indication on multi-display (including error indication)

Inspection 1

Display power supply voltage check

NG (0 V) →

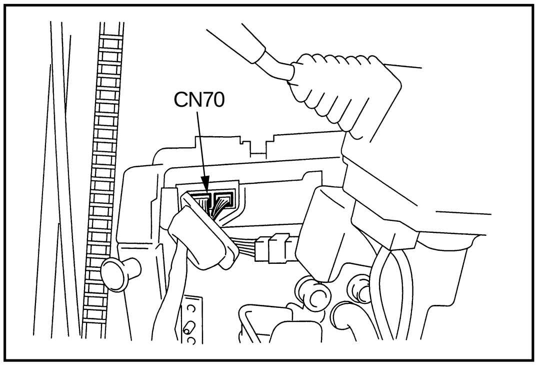
- Wiring defect
- CPU board defect
- DC/MD board defect

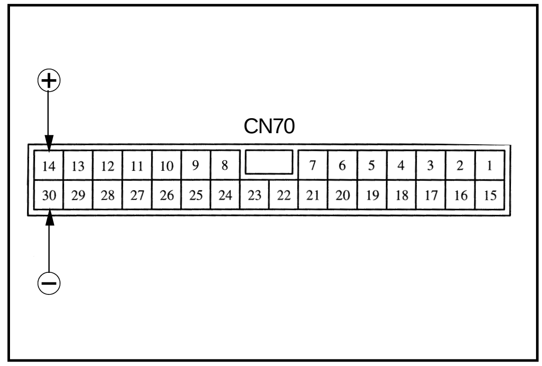
OK (Approx. 1.5 V) ↓

- Multi-display board defect
- LCD panel defect

Inspection 1:
Display power supply voltage check
Battery plug ON

| | |
|---|---|
| Measurement terminals | CN70-14 (16) ⊕ – CN70-30 (14) ⊖ |
| Tester range | DC 50 V |
| Standard | Approx. 15 V |



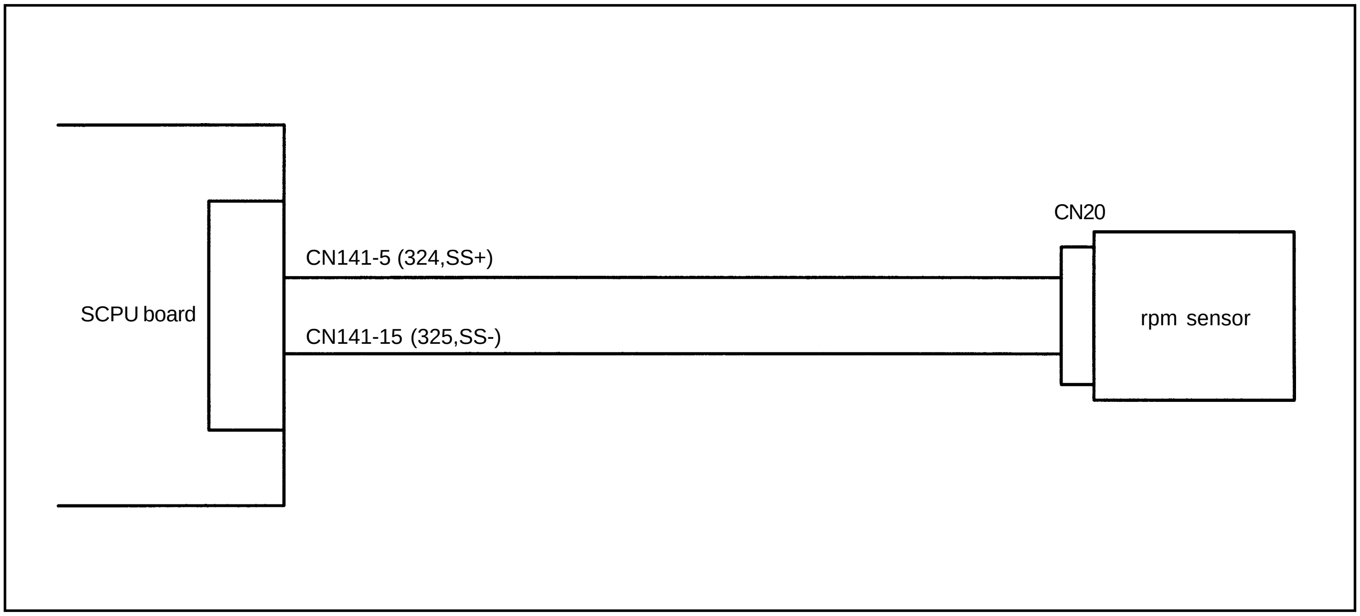

OK (approx. 15 V) → Multi-display board or LCD panel defect
NG (0 V) → Wiring, CPU board or DC-BD board defect

# SAS TROUBLESHOOTING

## WHEN AN ERROR CODE IS DISPLAYED

### Error code 51: Vehicle Speed Sensor Abnormality

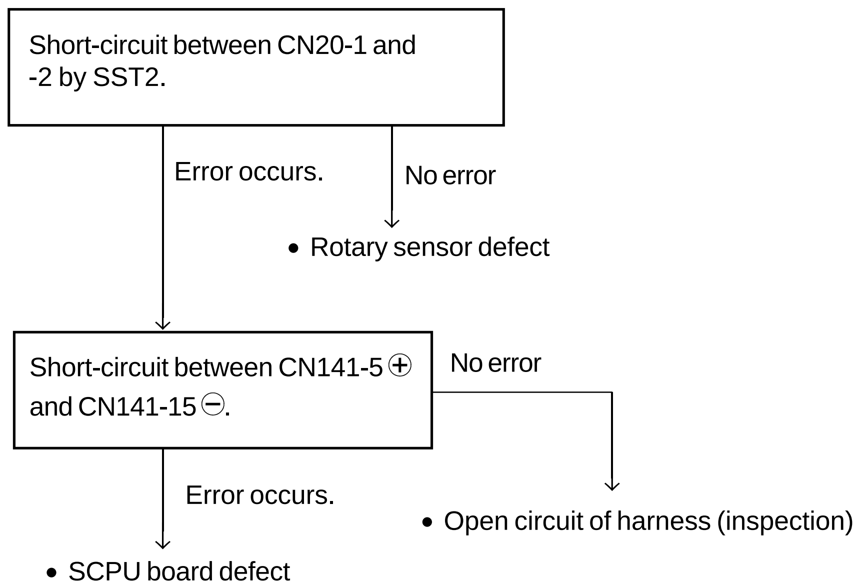
### Related portion



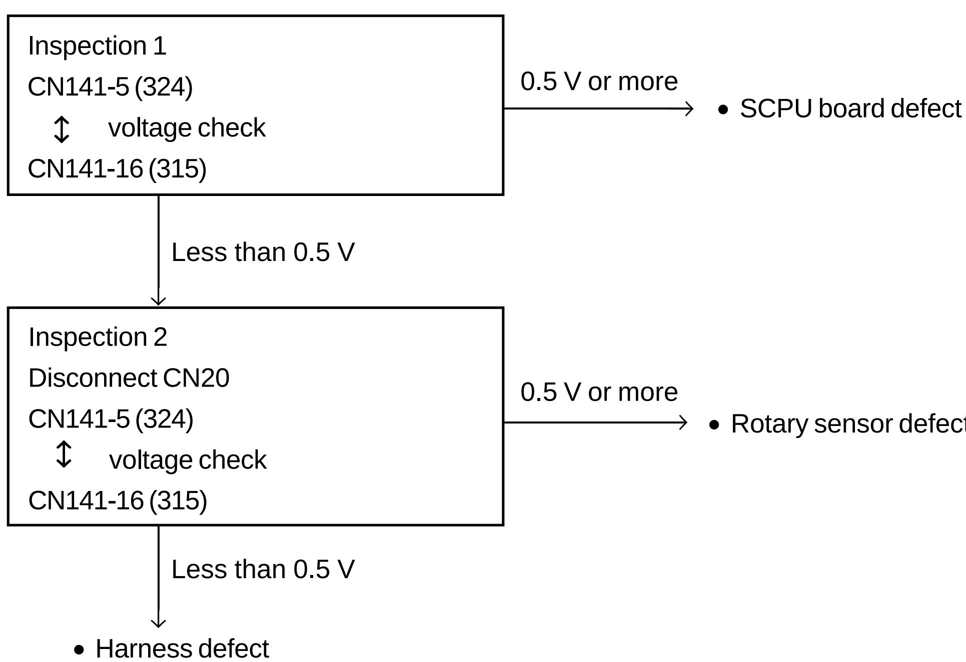

### Estimated causes

| | |
|---|---|
| ① | Rotary sensor defect |
| ② | Open circuit of harness |
| ③ | SCPU board defect |

## For 51-1

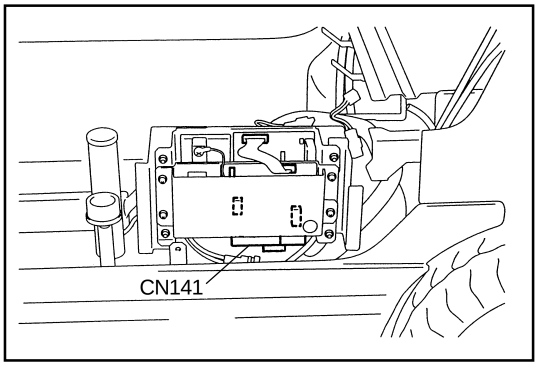


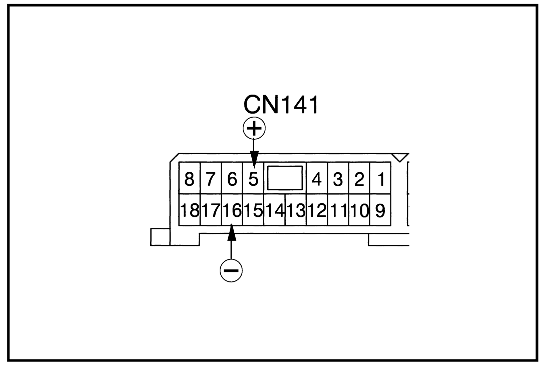

## For 51-2



Inspection 1 <for 51-2>:
Rotary sensor signal voltage check 1
Battery plug ON, key switch ON

| Measurement terminals | CN141-5 (324) ⊕ – CN141-16 (315) ⊖ |
|---|---|
| Tester range | DC 10 V |
| Standard | 0.5 V or more |

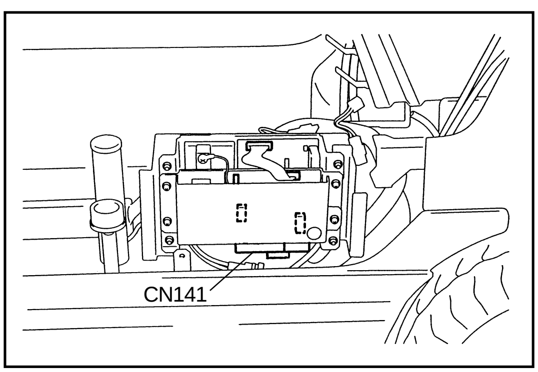


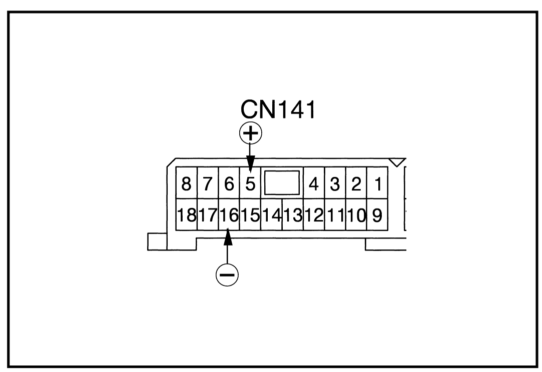




OK (0.5 V or more) → SCPU board defect
NG (less than 0.5 V) → Go to Inspection 2.

Inspection 2 <for 51-2>:
Rotary sensor signal voltage check 2
Battery plug ON, key switch ON, CN20 disconnection

| Measurement terminals | CN141-5 (324) ⊕ – CN141-16 (315) ⊖ |
|---|---|
| Tester range | DC 10 V |
| Standard | 0.5 V or more |

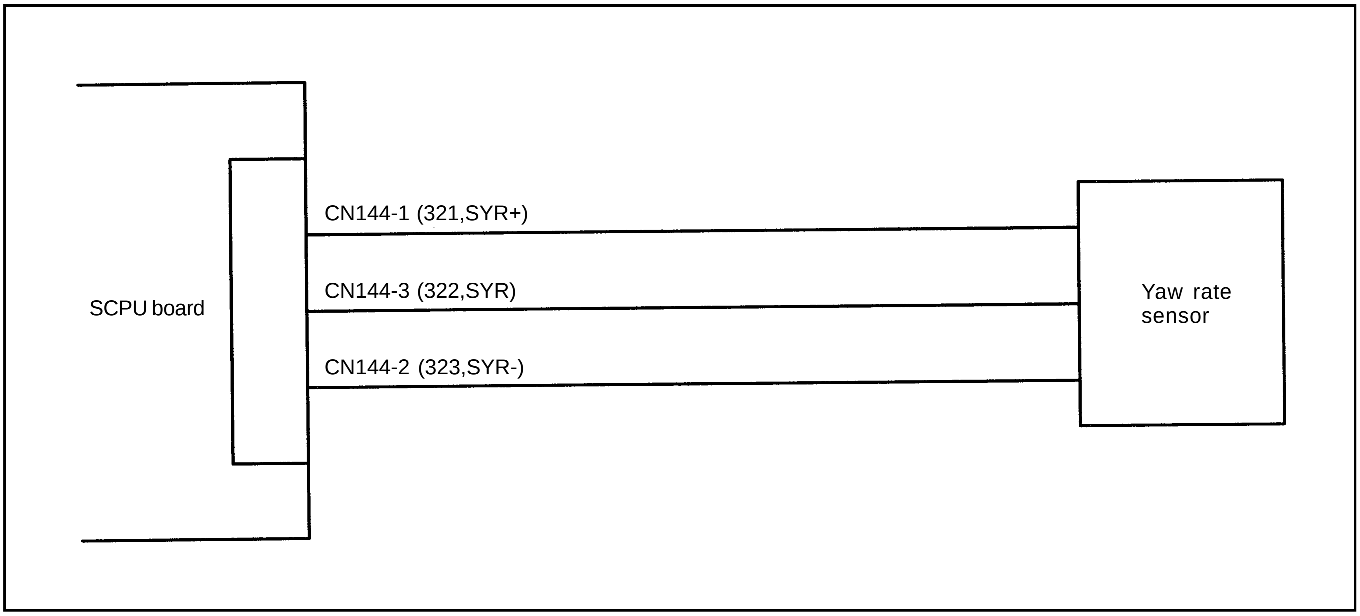



OK (0.5 V or more) → Rotary sensor defect
NG (less than 0.5 V) → Harness defect

# Error Code 52: Yaw Rate Sensor Abnormality

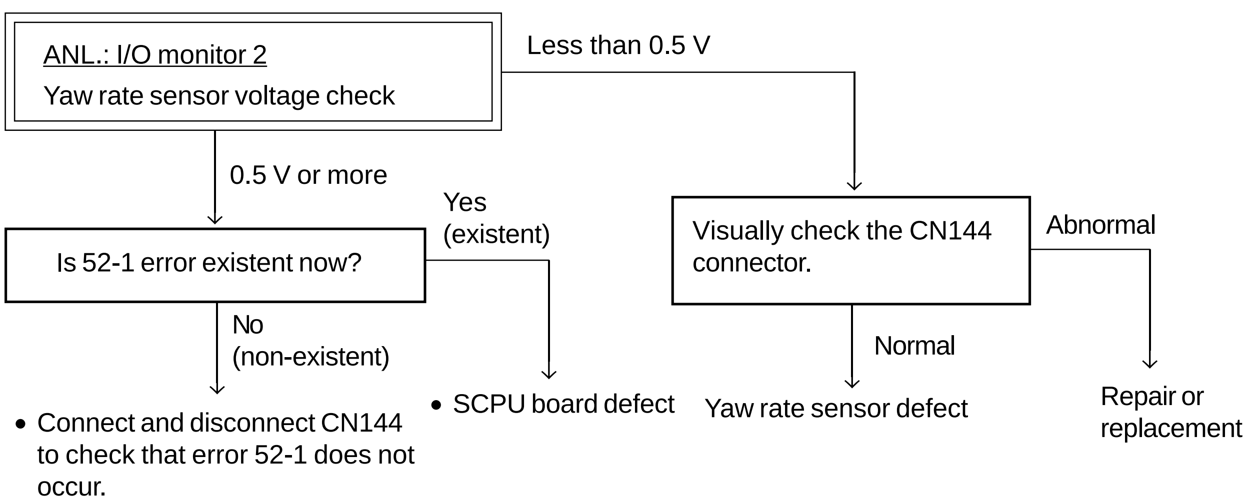
## Related portion



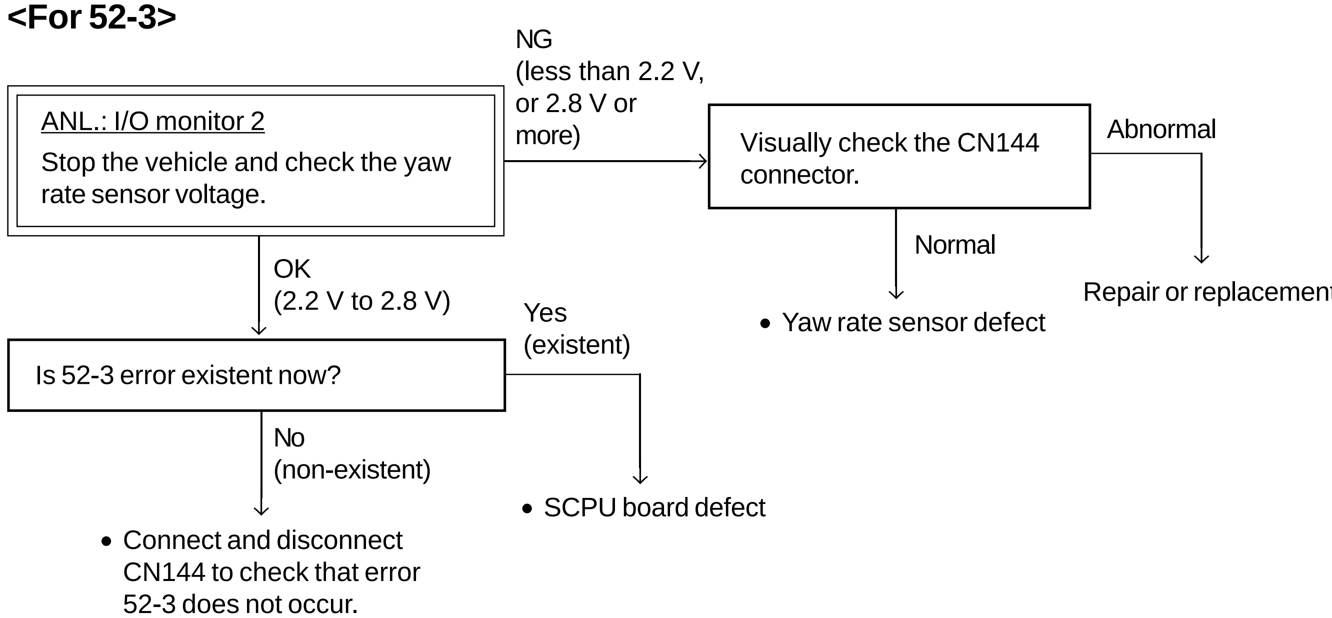

## Estimated causes

① Yaw rate sensor defect
② Short or open circuit of connector

## <For 52-1 or 52-2>

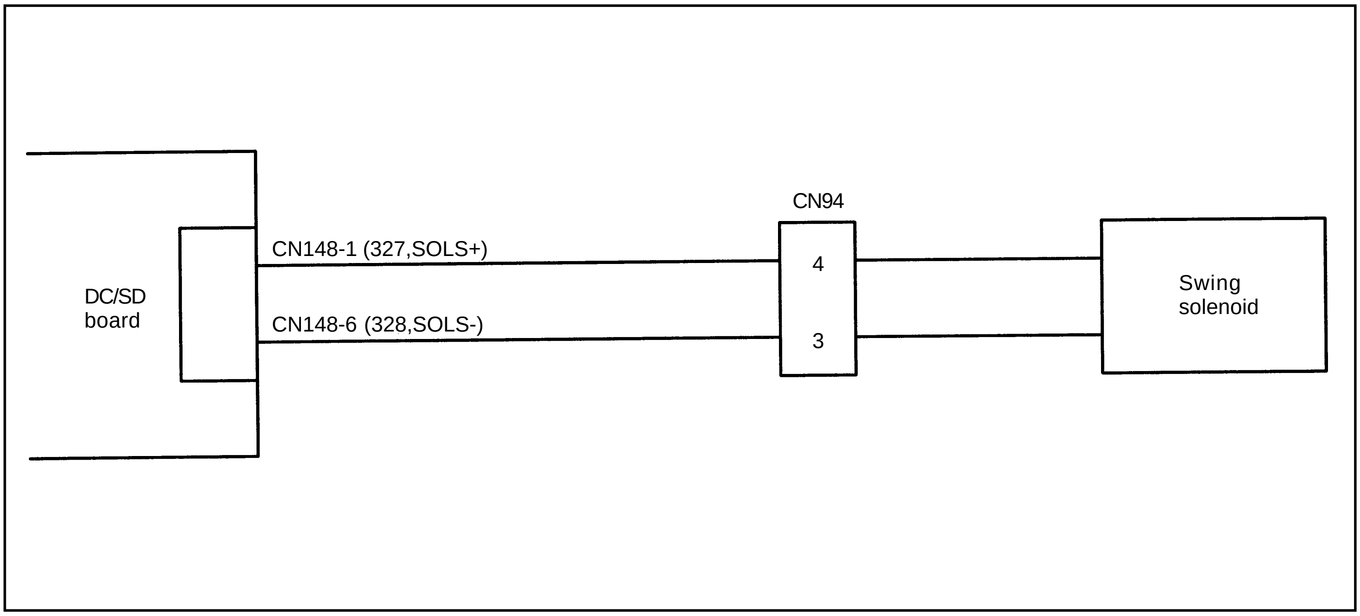


## <For 52-3>


ANL.: I/O monitor 2
Stop the vehicle and check the yaw rate sensor voltage.
NG (less than 2.2 V, or 2.8 V or more)
Visually check the CN144 connector.
Abnormal
Repair or replacement
Normal
• Yaw rate sensor defect
OK (2.2 V to 2.8 V)
Is 52-3 error existent now?
Yes (existent)
• SCPU board defect
No (non-existent)
• Connect and disconnect CN144 to check that error 52-3 does not occur.

## Error Code 54: Swing Solenoid Abnormality

### Related portion




### Estimated causes

| | |
|---|---|
| ① Swing solenoid defect | ③ DC/SD board defect |
| ② Short or open circuit of harness | ④ SCPU board defect |

### <For 54-1>

**Inspection 1**
Disconnect CN148
CN148-1 (327)
↕ resistance check
CN148-6 (328)

- 5.5 Ω ± 1 Ω (at 25°C) →

  **ANL.: ACTIVE**
  Replace the harness between CN146 and CN147 with SST5 and turn the swing solenoid ON.
  (See page 5-8).

  - Check signal "1": Normal →
    - CN146-CN147 harness defect
    - DC/SD board defect
  - Check signal "0": Abnormal →
    - SCPU board defect

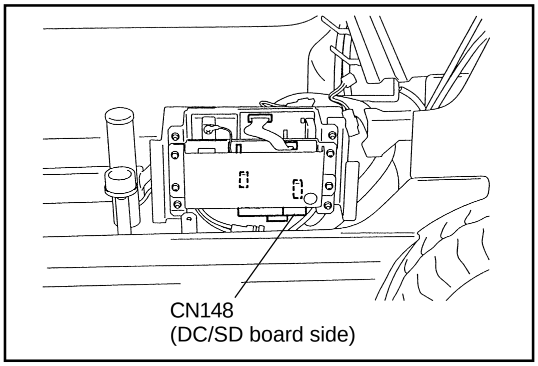
- other than 5.5 Ω ± 1 Ω (at 25°C) →

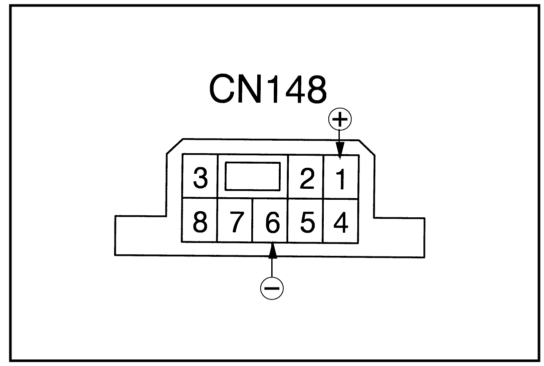
  **Inspection 2**
  Disconnect CN94
  CN94-4 (327)
  ↕ resistance check
  CN94-3 (320)

  - 5.5 Ω ± 1 Ω →
    - Main harness defect
  - other than 5.5 Ω ± 1 Ω →
    - Swing solenoid defect

Inspection 1 <for 54-1>:
Swing solenoid resistance check 1
Battery plug OFF, CN148 disconnection

| | |
|---|---|
| Measurement terminals | CN148-1 (327) ⊕ – CN148-6 (328) ⊖ |
| Tester range | Ω x 1 |
| Standard | 5.5 ± 1 Ω (at 25°C) |

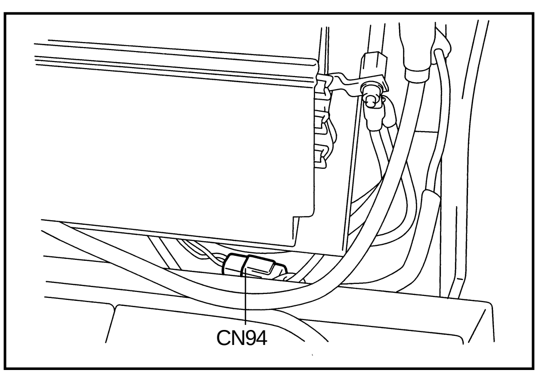


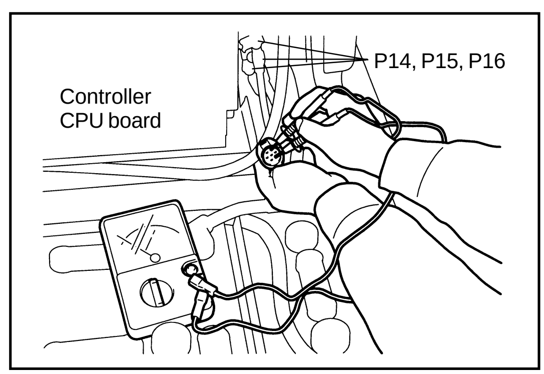




OK (5.5 ± 1Ω) → Go to ANL.: ACTIVE.
NG (other than 5.5 ± 1 Ω) → Go to Inspection 2.

Inspection 2 <for 54-1>:
Swing solenoid resistance check 2
Battery plug OFF, CN94 disconnection

| | |
|---|---|
| Measurement terminals | CN94-4 (327) ⊕ – CN94-3 (320) ⊖ |
| Tester range | Ω x 1 |
| Standard | 5.5 ± 1 Ω (at 25°C) |




OK (5.5 ± 1 Ω) → Main harness defect
NG (other than 5.5 ± 1 Ω) → Swing solenoid defect

## <For 54-2>

ANL.: ACTIVE

Replace the harness between CN146 and CN147 with SST5 and check the swing solenoid signal (without turning the solenoid ON).

"1"

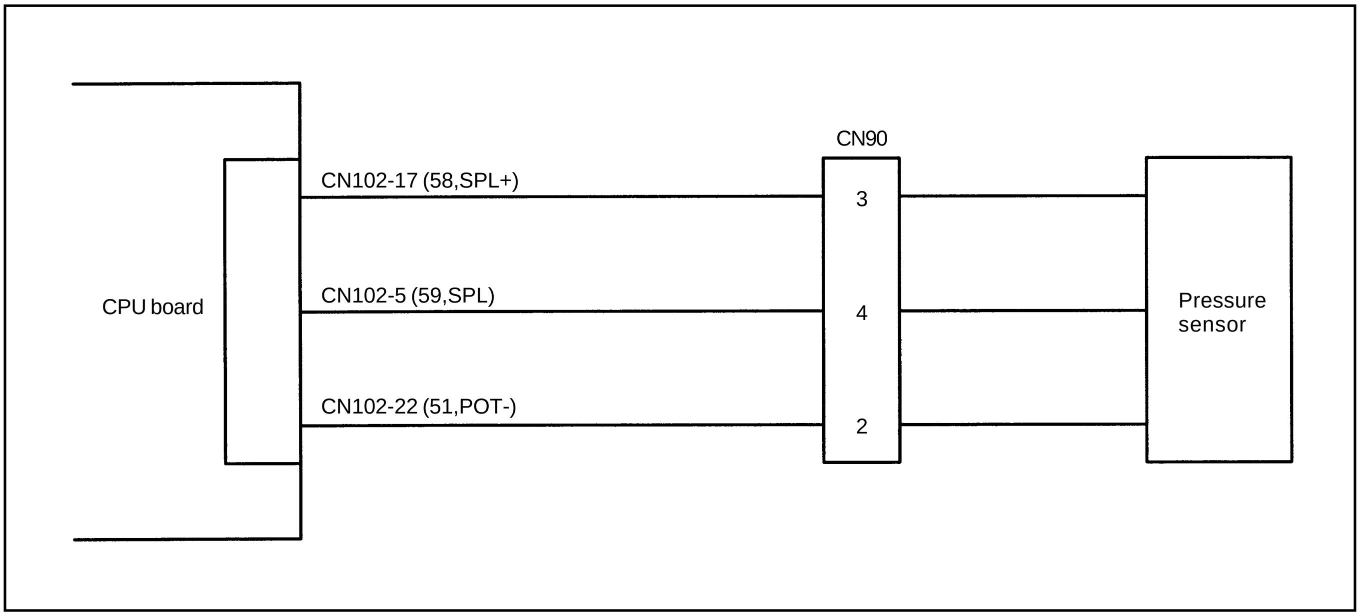
- SCPU board defect

"0"

- CN146-CN147 harness defect
- DC/SD board defect

# Error Code 61: Pressure Sensor Abnormality

## Related portion




## Estimated causes

① Pressure sensor defect
② Harness defect (short or open circuit)
③ CPU board defect

## <For 61-1>

Disconnect CN90, and use SST2 to short between terminals 3 and 4 on the REC side.

Error 61-2 occurs. →
- Sub-harness check
- Pressure sensor check

Error 61-2 does not occur. ↓

Inspection 1
Maintain SST2 as set, disconnect CN102
CN102-17 (58)
↕ resistance check
CN102-5 (59)

Open (∞ Ω) →
- Main harness defect

Short (20 Ω or less) ↓
- CPU board defect

## <For 61-2>

Disconnect CN90, and use SST2 to short between terminals 3 and 4 on the REC side.

Error 61-1 occurs.

- Sub-harness check
- Pressure sensor check

Error 61-1 does not occur.

Inspection 1

Maintain SST2 as set, disconnect CN102

CN102-5 (59)

↕ resistance check

CN102-22 (51)

Open (∞ Ω)

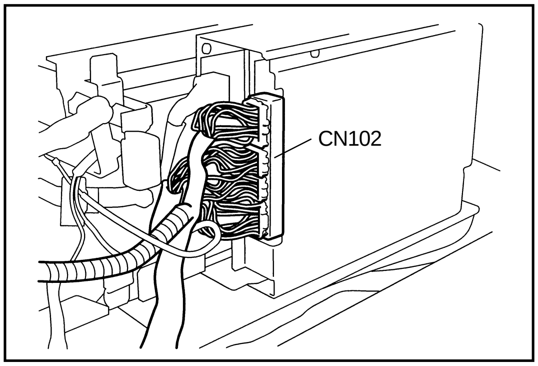
- Open circuit of main harness

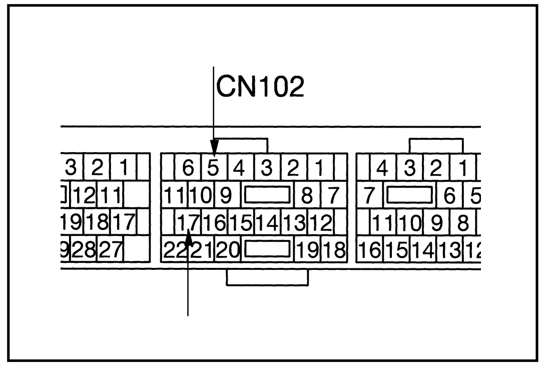
Short
(20 Ω or less)

- CPU board defect

Inspection 1 <for 61-1>:
Pressure sensor resistance check 1
Battery plug OFF, CN90 disconnection

| Measurement terminals | CN102-17 (58) – CN102-5 (59) |
|---|---|
| Tester range | Ω x 10 |
| Standard | Less than 20 Ω |

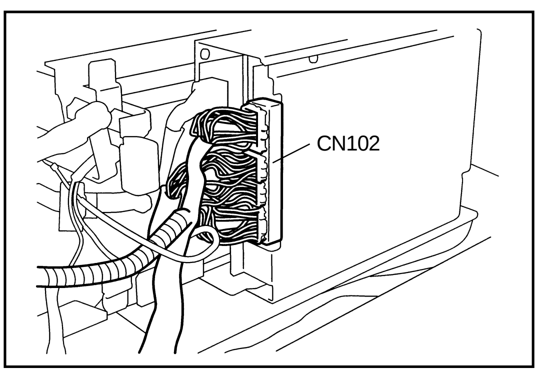


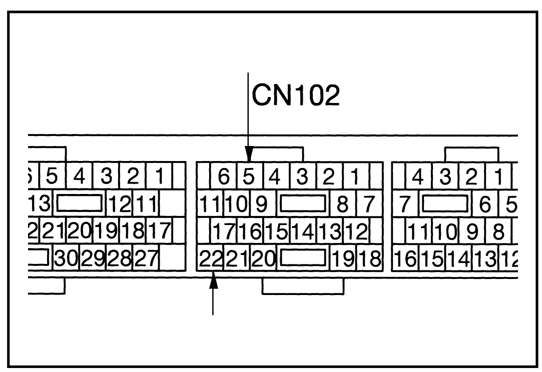




OK (short: less than 20 Ω) → CPU board defect
NG (open: ∞ Ω) → Open circuit of main harness

Inspection 1 <for 61-2>:
Pressure sensor resistance check 2
Battery plug OFF, CN102 disconnection

| Measurement terminals | CN102-5 (59) – CN102-22 (51) |
|---|---|
| Tester range | Ω x 10 |
| Standard | Less than 20 Ω |

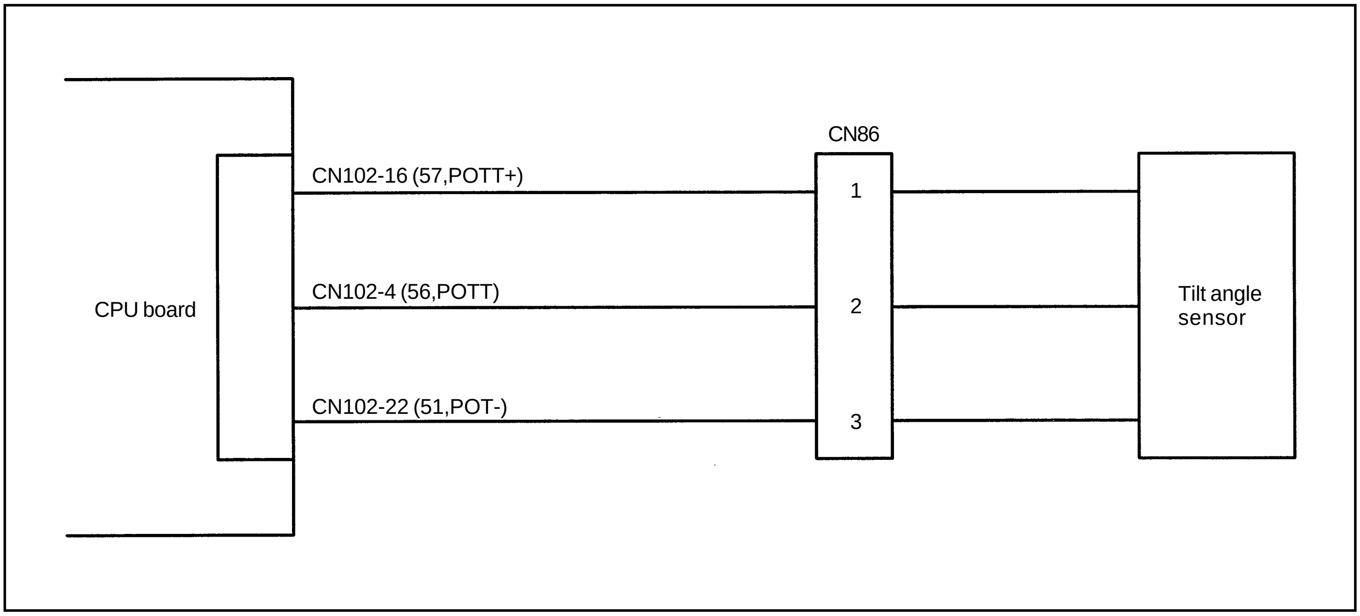



OK (short: less than 20 Ω) → CPU board defect
NG (open: ∞ Ω) → Open circuit of main harness

## Error Code 62: Tilt Angle Sensor Abnormality

### Related portion




### Estimated causes

① Tilt angle sensor abnormality
② Harness (short or open circuit)

### <For 62-1>

Disconnect CN86, and use SST2 to short terminals 1 and 2 on the REC side.

Error 62-2 occurs. →
- Sub-harness check
- Inspection of tilt angle sensor

↓ Error 62-2 does not occur.

Inspection 1
Maintain SST2 as set, disconnect
CN102-16 (57)
↕ resistance check
CN102-4 (56)

Open (∞ Ω) →
- Open circuit of main harness

↓ Short (20 Ω or less)

- CPU board defect

## <For 62-2>

Disconnect CN86, and use SST2 to short terminals 2 and 3 on the REC side.

Error 62-1 occurs. →

- Sub-harness check
- Inspection of tilt angle sensor

↓ Error 62-1 does not occur.

Inspection 2
Maintain SST2 as set, disconnect CN102
CN102-4 (56)
↕ resistance check
CN102-22 (51)

Open (∞ Ω) →

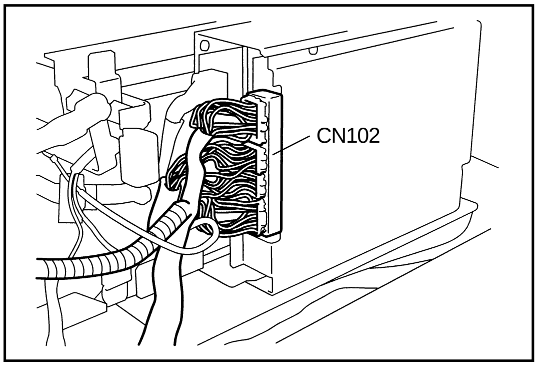
- Open circuit of main harness

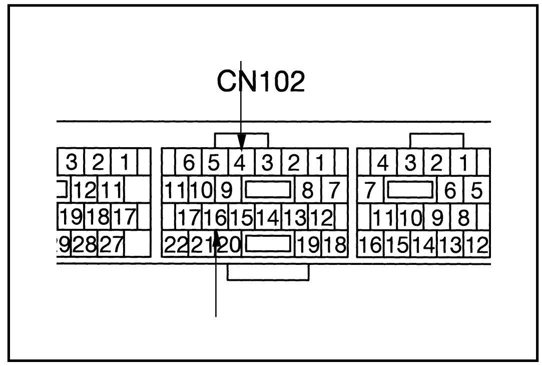
↓ Short (20 Ω or less)

- CPU board defect

Inspection 1 <for 62-1>:
Tilt angle sensor resistance check 1
Battery plug OFF, connector CN86 disconnection

| | |
|---|---|
| Measurement terminals | CN102-16 (57) – CN102-4 (56) |
| Tester range | Ω x 10 |
| Standard | 20 Ω or less |

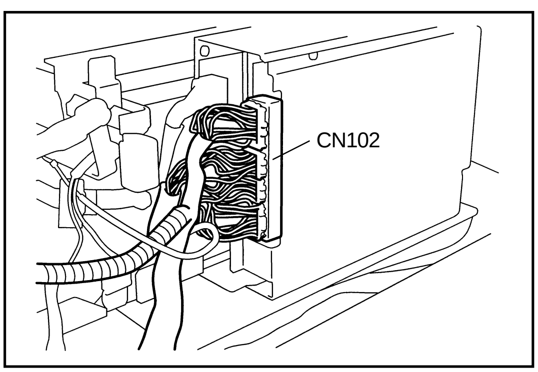


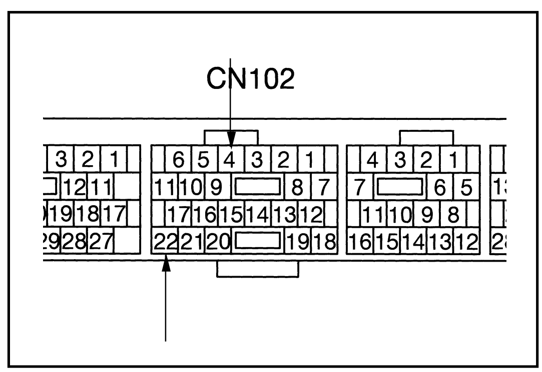




OK (short: 20 Ω or less) → CPU board defect
NG (open: ∞ Ω) → Open circuit of main harness

Inspection 1 <for 62-2>:
Tilt angle sensor resistance check 2
Battery plug OFF, connector CN102 disconnection

| | |
|---|---|
| Measurement terminals | CN102-4 (56) – CN102-22 (51) |
| Tester range | Ω x 10 |
| Standard | 20 Ω or less |

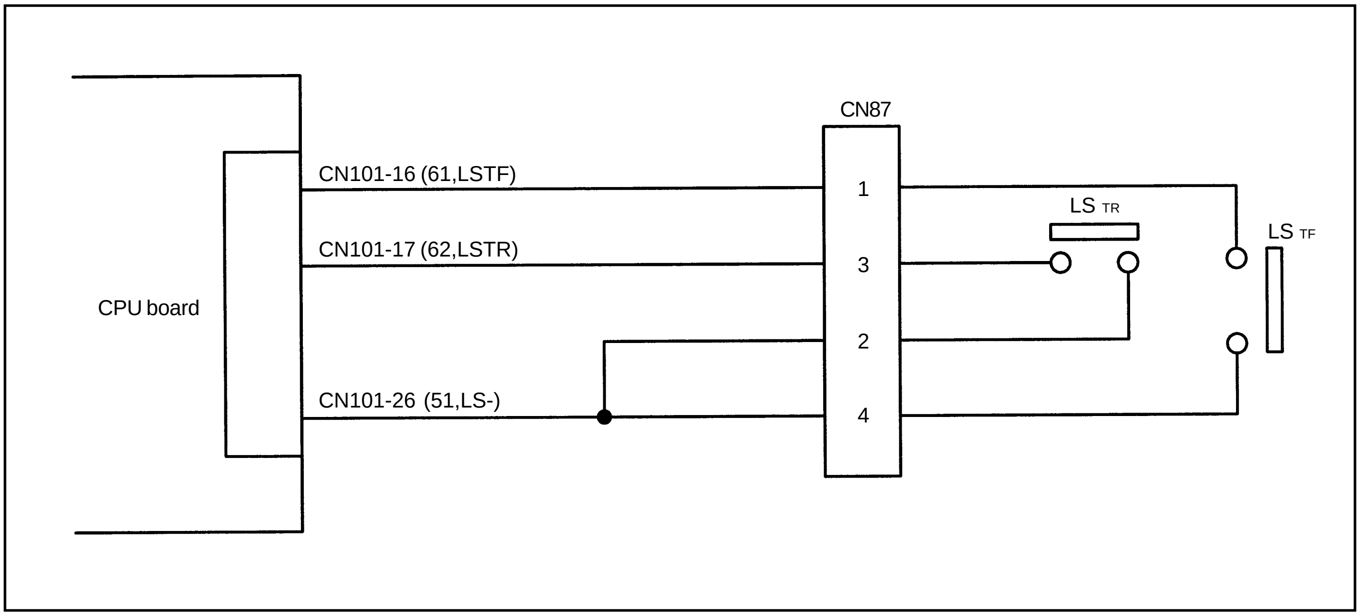



OK (short: 20 Ω or less) → CPU board defect
NG (open: ∞ Ω) → Open circuit of main harness

# Error Code 63: Tilt Switch Abnormality

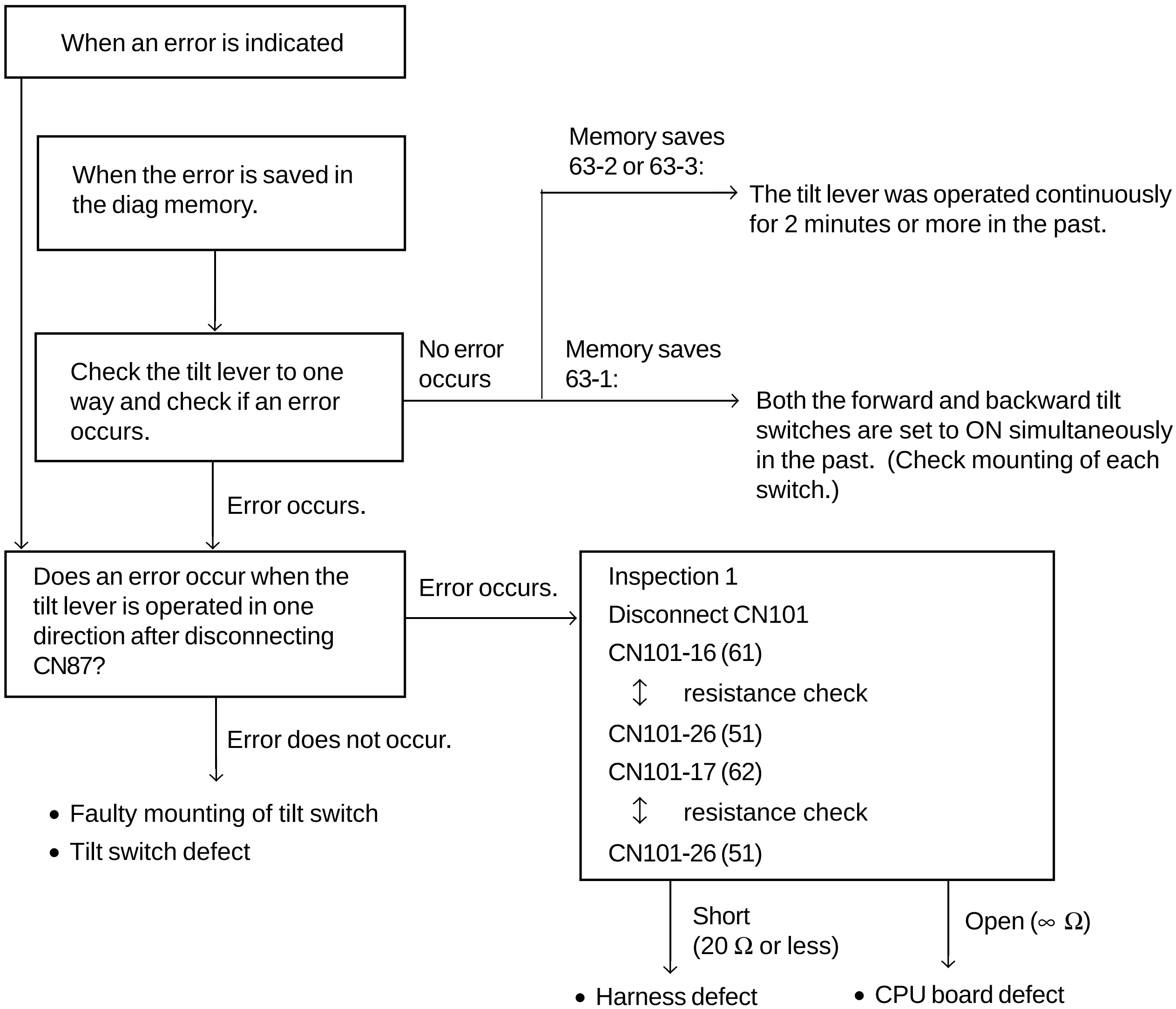
## Related portion




## Estimated causes

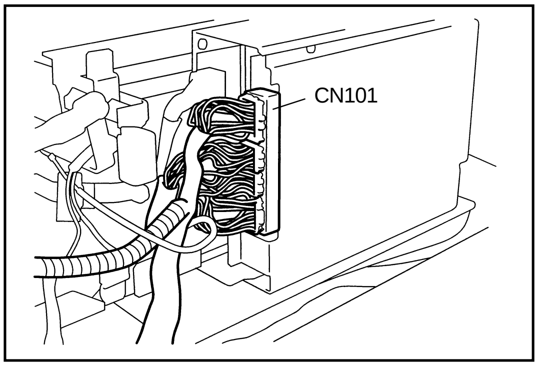
| | |
|---|---|
| ① | Short-circuit of tilt switch |
| ② | Short-circuit of harness |
| ③ | CPU board defect |

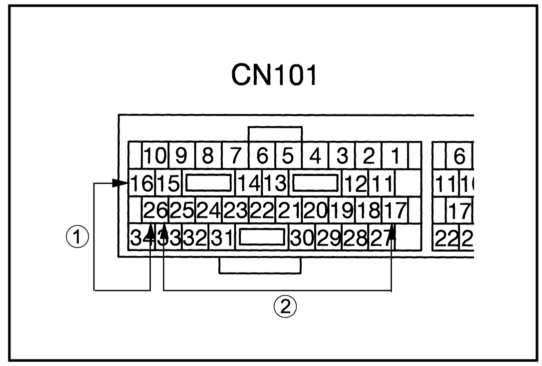
## <For 63-1, 63-2 or 63-3>



Inspection 1
Forward/Backward Tilt Switch Check:
Battery plug OFF

| | |
|---|---|
| Measurement terminals | ① Forward: CN101-16 (61) – CN101-26 (51)<br>② Backward: CN101-17 (62) – CN101-26 (51) |
| Tester range | Ω x 1 |
| Standard | ∞ Ω |

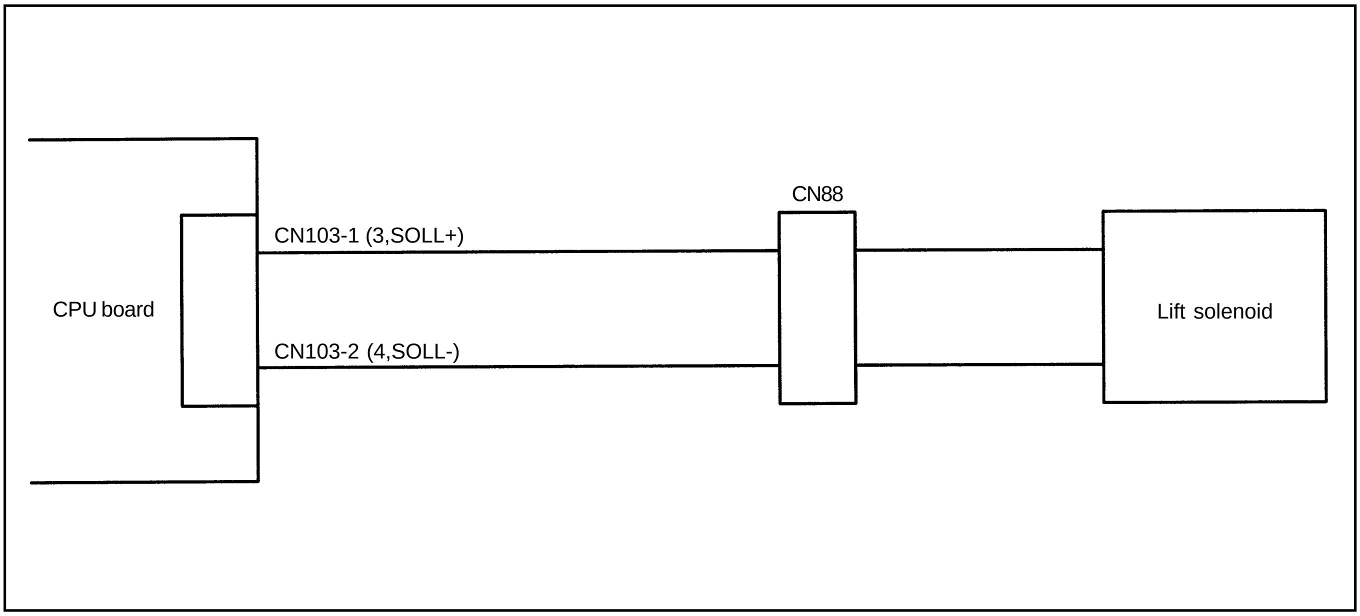



OK (open: ∞ Ω) → CPU board normal
NG (short: 20 Ω or less) → Short-circuit of harness

# Error Code 64: Lift Solenoid Abnormality

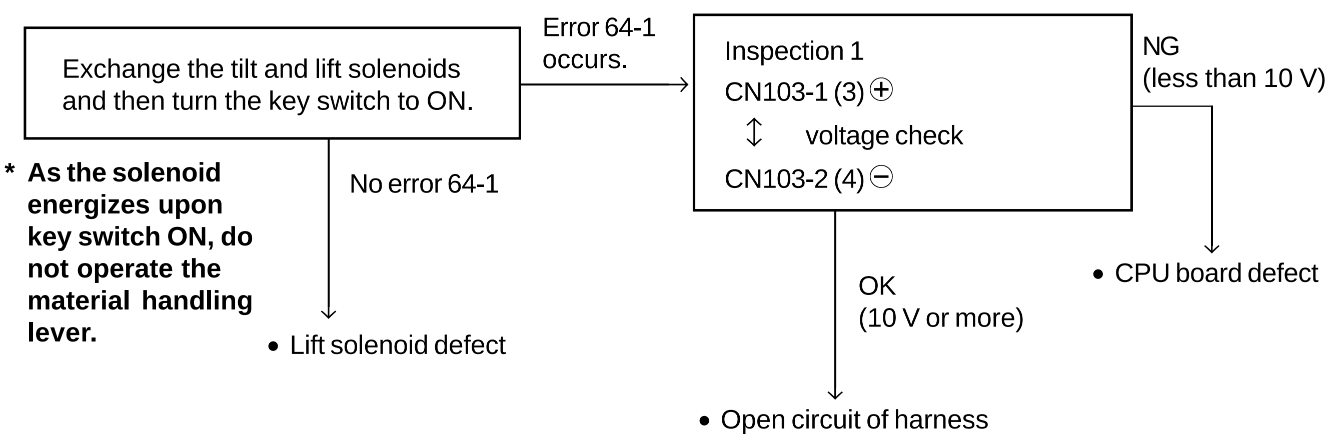
## Related portion




## Estimated causes

① Lift solenoid defect
② Open or short circuit of harness
③ CPU board defect

## <For 64-1>



## <For 64-2>

Exchange the tilt and lift solenoids and then turn the key switch to ON.

*** As the solenoid energizes upon key switch ON, do not operate the material handling lever.**

No error 64-2 →

- Lift solenoid defect

Error 64-2 occurs. →

Inspection 1

Disconnect CN88 and CN103.

CN103-1 (3) ⊕

↕ resistance check

CN103-2 (4) ⊖

OK: Open (∞ Ω) →

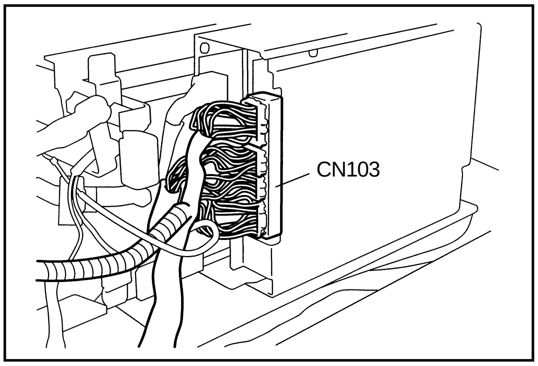
- CPU board defect

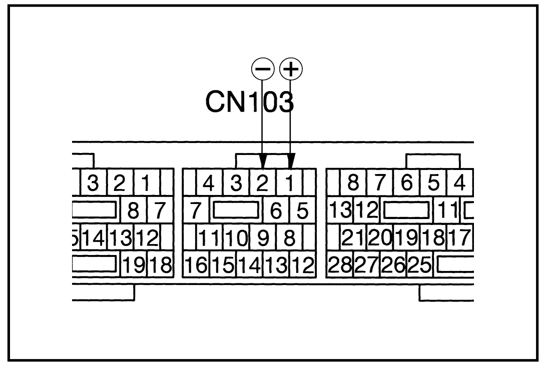
NG: Short (20 Ω or less) →

- Open circuit of harness

Inspection 1 <for 64-1>:
Lift solenoid signal voltage check
Battery plug ON, key switch ON
*** Use the analog tester for measurement.**

| | |
|---|---|
| Measurement terminals | CN103-1 (3) ⊕ – CN103-2 (4) ⊖ |
| Tester range | DC 50 V |
| Standard | 10 V or more |

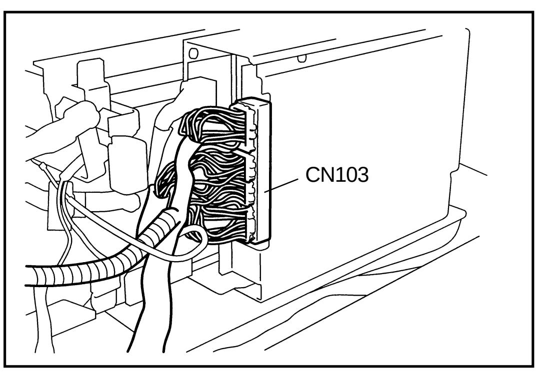


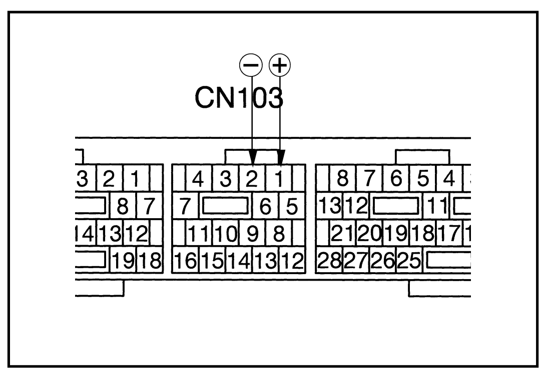




NG (less than 10 V) → CPU board defect
OK (10 V or more) → Open circuit of harness

Inspection 1 <for 64-2>:
Lift solenoid resistance check
Battery plug OFF, connector CN88 and CN103 disconnection

| | |
|---|---|
| Measurement terminals | CN103-1 (3) ⊕ – CN103-2 (4) ⊖ |
| Tester range | Ω x 10 |
| Standard | ∞ Ω |

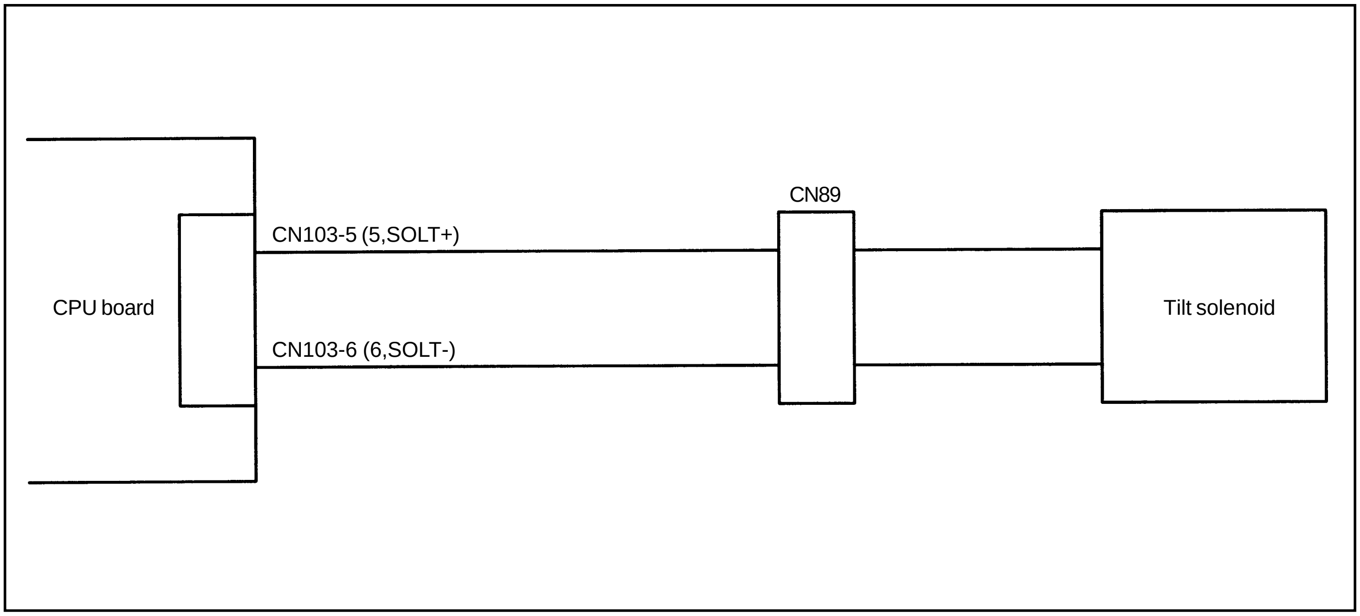



OK (∞ Ω) → CPU board defect
NG (20 Ω or less) → Short-circuit of harness

# Error Code 65: Tilt Solenoid Abnormality (SAS Vehicle)

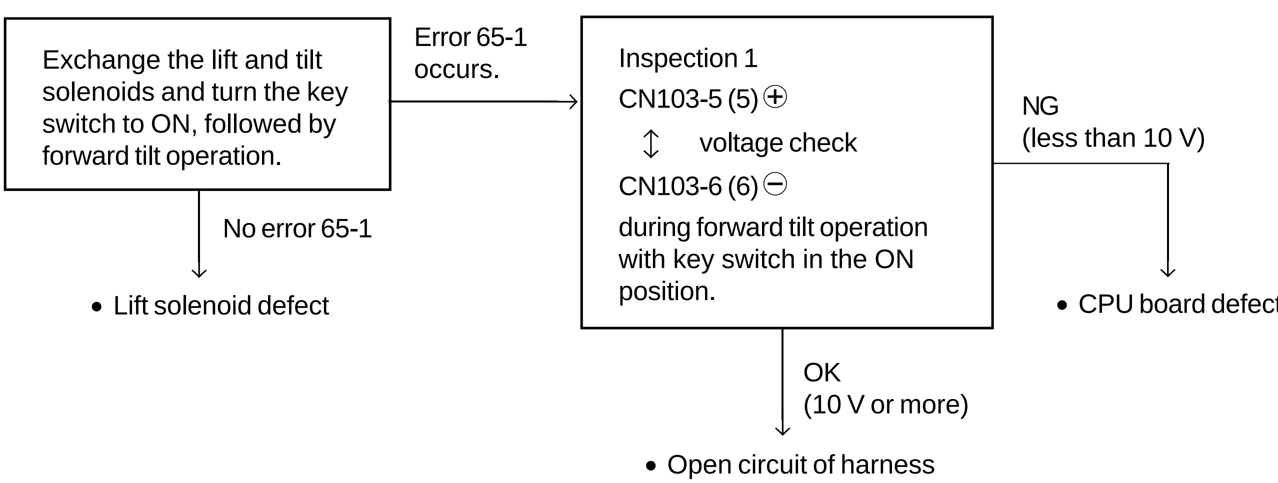
## Related portion




## Estimated causes

① Tilt solenoid defect
② Open or short circuit of harness
③ CPU board defect

## <For 65-1>



## <For 65-2>

Exchange the lift and tilt solenoids and turn the key switch to ON, followed by the forward tilt operation.

No error 65-2

- Lift solenoid defect

Error 65-2 occurs.

Inspection 1

Disconnect CN89 and CN103.

CN103-5 (5) ⊕

↕ resistance check

CN103-6 (6) ⊖

NG (short-circuit: 20 Ω or less)

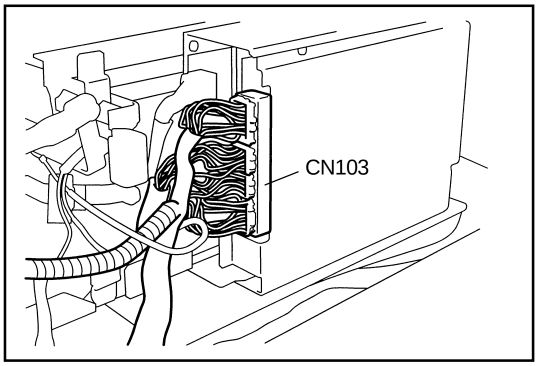
- Short-circuit of harness

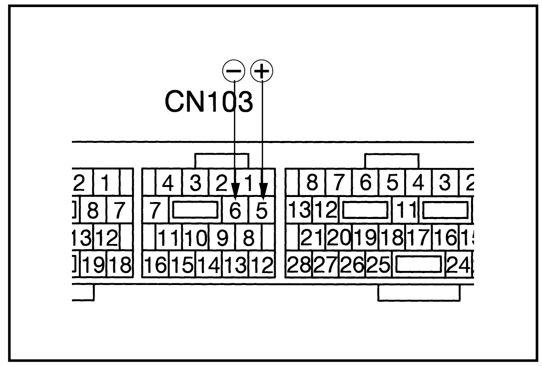
OK (open: ∞ Ω)

- CPU board defect

Inspection 1 <for 65-1>:
Tilt solenoid signal voltage check
Battery plug ON, check during forward tilt operation with key switch in the ON position
*** Use the analog tester for measurement.**

| | |
|---|---|
| Measurement terminals | CN103-5 (5) ⊕ – CN103-6 (6) ⊖ |
| Tester range | DC 50 V |
| Standard | 10 V or more |

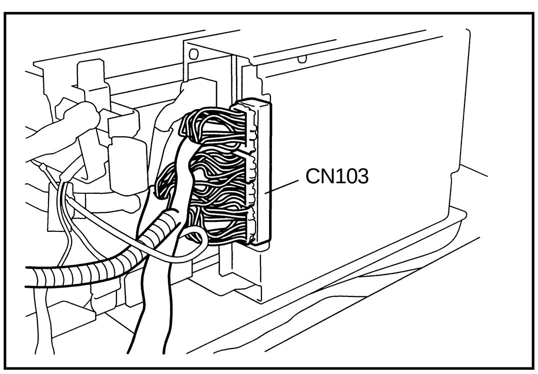


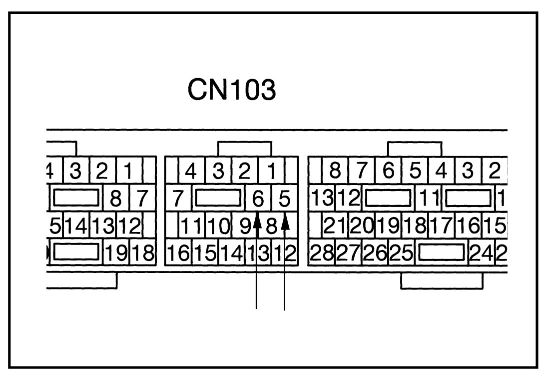




OK (10 V or more) → CPU board defect
NG (less than 10 V) → Open circuit of harness

Inspection 1 <for 65-2>:
Lift solenoid resistance check
Battery plug OFF, connectors CN88 and CN103 disconnection

| | |
|---|---|
| Measurement terminals | CN103-5 (5) ⊕ – CN103-6 (6) ⊖ |
| Tester range | Ω x 1 |
| Standard | ∞ Ω |

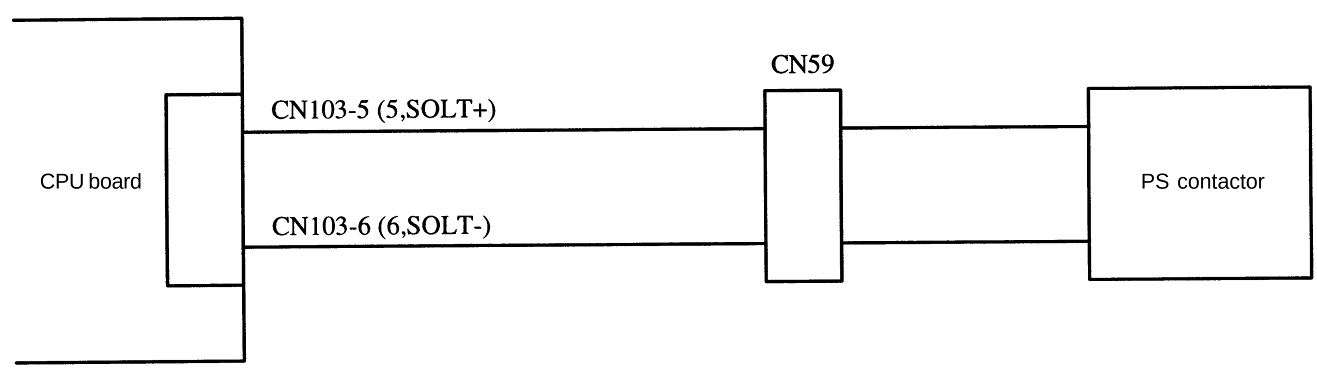



NG (20 Ω or less) → Short-circuit harness
OK (∞ Ω) → CPU board defect

## Error Code 65: PS Contactor Abnormality (Vehicle without SAS)

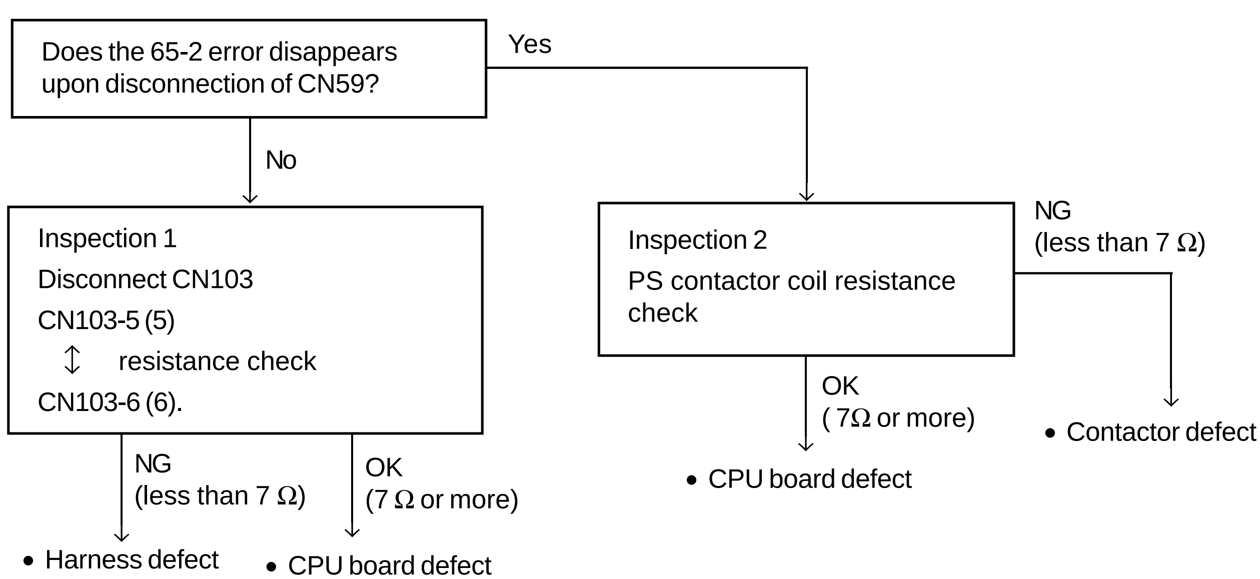
### Related portion




### Estimated causes

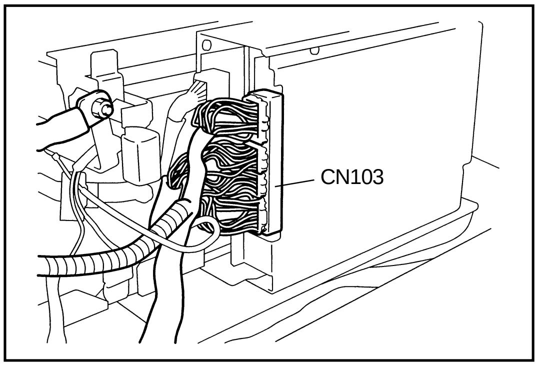
① PS contactor defect
② Short-circuit of harness
③ CPU board defect

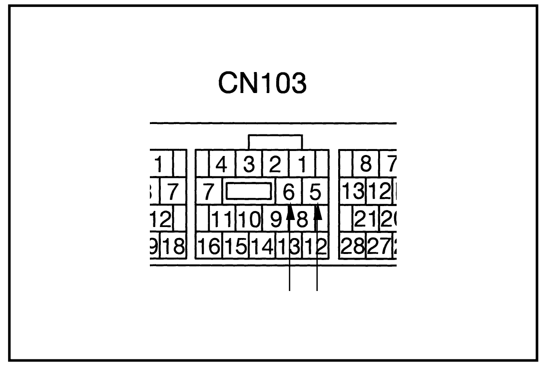
### <For 65-2>



Inspection 1:
PS contactor coil resistance check 1
Battery plug OFF, connector CN103 disconnection

| | |
|---|---|
| Measurement terminals | CN103-5 (5) – CN103-6 (6) |
| Tester range | Ω x 1 |
| Standard | 7 Ω or more |

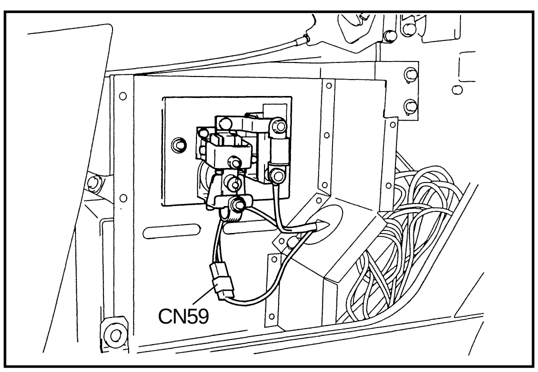


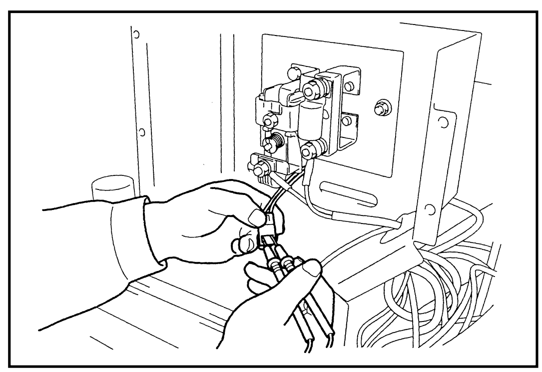




OK (7 Ω or more) → CPU board defect
NG (less than 7 Ω) → Harness defect

Inspection 2:
PS contactor coil resistance check 2
Battery plug OFF, connector CN59 disconnection

| | |
|---|---|
| Measurement terminals | CN59-1 (85) – CN59-2 (84) |
| Tester range | Ω x 1 |
| Standard | 7 Ω or more |



OK (7 Ω or more) → CPU board defect
NG (less than 7 Ω) → Contactor defect

## Error Code 66: Tilt Switching Value Abnormality

### Related portion

| |
|---|
| SCPU board |

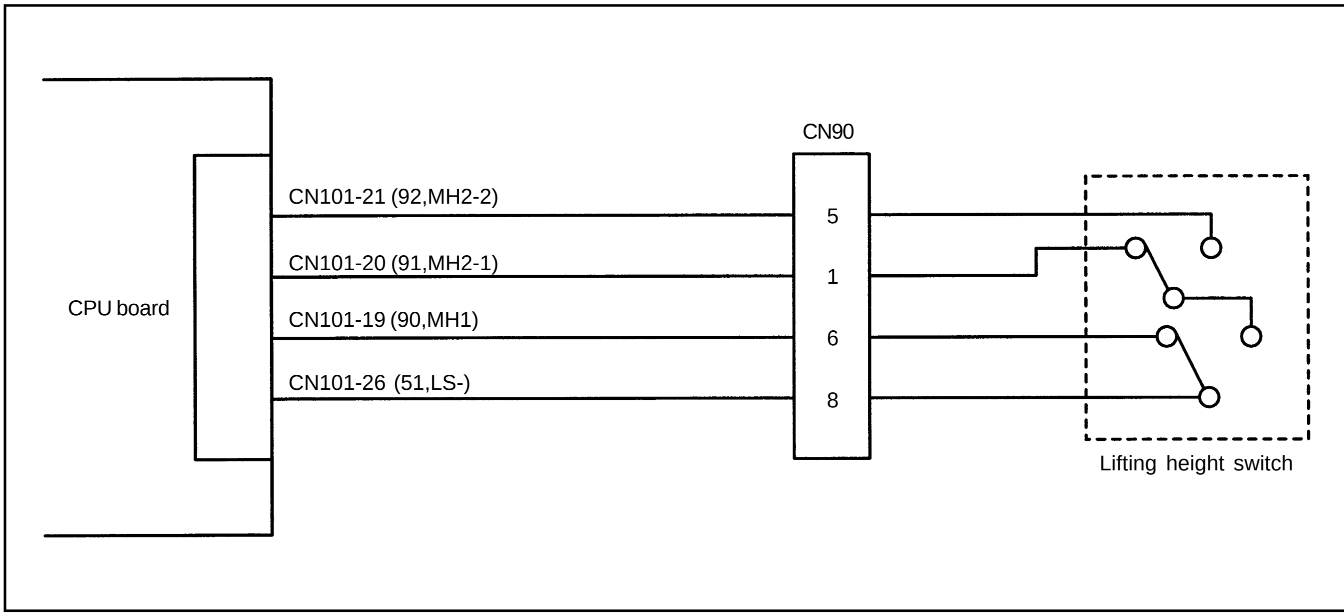
### Estimated causes

| |
|---|
| ① CPU board defect |

*** Since the CPU board is defective whenever error code 66-1 is indicated, replace the CPU board.**

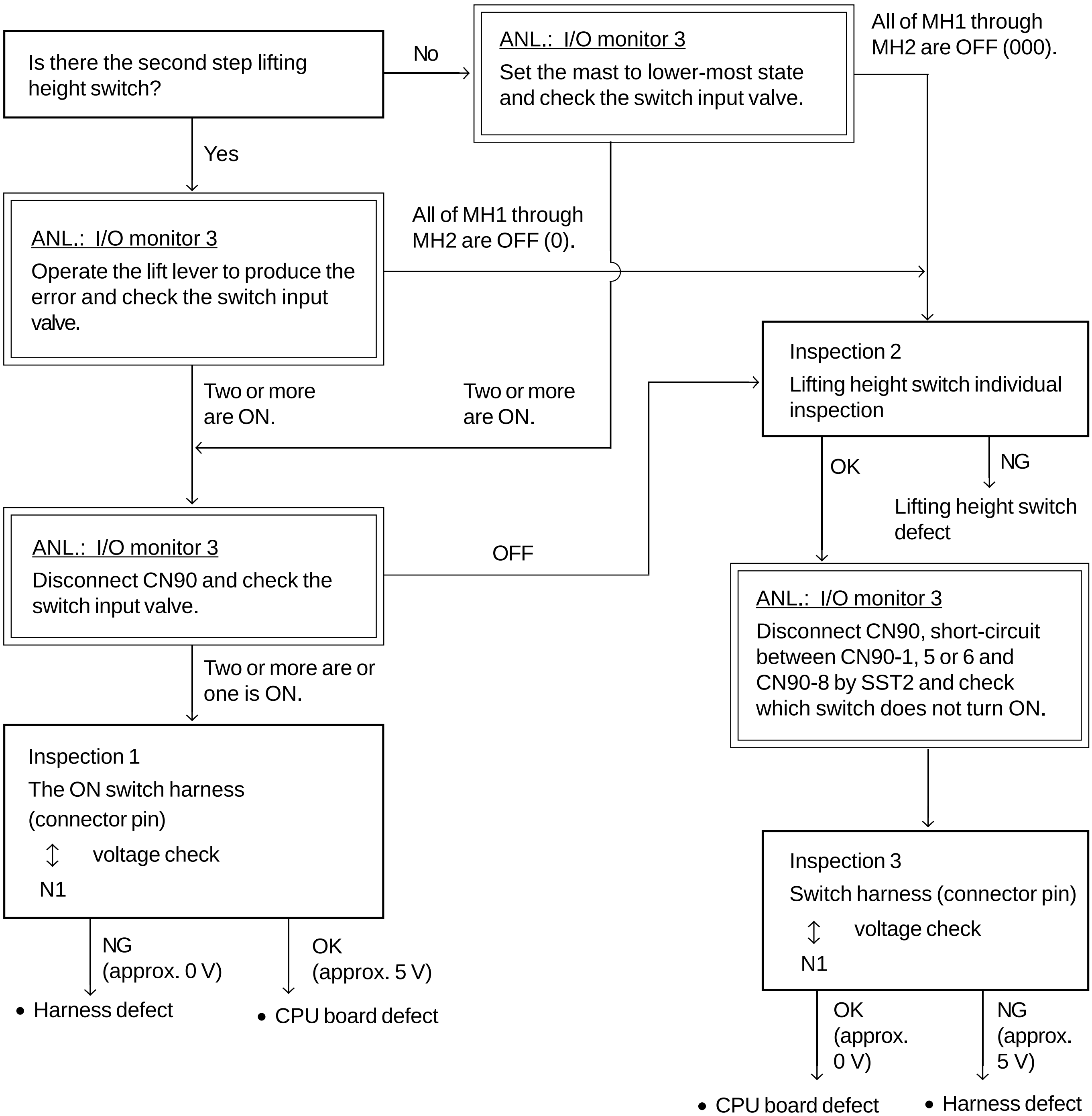
## Error Code 67: Lifting Height Switch Abnormality (SAS Vehicle)

### Related portion



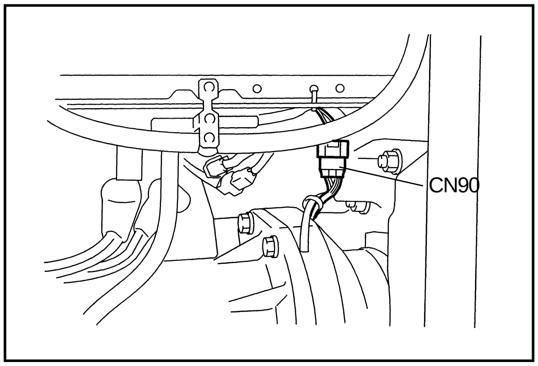

### Estimated causes

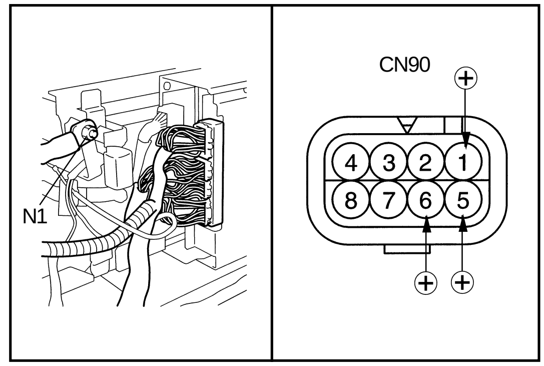
| | |
|---|---|
| ① | Open or short circuit of harness |
| ② | Lifting height sensor switch defect |


Is there the second step lifting height switch?
No
ANL.: I/O monitor 3
Set the mast to lower-most state and check the switch input valve.
All of MH1 through MH2 are OFF (000).
Yes
ANL.: I/O monitor 3
Operate the lift lever to produce the error and check the switch input valve.
All of MH1 through MH2 are OFF (0).
Two or more are ON.
Two or more are ON.
Inspection 2
Lifting height switch individual inspection
OK
NG
Lifting height switch defect
ANL.: I/O monitor 3
Disconnect CN90 and check the switch input valve.
OFF
ANL.: I/O monitor 3
Disconnect CN90, short-circuit between CN90-1, 5 or 6 and CN90-8 by SST2 and check which switch does not turn ON.
Two or more are or one is ON.
Inspection 1
The ON switch harness (connector pin)
↕ voltage check
N1
NG (approx. 0 V)
OK (approx. 5 V)
• Harness defect
• CPU board defect
Inspection 3
Switch harness (connector pin)
↕ voltage check
N1
OK (approx. 0 V)
NG (approx. 5 V)
• CPU board defect
• Harness defect

Inspection 1:
Lifting height switch ON voltage check
Battery plug ON, key switch ON

| | |
|---|---|
| Measurement terminals | CN90-1 (11), 5 (92), 6 (90) (ON position) ⊕ – N1 ⊖ |
| Tester range | DC 10 V |
| Standard | Approx. 5 V |

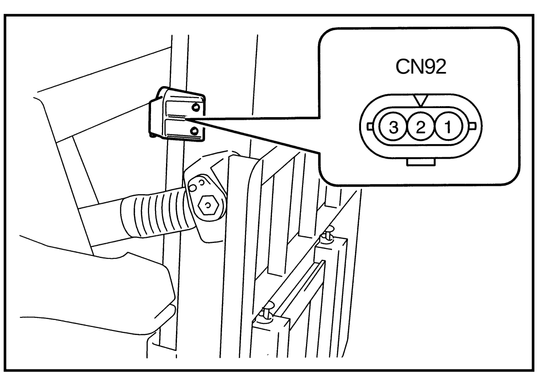


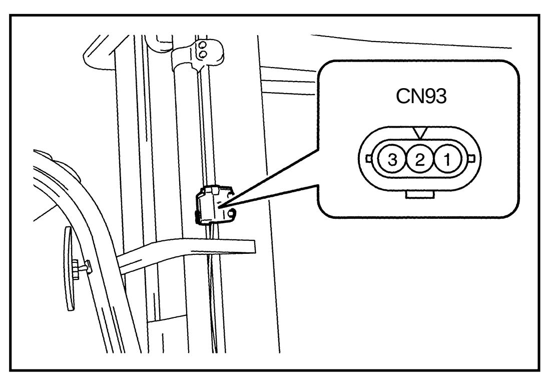




NG (approx. 0 V) → Harness defect
OK (approx. 5 V) → CPU board defect

Inspection 2:
Lifting height switch individual inspection
Battery plug OFF, connectors CN92 and CN93 disconnection

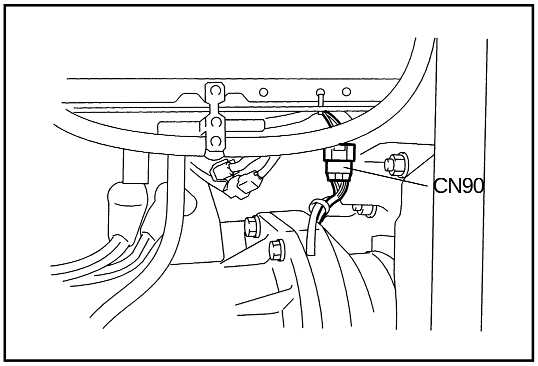
| Measurement terminals | Low lifting height | High lifting height |
|---|---|---|
| CN92-1 (51) – CN92-2 (90) | Continuous | Not continuous |
| CN92-1 (51) – CN92-3 (91) | Not continuous | Continuous |
| CN93-1 (105) – CN93-2 (91) | Continuous | Not continuous |
| CN93-1 (105) – CN93-3 (92) | Not continuous | Continuous |

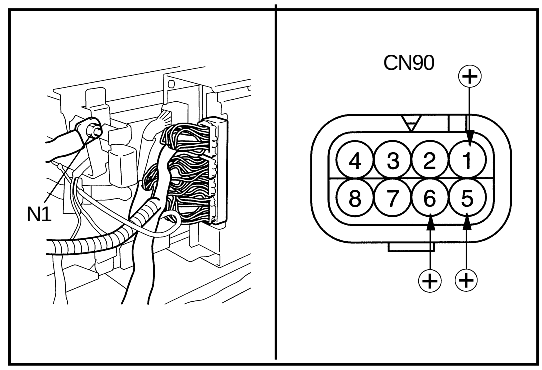


Inspection 3:
Lifting height switch ON voltage check
Battery plug ON, key switch ON

| | |
|---|---|
| Measurement terminals | CN90-1 (9), 5 (92), 6 (90) (OFF position) ⊕ – N1 ⊖ |
| Tester range | DC 10 V |
| Standard | Approx. 0 V |

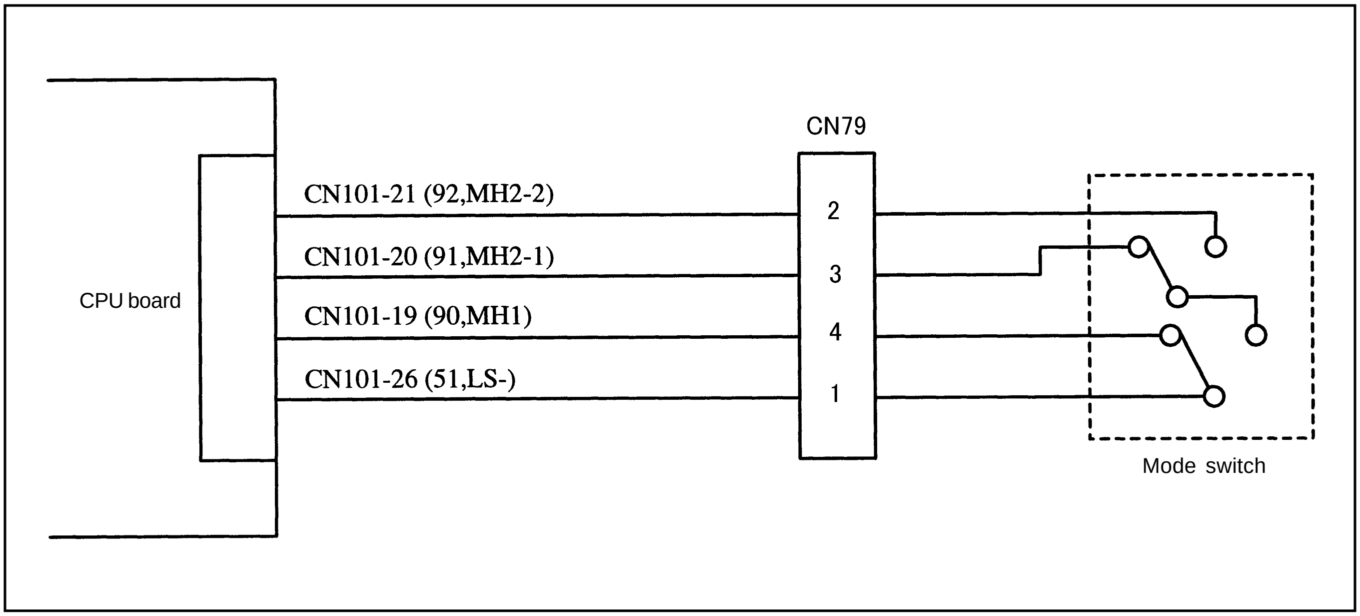



OK (approx. 0 V) → CPU board defect
NG (approx. 5 V) → Harness defect

# Error Code 67: Mode Switch Abnormality (Vehicle without SAS)

## Related portion




## Estimated causes

① Open or short circuit of harness
② Mode switch defect

ANL.: I/O monitor 3
Check the lifting height switch value.

- Consistently one "1" → Is 67 error occurring now?
  - Yes → • CPU board defect
  - No → CN79 inspection
- "000" → CN101 and CN79 inspection
- Two or more are "1" →

ANL.: I/O monitor 3
Disconnect CN79 and check the lifting height switch value.

- "000" → • Mode switch defect
- Other than "000" →

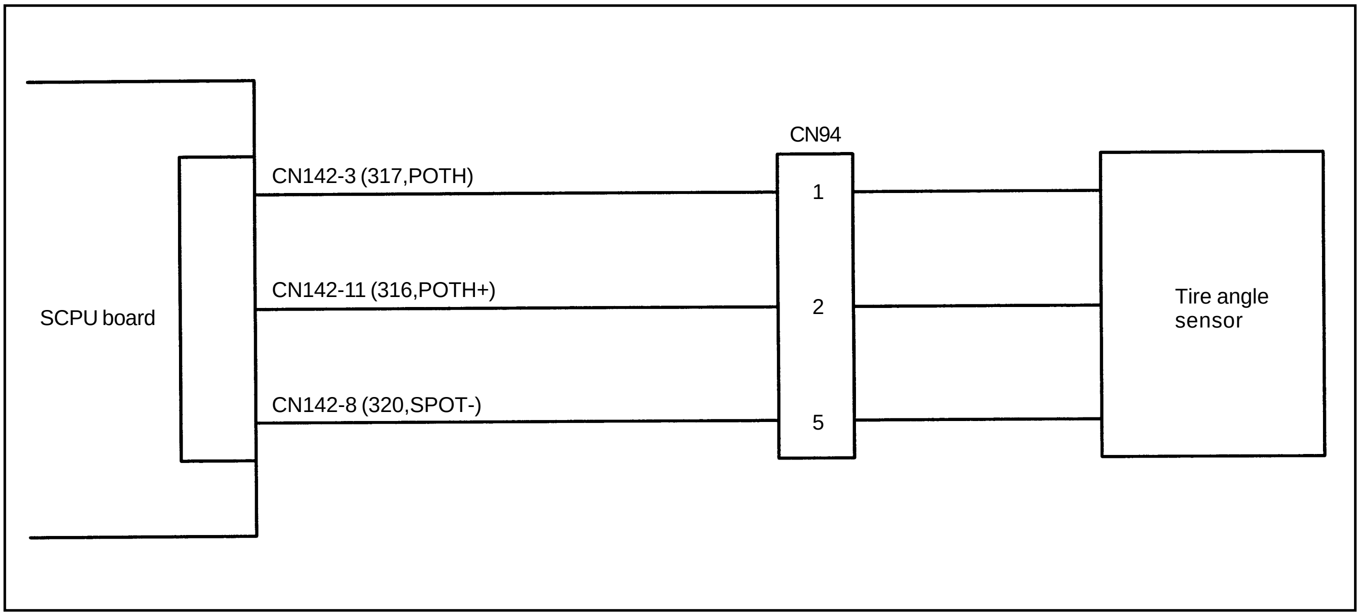
ANL.: I/O monitor 3
Disconnect CN101 and check the lifting height switch value.

- "000" → • Harness defect
- Other than "000" → • CPU board defect

*** When CN101 is disconnected, many unrelated errors occur, which is not abnormal.**

## Error Code 71: Tire Angle Sensor Abnormality

### Related portion




### Estimated causes

① Tire angle sensor defect
② Open or short circuit of harness

### <For 71-1>

Use SST2 and short between CN94-2 and CN94-4.

↓

Error code check

- Change to 71-2 → Tire angle sensor inspection *1
- Remains as 71-1 ↓

Inspection 1
CN142-3 (317) ⊕
↕ voltage check
CN142-8 (320) ⊖

- NG (less than 4 V) → • Harness defect
- OK (4 V or more) → • SCPU board defect

***1 Standard**
**CN142-3 (317) - CN142-11 (316): 400Ω ~ 1.5kΩ**
**CN142-8 (320) - CN142-11 (316): 1.6 ~ 2.4kΩ**

## <For 71-2>

Disconnect CN94 and check the error code.

Change to 71-1 → Tire angle sensor inspection *1

Remains as 71-2 ↓

Inspection 1
Disconnect CN142 and CN94
CN142-3 (317)
↕ resistance check
CN142-11 (316)

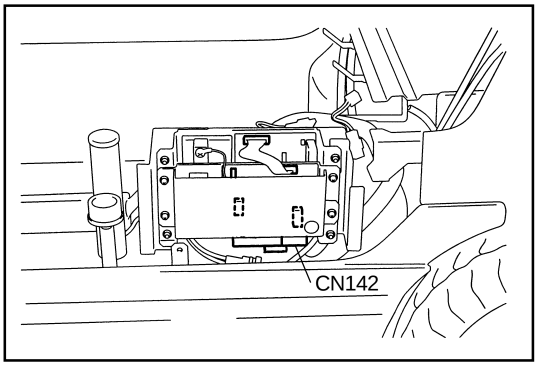
OK ($\infty$ Ω) → • SCPU board defect

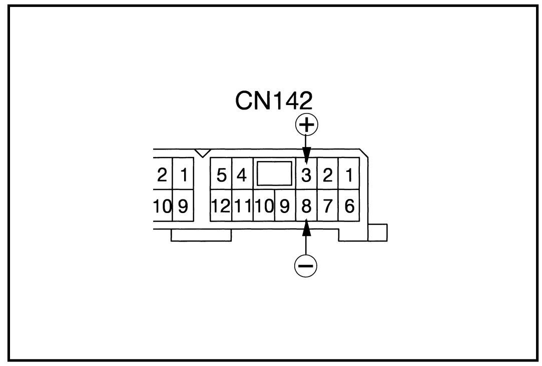
NG (less than 10 kΩ) → • Harness defect

***1**
**CN142-3 (317) - CN142-11 (316): 400Ω ~ 1.5kΩ**
**CN142-8 (320) - CN142-11 (316): 1.6 ~ 2.4kΩ**

Inspection 1 <for 71-1>:
Tire angle sensor signal voltage check
Battery plug ON, key switch ON

| | |
|---|---|
| Measurement terminals | CN142-3 (317) ⊕ – CN142-8 (320) ⊖ |
| Tester range | DC 10 V |
| Standard | Approx. 4 V |

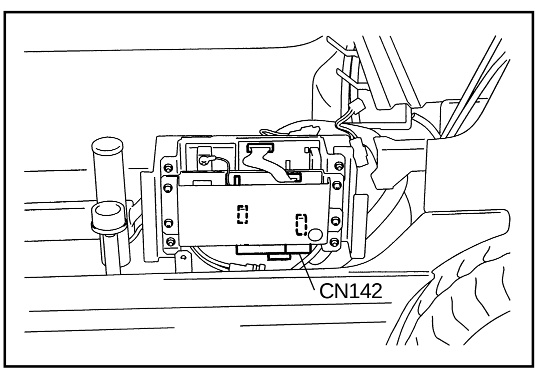


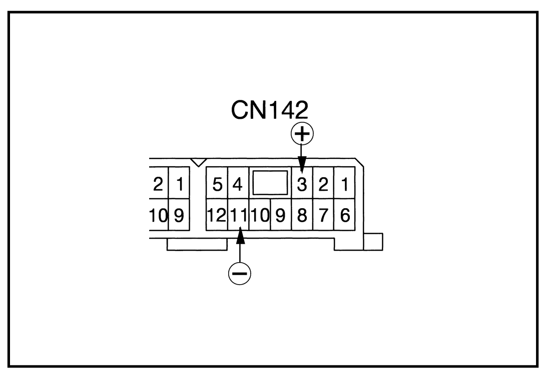




OK (4 V or more) → SCPU board defect
NG (less than 4 V) → Harness defect

Inspection 1 <for 71-2>:
Tire Angle Sensor Abnormality
Battery plug OFF

| | |
|---|---|
| Measurement terminals | CN142-3 (317) ⊕ – CN142-11 (316) ⊖ (harness side) |
| Tester range | Ω x 1 k |
| Standard | ∞ Ω |

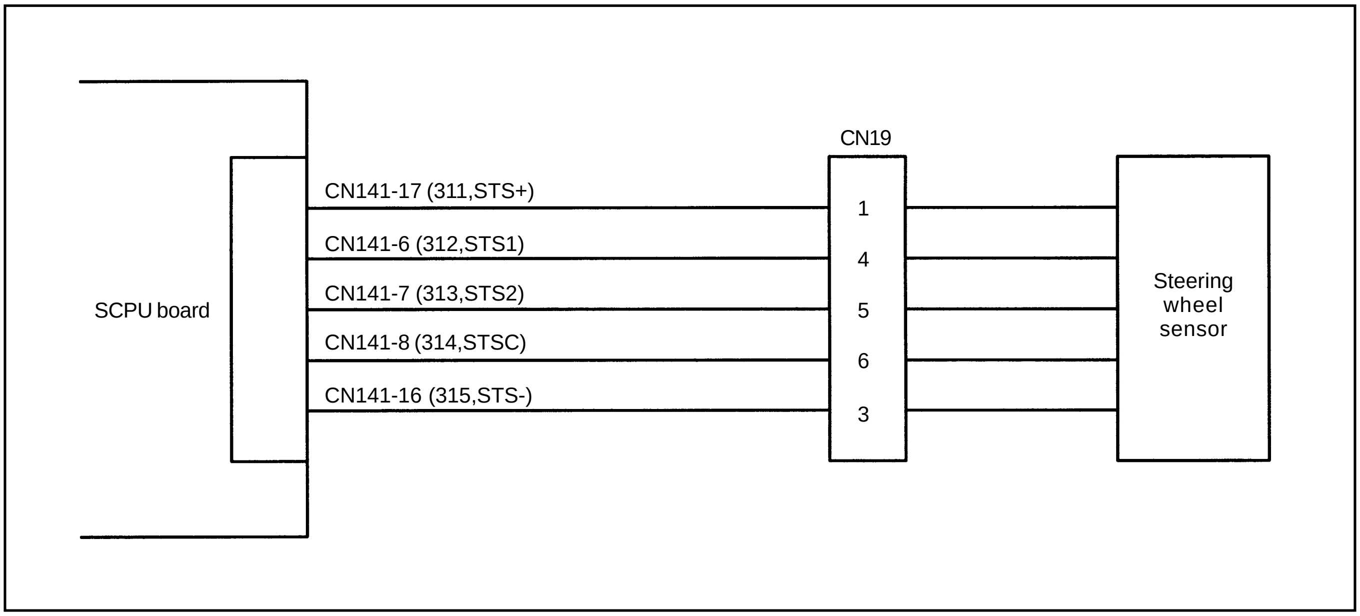



OK (∞ Ω) → SCPU board defect
NG (10 kΩ or more) → Harness defect

## Error Code 72: Steering Angle Sensor Abnormality

### Related portion




### Estimated causes

| | |
|---|---|
| ① | Steering angle sensor defect |
| ② | Open circuit of harness |

## <For 72-1 (STS1), 72-2 (STS2)>

<u>ANL.: I/O monitor 4</u>

Turn the steering wheel and check if STS1 or STS2 indication changes.

Yes → Normal

No ↓

Set SST7 to CN19
(See page 5-10).

↓

<u>ANL.: I/O monitor 4</u>

Turn the steering wheel and check if STS1 or STS2 indication changes.

Yes →

Inspection 1

Steering angle sensor inspection

Set SST7 to CN19. Check the voltage variation on the connector (TAB side) of the sensor when steering wheel is turned condition.

CN19-4 (312)

CN19-5 (313)

CN19-6 (314)

↕ voltage check

CN19-3 (315)

(See page 5-10).

OK (voltage variation) ↓ Normal

NG (no voltage variation) ↓

- Steering angle sensor defect

No ↓

Inspection 2

Turn the steering wheel.

CN141-6 (312)

↕ voltage check

CN141-16 (315)

OK (voltage variation) ↓

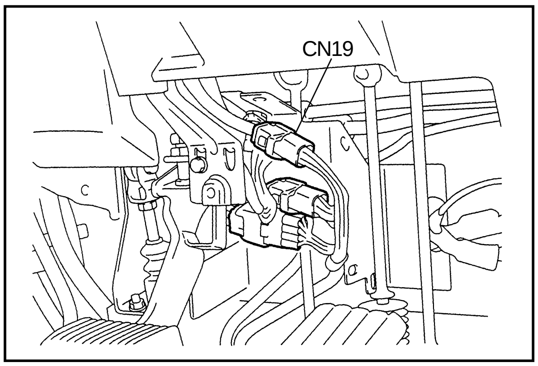
- SCPU board defect

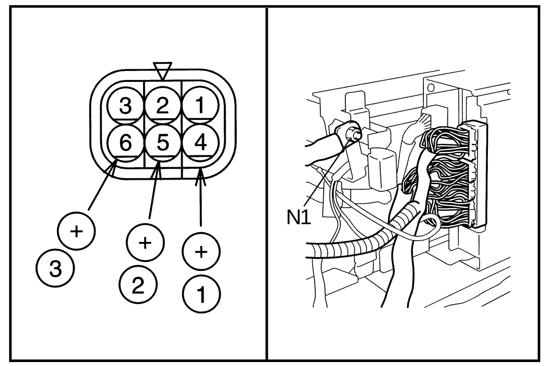
NG (no voltage variation) ↓

- Main harness defect

Inspection 1:
Steering angle sensor check
Battery plug ON, key switch ON, SST7 set to CN19

| | |
|---|---|
| Measurement terminals | ① CN19-4 (312) ⊕ – N1 ⊖<br>② CN19-5 (313) ⊕ – N1 ⊖<br>③ CN19-6 (314) ⊕ – N1 ⊖ |
| Tester range | DC 10 V |
| Standard | Voltage varies between 1 V and 4 V. |

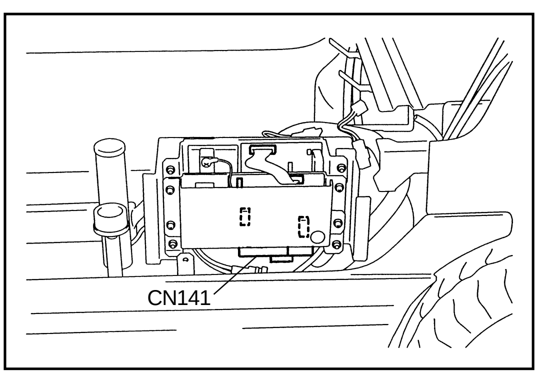


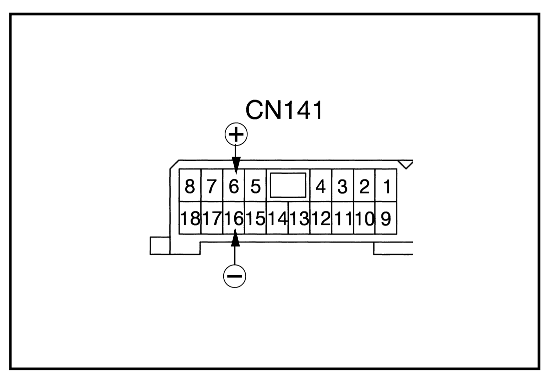




OK (variation between 1 V and 4 V) → Normal
NG (no voltage variation) → Steering angle sensor defect

Inspection 2:
Signal voltage variation check
Battery plug ON, key switch ON

| | |
|---|---|
| Measurement terminals | CN141-6 (312) ⊕ – CN141-16 (315) ⊖ |
| Tester range | DC 10 V |
| Standard | Voltage varies between 1 V and 4 V. |




OK (variation between 1 V and 4 V) → SCPU board defect
NG (no voltage variation) → Main harness defect

## <For 72-3>

Set SST7 to CN19.

ANL.: I/O monitor 4
STSC indication check

ON

- Steering angle sensor defect

OFF

Inspection 1
CN141-8 (314)
↕ voltage check
CN141-16 (315)

NG
(approx. 5 V)

- Main harness defect

OK (0 V)

- SCPU board defect

## <For 72-4>

Set SST7 to CN19.
(See page 5-10).

Inspection 1
CN19-1 (311) CNA-3 ⊕
↕ voltage check
CN19-3 (315) CNA-1 ⊖

CNA-3 : SST7 connector
CNA-1 pin Nos.

0 V

Inspection 4
CN141-17 (311)
↕ voltage check
CN141-16 (315).

Approx.
15 V

- Main harness defect

0 V

Inspection 5
Disconnect CN141 on the SCPU board side.
CN141-17 (311)
↕ voltage check
CN141-16 (315)

Approx.
15 V

- Short-circuit of main harness

0 V

- SCPU board defect

Approx. 15 V

Inspection 2
Steering angle sensor check

OK

NG

- Steering angle sensor defect

Inspection 3
Turn the steering wheel
CN141-6 (312) or -7 (313)
↕ voltage check
CN141-16 (315).

Both voltages vary.

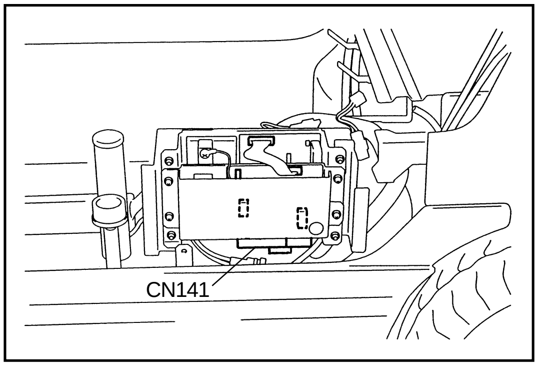
- SCPU board defect

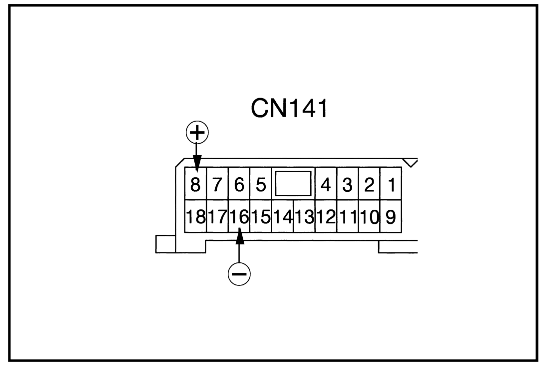
No variation of both or either voltage

- Main harness defect

Inspection 1 <for 72-3>:
Steering angle sensor signal voltage check 1
Battery plug ON, key switch ON

| | |
|---|---|
| Measurement terminals | CN141-8 (314) ⊕ – CN141-16 (315) ⊖ |
| Tester range | DC 10 V |
| Standard | Approx. 0 V |

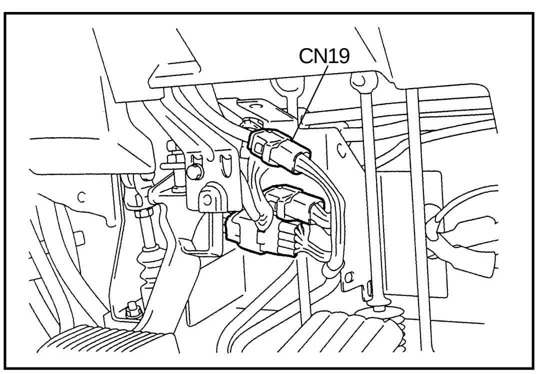


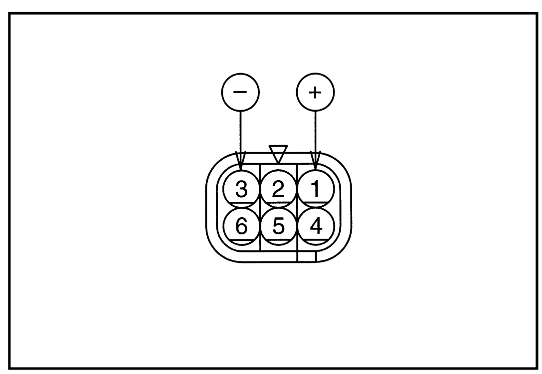




NG (approx. 5 V) → Main harness defect
OK (0 V) → SCPU board defect

Inspection 1 <for 72-4>:
Steering angle sensor signal voltage check 1
Battery plug ON, key switch ON

| | |
|---|---|
| Measurement terminals | CN19-1 (311) ⊕ – CN19-3 (315) ⊖ |
| Tester range | DC 200 V |
| Standard | Approx. 15 V |

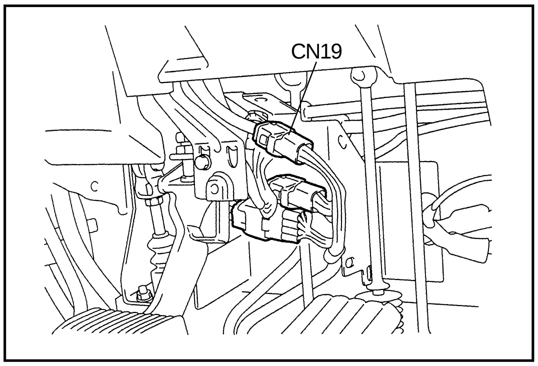


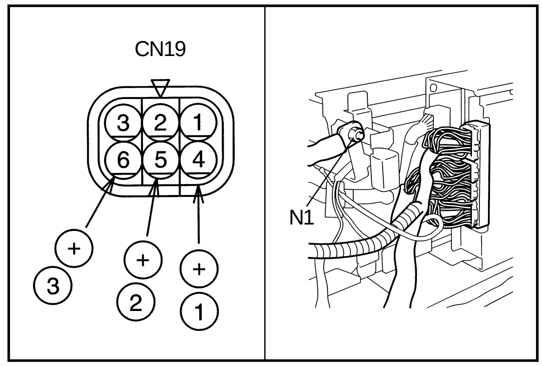




OK (approx. 15 V) → Go to Inspection 2.
NG (0 V) → Go to Inspection 4.

Inspection 2 <for 72-4>:
Steering angle sensor check
Battery plug ON, key switch ON, SST7 set to CN19

| | |
|---|---|
| Measurement terminals | ① CN19-4 (312) ⊕ – N1 ⊖<br>② CN19-5 (313) ⊕ – N1 ⊖<br>③ CN19-6 (314) ⊕ – N1 ⊖ |
| Tester range | DC 10 V |
| Standard | Voltage varies between 1 V and 4 V. |

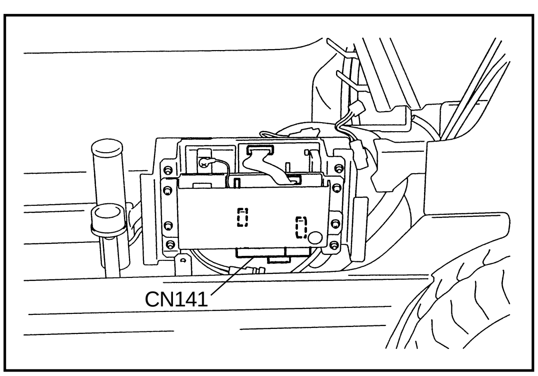


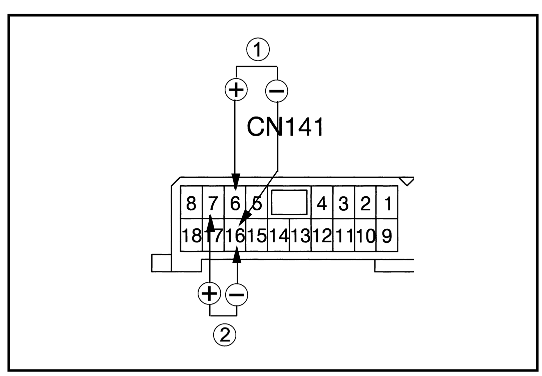




OK (variation between 1 V and 4 V) → Normal
NG (no voltage variation) → Steering angle sensor defect

Inspection 3 <for 72-4>:
Steering angle sensor signal voltage check 2
Battery plug ON, key switch ON, check during steering wheel operation

| | |
|---|---|
| Measurement terminals | ① CN141-6 (312) ⊕ – CN141-16 (315) ⊖<br>② CN141-7 (313) ⊕ – CN141-16 (315) ⊖ |
| Tester range | DC 200 V |
| Standard | Voltage varies between 1 V and 4 V. |

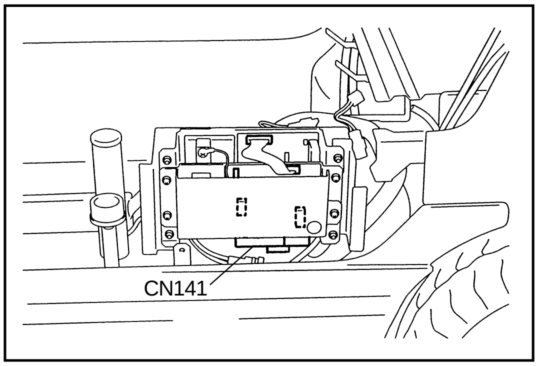


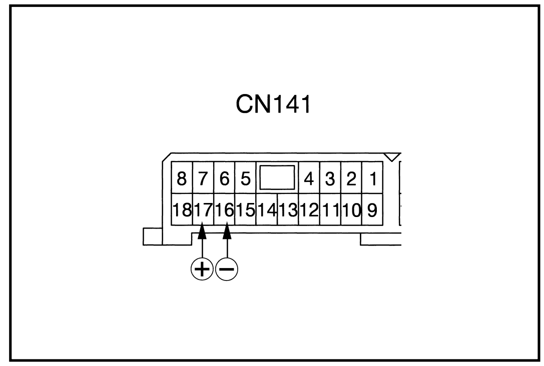




(Both voltages vary between 1 V and 4 V) → SCPU board defect
(Both or one voltage do not vary) → Main harness defect

Inspection 4 <for 72-4>:
Steering angle sensor signal voltage check 3
Battery plug ON, key switch ON

| Measurement terminals | CN141-17 (311) ⊕ – CN141-16 (315) ⊖ |
|---|---|
| Tester range | DC 200 V |
| Standard | Approx. 15 V |

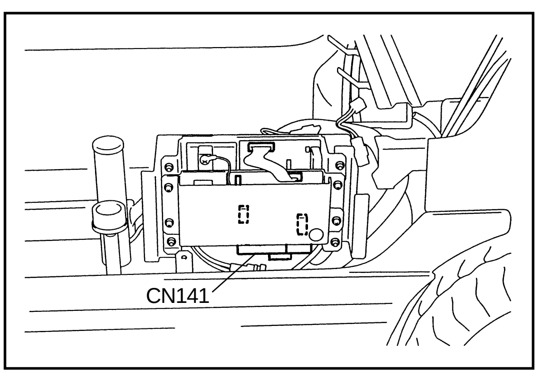


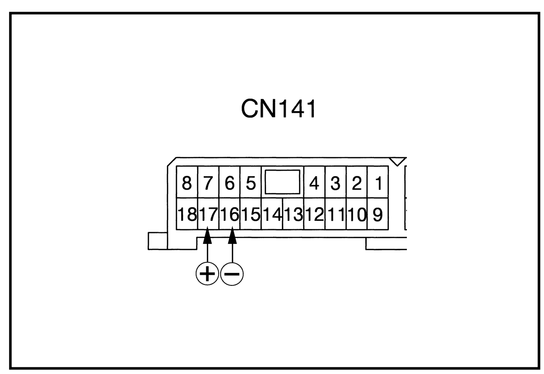




OK (approx. 15 V) → Main harness defect
NG (0 V) → Go to Inspection 5.

Inspection 5 <for 72-4>:
Battery plug ON, key switch ON, CN141 disconnection

| Measurement terminals | CN141-17 (311) ⊕ – CN141-16 (315) ⊖ |
|---|---|
| Tester range | DC 200 V |
| Standard | Approx. 15 V |

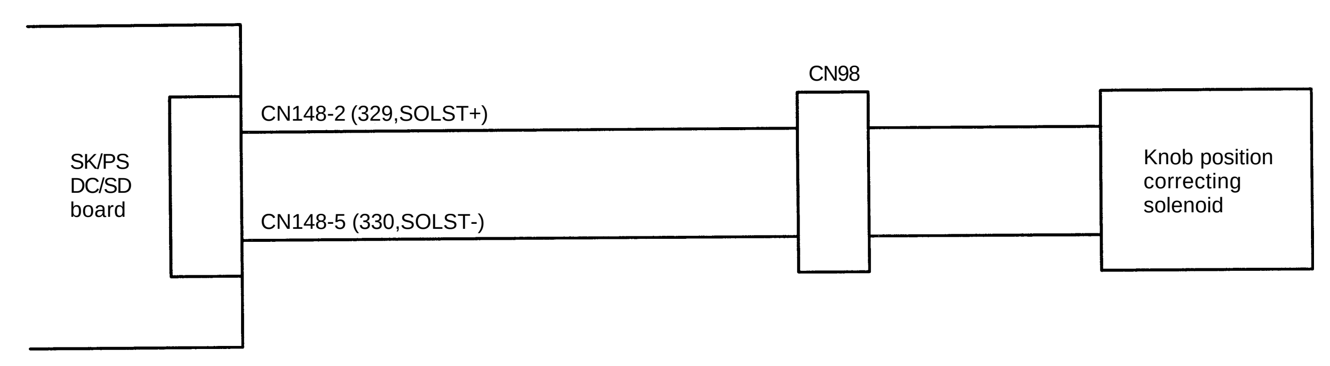



OK (approx. 15 V) → Short-circuit of main harness
NG (0 V) → SCPU board defect

## Error Code 73: Knob Position Compensation Solenoid Abnormality

### Related portion




### Estimated causes

| | |
|---|---|
| ① Knob position compensation solenoid defect | ③ DC/SD board defect |
| ② Open or short circuit of harness | ④ SCPU board defect |

### <For 73-1>

Inspection 1
Disconnect CN148
CN148-2 (44)
↕ resistance check
CN148-6 (353).

OK
(10 ± 1 Ω at 25°C)

NG
(other than 10 ± 1 Ω at 25°C)

<u>ANL.: Active</u>
Disconnect CN146 and CN147 and set SST5. Turn the knob position compensation solenoid ON.
(See page 5-8)

Check signal “1”
(normal)

Check signal “0”
(abnormal)

- CN146-CN147 harness defect
- DC/SD board defect

- SCPU board defect

Inspection 2
Disconnect CN98
CN98-1 (329)
↕ resistance check
CN98-2 (330).

OK
(10 ± 1 Ω)
(at 25°C)

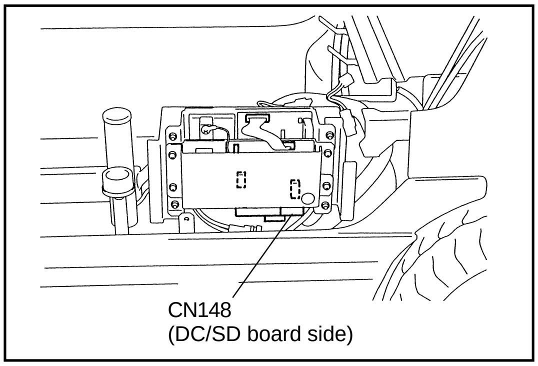
NG
(other than 10 ± 1 Ω at 25°C)

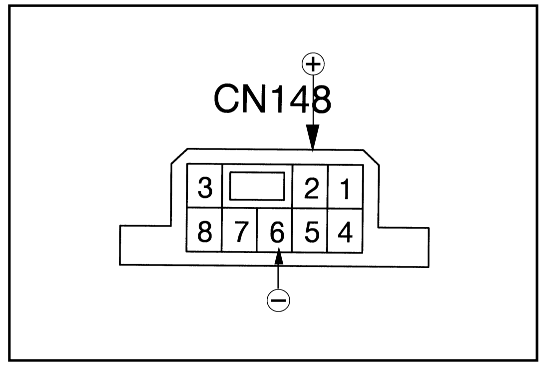
- Main harness defect

- Knob position correcting solenoid defect

Inspection 1 <for 73-1>:
Knob position correcting solenoid harness check
Battery plug OFF, connector CN148 disconnection

| | |
|---|---|
| Measurement terminals | CN148-2 (44) ⊕ – CN148-6 (353) ⊖ |
| Tester range | Ω x 1 |
| Standard | 10 ± 1 Ω (at 25°C) |

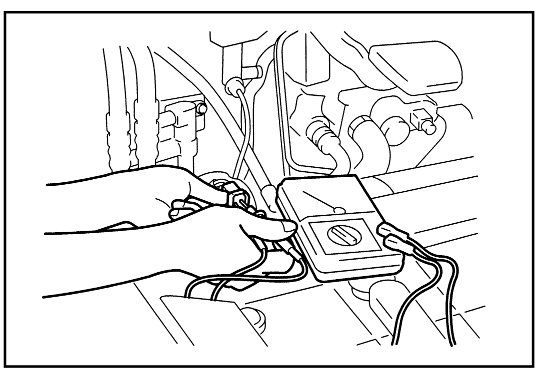


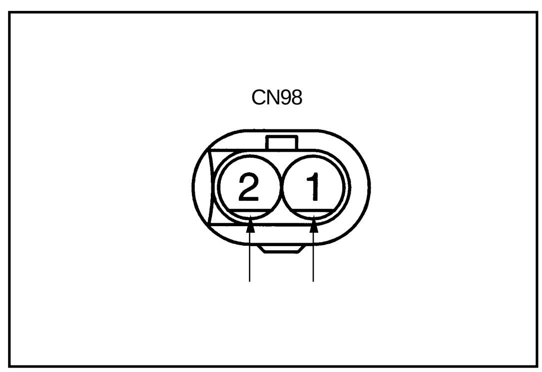




OK (10 ± 1 Ω) → Go to ANL.: ACTIVE
NG (other than 10 ± 1 Ω) → Go to Inspection 2.

Inspection 2:
Knob position correcting solenoid resistance check
Battery plug OFF, connector CN98 disconnection

| | |
|---|---|
| Measurement terminals | CN98-1 (329) – CN98-2 (330) |
| Tester range | Ω x 1 |
| Standard | 10 ± 1 Ω |






OK (10 ± 1 Ω) → Main harness defect
NG (other than 10 ± 1 Ω) → Knob position correcting solenoid defect

## <For 73-2>

<u>ANL.: ACTIVE</u>

Disconnect CN146 and CN147 and set SST5. Check the knob position correcting solenoid check signal (the solenoid must be OFF). (See page 5-8)

"1" (abnormal)

- SCPU board defect

"0" (normal)

- CN146-CN147 harness defect
- DC/SD board defect

## Error Code 74: Tire Angle Matching Value Abnormality

### Related portion

| |
|---|
| SCPU board |

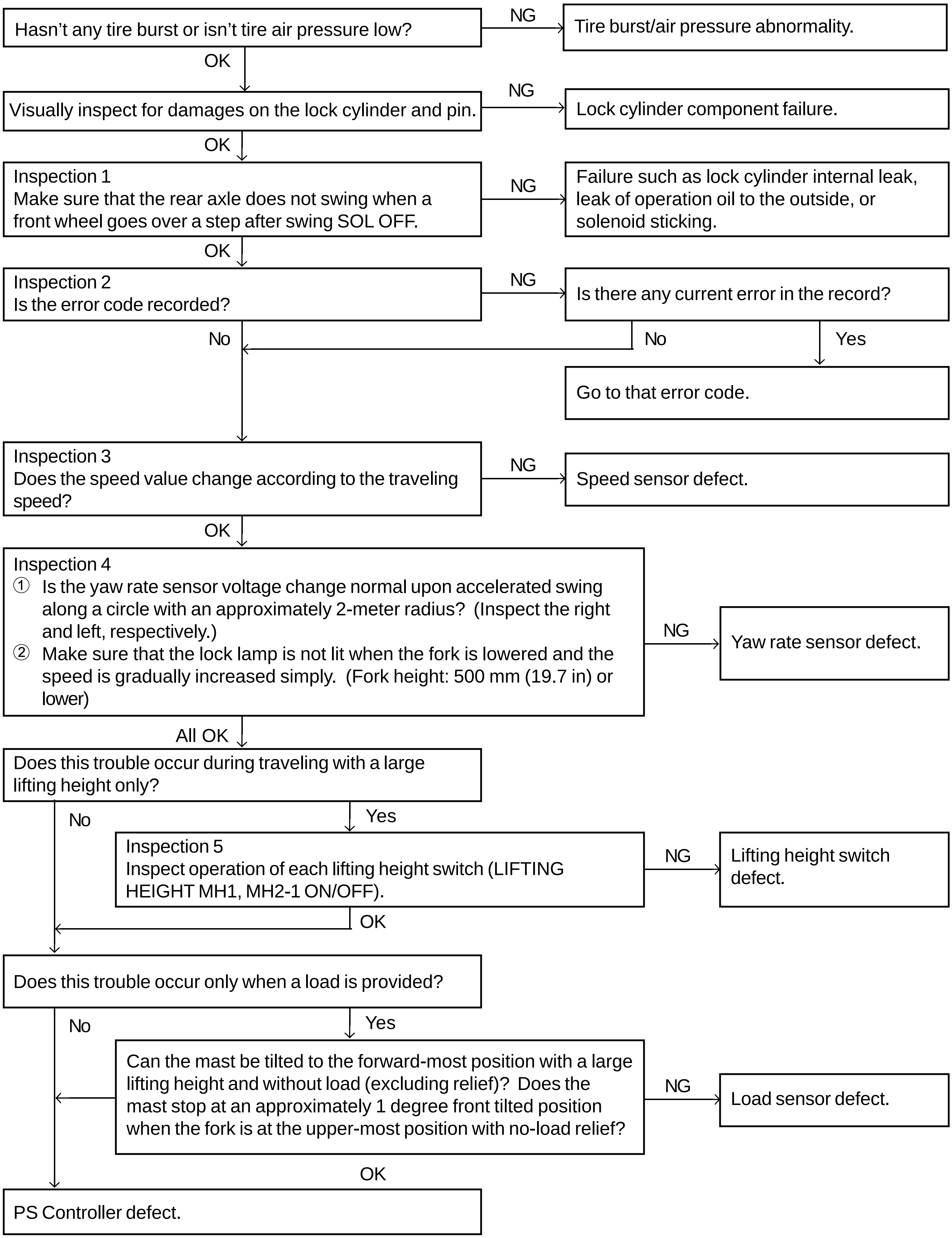
### Estimated causes

| |
|---|
| ① SCPU board defect |

Since the SCPU board is defective whenever 74-1 is indicated to the diagnosis memory, replace the SCPU board.

## WHEN NO ERROR CODE IS DISPLAYED

### ○ Stability not provided during traveling (-Locking hardly or not provided during traveling)



Inspection 1:

See that the rear axle does not swing when one front wheel rides on a high place after swing solenoid OFF.

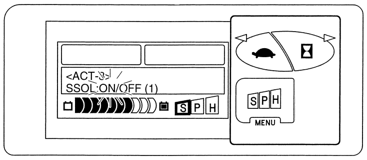
Analyzer: ACTIVE TEST

**Standard:**

When one front wheel rides on a high place after the swing solenoid is set to ON and OFF on a flat road, one front or rear wheel shall float above the ground.

**Caution:**

**Perform this inspection with no load at a low fork height.**



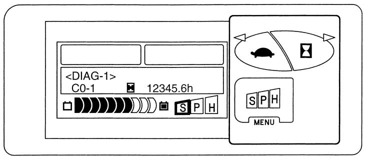

Inspection 2:

Is any error code recorded?

Analyzer: DIAG MEMORY

**Standard:**

No error shall be displayed near the current time on the hour meter.



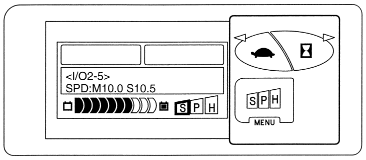

Inspection 3:

Does the speed value change according to the traveling speed?

Analyzer: I/O MONITOR 2/VEHICLE SPEED

**Standard:**

During traveling the speed value shall change according to the varying vehicle speed.




**Note:**

**The speed value is in a range of 95 to 130% of the actual vehicle speed.**

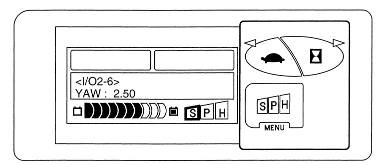
Inspection 4:

① Let the vehicle travel with acceleration on a circle whose radius is approx. 2 m (79 in), and check if the yaw sensor voltage variation is appropriate (check for each of right and left turns).

Analyzer: I/O MONITOR 2/YAW RATE SENSOR VOLTAGE

**Standard:**
At a low fork height with no load, travel with gradual acceleration (at a speed of 5 to 6 km/h (27.3 ~ 32.8 fpm)) on a circle whose radius is approx. 2 m (79 in) (with respect to the center of the vehicle). The yaw sensor voltage shall vary smoothly.

| | |
|---|---|
| In right turn | 2.5 V (stationary state) → approx. 3.0 V |
| In left turn | 2.5 V (stationary state) → approx. 2.0 V |

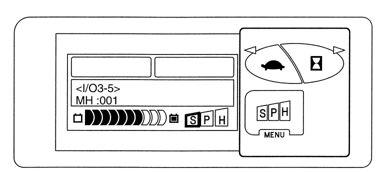



Inspection 5:

Check functioning of each fork height switch (ON/OFF of fork height MH1 and MH2-1).

Analyzer: I/O MONITOR 3/LIFTING HEIGHT SWITCH

**Standard:**
① Lift and lower the fork at around 2,200 mm (86.6 in) to actuate the fork height switch.
Only fork height MH1 is ON at a low fork height (below the fork height switch).
Only MH2-1 is ON at a high fork height (above the fork height switch).



- **Swing lock always occurs during traveling or loarding work. Or swing lock frequently occurs.**

Lock is always maintained (bracing kept) and the rear axle does not swing when the vehicle goes over a step although the swing lock indicator is not lit (upon engine start).

→ Yes: Failure such as lock cylinder solenoid valve sticking or clogging.

↓ No

Inspection 1
① Is the yaw rate sensor voltage change normal upon accelerated swing along a circle with an approximately 2-meter radius? (Inspect the right and left, respectively.)
② Make sure that the swing lock indicator is not lit when the fork is lowered and the speed is gradually increased simply. (Fork height: 500 mm (19.7 in) or lower).

→ NG: Yaw rate sensor abnormality.

↓ All OK

Inspection 2
Inspect the operation of each the lifting height switch. (LIFTING HEIGHT MH1, MH2-1 ON/OFF)

→ NG: Lifting height switch abnormality.

↓ OK

Can the mast be tilted to the forward-most position with a large lifting height and without load (excluding relief)? Does the mast stop at an approximately 1 degree front tilted position when the fork is at the upper-most position with no-load relief?

→ NG: Load sensor abnormality.

↓ OK

PS Controller defect.

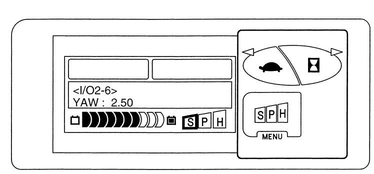
Inspection 1:

① Is the yaw rate sensor voltage change normal upon accelerated swing along a circle with an approximately 2-meter radius? (Inspect the right and left, respectively.)

Analyzer: I/O MONITOR 2/YAW RATE SENSOR VOLTAGE

**Standard:**
With a small lifting height and without load, perform accelerated swing along an approximately 2-meter radius circle (based on the vehicle center) gradually (up to 5 to 6 km/h (3.1 ~ 3.7 mile/h)). The yaw rate sensor voltage shall change.

| | |
|---|---|
| Swing to the right | 2.5 V (stop) to Approx. 3.0 V |
| Swing to the left | 2.5 V (stop) to Approx. 2.0 V |



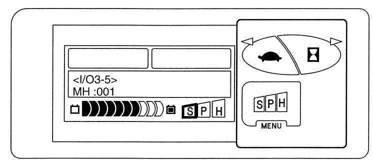
Inspection 2:

Inspect the operation of each the lifting height switch.
(LIFTING HEIGHT MH1, MH2-1 ON/OFF)

Analyzer: I/O MONITOR 3/LIFTING HEIGHT SWITCH

**Standard:**

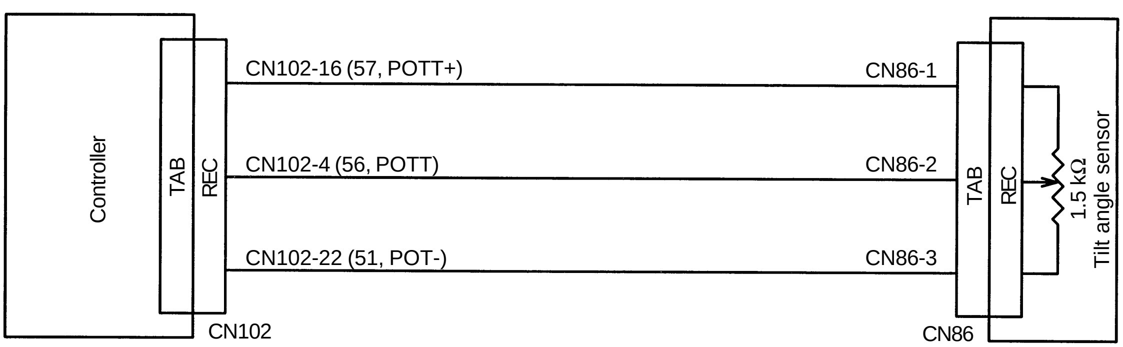
① Lift and lower the fork at a height of approximately 2200 mm (87 in) to activate the lifting height switch.
Note:
- LIFTING HEIGHT MH1 only is turned ON for a small lifting height (below the switch).
- LIFTING HEIGHT MH2-1 only is turned ON for a large lifting height (above the switch).



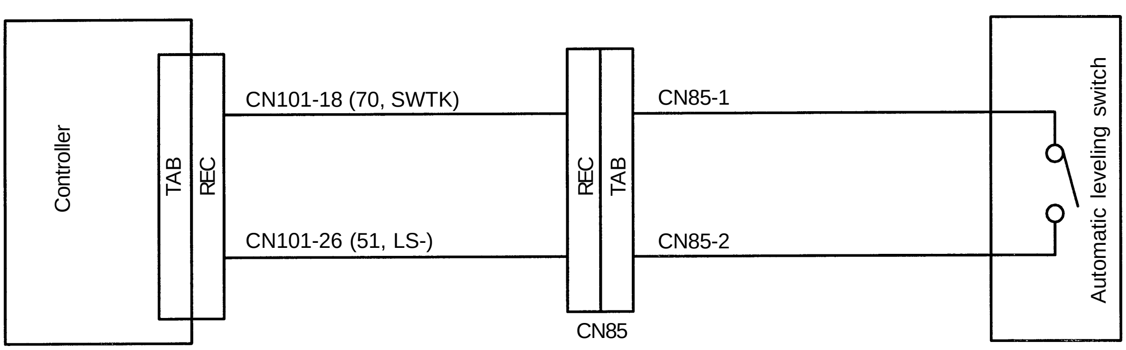

- **Stopping with automatic leveling fails. (Does not stop at a horizontal position but tilts at the forward-most position.)**

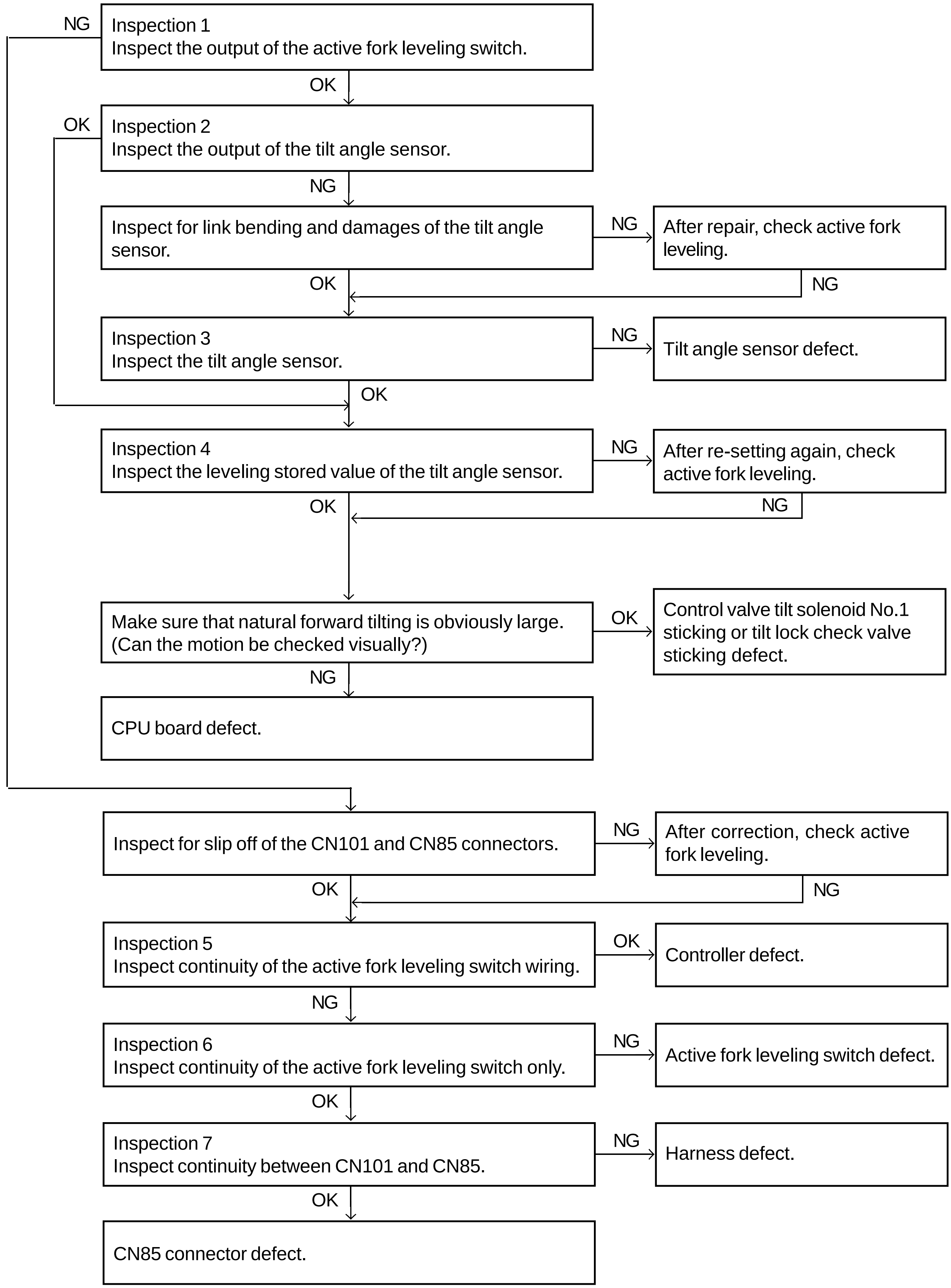
**Related Portion**

Tilt angle sensor




Active fork leveling switch




Inspection 1
Inspect the output of the active fork leveling switch.
NG
OK
Inspection 2
Inspect the output of the tilt angle sensor.
OK
NG
Inspect for link bending and damages of the tilt angle sensor.
NG
After repair, check active fork leveling.
OK
NG
Inspection 3
Inspect the tilt angle sensor.
NG
Tilt angle sensor defect.
OK
Inspection 4
Inspect the leveling stored value of the tilt angle sensor.
NG
After re-setting again, check active fork leveling.
OK
NG
Make sure that natural forward tilting is obviously large. (Can the motion be checked visually?)
OK
Control valve tilt solenoid No.1 sticking or tilt lock check valve sticking defect.
NG
CPU board defect.
Inspect for slip off of the CN101 and CN85 connectors.
NG
After correction, check active fork leveling.
OK
NG
Inspection 5
Inspect continuity of the active fork leveling switch wiring.
OK
Controller defect.
NG
Inspection 6
Inspect continuity of the active fork leveling switch only.
NG
Active fork leveling switch defect.
OK
Inspection 7
Inspect continuity between CN101 and CN85.
NG
Harness defect.
OK
CN85 connector defect.

Inspection 1:

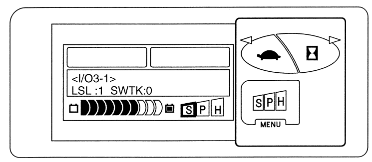
Inspect the output of the active fork leveling switch.

Turn the key switch ON

Analyzer: I/O MONITOR 3/TILT KNOB SWITCH

**Standard:**

| | Active fork leveling switch free | Active fork leveling switch depressed |
|---|---|---|
| SWTK | OFF | ON |




Inspection 2:

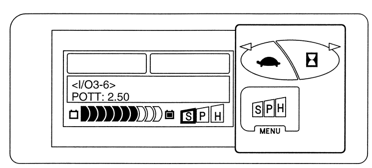
Inspect the output of the tilt angle sensor.

Turn the key switch ON

Analyzer: I/O MONITOR 3/TILT ANGLE SENSOR VOLTAGE

**Standard:**

When the tilt operation is performed and the mast is moved from the forward-most tilt position to the backward-most tilt position, the potential shall rise between 0.1 V and 4.9 V along with backward tilting.




Inspection 3:

Inspect the tilt angle sensor.

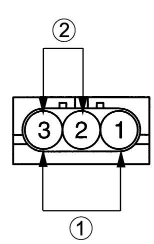
Turn the ignition switch OFF and remove the tilt angle sensor.

**Standard:**

| | |
|---|---|
| ① CN86-1 ~ CN86-3 | 1.5 kΩ ± 0.3 kΩ |

| | Sensor lever free | Sensor lever with full stroke |
|---|---|---|
| ② CN86-2 ~ CN86-3 | 0 kΩ | 1.5 kΩ ± 0.3 kΩ |

CN86



Inspection 4:

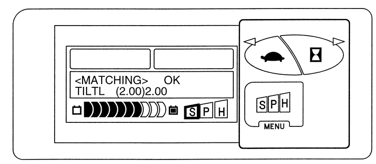
Inspect the leveling stored value of the tilt angle sensor.

Turn the key switch ON

Matching: Tilt horizontal angle

**Standard:**

The TILT value shall be smaller than the LEVEL value when the tilt is at the forward-most position.




Inspection 5:

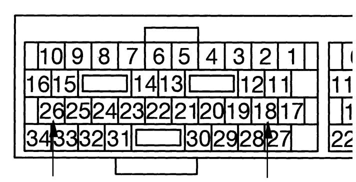
Inspect continuity of the active fork leveling switch wiring.

Turn the ignition switch OFF and disconnect CN101.

**Standard:**

| | Active fork leveling switch free | Active fork leveling switch depressed |
|---|---|---|
| CN101-18 – CN101-26 | No continuity | Continuity shall exist. |

CN101



Inspection 6:

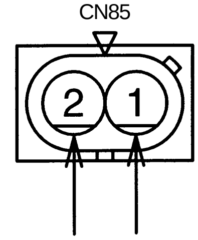
Inspect continuity of the active fork leveling switch only.

Turn the ignition switch OFF and disconnect CN85.

**Standard:**

| | Active fork leveling switch free | Active fork leveling switch depressed |
|---|---|---|
| CN85-1 – CN85-2 | No continuity | Continuity shall exist. |

CN85



Inspection 7:

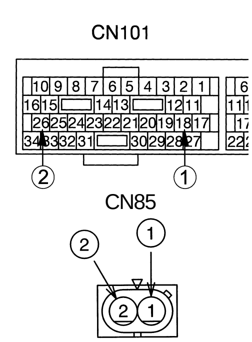
Inspect continuity between CN101 and CN85.

Turn the ignition switch OFF and disconnect CN101 and CN85.

**Standard:**

① CN101-18 – CN85-1: Continuity shall exist.

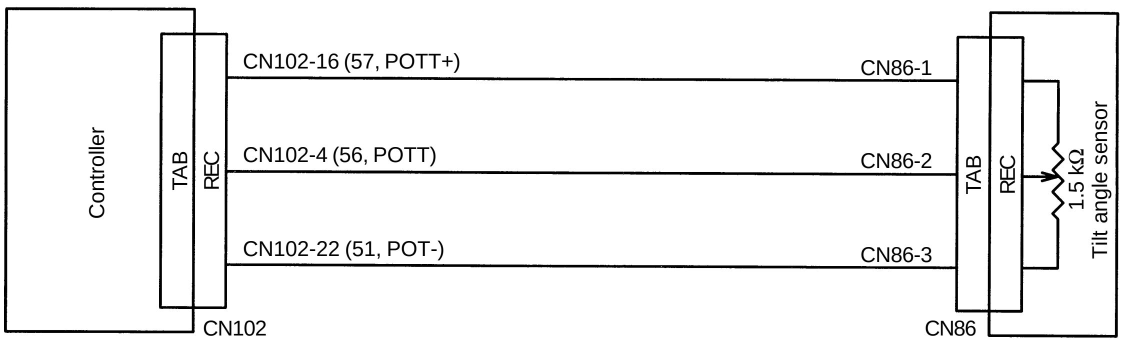
② CN101-26 – CN85-2: Continuity shall exist.



## ● Active fork leveling is not provided. (Stops at a non-horizontal position.)

**Related Portion:**

Tilt angle sensor




Inspect for link bending and damages of the tilt angle sensor.
- NG → After repair, check active fork leveling.
  - NG → (return to flow below)
- OK ↓

Inspection 1
Inspect the tilt angle sensor.
- NG → Tilt angle sensor defect.
- OK ↓

Inspection 2
Inspect the stored leveling value of the tilt angle sensor.
- NG → After re-setting again, check active fork leveling.
  - NG → (return to flow below)
- OK ↓

CPU board defect.

Inspection 1:

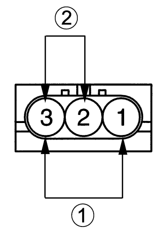
Inspect the tilt angle sensor.

Turn the key switch OFF and remove the tilt angle sensor.

**Standard:**

| | |
|---|---|
| ① CN86-1 – CN86-3 | 1.5 kΩ ± 0.3 kΩ |

| | Sensor lever free | Sensor lever with full stroke |
|---|---|---|
| ② CN86-2 – CN86-3 | 0 kΩ | 1.5 kΩ ± 0.3 kΩ |




Inspection 2:

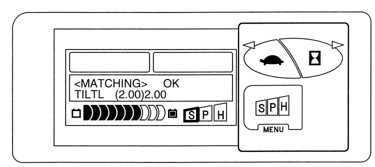
Inspect the stored leveling value of the tilt angle sensor.

Turn the key switch ON

Matching: Tilt horizontal angle

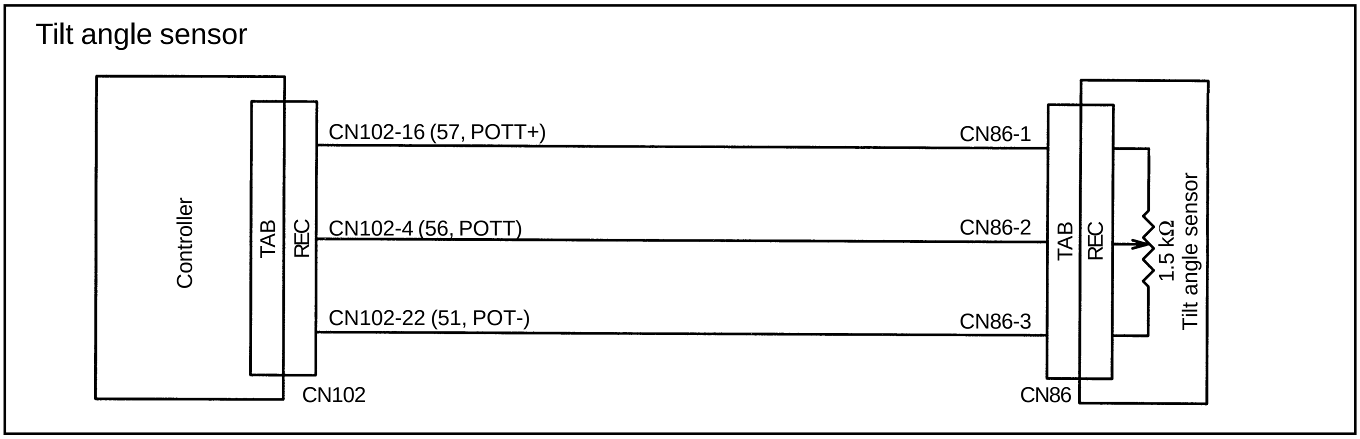
**Standard:**
The TILT value shall be the LEVEL value ± 0.05 V when the mast is upright.

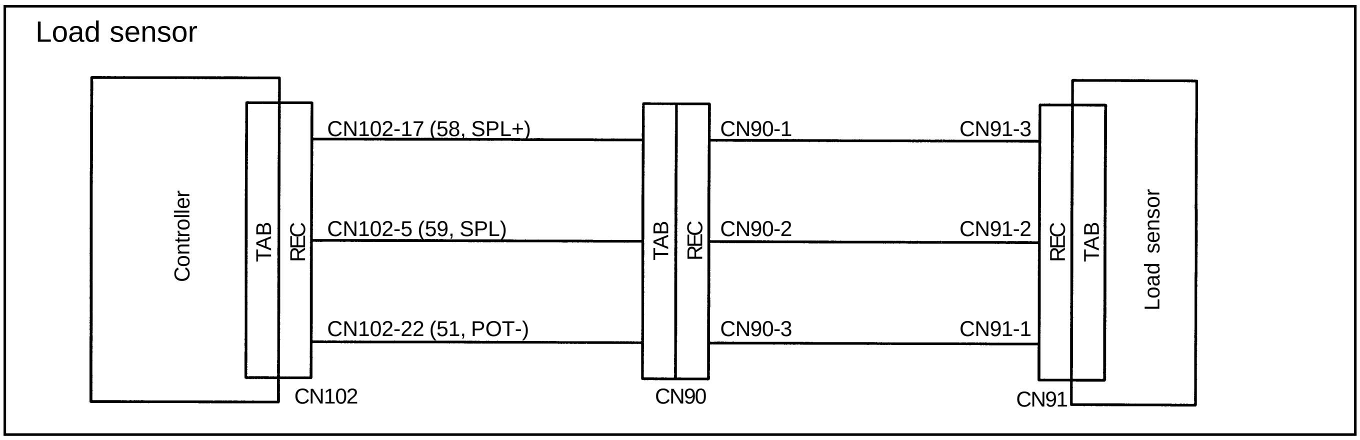
**Note:**
**Set the mast slowly forward from the backward-tilted position.**

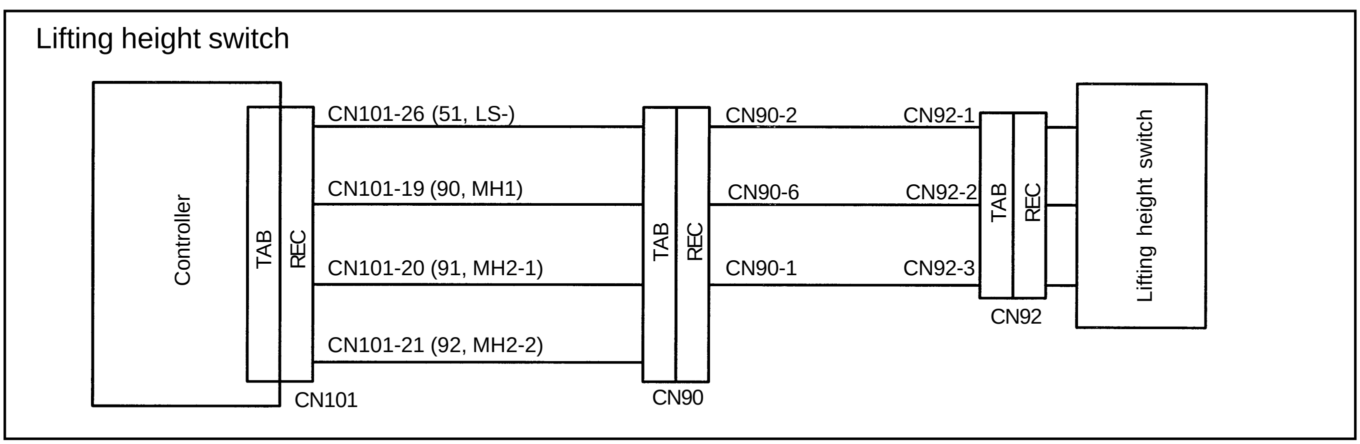


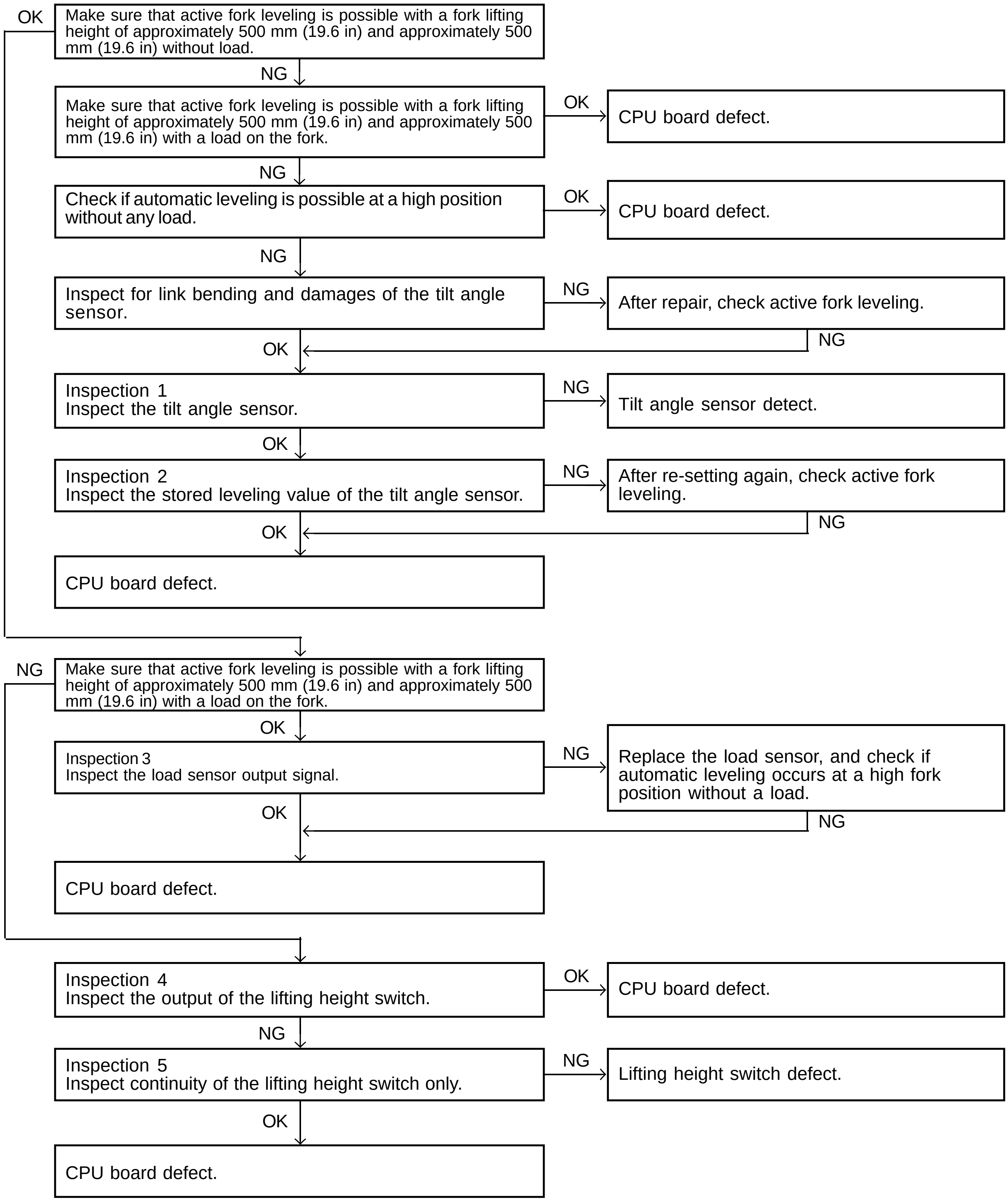
- **Active fork leveling is not provided. (Stops at a position when the knob switch is pressed.)**

**Related Portion**




OK
Make sure that active fork leveling is possible with a fork lifting height of approximately 500 mm (19.6 in) and approximately 500 mm (19.6 in) without load.
NG
Make sure that active fork leveling is possible with a fork lifting height of approximately 500 mm (19.6 in) and approximately 500 mm (19.6 in) with a load on the fork.
OK
CPU board defect.
NG
Check if automatic leveling is possible at a high position without any load.
OK
CPU board defect.
NG
Inspect for link bending and damages of the tilt angle sensor.
NG
After repair, check active fork leveling.
NG
OK
Inspection 1
Inspect the tilt angle sensor.
NG
Tilt angle sensor detect.
OK
Inspection 2
Inspect the stored leveling value of the tilt angle sensor.
NG
After re-setting again, check active fork leveling.
NG
OK
CPU board defect.
NG
Make sure that active fork leveling is possible with a fork lifting height of approximately 500 mm (19.6 in) and approximately 500 mm (19.6 in) with a load on the fork.
OK
Inspection 3
Inspect the load sensor output signal.
NG
Replace the load sensor, and check if automatic leveling occurs at a high fork position without a load.
NG
OK
CPU board defect.
Inspection 4
Inspect the output of the lifting height switch.
OK
CPU board defect.
NG
Inspection 5
Inspect continuity of the lifting height switch only.
NG
Lifting height switch defect.
OK
CPU board defect.

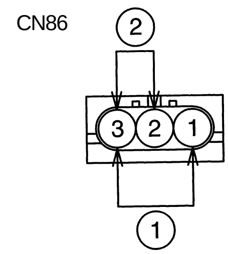
Inspection 1:
Inspect the tilt angle sensor.

Turn the ignition switch OFF and remove the tilt angle sensor.

**Standard:**

| | |
|---|---|
| ① CN86-1 – CN86-3 | 1.5 kΩ ± 0.3 kΩ |

| | Sensor lever free | Sensor lever with full stroke |
|---|---|---|
| ② CN86-2 – CN86-3 | 0 kΩ | 1.5 kΩ ± 0.3 kΩ |

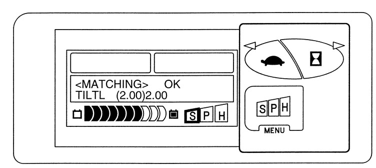



Inspection 2:
Inspect the stored leveling value of the tilt angle sensor.

Turn the key switch ON

Matching: Tilt horizontal angle

**Standard:**
The TILT value with the mast tilted fully backward is greater than the LEVEL value.

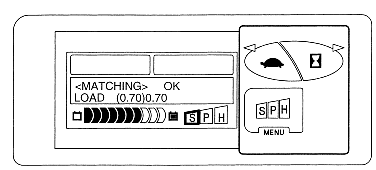



Inspection 3:
Inspect the load sensor output signal.

Turn the key switch ON

Matching: Load value

**Standard:**
The LOAD value is the value in ( ) ± 0.2 V or lower.
(Fork lifting height of approximately 500 mm (19.6 in) without load.)

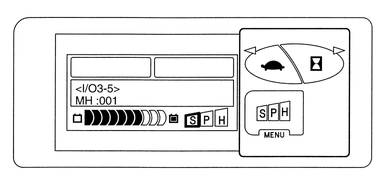



Inspection 4:
Inspect the lifting height switch output signal.

Turn the key switch ON

Analyzer: I/O MONITOR 3/LIFTING HEIGHT SWITCH

**Standard:**
When the fork height is 500 mm (19.6 in). the LIFTING HEIGHT output shall be as follows:
MH1: ON
MH2-1: OFF
MH2-2: OFF

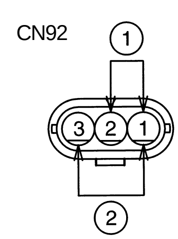



Inspection 5:
Inspect continuity of the lifting height switch only.

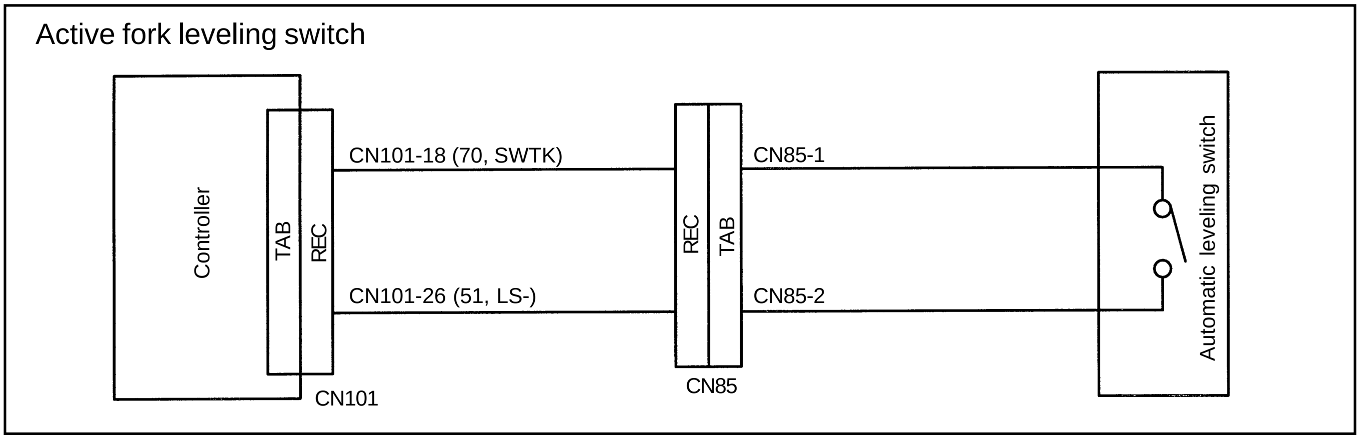
Turn the ignition switch OFF and disconnect CN31.

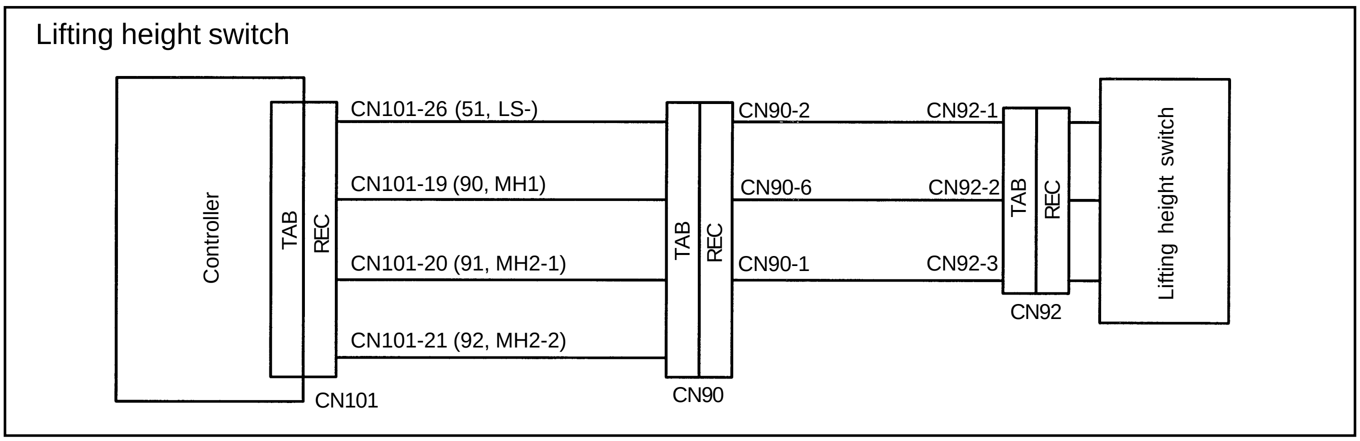
**Standard:**

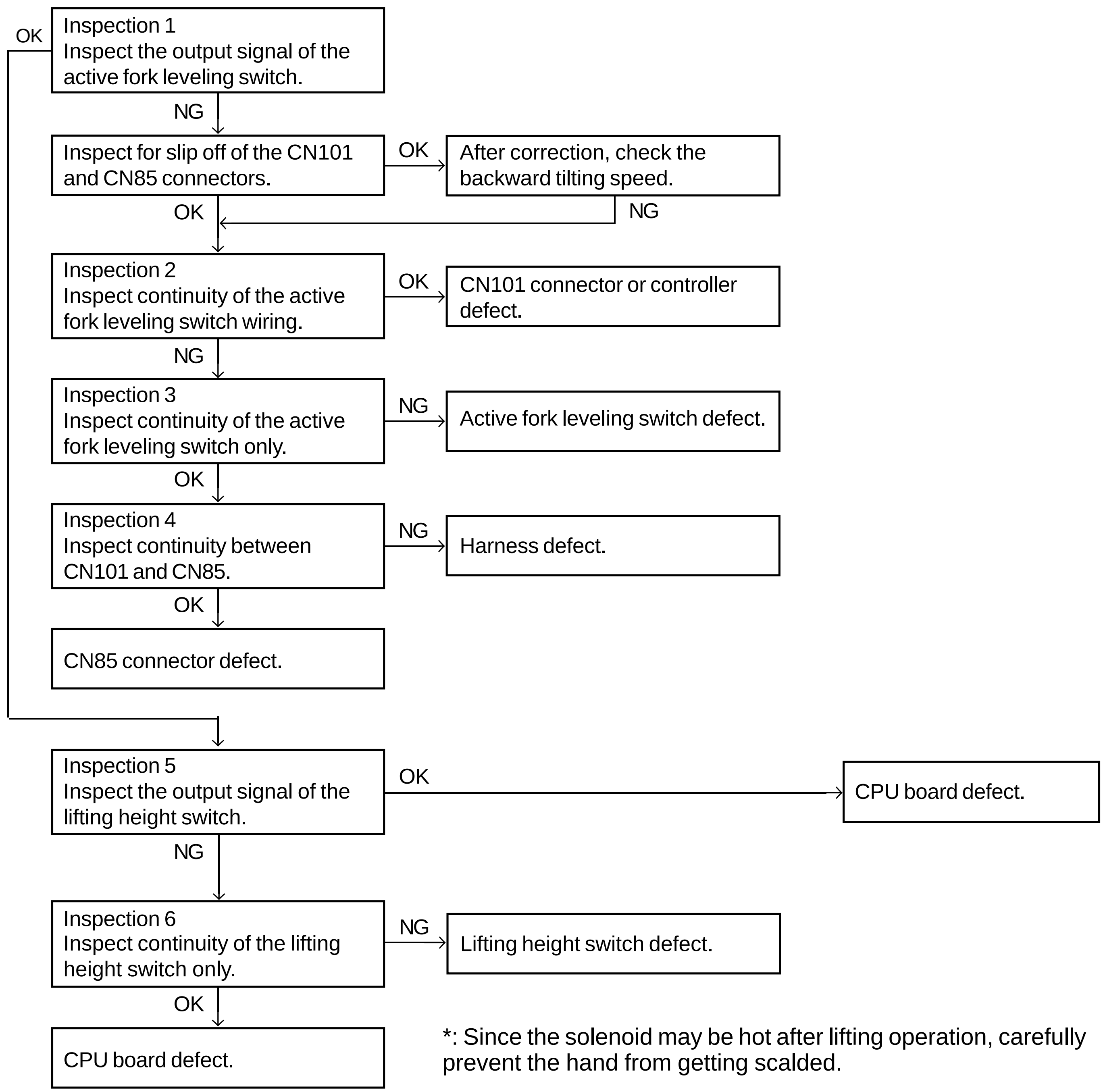
| | Fork height: Approximately 500 mm (19.6 in) |
|---|---|
| ① CN92-1 ~ CN92-2 | Continuity shall exist. |
| ② CN92-1 ~ CN92-3 | No continuity |



**● The active mast rear tilt speed is not regulated, or the backward tilting speed is always slow.**
**Related Portion**






*: Since the solenoid may be hot after lifting operation, carefully prevent the hand from getting scalded.

Inspection 1:

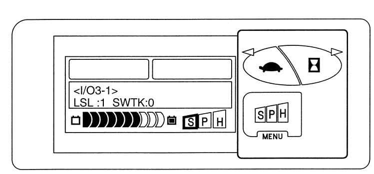
Inspect the output signal of the active fork leveling switch.

Turn the key switch ON

Analyzer: I/O MONITOR 3/TILT KNOB SWITCH

**Standard:**

| | Active fork leveling switch free | Active fork leveling switch depressed |
|---|---|---|
| SWTK | OFF | ON |



Inspection 2:

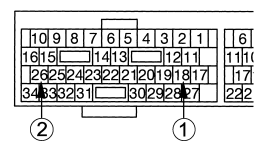
Inspect continuity of the active fork leveling switch wiring.

Turn the key switch OFF and disconnect CN101.

**Standard:**

| | Active fork leveling switch free | Active fork leveling switch depressed |
|---|---|---|
| CN101-18 – CN101-26 | No continuity | Continuity shall exist. |

CN101



Inspection 3:

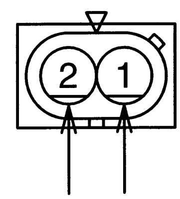
Inspect continuity of the active fork leveling switch only.

Turn the ignition switch OFF and disconnect CN85.

**Standard:**

| | Active fork leveling switch free | Active fork leveling switch depressed |
|---|---|---|
| CN85-1 – CN85-2 | No continuity | Continuity shall exist. |

CN85



Inspection 4:

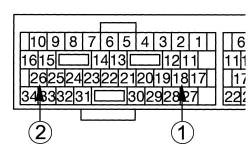
Inspect continuity between CN101 and CN85.

Turn the key switch OFF and disconnect CN101 and CN85.

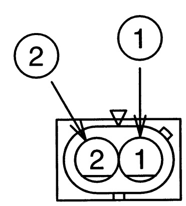
**Standard:**

① CN101-18 – CN85-1: Continuity shall exist.
② CN101-26 – CN85-2: Continuity shall exist.

CN101



CN85



Inspection 5:

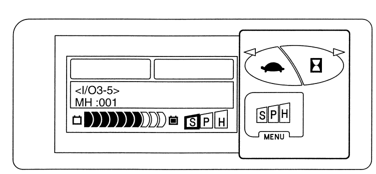
Inspect the output signal of the lifting height switch.

Turn the ignition switch ON (start the engine).

Analyzer: I/O MONITOR 3/LIFTING HEIGHT SWITCH

**Standard:**

When the fork height is 500 mm (19.6 in). the LIFTING HEIGHT output shall be as follows:
MH1: ON
MH2-1: OFF
MH2-2: OFF




Inspection 6:

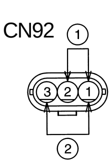
Inspect continuity of the lifting height switch only.

Turn the ignition switch OFF and disconnect CN92.

**Standard:**

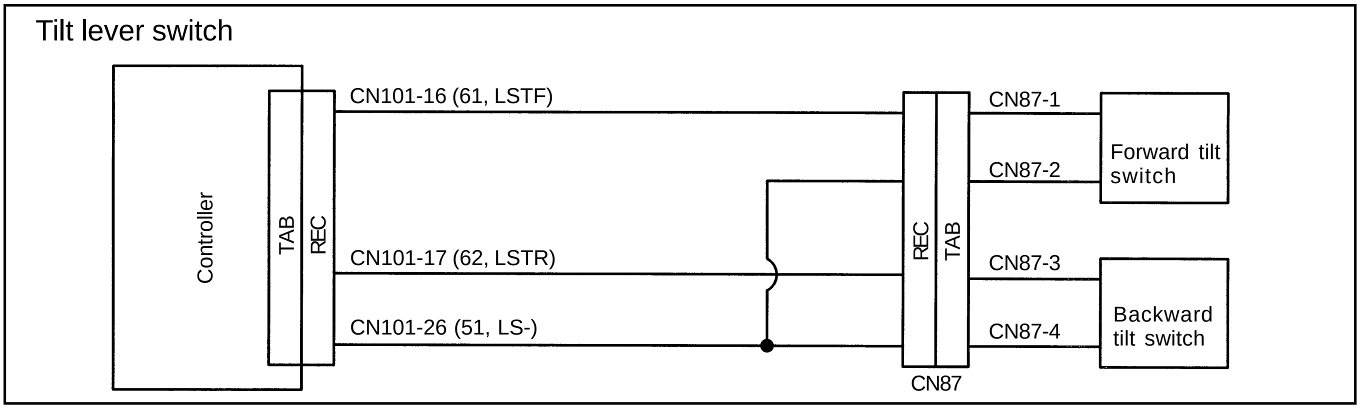
| | Small lifting height | Large lifting height |
|---|---|---|
| ① CN92-1 – N92-2 | Continuity shall exist. | No continuity. |
| ② CN92-1 – CN92-3 | No continuity. | Continuity shall exist. |

CN92



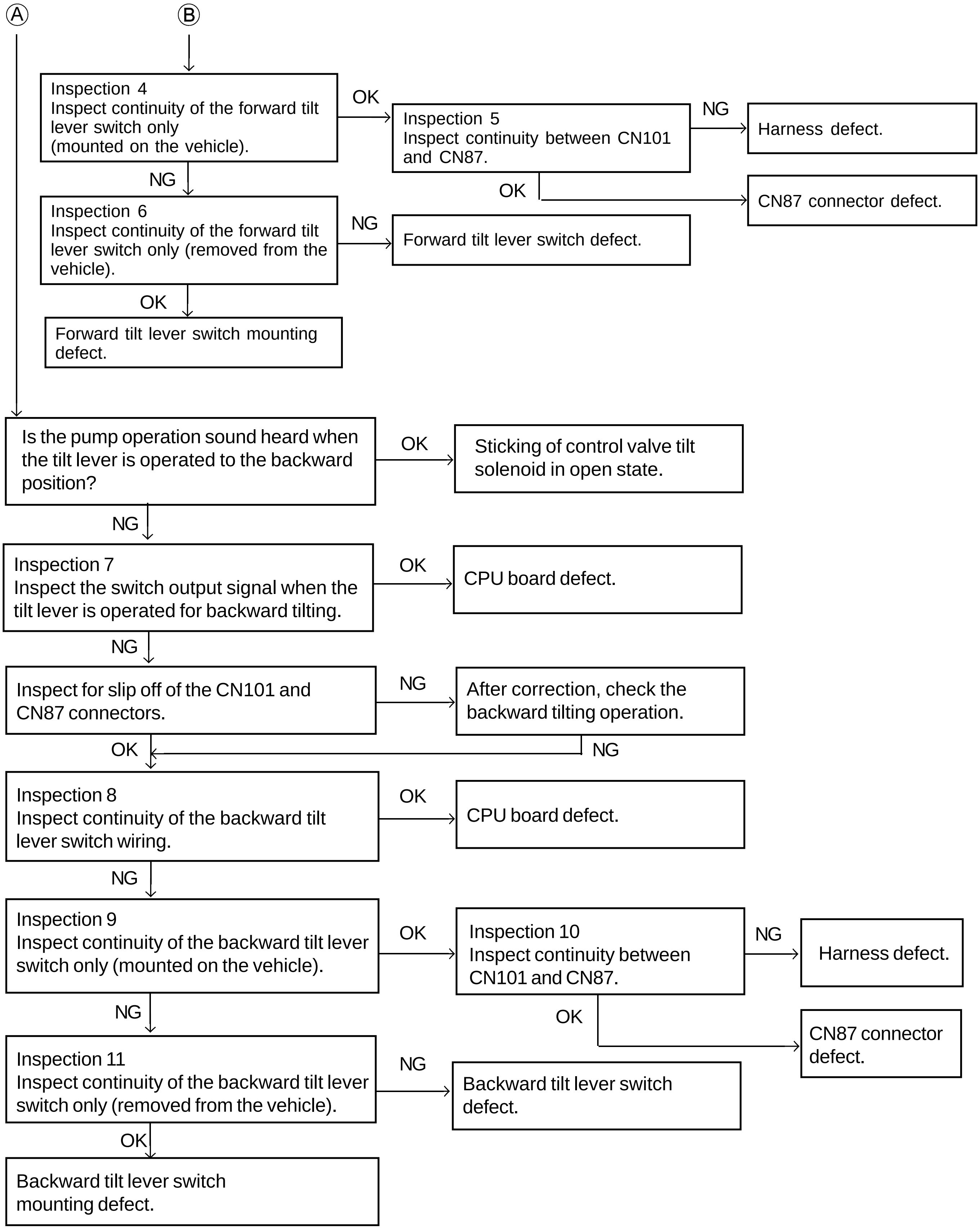
## ● The mast does not perform forward/backward tilt.

### Related Portion




Check to see if forward and backward tilting is impossible.
- OK → Check to see if forward tilting is possible.
- NG → Is the pump operation sound heard when the tilt lever is operated?
  - OK → Sticking of tilt lock check valve.
  - NG → Inspection 1
    Inspect the switch output signal when the tilt lever is operated.
    - OK → CPU board defect
    - NG → Inspect slip off of the CN87 connector.
      - OK → CPU board defect
      - NG → After correction, check the tilt operation.
        - NG → CPU board defect

Check to see if forward tilting is possible.
- OK → Go to Ⓐ on the next page.
- NG → Is the pump operation sound heard when the tilt lever is operated to the forward position?
  - OK → Sticking of control valve tilt solenoid in closed state.
  - NG → Inspection 2
    Inspect the switch output signal when the tilt lever is operated for forward tilting.
    - OK → CPU board defect.
    - NG → Inspect for slip off of the CN101 and CN87 connectors.
      - NG → After correction, check the forward tilting operation.
        - NG → Inspection 3
      - OK → Inspection 3
        Inspect continuity of the forward tilt lever switch wiring.
        - OK → CPU board defect.
        - NG → Go to Ⓑ on the next page.



Ⓐ
Ⓑ
Inspection 4
Inspect continuity of the forward tilt lever switch only (mounted on the vehicle).
OK
Inspection 5
Inspect continuity between CN101 and CN87.
NG
Harness defect.
OK
CN87 connector defect.
NG
Inspection 6
Inspect continuity of the forward tilt lever switch only (removed from the vehicle).
NG
Forward tilt lever switch defect.
OK
Forward tilt lever switch mounting defect.
Is the pump operation sound heard when the tilt lever is operated to the backward position?
OK
Sticking of control valve tilt solenoid in open state.
NG
Inspection 7
Inspect the switch output signal when the tilt lever is operated for backward tilting.
OK
CPU board defect.
NG
Inspect for slip off of the CN101 and CN87 connectors.
NG
After correction, check the backward tilting operation.
NG
OK
Inspection 8
Inspect continuity of the backward tilt lever switch wiring.
OK
CPU board defect.
NG
Inspection 9
Inspect continuity of the backward tilt lever switch only (mounted on the vehicle).
OK
Inspection 10
Inspect continuity between CN101 and CN87.
NG
Harness defect.
OK
CN87 connector defect.
NG
Inspection 11
Inspect continuity of the backward tilt lever switch only (removed from the vehicle).
NG
Backward tilt lever switch defect.
OK
Backward tilt lever switch mounting defect.

Inspection 1:

Inspect the switch output signal when the tilt lever is operated for backward tilting.
Turn the ignition switch ON (stop the engine).
Analyzer: I/O MONITOR 3/FORWARD TILT SWITCH, BACKWARD TILT SWITCH

**Standard:**

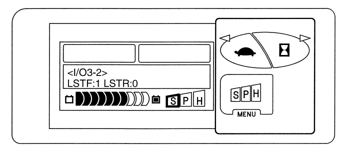
| | Tilt lever neutral | Tilt lever at forward | Tilt lever at backward |
|---|---|---|---|
| LSTF | OFF | ON | OFF |
| LSTR | OFF | OFF | ON |

Inspection 2:

Inspect the switch output signal when the tilt lever is operated for forward tilting.
Turn the ignition switch ON (stop the engine).
Analyzer: I/O MONITOR 3/FORWARD TILT SWITCH, BACKWARD TILT SWITCH

**Standard:**

| | Tilt lever neutral | Tilt lever at forward |
|---|---|---|
| LSTF | OFF | ON |
| LSTR | OFF | OFF |




Inspection 3:

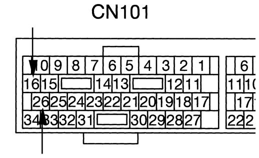
Inspect continuity of the forward tilt lever switch wiring.

Turn the key switch OFF and disconnect CN101.

**Standard:**

| | Tilt lever neutral | Tilt lever at forward |
|---|---|---|
| CN101-16 – CN101-26 | No continuity | Continuity shall exist. |

CN101



Inspection 4:

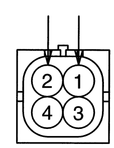
Inspect continuity of the forward tilt lever switch only (mounted on the machine).

Turn the key switch OFF and disconnect CN87.

**Standard:**

| | Tilt lever neutral | Tilt lever at forward |
|---|---|---|
| CN87-1 – CN87-2 | No continuity | Continuity shall exist. |

CN87



Inspection 5:

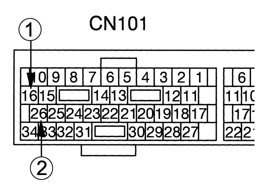
Inspect continuity between CN101 and CN87.

Turn the key switch OFF and disconnect CN101 and CN87.

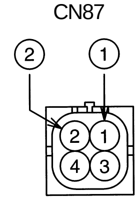
**Standard:**

① CN101-16 – CN87-1: Continuity shall exist.
② CN101-26 – CN87-2: Continuity shall exist.

CN101

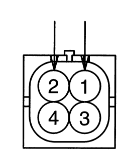


CN87



Inspection 6:
Inspect continuity of the forward tilt lever switch only (removed from the machine).

Turn the ignition switch OFF and disconnect CN87.
Remove the forward tilt lever switch (upper-side switch on the control valve).




**Standard:**

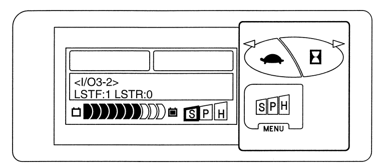
| | Switch free | Switch depressed |
|---|---|---|
| CN87-1 – CN87-2 | Continuity shall exist. | No continuity |

Inspection 7:
Inspect the switch output signal when the tilt lever is operated for backward tilting.

Turn the ignition switch ON (stop the engine).
Analyzer: I/O MONITOR 3/FORWARD TILT SWITCH, BACKWARD TILT SWITCH

**Standard:**

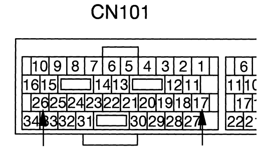
| | Tilt lever neutral | Tilt lever at backward |
|---|---|---|
| LSTF | OFF | OFF |
| LSTR | OFF | ON |




Inspection 8:
Inspect continuity of the backward tilt lever switch wiring.

Turn the key switch OFF and disconnect CN101.

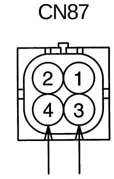
**Standard:**




| | Tilt lever neutral | Tilt lever at backward |
|---|---|---|
| CN101-17 – CN101-26 | No continuity | Continuity shall exist. |

Inspection 9:
Inspect continuity of the backward tilt lever switch only (mounted on the vehicle).

Turn the key switch OFF and disconnect CN87.

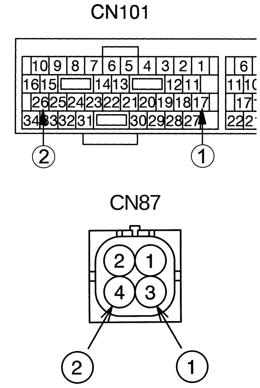



**Standard:**

| | Tilt lever neutral | Tilt lever at backward |
|---|---|---|
| CN87-3 – CN87-4 | No continuity | Continuity shall exist. |

Inspection 10:
Inspect continuity between CN101 and CN87.

Turn the key switch OFF and disconnect CN101 and CN87.

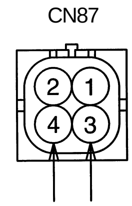



**Standard:**
① CN101-17 – CN87-3: Continuity shall exist.
② CN101-26 – CN87-4: Continuity shall exist.

Inspection 11:

Inspect continuity of the backward tilt lever switch only (removed from the vehicle).

Turn the key switch OFF and disconnect CN87.
Remove the backward tilt lever switch (lower-side switch on the control valve).




**Standard:**

| | Switch free | Switch depressed |
|---|---|---|
| CN87-3 – CN87-4 | Continuity shall exist. | No continuity |

- **The knob position runs out to a certain point (at least by 10 degrees from the straight-forward position).**

**Inspection 1**
Make sure that the difference between the knob position values from the right and left is 4 or less when the steering wheel is turned from the right or left to the neutral (straight-forward) position.

→ NG: Cam or steering wheel defect.

↓ OK

**Inspection 2**
Make sure that the central value of the knob position value is within 80 ± 1 when the steering wheel is turned from the right or left to the neutral (straight-forward) position.

→ NG: Steering wheel angle sensor run-out.

↓ OK

**Inspection 3**
Inspect the difference between the tire voltage value and re-setting voltage value when the rear wheel tires are just in straight-forward position.
⇒ The difference shall be at least 0.04 V.

→ NG: Tire angle re-setting defect
Perform re-setting again.

↓ OK

**Inspection 4**
Turn the knob SOL ON and make sure that the steering wheel turns idle at the tire end (Turning speed: 1 turn per 2 to 3 seconds).

→ NG: Knob solenoid valve closed failure
(plunger sticking, orifice clogged, etc.)

↓ OK

**Inspection 5**
Does the knob SOL go ON/OFF during stationary steering to the right and left?

→ OK: Knob solenoid valve closed failure (plunger sticking, orifice clogged, etc.)

↓ NG

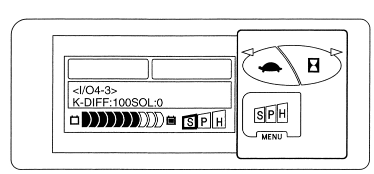
PS controller defect.

Inspection 1:

Make sure that the difference between the knob position values from the right and left is 4 or less when the steering wheel is turned from the right or left to the neutral (straight-forward) position.
Analyzer: I/O MONITOR 4/STEERING ANGLE KNOB POSITION

**Standard:**
The difference between the knob position values obtained when the steering wheel is turned from the right or left end to just the neutral position shall be 4 or less.

Example: Turning from the right end — 78
Turning from the left end — 83
83 — 78 = 5 (NG)

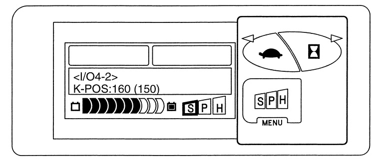


Inspection 2:

Make sure that the central value of the knob position value is within 80 ± 1 when the steering wheel is turned from the right or left end to the neutral (straight-forward) position.

Analyzer: I/O MONITOR 4/STEERING ANGLE KNOB POSITION

**Standard:**
The knob position value shall be within 80 ± 1 when the steering wheel is turned from the right or left end to the neutral (straight-forward) position.



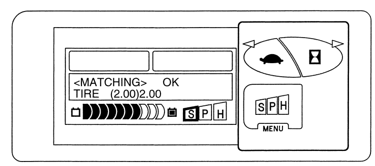

**Note:**
**Start from at least 1/3 turn before the TOYOTA mark center position.**

Inspection 3:

Inspect the difference between the tire voltage value and re-setting voltage value when the rear wheel tires are just in straight-forward position.
⇒ The difference shall be at least 0.04 V.

Matching: Tire angle

**Standard:**
The difference between the tire voltage value and re-setting voltage value shall be at least 0.04 V when the rear wheel tires are just in straight-forward position.

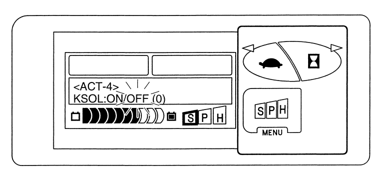



Inspection 4:

Turn the knob SOL ON and make sure that the steering wheel turns idle at the tire end. (Turning speed: 1 turn per 2 to 3 seconds)

Analyzer: ACTIVE TEST/KNOB POSITION CORRECTING SOLENOID

**Standard:**
The steering wheel shall turn idle when the knob SOL is turned ON and the steering wheel turns idle at the tire end. (Turning speed: 1 turn per 2 to 3 seconds)

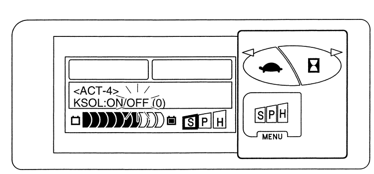



Inspection 5:

Does the knob SOL go ON/OFF during stationary steering to the right and left?

Analyzer: ACTIVE TEST/KNOB POSITION CORRECTING SOLENOID

**Standard:**
The knob SOL shall sometimes go ON/OFF when the steering wheel is turned from an end to another alternately. Perform this operation three times.



## ● The knob position runs out. (The knob position in straight-forward status is not constant.)

Inspection 1
Turn the knob SOL OFF and inspect the steering wheel revolution upon stationary steering (turning speed: 1 turn per 2 to 3 seconds) ⇒ Steering wheel revolution is 6 or less between ends?

NG → Knob solenoid valve open failure (plunger sticking, etc.)

OK ↓

Inspection 2
Turn the knob SOL ON and make sure that the steering wheel turns idle at the tire end (turning speed: 1 turn per 2 to 3 seconds).

NG → Knob solenoid valve closed failure (plunger sticking, orifice clogged, etc.)

OK ↓

Inspection 3
Is the tire voltage value changed when the steering wheel is turned to the right and left?

NG → Sensor or joint missing or damaged.

OK ↓

Inspection 4
Is the error code recorded?

Yes → Is any current error provided in the record?

- Yes → Go to the corresponding error code.
- No → Inspection 5

No ↓

Inspection 5
Make sure that the knob position value changes smoothly when the steering wheel is turned.

NG → Cam or steering wheel angle sensor defect.

OK ↓

Inspection 6
Make sure that the difference between the knob position values from the right and left is 4 or less when the steering wheel is turned from the right or left to the neutral (straight-forward) position.

NG → Cam or steering wheel defect.

OK ↓

Inspection 7
Inspect the gap between the tire angle sensor and the rubber bushing.

NG → Check to see if the link has abnormality such as slip off, damages, missing, etc.

- OK → Rear axle cylinder link defect (eccentric pin, king pin, etc.)
- NG → Rubber joint abnormality (looseness, gap, etc.)

OK ↓

Inspection 8
Does the speed value change according to the traveling speed?

NG → Speed sensor defect.

OK ↓

Inspection 9
Does the knob SOL go ON/OFF upon stationary steering to the right and left?

OK → Knob solenoid valve defect (valve clogged, etc.)

NG ↓

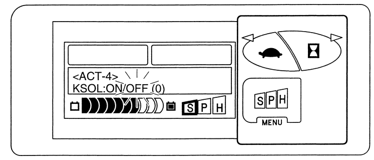
SK/PS controller defect.

Inspection 1:

Turn the knob SOL OFF and inspect the steering wheel revolution upon stationary steering (turning speed: 1 turn per 2 to 3 seconds)
⇒ Steering wheel revolution is 6 or less between ends?

Analyzer: ACTIVE TEST/KNOB POSITION CORRECTING SOLENOID

**Standard:**
Six or fewer rotations upon stationary steering after the knob SOL is turned OFF (turning speed: 1 turn per 2 to 3 seconds)

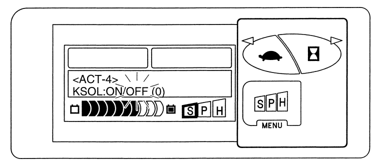



Inspection 2:

Turn the knob SOL ON and make sure that the steering wheel turns idle at the tire end (turning speed: 1 turn per 2 to 3 seconds).

Analyzer: ACTIVE TEST/KNOB POSITION CORRECTING SOLENOID

**Standard:**
When the knob SOL is turned ON, the steering wheel is turned to the tire end, and the steering wheel is further turned, the steering wheel shall turn idle (turning speed: 1 turn per 2 to 3 seconds).

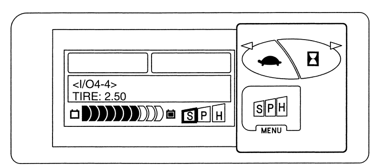



Inspection 3:

Is the tire voltage value changed when the steering wheel is turned to the right and left?

Analyzer: I/O MONITOR 4/TIRE ANGLE SENSOR VOLTAGE

**Standard:**
When the steering wheel is turned to the right and left, the tire voltage value should change smoothly and continuously in the whole rage.

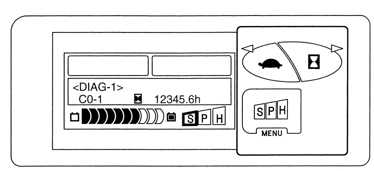



Inspection 4:

Is the error code recorded?

Analyzer: DIAG MEMORY

**Standard:**
Errors shall not exist near the current time.

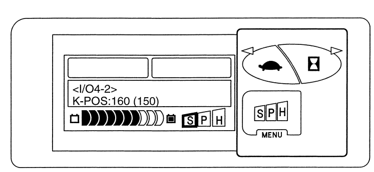



Inspection 5:

Make sure that the knob position value changes smoothly when the steering wheel is turned.

Analyzer: I/O MONITOR 4/STEERING ANGLE KNOB POSITION

**Standard:**
When the steering wheel is turned to the right and left, the knob position value shall change smoothly.
0 to 159 ⇒ 0 to 159 ⇒ repeated

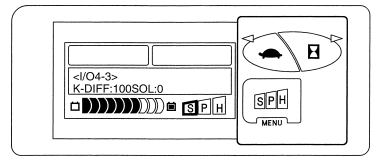


Inspection 6:

Make sure that the difference between the knob position values from the right and left is 4 or less when the steering wheel is turned from the right or left to the neutral (straight-forward) position.

Analyzer: I/O MONITOR 4/STEERING ANGLE KNOB POSITION

**Standard:**
The difference between the knob position values from the right and left shall be 4 or less when the steering wheel is turned from the right or left to the neutral position.




Example: Turning from the right end — 78
Turning from the left end — 83
83 - 78 = 5 (NG)

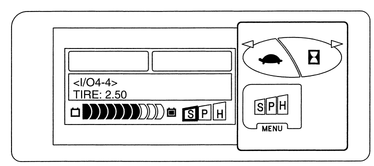
**Note:**
**Start from at least 1/3 turn before the TOYOTA mark center position.**

Inspection 7:

Jack up the vehicle until rear wheels leave the ground, and fully turn the steering wheel to either side. Then return the knob by approx. 70 mm (2.8 in) (approx. 25 degrees) from that position, and inspect variation in the tire voltage value. Inspect this for one direction at a time.

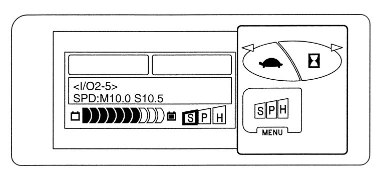
Analyzer: I/O MONITOR 4/TIRE ANGLE SENSOR VOLTAGE

**Standard:**
When the knob is alternately turned (tire is slightly moved) in 70 mm (approximately 25 degrees), the tire voltage change shall be at least 0.02 V.




Inspection 8:

Does the speed value change according to the traveling speed?



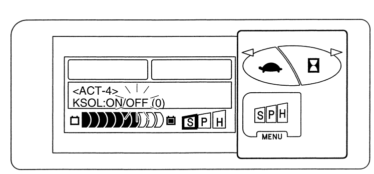

Analyzer: I/O MONITOR 2/VEHICLE SPEED

**Standard:**
The speed value shall change according to the traveling speed.

Inspection 9:

Does the knob SOL go ON/OFF upon stationary steering to the right and left?
Analyzer: ACTIVE TEST/KNOB POSITION CORRECTING SOLENOID

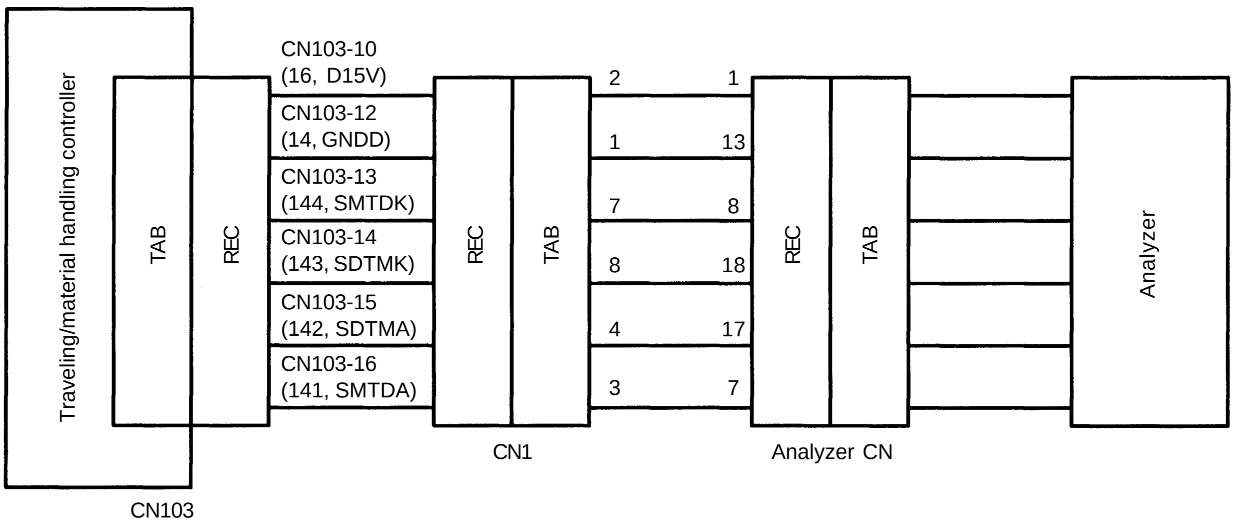
**Standard:**
The knob SOL shall sometimes go ON/OFF when the steering wheel is turned from an end to another alternately. Perform this operation three times.



# PLUG-IN ANALYZER

## • No Display on Screen

### Related portion




### Estimated causes

① Defective connector contact
② Analyzer harness defect
③ Defect of plug-in analyzer itself (mainly CPU board defect and not ROM defect)

Inspect CN1 and the analyzer connector for disconnection or defective contact.

NG → Check the screen display after correction.

NG → (return)

↓ OK

Inspection 1.
Analyzer CN1
↕ voltage check
Analyzer CN-13

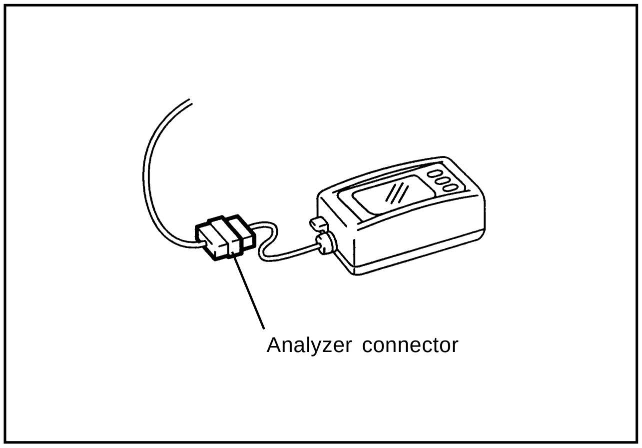
NG → Analyzer harness defect

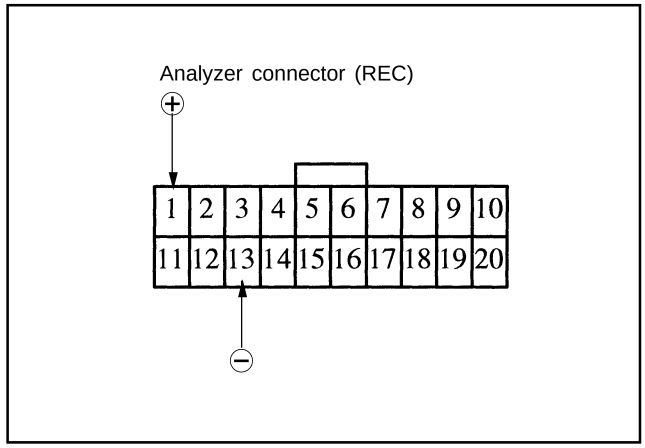
↓ OK

Plug-in analyzer defect

Inspection 1:
Analyzer supply voltage check
Battery plug ON, key switch ON

| | |
|---|---|
| Measurement terminals | Analyzer CN1 ⊕ – 13 ⊖ |
| Tester range | DC 50 |
| Standard | Approx. 15 V |

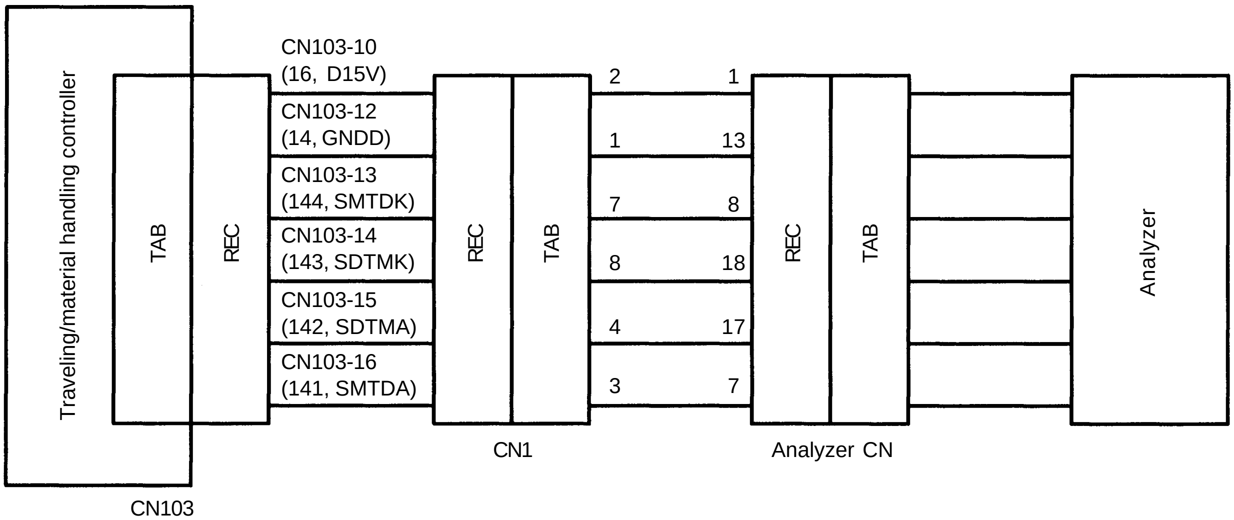



OK (Approx. 15 V) → Plug-in analyzer defect
NG (0 V) → Analyzer harness defect

- **“1. SAS” is displayed instead of “2. 7FB” on the MAIN MENU screen.**
- **No data (error memory, I/O monitor 1-4) display.**

## Related portion




## Estimated causes

① Connector contact defect
② Analyzer harness defect
③ Plug-in analyzer defect (mainly CPU defect and not ROM defect)
④ Traveling/material handling controller defect

Continuity check between CN1 and analyzer CN — NG → • Display check after correction (OK → back to flow)

↓ OK

Inspection 1.
Continuity check between CN1 and analyzer CN — NG → • Analyzer harness defect

↓ OK

Connect the plug-in analyzer to another vehicle and check if any data is displayed. — NG → • Plug-in analyzer defect

↓

A

A

| Inspection 2. Continuity check between CN103 and CN1 |
|---|

→ • Vehicle side harness defect

↓ OK

• Traveling·material handling controller defect

Inspection 1:
Continuity check between CN1 and analyzer CN
Key switch off, battery plug off, and analyzer harness disconnection

| | |
|---|---|
| Measurement terminals | CN1-7 – Analyzer CN-8<br>CN1-8 – Analyzer CN-18<br>CN1-4 – Analyzer CN-17<br>CN1-3 – Analyzer CN-7 |
| Tester range | Ω × 1 |
| Standard | 0 Ω |

OK (0 Ω) → Check by connecting the plug-in analyzer to another vehicle.
NG (∞ Ω) → Analyzer harness defect

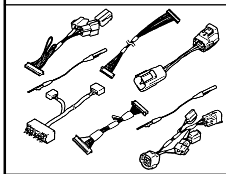
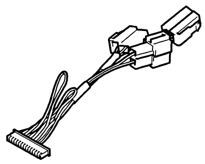
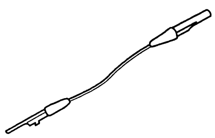
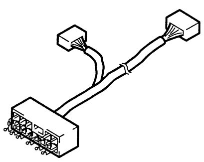
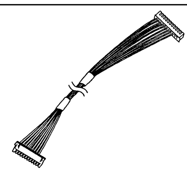
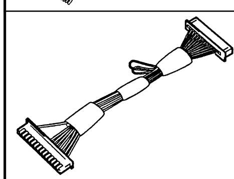
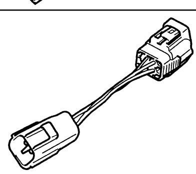
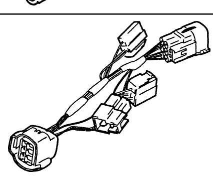
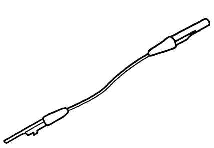
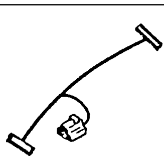
Inspection 2:
Continuity check between CN103 and CN1
Key switch off, battery plug off, CN103 and CN1 disconnection

| | |
|---|---|
| Measurement terminals | CN103-13 (144) – CN1-7 (144)<br>CN103-14 (143) – CN1-4 (143)<br>CN103-15 (142) – CN1-8 (142)<br>CN103-16 (141) – CN1-3 (141) |
| Tester range | Ω × 1 |
| Standard | 0 Ω |

OK (0 Ω) → Traveling·material handling controller defect
NG (∞ Ω) → Vehicle side harness defect

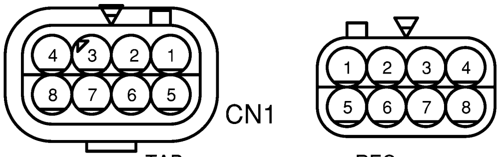
# APPENDIX

## SST LIST

| Illust. | Part No. | Part Name | |
|---|---|---|---|
|  | 09230-13130-71 | AC controller diagnosis kit | |
|  | 09231-13130-71 | Sub-harness for CN105 | • To check the traveling/material handling system fan ON/OFF signal<br>• To check MOS drive power supply ON/OFF signal |
|  | 09232-13130-71 | For CN20, 52, 55, 58, 86, 90 and 94 | To check each CPU board to sensor harness and the CPU board itself |
|  | 09233-13130-71 | Sub-harness for CN111, 112 | To check if the CPU board and DC/MD drives the MOS normally |
|  | 09234-13130-71 | Sub-harness for CN106, 107 | To check in combination with SST3<br>If the check result in connection with SST3 is NG, this sub-harness is used to discriminate if the cause of NG lies in the CPU or DC/MD. |
|  | 09235-13130-71 | Sub-harness for CN146 | To check the ON/OFF signal of the swing lock cylinder solenoid and knob offset correcting valve solenoid |
|  | 09236-13130-71 | Sub-harness for CN57 | To check signals from traveling speed sensors SSD1 and SSD2<br>(Replaces the SSD1 and SSD2 signals.) |
|  | 09237-13130-71 | Sub-harness for CN19 | • To discriminate whether the steering angle sensor or the harness/CPU board is defective by replacing STS1 and STS2 signals<br>• To check steering angle sensor power supply |
|  | 09238-13130-71 | Sub-harness for CN25 | To check the acceleration potentiometer short harness, harness from the CPU board to the acceleration potentiometer and the CPU board |
|  | 09239-13130-71 | Sub-harness for CN106, 107 | • To check the traveling/material handling system fan ON/OFF signal<br>• To check MOS drive power supply ON/OFF signal |

# CONNECTOR DRAWING (FOR VEHICLE WITHOUT SAS)

CN1



TAB

| NO | P | C | J |
|---|---|---|---|
| 1 | 14 | BR | CN2-4 |
| 2 | 16 | R | CN2-1 |
| 3 | 141 | R-B | CN1-8 |
| 4 | 144 | R-Y | CN1-7 |
| 5 | | | |
| 6 | | | |
| 7 | 144 | R-Y | CN1-4 |
| 8 | 141 | R-B | CN1-3 |

REC

| NO | P | C | J |
|---|---|---|---|
| 1 | 14 | BR | CN103-12 |
| 2 | 16 | R | CN103-10 |
| 3 | 141 | W-R | CN103-16 |
| 4 | 143 | R-Y | CN103-14 |
| 5 | | | |
| 6 | | | |
| 7 | 144 | G-R | CN103-13 |
| 8 | 142 | R-B | CN103-15 |

CN3

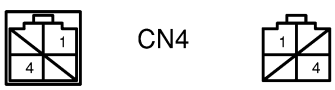
TAB

| NO | P | C | J |
|---|---|---|---|
| 1 | 101 | R | B |
| 2 | 104 | G | T |
| 3 | 102 | R-G | HS |
| 4 | 107 | R-Y | HM |

REC

| NO | P | C | J |
|---|---|---|---|
| 1 | 101 | R | CN29-1 |
| 2 | 104 | G-R | CN29-2 |
| 3 | 102 | R-G | CN29-4 |
| 4 | 107 | R-B | CN29-5 |

CN4



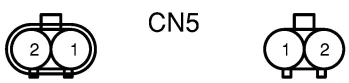
TAB

| NO | P | Ç | J |
|---|---|---|---|
| 1 | 41 | - | AM |
| 4 | 43 | | IG |

REC

| NO | P | C | J |
|---|---|---|---|
| 1 | 41 | Y | CN29-3 |
| 4 | 43 | B-Y | CN29-6 |

CN5



TAB

| NO | P | C | J |
|---|---|---|---|
| 1 | 101 | Y | LS $_{ST}$ |
| 2 | 111 | B-Y | LS $_{ST}$ |

REC

| NO | P | C | J |
|---|---|---|---|
| 1 | 101 | R | CN22-1 |
| 2 | 111 | R-L | CN38-2 |

CN6

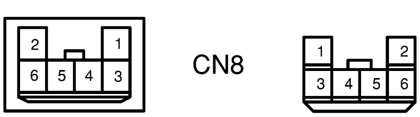
TAB

| NO | P | C | J $_B$ |
|---|---|---|---|
| 1 | 51 | B-W | LS $_B$ |
| 2 | 65 | R-L | LS |

REC

| NO | P | C | J |
|---|---|---|---|
| 1 | 51 | R-L | J1 |
| 2 | 65 | Y-G | CN45-4 |

CN8



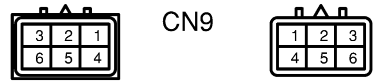
TAB

| NO | P | C | J |
|---|---|---|---|
| 1 | 41 | GY | SW $_{H(+)}$ |
| 2 | 48 | WB | SW $_{H(-)}$ |
| 3 | 110 | GW | SW $_{F(B)}$ |
| 4 | 108 | G | SW $_{F(R)}$ |
| 5 | 109 | GR | SW $_{F(L)}$ |
| 6 | | | |

REC

| NO | P | C | J |
|---|---|---|---|
| 1 | 41 | Y | J6 |
| 2 | 48 | P | H |
| 3 | 110 | GR | CN12-2 |
| 4 | 108 | R-Y | CN38-5 |
| 5 | 109 | G-Y | CN38-6 |
| 6 | | | |

CN9



TAB

| NO | P | C | J |
|---|---|---|---|
| 1 | 51 | O | DSF,DSR |
| 2 | 120 | B | DSFO |
| 3 | 103 | G | DSBU |
| 4 | 46 | W-O | DSR |
| 5 | 45 | W-BR | DSF |
| 6 | 43 | R | DSFO,DSBU |

REC

| NO | P | C | J |
|---|---|---|---|
| 1 | 51 | R-L | J1 |
| 2 | 120 | Y-R | CN24-1 |
| 3 | 103 | R-W | CN38-3 |
| 4 | 46 | G | CN101-2 |
| 5 | 45 | W | CN101-1 |
| 6 | 43 | B-Y | J7 |

CN11

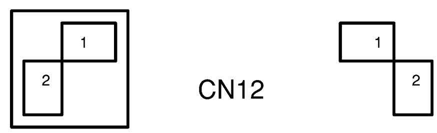
TAB

| NO | P | C | J $_L$ |
|---|---|---|---|
| 1 | 60 | G-W | LS |
| 2 | 51 | R-L | NO |
| 3 | 63 | G-B | LS $_{ATT}$ |

REC

| NO | P | C | J |
|---|---|---|---|
| 1 | 60 | G-W | CN101-32 |
| 2 | 51 | R-L | J1 |
| 3 | 63 | G-B | CN101-11 |

CN12



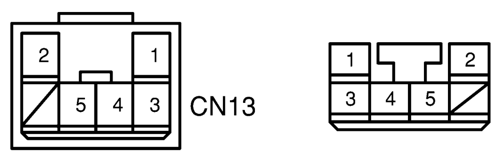
TAB

| NO | P | Ç | J |
|---|---|---|---|
| 1 | 43 | - | FRY |
| 2 | 110 | | FRY |

REC

| NO | P | C | J |
|---|---|---|---|
| 1 | 43 | B-Y | CN103-12 |
| 2 | 110 | GR | CN8-3 |

CN13



TAB

| NO | P | C | J |
|---|---|---|---|
| 1 | N1 | W-B | CN30-2 |
| 2 | 102 | R-G | CN30-1 |
| 3 | N1 | W-B | CN14-3 |
| 4 | 108 | R-Y | CN14-2 |
| 5 | 104 | G-R | CN14-1 |
| 6 | | | |

REC

| NO | P | C | J |
|---|---|---|---|
| 1 | N1 | W-B | J8 |
| 2 | 102 | R-G | CN17-2 |
| 3 | N1 | W-B | J8 |
| 4 | 108 | R-Y | J12 |
| 5 | 104 | G-R | CN38-4 |
| 6 | | | |

CN14

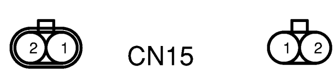
TAB

| NO | P | Ç | J |
|---|---|---|---|
| 1 | 104 | - | LC-R |
| 2 | 109 | - | LF-R |
| 3 | N1 | | GND |

REC

| NO | P | C | J |
|---|---|---|---|
| 1 | 104 | G-R | CN13-5 |
| 2 | 109 | G-Y | CN13-4 |
| 3 | N1 | W-B | CN13-3 |

CN15



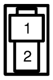
TAB

| NO | P | Ç | J |
|---|---|---|---|
| 1 | 51 | - | LS $_{PB}$ |
| 2 | 66 | | LS $_{PB}$ |

REC

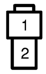
| NO | P | C | J |
|---|---|---|---|
| 1 | 51 | R-L | J1 |
| 2 | 66 | B-W | CN101-4 |

## CN16



TAB

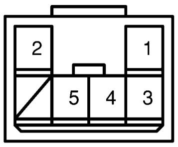
| NO | P | C | J |
|---|---|---|---|
| 1 | 107 | B | PLW |
| 2 | N1 | B | PLW |



REC

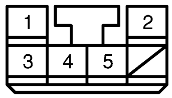
| NO | P | C | J |
|---|---|---|---|
| 1 | 107 | R-B | CN29-5,CN38-7 |
| 2 | N1 | W-B | J8,J8 |

## CN17



TAB

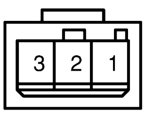
| NO | P | C | J |
|---|---|---|---|
| 1 | N1 | W-B | CN28-2 |
| 2 | 102 | R-G | CN28-1 |
| 3 | N1 | W-B | CN18-3 |
| 4 | 109 | G-Y | CN18-2 |
| 5 | 104 | G-R | CN18-1 |



REC

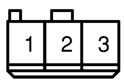
| NO | P | C | J |
|---|---|---|---|
| 1 | N1 | W-B | J8 |
| 2 | 102 | R-G | CN13-2 |
| 3 | N1 | W-B | J8 |
| 4 | 109 | G-Y | J11 |
| 5 | 104 | G-R | J10 |

## CN18



TAB

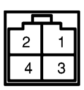
| NO | P | C | J |
|---|---|---|---|
| 1 | 104 | - | LC-L |
| 2 | 108 | - | LF-L |
| 3 | N1 |  | GND |



REC

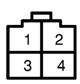
| NO | P | C | J |
|---|---|---|---|
| 1 | 104 | G-R | CN17-5 |
| 2 | 108 | G-Y | CN17-4 |
| 3 | N1 | W-B | CN17-3 |

## CN22



TAB

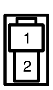
| NO | P | C | J |
|---|---|---|---|
| 1 | 101 | - | F4 |
| 2 | P1 | - | F4,F5 |
| 3 |  |  |  |
| 4 | 41 | - | F5 |



REC

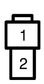
| NO | P | C | J |
|---|---|---|---|
| 1 | 101 | R | CN5-1 |
| 2 | P1 | B | P1 terminal |
| 3 |  |  |  |
| 4 | 41 | Y | J6 |

## CN23



TAB

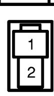
| NO | P | C | J |
|---|---|---|---|
| 1 | 103 | R-W | BZ |
| 2 | N1 | B | BZ |



REC

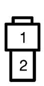
| NO | P | C | J |
|---|---|---|---|
| 1 | 103 | R-W | J13 |
| 2 | N1 | W-B | J8 |

## CN24



TAB

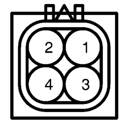
| NO | P | C | J |
|---|---|---|---|
| 1 | 120 | R-W | CHI |
| 2 | N1 | B | CHI |



REC

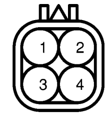
| NO | P | C | J |
|---|---|---|---|
| 1 | 120 | Y-R | CN9-2 |
| 2 | N1 | W-B | J8 |

## CN25



TAB

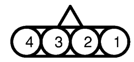
| NO | P | C | J |
|---|---|---|---|
| 1 | 52 | GR | CN26-3 |
| 2 | 53 | R-B | CN26-4 |
| 3 | 51 | R-L | CN26-1 |
| 4 | 64 | R-Y | CN26-2 |



REC

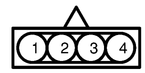
| NO | P | C | J |
|---|---|---|---|
| 1 | 52 | GR | CN102-2 |
| 2 | 53 | R-B | CN102-14 |
| 3 | 51 | R-L | J2 |
| 4 | 64 | R-Y | CN102-1 |

## CN26



TAB

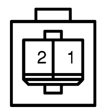
| NO | P | C | J |
|---|---|---|---|
| 1 | 51 | - | E2 |
| 2 | 64 | - | IDL |
| 3 | 52 | - | VTA |
| 4 | 53 |  | VC |



REC

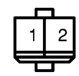
| NO | P | C | J |
|---|---|---|---|
| 1 | 51 | R-L | CN25-3 |
| 2 | 64 | R-Y | CN25-4 |
| 3 | 52 | GR | CN25-1 |
| 4 | 53 | R-B | CN25-2 |

## CN28



TAB

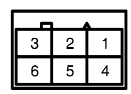
| NO | P | C | J |
|---|---|---|---|
| 1 | 102 | - | H/L |
| 2 | N1 |  | H/L |



REC

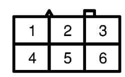
| NO | P | C | J |
|---|---|---|---|
| 1 | 102 | R-G | CN17-2 |
| 2 | N1 | W-B | CN17-1 |

## CN29



TAB

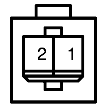
| NO | P | C | J |
|---|---|---|---|
| 1 | 101 | R | CN3-1 |
| 2 | 104 | G-R | CN3-2 |
| 3 | 41 | Y | CN4-1 |
| 4 | 102 | R-G | CN3-3 |
| 5 | 107 | R-B | CN3-4 |
| 6 | 43 | B-Y | CN4-4 |



REC

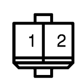
| NO | P | C | J |
|---|---|---|---|
| 1 | 101 | R | J9 |
| 2 | 104 | G-R | J10 |
| 3 | 41 | Y | CN103-7 |
| 4 | 102 | R-G | J15 |
| 5 | 107 | R-B | CN16-1 |
| 6 | 43 | B-Y | J7 |

## CN30



TAB

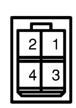
| NO | P | C | J |
|---|---|---|---|
| 1 | 102 | - | H/L |
| 2 | N1 |  | H/L |



REC

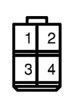
| NO | P | C | J |
|---|---|---|---|
| 1 | 102 | R-G | CN13-2 |
| 2 | N1 | W-B | CN13-1 |

## CN31



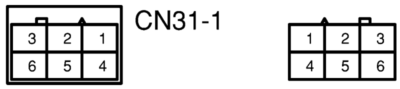
TAB

| NO | P | C | J |
|---|---|---|---|
| 1 | 104 | L | TL |
| 2 | 111 | L | STP |
| 3 | 109 | L | TRN |
| 4 | N1 | L | E |



REC

| NO | P | C | J |
|---|---|---|---|
| 1 | 104 | G-R | J43 |
| 2 | 111 | R-L | J41 |
| 3 | 109 | G-Y | CN38-6 |
| 4 | N1 | W-B | J46 |




TAB

| NO | P | C | J |
|---|---|---|---|
| 1 | 104 | R-W | LT-L |
| 2 | N1 | W-B | GND |
| 3 | N1 | Y | LF-RL |
| 4 | 111 | R-B | LST-L |
| 5 | 103 | R | LF-LR |
| 6 | 109 | G-W | LF-RL |

REC

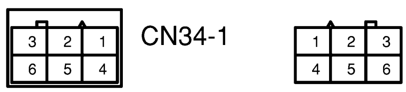
| NO | P | C | J |
|---|---|---|---|
| 1 | 104 | G-R | J43 |
| 2 | N1 | W-B | J46 |
| 3 | N1 | W-B | J46 |
| 4 | 111 | R-L | J41 |
| 5 | 103 | R-W | J42 |
| 6 | 109 | G-Y | J45 |


TAB

| NO | P | C | J |
|---|---|---|---|
| 1 | 104 | R | TL |
| 2 | 111 | R | STP |
| 3 | 103 | R | B/U |
| 4 | | | |
| 5 | 108 | R | TRN |
| 6 | N1 | R | E |

REC

| NO | P | C | J |
|---|---|---|---|
| 1 | 104 | G-R | J43 |
| 2 | 111 | R-L | J41 |
| 3 | 103 | R-W | J42 |
| 4 | | | |
| 5 | 108 | R-Y | J44 |
| 6 | N1 | W-B | J46 |

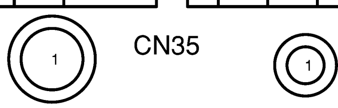



TAB

| NO | P | C | J |
|---|---|---|---|
| 1 | 104 | R-W | LT-R |
| 2 | N1 | W-B | GND |
| 3 | N1 | Y | LF-RR |
| 4 | 111 | R-B | LST-R |
| 5 | 103 | B | LF-RR |
| 6 | 108 | G-W | LF-RR |

REC

| NO | P | C | J |
|---|---|---|---|
| 1 | 104 | G-R | CN38-4 |
| 2 | N1 | W-B | J46 |
| 3 | N1 | W-B | J46 |
| 4 | 111 | R-L | CN38-2 |
| 5 | 103 | R-W | J42 |
| 6 | 108 | R-Y | CN38-5 |




TAB

| NO | P | C | J |
|---|---|---|---|
| 1 | 140 | B | SLL |

REC

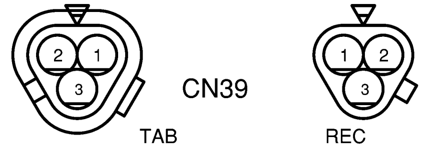
| NO | P | C | J |
|---|---|---|---|
| 1 | 140 | B | CN40-4 |


TAB

| NO | P | C | J |
|---|---|---|---|
| 1 | 120 | Y-R | J14 |
| 2 | 111 | R-L | CN5-2 |
| 3 | 103 | R-W | CN9-3 |
| 4 | 104 | G-R | CN13-5 |
| 5 | 108 | R-Y | CN8-4 |
| 6 | 109 | G-Y | CN8-5 |
| 7 | 107 | R-B | CN16-1 |
| 8 | N1 | W-B | J8 |

REC

| NO | P | C | J |
|---|---|---|---|
| 1 | 120 | Y-R | LF-R |
| 2 | 111 | R-L | CN34-1-4 |
| 3 | 103 | R-W | LF-R |
| 4 | 104 | G-R | CN34-1-1 |
| 5 | 108 | R-Y | CN34-1-6 |
| 6 | 109 | G-Y | CN31-3 |
| 7 | 107 | R-B | LW |
| 8 | N1 | W-B | LR |

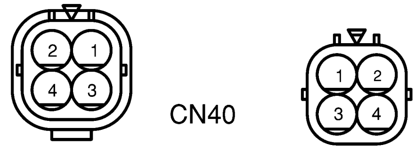



TAB

| NO | P | C | J |
|---|---|---|---|
| 1 | 145 | Y-R | CN2-2 |
| 2 | 146 | R | CN2-1 |
| 3 | 41 | Y | HM |

REC

| NO | P | C | J |
|---|---|---|---|
| 1 | 145 | Y-R | CN101-25 |
| 2 | 146 | R | CN101-15 |
| 3 | 41 | Y | J6 |

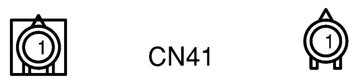



TAB

| NO | P | C | J |
|---|---|---|---|
| 1 | N1 | W-B | HM |
| 2 | 43 | B-Y | CN41 |
| 3 | | | |
| 4 | | | |

REC

| NO | P | C | J |
|---|---|---|---|
| 1 | N1 | W-B | N1 terminal |
| 2 | 43 | B-Y | J7 |
| 3 | 139 | P | CN68-1 |
| 4 | 140 | B | CN35-1 |

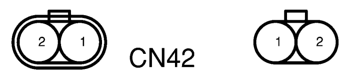



TAB

| NO | P | C | J |
|---|---|---|---|
| 1 | 43 | B-Y | HM |

REC

| NO | P | C | J |
|---|---|---|---|
| 1 | 43 | B-Y | CN40-2 |

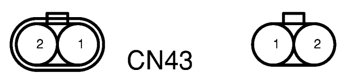



TAB

| NO | P | C | J |
|---|---|---|---|
| 1 | 67 | R | CN43-1 |
| 2 | 51 | P | CN43-2 |

REC

| NO | P | C | J |
|---|---|---|---|
| 1 | 67 | B-Y | CN101-5 |
| 2 | 51 | R-L | J1 |

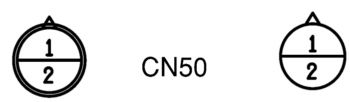



TAB

| NO | P | C | $J_D$ |
|---|---|---|---|
| 1 | 67 | R | $LS_D$ |
| 2 | 51 | P | LS |

REC

| NO | P | C | J |
|---|---|---|---|
| 1 | 67 | R | CN42-1 |
| 2 | 51 | P | CN42-2 |




TAB

| NO | P | C | J |
|---|---|---|---|
| 1 | P21 | B | Motor A |
| 2 | P23 | B | Motor B |

REC

| NO | P | C | J |
|---|---|---|---|
| 1 | P21 | L | CN51-1 |
| 2 | P23 | W | CN51-3 |

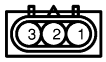

TAB

| NO | P | C | J |
|---|---|---|---|
| 1 | 87 | - | $SW_S$ |
| 2 | 86 | - | $SW_S$ |

REC

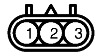
| NO | P | C | J |
|---|---|---|---|
| 1 | 87 | P | CN102-11 |
| 2 | 86 | B-Y | CN102-10 |

CN53




TAB

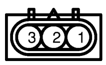
| NO | P | C | J |
|---|---|---|---|
| 1 | 81 | - | SSD1 |
| 2 | 83 | - | SSD1 |
| 3 | 80 | - | SSD1 |




REC

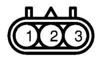
| NO | P | C | J |
|---|---|---|---|
| 1 | 81 | W- L | CN57-1 |
| 2 | 83 | BR | CN57-2 |
| 3 | 80 | G-R | CN57-4 |

CN54




TAB

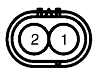
| NO | P | C | J |
|---|---|---|---|
| 1 | 82 | - | SSD2 |
| 2 | 83 | - | SSD2 |
| 3 | 80 | - | SSD2 |




REC

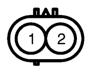
| NO | P | C | J |
|---|---|---|---|
| 1 | 82 | B-W | CN57-3 |
| 2 | 83 | BR | J23 |
| 3 | 80 | G-R | J24 |

CN55




TAB

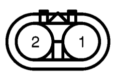
| NO | P | C | J |
|---|---|---|---|
| 1 | 89 | - | STM |
| 2 | 88 | - | STM |




REC

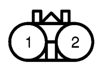
| NO | P | C | J |
|---|---|---|---|
| 1 | 89 | W-R | CN102-13 |
| 2 | 88 | Y-G | CN102-12 |

CN56




TAB

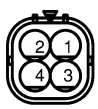
| NO | P | C | J |
|---|---|---|---|
| 1 | 85 | - | SSP |
| 2 | 84 | - | SSP |




REC

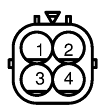
| NO | P | C | J |
|---|---|---|---|
| 1 | 85 | W-G | CN58-1 |
| 2 | 84 | B-R | CN58-2 |

CN57




TAB

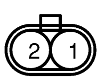
| NO | P | C | J |
|---|---|---|---|
| 1 | 81 | W- L | CN53-1 |
| 2 | 83 | BR | CN53-2 |
| 3 | 82 | B-W | CN54-1 |
| 4 | 80 | G-R | CN53-3 |




REC

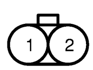
| NO | P | C | J |
|---|---|---|---|
| 1 | 81 | W- L | CN102-6 |
| 2 | 83 | BR | CN102-19 |
| 3 | 82 | B-W | CN102-7 |
| 4 | 80 | G-R | CN102-18 |

CN58




TAB

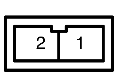
| NO | P | C | J |
|---|---|---|---|
| 1 | 85 | W-G | CN56-1 |
| 2 | 84 | B-R | CN56-2 |




REC

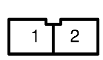
| NO | P | C | J |
|---|---|---|---|
| 1 | 85 | W-G | CN102-9 |
| 2 | 84 | B-R | CN102-8 |

CN59




TAB

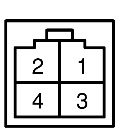
| NO | P | C | J |
|---|---|---|---|
| 1 | 5 | B | MPS |
| 2 | 6 | B | MPS |




REC

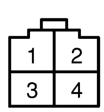
| NO | P | C | J |
|---|---|---|---|
| 1 | 5 | B-R | CN103-5 |
| 2 | 6 | R-L | CN102-6 |

CN79




TAB

| NO | P | C | J |
|---|---|---|---|
| 1 | 51 | - | SWMODE |
| 2 | 92 | - | SWMODE |
| 1 | 91 | - | SWMODE |
| 2 | 90 | | SWMODE |

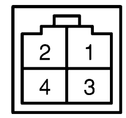



REC

| NO | P | C | J |
|---|---|---|---|
| 1 | 51 | R-L | CN101-26 |
| 2 | 92 | R-B | CN101-21 |
| 3 | 91 | GR | CN101-20 |
| 4 | 90 | O | CN101-19 |

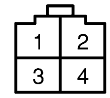
For volume selectable buzzer

CN80




TAB

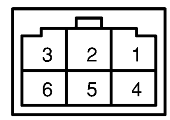
| NO | P | C | J |
|---|---|---|---|
| 1 | 125 | - | BZ |
| 2 | N1 | - | BZ |
| 1 | 127 | - | BZ |
| 2 | 126 | | BZ |




REC

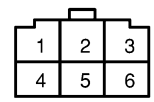
| NO | P | C | J |
|---|---|---|---|
| 1 | 125 | GR | CN81-3 |
| 2 | N1 | W-B | CN23-2 |
| 3 | 127 | R-Y | CN81-4 |
| 4 | 126 | R-L | CN81-5 |

CN81




TAB

| NO | P | C | J |
|---|---|---|---|
| 1 | 103 | - | SWBZ |
| 2 | 103 | - | SWBZ |
| 3 | 125 | - | SWBZ |
| 4 | 127 | - | SWBZ |
| 5 | 126 | - | SWBZ |
| 6 | | | |

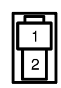



REC

| NO | P | C | J |
|---|---|---|---|
| 1 | 103 | R-W | CN23-1 |
| 2 | 103 | R-W | CN23-1 |
| 3 | 125 | GR | CN80-1 |
| 4 | 127 | R-Y | CN80-3 |
| 5 | 126 | R-L | CN80-4 |
| 6 | | | |

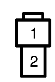
For wiper

CN36




TAB

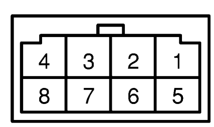
| NO | P | C | J |
|---|---|---|---|
| 1 | 124 | R | DMWP |
| 2 | N1 | W-B | DMWP |




REC

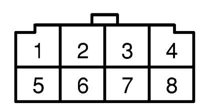
| NO | P | C | J |
|---|---|---|---|
| 1 | 124 | R-B | RWP2 |
| 2 | N1 | W-B | CN84-2 |

CN83




TAB

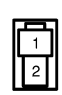
| NO | P | C | J |
|---|---|---|---|
| 1 | 121 | | SWWIPER |
| 2 | | | |
| 3 | | | |
| 4 | | | |
| 5 | | | |
| 6 | | - | |
| 7 | 122 | | SWWIPER |
| 8 | | | |




REC

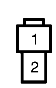
| NO | P | C | J |
|---|---|---|---|
| 1 | 121 | R-L | FWP |
| 2 | | | |
| 3 | | | |
| 4 | | | |
| 5 | | | |
| 6 | | | |
| 7 | 122 | R | CN84-1 |
| 8 | | | |

CN84




TAB

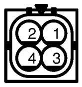
| NO | P | C | J |
|---|---|---|---|
| 1 | 122 | R | RWP1 |
| 2 | N1 | W-B | CN36-2 |

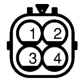



REC

| NO | P | C | J |
|---|---|---|---|
| 1 | 122 | R | CN83-7 |
| 2 | N1 | W-B | Joint with CN40-1 |

## CN87



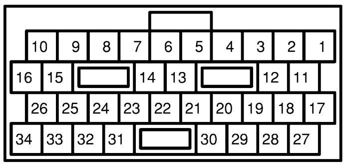

TAB

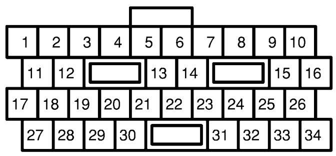
| NO | P | C | J |
|---|---|---|---|
| 1 | 61 | G-R | LSTF |
| 2 | 51 | R-L | LS- |
| 3 | 62 | L | LSTR |
| 4 | 51 | R-L | LS- |

REC

| NO | P | C | J |
|---|---|---|---|
| 1 | 61 | G-R | CN101-16 |
| 2 | 51 | R-L | J1 |
| 3 | 62 | L | CN101-17 |
| 4 | 51 | R-L | J1 |

## CN101



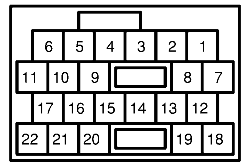

TAB

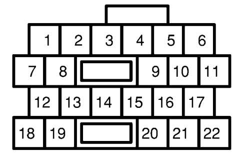
| NO | P | C | J |
|---|---|---|---|
| 1 | 45 | - | DSF |
| 2 | 46 | - | DSR |
| 3 | 65 | - | LSB |
| 4 | 66 | - | LSPB |
| 5 | 67 | | LSD |
| 6 | | | |
| 7 | | | |
| 8 | | | |
| 9 | 307 | - | SMTSA |
| 10 | 308 | - | SMTSK |
| 11 | 63 | - | LSAT1 |
| 12 | 307 | - | SSTMA |
| 13 | 308 | | SSTMK |
| 14 | | | |
| 15 | 146 | - | BIBC |
| 16 | 61 | - | LSTF |
| 17 | 62 | | LSTR |
| 18 | | | |
| 19 | 90 | - | MH1 |
| 20 | 91 | - | MH2-1 |
| 21 | 92 | | MH2-2 |
| 22 | | | |
| 23 | | | |
| 24 | | | |
| 25 | 145 | - | BIBD |
| 26 | 51 | | LS- |
| 27 | | | |
| 28 | | | |
| 29 | | | |
| 30 | | | |
| 31 | | | |
| 32 | 60 | | LSL1 |
| 33 | | | |
| 34 | | | |

REC

| NO | P | C | J |
|---|---|---|---|
| 1 | 45 | W | CN9-5 |
| 2 | 46 | G | CN9-4 |
| 3 | 65 | Y-G | CN6-2 |
| 4 | 66 | B-W | CN15-2 |
| 5 | 67 | B-Y | CN42-1 |
| 6 | | | |
| 7 | | | |
| 8 | | | |
| 9 | 307 | W-R | CN101-12 |
| 10 | 308 | G-Y | CN101-13 |
| 11 | 63 | G-B | CN11-3 |
| 12 | 307 | W-R | CN101-9 |
| 13 | 308 | G-Y | CN101-10 |
| 14 | | | |
| 15 | 146 | R | CN39-2 |
| 16 | 61 | G-R | CN87-1 |
| 17 | 62 | L | CN87-3 |
| 18 | | | |
| 19 | 90 | O | CN79-4 |
| 20 | 91 | GR | CN79-3 |
| 21 | 92 | R-B | CN79-2 |
| 22 | | | |
| 23 | | | |
| 24 | | | |
| 25 | 145 | Y-R | CN39-1 |
| 26 | 51 | R-L | CN79-1 |
| 27 | | | |
| 28 | | | |
| 29 | | | |
| 30 | | | |
| 31 | | | |
| 32 | 60 | G-W | CN11-1 |
| 33 | | | |
| 34 | | | |

## CN102



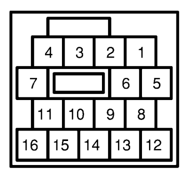

TAB

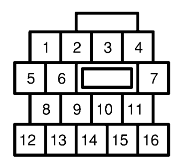
| NO | P | C | J |
|---|---|---|---|
| 1 | 64 | - | SWAC |
| 2 | 52 | | POTA |
| 3 | | | |
| 4 | | | |
| 5 | | | |
| 6 | 81 | - | SSD1 |
| 7 | 82 | - | SSD2 |
| 8 | 84 | - | SSP+ |
| 9 | 85 | - | SSP- |
| 10 | 86 | - | TD+ |
| 11 | 87 | - | TD- |
| 12 | 88 | - | TP+ |
| 13 | 89 | - | TP- |
| 14 | 53 | | POTA+ |
| 15 | | | |
| 16 | | | |
| 17 | | | |
| 18 | 80 | - | SSD+ |
| 19 | 83 | | SSD- |
| 20 | | | |
| 21 | | | |
| 22 | 51 | | POT- |

REC

| NO | P | C | J |
|---|---|---|---|
| 1 | 64 | R-Y | CN25-4 |
| 2 | 52 | GR | CN25-1 |
| 3 | | | |
| 4 | | | |
| 5 | | | |
| 6 | 81 | W-G | CN57-1 |
| 7 | 82 | B-W | CN57-3 |
| 8 | 84 | B-R | CN58-2 |
| 9 | 85 | W-G | CN58-1 |
| 10 | 86 | B-Y | CN52-2 |
| 11 | 87 | P | CN52-1 |
| 12 | 88 | Y-G | CN55-2 |
| 13 | 89 | W-R | CN55-1 |
| 14 | 53 | R-B | CN25-2 |
| 15 | | | |
| 16 | | | |
| 17 | | | |
| 18 | 80 | G-R | CN57-4 |
| 19 | 83 | BR | CN57-2 |
| 20 | | | |
| 21 | | | |
| 22 | 51 | R-L | CN25-3 |

## CN103



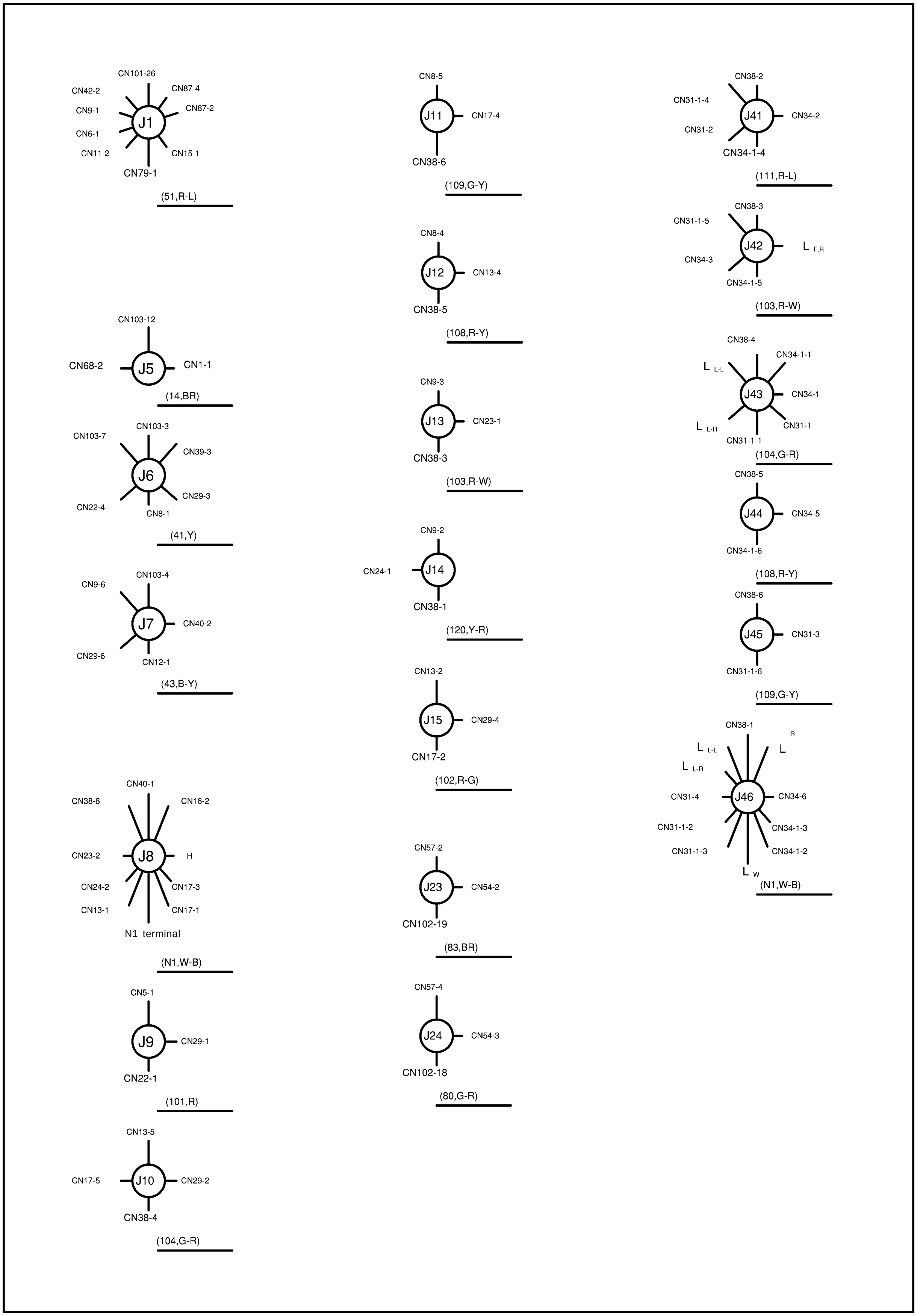




TAB

| NO | P | C | J |
|---|---|---|---|
| 1 | | | |
| 2 | | | |
| 3 | 41 | - | B48V |
| 4 | 43 | - | VBKY |
| 5 | 5 | - | SOLT+ |
| 6 | 6 | - | SOLT- |
| 7 | 41 | | VBBT |
| 8 | | | |
| 9 | | | |
| 10 | 16 | | D15V |
| 11 | | | |
| 12 | 14 | - | GNDD |
| 13 | 144 | - | SMTDK |
| 14 | 143 | - | SDTMK |
| 15 | 142 | - | SDTMA |
| 16 | 141 | | SMTDA |

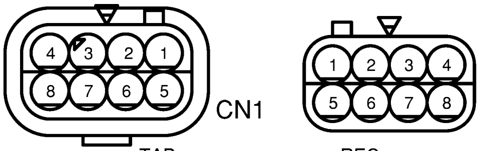
REC

| NO | P | C | J |
|---|---|---|---|
| 1 | | | |
| 2 | | | |
| 3 | 41 | Y | J6 |
| 4 | 43 | B-Y | CN12-1 |
| 5 | 5 | B-R | CN59-1 |
| 6 | 6 | R-L | CN59-2 |
| 7 | 41 | Y | CN29-3 |
| 8 | | | |
| 9 | | | |
| 10 | 16 | R | CN1-2 |
| 11 | | | |
| 12 | 14 | BR | CN1-1 |
| 13 | 144 | G-R | CN1-7 |
| 14 | 143 | R-Y | CN1-4 |
| 15 | 142 | R-B | CN1-8 |
| 16 | 141 | W-R | CN1-3 |


J1
CN101-26
CN42-2
CN87-4
CN9-1
CN87-2
CN6-1
CN11-2
CN15-1
CN79-1
(51,R-L)
J5
CN103-12
CN68-2
CN1-1
(14,BR)
J6
CN103-3
CN103-7
CN39-3
CN29-3
CN22-4
CN8-1
(41,Y)
J7
CN103-4
CN9-6
CN40-2
CN29-6
CN12-1
(43,B-Y)
J8
CN40-1
CN38-8
CN16-2
CN23-2
H
CN24-2
CN17-3
CN13-1
CN17-1
N1 terminal
(N1,W-B)
J9
CN5-1
CN29-1
CN22-1
(101,R)
J10
CN13-5
CN17-5
CN29-2
CN38-4
(104,G-R)
J11
CN8-5
CN17-4
CN38-6
(109,G-Y)
J12
CN8-4
CN13-4
CN38-5
(108,R-Y)
J13
CN9-3
CN23-1
CN38-3
(103,R-W)
J14
CN9-2
CN24-1
CN38-1
(120,Y-R)
J15
CN13-2
CN29-4
CN17-2
(102,R-G)
J23
CN57-2
CN54-2
CN102-19
(83,BR)
J24
CN57-4
CN54-3
CN102-18
(80,G-R)
J41
CN38-2
CN31-1-4
CN34-2
CN31-2
CN34-1-4
(111,R-L)
J42
CN38-3
CN31-1-5
L F,R
CN34-3
CN34-1-5
(103,R-W)
J43
CN38-4
CN34-1-1
L L-L
CN34-1
L L-R
CN31-1
CN31-1-1
(104,G-R)
J44
CN38-5
CN34-5
CN34-1-6
(108,R-Y)
J45
CN38-6
CN31-3
CN31-1-6
(109,G-Y)
J46
CN38-1
L L-L
L R
L L-R
CN31-4
CN34-6
CN31-1-2
CN34-1-3
CN31-1-3
CN34-1-2
L W
(N1,W-B)

# CONNECTOR DRAWING (FOR VEHICLE WITH SAS)

## CN1




TAB

| NO | P | C | J |
|---|---|---|---|
| 1 | 14 | BR | CN70-30 |
| 2 | 16 | R | CN70-14 |
| 3 | 141 | W-R | CN70-22 |
| 4 | 143 | R-Y | CN70-24 |
| 5 | 138 | W-R | CN70-5 |
| 6 | 137 | R-G | CN70-4 |
| 7 | 144 | G-R | CN70-23 |
| 8 | 142 | R-B | CN70-21 |

REC

| NO | P | C | J |
|---|---|---|---|
| 1 | 14 | BR | CN103-12 |
| 2 | 16 | R | CN103-10 |
| 3 | 141 | W-R | CN103-16 |
| 4 | 143 | R-Y | CN103-14 |
| 5 | 138 | W-R | CN141-13 |
| 6 | 137 | R-G | CN141-14 |
| 7 | 144 | G-R | CN103-13 |
| 8 | 142 | R-B | CN103-15 |

## CN3

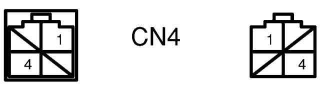

TAB

| NO | P | C | J |
|---|---|---|---|
| 1 | 101 | R | B |
| 2 | 104 | G | T |
| 3 | 102 | R-G | HS |
| 4 | 107 | R-Y | HM |

REC

| NO | P | C | J |
|---|---|---|---|
| 1 | 101 | R | CN29-1 |
| 2 | 104 | G-R | CN29-2 |
| 3 | 102 | R-G | CN29-4 |
| 4 | 107 | R-B | CN29-5 |

## CN4



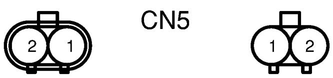

TAB

| NO | P | C | J |
|---|---|---|---|
| 1 | 41 | - | AM |
| 4 | 43 | | IG |

REC

| NO | P | C | J |
|---|---|---|---|
| 1 | 41 | Y | CN29-3 |
| 4 | 43 | B-Y | CN29-6 |

## CN5




TAB

| NO | P | C | J |
|---|---|---|---|
| 1 | 101 | Y | $LS_{ST}$ |
| 2 | 111 | B-Y | $LS_{ST}$ |

REC

| NO | P | C | J |
|---|---|---|---|
| 1 | 101 | R | CN22-1 |
| 2 | 111 | R-L | CN38-2 |

## CN6

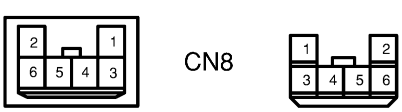

TAB

| NO | P | C | J |
|---|---|---|---|
| 1 | 51 | B-W | $LS_{B}$ |
| 2 | 65 | R-L | $LS_{B}$ |

REC

| NO | P | C | J |
|---|---|---|---|
| 1 | 51 | R-L | J1 |
| 2 | 65 | Y-G | CN45-4 |

## CN8



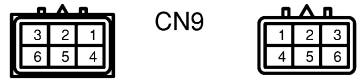

TAB

| NO | P | C | J |
|---|---|---|---|
| 1 | 41 | GY | $SW_{H(+)}$ |
| 2 | 48 | WB | $SW_{H(-)}$ |
| 3 | 110 | GW | $SW_{F(B)}$ |
| 4 | 108 | G | $SW_{F(R)}$ |
| 5 | 109 | GR | $SW_{F(L)}$ |
| 6 | | | |

REC

| NO | P | C | J |
|---|---|---|---|
| 1 | 41 | Y | J6 |
| 2 | 48 | P | H |
| 3 | 110 | GR | CN12-2 |
| 4 | 108 | R-Y | CN38-5 |
| 5 | 109 | G-Y | CN38-6 |
| 6 | | | |

## CN9




TAB

| NO | P | C | J |
|---|---|---|---|
| 1 | 51 | O | DSF,DSR |
| 2 | 120 | B | DSFO |
| 3 | 103 | G | DSBU |
| 4 | 46 | W-O | DSR |
| 5 | 45 | W-BR | DSF |
| 6 | 43 | R | DSFO,DSBU |

REC

| NO | P | C | J |
|---|---|---|---|
| 1 | 51 | R-L | J1 |
| 2 | 120 | Y-R | CN24-1 |
| 3 | 103 | R-W | CN38-3 |
| 4 | 46 | G | CN101-2 |
| 5 | 45 | W | CN101-1 |
| 6 | 43 | B-Y | J7 |

## CN11

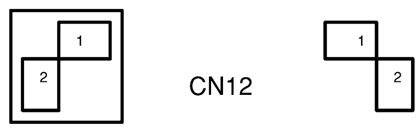

TAB

| NO | P | C | J |
|---|---|---|---|
| 1 | 60 | G-W | $LS_{L}$ |
| 2 | 51 | R-L | NO |
| 3 | 63 | G-B | $LS_{ATT}$ |

REC

| NO | P | C | J |
|---|---|---|---|
| 1 | 60 | G-W | CN101-32 |
| 2 | 51 | R-L | J1 |
| 3 | 63 | G-B | CN101-11 |

## CN12



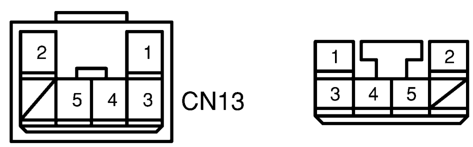

TAB

| NO | P | C | J |
|---|---|---|---|
| 1 | 43 | - | FRY |
| 2 | 110 | - | FRY |

REC

| NO | P | C | J |
|---|---|---|---|
| 1 | 43 | B-Y | CN103-12 |
| 2 | 110 | GR | CN8-3 |

## CN13




TAB

| NO | P | C | J |
|---|---|---|---|
| 1 | N1 | W-B | CN30-2 |
| 2 | 102 | R-G | CN30-1 |
| 3 | N1 | W-B | CN14-3 |
| 4 | 108 | R-Y | CN14-2 |
| 5 | 104 | G-R | CN14-1 |
| 6 | | | |

REC

| NO | P | C | J |
|---|---|---|---|
| 1 | N1 | W-B | J8 |
| 2 | 102 | R-G | CN17-2 |
| 3 | N1 | W-B | J8 |
| 4 | 108 | R-Y | J12 |
| 5 | 104 | G-R | CN38-4 |
| 6 | | | |

## CN14

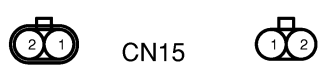

TAB

| NO | P | C | J |
|---|---|---|---|
| 1 | 104 | - | LC-R |
| 2 | 109 | - | LF-R |
| 3 | N1 | | GND |

REC

| NO | P | C | J |
|---|---|---|---|
| 1 | 104 | G-R | CN13-5 |
| 2 | 109 | G-Y | CN13-4 |
| 3 | N1 | W-B | CN13-3 |

## CN15

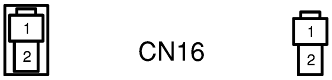



TAB

| NO | P | C | J |
|---|---|---|---|
| 1 | 51 | - | $LS_{PB}$ |
| 2 | 66 | | $LS_{PB}$ |

REC

| NO | P | C | J |
|---|---|---|---|
| 1 | 51 | R-L | J1 |
| 2 | 66 | B-W | CN101-4 |

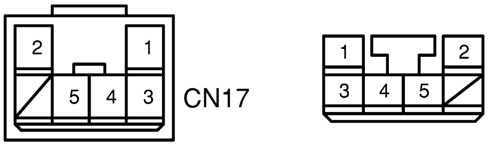



TAB

| NO | P | C | J |
|---|---|---|---|
| 1 | 107 | B | PLW |
| 2 | N1 | B | PLW |

REC

| NO | P | C | J |
|---|---|---|---|
| 1 | 107 | R-B | CN29-5,CN38-7 |
| 2 | N1 | W-B | J8,J8 |

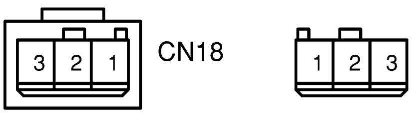



TAB

| NO | P | C | J |
|---|---|---|---|
| 1 | N1 | W-B | CN28-2 |
| 2 | 102 | R-G | CN28-1 |
| 3 | N1 | W-B | CN18-3 |
| 4 | 109 | G-Y | CN18-2 |
| 5 | 104 | G-R | CN18-1 |

REC

| NO | P | C | J |
|---|---|---|---|
| 1 | N1 | W-B | J8 |
| 2 | 102 | R-G | CN13-2 |
| 3 | N1 | W-B | J8 |
| 4 | 109 | G-Y | J11 |
| 5 | 104 | G-R | J10 |

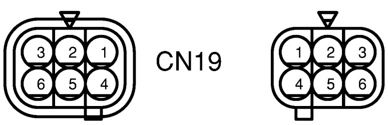



TAB

| NO | P | C | J |
|---|---|---|---|
| 1 | 104 | - | LC-L |
| 2 | 108 | - | LF-L |
| 3 | N1 | | GND |

REC

| NO | P | C | J |
|---|---|---|---|
| 1 | 104 | G-R | CN17-5 |
| 2 | 108 | G-Y | CN17-4 |
| 3 | N1 | W-B | CN17-3 |

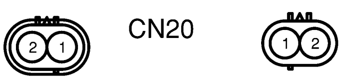



TAB

| NO | P | C | J |
|---|---|---|---|
| 1 | 311 | R | STS+ |
| 2 | | | |
| 3 | 315 | B | STS- |
| 4 | 312 | W | STS1 |
| 5 | 313 | G | STS2 |
| 6 | 314 | BR | STSC |

REC

| NO | P | C | J |
|---|---|---|---|
| 1 | 311 | W-R | CN141-17 |
| 2 | | | |
| 3 | 315 | BR | CN141-16 |
| 4 | 312 | G-W | CN141-6 |
| 5 | 313 | R-Y | CN141-7 |
| 6 | 314 | L | CN141-8 |




TAB

| NO | P | C | J |
|---|---|---|---|
| 1 | 325 | - | $SW_S$ |
| 2 | 324 | - | $SW_S$ |

REC

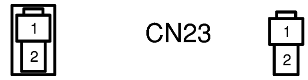
| NO | P | C | J |
|---|---|---|---|
| 1 | 325 | G-B | CN141-15 |
| 2 | 324 | Y-R | CN141-5 |


TAB

| NO | P | C | J |
|---|---|---|---|
| 1 | 101 | - | F4 |
| 2 | P1 | | F4,F5 |
| 3 | | - | |
| 4 | 41 | | F5 |

REC

| NO | P | C | J |
|---|---|---|---|
| 1 | 101 | R | CN5-1 |
| 2 | P1 | B | P1 terminal |
| 3 | | | |
| 4 | 41 | Y | J6 |

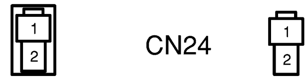



TAB

| NO | P | C | J |
|---|---|---|---|
| 1 | 103 | R-W | BZ |
| 2 | N1 | B | BZ |

REC

| NO | P | C | J |
|---|---|---|---|
| 1 | 103 | R-W | J13 |
| 2 | N1 | W-B | J8 |

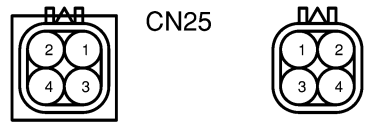



TAB

| NO | P | C | J |
|---|---|---|---|
| 1 | 120 | R-W | CHI |
| 2 | N1 | B | CHI |

REC

| NO | P | C | J |
|---|---|---|---|
| 1 | 120 | Y-R | CN9-2 |
| 2 | N1 | W-B | J8 |

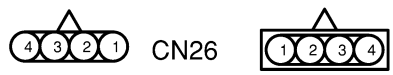



TAB

| NO | P | C | J |
|---|---|---|---|
| 1 | 52 | GR | CN26-3 |
| 2 | 53 | R-B | CN26-4 |
| 3 | 51 | R-L | CN26-1 |
| 4 | 64 | R-Y | CN26-2 |

REC

| NO | P | C | J |
|---|---|---|---|
| 1 | 52 | GR | CN102-2 |
| 2 | 53 | R-B | CN102-14 |
| 3 | 51 | R-L | J2 |
| 4 | 64 | R-Y | CN102-1 |




TAB

| NO | P | C | J |
|---|---|---|---|
| 1 | 51 | - | E2 |
| 2 | 64 | - | IDL |
| 3 | 52 | - | VTA |
| 4 | 53 | - | VC |

REC

| NO | P | C | J |
|---|---|---|---|
| 1 | 51 | R-L | CN25-3 |
| 2 | 64 | R-Y | CN25-4 |
| 3 | 52 | GR | CN25-1 |
| 4 | 53 | R-B | CN25-2 |


TAB

| NO | P | C | J |
|---|---|---|---|
| 1 | 102 | - | H/L |
| 2 | N1 | - | H/L |

REC

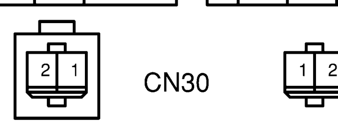
| NO | P | C | J |
|---|---|---|---|
| 1 | 102 | R-G | CN17-2 |
| 2 | N1 | W-B | CN17-1 |


TAB

| NO | P | C | J |
|---|---|---|---|
| 1 | 101 | R | CN3-1 |
| 2 | 104 | G-R | CN3-2 |
| 3 | 41 | Y | CN4-1 |
| 4 | 102 | R-G | CN3-3 |
| 5 | 107 | R-B | CN3-4 |
| 6 | 43 | B-Y | CN4-4 |

REC

| NO | P | C | J |
|---|---|---|---|
| 1 | 101 | R | J9 |
| 2 | 104 | G-R | J10 |
| 3 | 41 | Y | CN103-7 |
| 4 | 102 | R-G | J15 |
| 5 | 107 | R-B | CN16-1 |
| 6 | 43 | B-Y | J7 |



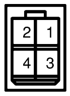
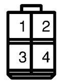

TAB

| NO | P | C | J |
|---|---|---|---|
| 1 | 102 | - | H/L |
| 2 | N1 | - | H/L |

REC

| NO | P | C | J |
|---|---|---|---|
| 1 | 102 | R-G | CN13-2 |
| 2 | N1 | W-B | CN13-1 |

## CN31

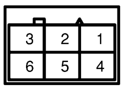
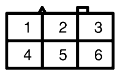
TAB

| NO | P | C | J |
|---|---|---|---|
| 1 | 104 | L | TL |
| 2 | 111 | L | STP |
| 3 | 109 | L | TRN |
| 4 | N1 | L | E |

REC

| NO | P | C | J |
|---|---|---|---|
| 1 | 104 | G-R | J43 |
| 2 | 111 | R-L | J41 |
| 3 | 109 | G-Y | CN38-6 |
| 4 | N1 | W-B | J46 |

## CN31-1

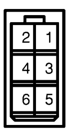
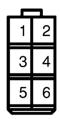
TAB

| NO | P | C | J |
|---|---|---|---|
| 1 | 104 | R-W | LT-L |
| 2 | N1 | W-B | GND |
| 3 | N1 | Y | LF-RL |
| 4 | 111 | R-B | LST-L |
| 5 | 103 | R | LF-LR |
| 6 | 109 | G-W | LF-RL |

REC

| NO | P | C | J |
|---|---|---|---|
| 1 | 104 | G-R | J43 |
| 2 | N1 | W-B | J46 |
| 3 | N1 | W-B | J46 |
| 4 | 111 | R-L | J41 |
| 5 | 103 | R-W | J42 |
| 6 | 109 | G-Y | J45 |

## CN34

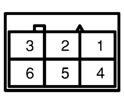
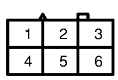
TAB

| NO | P | C | J |
|---|---|---|---|
| 1 | 104 | R | TL |
| 2 | 111 | R | STP |
| 3 | 103 | R | B/U |
| 4 | | | |
| 5 | 108 | R | TRN |
| 6 | N1 | R | E |

REC

| NO | P | C | J |
|---|---|---|---|
| 1 | 104 | G-R | J43 |
| 2 | 111 | R-L | J41 |
| 3 | 103 | R-W | J42 |
| 4 | | | |
| 5 | 108 | R-Y | J44 |
| 6 | N1 | W-B | J46 |

## CN34-1

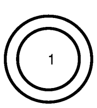
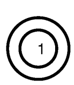
TAB

| NO | P | C | J |
|---|---|---|---|
| 1 | 104 | R-W | LT-R |
| 2 | N1 | W-B | GND |
| 3 | N1 | Y | LF-RR |
| 4 | 111 | R-B | LST-R |
| 5 | 103 | B | LF-RR |
| 6 | 108 | G-W | LF-RR |

REC

| NO | P | C | J |
|---|---|---|---|
| 1 | 104 | G-R | CN38-4 |
| 2 | N1 | W-B | J46 |
| 3 | N1 | W-B | J46 |
| 4 | 111 | R-L | CN38-2 |
| 5 | 103 | R-W | J42 |
| 6 | 108 | R-Y | CN38-5 |

## CN35

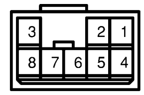
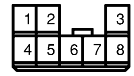
TAB

| NO | P | C | J |
|---|---|---|---|
| 1 | 140 | B | SLL |

REC

| NO | P | C | J |
|---|---|---|---|
| 1 | 140 | B | CN40-4 |

## CN38

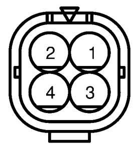
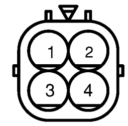
TAB

| NO | P | C | J |
|---|---|---|---|
| 1 | 120 | Y-R | J14 |
| 2 | 111 | R-L | CN5-2 |
| 3 | 103 | R-W | CN9-3 |
| 4 | 104 | G-R | CN13-5 |
| 5 | 108 | R-Y | CN8-4 |
| 6 | 109 | G-Y | CN8-5 |
| 7 | 107 | R-B | CN16-1 |
| 8 | N1 | W-B | J8 |

REC

| NO | P | C | J |
|---|---|---|---|
| 1 | 120 | Y-R | LF-R |
| 2 | 111 | R-L | CN34-1-4 |
| 3 | 103 | R-W | LF-R |
| 4 | 104 | G-R | CN34-1-1 |
| 5 | 108 | R-Y | CN34-1-6 |
| 6 | 109 | G-Y | CN31-3 |
| 7 | 107 | R-B | LW |
| 8 | N1 | W-B | LR |

## CN40

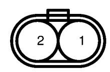
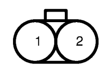
TAB

| NO | P | C | J |
|---|---|---|---|
| 1 | N1 | W-B | CN70-15 |
| 2 | 43 | B-Y | CN70-1 |
| 3 | 139 | P | CN70-19 |
| 4 | 140 | B | CN70-20 |

REC

| NO | P | C | J |
|---|---|---|---|
| 1 | N1 | W-B | N1 terminal |
| 2 | 43 | B-Y | J7 |
| 3 | 139 | P | CN68-1 |
| 4 | 140 | B | CN35-1 |

## CN42

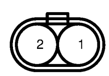
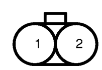
TAB

| NO | P | C | J |
|---|---|---|---|
| 1 | 67 | R | CN43-1 |
| 2 | 51 | P | CN43-2 |

REC

| NO | P | C | J |
|---|---|---|---|
| 1 | 67 | B-Y | CN101-5 |
| 2 | 51 | R-L | J1 |

## CN43

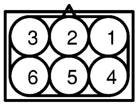
TAB

| NO | P | C | J |
|---|---|---|---|
| 1 | 67 | R | $LS_D$ |
| 2 | 51 | P | $LS_D$ |

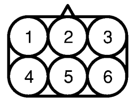
REC

| NO | P | C | J |
|---|---|---|---|
| 1 | 67 | R | CN42-1 |
| 2 | 51 | P | CN42-2 |

## With voice warning




CN45

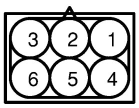



TAB

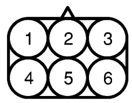
| NO | P | C | J |
|---|---|---|---|
| 1 | 180 | G-W | CN46-1 |
| 2 | 181 | G-Y | CN46-2 |
| 3 | 182 | G-B | CN46-3 |
| 4 | 183 | BR-W | CN46-4 |
| 5 | 184 | BR-R | CN46-5 |
| 6 | 43 | B-Y | CN47-1 |

REC

| NO | P | C | J |
|---|---|---|---|
| 1 | 180 | G-W | CN70-7 |
| 2 | 181 | G-Y | CN70-13 |
| 3 | 182 | G-B | CN70-12 |
| 4 | 183 | BR-W | CN70-28 |
| 5 | 184 | BR-R | CN70-29 |
| 6 | 43 | B-Y | J21 |




CN46

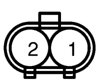



TAB

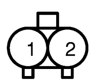
| NO | P | C | J |
|---|---|---|---|
| 1 | 180 | G-W | CN48-1 |
| 2 | 181 | G-Y | CN48-2 |
| 3 | 182 | G-B | CN48-3 |
| 4 | 183 | BR-W | CN48-4 |
| 5 | 184 | BR-R | CN48-5 |
| 6 | | | |

REC

| NO | P | C | J |
|---|---|---|---|
| 1 | 180 | G-W | CN45-1 |
| 2 | 181 | G-Y | CN45-2 |
| 3 | 182 | G-B | CN45-3 |
| 4 | 183 | BR-W | CN45-4 |
| 5 | 184 | BR-R | CN45-5 |
| 6 | | | |




CN47

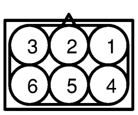



TAB

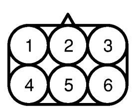
| NO | P | C | J |
|---|---|---|---|
| 1 | 43 | B-Y | CN49-1 |
| 2 | N1 | W-B | CN49-2 |

REC

| NO | P | C | J |
|---|---|---|---|
| 1 | 43 | B-Y | CN45-6 |
| 2 | N1 | W-B | N1 terminal |




CN48

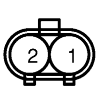



TAB

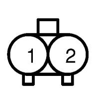
| NO | P | C | J |
|---|---|---|---|
| 1 | 180 | - | VOICE+ |
| 2 | 181 | - | VOICE1 |
| 3 | 182 | - | VOICE2 |
| 4 | 183 | - | VOICE3 |
| 5 | 184 | - | VOICE4 |
| 6 | | | |

REC

| NO | P | C | J |
|---|---|---|---|
| 1 | 180 | G-W | CN46-1 |
| 2 | 181 | G-Y | CN46-2 |
| 3 | 182 | G-B | CN46-3 |
| 4 | 183 | BR-W | CN46-4 |
| 5 | 184 | BR-R | CN46-5 |
| 6 | | | |




CN49

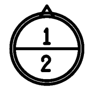



TAB

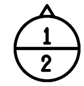
| NO | P | C | J |
|---|---|---|---|
| 1 | 43 | - | +48V |
| 2 | N1 | | GND |

REC

| NO | P | C | J |
|---|---|---|---|
| 1 | 43 | B-Y | CN47-1 |
| 2 | N1 | W-B | CN47-2 |




CN50

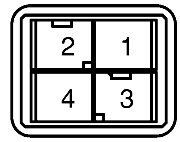


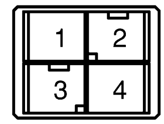

TAB

| NO | P | C | J |
|---|---|---|---|
| 1 | P21 | B | Motor A |
| 2 | P23 | B | Motor B |

REC

| NO | P | C | J |
|---|---|---|---|
| 1 | P21 | L | CN51-1 |
| 2 | P23 | W | CN51-3 |



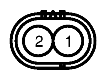

CN51

TAB

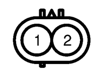
| NO | P | C | J |
|---|---|---|---|
| 1 | P21 | W | TMPS |
| 2 | P21 | R | TMPS |
| 3 | P23 | G | TMPS |
| 4 | N1 | B | TMPS |

REC

| NO | P | C | J |
|---|---|---|---|
| 1 | P21 | L | CN50-1 |
| 2 | P21 | R | F3 |
| 3 | P23 | W | CN50-2 |
| 4 | N1 | W-B | N1 terminal |




CN52

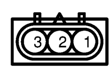



TAB

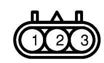
| NO | P | C | J |
|---|---|---|---|
| 1 | 87 | - | $SW_S$ |
| 2 | 86 | | SW |

REC

| NO | P | C | J |
|---|---|---|---|
| 1 | 87 | P | CN102-11 |
| 2 | 86 | B-Y | CN102-10 |




CN53

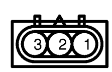



TAB

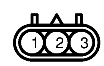
| NO | P | C | J |
|---|---|---|---|
| 1 | 81 | - | SSD1 |
| 2 | 83 | - | SSD1 |
| 3 | 80 | | SSD1 |

REC

| NO | P | C | J |
|---|---|---|---|
| 1 | 81 | W-L | CN57-1 |
| 2 | 83 | BR | CN57-2 |
| 3 | 80 | G-R | CN57-4 |




CN54

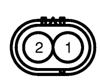



TAB

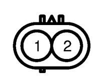
| NO | P | C | J |
|---|---|---|---|
| 1 | 82 | - | SSD2 |
| 2 | 83 | - | SSD2 |
| 3 | 80 | | SSD2 |

REC

| NO | P | C | J |
|---|---|---|---|
| 1 | 82 | B-W | CN57-3 |
| 2 | 83 | BR | J23 |
| 3 | 80 | G-R | J24 |




CN55

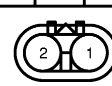



TAB

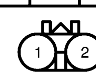
| NO | P | C | J |
|---|---|---|---|
| 1 | 89 | - | $STM_P$ |
| 2 | 88 | | $STM_P$ |

REC

| NO | P | C | J |
|---|---|---|---|
| 1 | 89 | W-R | CN102-13 |
| 2 | 88 | Y-G | CN102-12 |




CN56




TAB

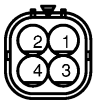
| NO | P | C | J |
|---|---|---|---|
| 1 | 85 | - | SSP |
| 2 | 84 | | SSP |

REC

| NO | P | C | J |
|---|---|---|---|
| 1 | 85 | W-G | CN58-1 |
| 2 | 84 | B-R | CN58-2 |

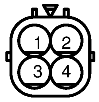
## CN57

TAB



| NO | P | C | J |
|---|---|---|---|
| 1 | 81 | W-L | CN53-1 |
| 2 | 83 | BR | CN53-2 |
| 3 | 82 | B-W | CN54-1 |
| 4 | 80 | G-R | CN53-3 |

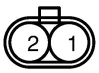
REC



| NO | P | C | J |
|---|---|---|---|
| 1 | 81 | W-L | CN102-6 |
| 2 | 83 | BR | CN102-19 |
| 3 | 82 | B-W | CN102-7 |
| 4 | 80 | G-R | CN102-18 |

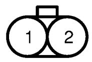
## CN58

TAB



| NO | P | C | J |
|---|---|---|---|
| 1 | 85 | W-G | CN56-1 |
| 2 | 84 | B-R | CN56-2 |

REC

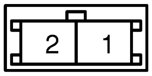


| NO | P | C | J |
|---|---|---|---|
| 1 | 85 | W-G | CN102-9 |
| 2 | 84 | B-R | CN102-8 |

Battery capacity 48V 330 ~ 565 AH

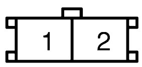
## CN60

TAB



| NO | P | C | J |
|---|---|---|---|
| 1 | S | R | AC plug |
| 2 | T | B | |

REC

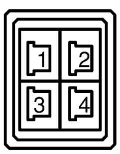


| NO | P | C | J |
|---|---|---|---|
| 1 | S | R | MSCH |
| 2 | T | B | MSCH |

Battery capacity 48V 600 ~ 845 AH, 80V 370 ~ 470 AH

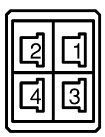
## CN60

TAB



| NO | P | C | J |
|---|---|---|---|
| 1 | T | B | MSCH |
| 2 | R | W | MSCH |
| 3 | 95 | L | THR |
| 4 | S | R | MSCH |

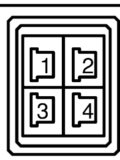
REC



| NO | P | C | J |
|---|---|---|---|
| 1 | T | B | AC plug |
| 2 | R | W | AC plug |
| 3 | 95 | L | CN64-1 |
| 4 | S | R | AC plug |

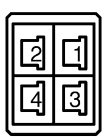
## CN61

TAB



| NO | P | C | J |
|---|---|---|---|
| 1 | U | W | THR |
| 2 | V | R | THR |
| 3 | | | |
| 4 | W | B | THR |

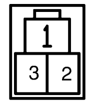
REC



| NO | P | C | J |
|---|---|---|---|
| 1 | U | | TRANS |
| 2 | V | | TRANS |
| 3 | | | |
| 4 | W | | TRANS |

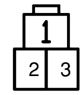
## CN64

TAB



| NO | P | C | J |
|---|---|---|---|
| 1 | 95 | L | CN65-1 |
| 2 | R | W | CN65-2 |
| 3 | S | R | CN65-3 |

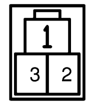
REC



| NO | P | C | J |
|---|---|---|---|
| 1 | 95 | L | CN60-3 (CN66-2) |
| 2 | R | W | AC plug |
| 3 | S | R | AC plug |

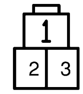
## CN65

TAB



| NO | P | C | J |
|---|---|---|---|
| 1 | 95 | L | DISP |
| 2 | R | W | DISP |
| 3 | S | R | DISP |

REC

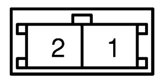


| NO | P | C | J |
|---|---|---|---|
| 1 | 95 | L | CN64-1 |
| 2 | R | W | CN64-2 |
| 3 | S | R | CN64-3 |

Only for battery capacity: 48V 330 ~ 565 AH

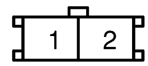
## CN66

TAB



| NO | P | C | J |
|---|---|---|---|
| 1 | R | W | MSCH |
| 2 | 95 | L | THR |

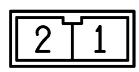
REC



| NO | P | C | J |
|---|---|---|---|
| 1 | R | W | AC plug |
| 2 | 95 | L | CN64-1 |

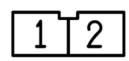
## CN68

TAB



| NO | P | C | J |
|---|---|---|---|
| 1 | 139 | P | STT |
| 2 | 14 | BR | STT |

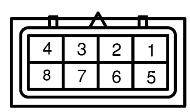
REC



| NO | P | C | J |
|---|---|---|---|
| 2 | 139 | P | CN40-3 |
| | 14 | BR | J5 |

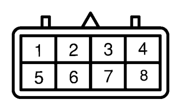
## CN69

TAB



| NO | P | C | J |
|---|---|---|---|
| 1 | 123 | O | Timer 1 terminal |
| 2 | 122 | Y | Timer 2 terminal |
| 3 | 121 | G | Timer 3 terminal |
| 4 | 124 | Y-R | Timer 4 terminal |
| 5 | 125 | Y-B | Timer 5 terminal |
| 6 | 126 | Y-G | Timer 6 terminal |
| 7 | 127 | Y-W | Timer 7 terminal |
| 8 | 14 | BR | Timer 8 terminal |

REC



| NO | P | C | J |
|---|---|---|---|
| 1 | 123 | O | CN70-25 |
| 2 | 122 | Y | CN70-26 |
| 3 | 121 | G | CN70-27 |
| 4 | 124 | Y-R | CN70-8 |
| 5 | 125 | Y-B | CN70-9 |
| 6 | 126 | Y-G | CN70-10 |
| 7 | 127 | Y-W | CN70-11 |
| 8 | 14 | BR | J22 |

REC

| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | | | 4 | 5 | | 7 | | | 8 | 9 | 10 | 11 | 12 | 13 | 14 |
| 15 | | | | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 |

TAB

| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 14 | 13 | 12 | 11 | 10 | 9 | 8 | | | 7 | | 5 | 4 | | | 1 |
| 30 | 29 | 28 | 27 | 26 | 25 | 24 | 23 | 22 | 21 | 20 | 19 | | | | 15 |

## CN70

TAB

| NO | P | C | J |
|---|---|---|---|
| 1 | 43 | B-Y | 48V |
| 4 | 137 | R-G | SL/L+ |
| 5 | 138 | W-R | SL/L- |
| 7 | 180 | G-W | AVD(+) |
| 8 | 124 | Y-R | CHG LED1 |
| 9 | 125 | Y-B | CHG LED2 |
| 10 | 126 | Y-G | CHG LED3 |
| 11 | 127 | Y-W | CHG LED4 |
| 12 | 182 | G-B | AVD2 |
| 13 | 181 | G-Y | AVD1 |
| 14 | 16 | R | D15V |
| 15 | N1 | W-B | N1 |
| 19 | 139 | P | STT |
| 20 | 140 | B | SLL |
| 21 | 142 | R-B | SDTMA |
| 22 | 141 | W-R | SMTDA |
| 23 | 144 | G-R | SMTDK |
| 24 | 143 | R-Y | SDTMK |
| 25 | 123 | O | CHG SW3 |
| 26 | 122 | Y | CHG SW2 |
| 27 | 121 | G | CHG SW1 |
| 28 | 183 | BR-W | AVD3 |
| 29 | 184 | BR-R | AVD4 |
| 30 | 14 | BR | GNDD |

REC

| NO | P | C | J |
|---|---|---|---|
| 1 | 43 | B-Y | CN40-2 |
| 4 | 137 | R-G | CN1-6 |
| 5 | 138 | W-R | CN1-5 |
| 7 | 180 | G-W | CN45-1 |
| 8 | 124 | Y-R | CN69-4 |
| 9 | 125 | Y-B | CN69-5 |
| 10 | 126 | Y-G | CN69-6 |
| 11 | 127 | Y-W | CN69-7 |
| 12 | 182 | G-B | CN45-3 |
| 13 | 181 | G-Y | CN45-2 |
| 14 | 16 | R | CN1-2 |
| 15 | N1 | W-B | CN40-1 |
| 19 | 139 | P | CN40-3 |
| 20 | 140 | B | CN40-4 |
| 21 | 142 | R-B | CN1-8 |
| 22 | 141 | W-R | CN1-3 |
| 23 | 144 | G-R | CN1-7 |
| 24 | 143 | R-Y | CN1-4 |
| 25 | 123 | O | CN69-1 |
| 26 | 122 | Y | CN69-2 |
| 27 | 121 | G | CN69-3 |
| 28 | 183 | BR-W | CN45-4 |
| 29 | 184 | BR-R | CN45-5 |
| 30 | 14 | BR | CN1-1 |

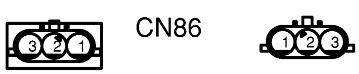

## CN85

TAB

| NO | P | C | J |
|---|---|---|---|
| 1 | 70 | - | SW TK |
| 2 | 51 | | SW TK |

REC

| NO | P | C | J |
|---|---|---|---|
| 1 | 70 | BR | CN101-18 |
| 2 | 51 | R-L | J1 |



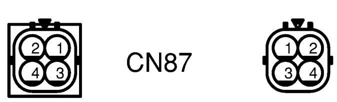

## CN86

TAB

| NO | P | C | J |
|---|---|---|---|
| 1 | 57 | G-W | VRAT |
| 2 | 56 | G | VRAT |
| 3 | 51 | R-L | VRAT |

REC

| NO | P | C | J |
|---|---|---|---|
| 1 | 57 | G-W | CN102-16 |
| 2 | 56 | G | CN102-4 |
| 3 | 51 | R-L | J2 |




## CN87

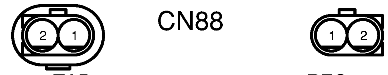
TAB

| NO | P | C | J |
|---|---|---|---|
| 1 | 61 | G-R | LSTF |
| 2 | 51 | R-L | LS- |
| 3 | 62 | L | LSTR |
| 4 | 51 | R-L | LS- |

REC

| NO | P | C | J |
|---|---|---|---|
| 1 | 61 | G-R | CN101-16 |
| 2 | 51 | R-L | J1 |
| 3 | 62 | L | CN101-17 |
| 4 | 51 | R-L | J1 |

## CN88



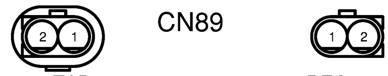

TAB

| NO | P | C | J |
|---|---|---|---|
| 1 | 4 | GR | CN103-2 |
| 2 | 3 | W-G | CN103-1 |

REC

| NO | P | C | J L |
|---|---|---|---|
| 1 | 4 | - | SOL L |
| 2 | 3 | | SOL |

## CN89




TAB

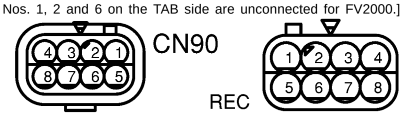
| NO | P | C | J |
|---|---|---|---|
| 1 | 6 | R-L | CN103-6 |
| 2 | 5 | B-R | CN103-5 |

REC

| NO | P | C | J T |
|---|---|---|---|
| 1 | 6 | R-L | SOL T |
| 2 | 5 | B-R | SOL |

1) When the lifting height is 2,000 or more, excluding 2) and 3) below
[Note: Nos. 1, 2 and 6 on the TAB side are unconnected for FV2000.]

## CN90




TAB

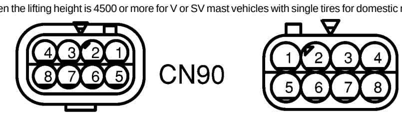
| NO | P | C | J |
|---|---|---|---|
| 1 | 91 | L-B | CN92-3 |
| 2 | 51 | BR-W | CN92-1 |
| 3 | 59 | G-Y | CN91-2 |
| 4 | 58 | | |
| 5 | 92 | | |
| 6 | 90 | L | CN92-2 |
| 7 | 93 | G | CN91-3 |
| 8 | 51 | BR | CN91-1 |

REC

| NO | P | C | J |
|---|---|---|---|
| 1 | 91 | GR | CN101-20 |
| 2 | 51 | R-L | CN101-26 |
| 3 | 59 | Y-G | CN102-5 |
| 4 | 58 | G-B | CN102-17 |
| 5 | 92 | R-B | CN101-21 |
| 6 | 90 | O | CN101-19 |
| 7 | 93 | R | CN101-14 |
| 8 | 51 | R-L | CN102-22 |

2) When the lifting height is 4500 or more for V or SV mast vehicles with single tires for domestic market

## CN90




TAB

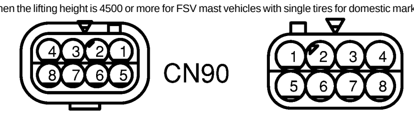
| NO | P | C | J |
|---|---|---|---|
| 1 | 91 | L-B | CN93-2 |
| 2 | 51 | BR-W | CN92-1 |
| 3 | 59 | Y-R | CN91-2 |
| 4 | 58 | | |
| 5 | 92 | L-W | CN93-3 |
| 6 | 90 | L | CN92-2 |
| 7 | 93 | G | CN91-3 |
| 8 | 51 | BR | CN91-1 |

REC

| NO | P | C | J |
|---|---|---|---|
| 1 | 91 | GR | CN101-20 |
| 2 | 51 | R-L | CN101-26 |
| 3 | 59 | Y-R | CN102-5 |
| 4 | 58 | G-B | CN102-17 |
| 5 | 92 | R-B | CN101-21 |
| 6 | 90 | O | CN101-19 |
| 7 | 93 | R | CN101-14 |
| 8 | 51 | R-L | CN102-22 |

3) When the lifting height is 4500 or more for FSV mast vehicles with single tires for domestic market

## CN90




TAB

| NO | P | C | J |
|---|---|---|---|
| 1 | 91 | L-B | CN99-2 |
| 2 | 51 | BR-W | CN92-1 |
| 3 | 59 | Y-R | CN91-2 |
| 4 | 58 | | |
| 5 | 92 | L-W | CN99-3 |
| 6 | 90 | L | CN92-2 |
| 7 | 93 | G | CN91-3 |
| 8 | 51 | BR | CN91-1 |

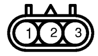
REC

| NO | P | C | J |
|---|---|---|---|
| 1 | 91 | GR | CN101-20 |
| 2 | 51 | R-L | CN101-26 |
| 3 | 59 | Y-R | CN102-5 |
| 4 | 58 | G-B | CN102-17 |
| 5 | 92 | R-B | CN101-21 |
| 6 | 90 | O | CN101-19 |
| 7 | 93 | R | CN101-14 |
| 8 | 51 | R-L | CN102-22 |

## CN91

TAB

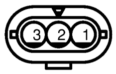
| NO | P | C | J |
|---|---|---|---|
| 1 | 51 | - | $SP_L$ |
| 2 | 59 | - | $SP_L$ |
| 3 | 93 | - | $SP_L$ |



REC

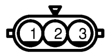
| NO | P | C | J |
|---|---|---|---|
| 1 | 51 | BR | CN90-8 |
| 2 | 59 | G-Y | CN90-3 |
| 3 | 93 | G | CN90-7 |

## CN92



TAB

| NO | P | C | J |
|---|---|---|---|
| 1 | 51 | BR-W | CN90-2 |
| 2 | 90 | L | CN90-6 |
| 3 | 91 | L-B | CN90-1 |



REC

| NO | P | C | J |
|---|---|---|---|
| 1 | 51 | - | SWMH1 |
| 2 | 90 | - | SWMH1 |
| 3 | 91 | - | SWMH1 |

| | | | |
|---|---|---|---|
| 3 | 105 | L-R | CN93-1 |

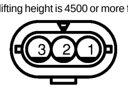
When the lifting height is 4500 or more for V or SV mast vehicles with single tires for domestic market

| | | | |
|---|---|---|---|
| 3 | 105 | L-R | CN99-4 |

When the lifting height is 4500 or more for FSV mast vehicles with single tires for domestic market

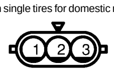
When the lifting height is 4500 or more for V or SV mast vehicles with single tires for domestic market

## CN93



TAB

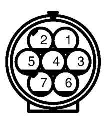
| NO | P | C | J |
|---|---|---|---|
| 1 | 105 | L-R | CN92-3 |
| 2 | 91 | L-B | CN90-1 |
| 3 | 92 | L-W | CN90-5 |



REC

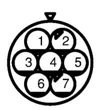
| NO | P | C | J |
|---|---|---|---|
| 1 | 105 | - | SWMH2 |
| 2 | 91 | - | SWMH2 |
| 3 | 92 | - | SWMH2 |

## CN94



TAB

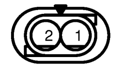
| NO | P | C | J |
|---|---|---|---|
| 1 | 316 | B-Y | CN142-11 |
| 2 | 317 | GR | CN142-3 |
| 3 | 320 | W-R | CN142-8 |
| 4 | 327 | G-L | CN148-1 |
| 5 | 328 | R-L | CN148-6 |
| 6 | 318 | G-W | CN142-10 |
| 7 | 319 | Y-G | CN142-2 |



REC

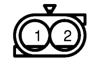
| NO | P | C | J |
|---|---|---|---|
| 1 | 316 | P | CN97-1 |
| 2 | 317 | G-W | CN97-2 |
| 3 | 320 | W-B | CN97-3 |
| 4 | 327 | L-B | CN95-1 |
| 5 | 328 | W-R | CN95-2 |
| 6 | 318 | G | CN96-3 |
| 7 | 319 | L-W | CN96-2 |

## CN95



TAB

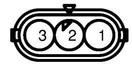
| NO | P | C | J |
|---|---|---|---|
| 1 | 327 | - | $SOL_S$ |
| 2 | 328 | - | SOL |



REC

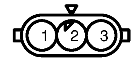
| NO | P | C | J |
|---|---|---|---|
| 1 | 327 | L-B | CN94-4 |
| 2 | 328 | W-R | CN94-5 |

## CN96



TAB

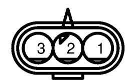
| NO | P | C | J |
|---|---|---|---|
| 1 | 320 | - | VRAM |
| 2 | 319 | - | VRAM |
| 3 | 318 | - | VRAM |



REC

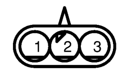
| NO | P | C | J |
|---|---|---|---|
| 1 | 320 | BR | J25 |
| 2 | 319 | L-W | CN94-7 |
| 3 | 318 | G | CN94-6 |

## CN97



TAB

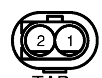
| NO | P | C | J |
|---|---|---|---|
| 1 | 316 | - | VRAH |
| 2 | 317 | - | VRAH |
| 3 | 320 | - | VRAH |



REC

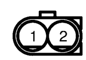
| NO | P | C | J |
|---|---|---|---|
| 1 | 316 | P | CN94-1 |
| 2 | 317 | G-W | CN94-2 |
| 3 | 320 | W-B | CN94-3 |

## CN98



TAB

| NO | P | C | J |
|---|---|---|---|
| 1 | 329 | B-Y | CN148-2 |
| 2 | 330 | GR | CN148-5 |

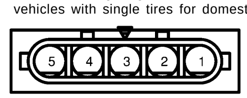


REC

| NO | P | C | J |
|---|---|---|---|
| 1 | 329 | - | $SOL_{ST}$ |
| 2 | 330 | | $SOL_{ST}$ |

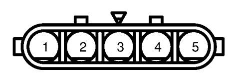
When the lifting height is 4500 or more for FSV mast vehicles with single tires for domestic market

## CN99



TAB

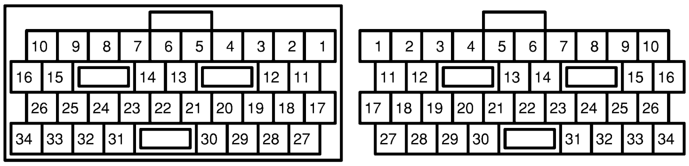
| NO | P | C | J |
|---|---|---|---|
| 1 | 93 | - | SS(IG) |
| 2 | 91 | - | SS(N/C) |
| 3 | 92 | - | SS(N/O) |
| 4 | 105 | - | SS(L) |
| 5 | 51 | - | SS(E) |



REC

| NO | P | C | J |
|---|---|---|---|
| 1 | 93 | B-R | J32 |
| 2 | 91 | L-B | CN90-1 |
| 3 | 92 | L-W | CN90-5 |
| 4 | 105 | L-R | CN92-3 |
| 5 | 51 | BR-W | J31 |

## CN101



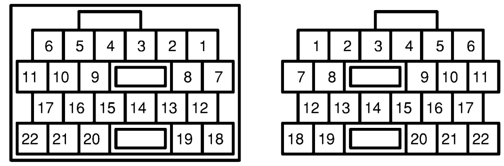

### TAB

| NO | P | C | J |
|---|---|---|---|
| 1 | 45 | - | DSF |
| 2 | 46 | - | DSR |
| 3 | 65 | - | LSB |
| 4 | 66 | - | LSPB |
| 5 | 67 | | LSD |
| 6 | | | |
| 7 | | | |
| 8 | | | |
| 9 | 307 | - | SMTSA |
| 10 | 308 | - | SMTSK |
| 11 | 63 | - | LSAT1 |
| 12 | 309 | - | SSTMA |
| 13 | 310 | - | SSTMK |
| 14 | 93 | | M15V |
| 15 | | | |
| 16 | 61 | - | LSTF |
| 17 | 62 | - | LSTR |
| 18 | 70 | - | SWTK |
| 19 | 90 | - | MH1 |
| 20 | 91 | - | MH2-1 |
| 21 | 92 | | MH2-2 |
| 22 | | | |
| 23 | | | |
| 24 | | | |
| 25 | | | |
| 26 | 51 | | LS- |
| 27 | | | |
| 28 | | | |
| 29 | | | |
| 30 | | | |
| 31 | | | |
| 32 | 60 | | LSL1 |
| 33 | | | |
| 34 | | | |

### REC

| NO | P | C | J |
|---|---|---|---|
| 1 | 45 | W | CN9-5 |
| 2 | 46 | G | CN9-4 |
| 3 | 65 | Y-G | CN6-2 |
| 4 | 66 | B-W | CN15-2 |
| 5 | 67 | B-Y | CN42-1 |
| 6 | | | |
| 7 | | | |
| 8 | | | |
| 9 | 307 | W-R | CN141-4 |
| 10 | 308 | G-Y | CN141-12 |
| 11 | 63 | G-B | CN11-3 |
| 12 | 309 | Y | CN141-3 |
| 13 | 310 | Y-R | CN141-11 |
| 14 | 93 | R | CN90-7 |
| 15 | | | |
| 16 | 61 | G-R | CN87-1 |
| 17 | 62 | L | CN87-3 |
| 18 | 70 | BR | CN85-1 |
| 19 | 90 | O | CN90-6 |
| 20 | 91 | GR | CN90-1 |
| 21 | 92 | R-B | CN90-5 |
| 22 | | | |
| 23 | | | |
| 24 | | | |
| 25 | | | |
| 26 | 51 | R-L | CN90-2 |
| 27 | | | |
| 28 | | | |
| 29 | | | |
| 30 | | | |
| 31 | | | |
| 32 | 60 | G-W | CN11-1 |
| 33 | | | |
| 34 | | | |

## CN102



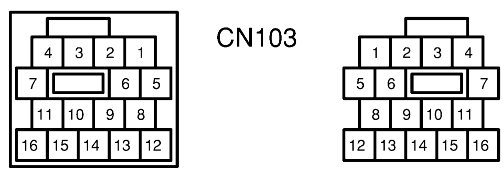

### TAB

| NO | P | C | J |
|---|---|---|---|
| 1 | 64 | - | SWAC |
| 2 | 52 | | POTA |
| 3 | | | |
| 4 | 56 | - | POTT |
| 5 | 59 | - | SPL |
| 6 | 81 | - | SSD1 |
| 7 | 82 | - | SSD2 |
| 8 | 84 | - | SSP+ |
| 9 | 85 | - | SSP- |
| 10 | 86 | - | TD+ |
| 11 | 87 | - | TD- |
| 12 | 88 | - | TP+ |
| 13 | 89 | - | TP- |
| 14 | 53 | | POTA+ |
| 15 | | | |
| 16 | 57 | - | POTT+ |
| 17 | 58 | - | SPL+ |
| 18 | 80 | - | SSD+ |
| 19 | 83 | | SSD- |
| 20 | | | |
| 21 | | | |
| 22 | 51 | | POT- |

### REC

| NO | P | C | J |
|---|---|---|---|
| 1 | 64 | R-Y | CN25-4 |
| 2 | 52 | GR | CN25-1 |
| 3 | | | |
| 4 | 56 | G | CN86-2 |
| 5 | 59 | Y-R | CN90-3 |
| 6 | 81 | W-L | CN57-1 |
| 7 | 82 | B-W | CN57-3 |
| 8 | 84 | B-R | CN58-2 |
| 9 | 85 | W-G | CN58-1 |
| 10 | 86 | B-Y | CN52-2 |
| 11 | 87 | P | CN52-1 |
| 12 | 88 | Y-G | CN55-2 |
| 13 | 89 | W-R | CN55-1 |
| 14 | 53 | R-B | CN25-2 |
| 15 | | | |
| 16 | 57 | G-W | CN86-1 |
| 17 | 58 | G-B | CN90-4 |
| 18 | 80 | G-R | CN57-4 |
| 19 | 83 | BR | CN57-2 |
| 20 | | | |
| 21 | | | |
| 22 | 51 | R-L | CN90-8 |

## CN103



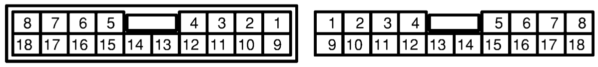

### TAB

| NO | P | C | J |
|---|---|---|---|
| 1 | 3 | - | SOLL+ |
| 2 | 4 | - | SOLL- |
| 3 | 41 | - | B48V |
| 4 | 43 | - | VBKY |
| 5 | 5 | - | SOLT+ |
| 6 | 6 | - | SOLT- |
| 7 | 41 | - | VBBT |
| 8 | 44 | | VBMB |
| 9 | | | |
| 10 | 16 | | D15V |
| 11 | | | |
| 12 | 14 | - | GNDD |
| 13 | 144 | - | SMTDK |
| 14 | 143 | - | SDTMK |
| 15 | 142 | - | SDTMA |
| 16 | 141 | | SMTDA |

### REC

| NO | P | C | J |
|---|---|---|---|
| 1 | 3 | W-G | CN88-2 |
| 2 | 4 | GR | CN88-1 |
| 3 | 41 | Y | J6 |
| 4 | 43 | B-Y | CN12-1 |
| 5 | 5 | B-R | CN89-2 |
| 6 | 6 | R-L | CN89-1 |
| 7 | 41 | Y | CN29-3 |
| 8 | 44 | Y-G | CN148-3 |
| 9 | | | |
| 10 | 16 | R | CN1-2 |
| 11 | | | |
| 12 | 14 | BR | CN1-1 |
| 13 | 144 | G-R | CN1-7 |
| 14 | 143 | R-Y | CN1-4 |
| 15 | 142 | R-B | CN1-8 |
| 16 | 141 | W-R | CN1-3 |

## CN141




TAB

| NO | P | C | J |
|---|---|---|---|
| 1 | | | |
| 2 | | | |
| 3 | 309 | | SSTMA |
| 4 | 307 | | SMTSA |
| 5 | 324 | | SS+ |
| 6 | 312 | | STS1 |
| 7 | 313 | | STS2 |
| 8 | 314 | | STSC |
| 9 | | | |
| 10 | | | |
| 11 | 310 | | SSTMK |
| 12 | 308 | | SMTSK |
| 13 | 138 | | SL/L- |
| 14 | 137 | | SL/L+ |
| 15 | 325 | | SS- |
| 16 | 315 | | STS- |
| 17 | 311 | | STS+ |
| 18 | | | |

REC

| NO | P | C | J |
|---|---|---|---|
| 1 | | | |
| 2 | | | |
| 3 | 309 | Y | CN101-12 |
| 4 | 307 | W-R | CN101-9 |
| 5 | 324 | Y-R | CN20-2 |
| 6 | 312 | G-W | CN19-4 |
| 7 | 313 | R-Y | CN19-5 |
| 8 | 314 | L | CN19-6 |
| 9 | | | |
| 10 | | | |
| 11 | 310 | Y-R | CN101-13 |
| 12 | 308 | G-Y | CN101-10 |
| 13 | 138 | W-R | CN1-5 |
| 14 | 137 | R-G | CN1-6 |
| 15 | 325 | G-B | CN20-1 |
| 16 | 315 | BR | CN19-3 |
| 17 | 311 | W-R | CN19-1 |
| 18 | | | |

## CN142


TAB

| NO | P | C | J |
|---|---|---|---|
| 1 | | | |
| 2 | 319 | | POTS |
| 3 | 317 | | POTH |
| 4 | | | |
| 5 | | | |
| 6 | | | |
| 7 | | | |
| 8 | 320 | | SPOT- |
| 9 | | | |
| 10 | 318 | | POTS+ |
| 11 | 316 | | POTH+ |
| 12 | | | |

REC

| NO | P | C | J |
|---|---|---|---|
| 1 | | | |
| 2 | 319 | Y-G | CN94-7 |
| 3 | 317 | GR | CN94-2 |
| 4 | | | |
| 5 | | | |
| 6 | | | |
| 7 | | | |
| 8 | 320 | W-R | CN94-3 |
| 9 | | | |
| 10 | 318 | G-W | CN94-6 |
| 11 | 316 | B-Y | CN94-1 |
| 12 | | | |

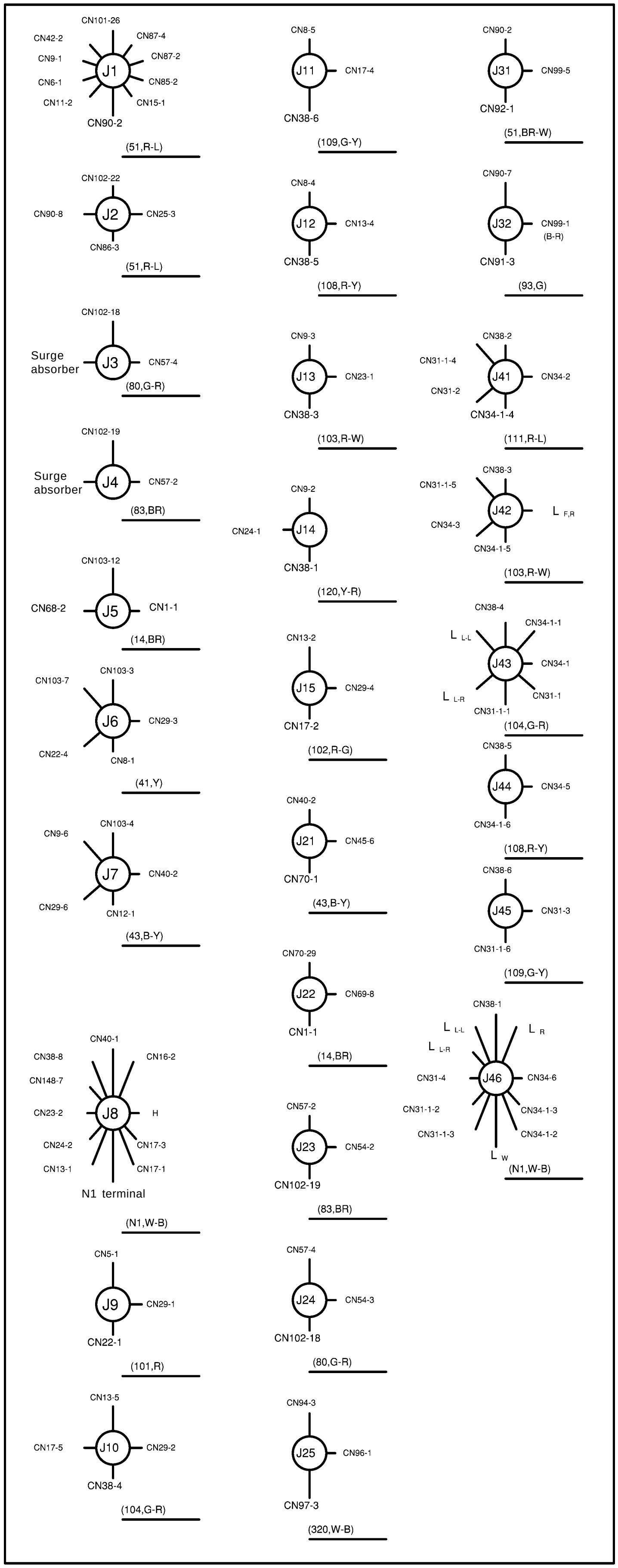
## CN148


TAB

| NO | P | C | J |
|---|---|---|---|
| 1 | 327 | | SOLS+ |
| 2 | 329 | | SOLST+ |
| 3 | 44 | | VBMB |
| 4 | | | |
| 5 | 330 | | SOLST- |
| 6 | 328 | | SOLS- |
| 7 | N1 | | N1 |
| 8 | | | |

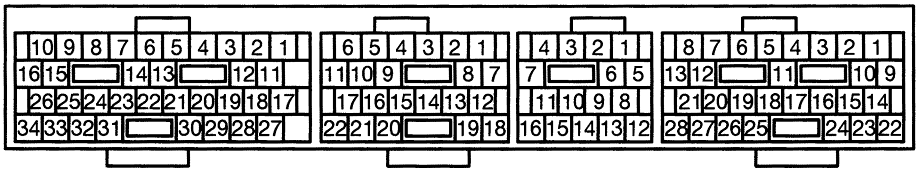
REC

| NO | P | C | J |
|---|---|---|---|
| 1 | 327 | G-L | CN94-4 |
| 2 | 329 | B-Y | CN98-1 |
| 3 | 44 | Y-G | CN103-8 |
| 4 | | | |
| 5 | 330 | GR | CN98-2 |
| 6 | 328 | R-L | CN94-5 |
| 7 | N1 | W-B | J8 |
| 8 | | | |


J1
CN101-26
CN42-2
CN87-4
CN9-1
CN87-2
CN6-1
CN85-2
CN11-2
CN15-1
CN90-2
(51,R-L)
J11
CN8-5
CN17-4
CN38-6
(109,G-Y)
J31
CN90-2
CN99-5
CN92-1
(51,BR-W)
J2
CN102-22
CN90-8
CN25-3
CN86-3
(51,R-L)
J12
CN8-4
CN13-4
CN38-5
(108,R-Y)
J32
CN90-7
CN99-1
(B-R)
CN91-3
(93,G)
J3
CN102-18
Surge absorber
CN57-4
(80,G-R)
J13
CN9-3
CN23-1
CN38-3
(103,R-W)
J41
CN38-2
CN31-1-4
CN34-2
CN31-2
CN34-1-4
(111,R-L)
J4
CN102-19
Surge absorber
CN57-2
(83,BR)
J14
CN9-2
CN24-1
CN38-1
(120,Y-R)
J42
CN38-3
CN31-1-5
L F,R
CN34-3
CN34-1-5
(103,R-W)
J5
CN103-12
CN68-2
CN1-1
(14,BR)
J15
CN13-2
CN29-4
CN17-2
(102,R-G)
J43
CN38-4
CN34-1-1
L L-L
CN34-1
L L-R
CN31-1
CN31-1-1
(104,G-R)
J6
CN103-3
CN103-7
CN29-3
CN22-4
CN8-1
(41,Y)
J44
CN38-5
CN34-5
CN34-1-6
(108,R-Y)
J21
CN40-2
CN45-6
CN70-1
(43,B-Y)
J7
CN103-4
CN9-6
CN40-2
CN29-6
CN12-1
(43,B-Y)
J45
CN38-6
CN31-3
CN31-1-6
(109,G-Y)
J22
CN70-29
CN69-8
CN1-1
(14,BR)
J46
CN38-1
L L-L
L R
L L-R
CN31-4
CN34-6
CN31-1-2
CN34-1-3
CN31-1-3
CN34-1-2
L W
(N1,W-B)
J8
CN40-1
CN38-8
CN16-2
CN148-7
CN23-2
H
CN24-2
CN17-3
CN13-1
CN17-1
N1 terminal
(N1,W-B)
J23
CN57-2
CN54-2
CN102-19
(83,BR)
J9
CN5-1
CN29-1
CN22-1
(101,R)
J24
CN57-4
CN54-3
CN102-18
(80,G-R)
J10
CN13-5
CN17-5
CN29-2
CN38-4
(104,G-R)
J25
CN94-3
CN96-1
CN97-3
(320,W-B)

# CPU BOARD CONNECTOR DRAWING

CN101 CN102 CN103 CN104




### CN101

| NO | P | J |
|---|---|---|
| 1 | 45 | DSF |
| 2 | 46 | DSR |
| 3 | 65 | LSB |
| 4 | 66 | LSPB |
| 5 | 67 | LSD |
| 6 | --- | --- |
| 7 | --- | --- |
| 8 | --- | --- |
| 9 | 307 | SNTSA |
| 10 | 308 | SMTSK |
| 11 | 63 | LSAT1 |
| 12 | 309 | SSTMA |
| 13 | 310 | SSTMK |
| 14 | 93 | M15V |
| 15 | 146 | B1BC |
| 16 | 61 | LSTF |
| 17 | 62 | LSTR |
| 18 | 70 | SWTK |
| 19 | 90 | MH1 |
| 20 | 91 | MH2-1 |
| 21 | 92 | MH2-2 |
| 22 | 69 | LSAT2 |
| 23 | --- | --- |
| 24 | --- | LSOPT2 |
| 25 | 145 | B1BD |
| 26 | 51 | LS- |
| 27 | --- | OPT0 |
| 28 | --- | --- |
| 29 | --- | --- |
| 30 | --- | --- |
| 31 | --- | --- |
| 32 | 60 | LSL |
| 33 | --- | --- |
| 34 | --- | --- |

### CN102

| NO | P | J |
|---|---|---|
| 1 | 64 | SWAC |
| 2 | 52 | POTA |
| 3 | --- | AOPT |
| 4 | 56 | POTT |
| 5 | 59 | SPL |
| 6 | 81 | SSD1 |
| 7 | 82 | SSD2 |
| 8 | 84 | SSP+ |
| 9 | 85 | SSP- |
| 10 | 86 | TD+ |
| 11 | 87 | TD- |
| 12 | 88 | TP+ |
| 13 | 89 | TP- |
| 14 | 53 | POTA+ |
| 15 | 54 | POTL+ |
| 16 | 57 | POTT+ |
| 17 | 58 | SPL+ |
| 18 | 80 | SSD+ |
| 19 | 83 | SSD- |
| 20 | --- | --- |
| 21 | --- | --- |
| 22 | 51 | POT- |

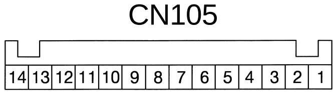
### CN103

| NO | P | J |
|---|---|---|
| 1 | 3 | SOLL+ |
| 2 | 4 | SOLL- |
| 3 | 41 | B48V |
| 4 | 43 | VBKY |
| 5 | 5 | SOLT+ |
| 6 | 6 | SOLT- |
| 7 | 41 | VBBT |
| 8 | 44 | VBMB |
| 9 | --- | --- |
| 10 | 16 | D15V |
| 11 | --- | --- |
| 12 | 14 | GNDD |
| 13 | 144 | SMTDK |
| 14 | 143 | SDTMK |
| 15 | 142 | SDTMA |
| 16 | 141 | SMTDA |

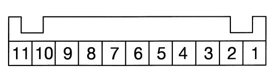
### CN104

| NO | P | J |
|---|---|---|
| 1 | N2 | N2C |
| 2 | 54 | CSBATT |
| 3 | --- | --- |
| 4 | 18 | B80V |
| 5 | 75 | CSD+ |
| 6 | 75 | CSP+ |
| 7 | 71 | CSDA |
| 8 | 72 | CSDB |
| 9 | 13 | C20V |
| 10 | N2 | N2 |
| 11 | 2 | MB- |
| 12 | P2 | VBP2 |
| 13 | 1 | MB+ |
| 14 | 44 | VBMB |
| 15 | 41 | B48V |
| 16 | 16 | D15V |
| 17 | 15 | C15V |
| 18 | 73 | CSPA |
| 19 | 74 | CSPB |
| 20 | 78 | THCD |
| 21 | 77 | THC+ |
| 22 | 44 | VBMB |
| 23 | 14 | GNDD |
| 24 | 14 | GNDC |
| 25 | 79 | THCP |
| 26 | --- | --- |
| 27 | 76 | CSD- |
| 28 | 76 | CSP- |

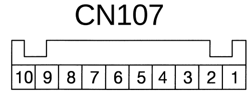
CN105




CN106




CN107




### CN105

| NO | P | J |
|---|---|---|
| 1 | 38 | FAN+ |
| 2 | 38 | FAN+ |
| 3 | 36 | FANCD |
| 4 | 37 | FANCP |
| 5 | --- | - |
| 6 | 39 | DDC |
| 7 | 40 | PDC |
| 8 | 94 | CKFAND+ |
| 9 | 97 | CKFAND- |
| 10 | 98 | CKFANP+ |
| 11 | 99 | CKFANP- |
| 12 | --- | - |
| 13 | --- | - |
| 14 | 100 | CHGFAN |

### CN106

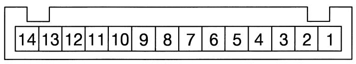
| NO | P | J |
|---|---|---|
| 1 | 33 | TMPU+ |
| 2 | 27 | TMPAU- |
| 3 | 28 | TMPBU- |
| 4 | 29 | TMPCU- |
| 5 | 30 | TMPAD- |
| 6 | 31 | TMPBD- |
| 7 | 32 | TMPCD- |
| 8 | 33 | TMPD+ |
| 9 | 35 | CKPV |
| 10 | --- | - |
| 11 | --- | - |

### CN107

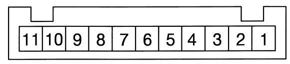
| NO | P | J |
|---|---|---|
| 1 | 26 | TMDU+ |
| 2 | 20 | TMDAU- |
| 3 | 21 | TMDBU- |
| 4 | 22 | TMDCU- |
| 5 | 23 | TMDAD- |
| 6 | 24 | TMDBD- |
| 7 | 25 | TMDCD- |
| 8 | 26 | TMDD+ |
| 9 | 34 | CKDV |
| 10 | --- | --- |

# DC/MD BOARD CONNECTOR DRAWING

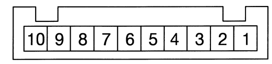
CN108




CN109




CN110




CN108

| NO | P | J |
|---|---|---|
| 1 | 100 | CHGFAN |
| 2 | --- | CKFANA- |
| 3 | --- | CKFANA+ |
| 4 | 99 | CKFANP- |
| 5 | 98 | CKFANP+ |
| 6 | 97 | CKFAND- |
| 7 | 94 | CKFAND+ |
| 8 | 40 | PDC |
| 9 | 39 | DDC |
| 10 | --- | FANCA |
| 11 | 37 | FANCP |
| 12 | 36 | FANCD |
| 13 | 38 | FAN+ |
| 14 | 38 | FAN+ |

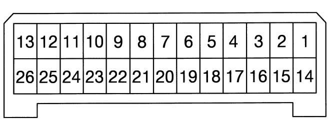
CN109

| NO | P | J |
|---|---|---|
| 1 | 33 | TMPU+ |
| 2 | 27 | TMPAU- |
| 3 | 28 | TMPBU- |
| 4 | 29 | TMPCU- |
| 5 | 30 | TMPAD- |
| 6 | 31 | TMPBD- |
| 7 | 32 | TMPCD- |
| 8 | 33 | TMPD+ |
| 9 | 35 | CKPV |
| 10 | --- | --- |
| 11 | --- | --- |

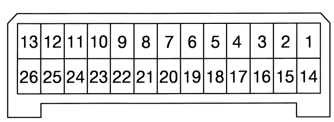
CN110

| NO | P | J |
|---|---|---|
| 1 | 26 | TMDU+ |
| 2 | 20 | TMDAU- |
| 3 | 21 | TMDBU- |
| 4 | 22 | TMDCU- |
| 5 | 23 | TMDAD- |
| 6 | 24 | TMDBD- |
| 7 | 25 | TMDCD- |
| 8 | 26 | TMDD+ |
| 9 | 34 | CKDV |
| 10 | --- | --- |

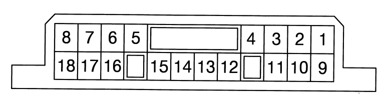
CN111




CN112




CN113




CN111

| NO | P | J |
|---|---|---|
| 1 | 150 | TMDAU1+ |
| 2 | 152 | TMDAD1+ |
| 3 | 154 | TMDBU1+ |
| 4 | 151 | TMDAU-G |
| 5 | 153 | TMDAD-G |
| 6 | 155 | TMDBU-G |
| 7 | 157 | TMDBD-G |
| 8 | 159 | TMDCU-G |
| 9 | 161 | TMDCD-G |
| 10 | --- | --- |
| 11 | 156 | TMDBD1+ |
| 12 | 158 | TMDCU1+ |
| 13 | 160 | TMDCD1+ |
| 14 | P3 | TMDAU-SD |
| 15 | N2 | TMDAD-SD |
| 16 | P5 | TMDBU-SD |
| 17 | 150 | TMDAU2+ |
| 18 | 152 | TMDAD2+ |
| 19 | 154 | TMDBU2+ |
| 20 | 156 | TMDBD2+ |
| 21 | 158 | TMDCU2+ |
| 22 | 160 | TMDCD2+ |
| 23 | --- | --- |
| 24 | N2 | TMDBD-SD |
| 25 | P7 | TMDCU-SD |
| 26 | N2 | TMDCD-SD |

CN112

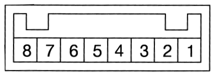
| NO | P | J |
|---|---|---|
| 1 | 162 | TMPAU1+ |
| 2 | 164 | TMPAD1+ |
| 3 | 166 | TMPBU1+ |
| 4 | 163 | TMPAU-G |
| 5 | 165 | TMPAD-G |
| 6 | 167 | TMPBU-G |
| 7 | 169 | TMPBD-G |
| 8 | 171 | TMPCU-G |
| 9 | 173 | TMPCD-G |
| 10 | --- | --- |
| 11 | 168 | TMPBD1+ |
| 12 | 170 | TMPCU1+ |
| 13 | 172 | TMPCD1+ |
| 14 | P12 | TMPAU-SD |
| 15 | N2 | TMPAD-SD |
| 16 | P14 | TMPBU-SD |
| 17 | 162 | TMPAU2+ |
| 18 | 164 | TMPAD2+ |
| 19 | 166 | TMPBU2+ |
| 20 | 168 | TMPBD2+ |
| 21 | 170 | TMPCU2+ |
| 22 | 172 | TMPCD2+ |
| 23 | --- | --- |
| 24 | N2 | TMPBD-SD |
| 25 | P16 | TMPCU-SD |
| 26 | N2 | TMPCD-SD |

CN113

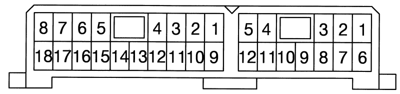
| NO | P | J |
|---|---|---|
| 1 | 41 | B48V |
| 2 | 44 | VBMB |
| 3 | --- | Q601G |
| 4 | 7 | FAND+ |
| 5 | 8 | FAND- |
| 6 | 9 | FANP+ |
| 7 | 10 | FANP- |
| 8 | --- | Q701G |
| 9 | --- | FANA+ |
| 10 | --- | FANA- |
| 11 | --- | Q501G |
| 12 | 14 | GNDD |
| 13 | 14 | GNDC |
| 14 | 16 | D24V |
| 15 | 15 | C24V |
| 16 | 13 | C20V |
| 17 | N2 | N2 |
| 18 | N2 | N2 |

# SCPU BOARD CONNECTOR DRAWING

CN140




CN141 CN142




CN140

| | P | J |
|---|---|---|
| 1 | --- | C5V |
| 2 | --- | GNDC |
| 3 | --- | FTXD |
| 4 | --- | VPP |
| 5 | --- | MD1 |
| 6 | --- | FRES |
| 7 | --- | FRXD |
| 8 | --- | SELR |

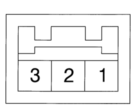
CN141

| | P | J |
|---|---|---|
| 1 | --- | SSTXA |
| 2 | --- | SXTSA |
| 3 | 309 | SSTMA |
| 4 | 307 | SMTSA |
| 5 | 324 | SS+ |
| 6 | 312 | STS1 |
| 7 | 313 | STS2 |
| 8 | 314 | STSC |
| 9 | --- | SSTXK |
| 10 | --- | SXTSK |
| 11 | 310 | SSTMK |
| 12 | 308 | SMTSK |
| 13 | 138 | SL/L- |
| 14 | 137 | SL/L+ |
| 15 | 325 | SS- |
| 16 | 315 | STS- |
| 17 | 311 | STS+ |
| 18 | --- | --- |

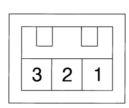
CN142

| | P | J |
|---|---|---|
| 1 | --- | POTOPT |
| 2 | 319 | POTS |
| 3 | 317 | POTH |
| 4 | --- | --- |
| 5 | --- | --- |
| 6 | --- | --- |
| 7 | --- | POTOPT- |
| 8 | 320 | SPOT- |
| 9 | --- | POTOPT+ |
| 10 | 318 | POTS+ |
| 11 | 316 | POTH+ |
| 12 | --- | --- |

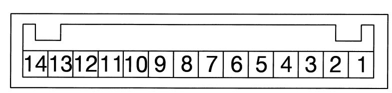
CN144




CN145




CN146




CN144

| | P | J |
|---|---|---|
| 1 | 321 | SYR+ |
| 2 | 323 | SYR- |
| 3 | 322 | SYR |

CN145

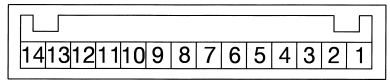
| | P | J |
|---|---|---|
| 1 | 340 | TMPSG |
| 2 | P24 | SH+ |
| 3 | N1 | SH- |

CN146

| | P | J |
|---|---|---|
| 1 | --- | --- |
| 2 | 44 | VBMB |
| 3 | 350 | PS20V |
| 4 | 351 | GNDPS |
| 5 | 352 | SC15V |
| 6 | 353 | GNDSC |
| 7 | 331 | DRSOL+ |
| 8 | 332 | DRSOL- |
| 9 | 333 | CKSOLS |
| 10 | 334 | CKSOLST |
| 11 | 335 | SGSOLS |
| 12 | 336 | SGSOLST |
| 13 | 337 | RESOL |
| 14 | --- | --- |

# DC/SD BOARD CONNECTOR DRAWING

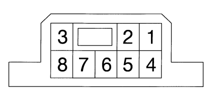
CN147




CN147

| | P | J |
|---|---|---|
| 1 | --- | --- |
| 2 | 44 | VBMB |
| 3 | 350 | PS20V |
| 4 | 351 | GNDPS |
| 5 | 352 | SC15V |
| 6 | 353 | GNDSC |
| 7 | 331 | DRSOL+ |
| 8 | 332 | DRSOL- |
| 9 | 333 | CKSOLS |
| 10 | 334 | CKSOLST |
| 11 | 335 | SGSOLS |
| 12 | 336 | SGSOLST |
| 13 | 337 | RESOL |
| 14 | --- | CKT-G |

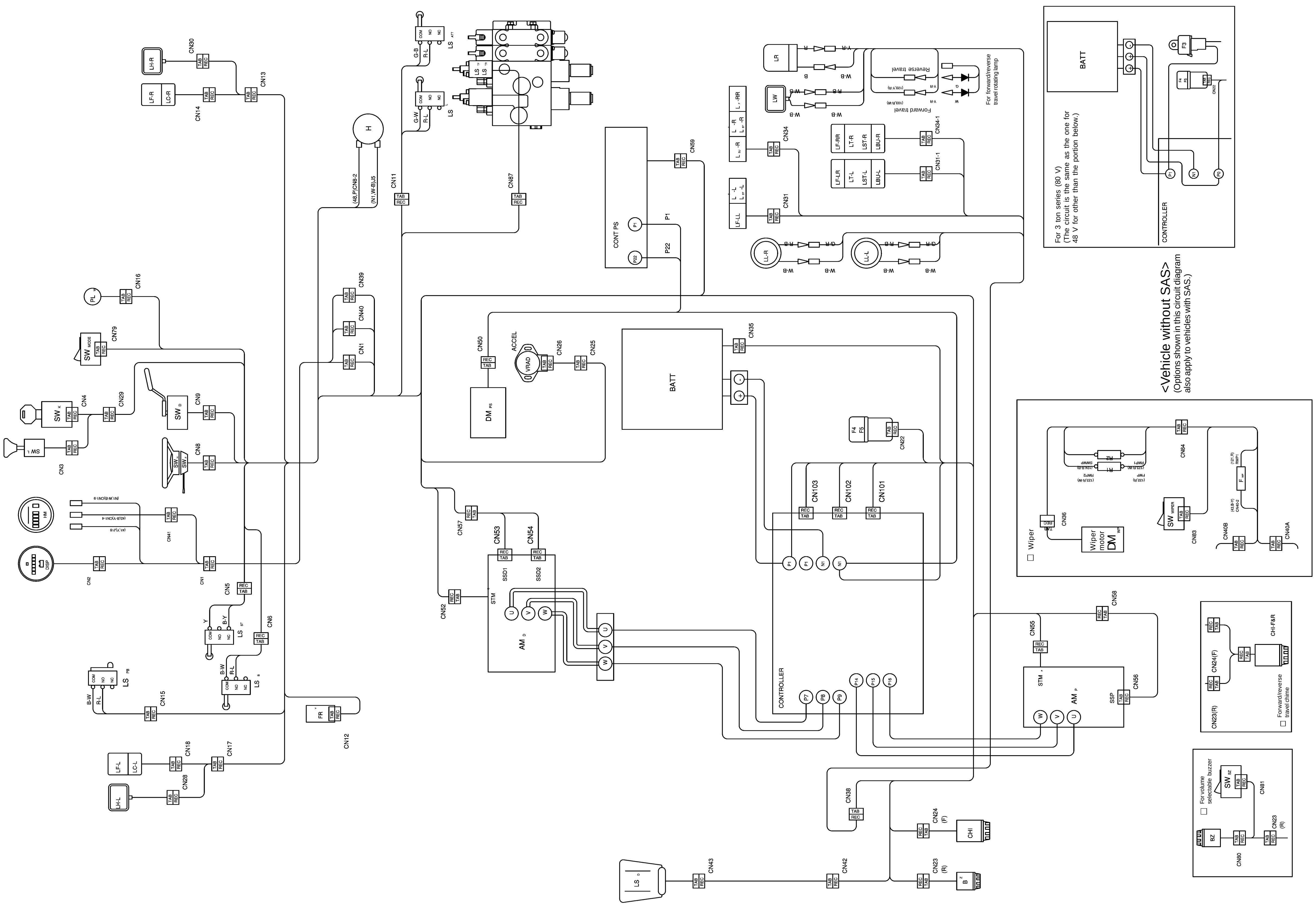
CN148



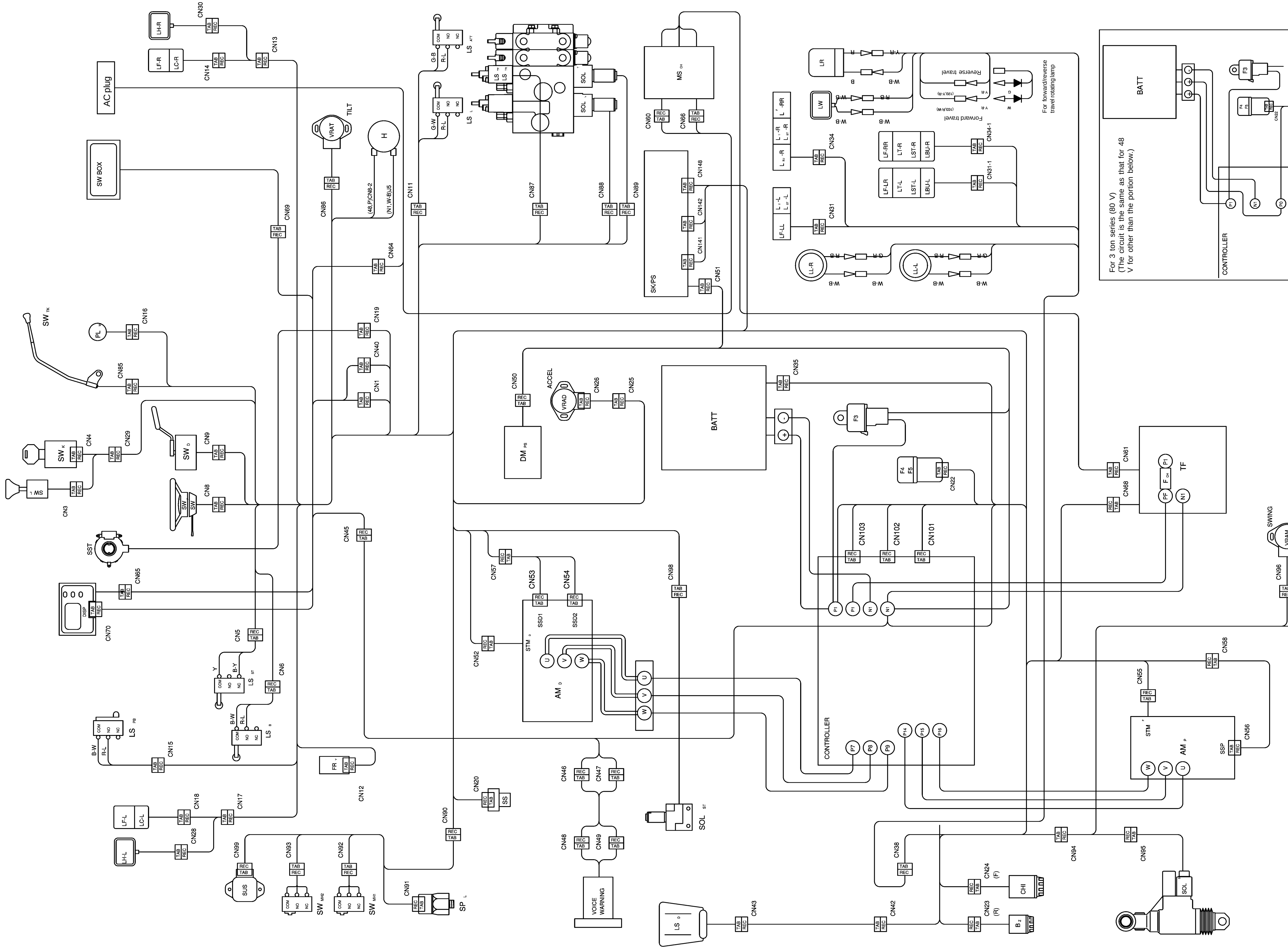

CN148

| | P | J |
|---|---|---|
| 1 | 327 | SOLS+ |
| 2 | 329 | SOLST+ |
| 3 | 44 | VBMB |
| 4 | --- | CK20V |
| 5 | 330 | SOLST- |
| 6 | 328 | SOLS- |
| 7 | N1 | N1 |
| 8 | --- | CK15V |

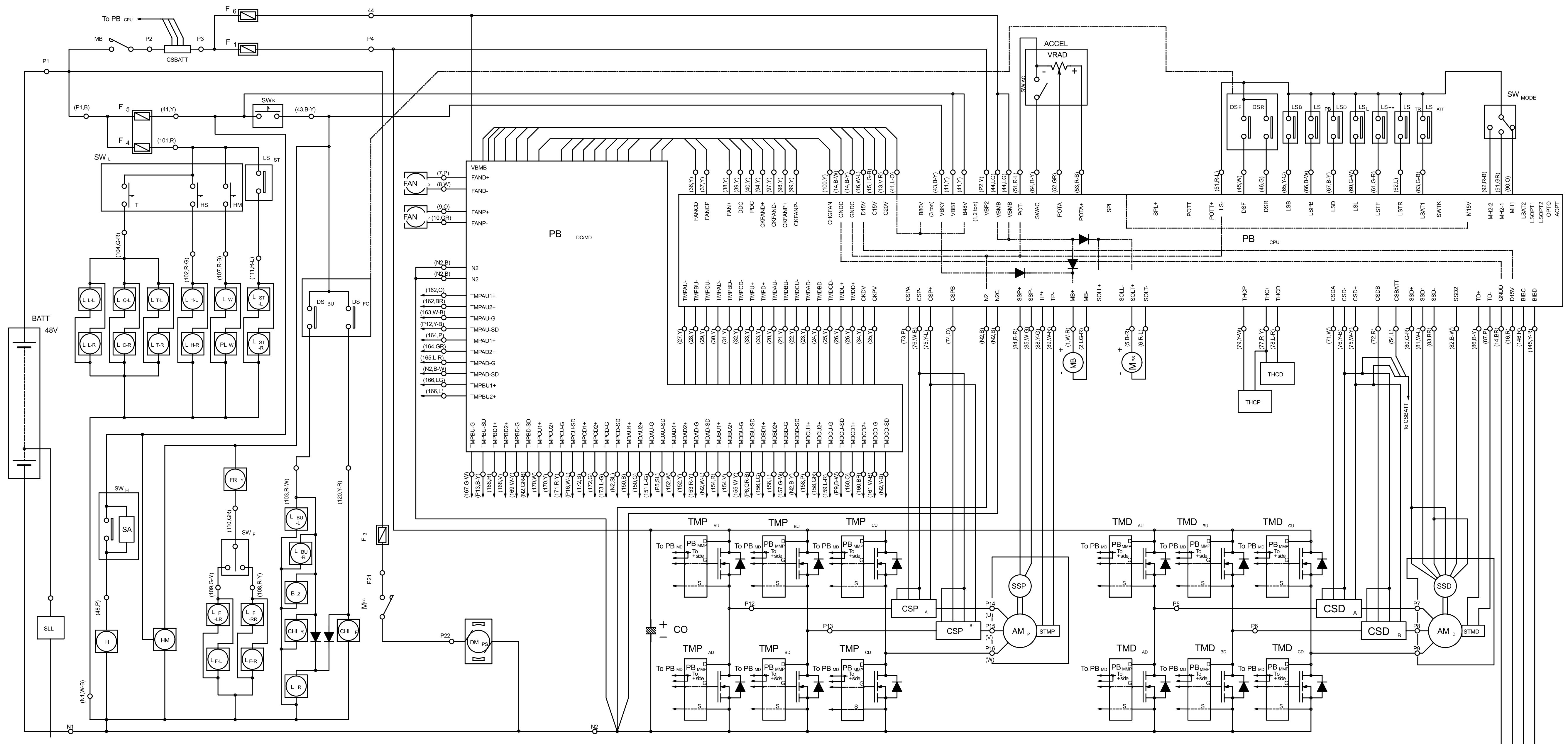
# CONNECTING DIAGRAM (FOR VEHICLE WITHOUT SAS)

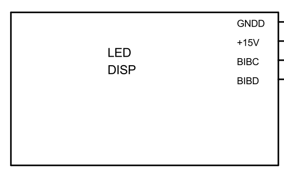


## CONNECTING DIAGRAM (FOR VEHICLE WITH SAS)



# WIRING DIAGRAM (FOR VEHICLE WITHOUT SAS)

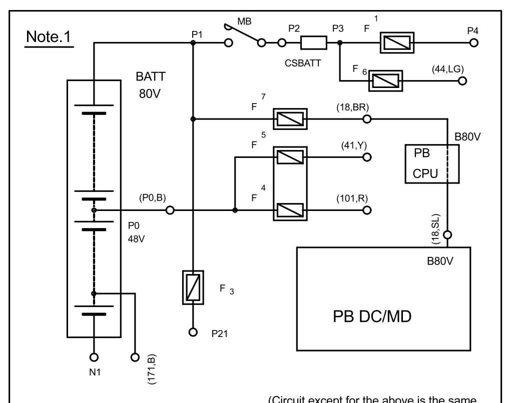





| | |
|---|---|
| | |
| | |
| | |
| | |
| | |
| | |
| | |
| BATT | BATTERY |
| F1 | FUSE, DRIVE |
| F3 | FUSE, POWER STEERING |
| F4 | FUSE, LAMP |
| F5 | FUSE, CONTROL CIRCUIT |
| F6 | FUSE, SK/PS&SOLENOID |
| F7 | FUSE, DC-DC COMVERTER |
| LED DISP | LED DISPLAY |
| | |
| THCD | THERMO, DRIVE |
| THCP | THERMO, PUMP |
| AM$_{D}$ | MOTOR, DRIVE |
| AM$_{P}$ | MOTOR, PUMP |
| DM$_{PS}$ | MOTOR, POWER STEERING |
| | |
| | |
| | |
| | |
| | |
| FAN$_{D}$ | FAN, DRIVE |
| FAN$_{P}$ | FAN, PUMP |
| VRAD | VARI-OHM, ACCEL, DRIVE |
| | |
| | |
| | |

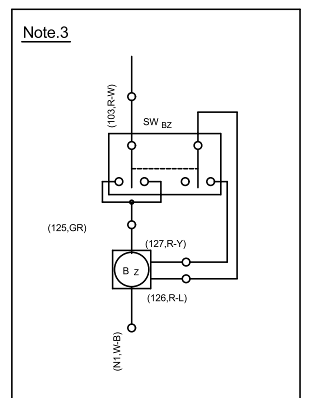
| | |
|---|---|
| PB$_{CPU}$ | PRINT BOARD, COMPUTER |
| PB$_{DC/MD}$ | PRINT BOARD, DC/MD |
| PB$_{MMP}$ | PRINT BOARD, MMP |
| | |
| | |
| | |
| TMD$_{AU}$ | TRANSISTOR, MAIN, DRIVE, PHASE A UPR |
| TMD$_{BU}$ | TRANSISTOR, MAIN, DRIVE, PHASE B UPR |
| TMD$_{CU}$ | TRANSISTOR, MAIN, DRIVE, PHASE C UPR |
| TMD$_{AD}$ | TRANSISTOR, MAIN, DRIVE, PHASE A LWR |
| TMD$_{BD}$ | TRANSISTOR, MAIN, DRIVE, PHASE B LWR |
| TMD$_{CD}$ | TRANSISTOR, MAIN, DRIVE, PHASE C LWR |
| TMP$_{AU}$ | TRANSISTOR, MAIN, PUMP, PHASE A UPR |
| TMP$_{BU}$ | TRANSISTOR, MAIN, PUMP, PHASE B UPR |
| TMP$_{CU}$ | TRANSISTOR, MAIN, PUMP, PHASE C UPR |
| TMP$_{AD}$ | TRANSISTOR, MAIN, PUMP, PHASE A LWR |
| TMP$_{BD}$ | TRANSISTOR, MAIN, PUMP, PHASE B LWR |
| TMP$_{CD}$ | TRANSISTOR, MAIN, PUMP, PHASE C LWR |
| TMPS | TRANSISTOR, MAIN, POWER STEERING |
| | |
| CO | CAPACITOR, OVERALL |
| CSBATT | CURRENT SENSOR, BATTERY |
| CSD$_{A}$ | CURRENT SENSOR, DRIVE, PHASE A |
| CSD$_{B}$ | CURRENT SENSOR, DRIVE, PHASE B |
| CSP$_{A}$ | CURRENT SENSOR, PUMP, PHASE A |
| CSP$_{B}$ | CURRENT SENSOR, PUMP, PHASE B |
| | |
| | |
| | |
| SLL | SENSOR, LEQUID LEVEL |
| M$_{PS}$ | CONTACTOR, PS |
| MB | CONTACTOR, BATTERY |

| | |
|---|---|
| DS$_{F}$ | DIRECTION SWITCH, FORWARD |
| DS$_{R}$ | DIRECTION SWITCH, REVERSE |
| DS$_{FO}$ | DIRECTION SWITCH, FORWARD OPTIONAL |
| DS$_{BU}$ | DIRECTION SWITCH, BACK-UP |
| LS$_{L}$ | LIMIT SWITCH, LIFT |
| LS$_{ATT}$ | LIMIT SWITCH, ATTACHMENT |
| LS$_{ST}$ | LIMIT SWITCH, STOP LAMP |
| LS$_{B}$ | LIMIT SWITCH, BRAKE |
| LS$_{PB}$ | LIMIT SWITCH, PARKIG BRAKE |
| LS$_{TF}$ | LIMIT SWITCH, TILT FR |
| LS$_{TR}$ | LIMIT SWITCH, TILT RR |
| SW$_{AC}$ | SWITCH, ACCEL |
| SW$_{K}$ | SWITCH, KEY |
| SW$_{L}$ | SWITCH, LIGHT |
| SW$_{F}$ | SWITCH, FLASHER |
| SW$_{H}$ | SWITCH, HORN |
| | |
| SW$_{MODE}$ | SWITCH, MODE |
| | |
| L$_{H-L}$ | LAMP, HEAD LH |
| L$_{H-R}$ | LAMP, HEAD RH |
| L$_{C-L}$ | LAMP, CLEARANCE LH |
| L$_{C-R}$ | LAMP, CLEARANCE RH |
| L$_{T-L}$ | LAMP, TAIL LH |
| L$_{T-R}$ | LAMP, TAIL RH |
| L$_{L-L}$ | LAMP, LICENCE LH |
| L$_{L-R}$ | LAMP, LICENCE RH |
| L$_{W}$ | LAMP, WORKING |
| L$_{F-LR}$ | LAMP, FLASHER LH (REAR) |
| L$_{F-RR}$ | LAMP, FLASHER RH (REAR) |
| L$_{F-L}$ | LAMP, FLASHER LH |
| L$_{F-R}$ | LAMP, FLASHER RH |

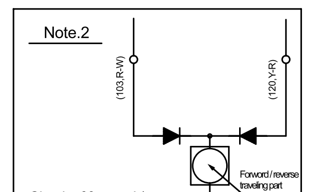



In case of 3 ton series (80V) (Circuit except for the above is the same with that of the 48V vehicle)

| | |
|---|---|
| | |
| PL$_{W}$ | PILOT LAMP, WORKING |
| | |
| L$_{ST-L}$ | LAMP, STOP LH |
| L$_{ST-R}$ | LAMP, STOP RH |
| L$_{R}$ | LAMP, ROTALY |
| L$_{BU-L}$ | LAMP, BACK-UP LH |
| L$_{BU-R}$ | LAMP, BACK-UP RH |
| | |
| B$_{Z}$ | BUZZER |
| CHI$_{F}$ | CHIME, FORWARD |
| CHI$_{R}$ | CHIME, REVERSE |
| H | HORN |
| FR$_{Y}$ | RELAY, FLASHER |
| | |
| HM | METER, HOUR |

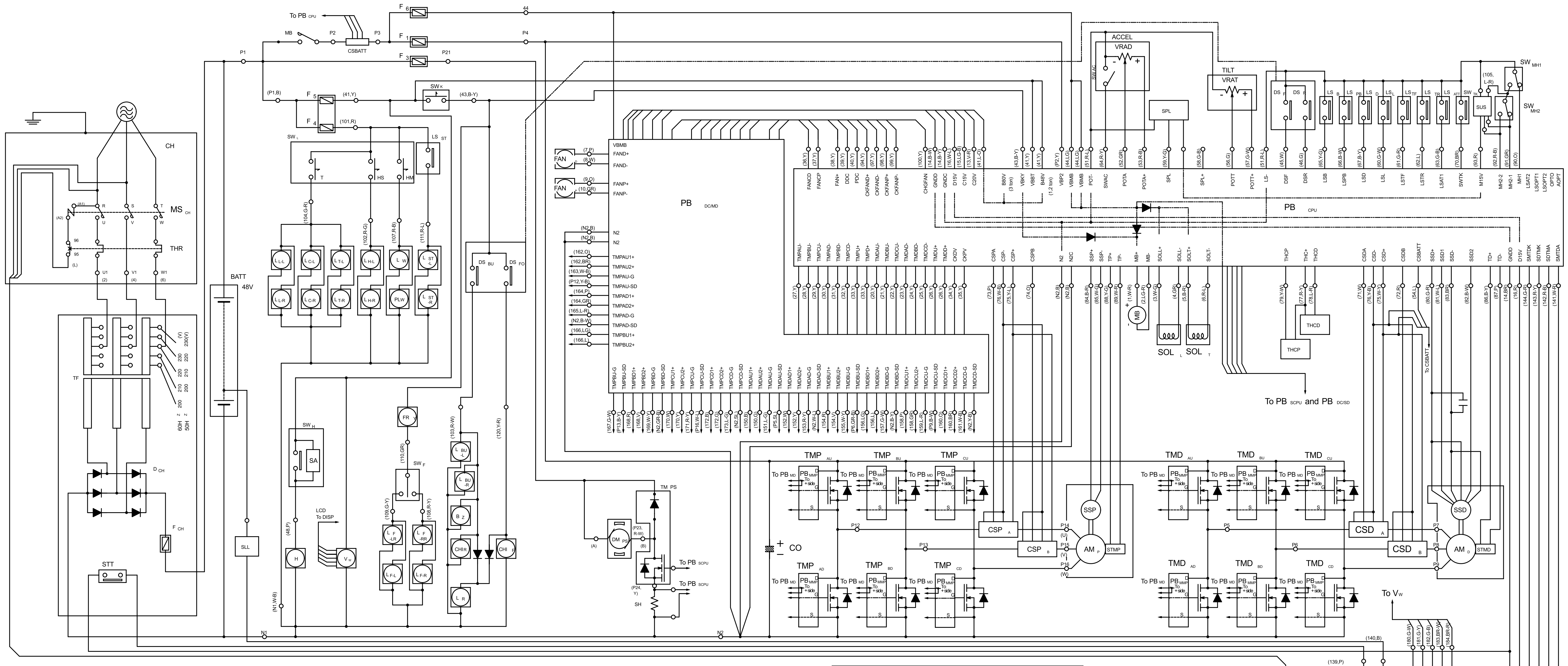


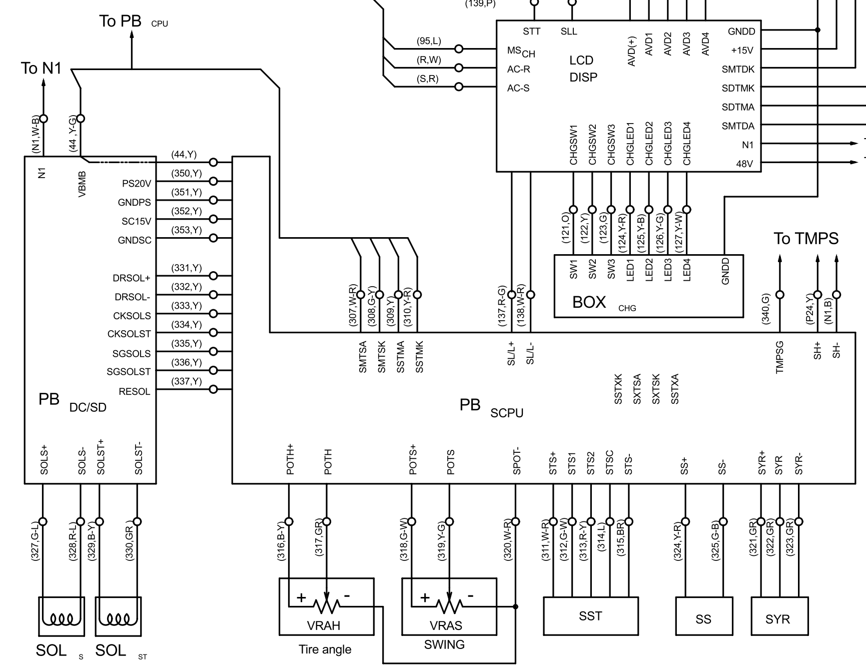

Circuit for the volume controllable buzzer

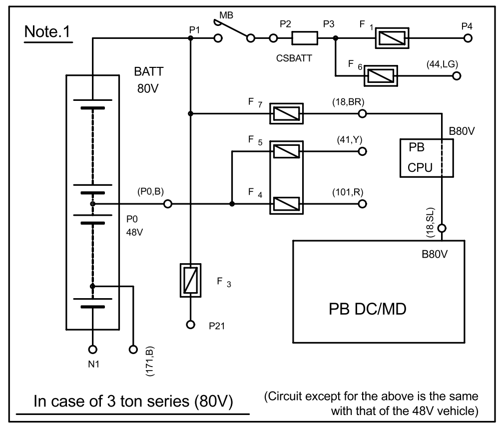



Circuit of forword / reverse traveling part

# WIRING DIAGRAM (FOR VEHICLE WITH SAS)








| | |
|---|---|
| CH | CHARGER |
| TF | TRANSFORMER |
| $MS_{CH}$ | MAGNET SWITCH, CHARGER |
| THR | RELAY, THERMAL |
| $D_{CH}$ | DIODE, CHARGER |
| $F_{CH}$ | FUSE, CHARGER |
| STT | SWITCH, TRANS, THERMO |
| BATT | BATTERY |
| F1 | FUSE, DRIVE |
| F3 | FUSE, POWER STEERING |
| F4 | FUSE, LAMP |
| F5 | FUSE, CONTROL CIRCUIT |
| F6 | FUSE, SK/PS&SOLENOID |
| F7 | FUSE, DC-DC COMVERTER |
| LCD DISP | LCD DISPLAY |
| $BOX_{CHG}$ | BOX, CHARGER |
| THCD | THERMO, DRIVE |
| THCP | THERMO, PUMP |
| $AM_{D}$ | MOTOR, DRIVE |
| $AM_{P}$ | MOTOR, PUMP |
| $DM_{PS}$ | MOTOR, POWER STEERING |
| | |
| $SOL_{S}$ | SOLENOID, SWING |
| $SOL_{ST}$ | SOLENOID, STEERING |
| $SOL_{L}$ | SOLENOID, LIFT |
| $SOL_{T}$ | SOLENOID, TILT |
| $FAN_{D}$ | FAN, DRIVE |
| $FAN_{P}$ | FAN, PUMP |
| VRAD | VARI-OHM, ACCEL, DRIVE |
| VRAT | VARI-OHM, TILT |
| VRAH | VARI-OHM, TIRE(HANDLE) |
| VRAS | VARI-OHM, SWING |

| | |
|---|---|
| $PB_{CPU}$ | PRINT BOARD, COMPUTER |
| $PB_{DC/MD}$ | PRINT BOARD, DC/MD |
| $PB_{MMP}$ | PRINT BOARD, MMP |
| $PB_{SCPU}$ | PRINT BOARD, SK/PS COMPUTER |
| $PB_{DC/SD}$ | PRINT BOARD, DC/SD |
| | |
| $TMD_{AU}$ | TRANSISTOR, MAIN, DRIVE, PHASE A UPR |
| $TMD_{BU}$ | TRANSISTOR, MAIN, DRIVE, PHASE B UPR |
| $TMD_{CU}$ | TRANSISTOR, MAIN, DRIVE, PHASE C UPR |
| $TMD_{AD}$ | TRANSISTOR, MAIN, DRIVE, PHASE A LWR |
| $TMD_{BD}$ | TRANSISTOR, MAIN, DRIVE, PHASE B LWR |
| $TMD_{CD}$ | TRANSISTOR, MAIN, DRIVE, PHASE C LWR |
| $TMP_{AU}$ | TRANSISTOR, MAIN, PUMP, PHASE A UPR |
| $TMP_{BU}$ | TRANSISTOR, MAIN, PUMP, PHASE B UPR |
| $TMP_{CU}$ | TRANSISTOR, MAIN, PUMP, PHASE C UPR |
| $TMP_{AD}$ | TRANSISTOR, MAIN, PUMP, PHASE A LWR |
| $TMP_{BD}$ | TRANSISTOR, MAIN, PUMP, PHASE B LWR |
| $TMP_{CD}$ | TRANSISTOR, MAIN, PUMP, PHASE C LWR |
| TMPS | TRANSISTOR, MAIN, POWER STEERING |
| SH | SHANT, POWER STEERING |
| CO | CAPACITOR, OVERALL |
| CSBATT | CURRENT SENSOR, BATTERY |
| $CSD_{A}$ | CURRENT SENSOR, DRIVE, PHASE A |
| $CSD_{B}$ | CURRENT SENSOR, DRIVE, PHASE B |
| $CSP_{A}$ | CURRENT SENSOR, PUMP, PHASE A |
| $CSP_{B}$ | CURRENT SENSOR, PUMP, PHASE B |
| SYR | SENSOR, YAWRATE |
| SS | SENSOR, SPEED |
| SST | SENSOR, STEERING |
| SLL | SENSOR, LEQUID LEVEL |
| SUS | SENSOR, ULTRA SONIC |
| MB | CONTACTOR, BATTERY |

| | |
|---|---|
| $DS_{F}$ | DIRECTION SWITCH, FORWARD |
| $DS_{R}$ | DIRECTION SWITCH, REVERSE |
| $DS_{FO}$ | DIRECTION SWITCH, FORWARD OPTIONAL |
| $DS_{BU}$ | DIRECTION SWITCH, BACK-UP |
| $LS_{L}$ | LIMIT SWITCH, LIFT |
| $LS_{ATT}$ | LIMIT SWITCH, ATTACHMENT |
| $LS_{ST}$ | LIMIT SWITCH, STOP LAMP |
| $LS_{B}$ | LIMIT SWITCH, BRAKE |
| $LS_{PB}$ | LIMIT SWITCH, PARKIG BRAKE |
| $LS_{TF}$ | LIMIT SWITCH, TILT FR |
| $LS_{TR}$ | LIMIT SWITCH, TILT RR |
| $SW_{AC}$ | SWITCH, ACCEL |
| $SW_{K}$ | SWITCH, KEY |
| $SW_{L}$ | SWITCH, LIGHT |
| $SW_{F}$ | SWITCH, FLASHER |
| $SW_{H}$ | SWITCH, HORN |
| $SW_{TK}$ | SWITCH, TILT KNOB |
| $SW_{MH1}$ | SWITCH, HIGHT NO.1 |
| $SW_{MH2}$ | SWITCH, HIGHT NO.2 |
| $L_{H-L}$ | LAMP, HEAD LH |
| $L_{H-R}$ | LAMP, HEAD RH |
| $L_{C-L}$ | LAMP, CLEARANCE LH |
| $L_{C-R}$ | LAMP, CLEARANCE RH |
| $L_{T-L}$ | LAMP, TAIL LH |
| $L_{T-R}$ | LAMP, TAIL RH |
| $L_{L-L}$ | LAMP, LICENCE LH |
| $L_{L-R}$ | LAMP, LICENCE RH |
| $L_{W}$ | LAMP, WORKING |
| $L_{F-LR}$ | LAMP, FLASHER LH (REAR) |
| $L_{F-RR}$ | LAMP, FLASHER RH (REAR) |
| $L_{F-L}$ | LAMP, FLASHER LH |
| $L_{F-R}$ | LAMP, FLASHER RH |

| | |
|---|---|
| | |
| $PL_{W}$ | PILOT LAMP, WORKING |
| | |
| $L_{ST-L}$ | LAMP, STOP LH |
| $L_{ST-R}$ | LAMP, STOP RH |
| $L_{R}$ | LAMP, ROTALY |
| $L_{BU-L}$ | LAMP, BACK-UP LH |
| $L_{BU-R}$ | LAMP, BACK-UP RH |
| | |
| $B_{Z}$ | BUZZER |
| $CHI_{F}$ | CHIME, FORWARD |
| $CHI_{R}$ | CHIME, REVERSE |
| H | HORN |
| $FR_{Y}$ | RELAY, FLASHER |
| | |
| $V_{w}$ | VOICE WARNING |

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