

Tillägg för OPS (fr.o.m 2006)

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GENERAL

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PERIODIC MAINTENANCE

INSPECTION METHOD

I : Inspection. Repair or Replacement if required.
 M : Measurement. Repair or Adjustment if required.
 T : Retightening C : Cleaning L : Lubrication
 * : For new vehicle *1 : Flaw detector

Item		Inspection Period	Every 6 weeks	Every 3 months	Every 6 months	Every 12 months
			Every 250 hours	Every 500 hours	Every 1000 hours	Every 2000 hours
SAFETY DEVICES, ETC.						
Seat	Loosening and damage of mounting	I	←	←	←	←
	Seatbelt damage and function	I	←	←	←	←
	Seat switch function	I	←	←	←	←
OPS	Functions	I	←	←	←	←

OPS SYSTEM

General

The OPS (Operator Presence Sensing) system is added as standard.

The switch mounted underneath the seat detects the operator on the seat. When there is no operator, the OPS system cuts off the driving power and restricts material handling operations. (Refer to page 0-6.)

The OPS system operates (to disable traveling and material handling) upon lapse of 2 seconds after the operator leaves the seat.

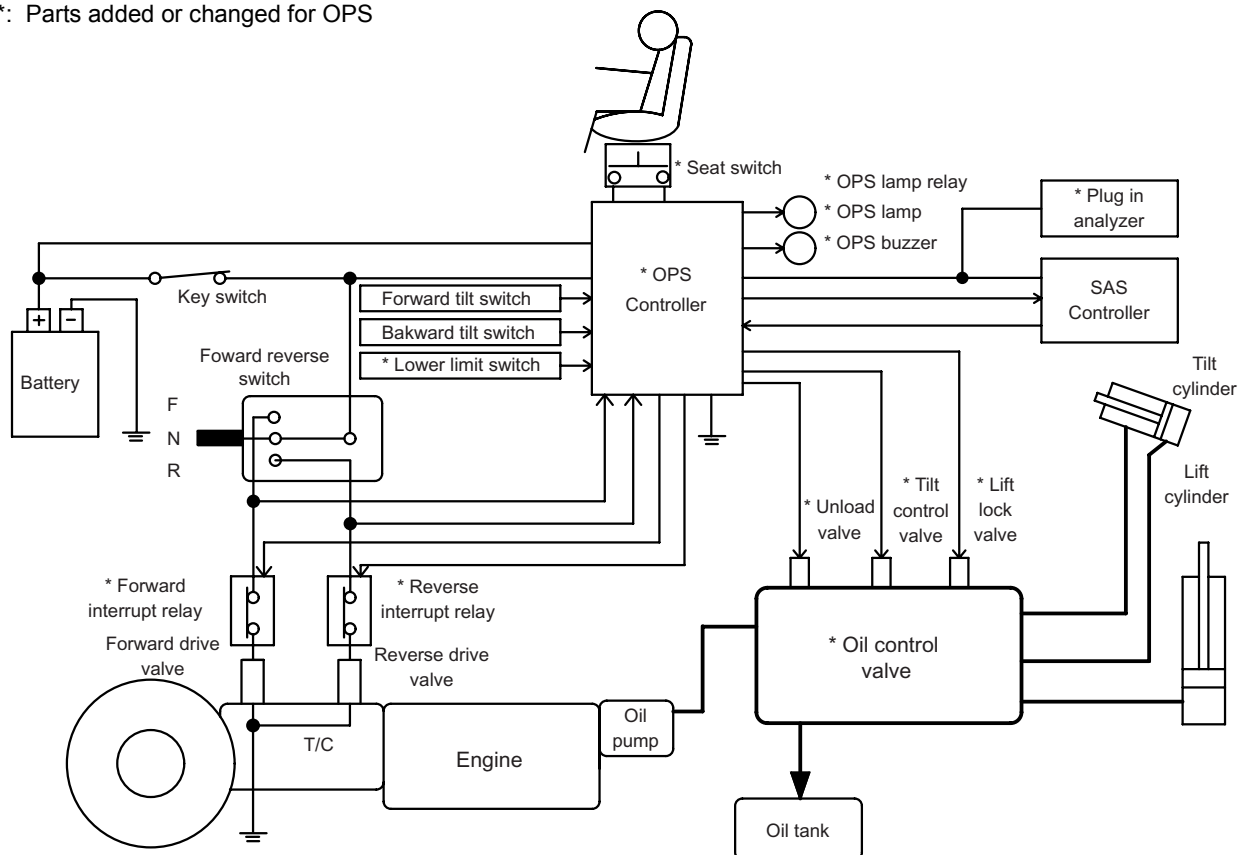
When the OPS controller detects the seat switch going off, it sounds the OPS buzzer (bleeping) for about one second and turns the OPS lamp on before OPS activation. Furthermore, the OPS lamp keeps lighting while the seat switch stays off.

If the seat switch is turned on without returning the forward/reverse lever to the neutral position after drive OPS activation, the newly added return to neutral warning function sounds the buzzer at short intervals (pip-pip) to warn the operator of the unreleased state of the drive OPS.

When the OPS controller detects any system malfunction, the OPS lamp blinks to warn the abnormality.

Control block diagram

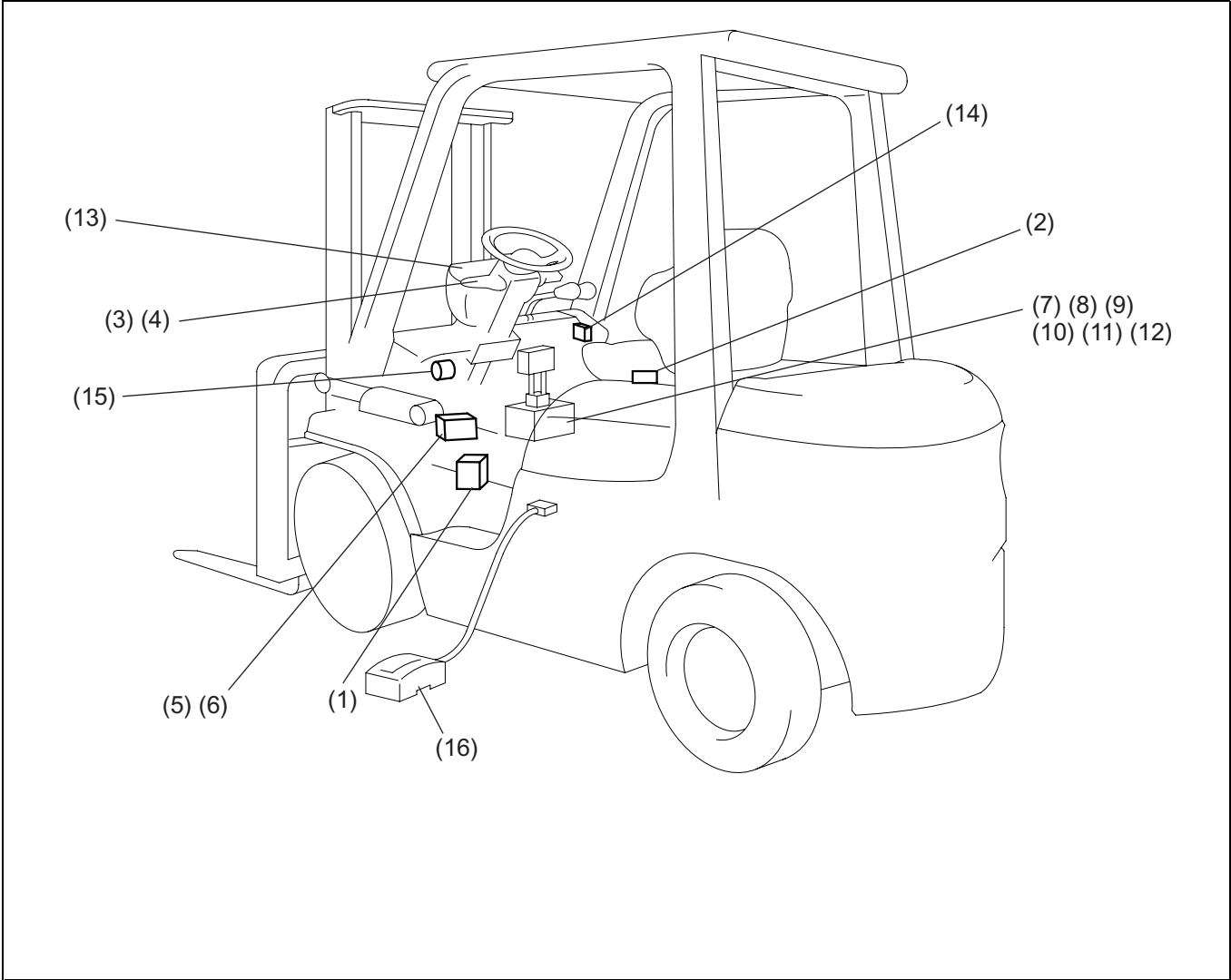
*: Parts added or changed for OPS



Note:

On the mini-lever specification (OPT) vehicle, the oil control valve is substituted by a proportional solenoid valve and the mini-lever controller is added. Moreover, the forward/backward tilt switch, lower switch, tilt control valve and lift lock valve are not provided.

Name of each part



(1)	OPS controller	(9)	Backward tilt switch
(2)	Seat switch	(10)	Unload valve
(3)	Forward switch	(11)	Lift lock valve
(4)	Reverse switch	(12)	Tilt control valve
(5)	Forward interrupt relay	(13)	OPS lamp
(6)	Reverse interrupt relay	(14)	OPS lamp relay
(7)	Lower switch	(15)	OPS buzzer
(8)	Forward tilt switch	(16)	Plug-in analyzer

Function of each part

Input to controller

	Name	Function
(2)	Seat switch	This switch mounted underneath the seat detects the operator sitting on the seat.
(3)	Forward switch	This switch inputs the voltage branched from the forward drive valve power supply line to the OPS controller that detects the forward drive operation.
(4)	Reverse switch	This switch inputs the voltage branched from the reverse drive valve power supply line to the OPS controller that detects the reverse drive operation.
(7)	Lower switch	This limit switch installed at the lift spool of the oil control valve detects the lowering operation by the lift lever.
(8)	Forward tilt switch	This limit switch installed at the tilt spool of the oil control valve detects the forward operation of the tilt lever.
(9)	Backward tilt switch	This limit switch installed at the tilt spool of the oil control valve detects the backward operation of the tilt lever.

Output from controller

	Name	Function
(5)	Forward interrupt relay	This relay cuts off the voltage supply to the forward drive valve in the torque converter according to the instruction from the OPS controller.
(6)	Reverse interrupt relay	This relay cuts off the voltage supply to the reverse drive valve in the torque converter according to the instruction from the OPS controller.
(10)	Unload valve	Provides a bypass to the tank circuit for the hydraulic oil supplied from the oil pump to the oil control valve.
(11)	Lift lock valve	This valve cuts off the oil flow from the lift cylinder to the oil tank according to the instruction from the OPS controller to disable fork lowering.
(12)	Tilt control valve	This valve changes the oil path to the tilt cylinder according to the instruction from the OPS controller to disable forward tilting and to slow down the backward tilting speed.
(13)	OPS lamp	This lamp lights while the seat switch is off to indicate the OPS operation. Furthermore, it blinks when the OPS controller detects any abnormality.
(14)	OPS lamp relay	The OPS lamp electric circuit is opened or closed according to the instruction from the OPS controller. The lamp is kept on when there is no instruction from the OPS controller.
(15)	OPS buzzer	This buzzer sounds in the predetermined pattern when the seat switch is turned off or when the forward/reverse shift lever needs returning to the neutral position (return to neutral warning).
(16)	Plug-in analyzer	<p>This new plug-in analyzer is added with the OPS analyzer functions to the service functions of the conventional SAS analyzer. It is connected to the same service connector.</p> <p>OPS analyzer functions</p> <ul style="list-style-type: none"> • Diagnostic display (More detailed display than OPS lamp blinking frequency) • I/O monitor display (Shortening the time required for troubleshooting) • Output test (Shortening the troubleshooting time by setting each output on and off according to the instruction from the OPS controller)

Control specifications

1. Drive OPS

When the OPS controller detects seat switch off state for 2 seconds, the forward/reverse interrupt relay is operated to disconnect the driving power supply to the forward/reverse drive relay in the transmission. This drive OPS operation is released when the seat switch is turned on and the forward/reverse shift relay is returned to the neutral position.

2. Material handling OPS

(1) Standard lever vehicle

When the OPS controller detects seat switch OFF for 2 seconds, the lift lock valve and tilt control valve are controlled to stop fork lowering and forward tilting. Other material handling operations such as backward tilting, fork lifting and attachment operations are stopped by interrupting the hydraulic oil supply by means of the unload valve. The disabled material handling operations are released upon lapse of 1 second after seat switch ON.

Caution:

- **Backward tilting:** If the material handling lever is operated while the OPS is functioning, the mast may be tilted backward because of the weight of the tilted mast or the back pressure at the unload valve.
- **Attachment:** If the material handling lever is operated while the OPS is functioning, the attachment may move because of the own weight of the attachment or the back pressure at the unload valve.

(2) Mini-lever vehicle (OPT: Remains unchanged from the present vehicle)

When the mini-lever controller detects seat switch off state for two seconds through the OPS controller, the proportional solenoid valve is activated to disable lift, tilt and attachment operations.

When the seat switch is turned on with all levers returned to their neutral positions, this material handling OPS activated state is released. (In the case of mini-lever option, returning the levers to their neutral positions is added as the OPS release condition because small levers are easy to be operated, possibly causing erroneous lever operation by movement of a luggage placed on the armrest.)

1. OPS operation notice

When the OPS controller detects the seat switch off state, it sounds the OPS buzzer (bleep) for about one second, and turns the OPS lamp on to warn the operator of the OPS operation.

2. Return-to-neutral warning

The OPS controller warns the driver of the failure in releasing the drive OPS by sounding the buzzer at short intervals (pip-pip) when the seat switch is turned on without returning the forward/reverse shift lever to its neutral position.

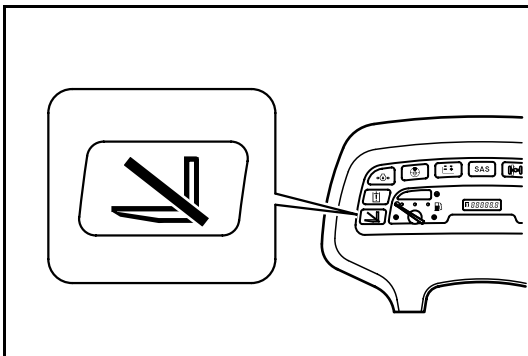
3. Malfunction alarm

When the OPS controller detects any malfunction, it blinks the OPS lamp to warn the malfunction. The lamp blinking frequency identifies the defective part.

Seat

Every seat has the seat switch for operator detection.

When replacing seat, install a genuine TOYOTA seat designed specifically for this lift truck. (The OPS does not function unless the correct seat is installed.)



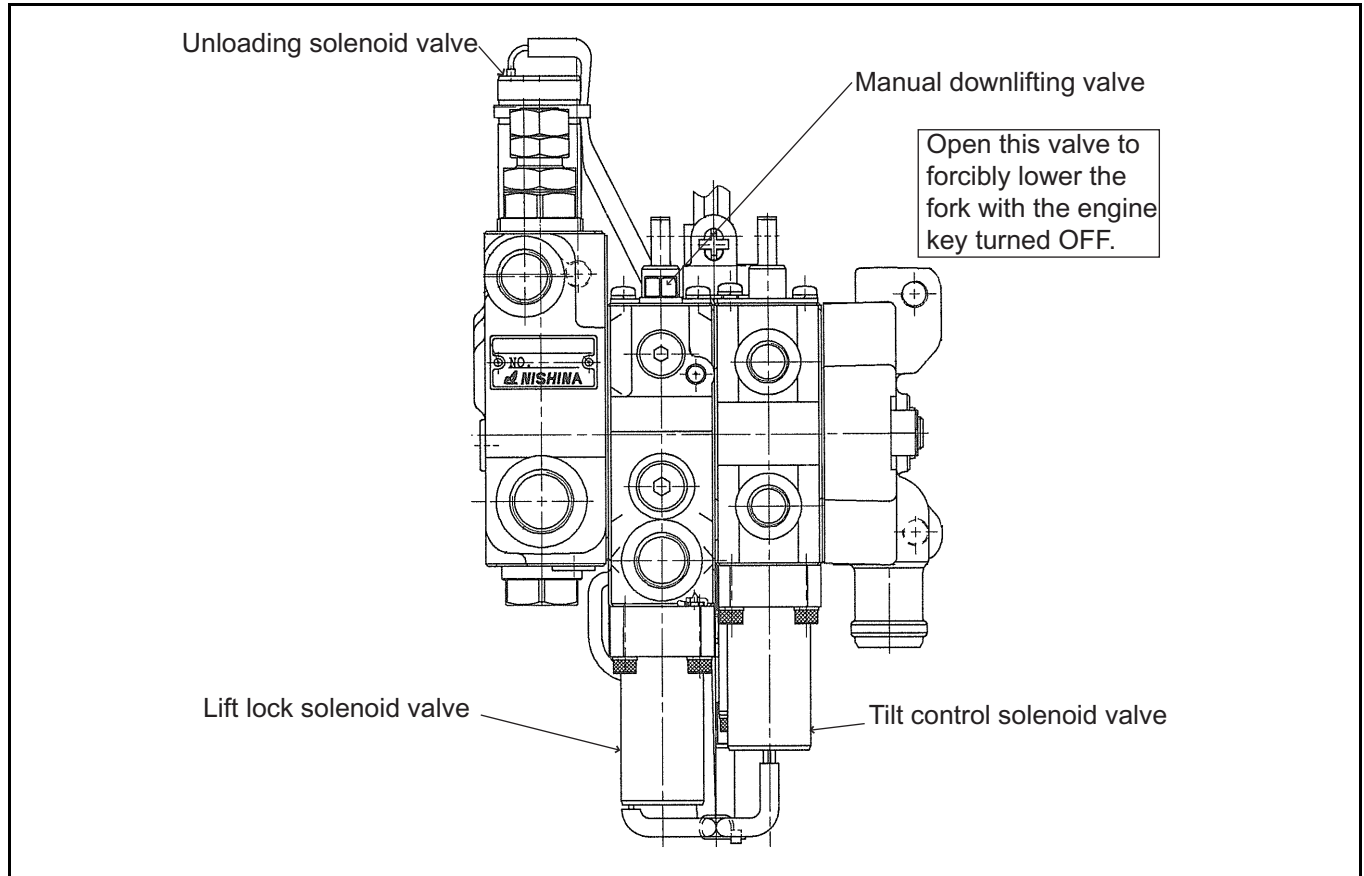
Combination Meter

OPS lamp

This lamp indicates OPS operation and warns an OPS error.

Oil Control Valve

1. A new oil control valve is adopted for use with the added OPS system.
2. An electronic hydraulic control mechanism is incorporated in the tilt control circuit for controlling the mast tilting operation.
3. The additional check valve in each of the lift and tilt circuit greatly reduces natural drop and natural forward tilt.
4. The unload valve provided in the supply circuit.



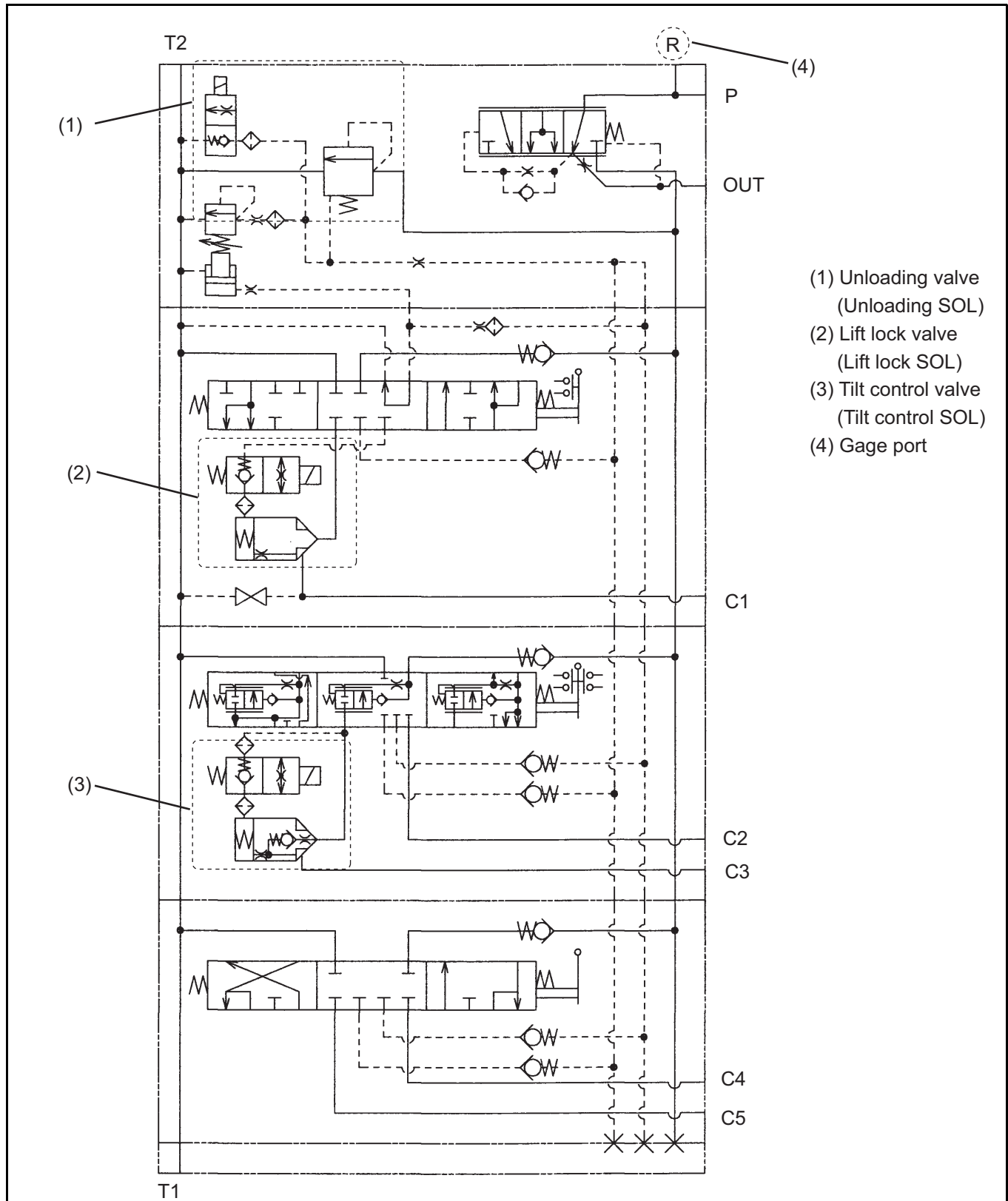
Specifications

		1-ton series	2-ton series	3-ton series	J3.5-ton series
Relief pressure setting kPa (kgf/cm ²)	Lift	17800 (182)	18700 (191)	←	←
	Tilt	11800 (120)	14700 (150)	←	15700 (160)
Flow divider flow rate	L/min	13.0	←	15.2	←

SAS

Hydraulic circuit diagram

The integral control valve has integrated the unload valve (unload SOL), lift lock valve (lift lock SOL) and the tilt control valve (tilt control SOL) with the oil control valve in the previous model. Each solenoid valve (SOL) is normally closed.

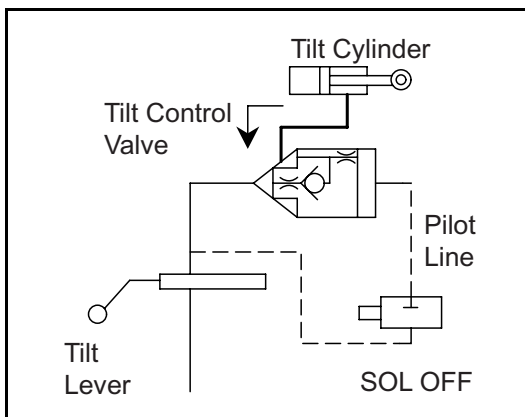


Hydraulic circuit control

Tilt control is achieved by ON/OFF of the tilt control solenoid (SOL) valve installed on the integral control valve. The relationships between the tilt hydraulic circuit and tilt control SOL valve is as shown in the table below. When the SOL is OFF upon backward tilting operation, the circuit is fully open. When the SOL is OFF upon neutral or tilt forward operation, tilting is stopped.

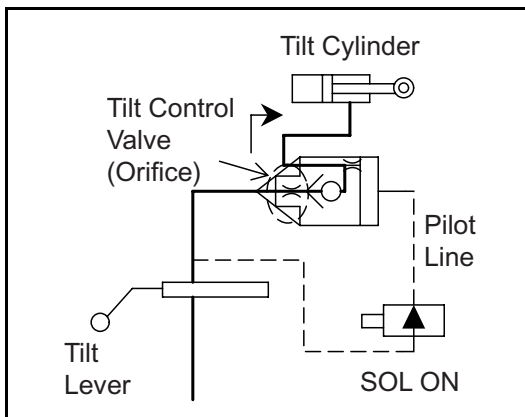
Tilt control SOL			
ON		OFF	
Semi-open circuit	Forward tilt circuit	Full open circuit for backward tilting	Tilt stop circuit
<ul style="list-style-type: none"> High lifting height, backward tilting speed restriction Low lifting-height, backward tilting speed restriction* 	<ul style="list-style-type: none"> Forward tilting 	<ul style="list-style-type: none"> Low lifting height, backward tilting 	<ul style="list-style-type: none"> Tilt lever at neutral Stop with forward tilting angle restriction Automatic leveling stop with forward tilting

*Backward tilting operation with the tilt lever knob switch depressed.



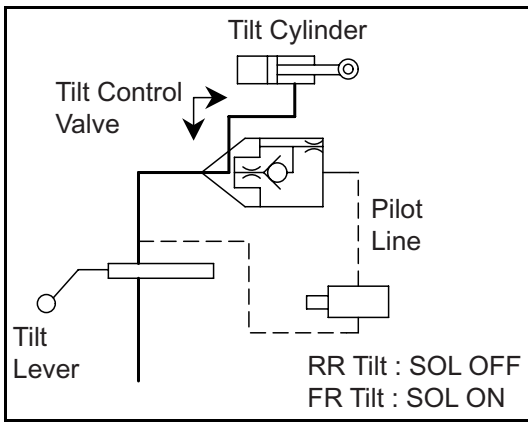
1. Tilt stop circuit

The tilt stop circuit refers to the state where the tilting operation is disabled as upon tilt lever setting at the neutral position or upon stopping with forward tilting angle restriction or fork automatic leveling. The tilt cylinder operation is stopped because the tilt control valve in the control valve is closed.



2. Tilt semi-open circuit

The tilt semi-open circuit refers to the state where the tilting operation speed is restricted (slowed down). The tilting speed is slowed down because the orifice in the tilt control valve is connected to reduce the oil flow to the tilt cylinder.



3. Tilt full open circuit
The tilt full open circuit refers to the state where the tilting speed is not restricted. The forward/backward tilting speed at the low lifting height becomes the normal tilting speed. The fully opened circuit in the tilting control valve results in normal tilting speed with no restriction.

Key-off lift lock

1. The integral control valve is designed for addition of the OPS system and the lift hydraulic circuit is modified accordingly.
2. When the engine key is turned off, the fork cannot be lowered when the lift lever is set to the down position.
3. Since the check valve was closed during no hydraulic pressure generation in the past, lowering operation was disabled. After the change, the lift lock solenoid valve is adopted to enable lowering when the engine is stopped so long as the key switch is at the ON position.

MINI LEVER

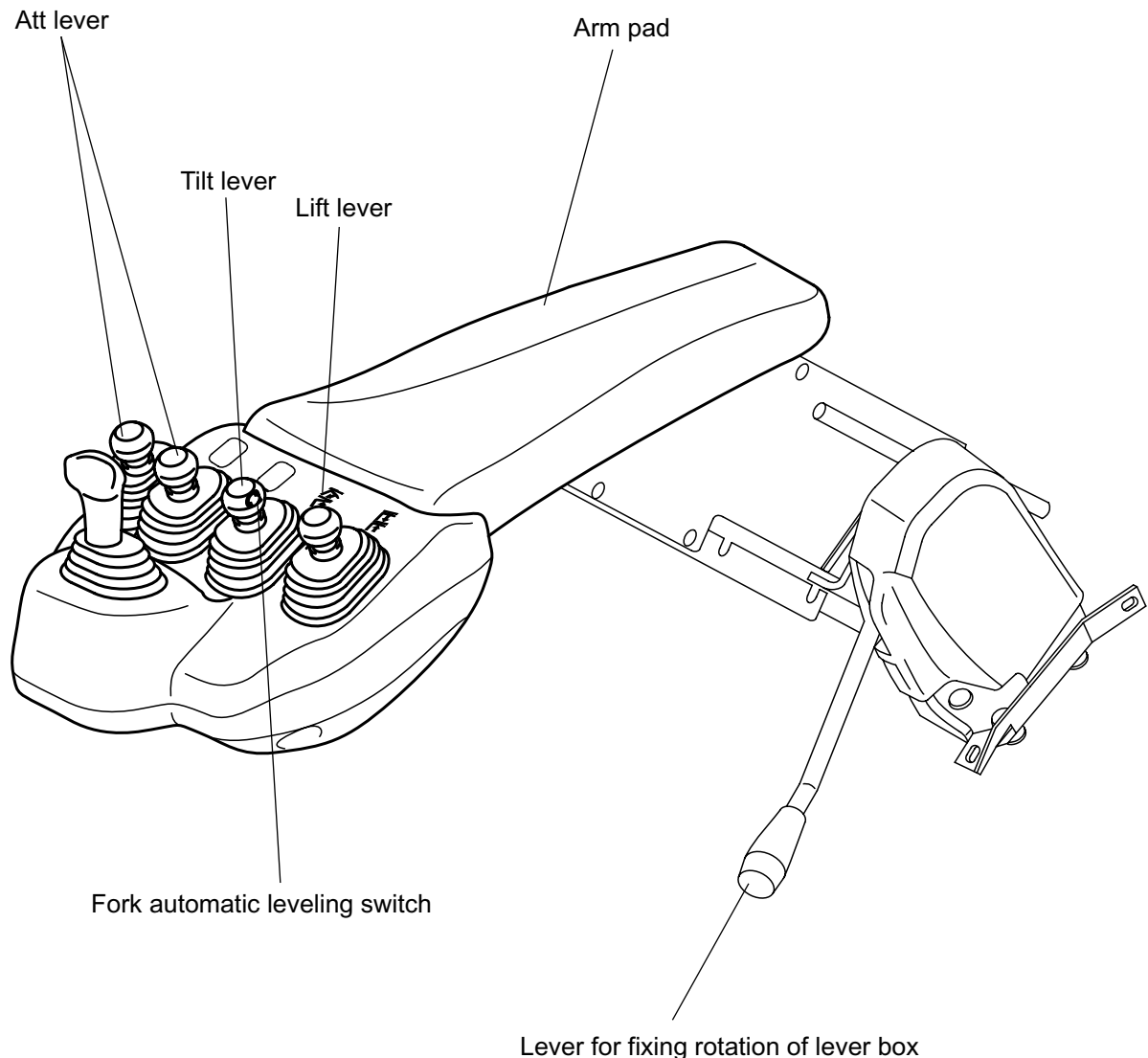
General

1. The fork automatic leveling is effective when the lever is operated toward the forward tilting side while pushing the button beside the knob.
2. The lever position is adjustable in the front-back direction. Loosen the lever box fixing lever by raising it, set the box at the position desired by the operator, and fix the lever by pushing it.
On the cabin model, push the fixing lever for loosening and pull it up for fixing.

Note:

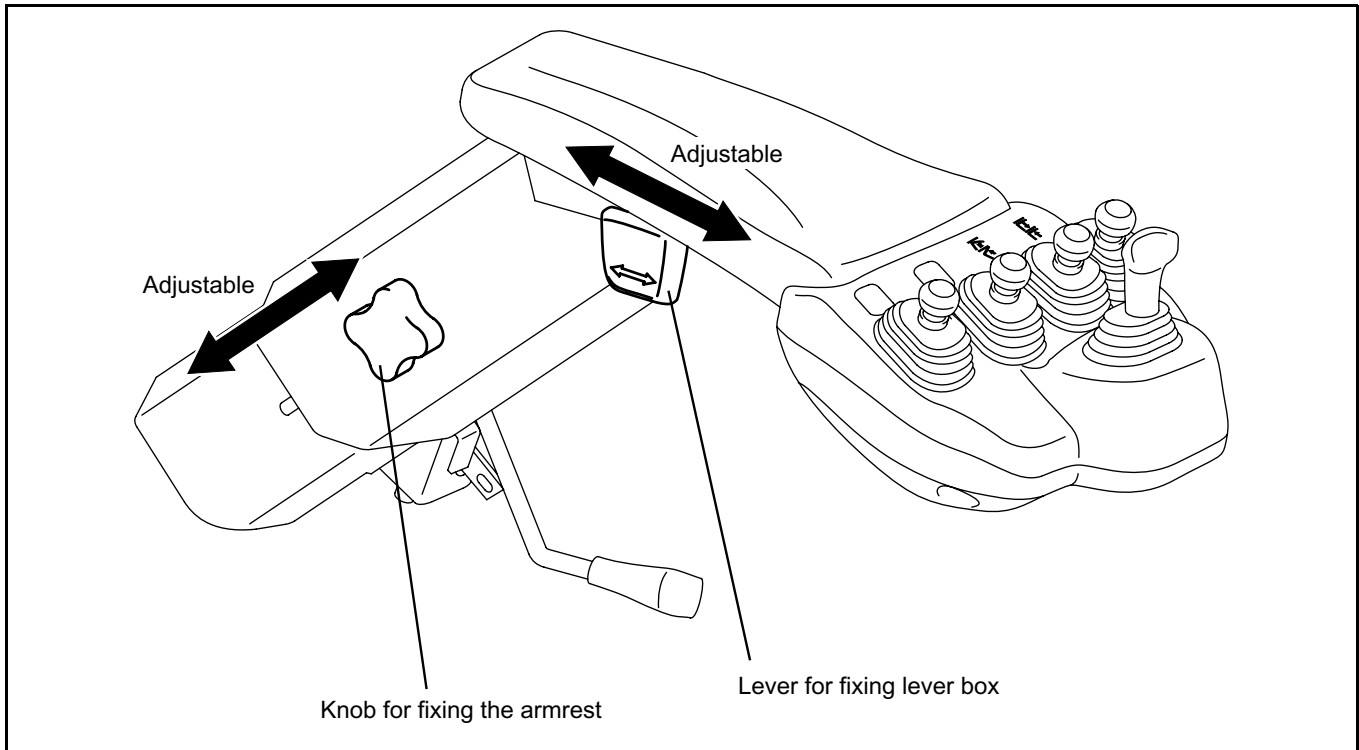
- Since automatic fork leveling function is disabled with a load on the fork at a high lifting height (2 m (78.7 in) or above), forward tilting fails while the automatic leveling switch is kept on.
- Forward tilting is fully disabled at the maximum fork height regardless of whether loaded or unloaded (only when the automatic leveling switch is ON).

Load handling operation is prohibited when operator leave the seat.



Armrest structure

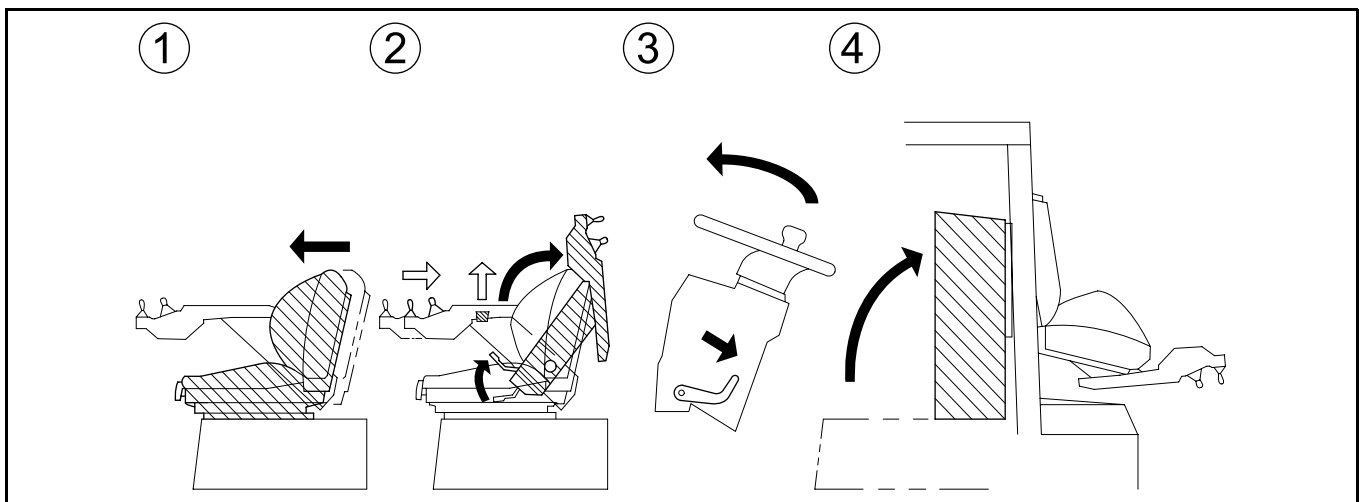
1. The armrest is fixed on the seat to slide with the seat.
2. The armrest height is adjustable. Loosen the armrest fixing knob, set the armrest in the position desired by the operator, and tighten the knob for fixation.



Engine hood opening procedure

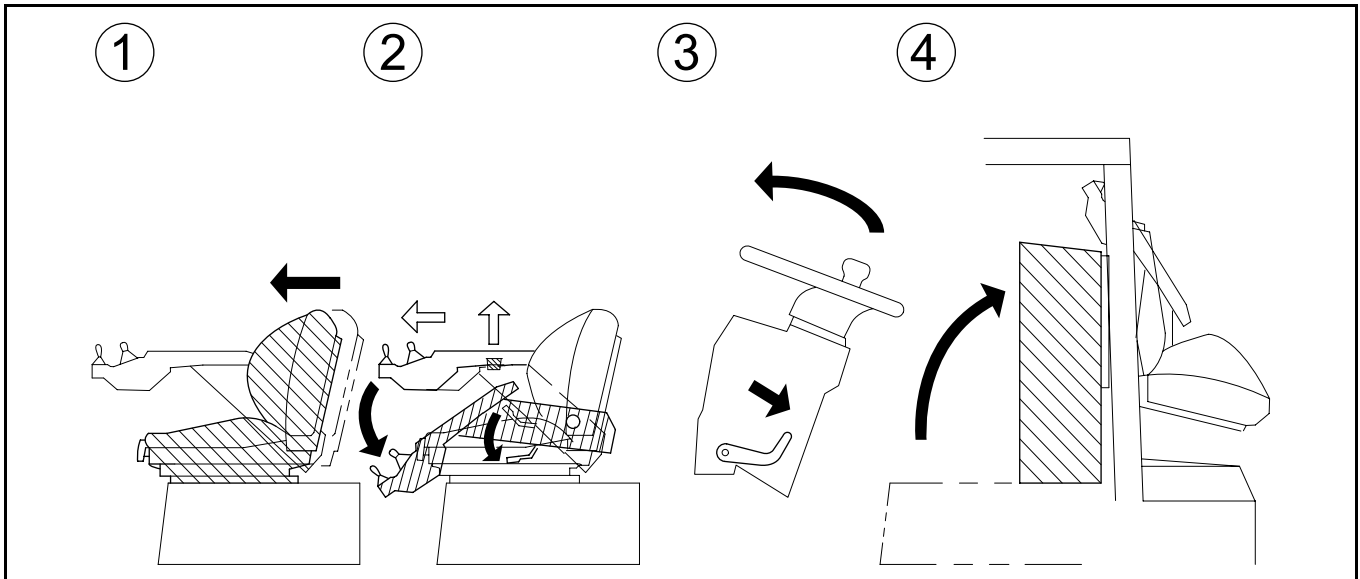
Other than the cabin model

1. Move the seat to the frontmost position.
2. Pull the lever box fixing lever.
Move the mini-lever box to the rearmost position.
Pull the lever box rotation lock lever, and flip up the armrest.
3. Pull the unlock lever. Tilt the steering post forward.
4. Open the engine hood.



Cabin model

1. Move the seat to the frontmost position.
2. Pull the lever box fixing lever.
Move the mini-lever box to the frontmost position.
Push the lever box rotation lock lever.
Tilt the armrest forward.
3. Pull the unlock lever.
Tilt the steering post forward.
4. Open the engine hood.



OPS

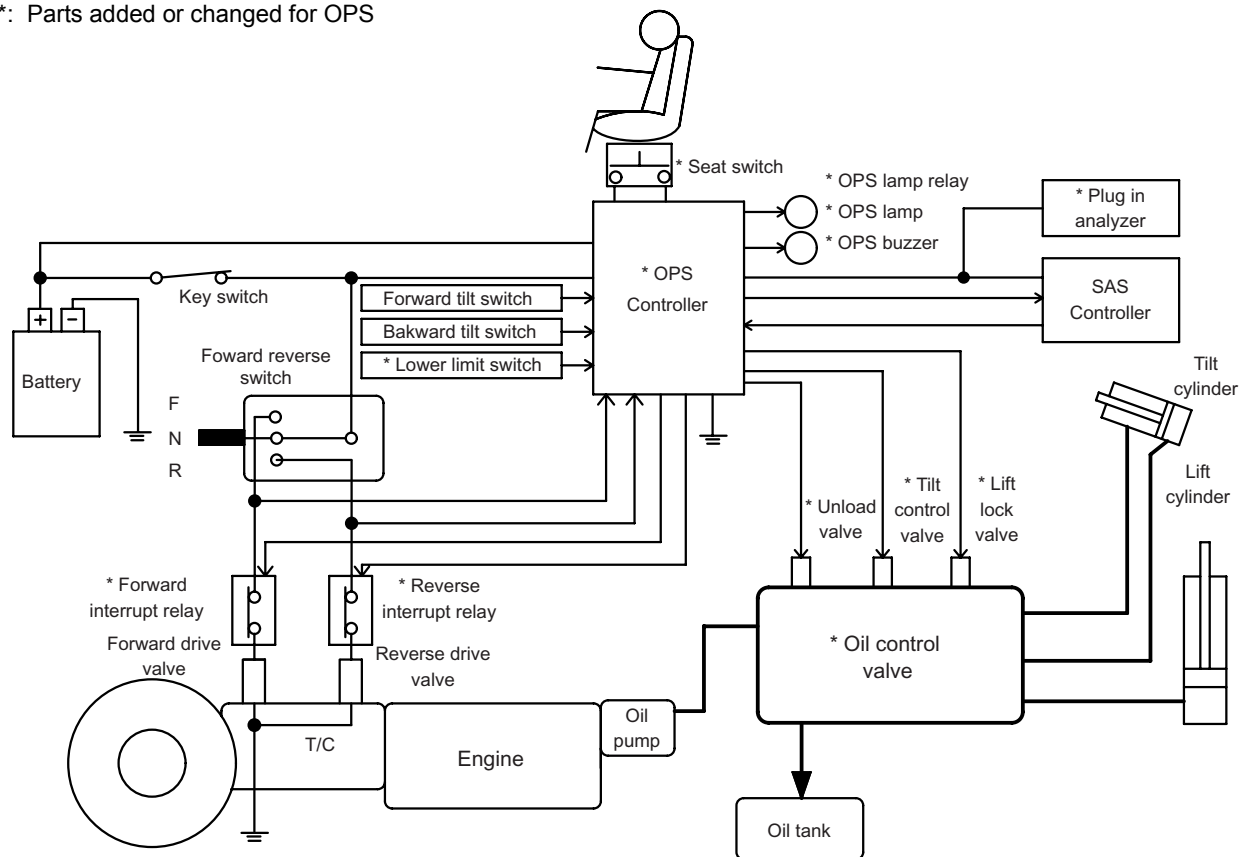
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TROUBLESHOOTING BY ERROR CODE	1-20
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Note:

See Section 6 (SAS) for the connector layout, controller sequence and connector diagram.

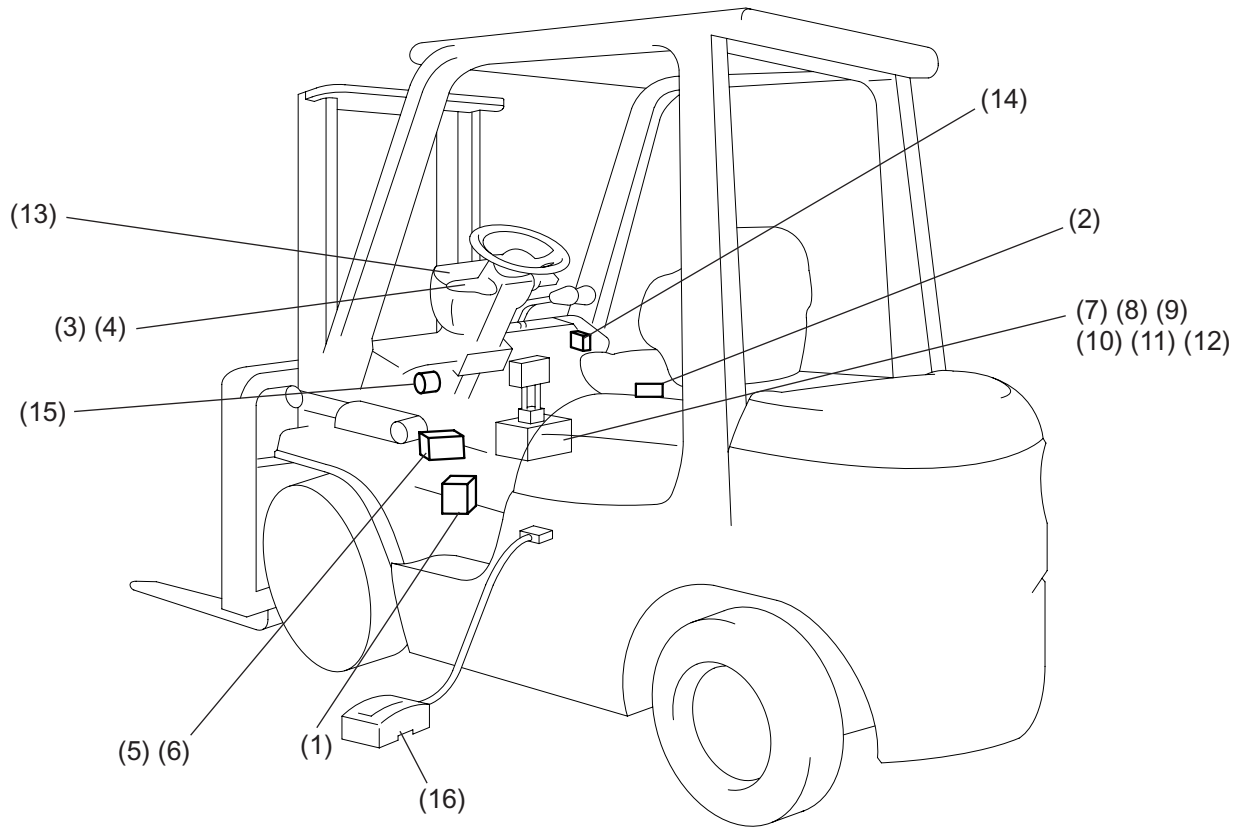
GENERAL

*: Parts added or changed for OPS



Note:

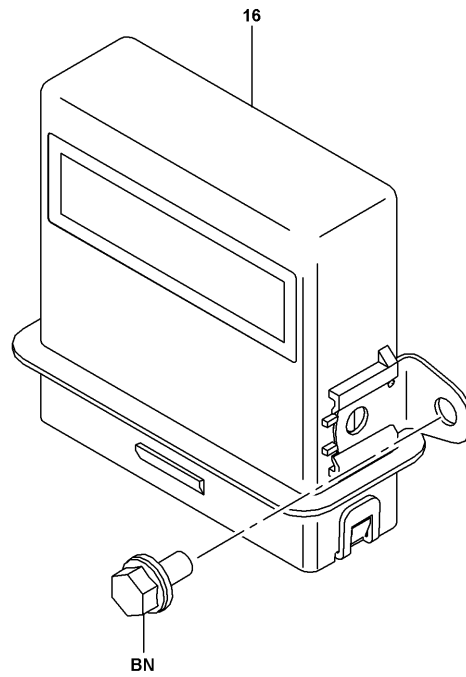
On the mini-lever specification (OPT) vehicle, the oil control valve is substituted by a proportional solenoid valve and the mini-lever controller is added. Moreover, the forward/backward tilt switch, lower switch, tilt control valve and lift lock valve are not provided.



(1)	OPS controller	(9)	Backward tilt switch
(2)	Seat switch	(10)	Unload valve
(3)	Forward switch	(11)	Lift lock valve
(4)	Reverse switch	(12)	Tilt control valve
(5)	Forward interrupt relay	(13)	OPS lamp
(6)	Reverse interrupt relay	(14)	OPS lamp relay
(7)	Lower switch	(15)	OPS buzzer
(8)	Forward tilt switch	(16)	Plug-in analyzer

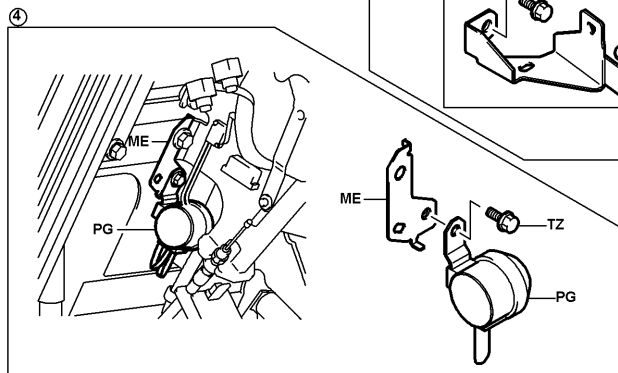
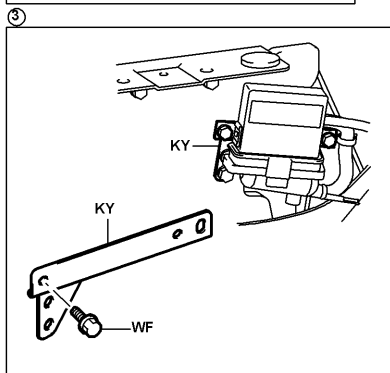
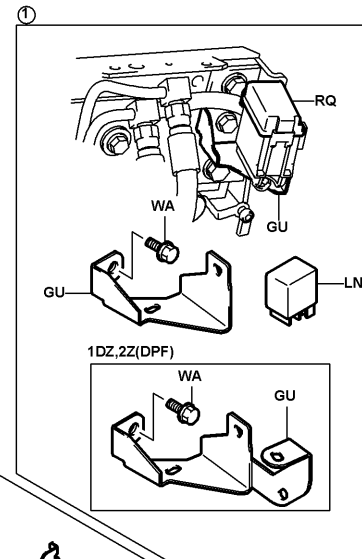
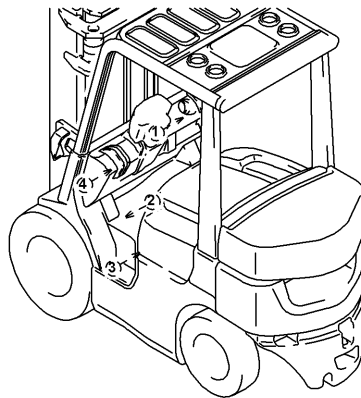
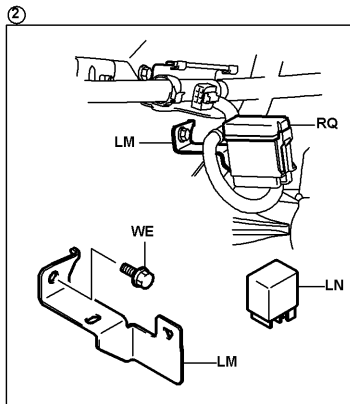
COMPONENTS

1910



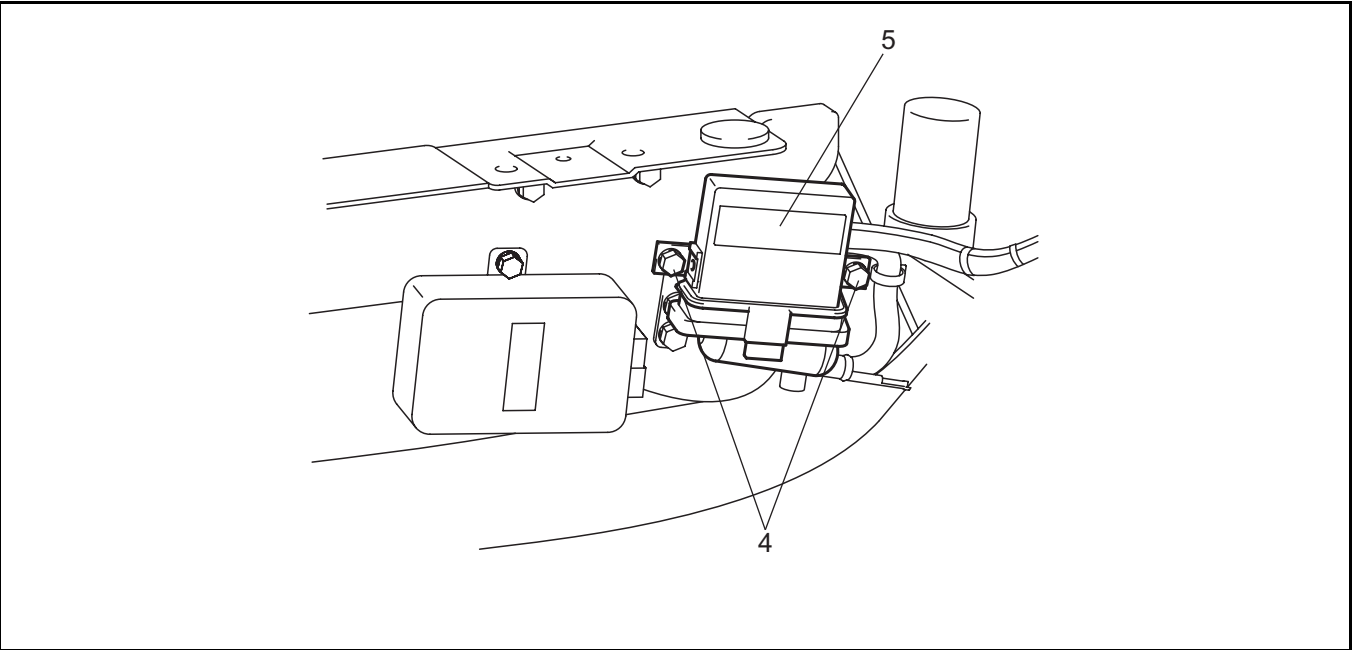
1910-023A

5701



5701-453

OPS CONTROLLER REMOVAL · INSTALLATION

**1**

Removal Procedure

- 1 Open the engine compartment lid.
- 2 Remove the toe board.
- 3 Remove the step LH.
- 4 Remove the OPS controller set bolts.
- 5 Disconnect the connector and remove the OPS controller.

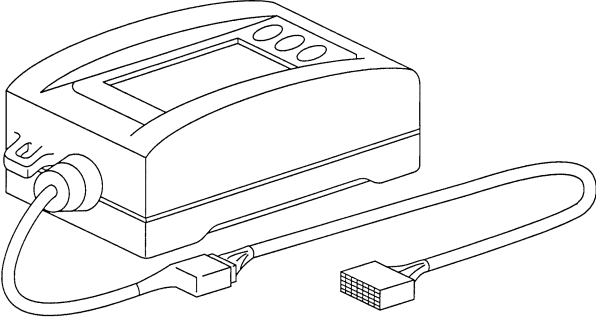
Installation Procedure

The installation procedure is the reverse of the removal procedure.

OPS PLUG-IN ANALYZER

For the maintenance and service of OPS functions, a separate type plug-in analyzer is introduced as an SST (Special Tool for Service).

The plug-in analyzer is designed to read the operating state of sensors and actuators used for the OPS functions and the error information detected by the controller. It serves to check on the operating state of OPS functions and shortens the repair time for a problem. Moreover, it is installed with save function to file data displayed on the screen in the SST.

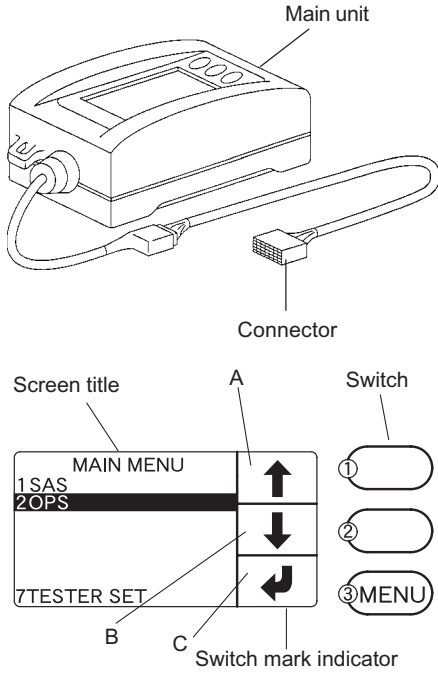
SST 09240-23323-71			
			
	Menu name		Reference page
Communication function with the OPS controller on the vehicle side	OPS	DIAG MEMORY	Indication of ten error codes and sub-codes in past.
		IN/OUT MONITOR	Monitoring input voltage value from the sensors and the output signal, etc. to the solenoid, etc.
		ACTIVE TEST	Forced operation of solenoids and warning lamps.
		CONTROLLER DATA	Indication of OPS controller abbreviation number and version

SCREEN CONFIGURATION

MAIN MENU					
1. SAS	—	See page 17~25 of 7FGF/7FDF 15~30 Repair Manual (Pub. No. CE026, CE026-1)			
2. OPS					
	—	ANALYZER MENU			
		1. DIAG MEMORY	—	DIAG MEMORY (1/1)	Page 1~9
		2. IN/OUT MONITOR		IN/OUT MONITOR (1/3)	1~10
				IN/OUT MONITOR (2/3)	1~10
				IN/OUT MONITOR (3/3)	1~10
		3. ACTIVE TEST		ACTIVE TEST (1/1)	1~12
		4. CONTROLLER DATA		CONTROLLER DATA (1/1)	1~13
		7. END			
7. TESTER SET	—	See page 17~25 of 7FGF/7FDF 15~30 Repair Manual (Pub. No. CE026, CE026-1)			

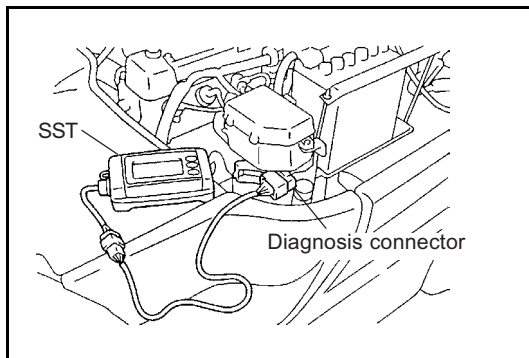
BASIC OPERATION

Name of Sections and the Switch Functions

Name of section	Position of indication	Mark	Function	Switch
	A	↑	<ul style="list-style-type: none"> Move the cursor to the above item. Move to the preceding page. 	Selector switch ①
		↔	<ul style="list-style-type: none"> Move the cursor to right or left. 	
		<Blank>	<No function>	
	B	↓	<ul style="list-style-type: none"> Select the item below. Move to the following page. 	Selector switch ②
		<Blank>	<No function>	
	C	↶	Determine an item for selection.	Menu switch ③
		<Blank>	<ul style="list-style-type: none"> Move to MENU screen. 	

Caution on using:

- Keep the main unit, wire harness, connector, etc. away from the exhaust and other heated sections.
- Operate the switch with finger tip.
- Don't give it strong impact from dropping or collision.
- Don't leave it under the direct rays of the sun for long time.



Connection and Operation of SST

- Turn the key switch OFF.
- Open the diagnosis connector cover of the vehicle and properly connect the connector on the SST side.
SST 09240-23323-71

Note:

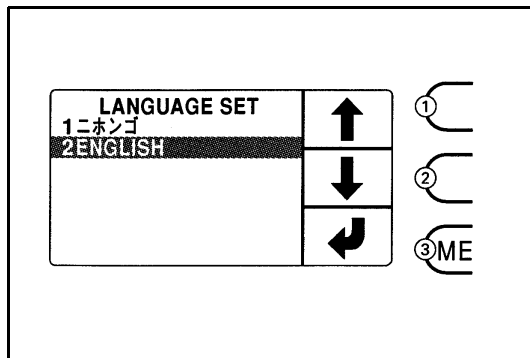
Since the connector has no locking device, securely connect it to prevent contact defect upon closing the engine hood with the connector in connected state.

- Turn the key switch ON or start engine.

- Display of the initialization screen

After about 15 seconds of display, "LANGUAGE SET" or "MAIN MENU" screen appears. The screen may be changed during this period by pressing the menu switch ③.





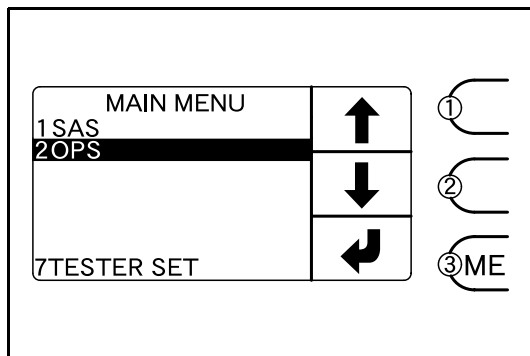
5. "LANGUAGE SET" screen

Since this screen appears only when the language is undefined, determine a language to use for display.

- (1) Select a display language by pressing selector switch ① and ②.
 - Japanese
 - English
- (2) Press MENU switch ③ to determine the language setting.

Note:

Once the display language is defined, "LANGUAGE SET" screen will not be displayed from the next time onward. To change language, go to "TESTER SET" of "MAIN MENU".



6. "MAIN MENU" screen

- (1) Select the menu using selector switch ① and ② and determine by pressing menu switch ③.
 - SAS: Moves to SAS MENU screen.
 - OPS: Moves to OPS ANALYZER MENU screen.
 - TESTER SET: Moves to TESTER SET screen.

Removal of SST

1. Check that the screen title is for one of the MENU screens.
2. Turn the key switch OFF.
3. Disconnect the connector.

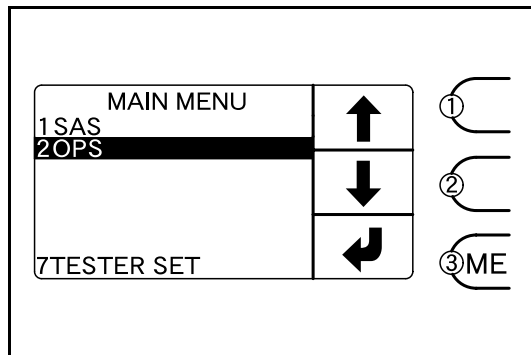
Note:

To disconnect, hold the body of the connector.

4. Close the diagnosis connector cover.

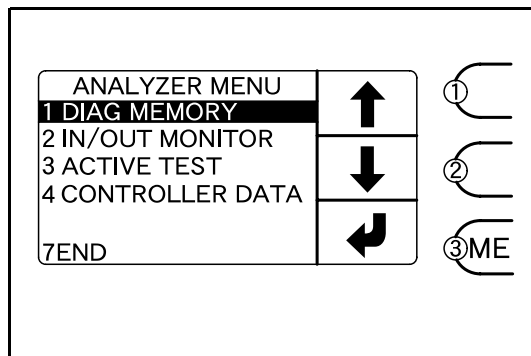
ANALYZER

ANALYZER MENU	Display contents and function	Page
1. DIAG MEMORY	Indication of error codes for 10 most recent errors	1-9
2. IN/OUT MONITOR	Indication of operating conditions of vehicle electrical system	1-10
3. ACTIVE TEST	Forced operation signal output to the selected item	1-12
4. CONTROLLER DATA	Indication of the OPS controller part number and version	1-13



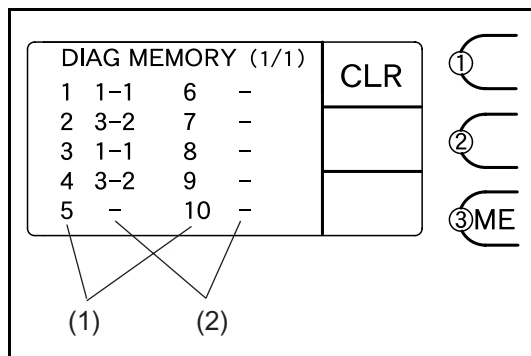
Operation Procedure

1. Select and enter "2OPS" on the main menu screen to display the OPS ANALYZER MENU screen.



2. ANALYZER MENU screen

- (1) Move the cursor to the desired menu by operating selector switch ① or ②, and enter by operating MENU switch ③.
- (2) Select and enter "END" to return to the MAIN MENU screen.



"1 DIAG MEMORY"

This screen displays ten error codes from the most recent one.

[Explanation on display contents]

- (1) Order of error occurrence
- (2) Error codes

[Clear memory]

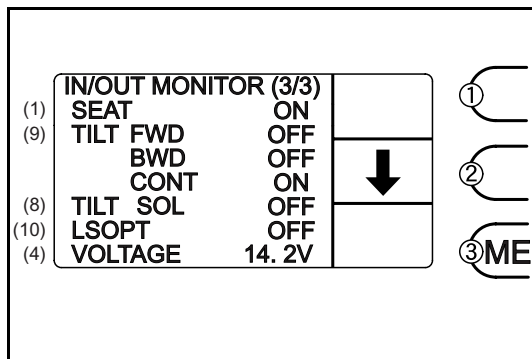
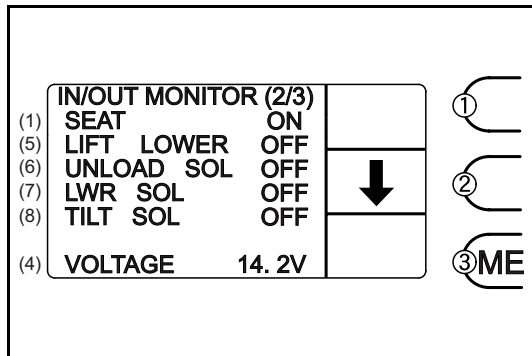
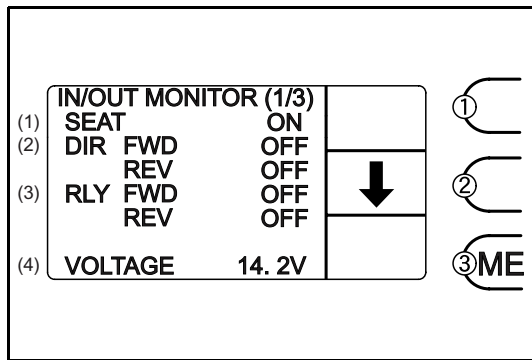
Press selector switch ① continuously for 2 seconds.

[End]

Press MENU switch ③ to return to the ANALYZER MENU screen.

Note:

- Only "-" appears at the end of the item involving no error occurrence.
- If reception has not been completed, only the number appears without "-" indication.



"2 IN/OUT MONITOR" (Excluding the mini-lever vehicle)

[Explanation on display contents]

(1) SEAT: Seat switch input signal

(2) DIR: Direction switch input signal

FWD: Forward direction switch input signal

REV: Reverse direction switch input signal

(3) RLY: Output signal to forward/reverse interrupt relay

FWD: Output signal to forward interrupt relay

REV: Output signal to reverse interrupt relay

(4) VOLTAGE: OPS controller power supply voltage

(5) LIFT LOWER: Lift lowering switch input signal

(6) UNLOAD SOL: Output signal to unload solenoid

(7) LWR SOL: Output signal to lowering lock solenoid

(8) TILT SOL: Output signal to tilt solenoid

(9) TILT: Tilt lever switch input signal

FWD: Forward tilt switch input signal

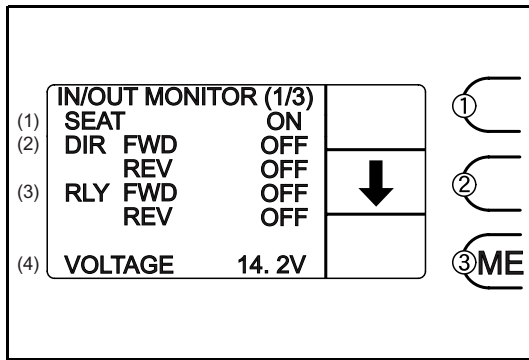
BWD: Backward tilt switch input signal

CONT: SAS tilt control command input signal

(10) LSOPT: Reserved.

[End]

Press MENU switch ③ to return to the ANALYZER MENU screen.



"2 IN/OUT MONITOR" (Mini-lever vehicle)

[Explanation on display contents]

(1) SEAT: Seat switch input signal

(2) DIR: Direction switch input signal

FWD: Forward direction switch input signal

REV: Reverse direction switch input signal

(3) RLY: Output signal to forward/reverse interrupt relay

FWD: Output signal to forward interrupt relay

REV: Output signal to reverse interrupt relay

(4) VOLTAGE: OPS controller power supply voltage

(5) LIFT LOWER: Lift lowering switch input signal

(6) TILT: Tilt lever switch input signal

FWD: Forward tilt switch input signal

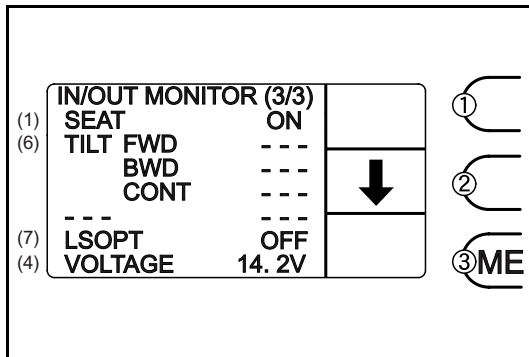
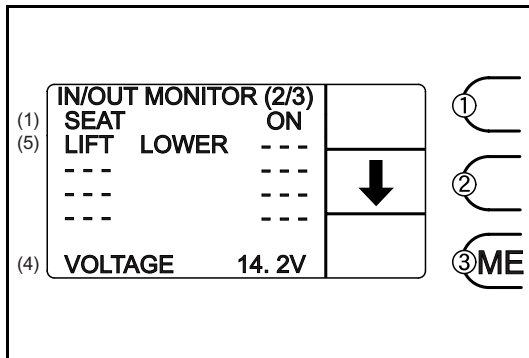
BWD: Backward tilt switch input signal

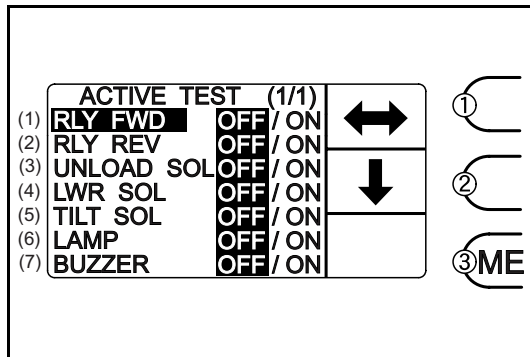
CONT: SAS tilt control command input signal

(7) LSOPT: Reserved.

[End]

Press MENU switch ③ to return to the ANALYZER MENU screen.





"3 ACTIVE TEST" (Excluding the mini-lever vehicle)

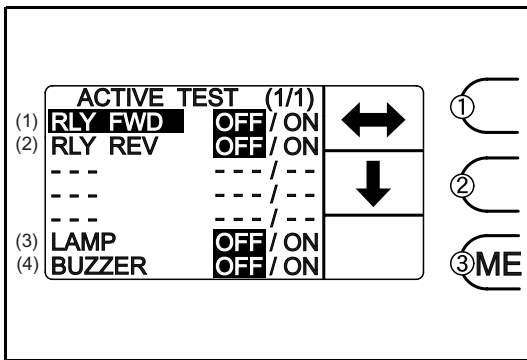
Note:

ON indication on the screen shows the controller output state. The operation, therefore, should be checked visually, by operating sound, etc.

1. Select the item by selector switch ②, and set OFF/ON by selector switch ①.

[Explanation on display contents]

- (1) RLY FWD
Set to ON for forced output of forward interrupt relay activating signal. (Forward traveling disabled state)
 - (2) RLY REV
Set to ON for forced output of reverse interrupt relay activating signal. (Reverse traveling disabled state)
 - (3) UNLOAD SOL
Set to ON for forced output of unload solenoid activating signal. (Material handling disabled state)
 - (4) LWR SOL
Set to ON for forced output of lowering lock solenoid activating signal. (Lowering enabled state)
 - (5) TILT SOL
Set to ON for forced output of tilt solenoid activating signal. (Forward tilting enabled state with backward tilting speed restriction)
 - (6) LAMP
Set to ON for forced output of OPS lamp lighting signal. (OPS lamp lighting state)
 - (7) BUZZER (Export model)
Set to ON for forced output of OPS buzzer sounding signal. (Continuous OPS buzzer sounding)
2. After resetting all items to OFF, press MENU switch ③ to return to the ANALYZER MENU screen.



"3 ACTIVE TEST" (Mini-lever vehicle)

Note:

ON indication on the screen shows the controller output state. The operation, therefore, should be checked visually, by operating sound, etc.

1. Select the item by selector switch ②, and set OFF/ON by selector switch ①.

[Explanation on display contents]

- (1) RLY FWD
Set to ON for forced output of forward interrupt relay activating signal. (Forward traveling disabled state)
- (2) RLY REV
Set to ON for forced output of reverse interrupt relay activating signal. (Reverse traveling disabled state)
- (3) LAMP
Set to ON for forced output of OPS lamp lighting signal. (OPS lamp lighting state)
- (4) BUZZER
Set to ON for forced output of OPS buzzer sounding signal. (Continuous OPS buzzer sounding)

2. After resetting all items to OFF, press MENU switch ③ to return to the ANALYZER MENU screen.

"4 CONTROLLER DATA"

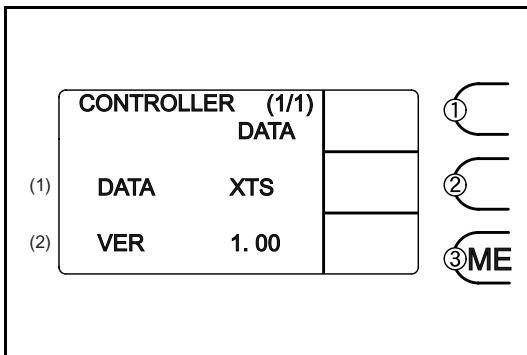
The OPS controller abbreviation No. and version No. can be displayed on this screen.

[Explanation on display contents]

- (1) DATA
Controller abbreviation No.
- (2) VER
Version No.

[End]

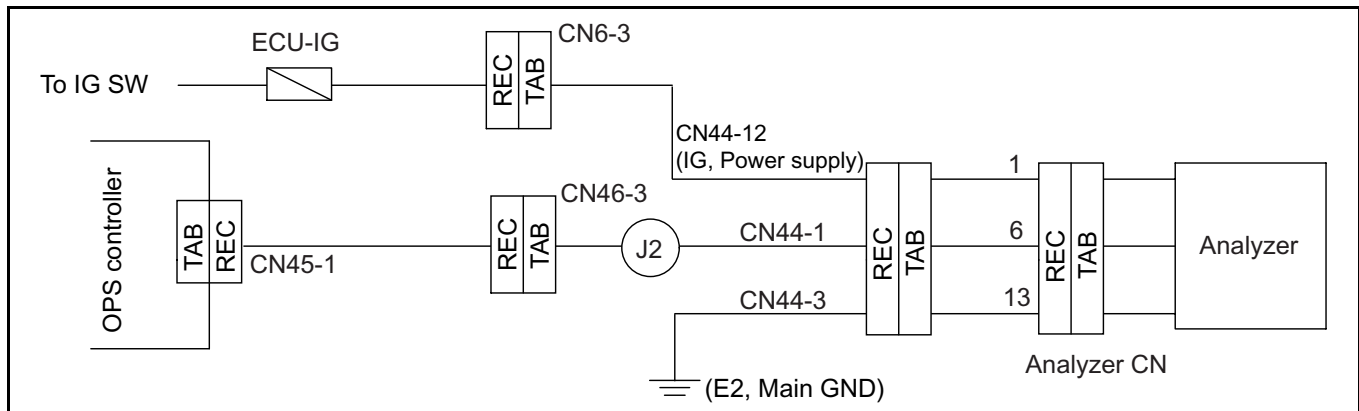
Press MENU switch ③ to return to the ANALYZER MENU screen.



TROUBLESHOOTING

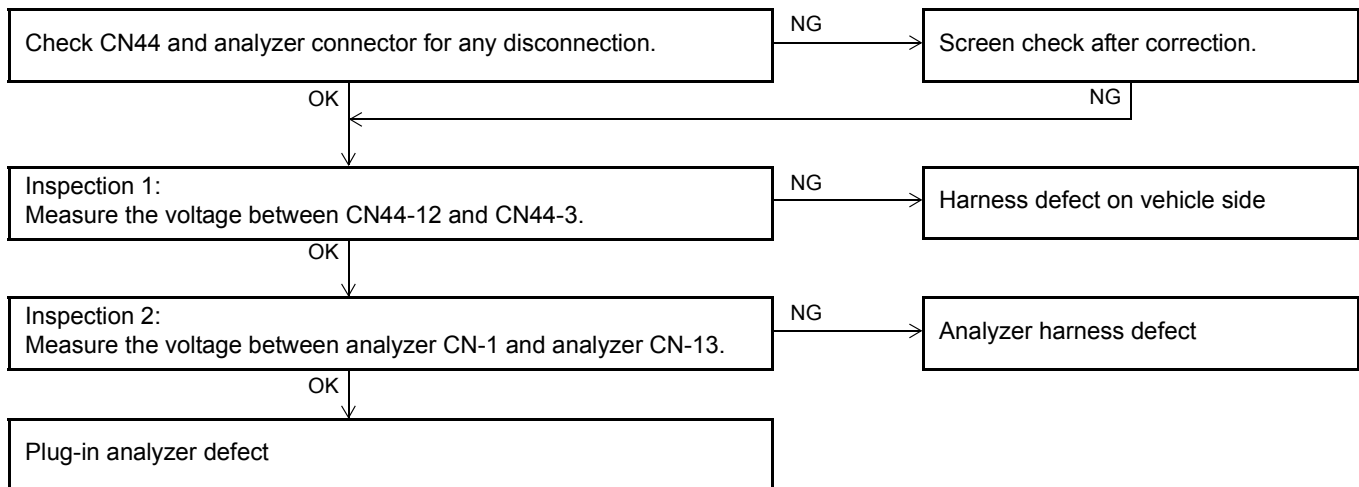
● No display on the screen.

Related Portion



Estimated Causes:

- ① Connector contact defect
- ② Analyzer harness (power supply) defect
- ③ Plug-in analyzer defect



Inspection 1:

Measure the voltage between CN44-12 and CN44-3.
Key switch ON (engine in stopped state)

Standard:

CN44-12 (+) ~ CN44-3 (-)	8 to 16 V
--------------------------	-----------

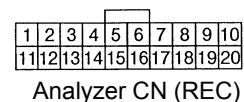


Inspection 2:

Measure the voltage between analyzer CN-1 and analyzer CN-13.
Key switch ON (engine in stopped state)

Standard:

Analyzer CN-1(+) ~ analyzer CN-13 (-)	8 to 16 V
---------------------------------------	-----------



OPS TROUBLESHOOTING

DIAGNOSIS

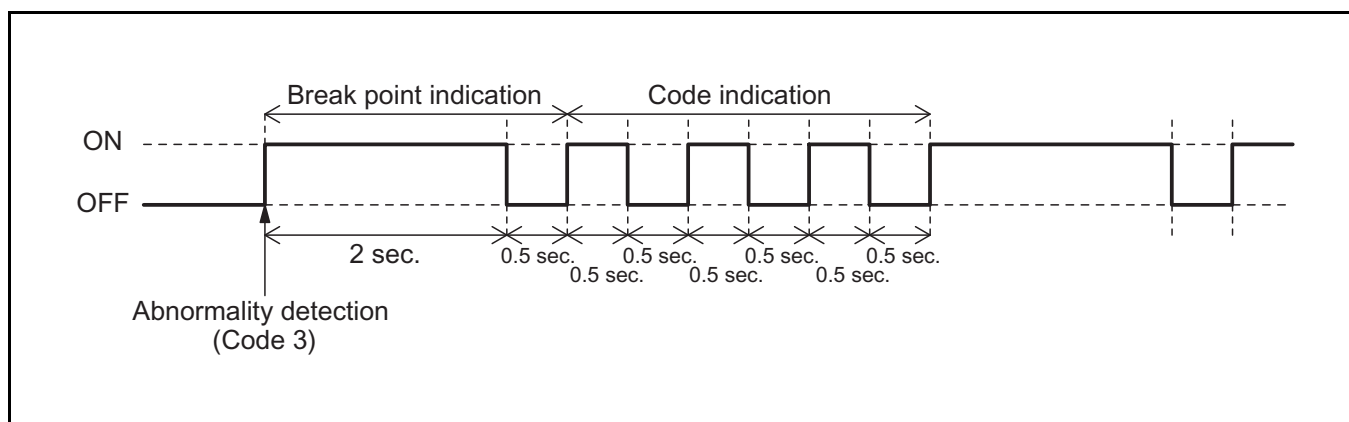
The diagnosis function informs the operator of a trouble occurrence and the trouble position by blinking the OPS lamp on the combination meter when the OPS controller detects an abnormality. The trouble position is indicated by the lamp blinking count.

Note:

- The OPS lamp is lit for 1 second upon key switch ON for broken lamp check.
- The OPS lamp comes on when the operator leaves the seat.
- If multiple errors occur at a time, only the lowest error code appears. Upon correction of that error, the next lowest error code appears.

Example:

Display example of error code 3



DIAGNOSIS ERROR CODE LIST

Lamp	Error code	Vehicle spec.	Error description	Major cause	Phenomenon on vehicle	
					Standard model	Mini lever model
ON	—	—	Dead lamp check	—	—	—
Blinking (one short ON pulse)	1-1	All specifications	Seat switch abnormality	Sticking GND fault	No OPS functioning	No OPS functioning
Blinking (two short ON cycles)	2-1	Other than mini lever model	Lift lowering switch abnormality	Sticking GND fault	No special change from normal state (Excessive leak during lowering)	—
Blinking (three short ON cycles)	3-1	All specifications	Forward interrupt relay (RYF) abnormality	Discontinuity	Forward traveling is possible while OPS is operating.	Forward traveling is possible while OPS is operating.
				GND fault	↑	↑
				+B shorting	Forward traveling is always disabled.	Forward traveling is always disabled.
	3-2		Reverse interrupt relay (RYR) abnormality	Discontinuity	Reverse traveling is possible while OPS is operating.	Reverse traveling is possible while OPS is operating.
				GND fault	↑	↑
				+B shorting	Reverse traveling is always disabled.	Reverse traveling is always disabled.
Blinking (four short ON cycles)	4-1	Other than mini lever model	Unload solenoid (SOL1) abnormality	Discontinuity	Lift lowering and backward tilting are disabled but other material handling operations are possible while OPS is operating	—
				GND fault	↑	—
				+B shorting	All material handling operations are disabled while OPS is operating. While OPS is not operating, only lift lowering is possible but other material handling operations are disabled.	—
Blinking (four short ON cycles)	4-2		Lowering lock solenoid (SOL2) abnormality	Discontinuity	While OPS is operating, all material handling operations are disabled. While OPS is not operating, only forward tilting is disabled and all other material handling operations are possible.	—
				GND fault	↑	—
				+B shorting	While OPS is operating, only lift lowering is possible and all other material handling operations are disabled.	—

Lamp	Error code	Vehicle spec.	Error description	Major cause	Phenomenon on vehicle	
					Standard model	Mini lever model
Blinking (four short ON cycles)	4-3	Other than mini lever model	Tilt solenoid (SOL3) abnormality	Discontinuity	While OPS is operating, all material handling operations are disabled. While OPS is not operating, only forward tilting is disabled and all other material handling operations are possible.	—
				GND fault	↑	—
				+B shorting	Automatic leveling stop is disabled.	—
Blinking (five short ON cycles)	5-1	All specifications	Shift lever abnormality	+B shorting	When OPS is operating, releasing is disabled (locked state by return to neutral function).	When OPS is operating, releasing is disabled (locked state by return to neutral function).
ON	7-1	All specifications	CPU abnormality	Controller abnormality	Drive OPS does not function, lowering is always disabled, and material handling OPS does not function.	Drive OPS does not function.
	7-2		CPU abnormality			
	7-3		CPU abnormality			
Blinking (seven short ON cycles)	7-4		CPU abnormality		None in particular	None in particular
ON	7-5		EEPROM abnormality		Drive OPS does not function, lowering is always disabled, and material handling OPS does not function.	Drive OPS does not function.
	7-6		EEPROM abnormality			
ON	—	All specifications	Low voltage alarm	Low battery voltage	Ordinary control (Failure in control may arise.)	Ordinary control (Failure in control may arise.)
ON	—	—	OPS operation	Departure from seat	—	—

List of Reference Pages for Error Codes and Sub Error Codes

Without analyzer (SST)			With analyzer (SST)		
Error code	Error description	Page	Error code	Error description	Page
1	Seat switch abnormality	1-20	1-1	Seat switch abnormality	1-21
2	Lowering switch abnormality	1-23	2-1	Lowering switch abnormality	1-25
3	Forward interrupt relay (RYF) abnormality Reverse interrupt relay (RYR) abnormality	1-27	3-1	Forward interrupt relay (RYF) abnormality	1-27
			3-2	Reverse interrupt relay (RYR) abnormality	1-27
4	Solenoid (SOL) abnormality	1-29	4-1	Unload solenoid (SOL1) abnormality	1-29
			4-2	Lowering lock solenoid (SOL2) abnormality	1-29
			4-3	Tilt solenoid (SOL3) abnormality	1-29
5	T/C shift lever abnormality	1-31	5-1	T/C shift lever abnormality	1-33
7	OPS controller abnormality	—	7-1	CPU abnormality	—
			7-2	CPU abnormality	—
			7-3	CPU abnormality	—
			7-4	CPU abnormality	—
			7-5	EEPROM abnormality	—
			7-6	EEPROM abnormality	—

List of Pages to be Referenced by Phenomenon

Description	Pages to be referenced	
	Without analyzer	With analyzer
The OPS buzzer does not sound or keeps sounding.	1-35	1-35
The OPS lamp dos not come on.	1-39	1-39
The OPS lamp keeps lighting (including the state where traveling and material handling are both disabled).	1-41	1-44
The fork cannot be lowered (excluding the mini-lever vehicle).	1-47	1-50
The material handling OPS does not function (including the state where fork lowering and forward tilting are both disabled).	1-52	1-52
The material handling OPS does not function (mini-lever vehicle).	1-53	1-53
Material handling fails (including the case where only fork lowering is possible).	1-55	1-55
Material handling fails (mini-lever vehicle).	1-56	1-56
The mast backward tilting speed is always slow or unrestricted (excluding the mini-lever vehicle).	1-58	1-58
Mast forward tilting fails (excluding the mini-lever vehicle).	1-62	1-62
The drive OPS does not function.	1-66	1-66
Traveling fails (including forward the cases of traveling only, reverse traveling only and occasional failures).	1-69	1-69

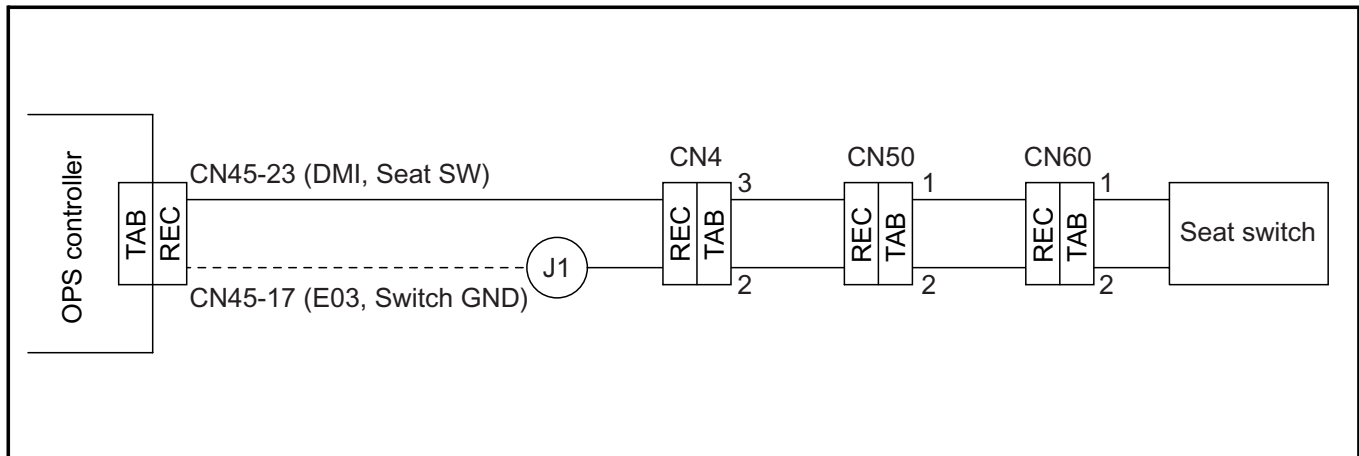
Note:

The illustration for the STD lever vehicle is shown as the analyzer screen in the troubleshooting for both the STD lever and mini-lever vehicles.

TROUBLESHOOTING BY ERROR CODE

● Error Code 1 · 1-1 (Seat switch abnormality)

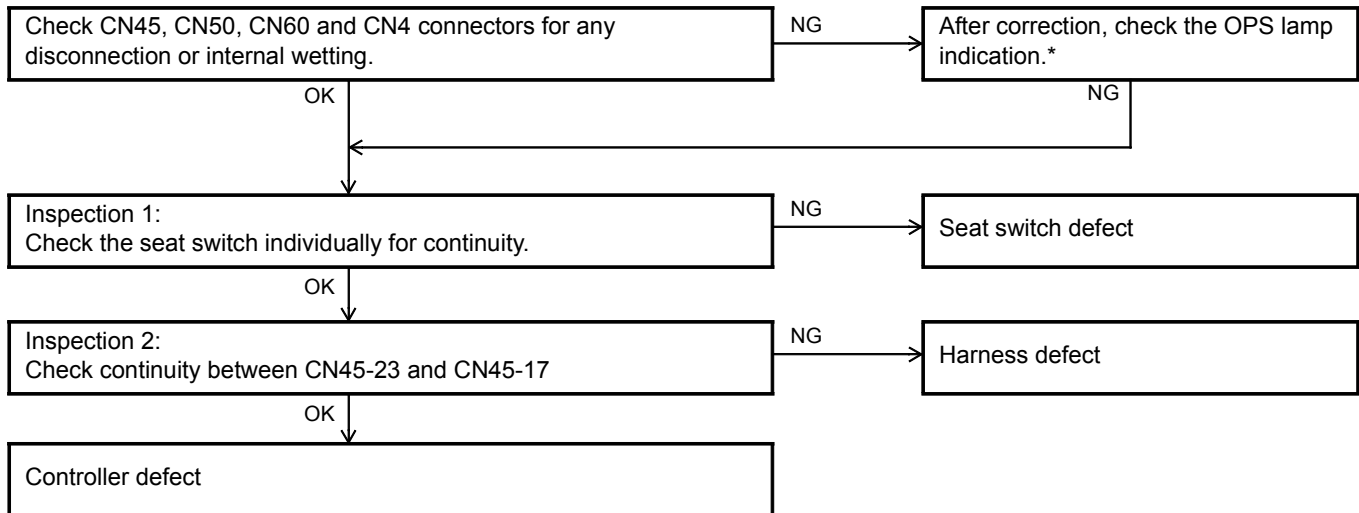
Related Portion



Estimated Causes:

- ① Connector contact defect
- ② Seat switch defect
- ③ Harness defect
- ④ Controller defect

Error code 1



*: After correction, check the OPS lamp indication.

After connecting all connectors, turn the key switch to OFF once, then to ON (for 2 seconds or more), and to OFF again.

After waiting without seating for about 15 minutes and turn the key switch to ON. The OPS must not display error code 1 with blinking.

Inspection 1:

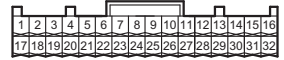
Check the individual seat switch for continuity.
Key switch OFF, CN 60 disconnection.

**Standard:**

	Seated	Unseated
CN60-1 ~ CN60-2	Continuity	No continuity

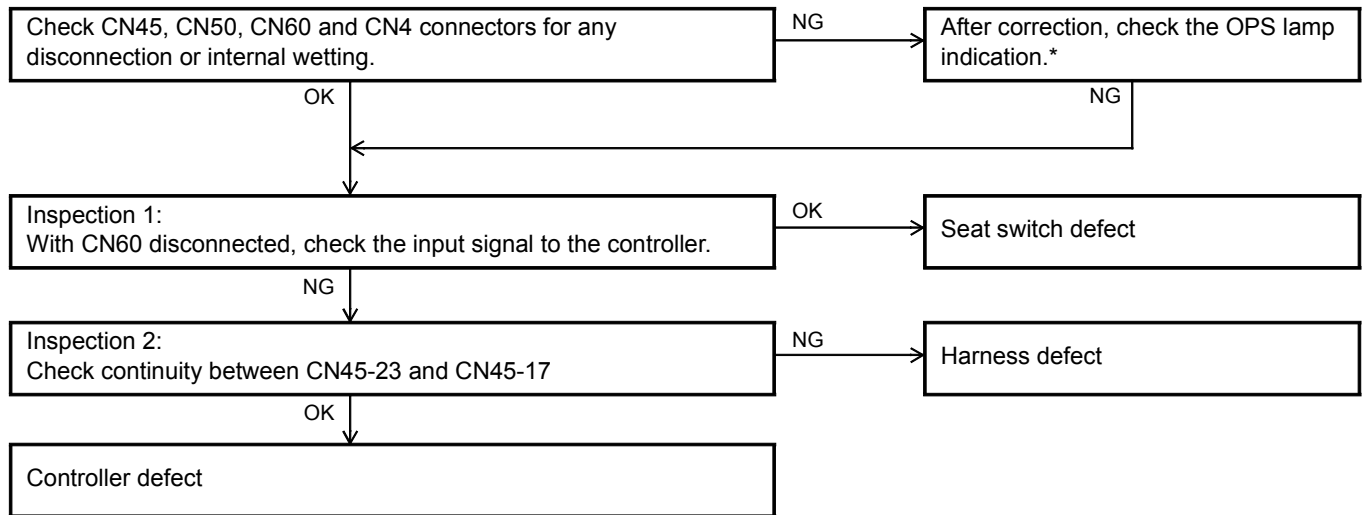
Inspection 2:

Check continuity between CN45-23 and CN45-17.
Key switch OFF, CN45 disconnection. (CN4, CN50 and CN60 must be connected.)

**Standard:**

	Seated	Unseated
CN45-23 ~ CN45-17	Continuity	No continuity

Error code 1-1



*: After correction check the OPS lamp indication.

After connecting all connectors, turn the key switch to OFF once, then to ON (for 2 seconds or more), and to OFF again. After waiting without seating for about 15 minutes and turn the key switch to ON. The OPS must not display error code 1 with blinking.

Inspection 1:

With CN60 disconnected, check the input signal to the controller.
CN60 connector disconnection, key switch OFF ⇒ ON
Analyzer: MAIN MENU → OPS → ANALYZER MENU → IN/OUT MONITOR

IN/OUT MONITOR (1/3)

SEAT	
DIR FWD	ON
REV	OFF
RLY FWD	OFF
REV	OFF
VOLTAGE	14. 2V

①

②

③ME

↓

Standard:

	Seated	Unseated
SEAT	OFF	OFF

Inspection 2:

Check continuity between CN45-23 and CN45-17.
Key switch OFF, CN45 disconnection. (CN4, CN50 and CN60 must be connected.)

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32

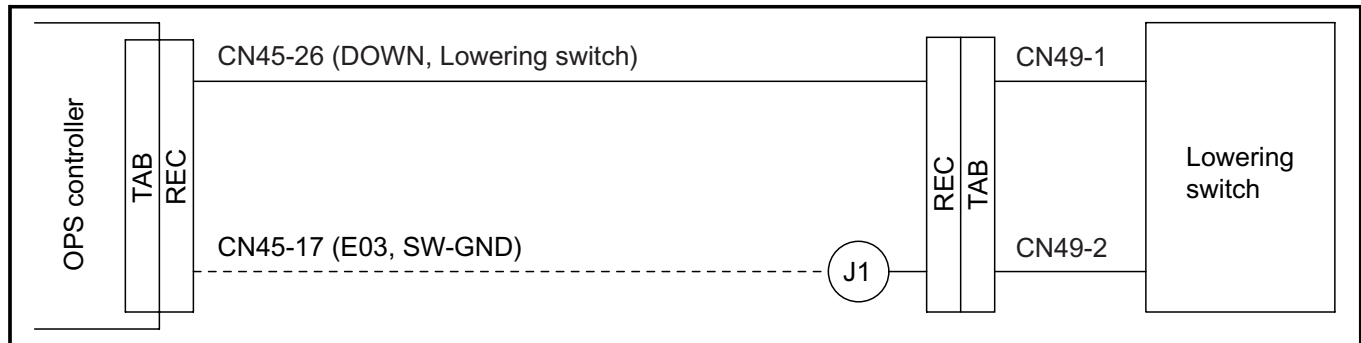
CN45 (REC)

Standard:

	Seated	Unseated
CN45-23 ~ CN45-17	Continuity	No continuity

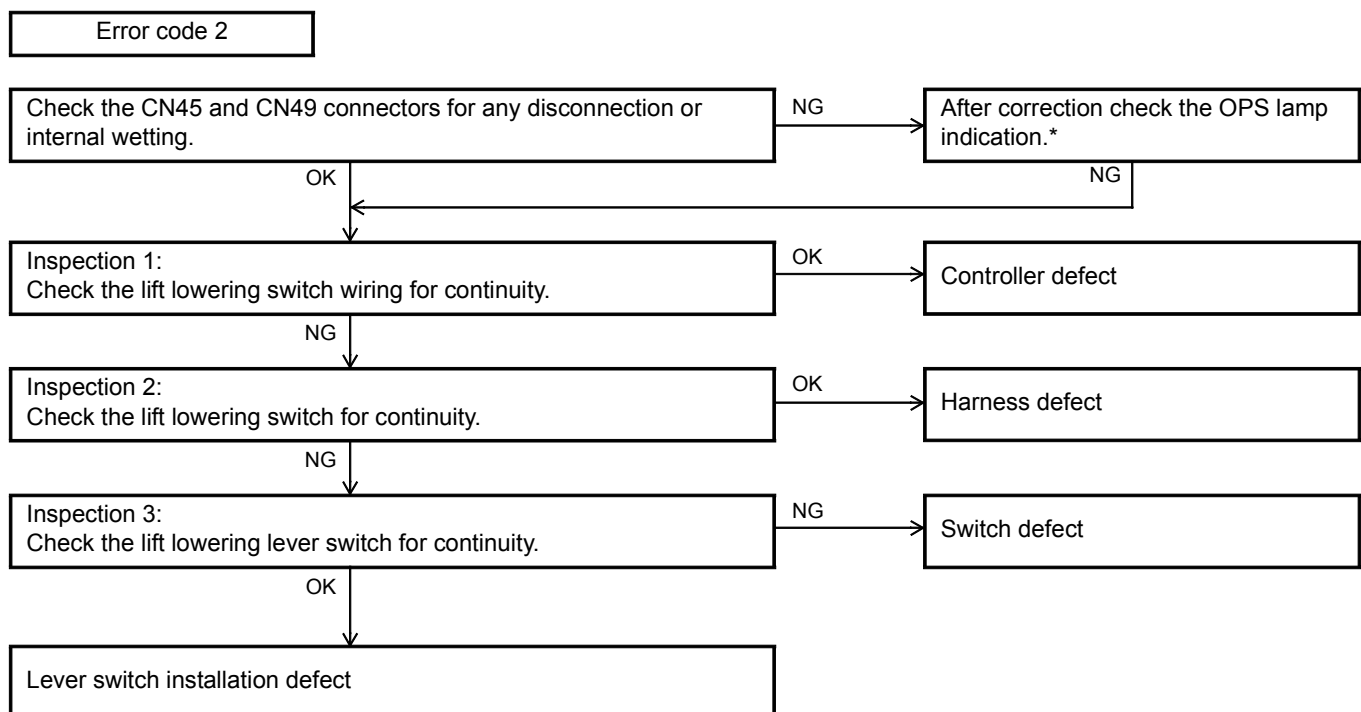
- Error Code 2
- Error Code 2-1 (Lowering switch abnormality)

Related Portion



Estimated Causes:

- | | |
|----------------------------|---------------------------------------|
| ① Connector contact defect | ④ Controller defect |
| ② Lowering switch defect | ⑤ Lowering switch installation defect |
| ③ Harness defect | |



*: After correction check the OPS lamp indication.

After key switch ON, keep the lift lever in the neutral position for 2 minutes and check if the OPS lamp blinks. The OPS lamp must not indicate error code 2 with blinking.

Inspection 1:

Check the lift lower lever switch wiring for continuity.
Key switch OFF, CN45 disconnection.



CN45 (REC)

Standard:

	Lever at neutral position	Lever at up position	Lever at down position
CN45-26 ~ CN45-17	No continuity	No continuity	Continuity

Inspection 2:

Check the lift lower lever switch individually (as installed on the vehicle) for continuity.
Key switch OFF, CN49 disconnection.



CN49 (TAB)

Standard:

	Lever at neutral position	Lever at up position	Lever at down position
CN49-1 ~ CN49-2	No continuity	No continuity	Continuity

Inspection 3:

Check the lift lower lever switch individually (as removed from the vehicle) for continuity.
Key switch OFF, CN49 disconnection.

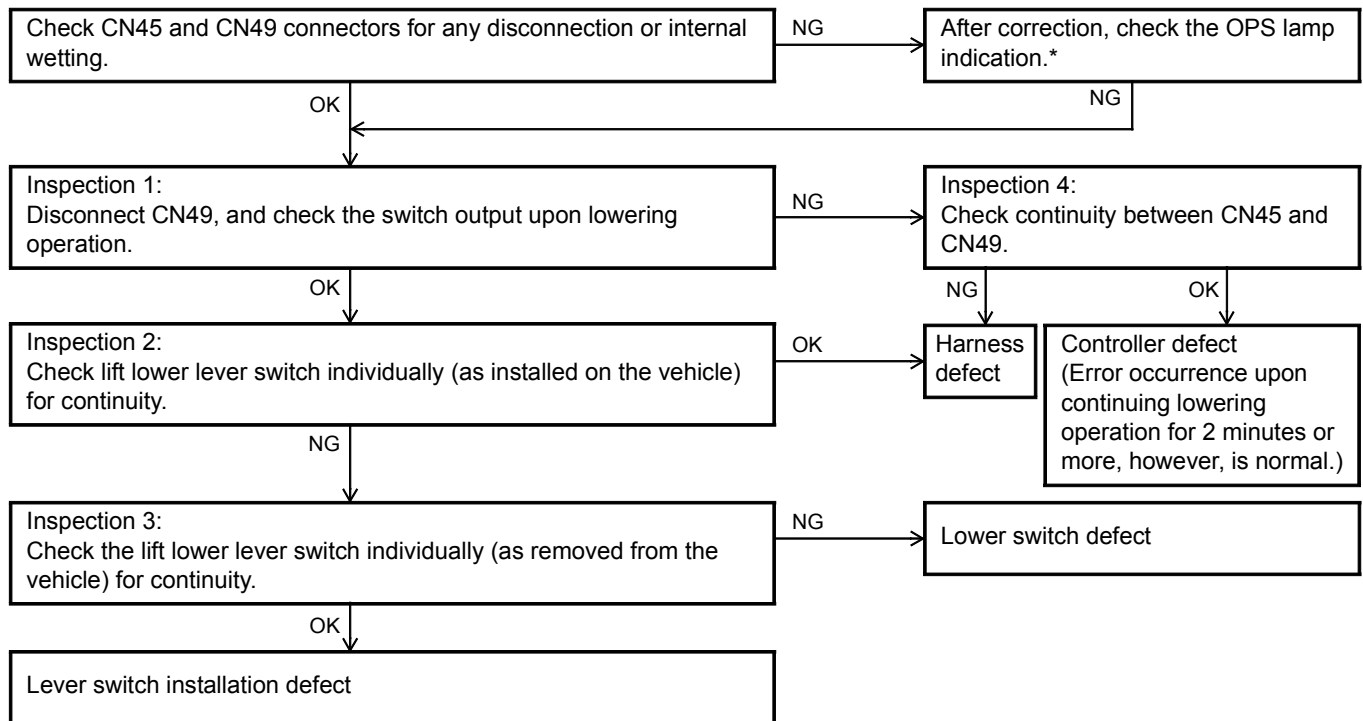


CN49 (TAB)

Standard:

	Switch free	Switch pressed
CN49-1 ~ CN49-2	Continuity	No continuity

Error code 2-1



*: After correction, check the OPS lamp indication.

After key switch ON, keep the lift lever in the neutral position for 2 minutes and check if the OPS lamp blinks.
The OPS lamp must not indicate error code 2 with blinking.

Inspection 1:

Disconnect CN49 and check the switch output upon lowering operation.

Key switch ON (engine in stopped state)

Analyzer: MAIN MENU → OPS → ANALYZER MENU → IN/OUT MONITOR

IN/OUT MONITOR (2/3)			
SEAT	ON		①
LIFT LOWER	OFF		
UNLOAD SOL	OFF	↓	②
LWR SOL	OFF		
TILT SOL	OFF		
VOLTAGE	14.2V		③ ME

Standard:

Lift lower switch

	Lever at neutral position	Lever at up position	Lever at down position
LIFT LOWER	OFF	OFF	OFF

Inspection 2:

Check the lift lower lever switch individually (as installed on the vehicle) for continuity.

Key switch OFF, CN49 disconnection.

**Standard:**

Lift lower switch

	Lever at neutral position	Lever at up position	Lever at down position
CN49-1 ~ CN49-2	No continuity	No continuity	Continuity

Inspection 3:

Check the lift lower lever switch individually (as removed from the vehicle) for continuity.
Key switch OFF, CN49 disconnection.



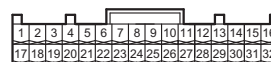
CN49 (TAB)

Standard:

	Switch free	Switch pressed
CN49-1 ~ CN49-2	Continuity	No continuity

Inspection 4:

Check continuity between CN45 and CN49.
Key switch OFF, CN45 and CN49 disconnection.



CN45 (REC)



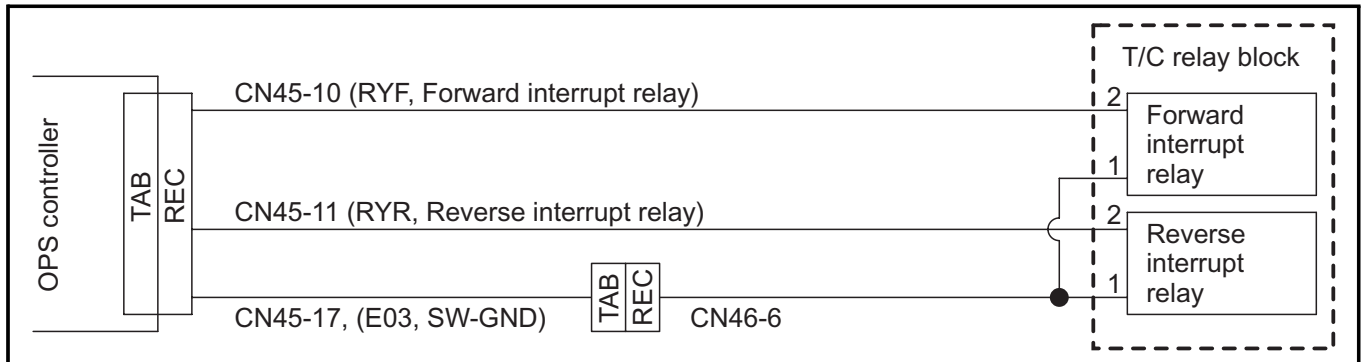
CN49 (REC)

Standard:

CN45-26 ~ CN45-17	No continuity
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- Error Code 3
- Error Code 3-1 (Forward interrupt relay (RYF) abnormality)
- Error Code 3-2 (Reverse interrupt relay (RYR) abnormality)

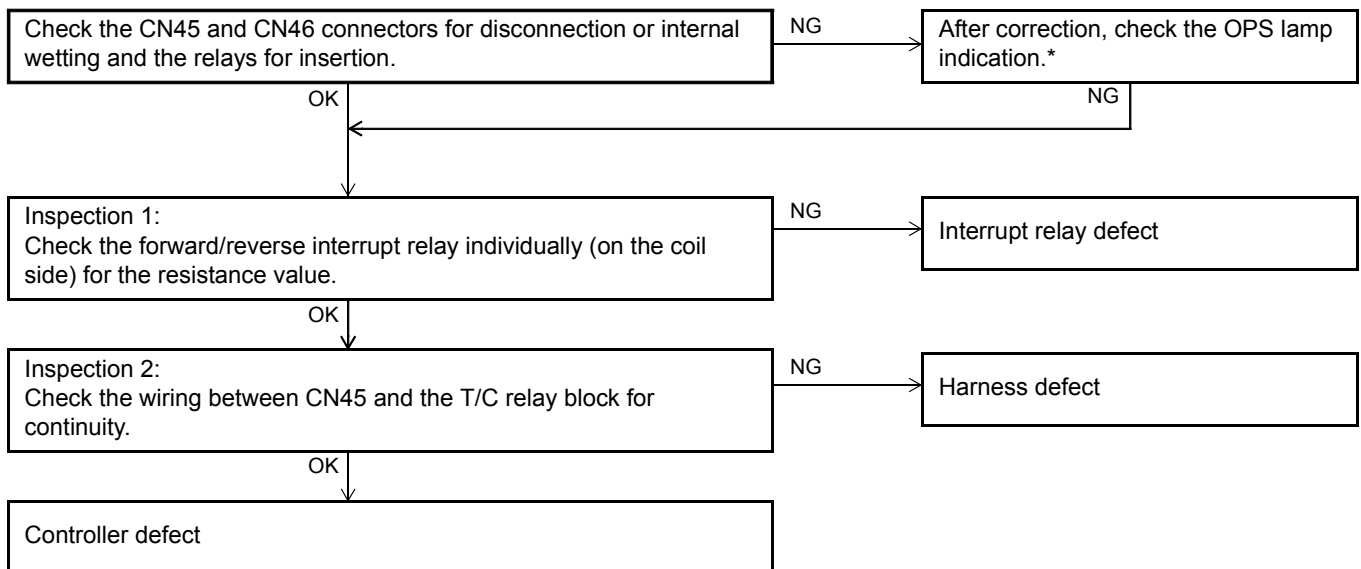
Related Portion



Estimated Causes:

- | | |
|----------------------------------|---------------------|
| ① Connector contact defect | ④ Harness defect |
| ② Forward interrupt relay defect | ⑤ Controller defect |
| ③ Reverse interrupt relay defect | |

Error Codes 3, 3-1, 3-2



*: After correction, check the OPS lamp indication.

After key switch ON, place the shift lever in the forward or reverse position and leave the seat to check if the OPS lamp blinks.

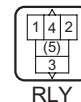
The OPS lamp must not display error code 3 with blinking.

Note:

When the analyzer is provided, check the related portion after checking the error memory for the current error code. See p1-9 "1 DIAG MEMORY" for the error memory check method.

Inspection 1:

Check the forward/reverse interrupt relay (on coil side) individually.
 Measure the resistance between terminals of each of the forward and reverse interrupt relays.
 Key switch OFF, relay disconnection from T/C relay block.

**Standard:**

	Resistance
Forward interrupt relay, between terminals 1 and 2	Approx. 90 Ω (20°C)
Reverse interrupt relay, between terminals 1 and 2	Approx. 90 Ω (20°C)

Inspection 2:

Check continuity of the wiring between CN45 and T/C relay block.
 Key switch OFF, CN45 disconnection, relay removal from the T/C relay block.



CN45 (REC)

Standard:

- Discontinuity check

CN45-10 ~ Forward interrupt relay terminal 2	Continuity
CN45-11 ~ Reverse interrupt relay terminal 2	Continuity
CN45-17 ~ Forward interrupt relay terminal 1	Continuity
CN45-17 ~ Reverse interrupt relay terminal 1	Continuity

- GND fault check

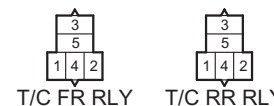
CN45-10 ~ CN45-17	No continuity
CN45-11 ~ CN45-17	No continuity

- +B shorting check

CN45-10 ~ CN45-32	No continuity
CN45-11 ~ CN45-32	No continuity

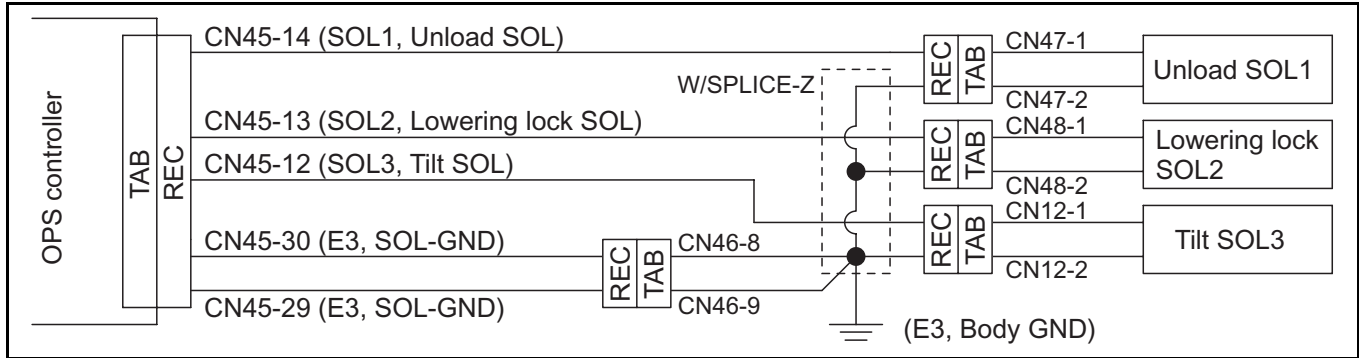
- IG line shorting check

CN45-10 ~ CN45-15,-16	No continuity
CN45-11 ~ CN45-15,-16	No continuity



- Error Code 4
- Error Code 4-1 (Unload solenoid (SOL1) abnormality)
- Error Code 4-2 (Lowering lock solenoid (SOL2) abnormality)
- Error Code 4-3 (Tilt solenoid (SOL3) abnormality)

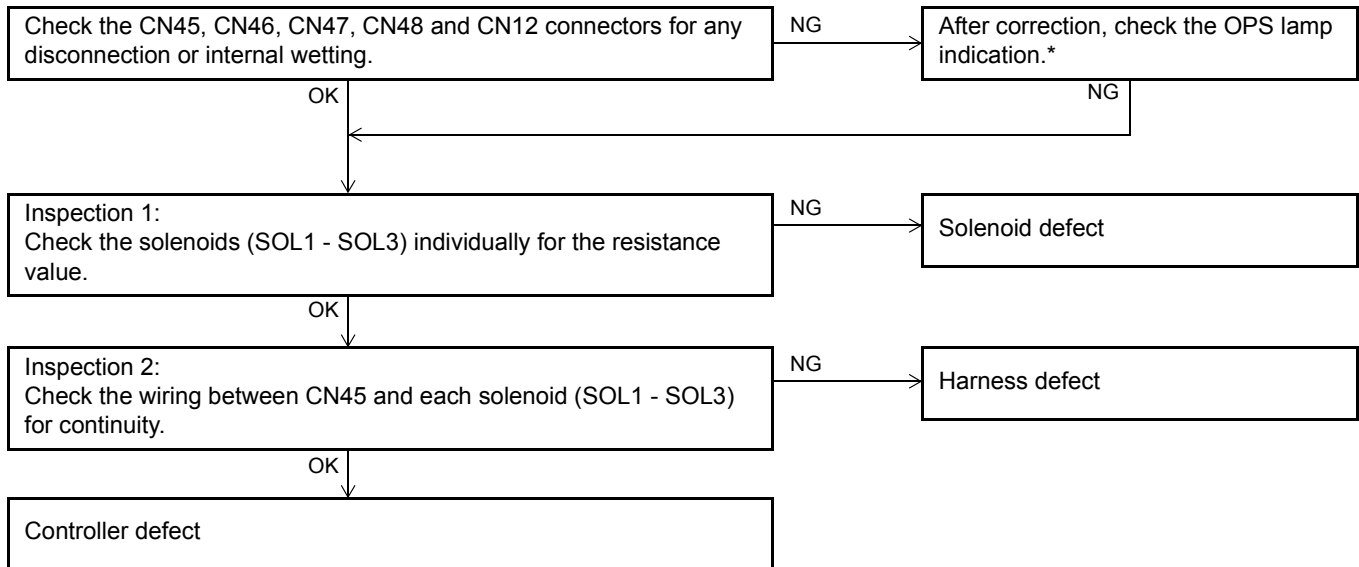
Related Portion



Estimated Causes:

- | | |
|---------------------------------|------------------------|
| ① Connector contact defect | ④ Tilt solenoid defect |
| ② Unload solenoid defect | ⑤ Controller defect |
| ③ Lowering lock solenoid defect | ⑥ Harness defect |

Error Codes 4, 4-1, 4-2, 4-3



*: After correction, check the OPS lamp indication.

After starting the engine, operate lift up/down, forward/backward tilt in each of OPS activation and deactivation to check if the OPS lamp blinks.

The OPS lamp must not display error code 4 with blinking.

Note:

When the analyzer is provided, check the related portion after checking the error memory for the current error code. See p1-9 "1 DIAG MEMORY" for the error memory check method.

Inspection 1:

Check the resistance of each solenoid (SOL1 to SOL 3).
Key switch OFF, CN47, CN48 and CN12 disconnection.

Standard:

		Resistance
SOL1	CN47-1 ~ CN47-2	Approx. 9 Ω (20°C)
SOL2	CN48-1 ~ CN48-2	Approx. 9 Ω (20°C)
SOL3	CN12-1 ~ CN12-2	Approx. 9 Ω (20°C)



CN47 (TAB)



CN48 (TAB)



CN12 (TAB)

Inspection 2:

Check continuity of the wiring between CN45 and each of solenoids SOL1 to SOL3.
Key switch OFF, CN45, CN47, CN48 and CN12 disconnection.

Standard:

- Discontinuity check

CN45-14 ~ CN47-1	Continuity
CN45-29 ~ CN47-2	Continuity
CN45-30 ~ CN47-2	Continuity
CN47-2 ~ Frame	Continuity



CN45 (REC)

CN45-13 ~ CN48-1	Continuity
CN45-29 ~ CN48-2	Continuity
CN45-30 ~ CN48-2	Continuity
CN48-2 ~ Frame	Continuity



CN47 (REC)



CN48 (REC)



CN12 (REC)

CN45-12 ~ CN12-1	Continuity
CN45-29 ~ CN12-2	Continuity
CN45-30 ~ CN12-2	Continuity
CN12-2 ~ Frame	Continuity

- GND fault check

CN45-14 ~ CN45-29,-30	No continuity
CN45-13 ~ CN45-29,-30	No continuity
CN45-12 ~ CN45-29,-30	No continuity

- +B shorting check

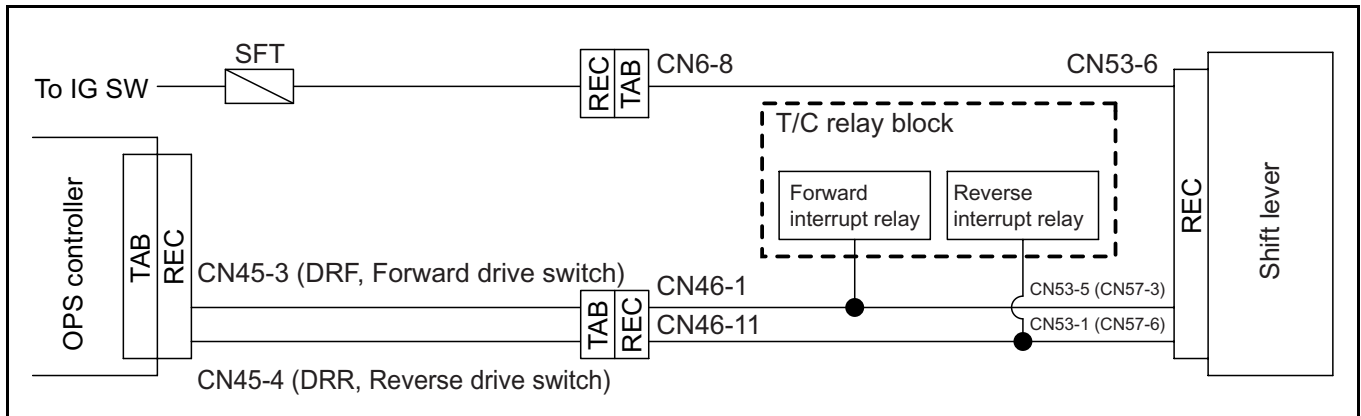
CN45-14 ~ CN45-32	No continuity
CN45-13 ~ CN45-32	No continuity
CN45-12 ~ CN45-32	No continuity

- IG line shorting check

CN45-14 ~ CN45-15,-16	No continuity
CN45-13 ~ CN45-15,-16	No continuity
CN45-12 ~ CN45-15,-16	No continuity

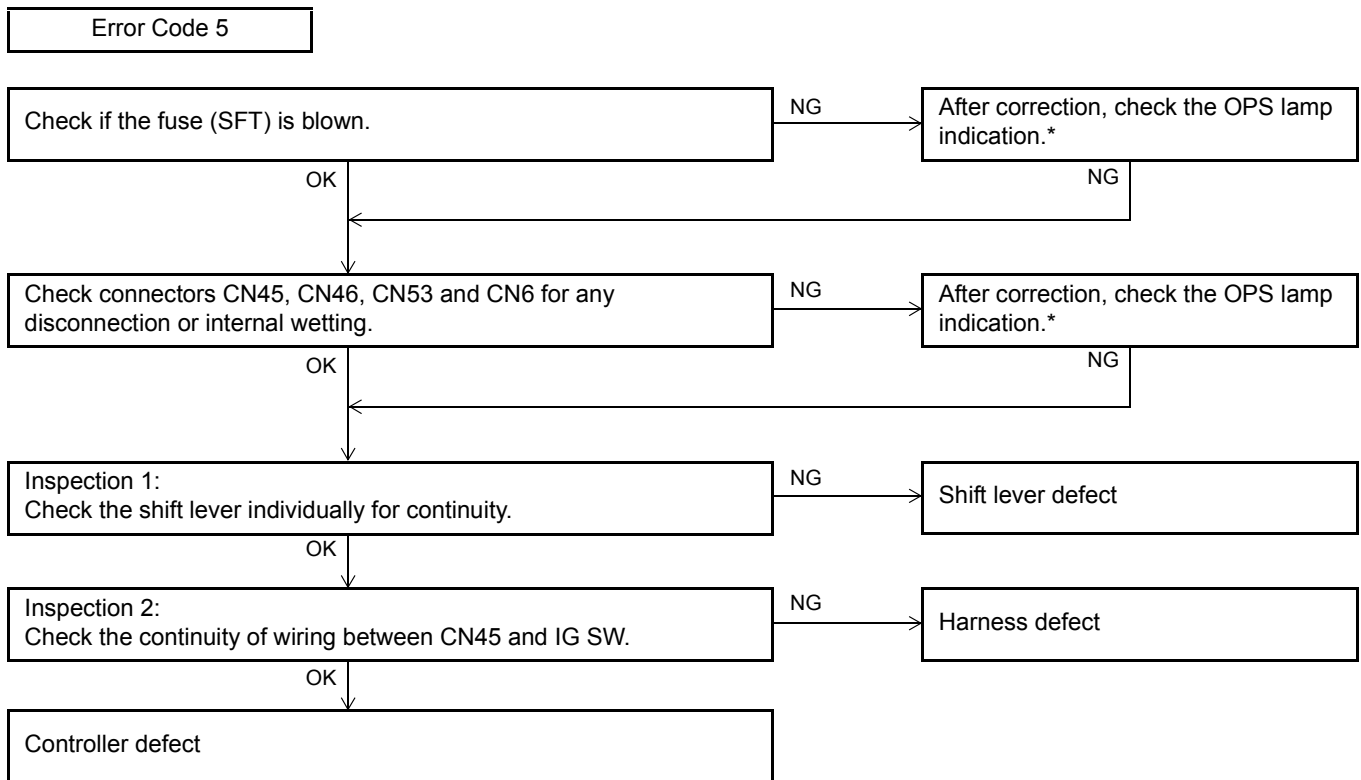
● Error Code 5 · 5-1 (T/C shift lever abnormality)

Related Portion



Estimated causes:

- | | |
|-----------------------------|---------------------|
| ① Connector contact defect | ④ Controller defect |
| ② Shift lever switch defect | ⑤ Fuse defect |
| ③ Harness defect | |

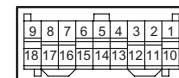


*: After correction, check the OPS lamp indication.

After key switch ON, operate the shift lever to forward or reverse position and check if the OPS lamp blinks. The OPS lamp must not display error code 5 with blinking.

Inspection 1:

Check the T/C shift lever individually for continuity.
Key switch OFF, CN53 disconnection.



DIRECTION SWITCH

Standard:

	Lever at neutral position	Lever at forward traveling position	Lever at reverse traveling position
Between pins 5 and 6 on lever side	No continuity	Continuity	No continuity
Between pins 6 and 1 on lever side	No continuity	No continuity	Continuity

Inspection 2:

Check the wiring between CN45 and IG SW for continuity.
Key switch OFF, CN45 and IG SW connectors disconnection.
(CN6, CN46 and CN53 must be connected.)



CN45 (REC)

Standard:

- Lever at neutral

CN45-3 ~ IG SW-4	No continuity
CN45-4 ~ IG SW-4	No continuity



IG SW

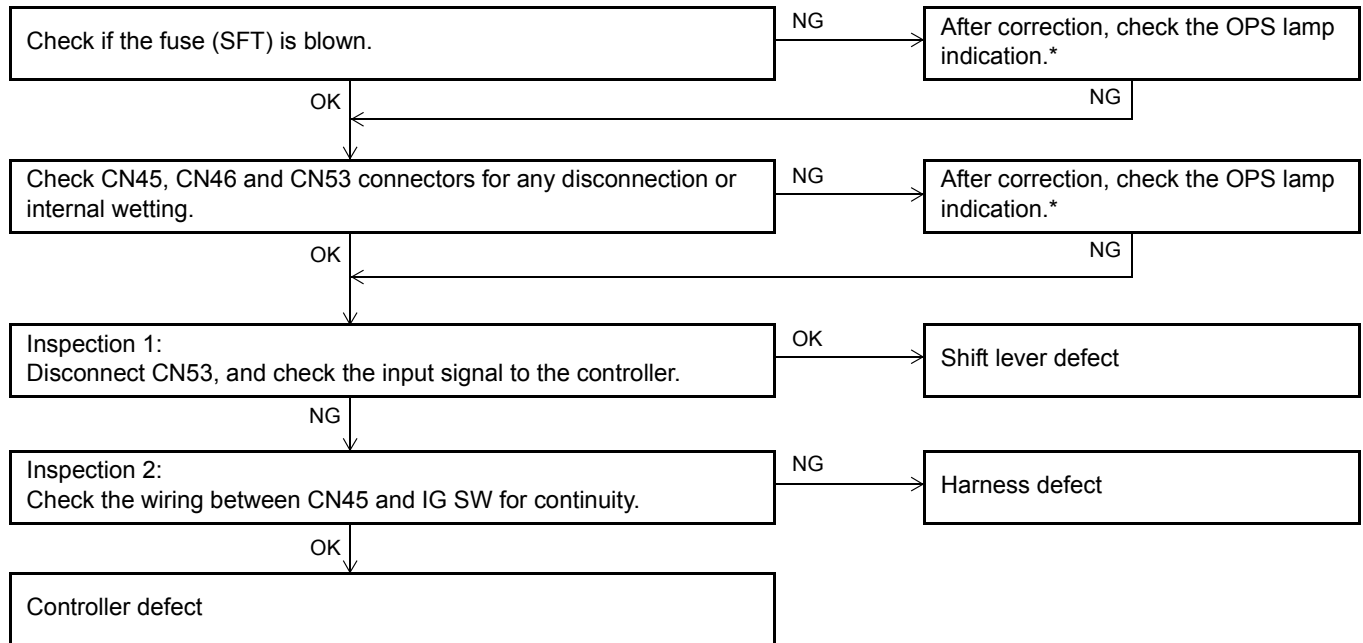
- +B shorting check

CN45-3 ~ CN45-32	No continuity
CN45-4 ~ CN45-32	No continuity

- IG line shorting check

CN45-3 ~ CN45-15,-16	No continuity
CN45-4 ~ CN45-15,-16	No continuity

Error code 5-1



*: After correction, check the OPS lamp indication.

After key switch ON, operate the shift lever to the forward or reverse position and check if the OPS lamp blinks.
The OPS lamp must not indicate error code 5 with blinking.

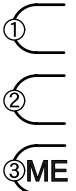
Inspection 1:

Disconnect CN53, and check the input signal to the controller.

CN53 disconnection, and key switch ON (engine in stopped state)

Analyzer: MAIN MENU → OPS → ANALYZER MENU → IN/OUT MONITOR

IN/OUT MONITOR (1/3)			
SEAT		ON	
DIR	FWD	OFF	
	REV	OFF	
RLY	FWD	OFF	
	REV	OFF	
VOLTAGE			14.2V

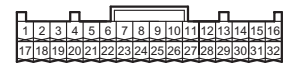


Standard:

	Lever at neutral position	Lever at forward traveling position	Lever at reverse traveling position
DIR FWD	OFF	OFF	OFF
DIR REV	OFF	OFF	OFF

Inspection 2:

Check the wiring between CN45 and IG SW for continuity.
 Key switch OFF, CN45 and IG SW connectors disconnection.
 (CN6, CN46 and CN53 must be connected.)



CN45 (REC)



IG SW

Standard:

- Lever at neutral

CN45-3 ~ IG SW-4	No continuity
CN45-4 ~ IG SW-4	No continuity

- +B shorting check

CN45-3 ~ CN45-32	No continuity
CN45-4 ~ CN45-32	No continuity

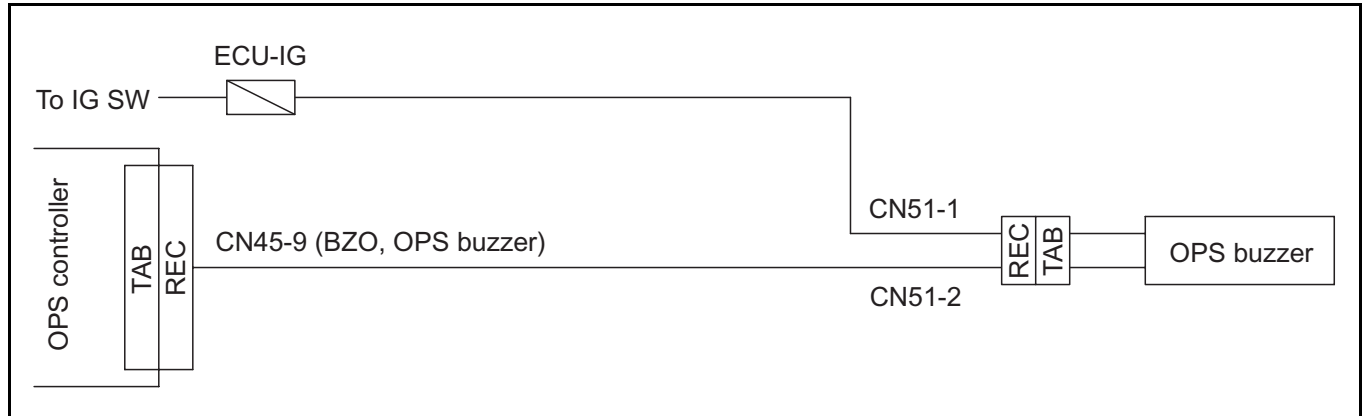
- IG line shorting check

CN45-3 ~ CN45-15,-16	No continuity
CN45-4 ~ CN45-15,-16	No continuity

TROUBLESHOOTING BY PHENOMENON

- The OPS buzzer does not sound.
- The OPS buzzer keeps sounding.

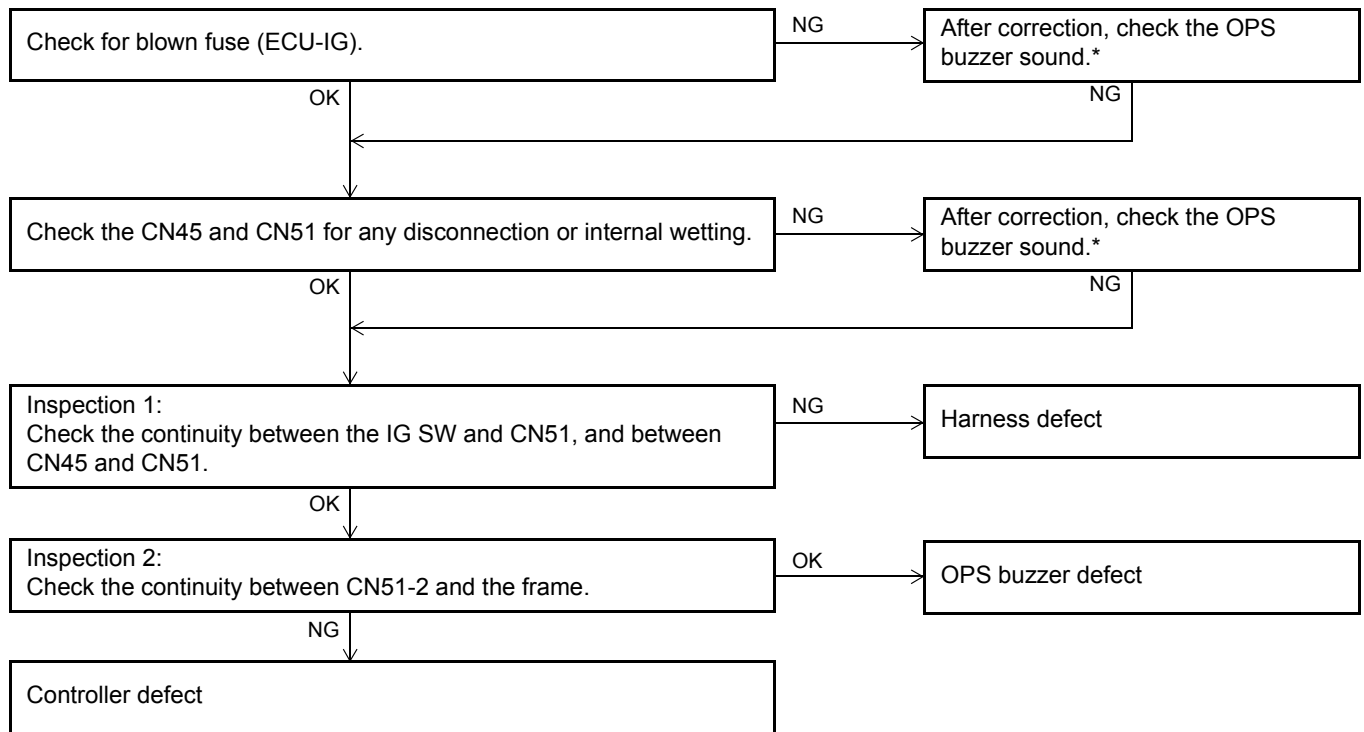
Related Portion



Estimated Causes:

- | | |
|----------------------------|---------------------|
| ① Connector contact defect | ④ Controller defect |
| ② OPS buzzer defect | ⑤ Fuse defect |
| ③ Harness defect | |

The OPS buzzer does not sound.



*: After correction, check the OPS buzzer sound.

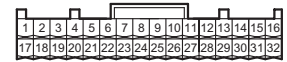
After connecting all connectors, turn the key switch ON, and leave the seat to check if the buzzer sounds.

Inspection 1:

Check the continuity between the IG SW and CN51, and between CN45 and CN51.
Key switch OFF, CN45, CN51, IG SW connector disconnection.

Standard:

IG SW-4 ~ CN51-1	Continuity
CN45-9 ~ CN51-2	Continuity



CN45 (REC)



CN51 (REC)



IG SW

Inspection 2:

Check the continuity between CN51-2 and the frame.

- Without analyzer

Disconnect CN51 and turn the key switch to ON (engine in stopped state).

Standard:

	Buzzer ON	Buzzer OFF
Between CN51-2 and the frame	Continuity	No continuity



CN51 (REC)

* Normally, the buzzer sounds for 1 second upon lapse of 0.5 seconds after the operator leaves the seat.

- With analyzer

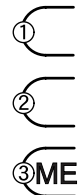
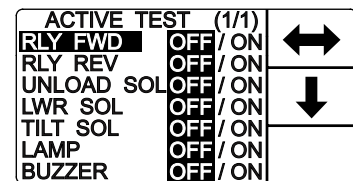
Disconnect CN51 and turn the key switch to ON (engine in stopped state).

Analyzer: MAIN MENU → OPS → ANALYZER MENU → ACTIVE TEST

Standard:

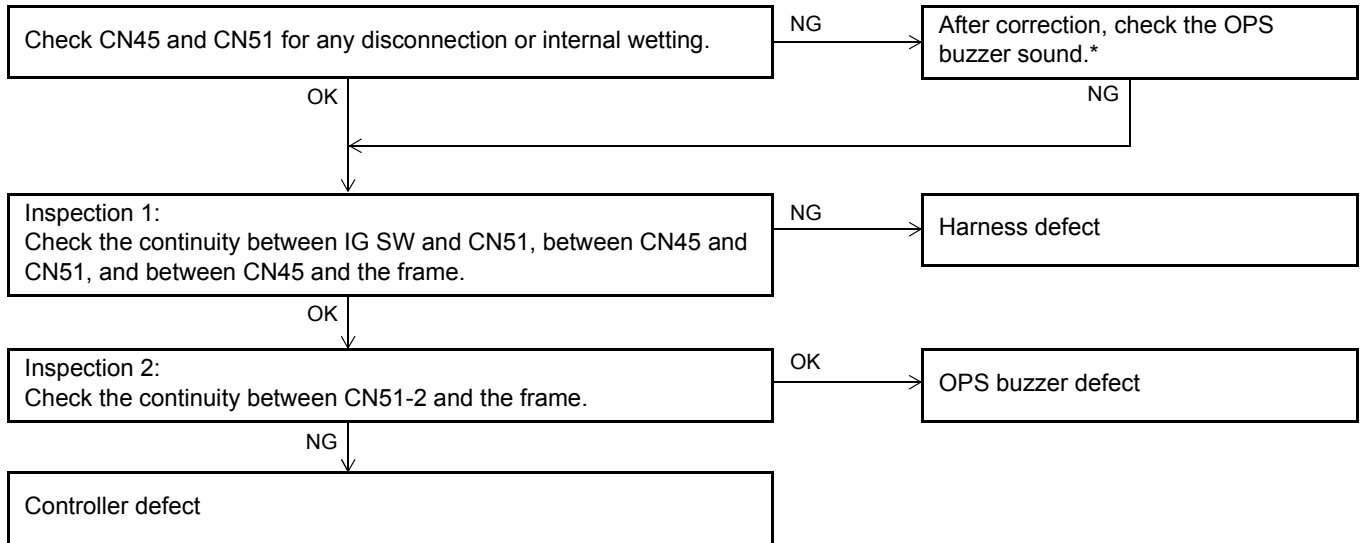
Forcibly turn the OPS buzzer ON and OFF, and check the continuity between CN51-1 and CN51-2.

	Buzzer ON	Buzzer OFF
Between CN51-2 and the frame	Continuity	No continuity



CN51 (REC)

The OPS buzzer keeps sounding.



*: After correction, check the OPS buzzer sound.

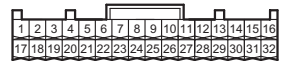
After connecting all connectors, turn the key switch to ON and leave the seat to check if the buzzer sounds.

Inspection 1:

Check the continuity between the IG SW and CN51, and between CN45 and CN51.
Key switch OFF, CN45, CN51, IG SW connector disconnection.

Standard:

IG SW-4 ~ CN51-1	Continuity
CN45-9 ~ CN51-2	Continuity
Between CN45-9 and the frame	No continuity



CN45 (REC)



CN51 (REC)



IG SW

Inspection 2:

Check the continuity between CN51-2 and the frame.

- Without analyzer

Disconnect CN51 and turn the key switch to ON (engine in stopped state).



CN51 (REC)

Standard:

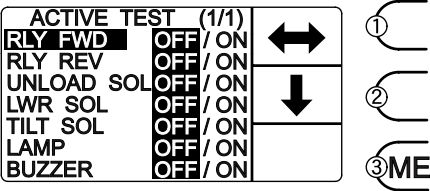
	Buzzer ON	Buzzer OFF
Between CN51-2 and frame	Continuity	No continuity

* Normally, buzzer sounds for 1 second upon lapse of 0.5 sec after the operator leaves the seat.

- With analyzer

Disconnect CN51 and turn the key switch to ON (engine in stopped state).

Analyzer: MAIN MENU → OPS → ANALYZER MENU → ACTIVE TEST



Standard:

Forcibly turn the OPS buzzer ON and OFF, and check the continuity between CN51-1 and CN51-2.

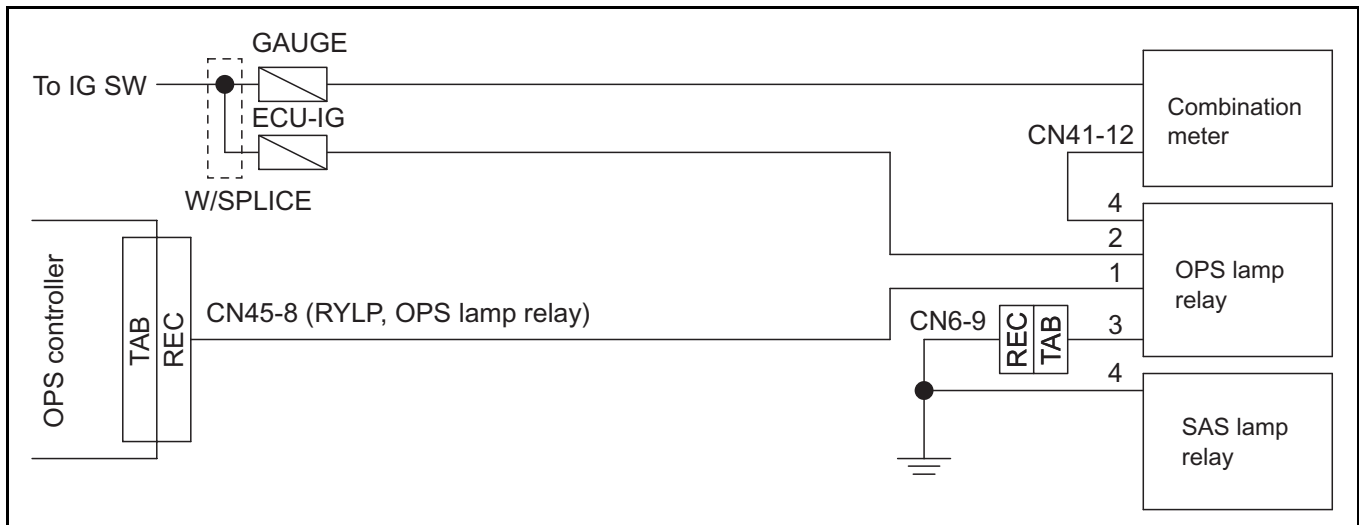
	Buzzer ON	Buzzer OFF
Between CN51-2 and frame	Continuity	No continuity



CN51 (REC)

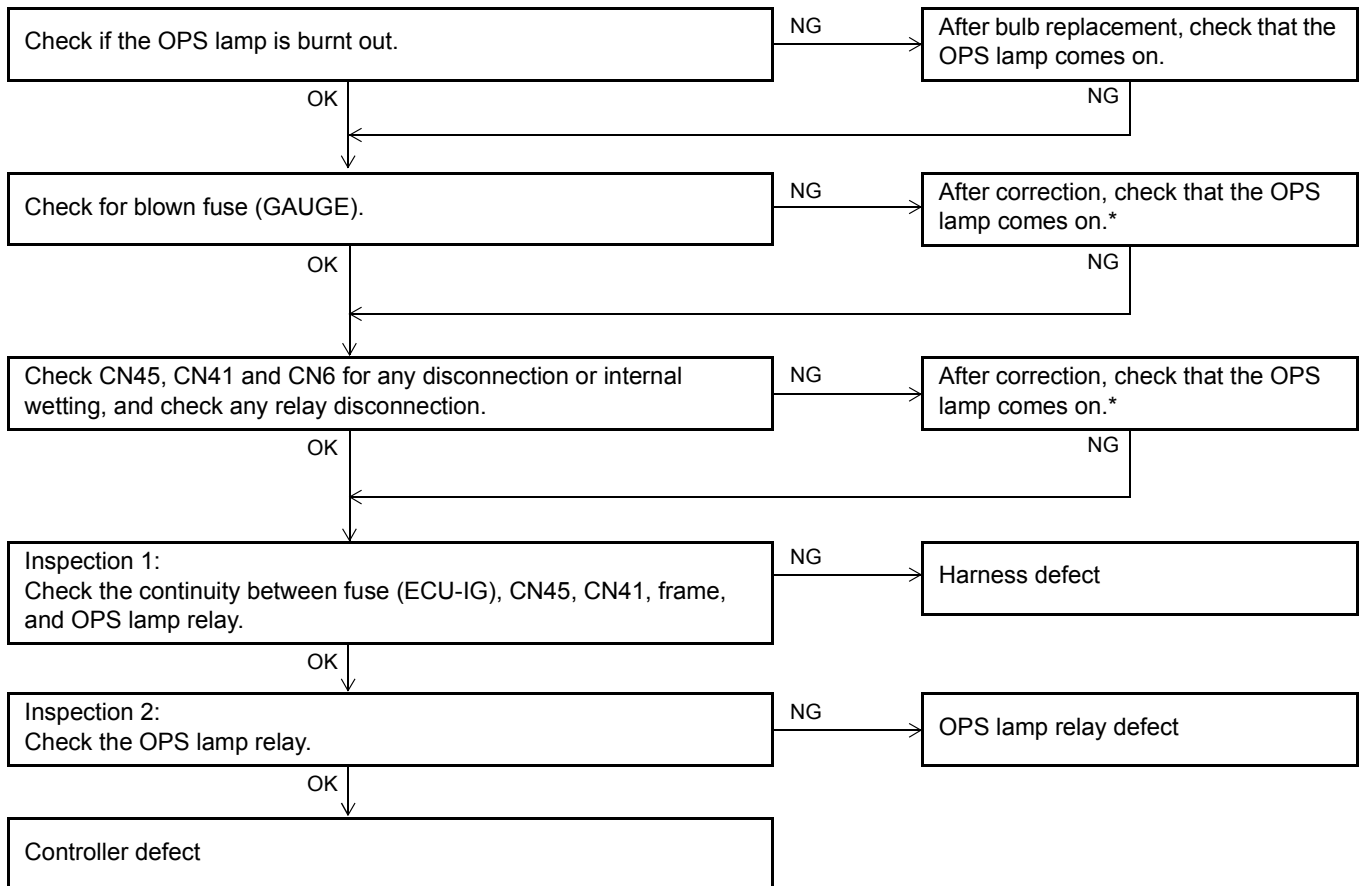
● The OPS lamp does not come on.

Related Portion



Estimated Causes:

- | | |
|----------------------------|---------------------|
| ① Connector contact defect | ④ Harness defect |
| ② OPS lamp defect | ⑤ Controller defect |
| ③ OPS lamp relay defect | ⑥ Fuse defect |



*: After correction, check OPS lamp lighting.

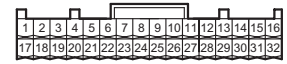
After connecting all connectors, turn the key switch to ON (engine in stopped state) and leave the seat to see that the OPS lamp comes on.

Inspection 1:

Check the continuity between fuse (ECU-IG), CN45, CN41, frame, and OPS lamp relay.
Turn the key switch OFF, disconnect CN45 and CN41, and remove the OPS lamp relay.

Standard:

Between fuse (ECU-IG) and relay pin 2	Continuity
Between CN45-8 and relay pin 1	Continuity
Between frame and replay pin 3	Continuity
Between CN41-12 and relay pin 4	Continuity
Between frame and relay pin 1	No continuity



CN45 (REC)



CN41 (REC)



OPS LAMP RLY

Inspection 2:

Check the OPS lamp relay.

- Without analyzer

(1) Turn the key switch OFF, remove the OPS lamp relay from the relay block, and then turn the key switch to ON (engine in stopped state). Check the continuity between OPS lamp relay pin 1 and the frame with no one on the seat.

Standard:

	Lamp ON	Lamp OFF
Between relay pin 1 and frame	No continuity	Continuity



OPS LAMP RLY

(2) Turn the key switch to OFF, reinstall the OPS lamp relay, and then turn the key switch to ON (engine in stopped state). Measure the voltage between OPS lamp relay pins 3 and 4.

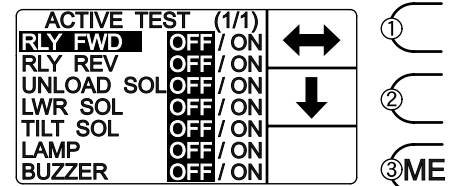
Standard:

	Lamp ON	Lamp OFF
Between relay pins 3 and 4	0 V	Approx. 12 V

- With analyzer

(1) Turn the key switch to OFF, remove the OPS lamp relay from the relay block, and then turn the key switch to ON (engine in stopped state). Check the continuity between OPS lamp relay pin 1 and the frame with no one on the seat.

Analyzer: MAIN MENU → OPS → ANALYZER MENU → ACTIVE TEST

**Standard:**

Forcibly turn the OPS lamp ON and OFF, and check the continuity.

	Lamp ON signal	Lamp OFF signal
Between relay pin 1 and frame	No continuity	Continuity



OPS LAMP RLY

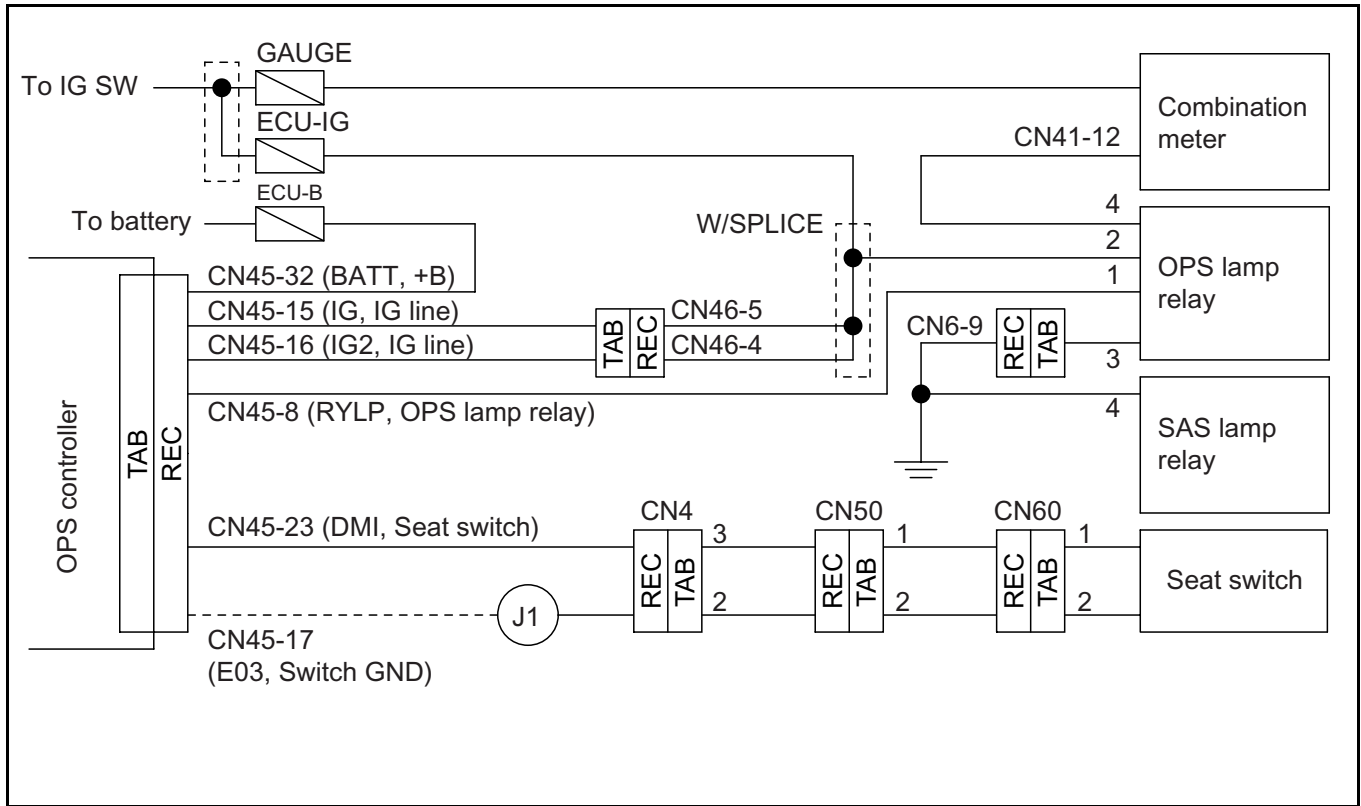
(2) Turn the key switch to OFF, reinstall the OPS lamp relay, and then turn the key switch to ON (engine in stopped state). Measure the voltage between OPS lamp relay pins 3 and 4.

Standard:

	Lamp ON	Lamp OFF
Between relay pins 3 and 4	0 V	Approx. 12 V

- The OPS lamp keeps lighting. (Including when traveling and material handling are both disabled)

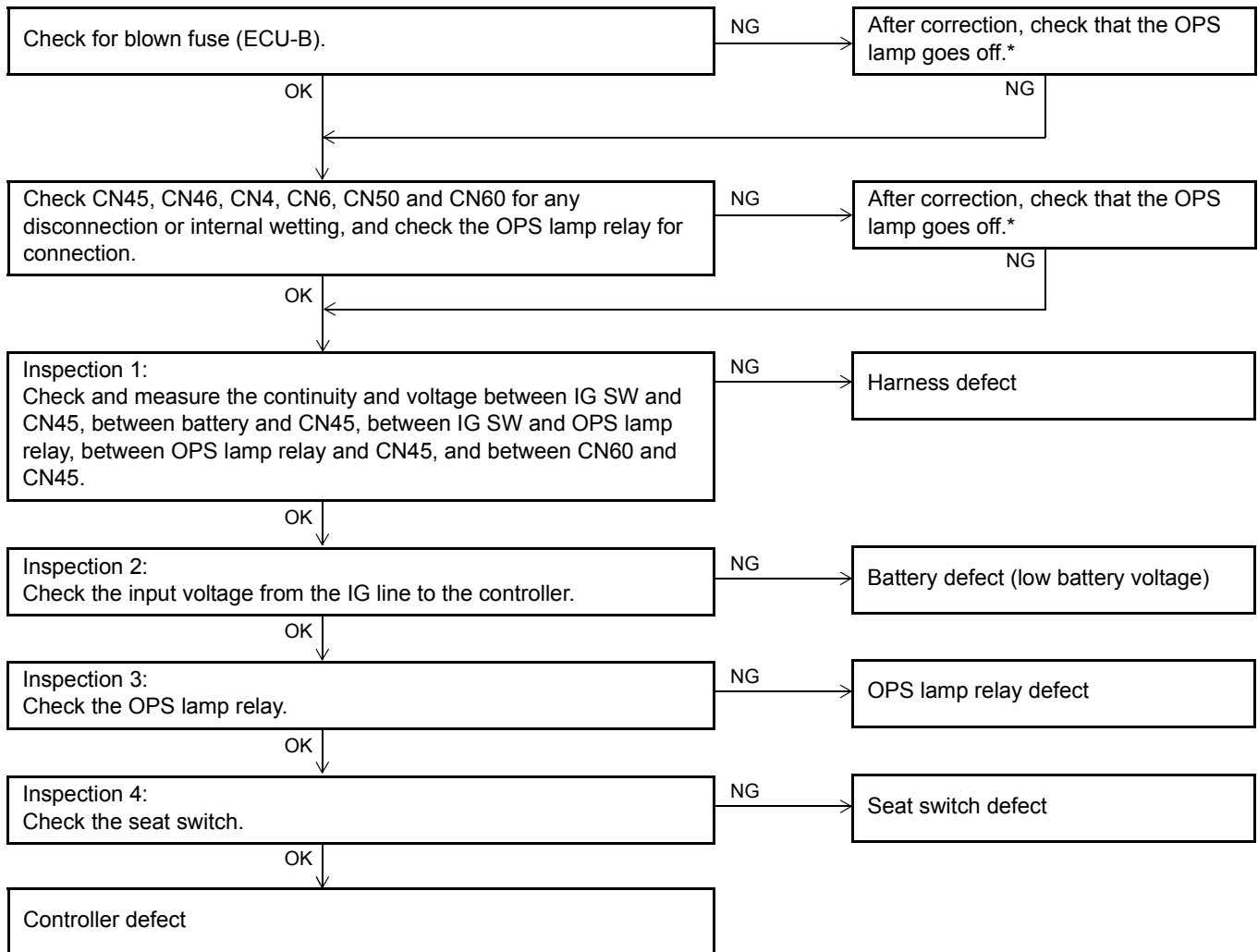
Related Portion



Estimated Causes:

- | | |
|----------------------------|-----------------------------|
| ① Contactor contact defect | ⑤ Controller defect |
| ② OPS lamp defect | ⑥ Fuse defect |
| ③ OPS lamp relay defect | ⑦ Low battery voltage |
| ④ Harness defect | ⑧ Seat switch discontinuity |

Without Analyzer



*: After correction, check that the OPS lamp goes off.

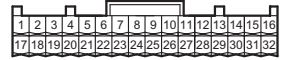
After connecting all connectors, turn the key switch to ON while staying on the seat (engine in stopped state). Check that the OPS lamp goes off in 1 second.

Inspection 1:

Check and measure the continuity and voltage between IG SW and CN45, between the battery and CN45, between IG SW and OPS lamp relay, between OPS lamp relay and CN45, and between CN60 and CN45. Turn the key switch to OFF, disconnect CN45, CN60 and IG SW connector, and then remove the OPS lamp relay.

Standard:

IG SW-4 ~ CN45-16	Continuity
IG SW-4 ~ CN45-15	Continuity
Between IG SW-4 and relay pin 2	Continuity
Between CN45-8 and relay pin 1	Continuity
CN45-23 ~ CN60-1	Continuity
CN45-17 ~ CN60-2	Continuity
CN45-15 ~ CN45-31	No continuity
CN45-16 ~ CN45-31	No continuity
Between frame and relay pin 4	No continuity
CN45-32 ~ CN45-31	Approx. 12 V



CN45 (REC)



CN60 (REC)



IG SW



OPS LAMP RLY

Inspection 2:

Check the input voltage from the IG line to the controller. Disconnect CN45 and turn the key switch to ON. (Connectors other than CN45 must be connected).

Standard:

CN45-15 ~ CN45-31	11 V or more
CN45-16 ~ CN45-31	11 V or more

Inspection 3:

Check the OPS lamp relay.

- (1) Turn the key switch to OFF, remove the OPS lamp relay from the relay block, and then turn the key switch to ON (engine in stopped state). Check the continuity between OPS lamp relay pin 1 and frame with no one on the seat.

Standard:

	Lamp ON	Lamp OFF
Between relay pin 1 and frame	No continuity	Continuity



OPS LAMP RLY

- (2) Turn the key switch to OFF, reinstall the OPS lamp relay, and then turn the key switch to ON (engine in stopped state). Measure the voltage between OPS lamp relay pins 3 and 4.

Standard:

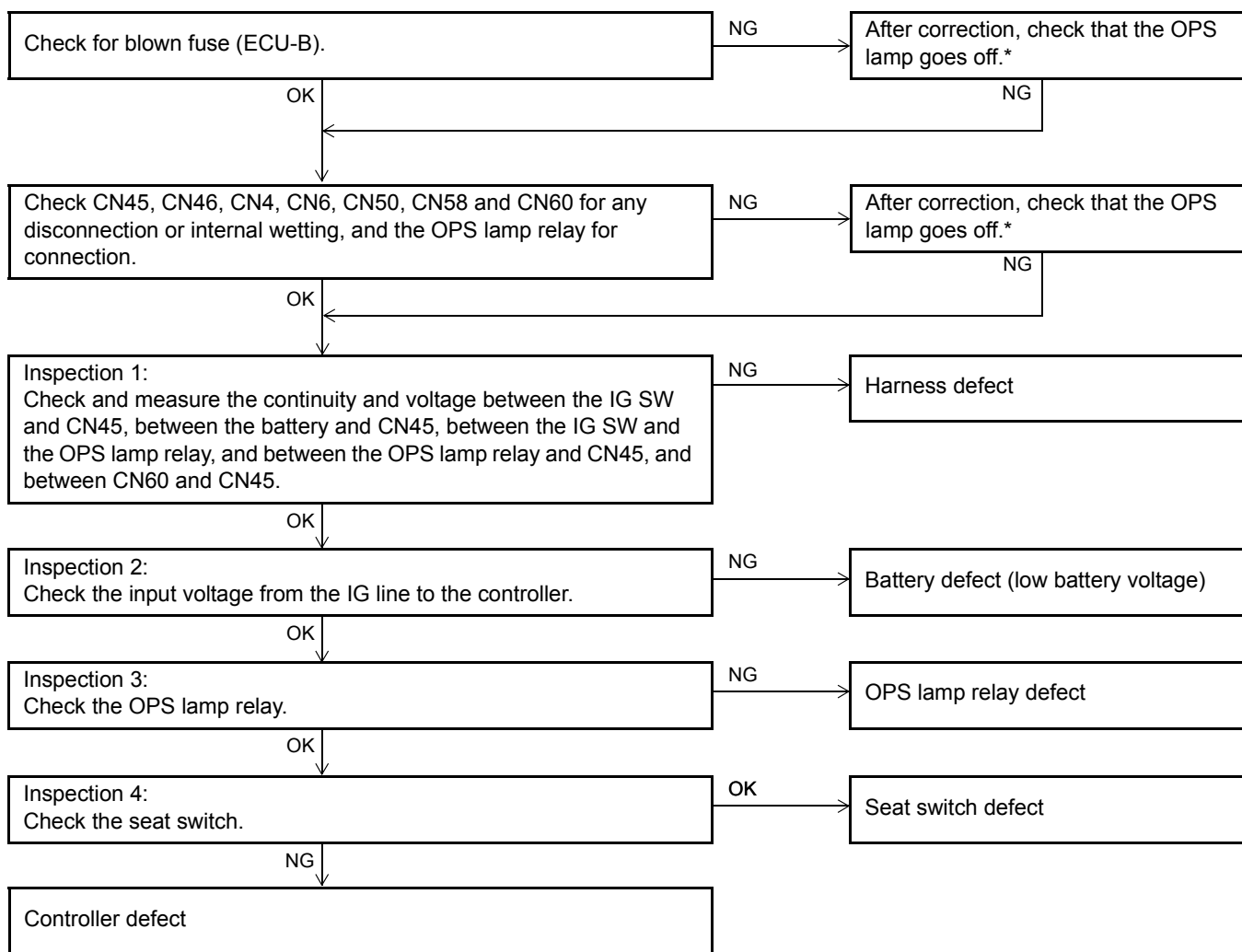
	Lamp ON	Lamp OFF
Between relay pins 3 and 4	0 V	Approx. 12 V

Inspection 4:

Check the individual seat switch for continuity.
Turn the key switch to OFF, and disconnect CN60.

Standard:

	Seated	Unseated
CN60-1 ~ CN60-2	Continuity	No continuity

**With Analyzer**

*: After correction, check that the OPS lamp goes off.

After connecting all connectors, turn the key switch to ON with no one on the seat (engine in stopped state).
Check that the OPS lamp goes off in 1 second.

Inspection 1:

Check and measure the continuity and voltage between the IG SW and CN45, between the battery and CN45, between the IG SW and the OPS lamp relay, between the OPS lamp relay and CN45, and between CN60 and CN45. Turn the key switch to OFF, disconnect CN45, CN60 and IG SW connector, and then remove the OPS lamp relay.

Standard:

IG SW-4 ~ CN45-16	Continuity
IG SW-4 ~ CN45-15	Continuity
Between IG SW-4 and relay pin 2	Continuity
Between CN45-8 and relay pin 1	Continuity
CN45-23 ~ CN60-1	Continuity
CN45-17 ~ CN60-2	Continuity
CN45-15 ~ CN45-31	No continuity
CN45-16 ~ CN45-31	No continuity
Between frame and relay pin 4	No continuity
CN45-32 ~ CN45-31	Approx. 12 V



CN45 (REC)



CN60 (REC)



IG SW



OPS LAMP RLY

Inspection 2:

Check the input voltage from the IG line to the controller.

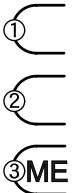
After connecting all connectors, turn the key switch to ON (engine in stopped state).

Analyzer: MAIN MENU → OPS → ANALYZER MENU → IN/OUT MONITOR

Standard:

	Key ON
VOLTAGE	11 V or more

IN/OUT MONITOR (1/3)		
SEAT	ON	
DIR FWD	OFF	
REV	OFF	
RLY FWD	OFF	
REV	OFF	
VOLTAGE	14.2V	



Inspection 3:

Check the OPS lamp relay.

(1) Turn the key switch to OFF, remove the OPS lamp relay from the relay block, and then turn the key switch to ON (engine in stopped state). Check the continuity between OPS lamp relay pin 1 and the frame with no one on the seat.

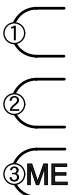
Analyzer: MAIN MENU → OPS → ANALYZER MENU → ACTIVE TEST

Standard:

Forcibly turn the OPS lamp to on and off, and check the continuity.

	Lamp ON signal	Lamp OFF signal
Between relay pin 1 and frame	No continuity	Continuity

ACTIVE TEST (1/1)		
RLY FWD	OFF / ON	
RLY REV	OFF / ON	
UNLOAD SOL	OFF / ON	
LWR SOL	OFF / ON	
TILT SOL	OFF / ON	
LAMP	OFF / ON	
BUZZER	OFF / ON	



(2) Turn the key switch to OFF, reinstall the OPS lamp relay, and then turn the key switch to ON (engine in stopped state). Measure the voltage between OPS lamp relay pins 3 and 4.

Standard:

	Lamp ON	Lamp OFF
Between relay pins 3 and 4	0 V	Approx. 12 V



OPS LAMP RLY

Inspection 4:

Check the seat switch individually.
Turn the key switch to OFF and disconnect CN60.

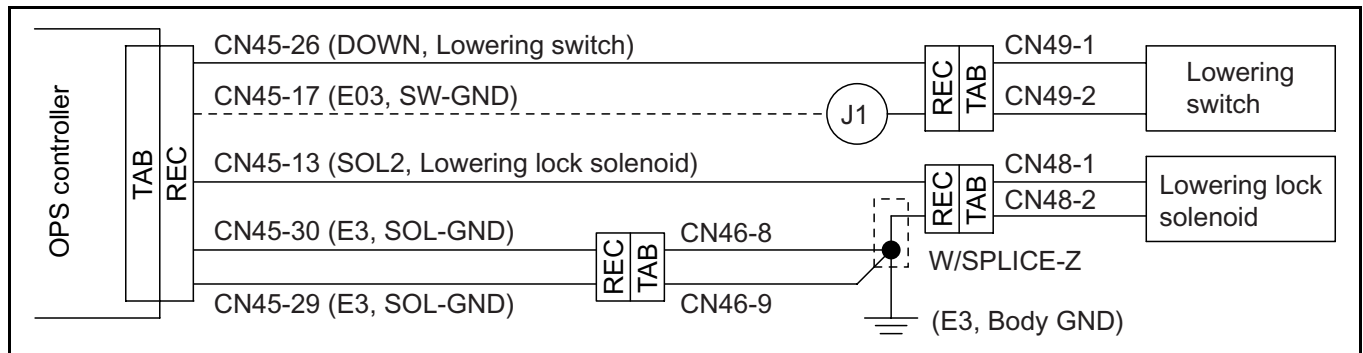


Standard:

	Seated	Unseated
CN60-1 ~ CN60-2	Continuity	No continuity

● Cannot lower the fork. (Excluding mini-lever vehicle)

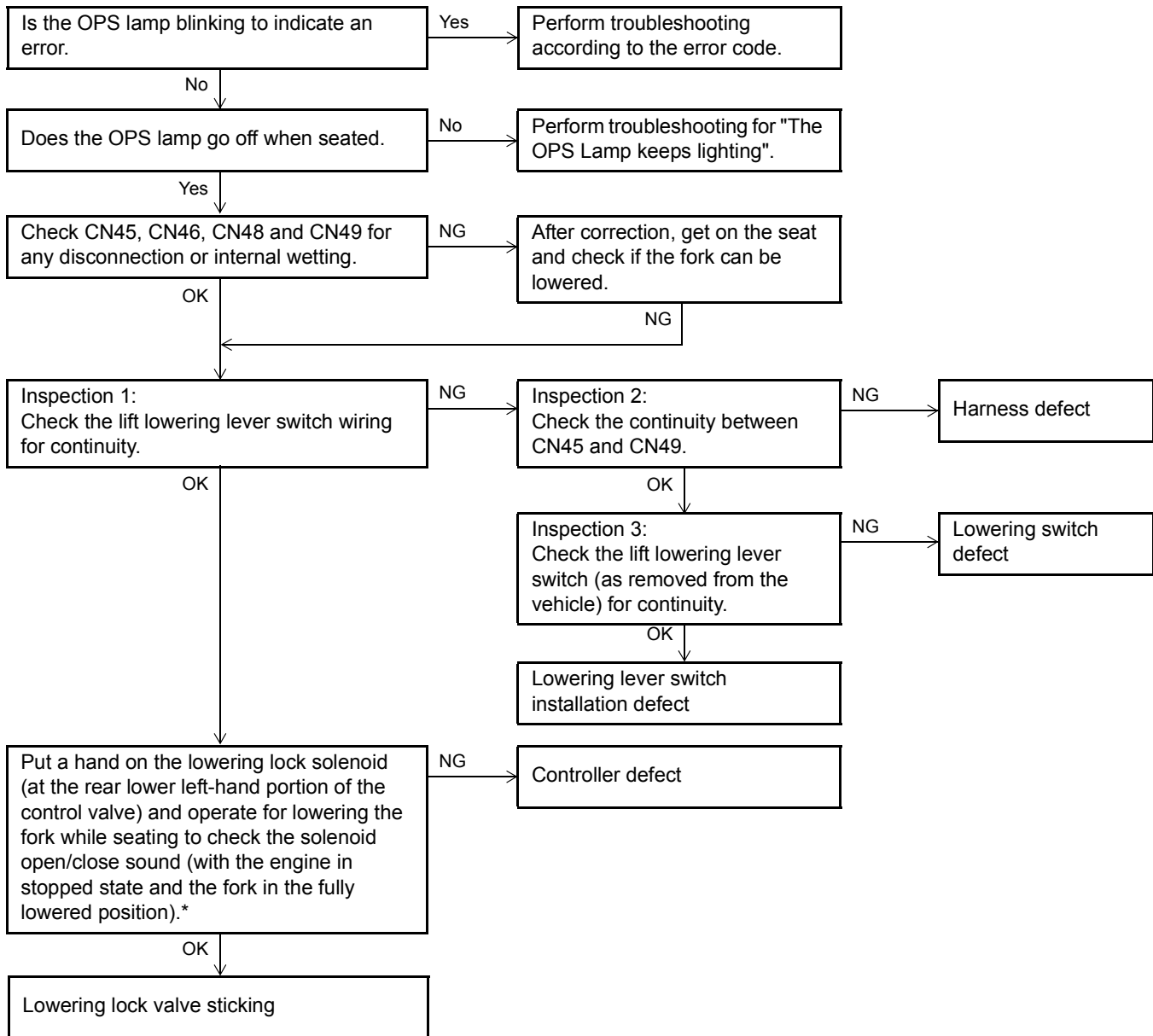
Related Portion



Estimated Causes:

- | | |
|---|---|
| ① Connector contact defect | ④ Lowering lever switch installation defect |
| ② Lowering switch defect | ⑤ Controller defect |
| ③ Control valve lowering lock valve sticking defect | ⑥ Harness defect |

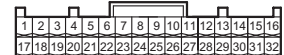
Without Analyzer

**Caution:**

*: Be careful so as not to get burnt because the solenoid may be hot.

Inspection 1:

Check the lift lowering lever switch wiring for continuity.
Turn the key switch to OFF and disconnect CN45.



CN45 (REC)

Standard:

	Lever at neutral position	Lever at up position	Lever at lowering position
CN45-26 ~ CN45-17	No continuity	No continuity	Continuity

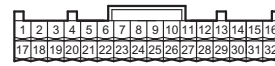
Inspection 2:

Check the continuity between CN45 and CN49.

Turn the key switch OFF, and disconnect CN45 and CN49.

Standard:

CN45-26 ~ CN49-1	Continuity
CN45-17 ~ CN49-2	Continuity



CN45 (REC)



CN49 (REC)

Inspection 3:

Check the lift lowering lever switch individually (as removed from the vehicle) for continuity.

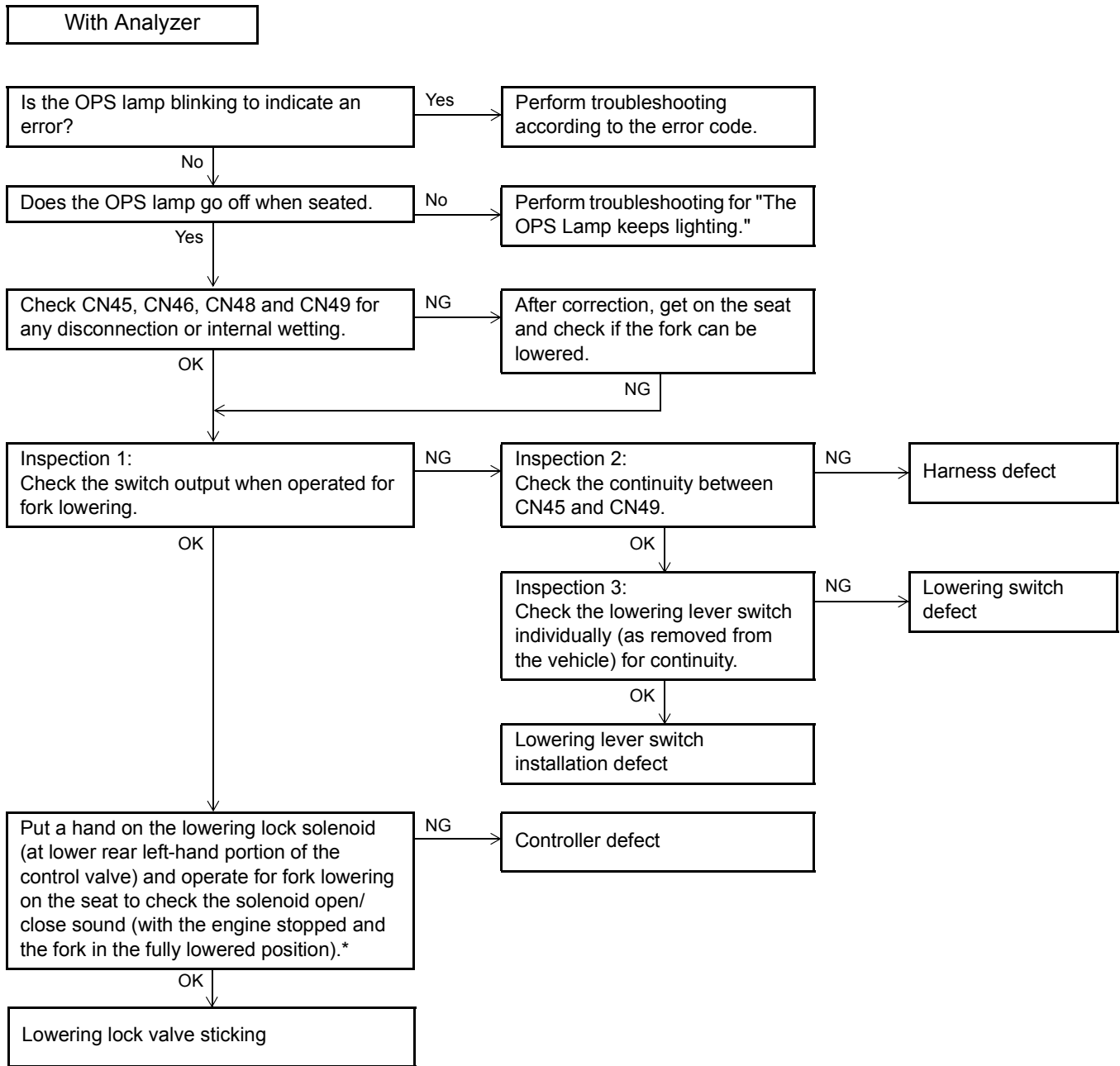
Turn the key switch OFF, and disconnect CN49.

Standard:

	Free	Pressed
CN49-1 ~ CN49-2	Continuity	No continuity



CN49 (TAB)

**Caution:**

*: Be careful so as not to get burnt because the solenoid may be hot.

Inspection 1:

Check the switch output when operated for lowering.

Turn the key switch to ON (engine in stopped state).

Analyzer: MAIN MENU → OPS → ANALYZER MENU → IN/OUT MONITOR

IN/OUT MONITOR (2/3)			①
SEAT	LOWER	ON	② ↓
LIFT	SOL	OFF	
UNLOAD	SOL	OFF	
LWR	SOL	OFF	
TILT	SOL	OFF	③ ME
VOLTAGE		14.2V	

Standard:

	Lever at neutral position	Lever at up position	Lever at lowering position
LIFT LOWER	OFF	OFF	ON

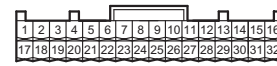
Inspection 2:

Check the continuity between CN45 and CN49.

Turn the key switch to OFF, and disconnect CN45 and CN49.

Standard:

CN45-26 ~ CN49-1	Continuity
CN45-17 ~ CN49-2	Continuity



CN45 (REC)



CN49 (REC)

Inspection 3:

Check the lift lowering lever switch individually (as removal from the vehicle) for continuity.

Turn the key switch to OFF, and disconnect CN49.

Standard:

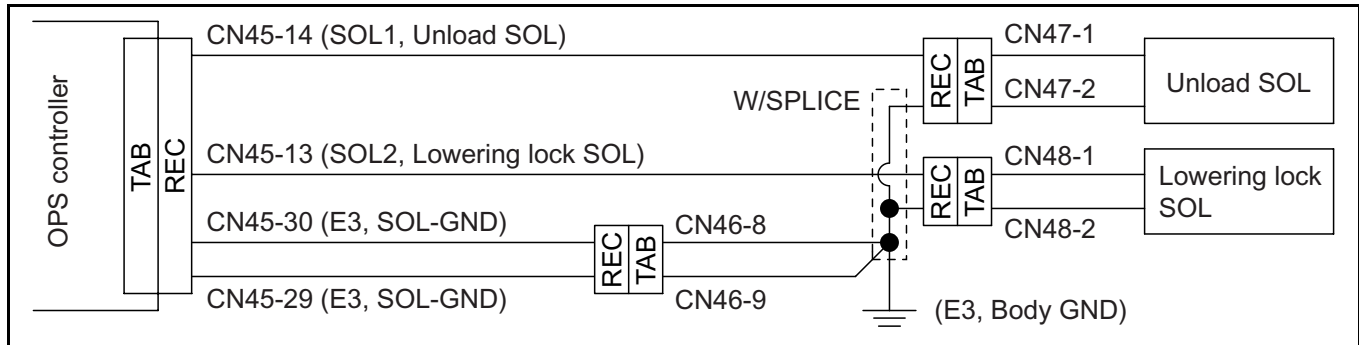
	Free	Pressed
CN49-1 ~ CN49-2	Continuity	No continuity



CN49 (TAB)

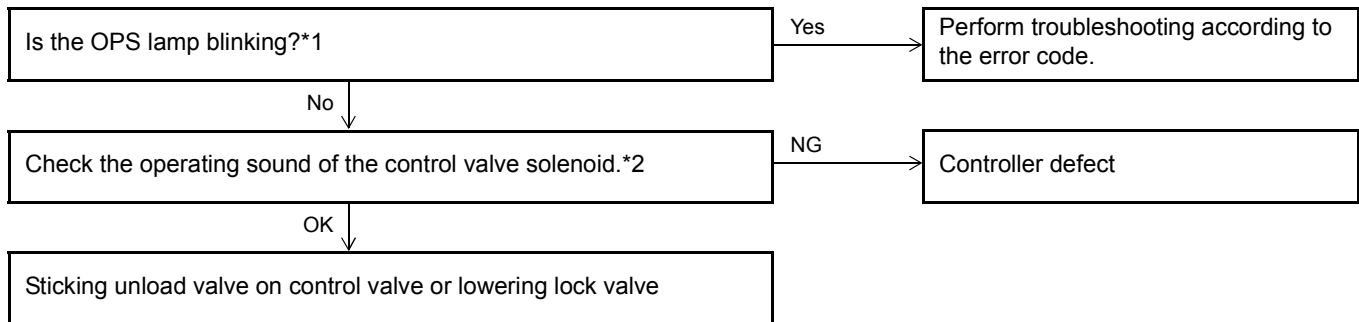
- The material handling OPS does not function (Including when lowering and forward tilting are disabled).

Related Portion



Estimated Causes:

- ① Controller defect
- ② Control valve unload valve or lowering lock valve defect



*1: Check if the OPS lamp is blinking.

Turn the key switch to OFF → ON (2 seconds or more) → OFF with no one on the seat. Leave the vehicle as it is for 15 minutes or more, and turn the key switch to ON again to confirm that the OPS lamp does not blink.

*2: Check the control valve solenoid operating sound.

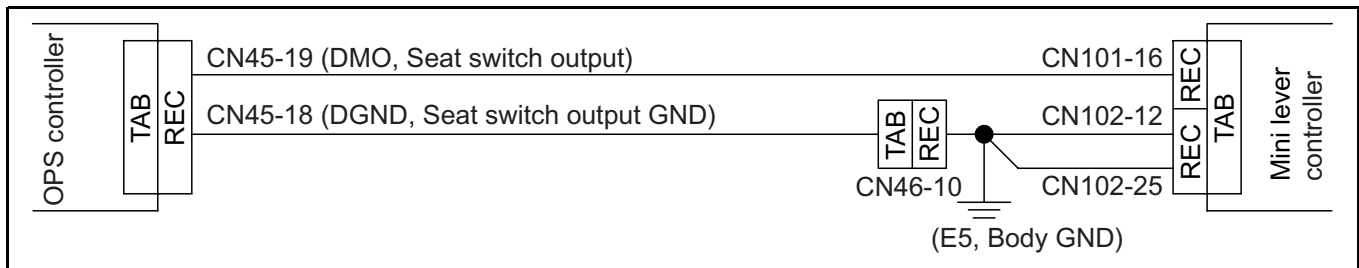
- Turn the key switch to ON (engine in stopped state) and put a hand on the unload solenoid of the control valve to check the solenoid open/close sound is heard in 2 seconds after leaving the seat or upon getting on the seat.
- Put a hand on the lowering lock solenoid of the control valve while seating to confirm the solenoid open/close sound is heard upon fork lowering operation.

Caution:

*2: Be careful so as not to get burnt because the solenoid may be hot.

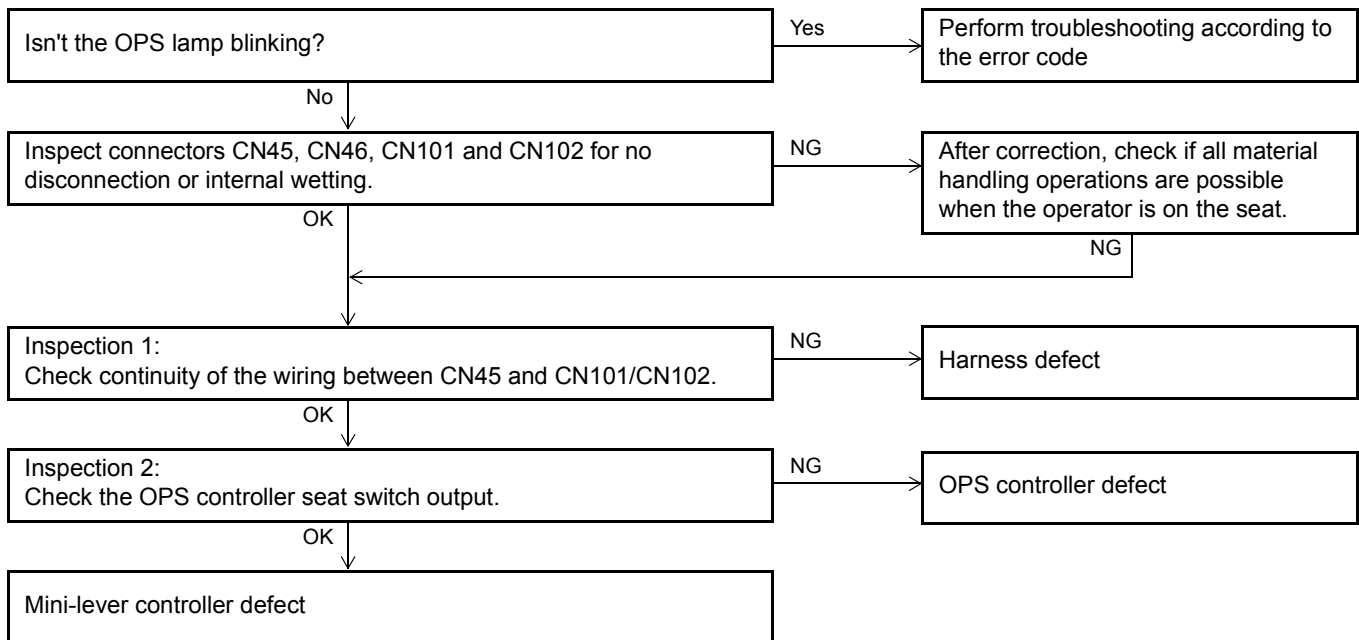
● Material handling OPS does not function. (Mini-lever vehicle)

Related Portion



Estimated Causes:

- ① Connector contact defect
- ② Harness defect
- ③ OPS controller defect
- ④ Mini-lever controller defect



*: Make sure that the OPS lamp does not blink.

Set the key switch OFF → ON (2 sec or more) → OFF with no one on the seat. After waiting for 15 minutes without any operation, turn the key switch ON again and make sure that the OPS lamp does not blink.

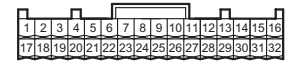
Inspection 1:

Check continuity between CN45 and CN101/CN102.

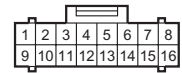
Key switch OFF, and CN45, CN101, CN102 disconnection

Standard:

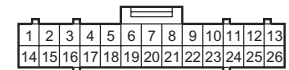
CN45-19 ~ CN101-16	Continuity
CN45-18 ~ CN102-12	Continuity
CN45-18 ~ CN102-25	Continuity
CN45-19 ~ CN45-18	No continuity
CN45-19 - Frame	No continuity



CN45 (REC)



CN101 (REC)



CN102 (REC)

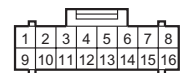
Inspection 2:

Inspect the OPS controller seat switch output.

CN101 and CN102 disconnection, key switch ON (engine in stopped state)

Standard:

Tester		Seated	Unseated
Digital	CN101-16 (+) ~ CN102-12 (-)	Continuity	No continuity
Analog	CN101-16 (-) ~ CN102-12 (+)	Continuity	No continuity



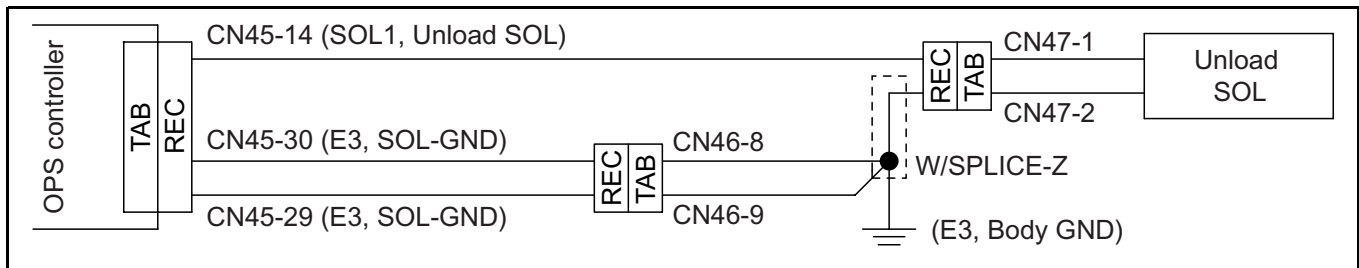
CN101 (REC)



CN102 (REC)

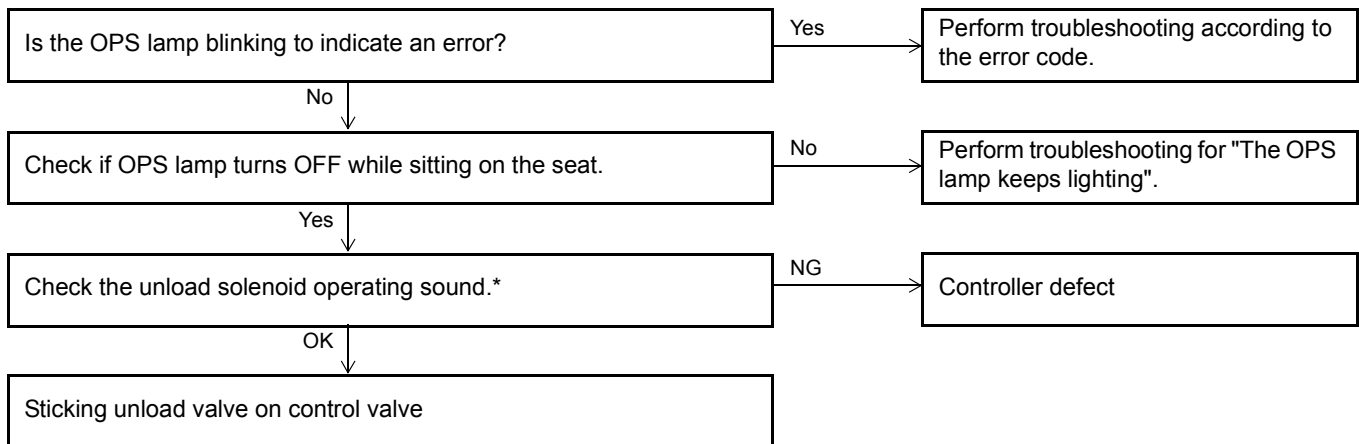
● Material handling fails (Including when fork lowering is disabled)

Related Portion



Estimated Causes:

- ① Sticking unload valve on control valve
- ② Controller defect



*: Check the control valve solenoid operating sound.

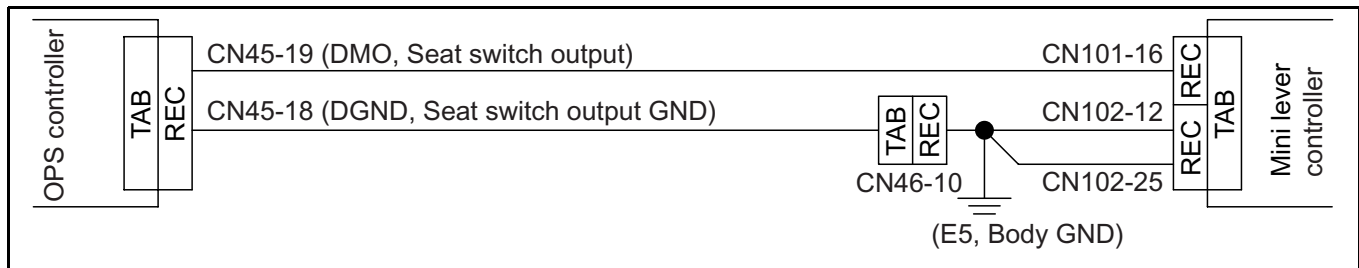
Turn the key switch to ON (engine in stopped state) and put a hand on the unload solenoid of the control valve to check if the solenoid open/close sound is heard in 2 seconds after leaving the seat or upon getting on the seat.

Caution:

*: Be careful so as not to get burnt because the solenoid may be hot.

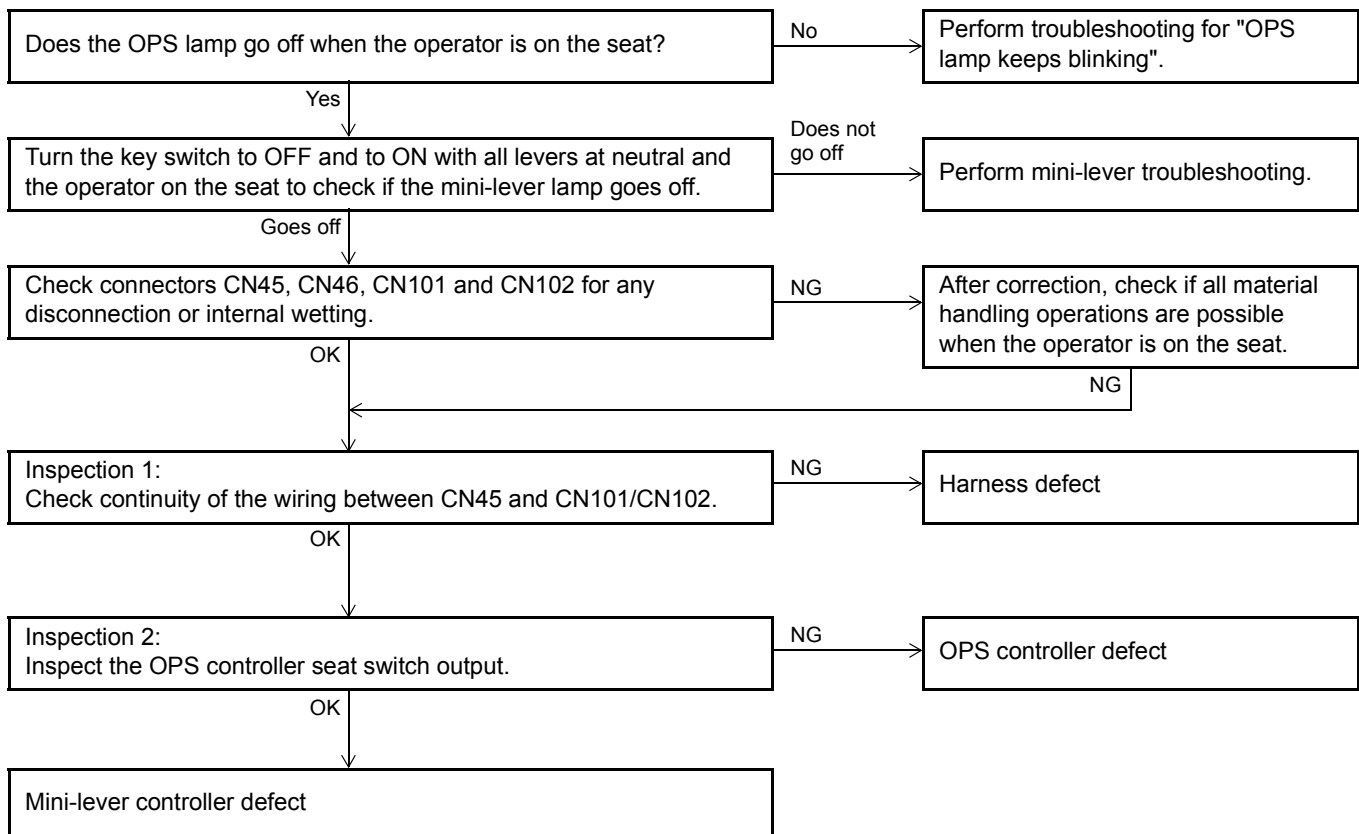
● Material handling fails. (mini-lever vehicle)

Related Portion



Estimated Causes:

- ① Connector contact defect
- ② Harness defect
- ③ OPS controller defect
- ④ Mini-lever controller defect

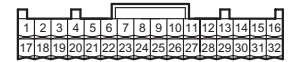


Inspection 1:

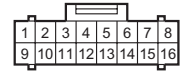
Check continuity between CN45 and CN101/CN102.
Key switch OFF, CN45, CN101 and CN102 disconnection

Standard:

CN45-19 ~ CN101-16	Continuity
CN45-18 ~ CN102-12	Continuity
CN45-18 ~ CN102-25	Continuity



CN45 (REC)



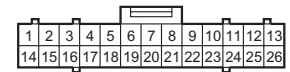
CN101 (REC)

Inspection 2:

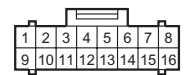
Check the OPS controller seat switch output.
CN101 and CN102 disconnection, key switch ON (engine in stopped state)

Standard:

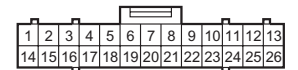
Tester		Seated	Unseated
Digital	CN101-16 (+) ~ CN102-12 (-)	Continuity	No continuity
Analog	CN101-16 (-) ~ CN102-12 (+)	Continuity	No continuity



CN102 (REC)



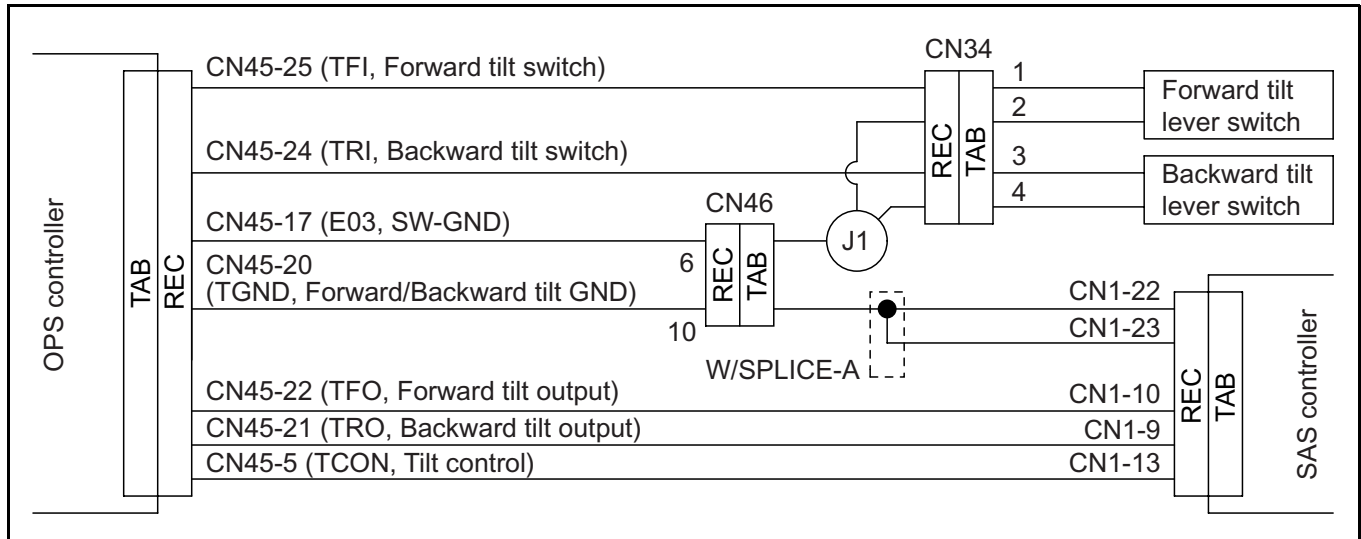
CN101 (REC)



CN102 (REC)

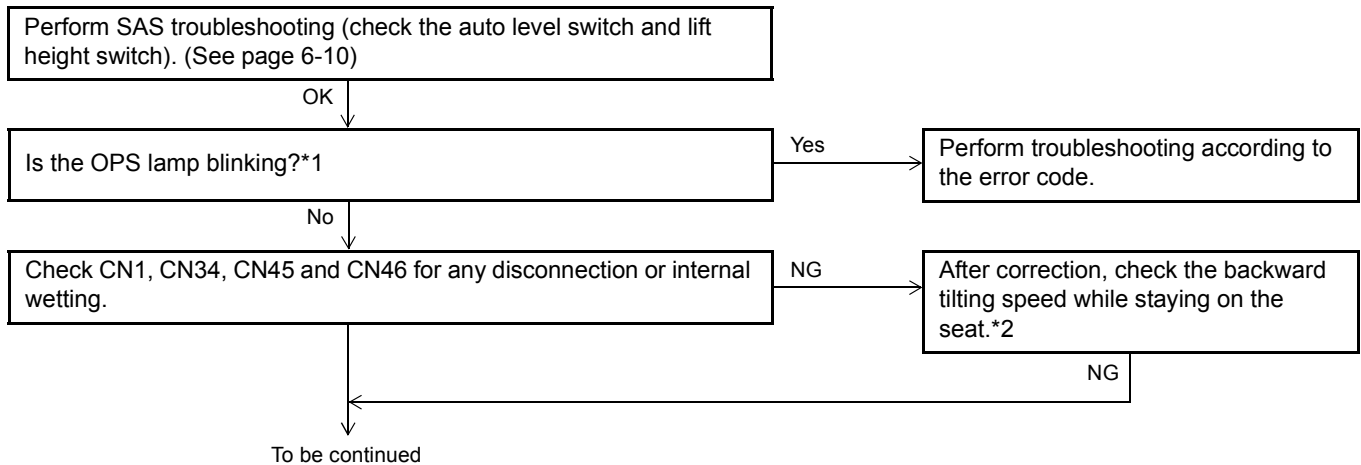
- The mast backward tilting speed is always slow or unrestricted. (Excluding the mini-lever vehicle)

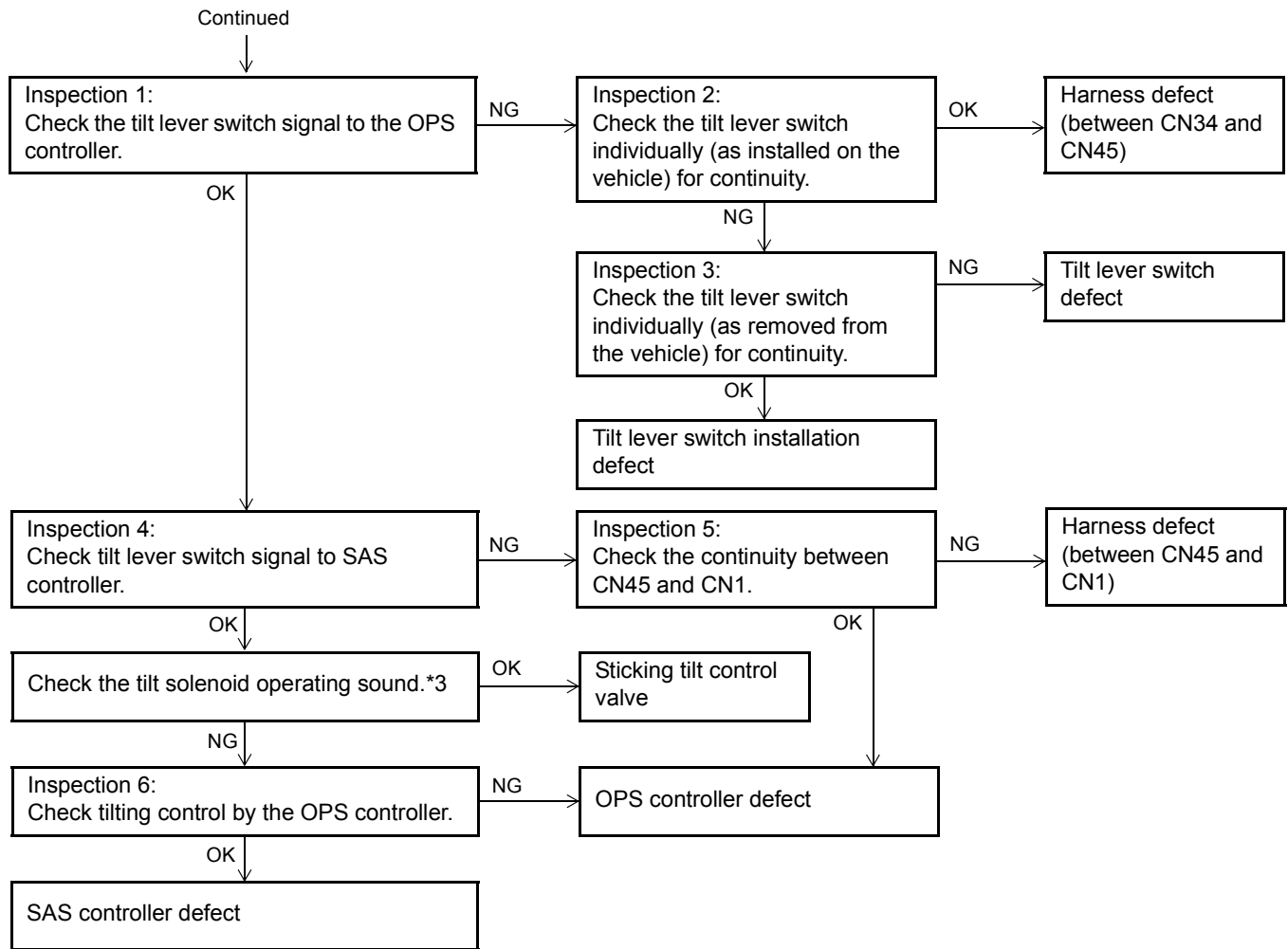
Related Portion



Estimated Causes:

- | | |
|---|-------------------------------|
| ① Connector contact defect | ⑤ Sticking tilt control valve |
| ② Harness defect | ⑥ OPS controller defect |
| ③ Tilt lever switch defect | ⑦ SAS controller defect |
| ④ Tilt lever switch installation defect | |





*1: Check if the OPS lamp is blinking.

Turn the key switch to OFF → ON (2 seconds or more) → ON with no one on the seat. Leave the vehicle as it is for 15 minutes or more, and turn the key switch to ON again to confirm that the OPS lamp does not blink.

*2: After correction, check the backward tilting speed while staying on the seat.

After turning the key switch to ON while staying on the seat, check the mast backward tilting speed.

*3: Check the tilt solenoid operating sound.

Turn the key switch to ON (engine in stopped state) and put a hand on the tilt solenoid of the control valve to check the solenoid open/close sound upon forward tilting operation with the unloaded fork at a height of 500 mm (20 inches).

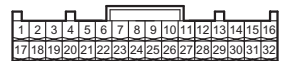
Caution:

***3: Be careful so as not to get burnt because the solenoid may be hot.**

Inspection 1:

Check the tilt lever switch signal to the OPS controller.

Turn the key switch to OFF and disconnect CN45. (CN34 and CN46 must be connected.)



CN45 (REC)

Standard

	Lever at neutral position	Lever at forward tilt position	Lever at backward tilt position
CN45-25 ~ CN45-17	No continuity	Continuity	No continuity
CN45-24 ~ CN45-17	No continuity	No continuity	Continuity

Inspection 2:

Check the tilt lever switch individually (as installed on the vehicle) for continuity.
Turn the key switch to OFF and disconnect CN34.

Standard:

	Lever at neutral position	Lever at forward tilt position	Lever at backward tilt position
CN34-1 ~ CN34-2	No continuity	Continuity	No continuity
CN34-3 ~ CN34-4	No continuity	No continuity	Continuity



CN34 (TAB)

Inspection 3:

Check the tilt lever switch individually (as removed from the vehicle) for continuity.
Turn the key switch to OFF and disconnect CN34.

Standard:

- Forward tilting switch (upper switch as installed on the vehicle)

	Free	Pressed
CN34-1 ~ CN34-2	Continuity	No continuity

- Backward tilting switch (lower switch as Installed on the vehicle)

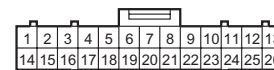
	Free	Pressed
CN34-3 ~ CN34-4	Continuity	No continuity



CN34 (TAB)

Inspection 4:

Check the tilt lever switch signal to the SAS controller.
Disconnect CN1 and turn the key switch to ON (engine in stopped state).



CN1 (REC)

Standard:

Circuit tester		Lever at neutral position	Lever at forward tilt position	Lever at backward tilt position
Digital type	CN1-10 (+) ~ CN1-23 (-)	No continuity	Continuity	No continuity
	CN1-9 (+) ~ CN1-23 (-)	No continuity	No continuity	Continuity
Analog type	CN1-10 (-) ~ CN1-23 (+)	No continuity	Continuity	No continuity
	CN1-9 (-) ~ CN1-23 (+)	No continuity	No continuity	Continuity

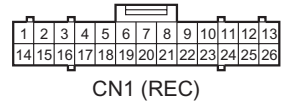
Note:

As the key switch is turned to ON with the connector disconnected for this inspection, the SAS lamp comes on and the error code (F1) appears.

Inspection 5:

Check the continuity between CN45 and CN1.

Turn the key switch to OFF, and disconnect CN1 and CN45. (CN46 must be connected.)

**Standard:**

CN45-22 ~ CN1-10	Continuity
CN45-21 ~ CN1-9	Continuity
CN45-20 ~ CN1-23	Continuity
Between CN45-22 and frame	No continuity
Between CN45-21 and frame	No continuity

**Inspection 6:**

Check the tilt control by the OPS controller.

Disconnect CN1 and turn the key switch to ON. (CN34 and CN46 must be connected).

Operate the tilt lever to check the mast movement.

Standard:

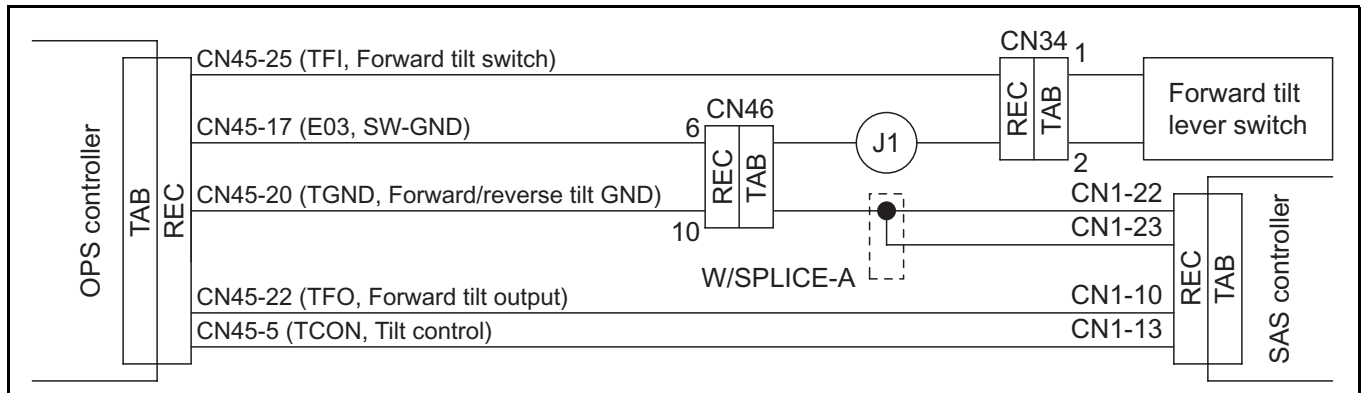
Lever at neutral position	Mast does not move.
Lever at forward tilt position	Mast tilts forward.
Lever at backward tilt position	Mast tilts backward at the normal speed.

Note:

As the key switch is turned to ON with the connector disconnected for this inspection, the SAS lamp comes on and the error code (F1) appears.

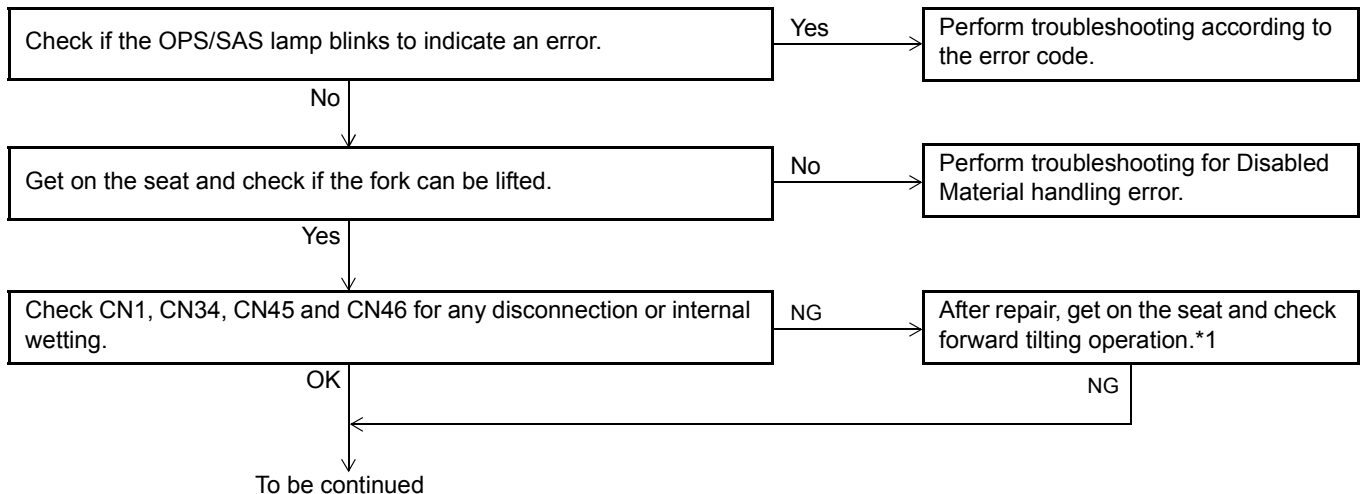
● Mast forward tilting fails. (Excluding the mini-lever vehicle)

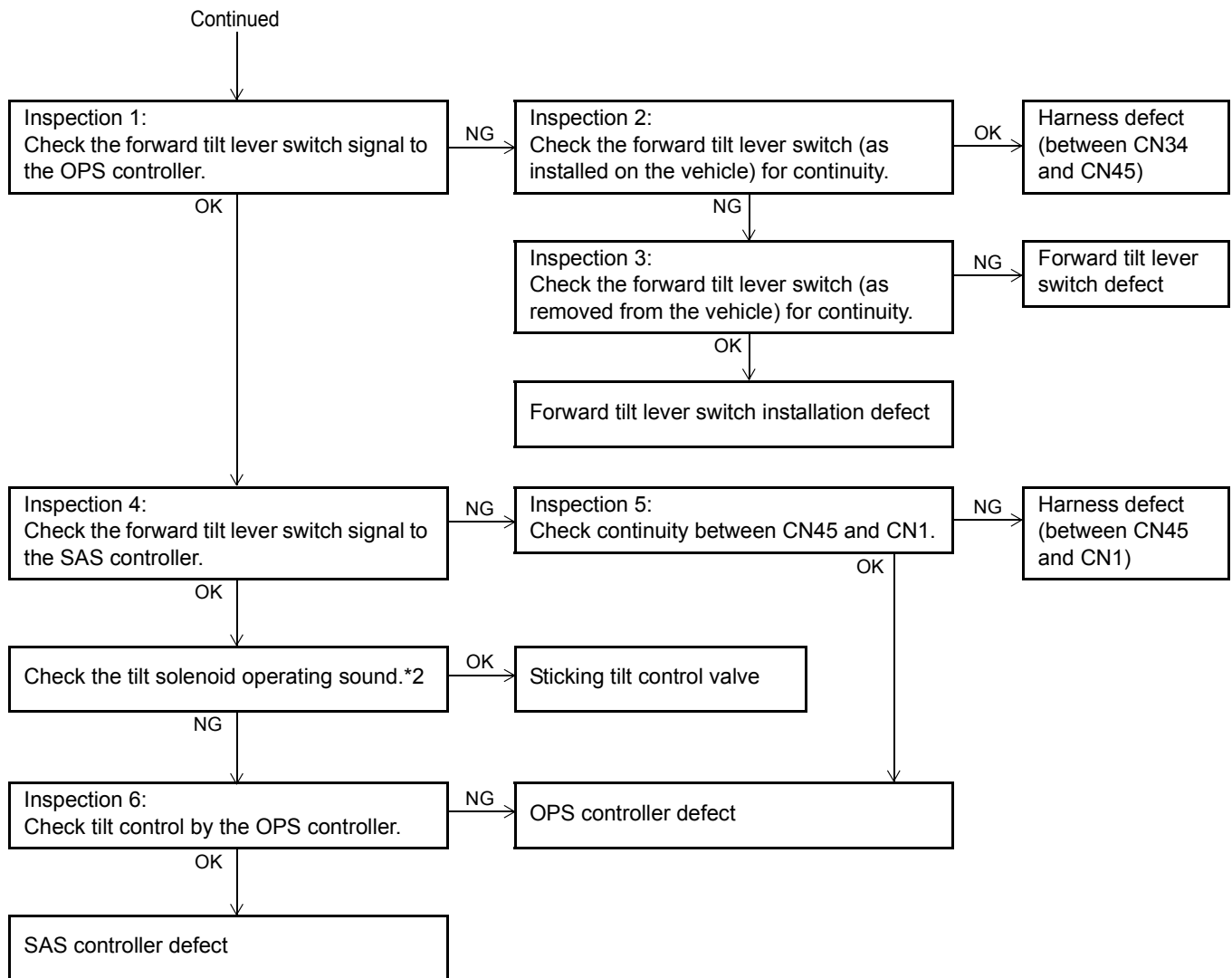
Related Portion



Estimated Causes:

- | | |
|---|-------------------------------|
| ① Connector contact defect | ⑤ Sticking tilt control valve |
| ② Harness defect | ⑥ OPS controller defect |
| ③ Forward tilt lever switch defect | ⑦ SAS controller defect |
| ④ Forward tilt lever switch installation defect | |





*1: Get on the seat and check forward tilting operation:

Stay on the seat and turn the key switch to ON. Operate the tilt lever with the unloaded fork at a height of 500 mm (20 inches) to check if the mast can be tilted forward.

*2: Check for tilt solenoid operating sound:

Stay on the seat and turn the key switch to ON (with the engine in stopped state). Put a hand on the tilt solenoid of the control valve with the unloaded fork at a height of 500 mm (20 inches) to check for the solenoid operating sound when the tilt lever is operated toward the forward tilting side.

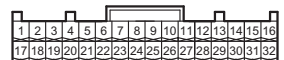
Caution:

***2: Be careful so as not to get burnt because the solenoid may be hot.**

Inspection 1:

Check the forward tilt lever switch signal to the OPS controller.

Key switch OFF, CN45 disconnection. (CN34 and CN46 must be connected.)



CN45 (REC)

Standard:

	Lever at neutral position	Lever at forward position	Lever at backward position
CN45-25 ~ CN45-17	No continuity	Continuity	No continuity

Inspection 2:

Check the forward tilt lever switch (as installed on the vehicle) for continuity.
Key switch OFF, CN34 disconnection.



CN34 (TAB)

Standard:

	Lever at neutral position	Lever at forward tilt position	Lever at backward tilt position
CN34-1 ~ CN34-2	No continuity	Continuity	No continuity

Inspection 3:

Check the forward tilt lever switch (as removed from the vehicle) for continuity.
Key switch OFF, CN34 disconnection



CN34 (TAB)

Standard:

Tilt forward switch (upper switch when installed on the vehicle)

	Free	Pressed
CN34-1 ~ CN34-2	Continuity	No continuity

Inspection 4:

Check the forward tilt lever switch signal to the SAS controller.
CN1 disconnection, key switch ON (with the engine in stopped state)



CN1 (REC)

Standard:

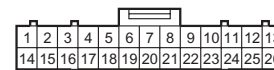
Circuit tester		Lever at neutral position	Lever at forward tilt position	Lever at backward tilt position
Digital type	CN1-10(+) ~ CN1-23(-)	No continuity	Continuity	No continuity
Analog type	CN1-10(-) ~ CN1-23(+)	No continuity	Continuity	No continuity

Note:

As the key switch is turned to ON with the connector disconnected for this inspection, the SAS lamp comes on and the error code (F1) appears.

Inspection 5:

Check continuity between CN45 and CN1.
Key switch OFF, CN1 and CN45 disconnection.



CN1 (REC)

Standard:

CN45-22 ~ CN1-10	Continuity
CN45-20 ~ CN1-23	Continuity



CN45 (REC)

Inspection 6:

Check tilt control by the OPS controller.
CN1 disconnection, key switch ON. (CN34 and CN46 must be connected.)
Operate the tilt lever and check the mast movement.

Standard:

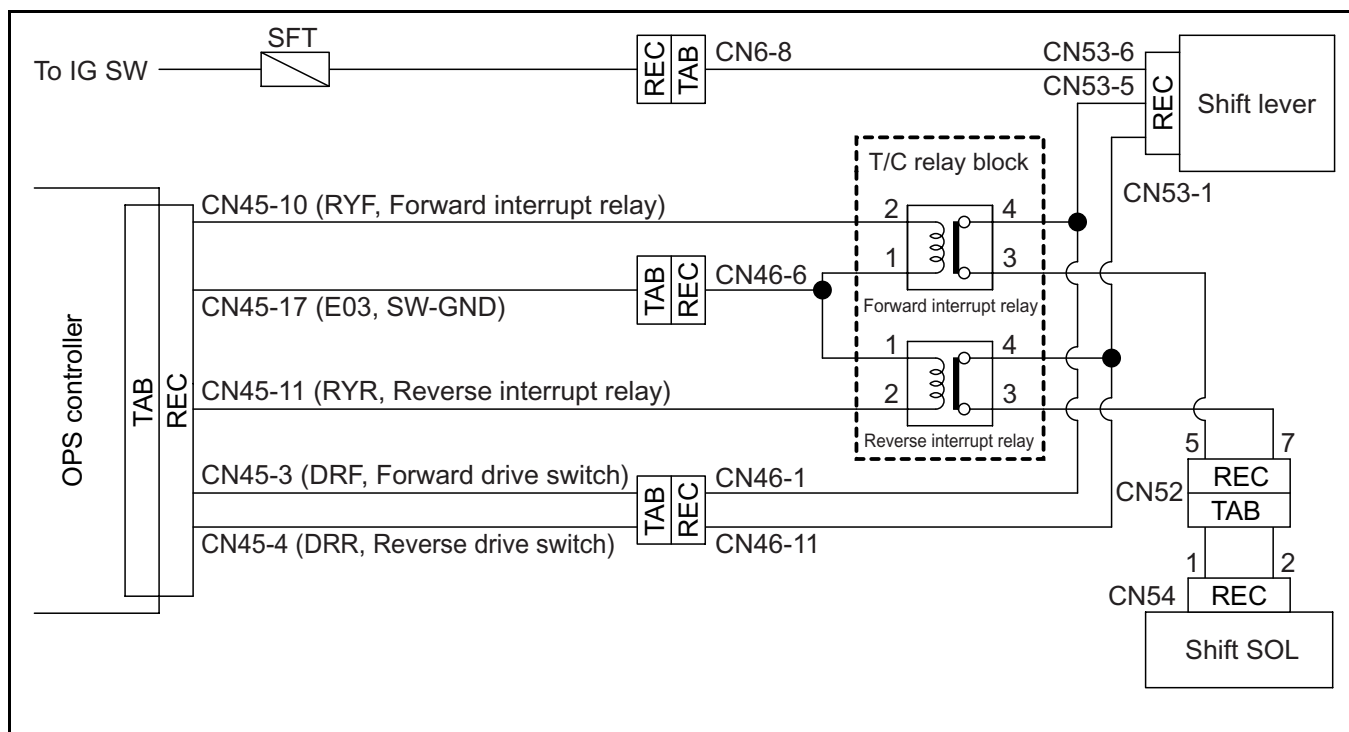
Lever at neutral position	Mast does not move.
Lever at forward tilt position	Mast tilts forward.
Lever at backward tilt position	Mast tilts backward at the normal speed.

Note:

As the key switch is turned to ON with the connector disconnected for this inspection, the SAS lamp comes on and the error code (F1) appears.

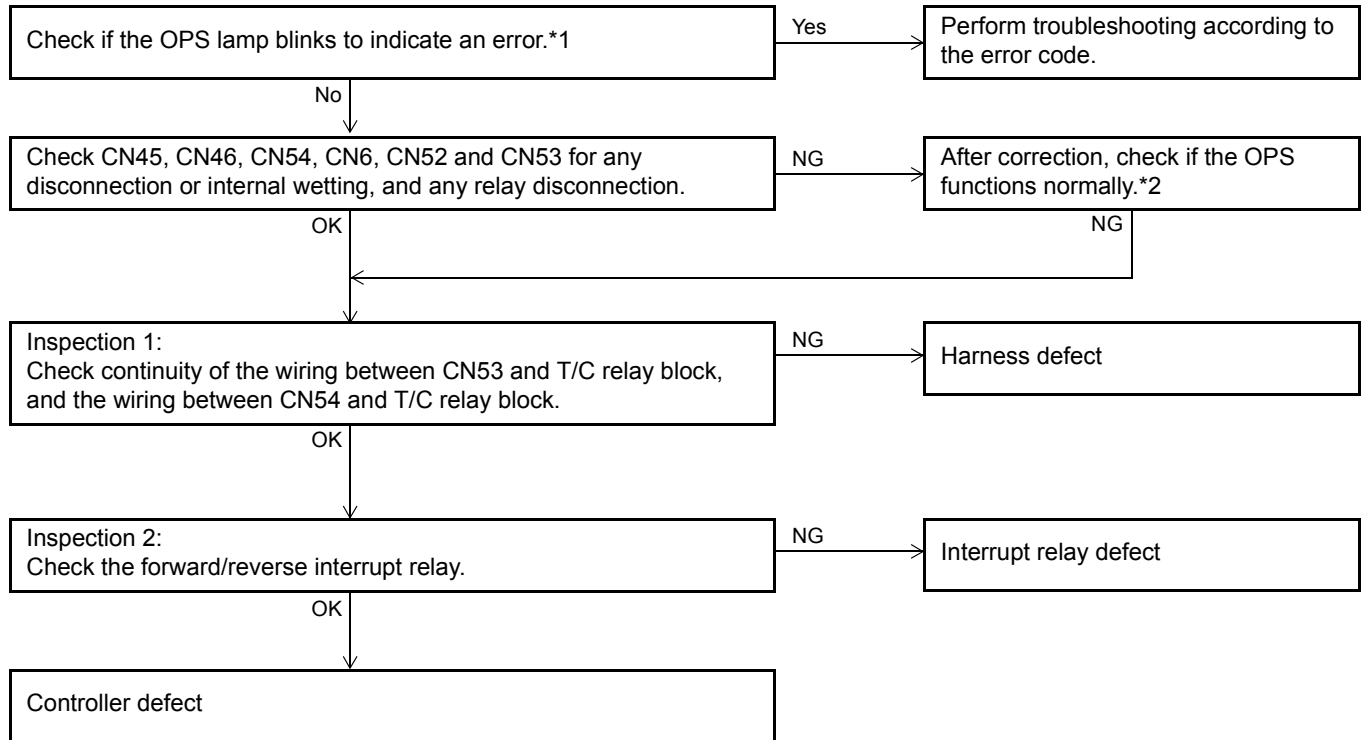
● The drive OPS does not function.

Related portion



Estimated Causes:

- | | |
|----------------------------------|---------------------|
| ① Connector interrupt defect | ④ Harness defect |
| ② Forward interrupt relay defect | ⑤ Controller defect |
| ③ Reverse interrupt relay defect | |



*1: Check if the OPS lamp blinks to indicate an error.

Without getting on the seat, turn the key switch to OFF → ON (2 seconds or more) → OFF. Leave the vehicle as it is for at least 15 minutes. Then turn the key switch to ON again and make sure that the OPS lamp does not blink.

*2: After correction, check if the drive OPS functions normally.

Turn the key switch ON, set the shift lever to either forward or reverse and leave the seat. Check if the drive OPS is activated.

Inspection 1:

Check continuity of the wiring between CN53 and T/C relay block, and the wiring between CN54 and T/C relay block.

Turn the key switch OFF, disconnect CN53 and CN54, and remove the relays from the T/C relay block.

Standard:

Between CN53-5 and pin 4 of forward interrupt relay	Continuity
Between CN53-1 and pin 4 of reverse interrupt relay	Continuity
Between CN54-1 and pin 3 of forward interrupt relay	Continuity
Between CN54-2 and pin 3 of reverse interrupt relay	Continuity
CN53-6 ~ IG SW-4	Continuity



CN53 (REC)



CN54 (REC)



IG SW



T/C FR RLY

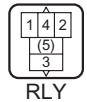


T/C RR RLY

Inspection 2:

Check the forward/reverse interrupt relay individually.

- (1) Turn the key switch to OFF and disconnect the relays from the T/C relay block. Measure the resistances between the specified pins of the forward/reverse interrupt relay.

**Standard:**

	Resistance
Between forward interrupt relay pins 1 and 2	Approx. 90 Ω (at 20°C)
Between reverse interrupt relay pins 1 and 2	Approx. 90 Ω (at 20°C)

- (2) Install the relay and disconnect CN53 and CN54. Leave the seat unseated, and turn the key switch to ON (with the engine in stopped state).



- Without analyzer

Standard:

	Unseated	Seated
CN53-5 ~ CN54-1	No continuity	Continuity
CN53-1 ~ CN54-2	No continuity	Continuity

- With analyzer

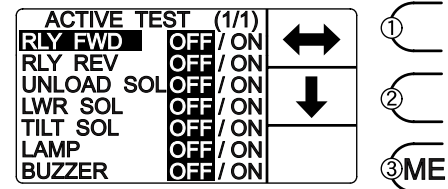
Forcibly set forward and reverse interrupt relays to ON and OFF and check continuity in each state.

Analyzer: MAIN MENU → OPS → ANALYZER MENU → ACTIVE TEST

Standard:

- Forward interrupt relay (RLY FWD)

	Relay ON	Relay OFF
CN53-5 ~ CN54-1	No continuity	Continuity

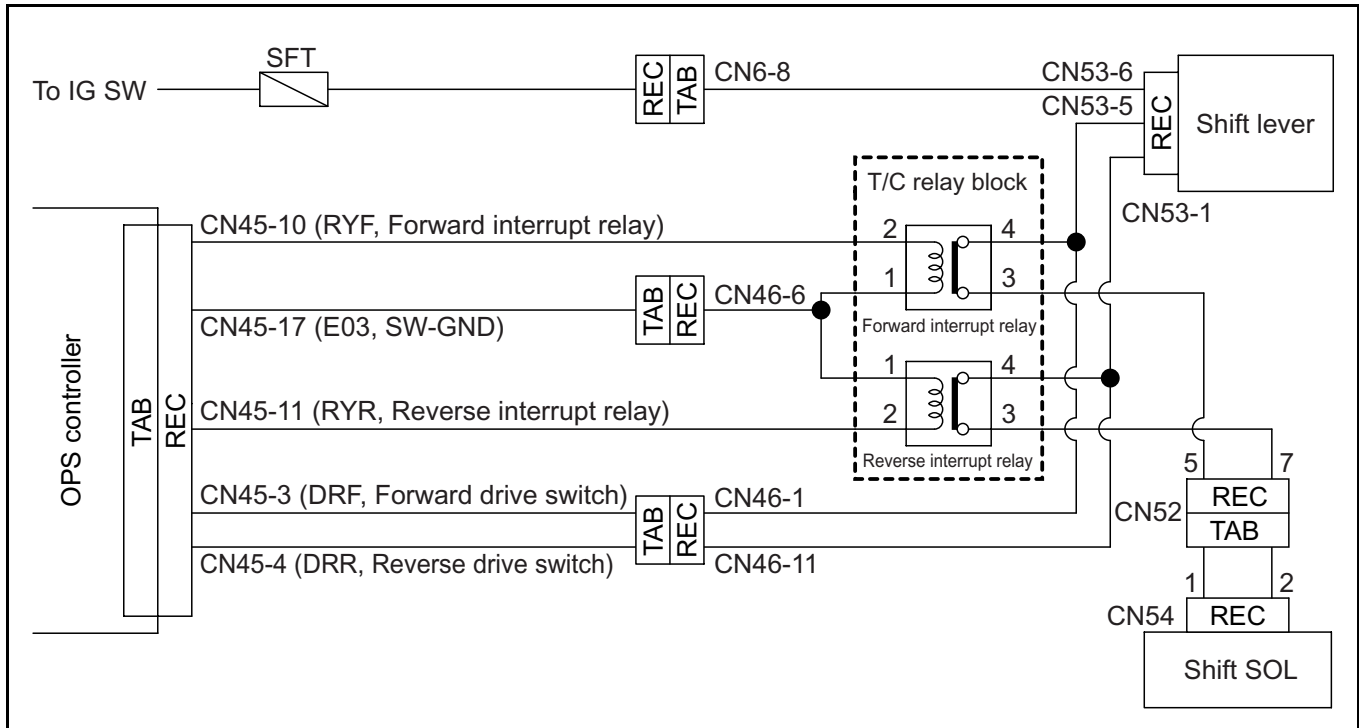


- Reverse interrupt relay (RLY REV)

	Relay ON	Relay OFF
CN53-1 ~ CN54-2	No continuity	Continuity

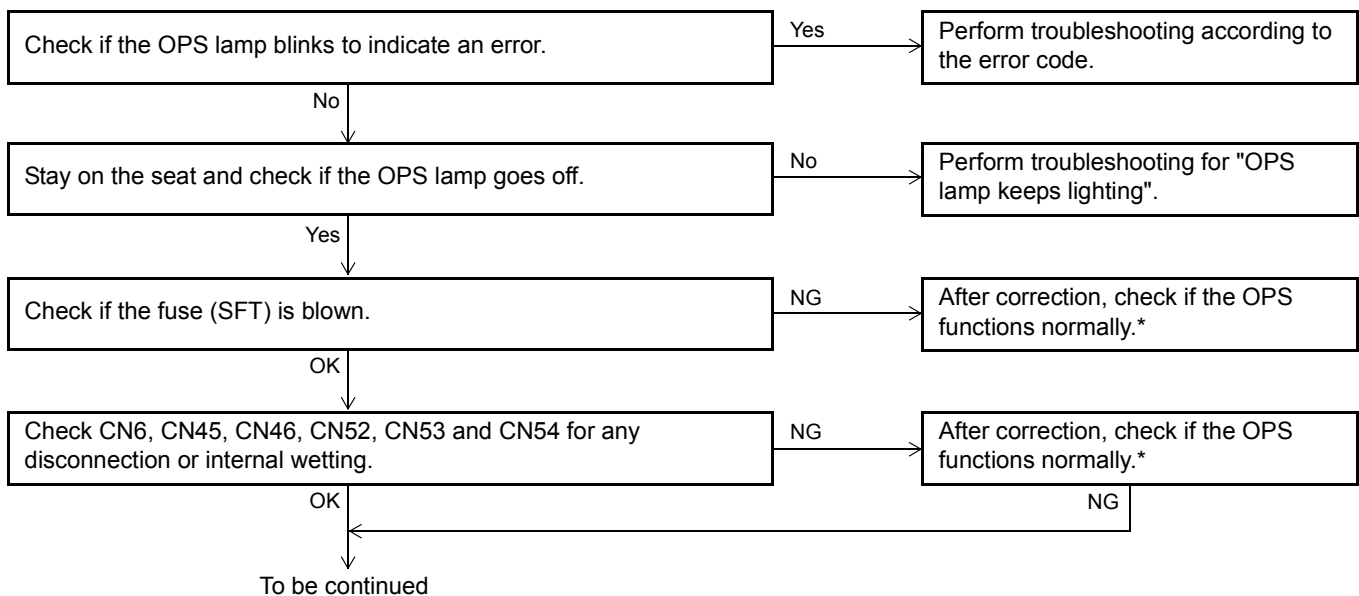
● **Traveling fails (Including forward cases of traveling only, reverse traveling only, and occasional failures)**

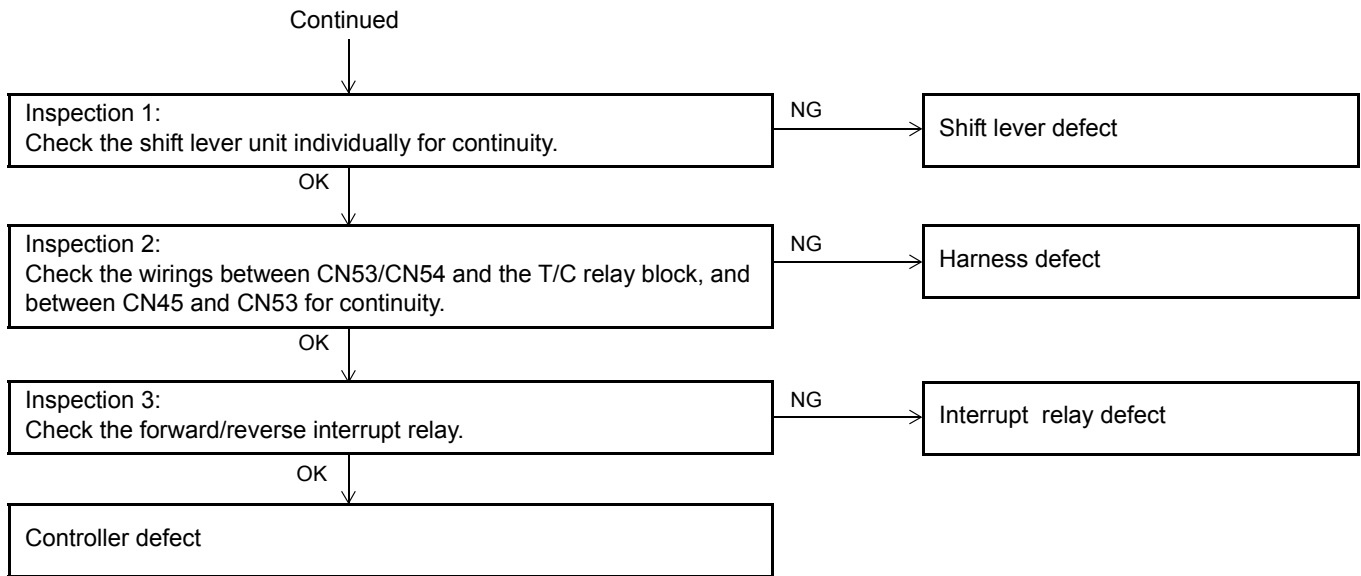
Related Portion



Estimated Causes:

- | | |
|----------------------------------|-----------------------------|
| ① Connector contact defect | ⑤ Controller defect |
| ② Forward interrupt relay defect | ⑥ Shift lever switch defect |
| ③ Reverse interrupt relay defect | ⑦ Fuse defect |
| ④ Harness defect | |





* After correction, check if the OPS functions normally.

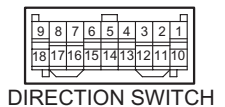
When the operator leaves the seat with key switch ON to activate the OPS, sets the shift lever to the forward position then sits on the seat again, check that forward traveling is disabled with the buzzer sounding at short intervals.

Next, check that forward traveling is enabled if the shift lever is set to neutral once and then to forward again.

Inspection 1:

Check the T/C shift lever unit individually for continuity.
Key switch OFF, CN53 disconnection.

Standard:



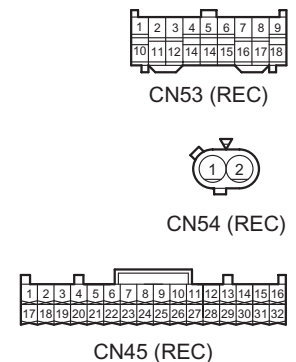
	Lever at neutral	Lever at forward	Lever at reverse
Between pins 6 and 5 on lever side	No continuity	Continuity	No continuity
Between pins 6 and 1 on lever side	No continuity	No continuity	Continuity

Inspection 2:

Check the wiring between CN53/CN54 and T/C relay block and between CN45 and CN53 for continuity.
Turn the key switch to OFF, disconnect CN53, CN54 and CN45, and disconnect relays from the T/C relay block.

Standard:

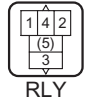
Between CN53-5 and pin 4 of forward interrupt relay	Continuity
Between CN53-1 and pin 4 of reverse interrupt relay	Continuity
Between CN54-1 and pin 3 of forward interrupt relay	Continuity
Between CN54-2 and pin 3 of reverse interrupt relay	Continuity
CN53-6 ~ IG SW-4	Continuity
CN45-3 ~ CN53-5	Continuity
CN45-4 ~ CN53-1	Continuity



Inspection 3:

Check the forward/reverse interrupt relay individually.

- (1) Turn the key switch OFF and remove the relays from the T/C relay block. Measure the resistance between pins of each of forward and reverse interrupt relays.

**Standard:**

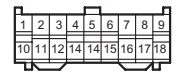
	Resistance
Between forward interrupt relay pins 1 and 2	Approx. 90 Ω (at 20°C)
Between reverse interrupt relay pins 1 and 2	Approx. 90 Ω (at 20°C)

- (2) Install the relays and disconnect CN53 and CN54. Turn the key switch to ON (with the engine in stopped state) after leaving the seat.

- Without analyzer

Standard:

	Unseated	Seated
CN53-5 ~ CN54-1	No continuity	Continuity
CN53-1 ~ CN54-2	No continuity	Continuity



CN53 (REC)



CN54 (REC)

- With analyzer

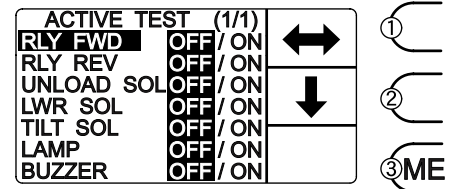
Forcibly turn each of the forward and reverse interrupt relays ON and OFF, and check the continuity in each state.

Analyzer: MAIN MENU → OPS → ANALYZER MENU → ACTIVE TEST

Standard:

- RLY FWD

	Relay ON	Relay OFF
CN53-5 ~ CN54-1	No continuity	Continuity



- RLY REV

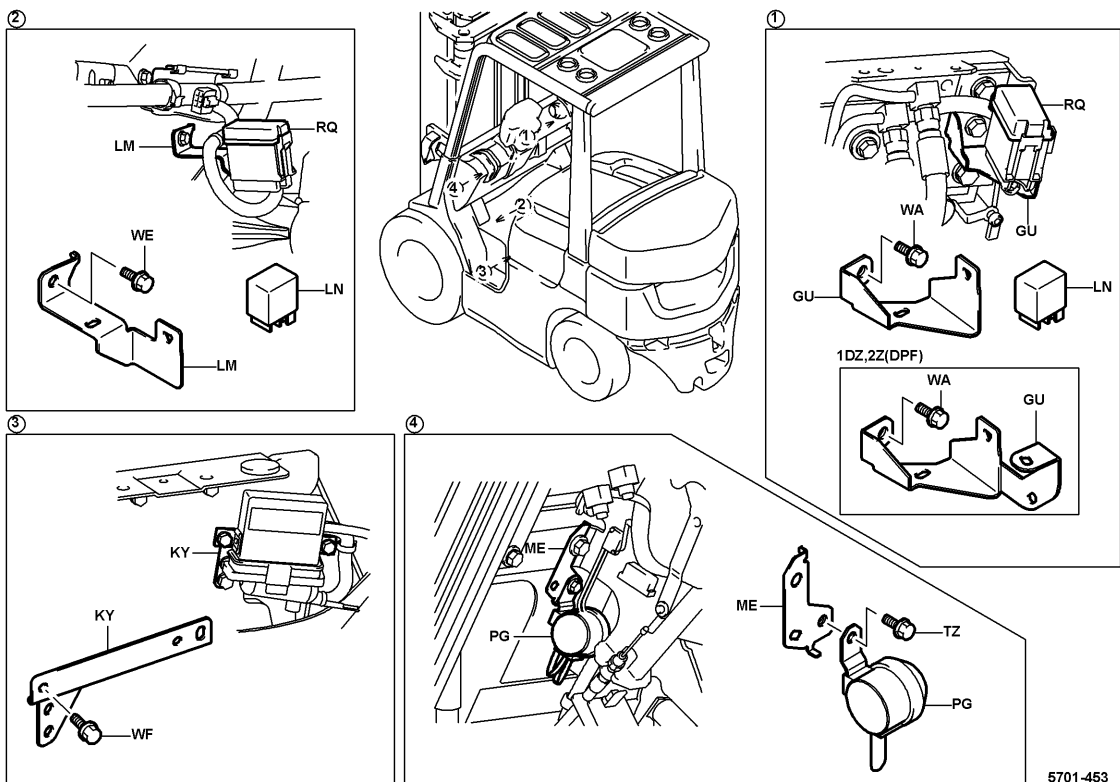
	Relay ON	Relay OFF
CN53-1 ~ CN54-2	No continuity	Continuity

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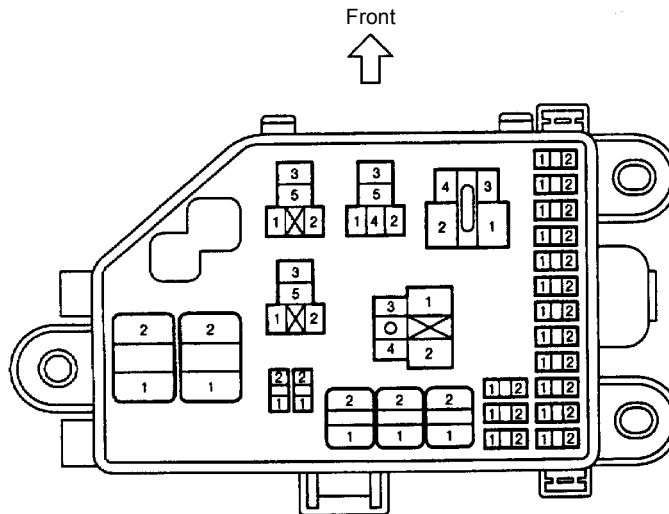
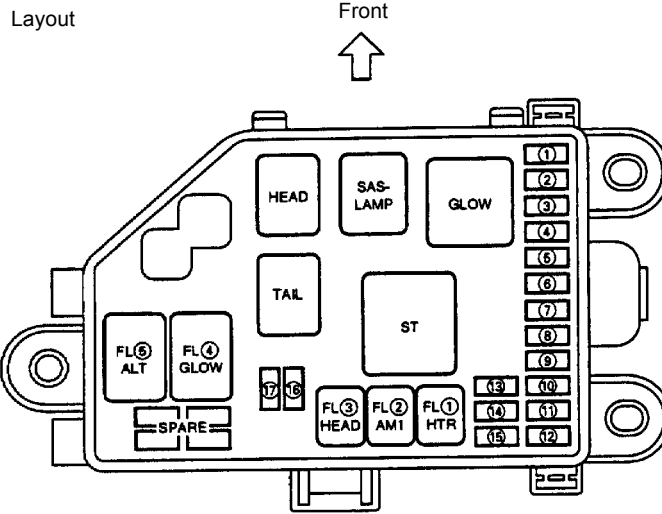
COMPONENTS

5701

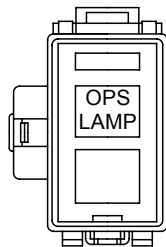


RELAY BLOCK

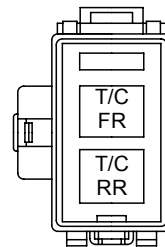
2

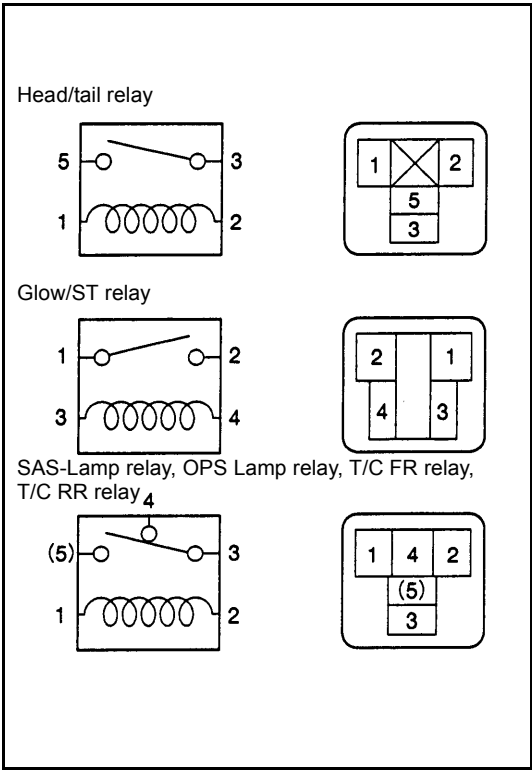


OPS lamp relay block



Torque converter relay block





RELAY INSPECTION

Individual Relay Continuity Inspection

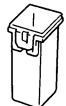
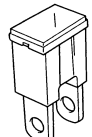
Measurement state	Measurement positions	Standard
Head/tail relay		
Normal state	1-2	Continuity
	3-5	No continuity
When the battery voltage is applied to terminals 1 and 2:	3-5	Continuity
Glow/ST relay		
Normal state	1-2	No continuity
	3-4	Continuity
When the battery voltage is applied to terminals 3 and 4:	1-2	Continuity
SAS-LAMP relay, OPS Lamp relay, T/C FR relay, T/C RR relay		
Normal state	1-2, 3-4	Continuity
When the battery voltage is applied to terminals 1 and 2:	3-4	No continuity

PORTIONS PROTECTED BY FUSES

NO	Name	Capacity	Main protected portions
①	ECU-B	7.5A	Mini lever controller, OPS controller
②	DPF2	7.5A	DPF ECU activation
③	ST (Starting motor)	7.5A	Starting motor relay (IG) and glow plug timer (IG)
④	SFT (Shift)	7.5A	Electric shift T/C
⑤	ECU-IG	7.5A	SAS controller, steering angle sensor, and SAS error lamp relay, OPS controller, and OPS lamp relay
⑥	IGN (Ignition)	7.5A	Alternator, glow plug timer, ignition coil, emission control, ABCV, injection, LPG main solenoid, LPG slow solenoid, fuel cut and emission controller
⑦	TURN (Turn)	7.5A	Turn signal lamp and flasher relay
⑧	GAUGE (Meter)	10A	Hour meter, water temperature gauge, fuel gauge, warning lamps (charge, engine oil pressure, air cleaner, lock indicator, sedimenter, glow indicator, fuel, brake, cooling water and battery), back-up buzzer, T/C oil thermometer, speed meter, strobo, speed alarm, wiper relay (coil side), heater relay (coil side), back-up lamp and SAS buzzer
⑨	HTR (Heater)	10A	Heater
⑩	WIPER (Wiper)	15A	Front wiper, rear wiper, room lamp and washer motor
⑪	HORN (Horn)	7.5A	Horn
⑫	ALT-S (Alternator sending)	5A	Alternator sending
⑬	HEAD (Headlamp)	15A	Headlamp
⑭	DPF1	15A	DPF system drive circuit
⑮	TAIL (Tail)	7.5A	Tail lamp, clearance lamp and meter illumination
⑯	WORK-LP (Work lamp)	10A	Rear work lamp
⑰	STOP (Stop lamp)	7.5A	Stop lamp

Including options

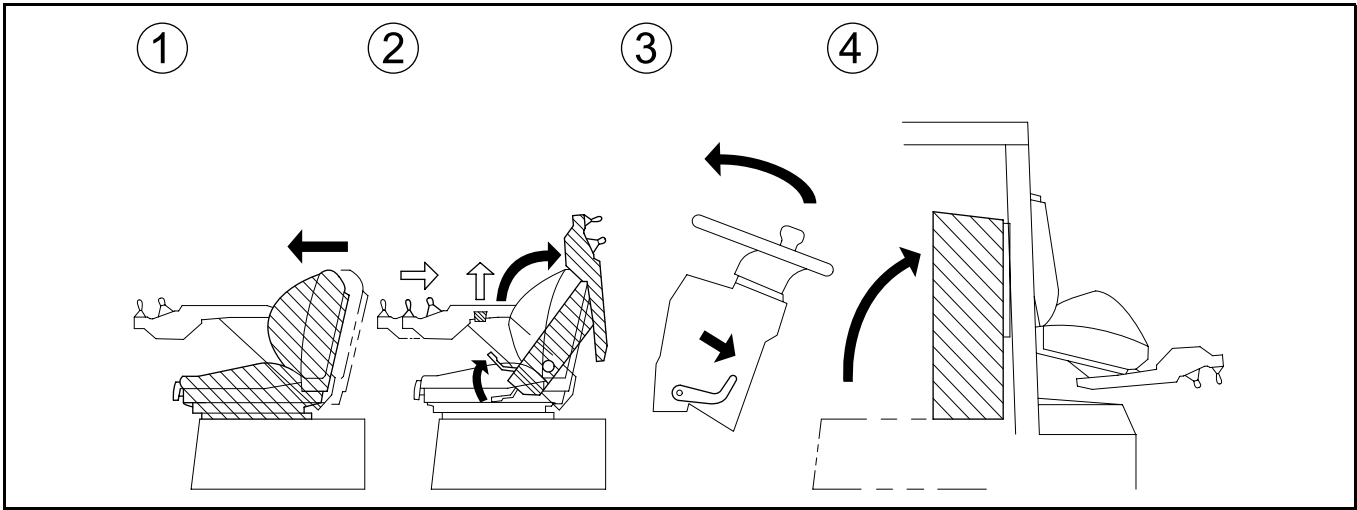
Fusible links

NO.	Name	Capacity	Type
FL ①	HTR	30A	 Cartridge type
	GOV	30A	
FL ②	AM1	40A	
FL ③	HEAD	40A	 Screw-fastened type
FL ④	GLOW	2Z engine 120A 1DZ-II engine 60A	
FL ⑤	ALT	80A	

PROCEDURE FOR ENGINE HOOD OPENING

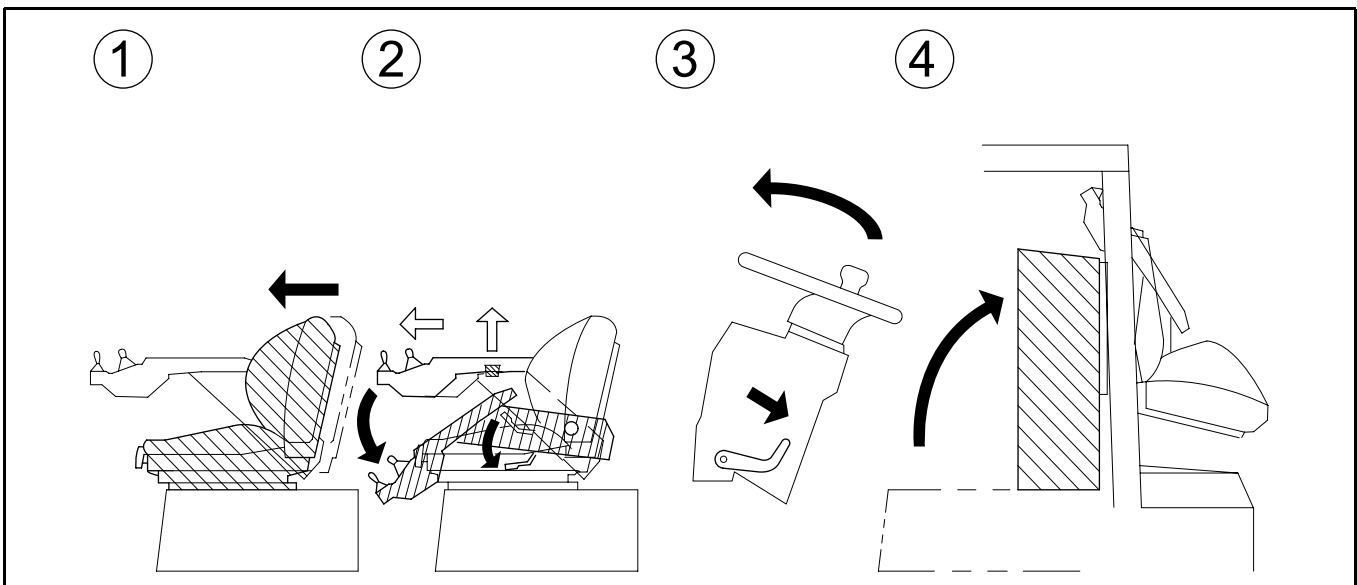
Excluding the Cabin

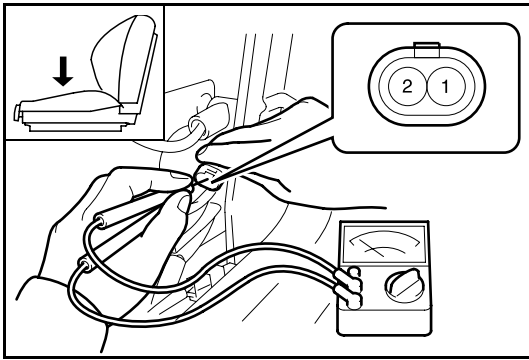
1. Move the seat to the most forward position.
2. Pull the lever for fixing lever box.
Move the mini lever box to the most backward position.
Pull the lever for fixing rotation of lever box.
Flip-up the armrest.
3. Pull the lock release lever.
4. Open the engine hood.



At Cabin

1. Move the seat to the most forward position.
2. Pull the lever for fixing lever box.
Move the mini lever box to the most forward position.
Push the lever for fixing rotation of lever box.
Incline the armrest forward.
3. Pull the lock release lever.
4. Open the engine hood.





SEAT SWITCH INSPECTION

Push on the seat cushion and check continuity of the seat switch.

Measurement position:

Between seat switch connectors CN50-1 and CN50-2 in LH side of engine room

Standard:

Not pushed: OFF ($\infty \Omega$)

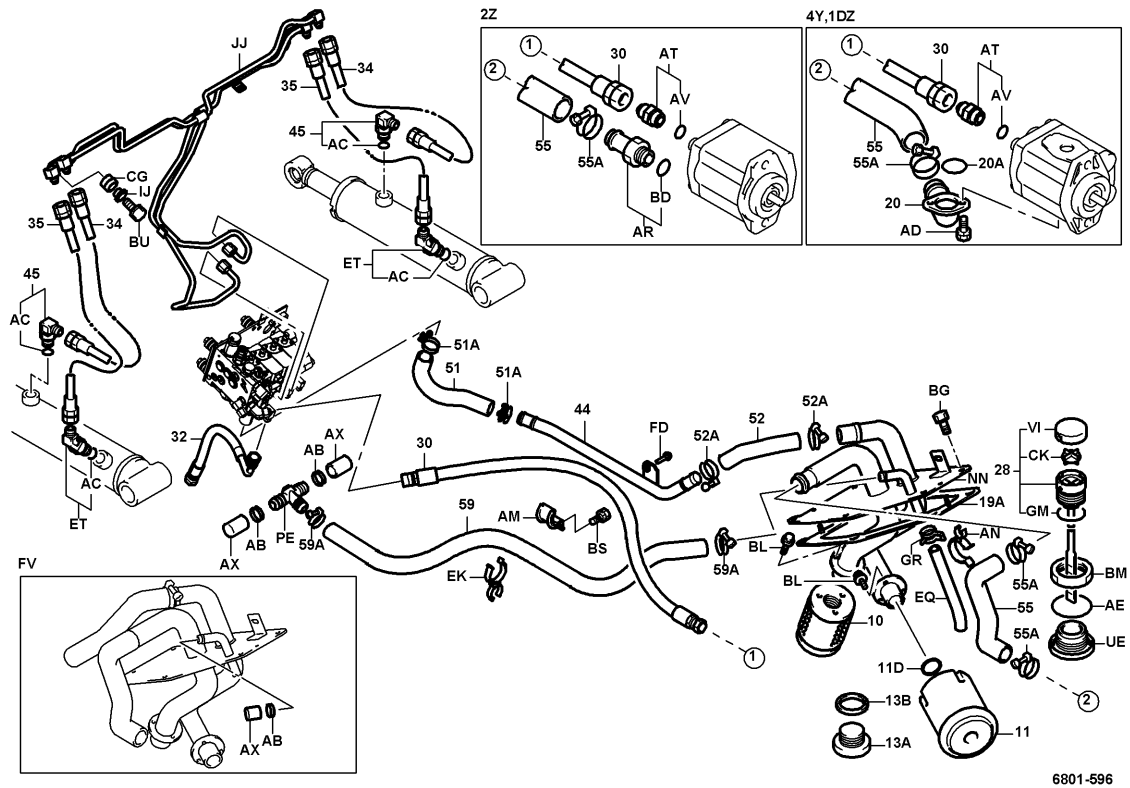
When pushed: ON (0Ω)

MATERIAL HANDLING SYSTEM

	Page
COMPONENTS	3-2
OIL LEAK TEST	3-3
LIFT CYLINDER.....	3-3
TILT CYLINDER.....	3-3

COMPONENTS

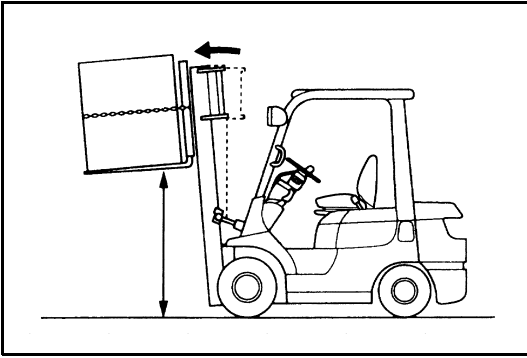
6801



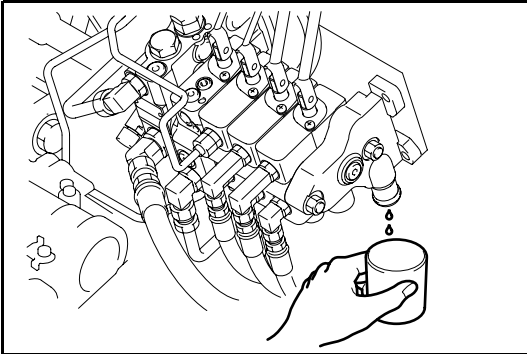
OIL LEAK TEST

LIFT CYLINDER

1. Set the mast in the vertical position with the standard load on the fork. Lift the fork by 1 to 1.5 m (40 to 59 in).



2. Slowly tilt the mast fully forward, and stop the engine. After 5 minutes, disconnect the oil control valve to oil tank hose. Place a measuring cylinder under the elbow and measure the amount of oil leaking in one minute.



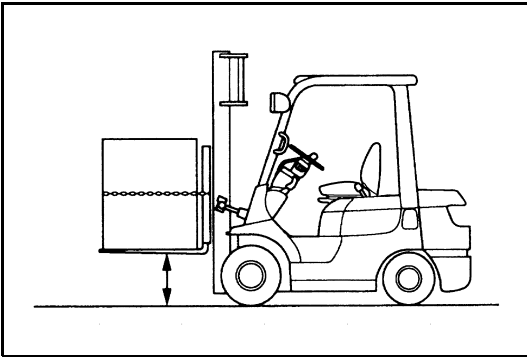
Standard (at lift port): 8 cm³ (0.49 in³) or less

Note:

If the natural drop is great even though the oil leak amount is within the standard, the lift cylinder packing is defective.

TILT CYLINDER

1. Set the mast in the vertical position with standard load on the fork. Lift the fork by about 50 cm (19.7 in) and stop the engine.
2. After waiting for 5 minutes, disconnect the oil control valve to oil tank hose. Place a measuring cylinder under the elbow and measure the amount of oil leaking in one minute.

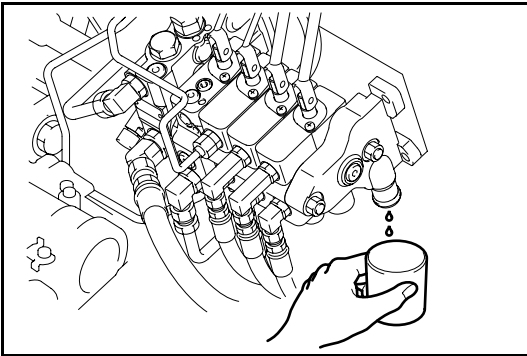


Standard (total for lift and tilt): 16 cm³ (0.98 in³) or less

3. The leak amount at the tilt port is the total leak amount less the leak amount from the lift port.

Note:

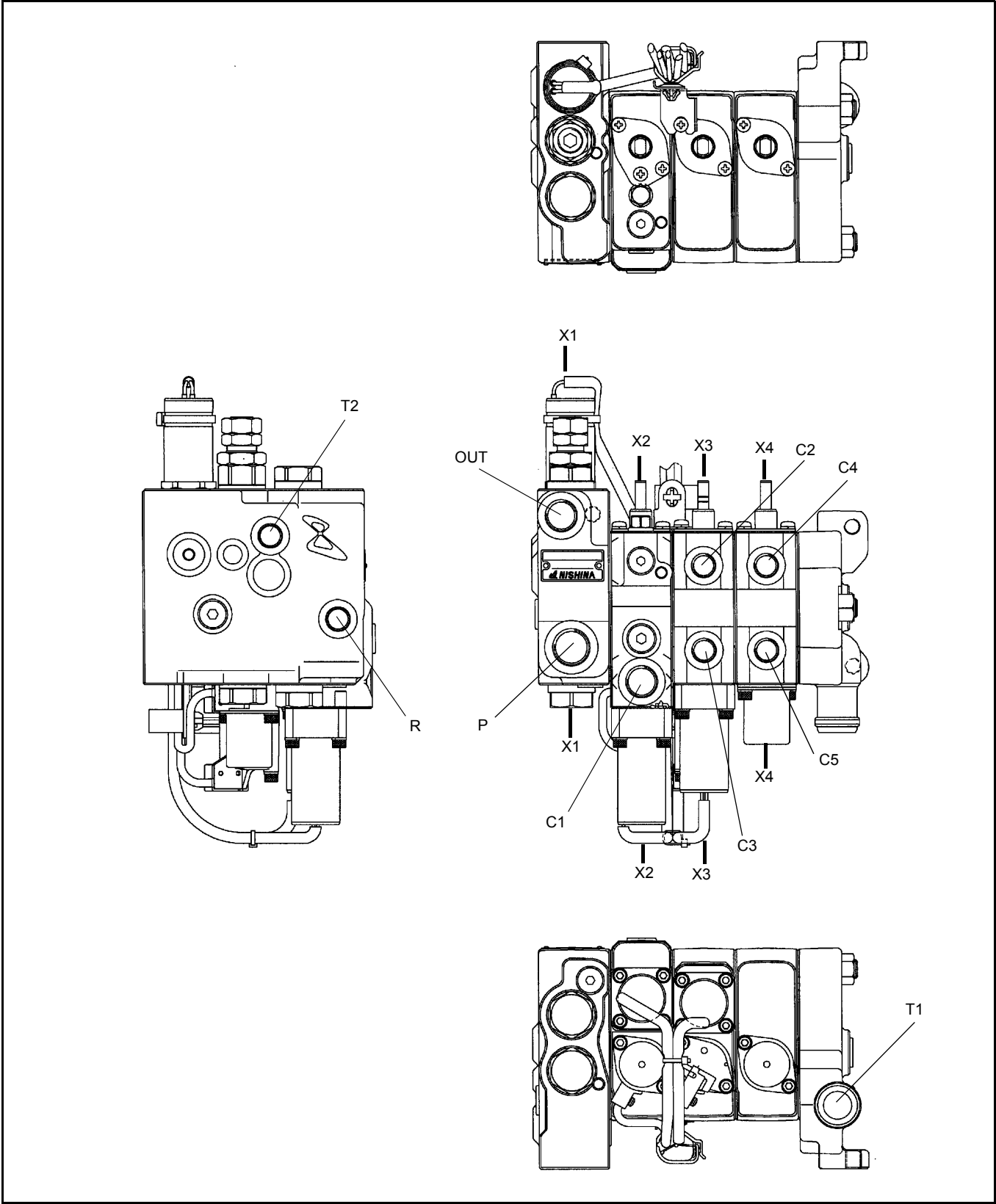
If the natural forward tilt is great even though the oil leak amount is within the standard, either the tilt lock valve or the tilt cylinder packing is defective.



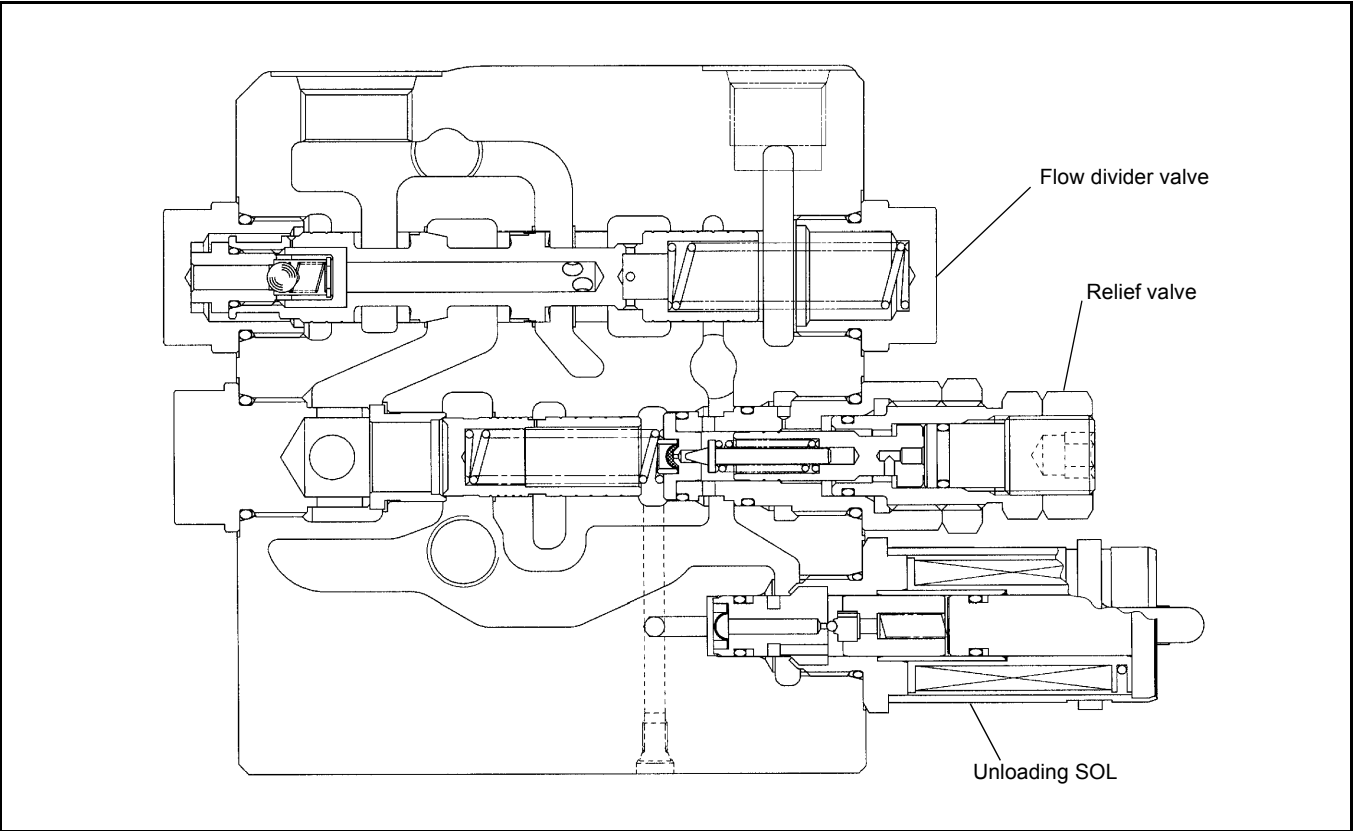
OIL CONTROL VALVE

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OIL CONTROL VALVE ASSY	4-8
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DISASSEMBLY · INSPECTION · ASSEMBLY	4-9
RELIEF PRESSURE ADJUSTMENT	4-14
LIFT LOCK RELEASE BOLT	4-16

GENERAL

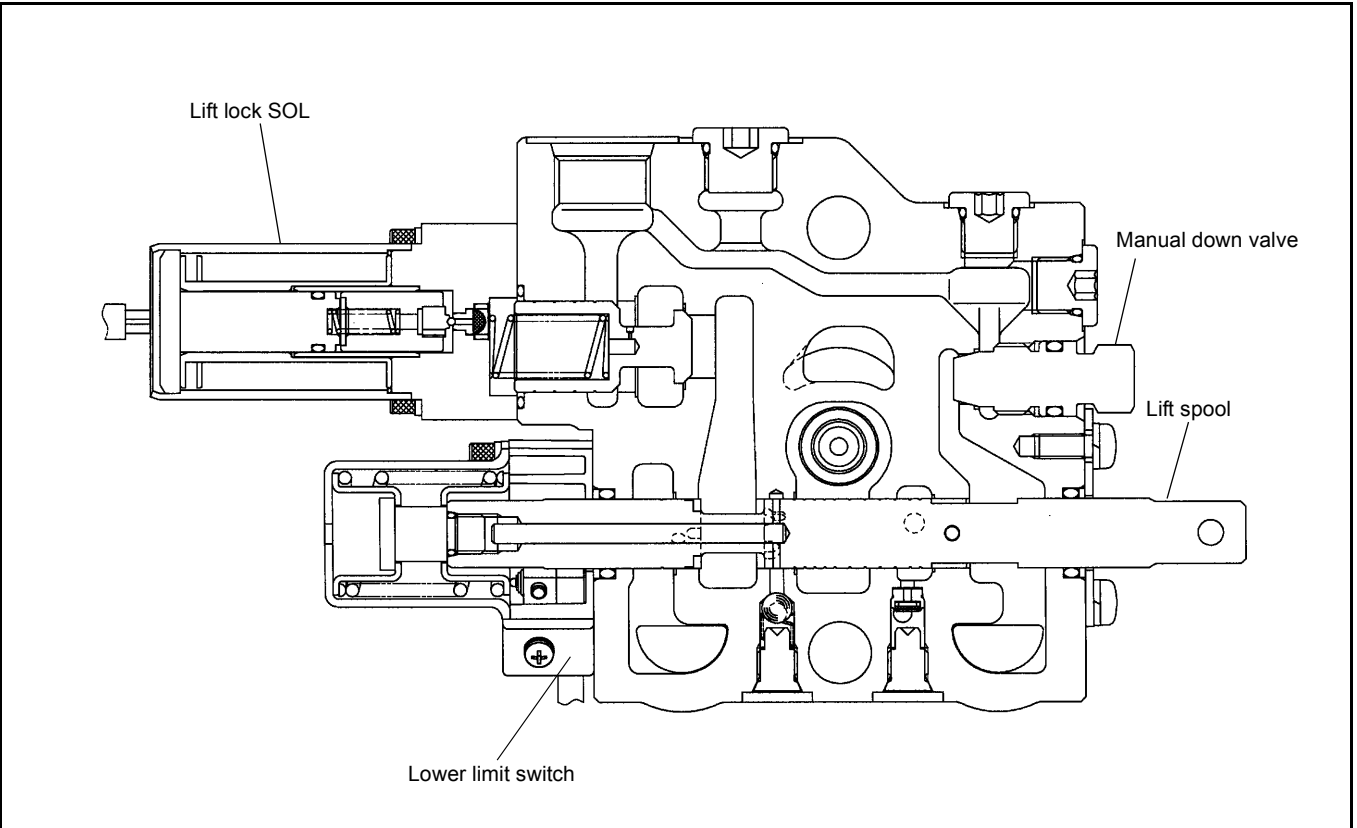


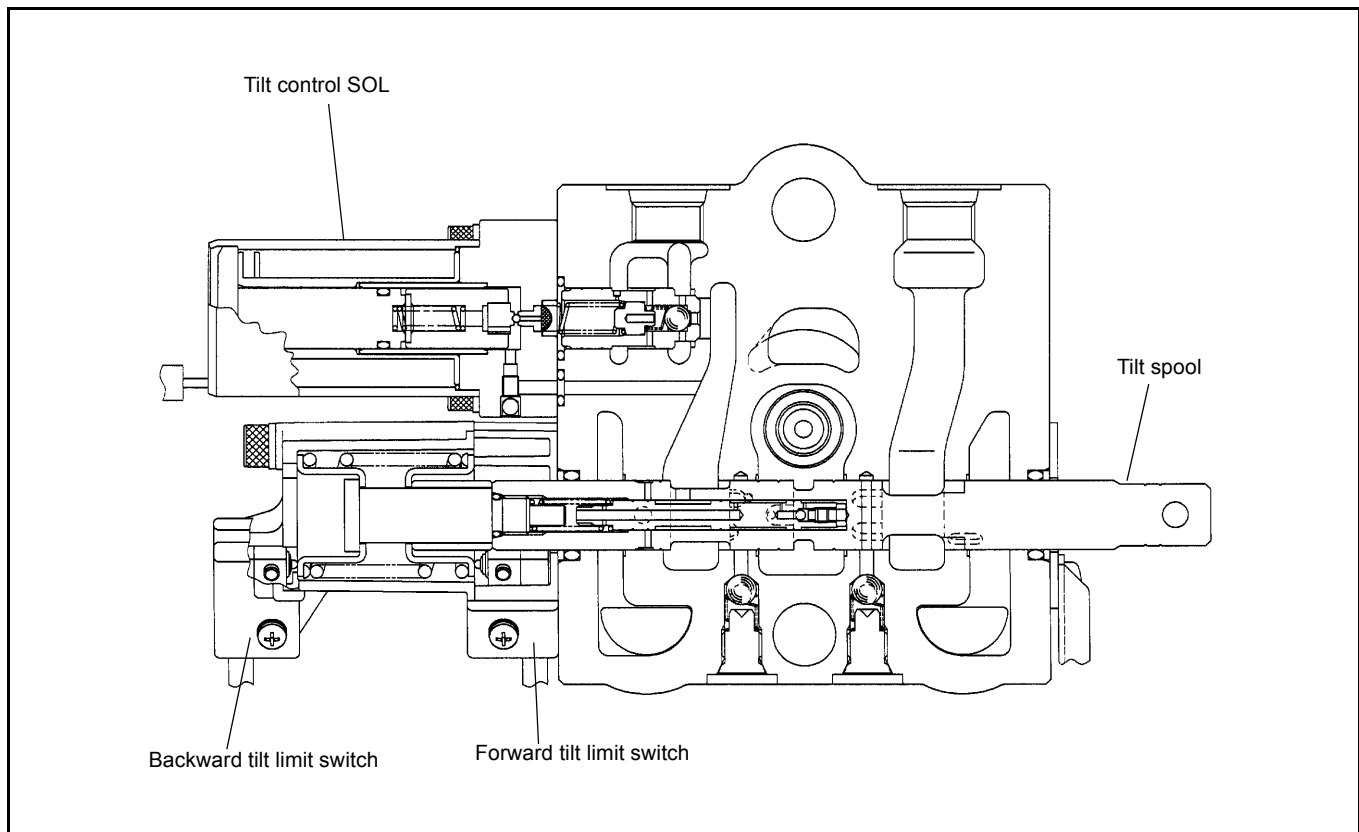
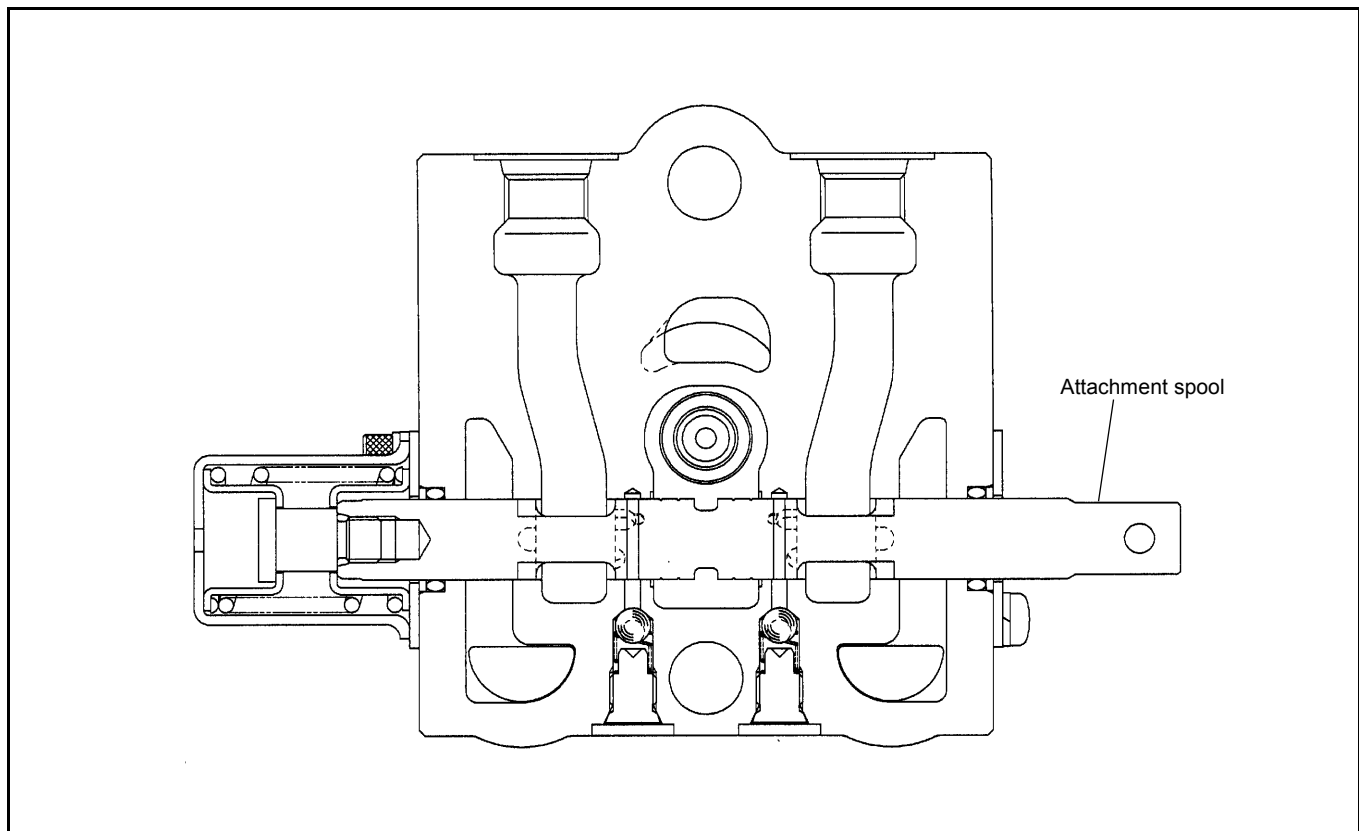
X1-X1



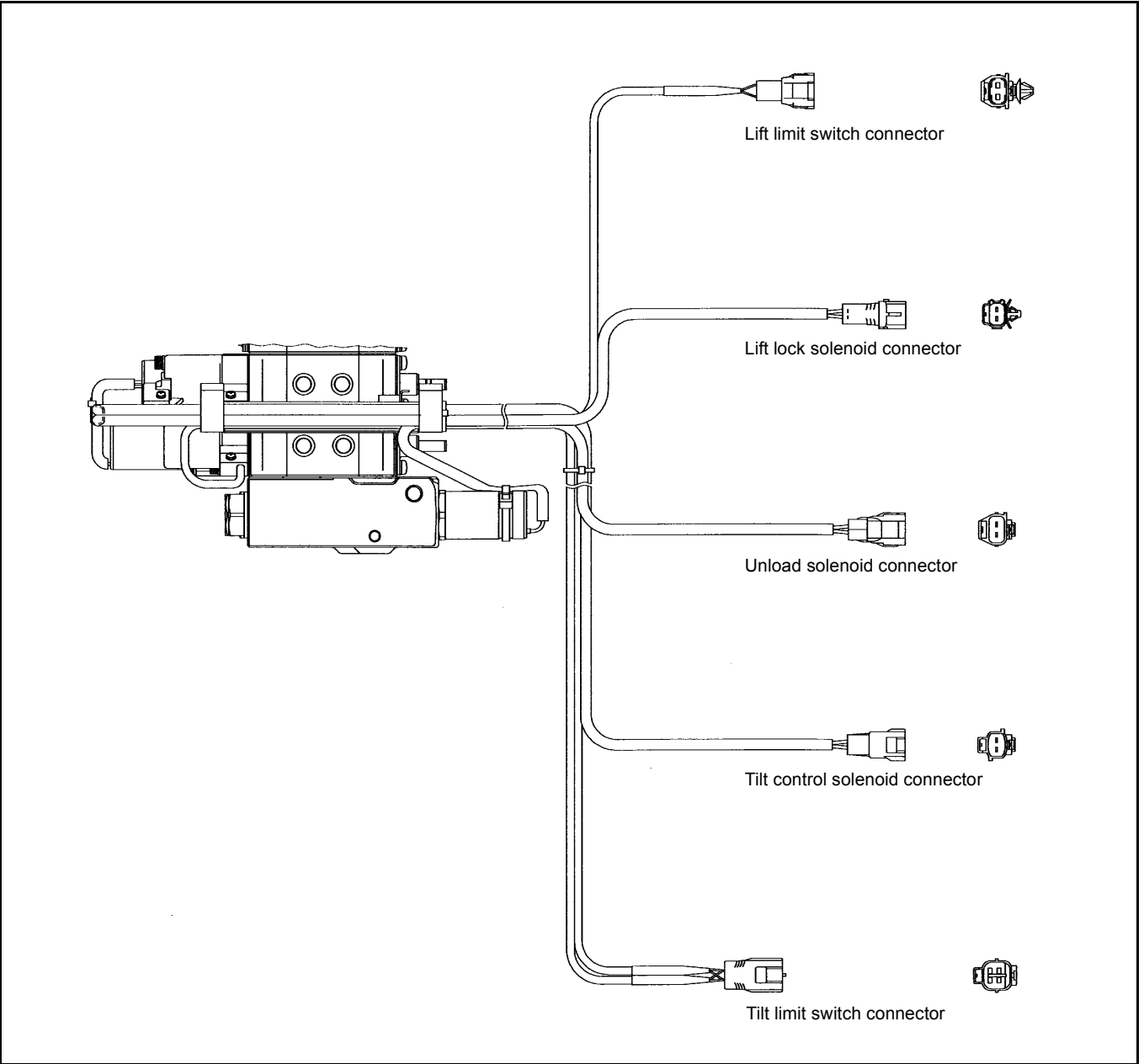
4

X2-X2

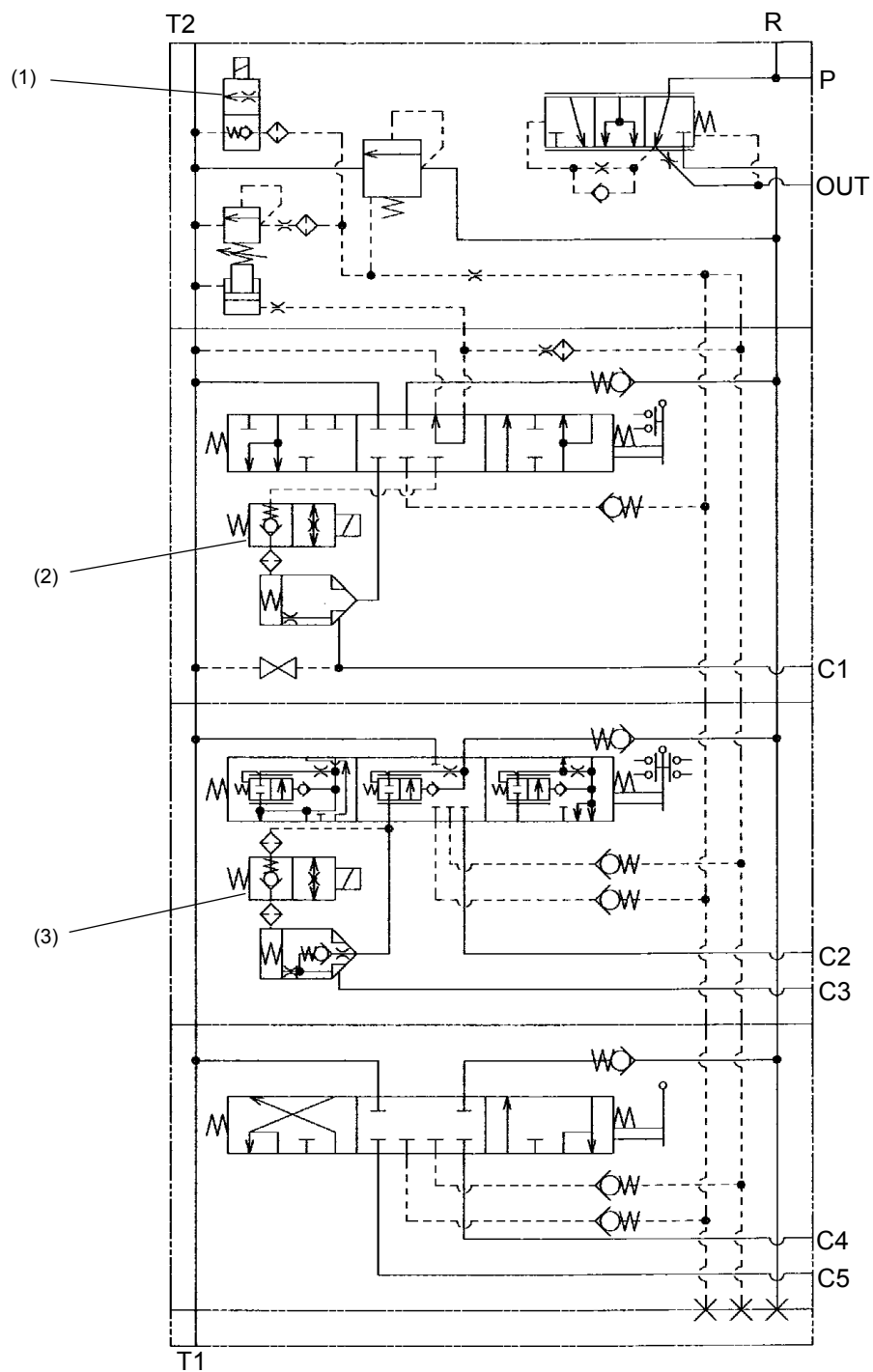


X3-X3**X4-X4**

SOLENOID CONNECTOR DIAGRAM



HYDRAULIC CIRCUIT DIAGRAM



(1) Unloading SOL

(2) Lift lock SOL

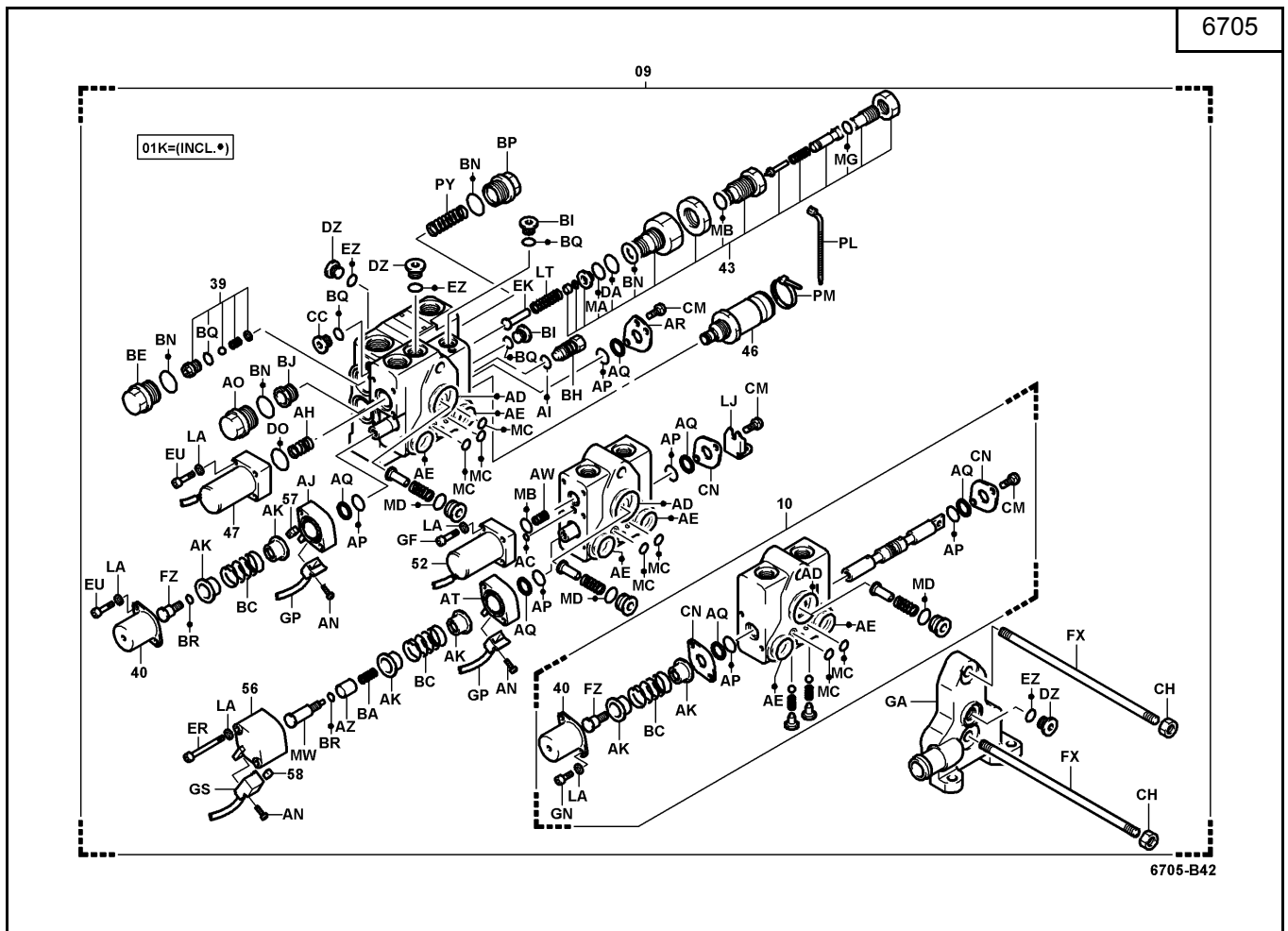
(3) Tilt control SOL

R: Gauge port

SPECIFICATIONS

Vehicle model		1 ton series	2 ton series	3 ton series	J3.5 ton series
Type		Add-on type			
Relief set pressure	Lift	17.8 (182) [2590]	18.7 (191) [2720]	←	←
MPa (kgf/cm ²) [psi]	Tilt	11.8 (120) [1710]	14.7 (150) [2130]	←	15.7 (160) [2280]
Flow divider flow rate ℓ/min (US gal/min)		13.0 (3.43)	←	15.2 (4.01)	←

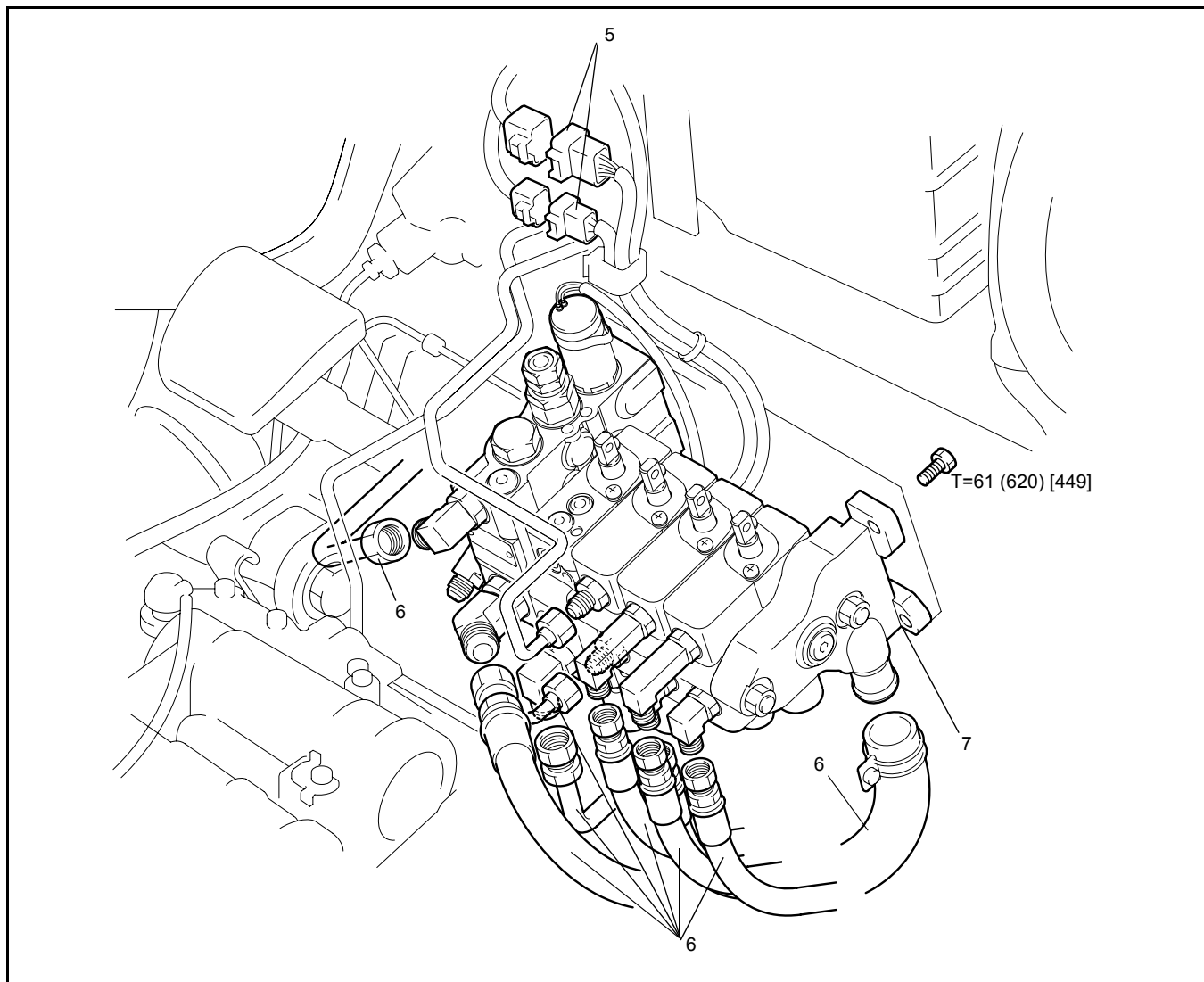
COMPONENTS



OIL CONTROL VALVE ASSY

REMOVAL · INSTALLATION

T=N·m (kgf·cm) [ft·lb]



Removal Procedure

- 1 Remove the toe board.
- 2 Remove the lower panel.
- 3 Remove the instrument panel RH.
- 4 Disconnect the lever rod.
- 5 Disconnect the connector.
- 6 Disconnect the piping.
- 7 Remove the oil control valve W/bracket.
(Carefully operate so as not to damage the limit switch underneath the oil control valve.)
- 8 Remove the oil control valve.
- 9 Remove the fitting.

Installation Procedure

The installation procedure is the reverse of the removal procedure.

Remarque

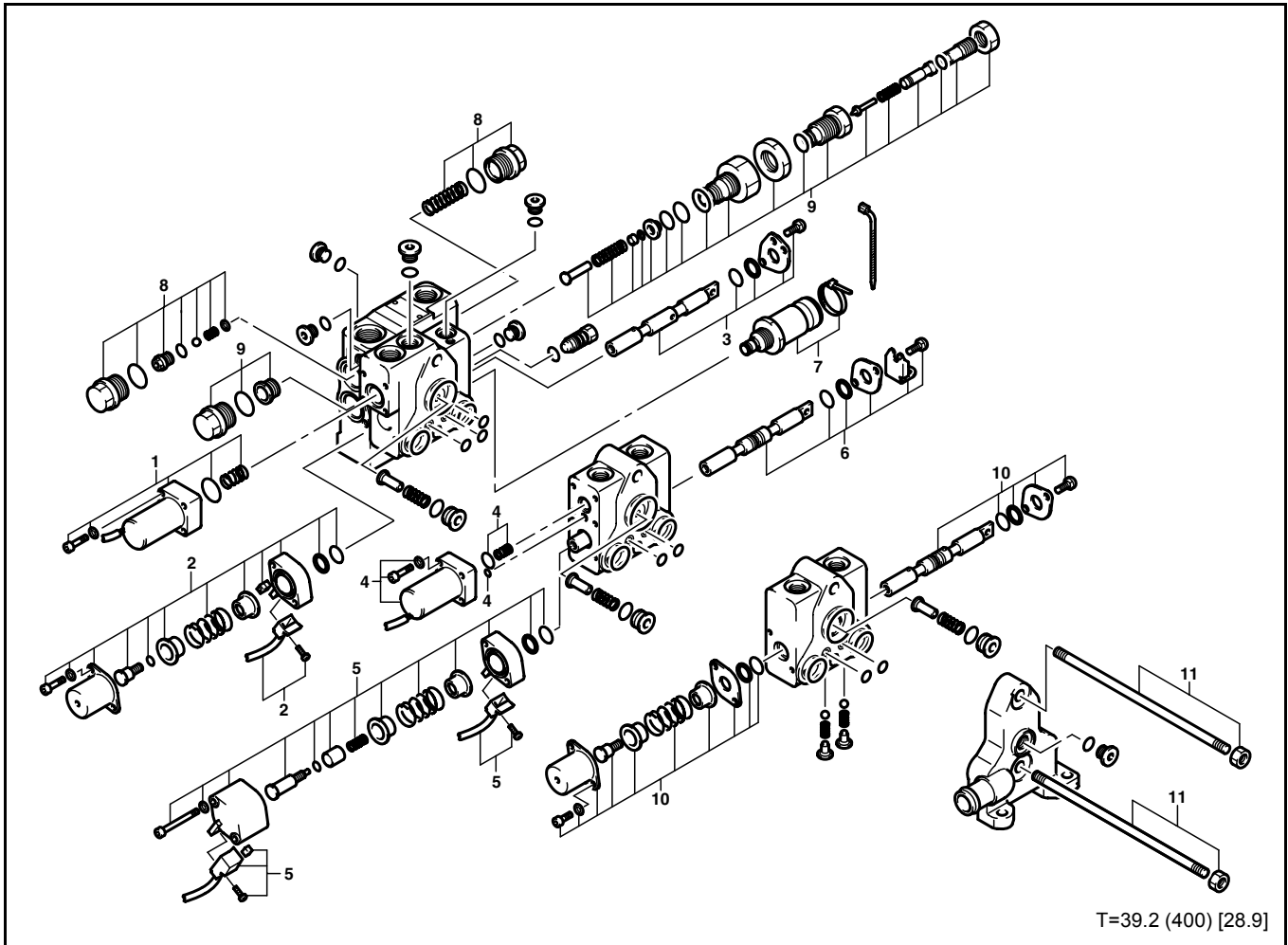
- Apply grease (chassis grease) on the oil control valve lever links.
- After installation, check the hydraulic oil level, and if the level is too low, add more hydraulic oil.

DISASSEMBLY · INSPECTION · ASSEMBLY

Note:

- Select a clean location for operation.
- Since each part is finished with high precision, carefully operate so as not to damage it.

T=N·m (kgf·cm) [ft·lbf]



Disassembly Procedure

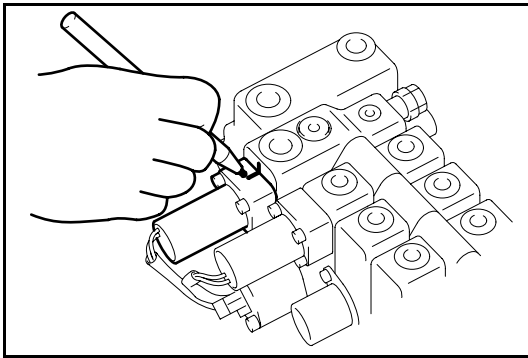
- 1 Remove the lift solenoid. **[Point 1]**
- 2 Remove the lift limit switch and spring cover. **[Point 2]**
- 3 Remove the lift spool. **[Point 3]**
- 4 Remove the tilt solenoid. **[Point 4]**
- 5 Remove the tilt limit switch and spring cover. **[Point 5]**
- 6 Remove the tilt spool. **[Point 6]**
- 7 Remove the unload solenoid. **[Point 7]**
- 8 Remove the flow divider valve. **[Point 8]**
- 9 Remove the relief valve. **[Point 9]**
- 10 Remove the attachment valve.
- 11 Remove the rod bolt and the housing.

Assembly Procedure

The assembly procedure is the reverse of the disassembly procedure.

Note:

Thoroughly wash each part, remove dirt by blowing compressed air, and apply hydraulic oil before assembly.

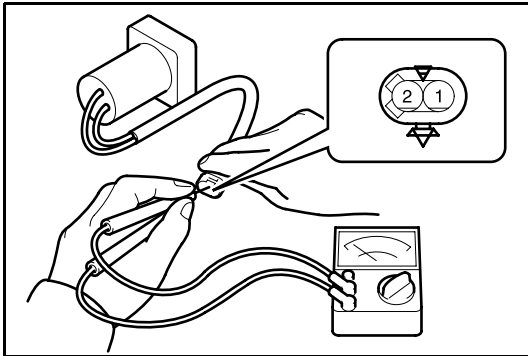


Point Operations

[Point 1]

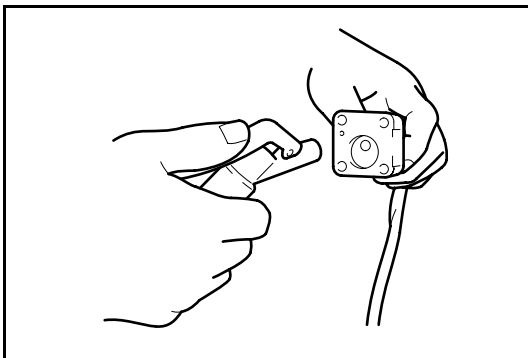
Disassembly:

Provide a match marks on each solenoid to ensure installation in the correct position.



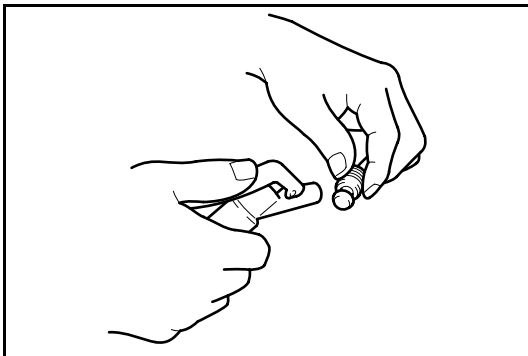
Inspection:

Inspect continuity of the lift solenoid.



Inspection:

Inspect and wash the filter to eliminate clogging.



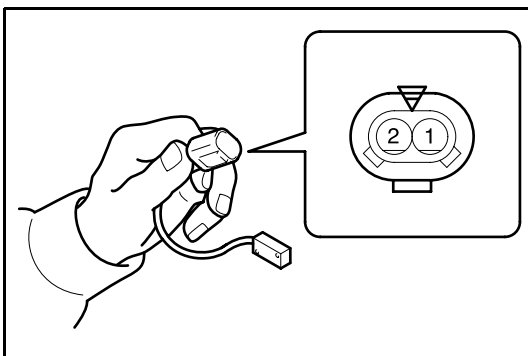
Inspection:

Inspect and wash orifice to eliminate clogging.

Assembly:

Assemble while checking match marks.

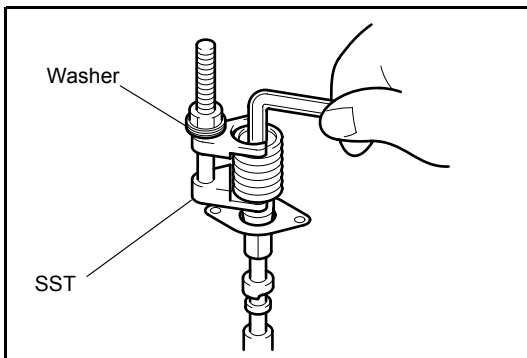
Carefully prevent incorrect installation of each solenoid spool.



[Point 2]

Inspection:

Inspect continuity of the lift limit switch.

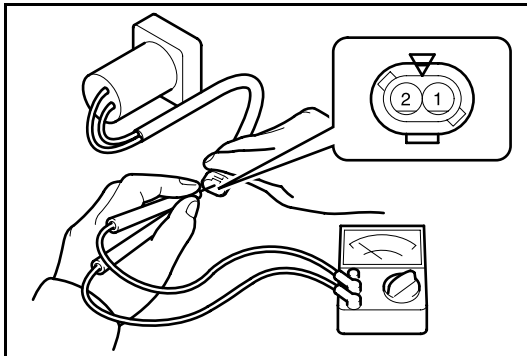
**[Point 3]**

Disassembly/assembly:

Remove the compression spring from the lift spool.

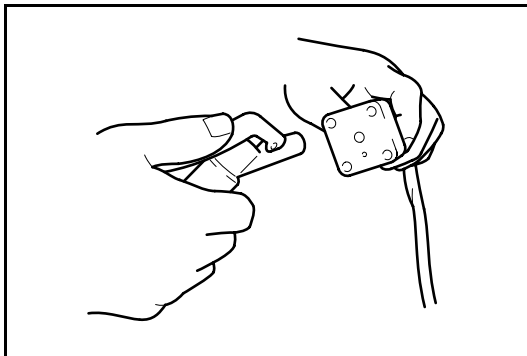
SST 09610-10161-71

Use the SST with a washer.

**[Point 4]**

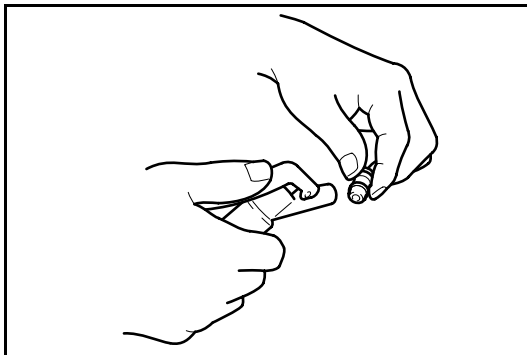
Inspection:

Inspect continuity of the tilt solenoid.



Inspection:

Inspect and wash the filter to eliminate clogging.

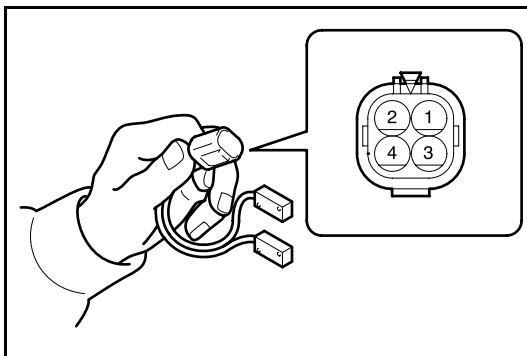


Inspection:

Inspect and wash orifice to eliminate clogging.

Assembly:

Carefully prevent incorrect installation of each solenoid spool.

**[Point 5]**

Inspection:

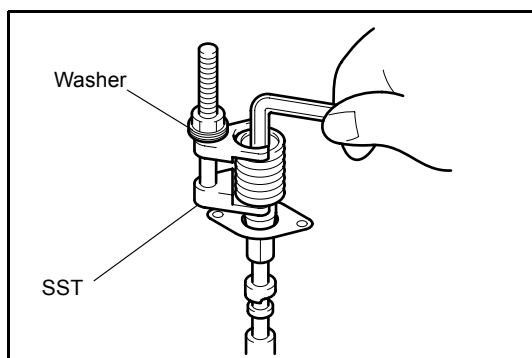
Inspect continuity of the tilt limit switch.

Forward tilting side (between terminals 1 and 2):
No continuity when the switch is pressed.

Backward tilting side (between terminals 3 and 4):
No continuity when the switch is pressed.

Assembly:

Carefully prevent confusion between forward and backward tilt limit switches.

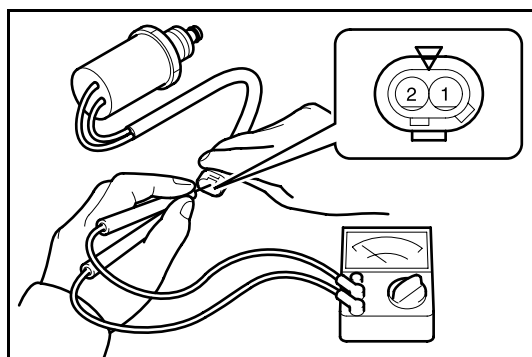
**[Point 6]**

Disassembly-assembly:

Remove the compression spring from the tilt spool.

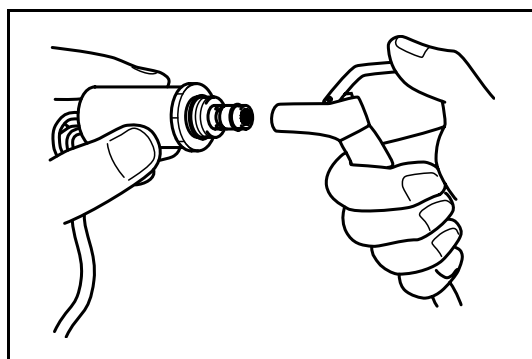
SST 09610-19161-71

Use the SST with a washer.

**[Point 7]**

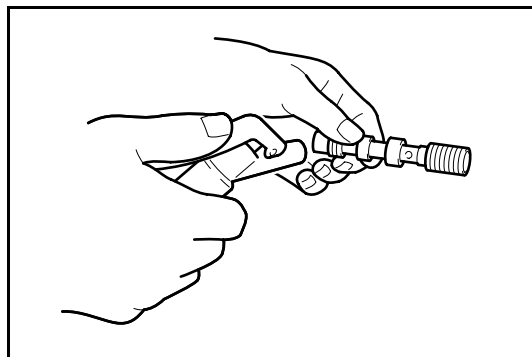
Inspection:

Inspect continuity of the unload solenoid.

**[Point 8]**

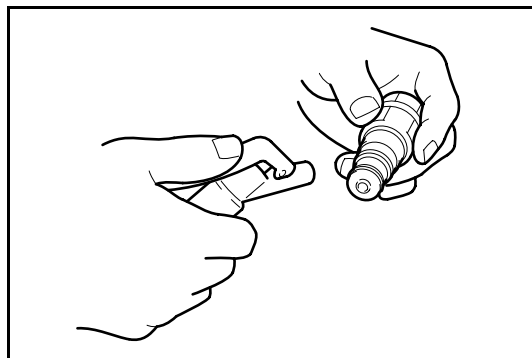
Inspection:

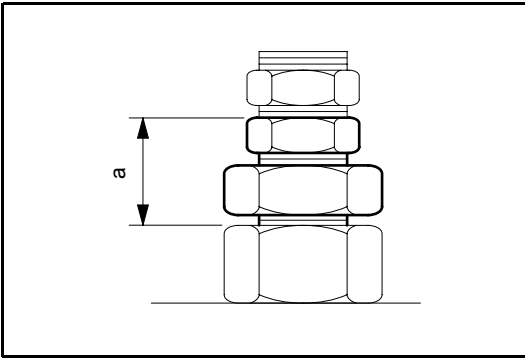
Inspect and wash orifice to eliminate clogging.

**[Point 9]**

Inspection:

Inspect and wash the filter to eliminate clogging.



**Assembly:**

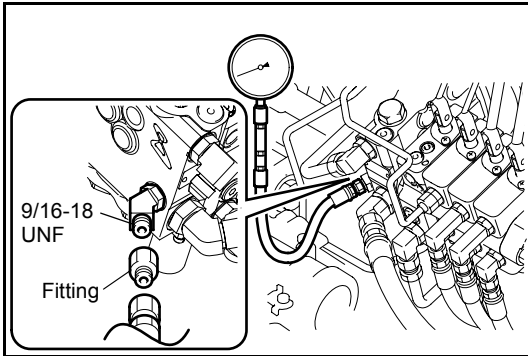
When the relief valve is disassembled, temporarily install it after setting the nuts as illustrated.

a = 27.0 mm (0.62 in)

RELIEF PRESSURE ADJUSTMENT

Note:

- Since the relief valve is structured in two stages, always adjust the relief pressure in the correct order: the lift (high pressure) side first and the tilt (low pressure) side later. (If the lift side is normal and the tilt side is abnormal as the result of relief pressure inspection, it is allowed to adjust only the tilt side pressure.)
- Always adjust the relief pressure as described below. Thoughtless adjustment may give rise to a high pressure, possible damaging the hydraulic equipment such as the oil pump.
- Make sure that the no-load maximum speed is as specified before the adjustment operation.



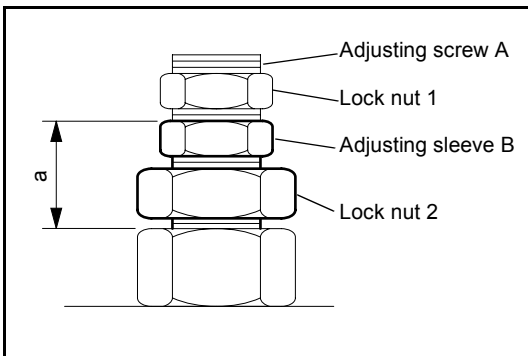
1. Install an oil pressure gauge.

Remove the oil pressure detection port plug installed on the left side of the oil control valve, and install the oil pressure gauge.

Plug size: 9/16-18UNF

Fitting size: 9/16-18UNF × PF1/4

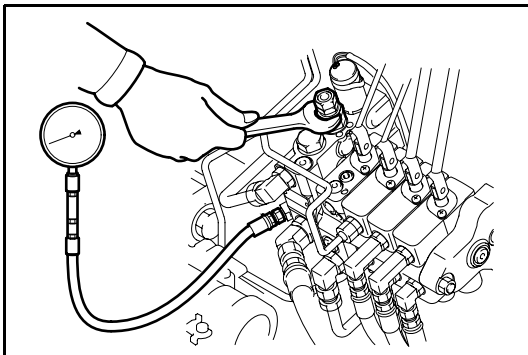
Fitting: 90407-13469-71



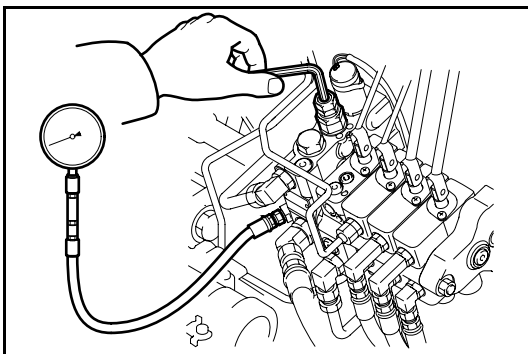
2. Set adjusting screw A and adjusting sleeve B of the relief valve as follows:

- (1) Loosen lock nut 1 and fully tighten adjusting screw A. Then loosen it by one to two turns.
- (2) Loosen lock nut 2, and position adjusting sleeve B to satisfy the following dimension:

a = 27 mm (0.62 in)



3. Start the engine and check for any oil leak or abnormal noise.
4. Adjust the lift side relief pressure.
 - (1) Turn the seat switch to ON. (Operate by two persons with one on the operator's seat)
 - (2) Operate the lift lever to raise the fork to the uppermost position.
 - (3) With the engine running at the maximum speed, operate the lift lever to the lift side. Gradually tighten adjusting sleeve B to adjust the oil pressure in the relief state to satisfy the standard below for adjustment, and fix it by turning lock nut 2.



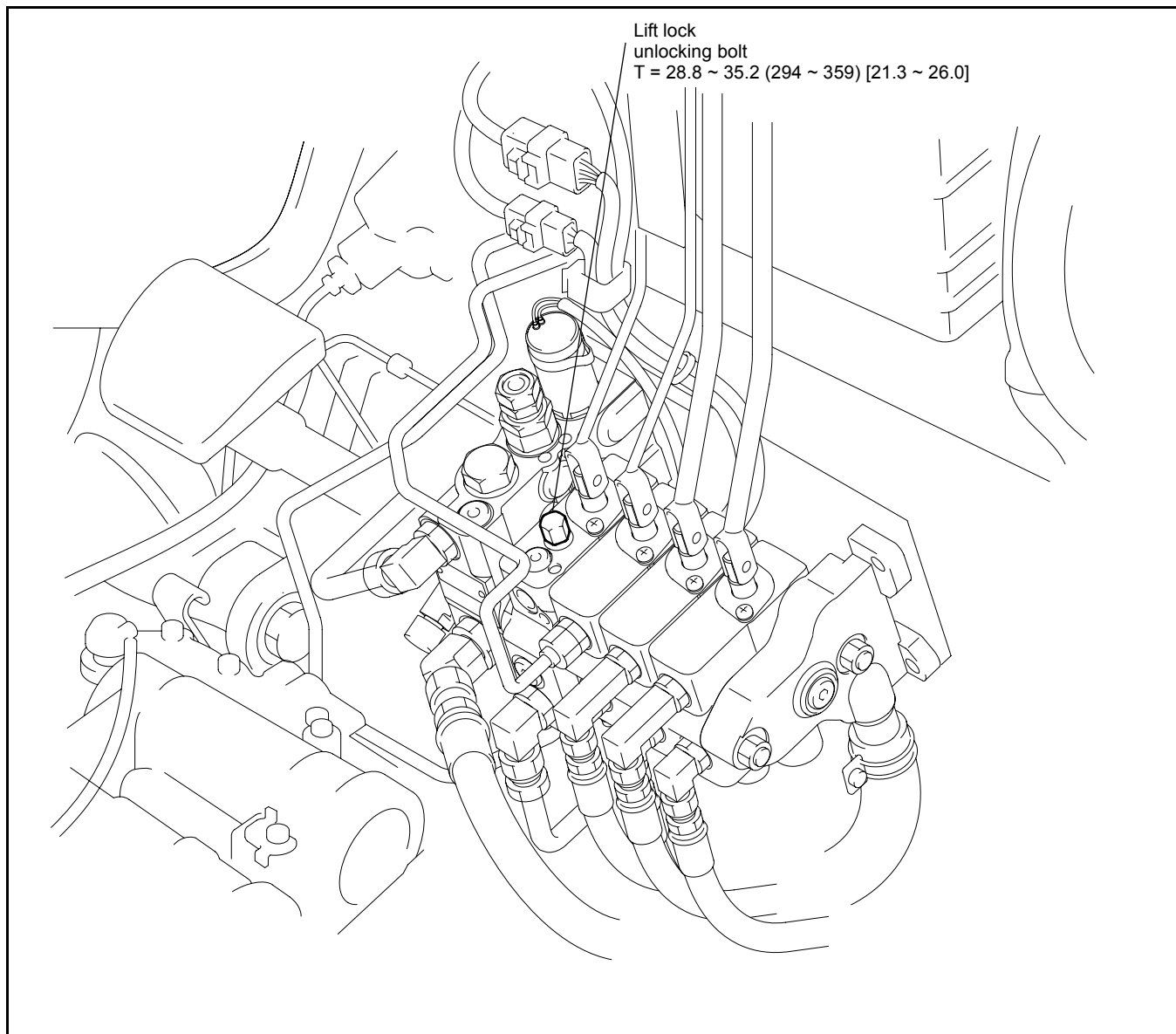
5. Adjust the tilt side relief pressure.
 - (1) Turn the seat switch to ON. (Operate by two persons with one on the operator's seat.)
 - (2) Operate the tilt lever to tilt the mast fully backward.
 - (3) With the engine running at the maximum speed, operate the tilt lever for backward tilting. Gradually tighten adjusting screw A until the oil pressure in the relief state satisfies the standard below. Then fix the position by turning lock nut 1.
6. Turn the key switch to OFF.
7. Remove the oil pressure gauge and tighten the plug.

StandardsUnit: MPa (kgf/cm²) [psi]

Vehicle model	1 ton series	2 · 3 ton series	J3.5 ton series
Lift side relief pressure	$17.8^{+1.7}_0$ (182^{+17}_0) [2590^{+240}_0]	$18.7^{+1.7}_0$ (191^{+17}_0) [2720^{+240}_0]	←
Tilt side relief pressure	$11.8^{+1.7}_0$ (120^{+17}_0) [1710^{+240}_0]	$14.7^{+1.7}_0$ (150^{+17}_0) [2130^{+240}_0]	$15.7^{+1.7}_0$ (160^{+17}_0) [2280^{+240}_0]

LIFT LOCK RELEASE BOLT

T=N·m (kgf·cm) [ft·lbf]



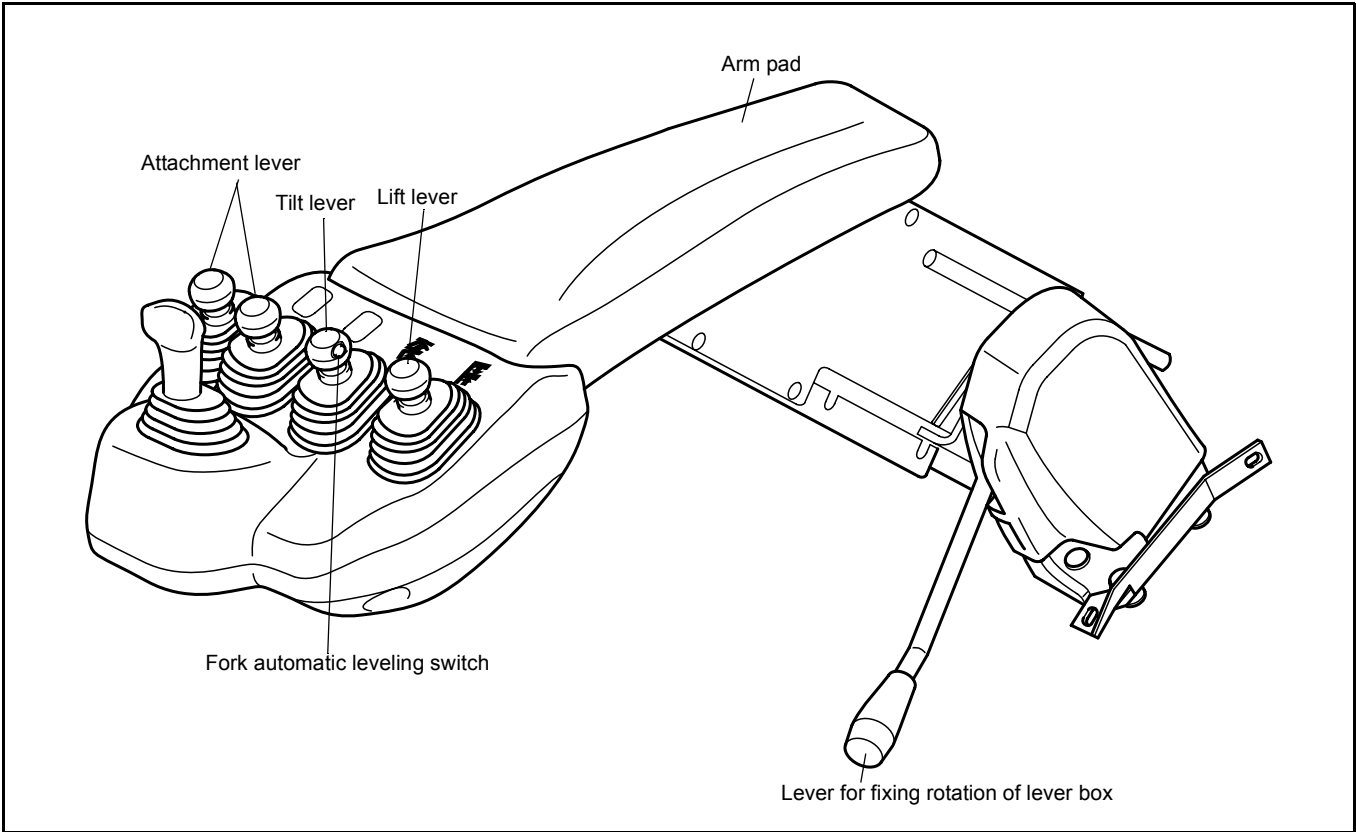
When the forks do not descend, due to a malfunction or other cause, loosen the lift lock unlocking bolt to lower the forks in emergencies.

After making repairs, tighten it appropriately.

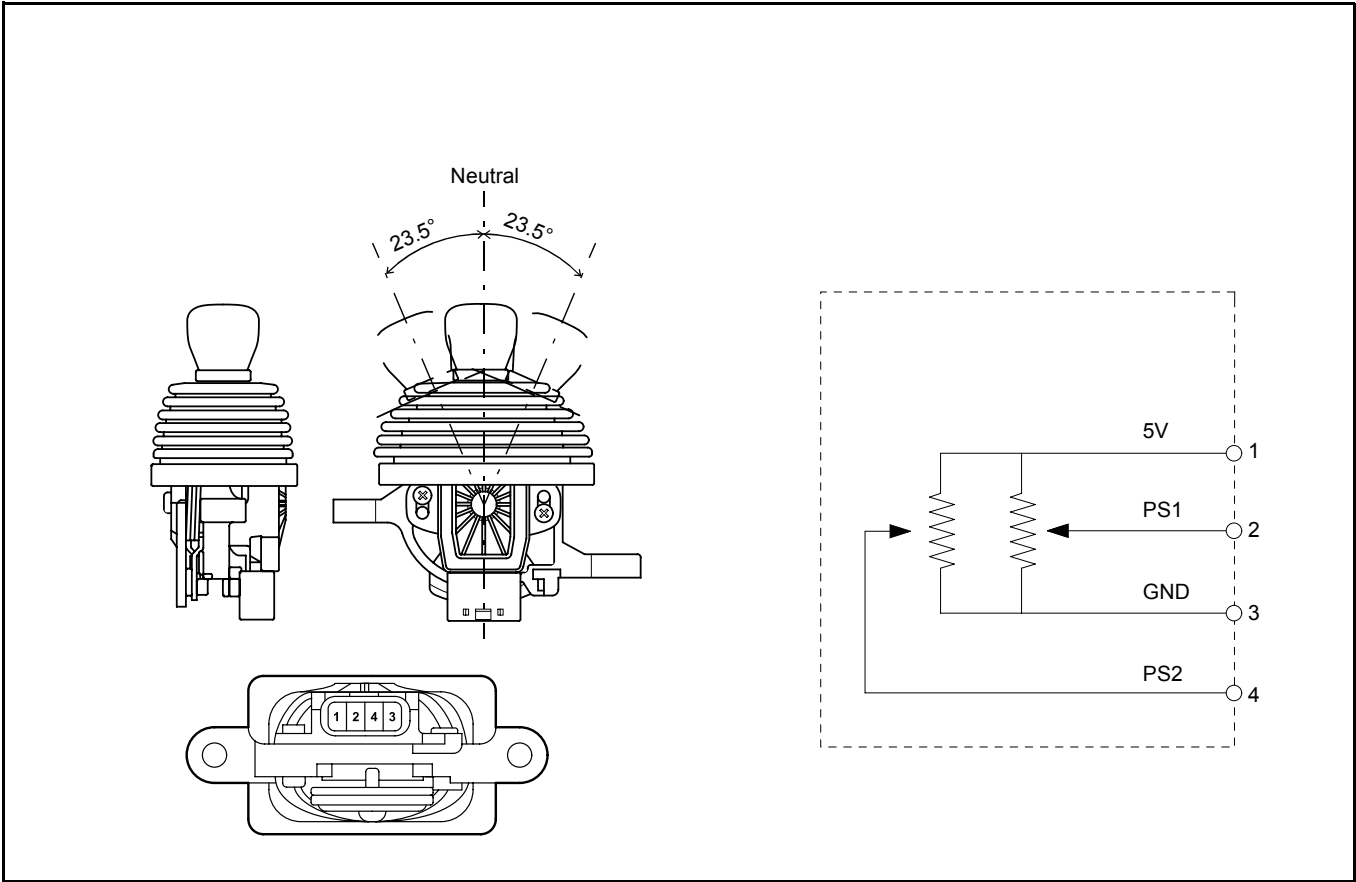
MINI LEVER

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DISASSEMBLY · INSPECTION · ASSEMBLY	5-7
MINI LEVER MATCHING	5-8
MINI LEVER TROUBLESHOOTING	5-9
CONTROLLER SEQUENCE	5-12
CONNECTOR LAYOUT	5-13
CONNECTOR DIAGRAMS	5-14

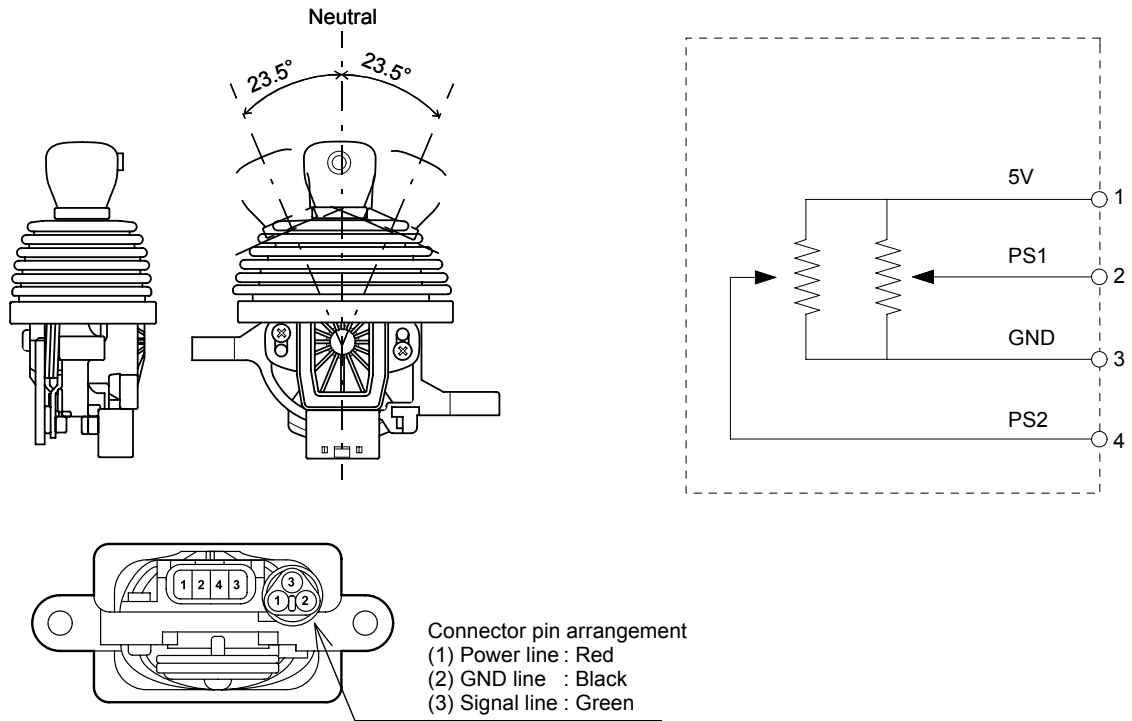
GENERAL



Lift Lever-Attachment Lever

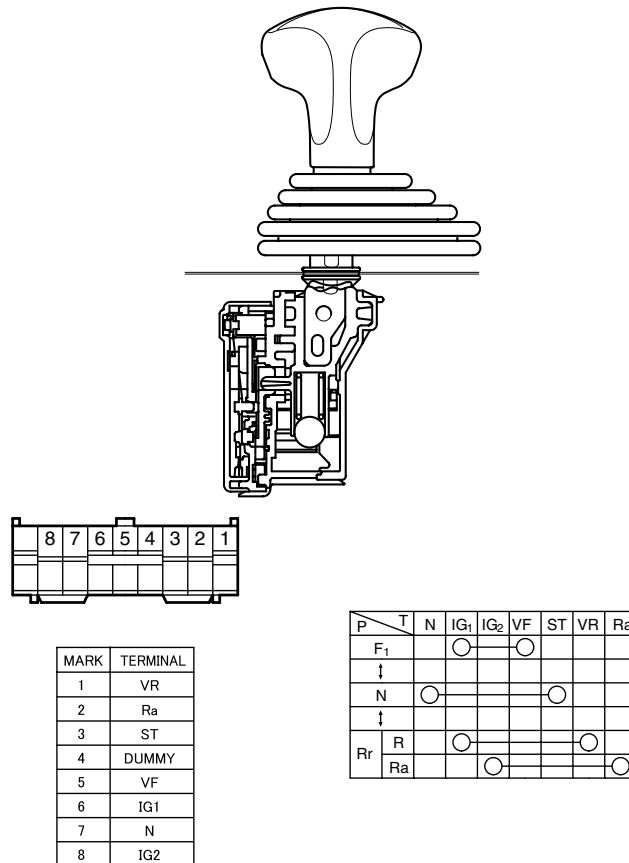


Tilt Lever



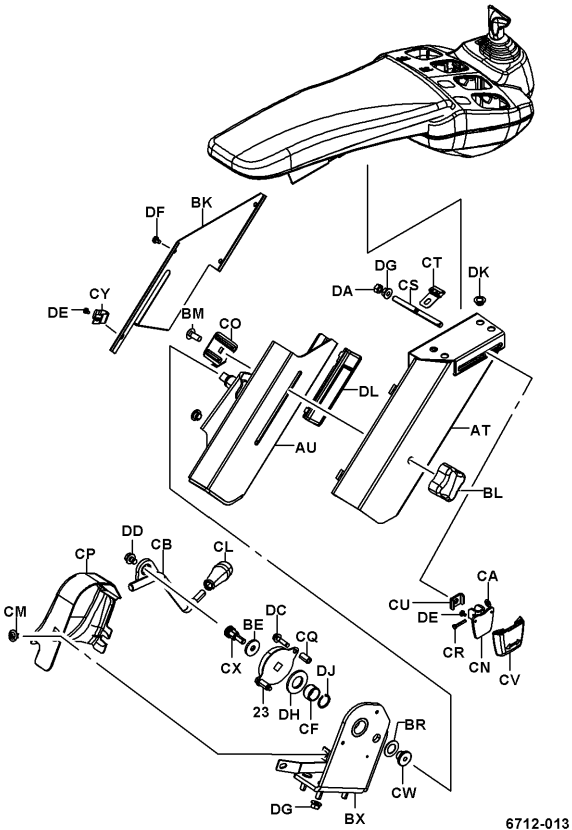
5

Direction Switch



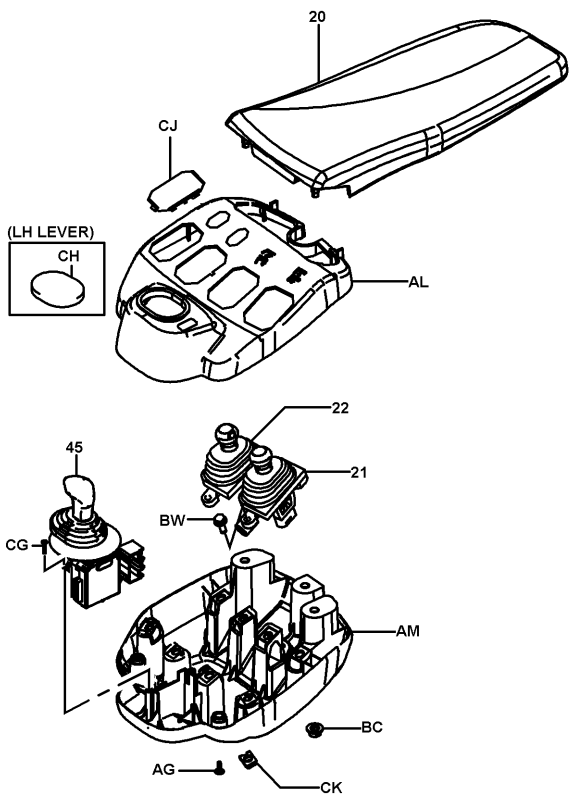
COMPONENTS

6712



6712-013

6712

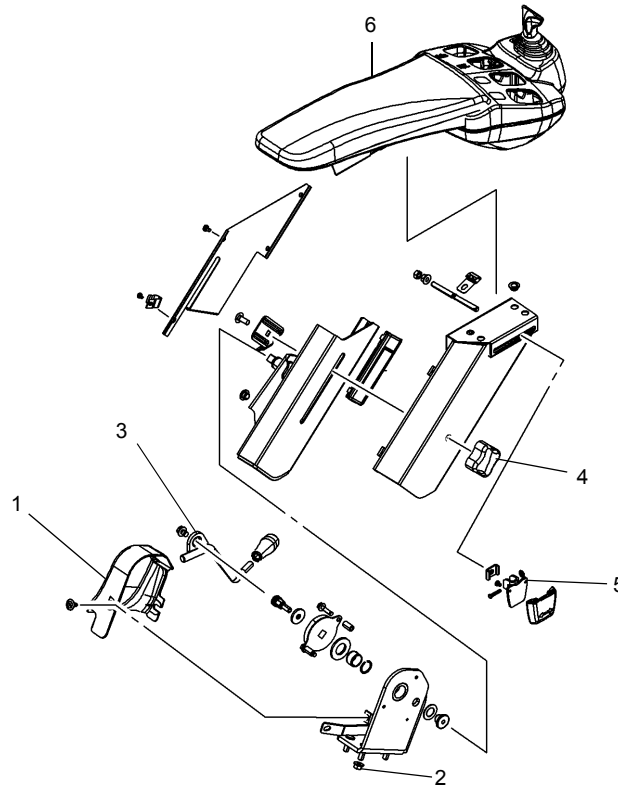


6712-014

MINI-LEVER BOX

REMOVAL · INSTALLATION

5



Removal Procedure

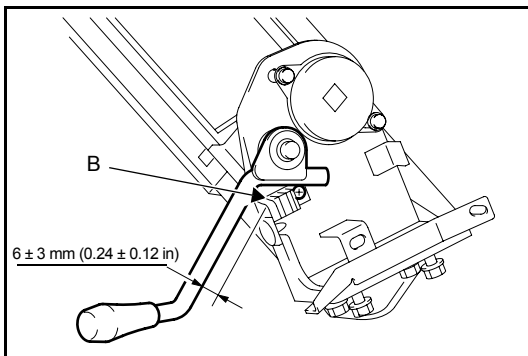
- 1 Remove the cover from the rotation lock lever and disconnect the connector.
- 2 Remove the bolt and remove the armrest with stand ASSY.
- 3 Remove the rotation lock lever. **[Point 1]**
- 4 Remove the armrest fixing knob, and remove the stand lower.
- 5 Remove the lever box fixing knob, and remove the stand upper. **[Point 2]**
- 6 Remove the lever box from the armrest.

Installation Procedure

The installation procedure is the reverse of the removal procedure.

Note:

Apply MP grease on the sliding contact portion before assembly.



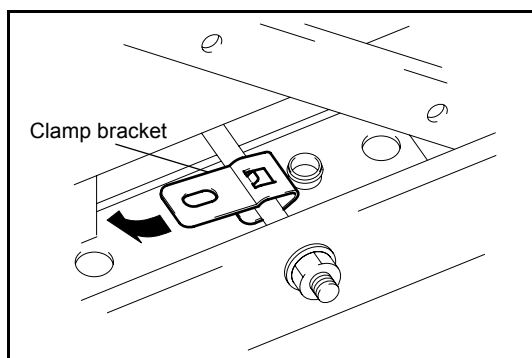
Point Operations

[Point 1]

Reassembly :

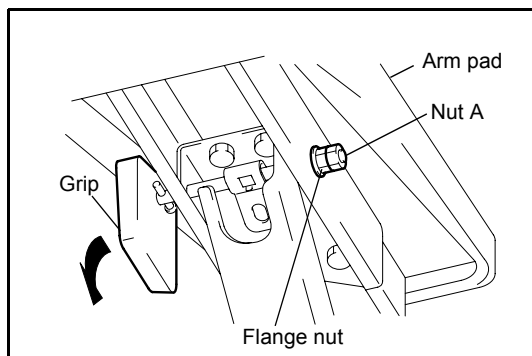
Adjust the position of the serrated portion to satisfy the illustrated dimension. (Visual check allowable)

One serration notch moves the B portion by 6 mm (0.24 in).

**[Point 1]**

Reassembly :

Match the clamp bracket hole with the protrusion in the lever shaft, and turn the bracket as illustrated.



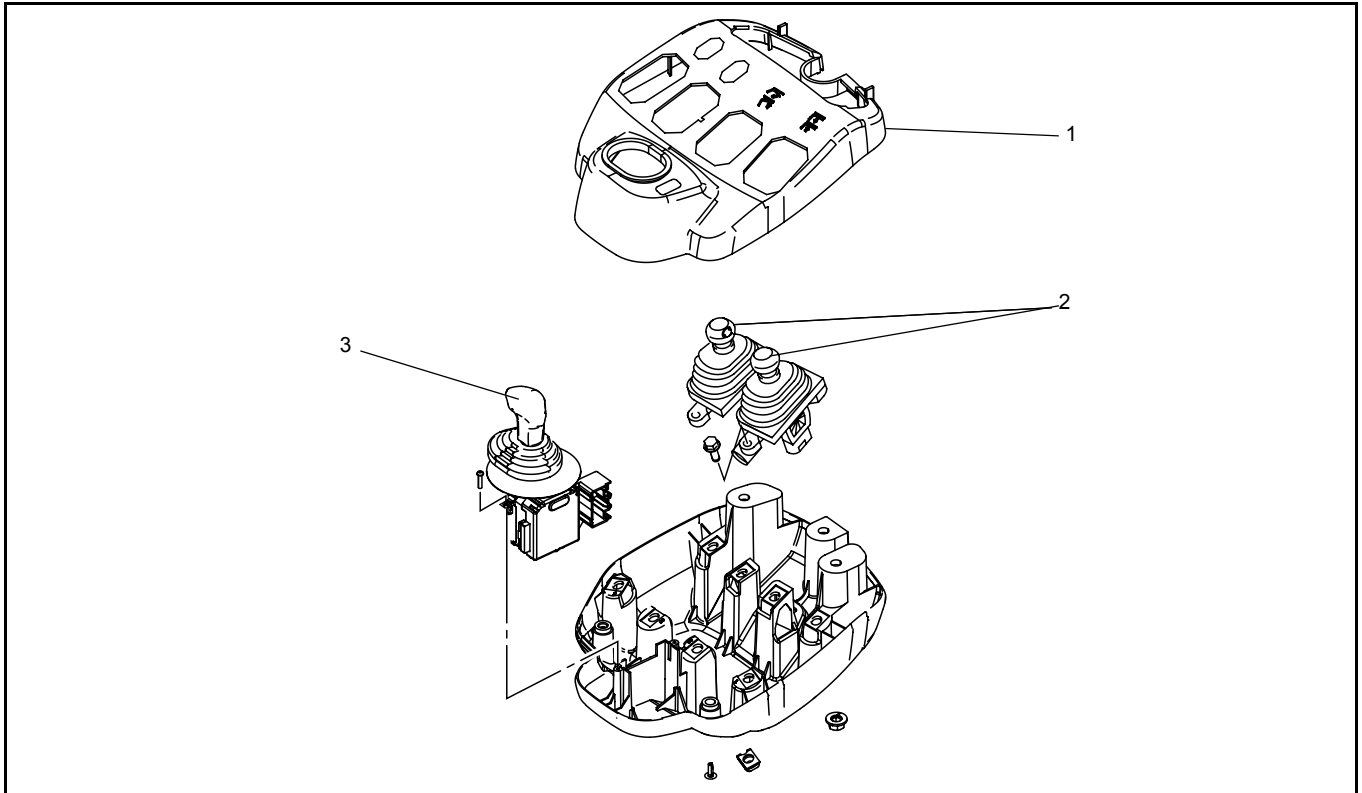
Reassembly :

Tighten the flange nut to adjust the grip operating force. Confirm no movement by manually pushing and pulling the arm pad. If it moves, tighten the flange nut further.

Tighten nut A to the specified torque.

T = 14 N · m (143 kgf · cm) [10.3 ft · lbf]

DISASSEMBLY · INSPECTION · ASSEMBLY



Disassembly Procedure

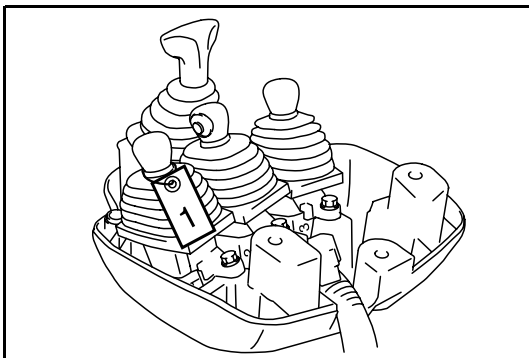
- 1 Remove the lever cover.
- 2 Disconnect the connector and remove each lever switch. **[Point 1]**
- 3 Remove the direction switch.

Assembly Procedure

The assembly procedure is the reverse of the disassembly procedure.

Note:

When the lift lever potentiometer, tilt lever potentiometer or attachment potentiometer is disassembled or replaced, perform mini lever matching (see page 5-8).



[Point 1]

Disassembly :

Put tags showing connector numbers to the connectors.

Reassembly :

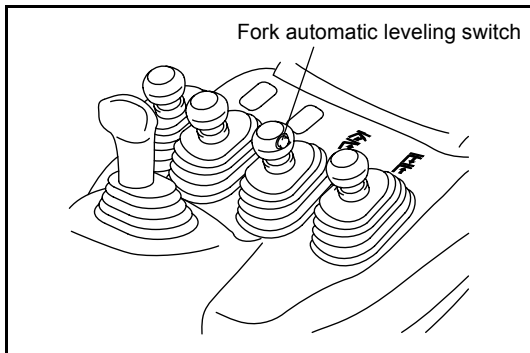
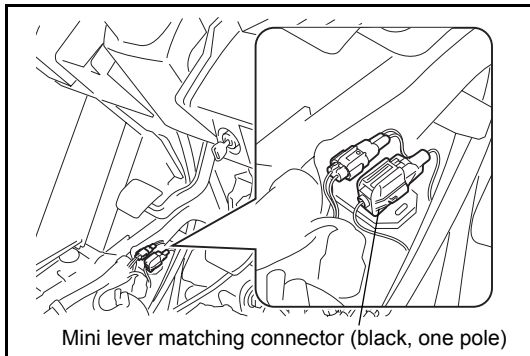
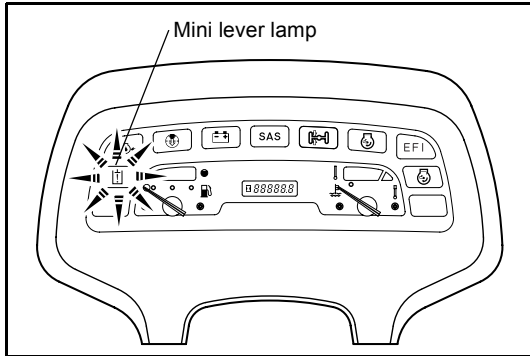
Connect the connectors by matching the numbers.

MINI LEVER MATCHING

Note:

Before starting matching, be sure that the vehicle conditions are as follows:

1. All levers are in neutral positions.
2. The mini lever matching connector is connected.



Mini Lever Matching Procedure

1. Turn the key switch to ON.

Note:

In case of initial matching, the mini lever lamp comes on for two seconds and then blinks at intervals of one second. If matching has been performed earlier, the lamp goes off after lighting for two seconds.

2. Disconnect the mini lever matching connector.
The mini lever lamp blinks at intervals of 0.5 second.:
3. Turn the fork automatic leveling switch ON.
The mini lever lamp goes off after lighting for two seconds.
(Matching is completed.)

Note:

Check neutral setting of all levers again, and turn the fork automatic leveling switch ON.

4. Connect the mini lever matching connector and turn the key switch to OFF.

MINI LEVER TROUBLESHOOTING

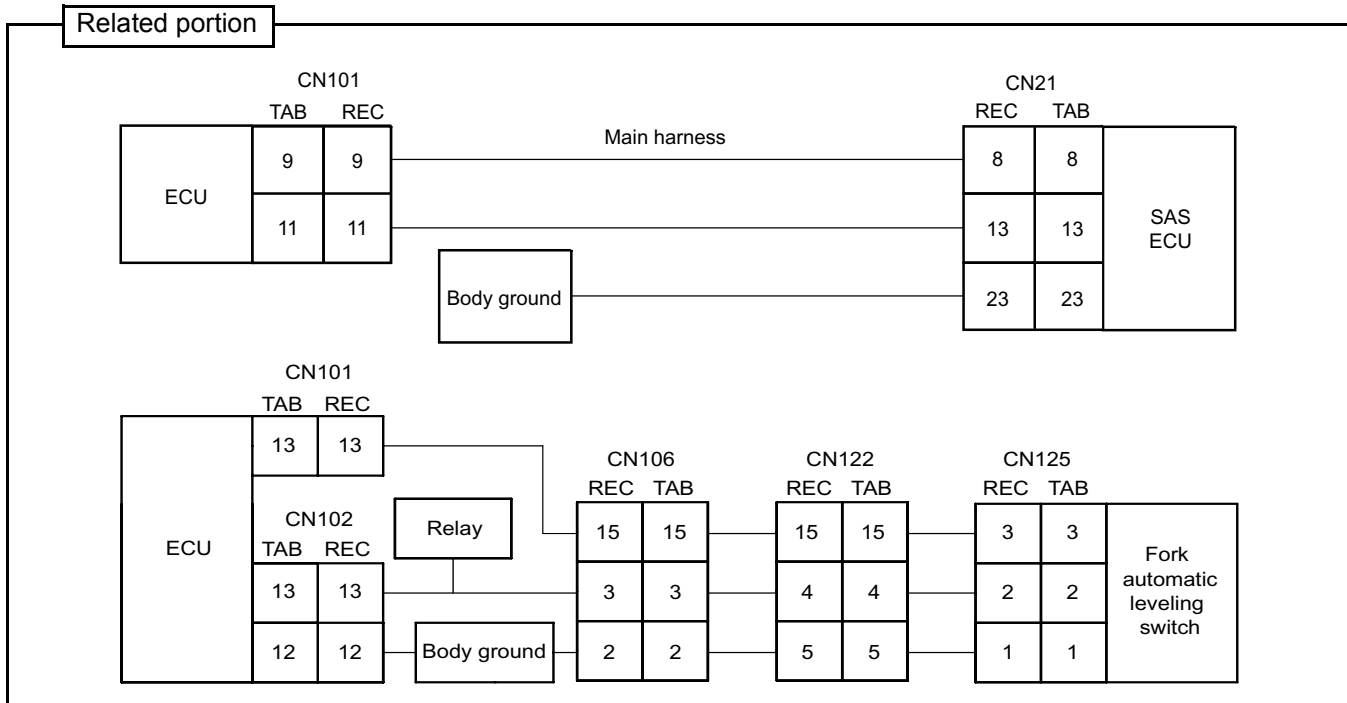
Note:

Troubleshooting is the same except for the following:

- Delete the following item from the items for "No error code display".
Delete: All material handling operations (all levers) disabled
For troubleshooting for this phenomenon, see the troubleshooting in the OPS section.
- Troubleshooting for the following phenomenon is changed.

Fork automatic leveling, backward tilting speed restriction and forward tilting angle restriction are invalid.

Fork automatic leveling, backward tilting speed restriction and forward tilting angle restriction are invalid.



Condition for error detection

- The automatic leveling switch simulation signal is not output (harness open circuit)
- The automatic leveling switch is open-circuited (harness open circuit)
- The SAS tilt control command is not output (SAS ECU defect)

Operate for forward tilting immediately after relief at the maximum lifting height without load, and check if the operation is stopped upon forward lifting by about 1°. (Slowly operate with the fork automatic leveling switch turned to OFF.)

NG

Refer to SAS troubleshooting (automatic leveling disabled).
Check the tilt angle sensor operation.

OK

Key switch: OFF
Disconnect CN101 and check continuity between CN101(REC)-9 and CN21(REC)-8, between CN101(REC)-11 and CN21(REC)-13, and between CN21(REC)-23 and body ground with a circuit tester.
[OK] Continuity, [NG] No continuity

NG

Main harness defect

OK

Key switch: ON
Check continuity between CN101(REC)-13 and body ground with a circuit tester.
When the automatic leveling switch is ON:
[OK] Continuity, [NG] No continuity
When the automatic leveling switch is OFF:
[OK] No continuity, [NG] Continuity

OK
(A)

NG
(B)

(A)



Key switch: ON
Perform forward tilting, connect all connectors, and measure the voltage between CN101-1 and CN101-2 with a circuit tester.
[OK] 4 V or more during forward tilting
[NG] Less than 4 V during forward tilting
Perform backward tilting, connect all connectors, and measure the voltage between CN101-1 and CN101-10 with a circuit tester.
[OK] 4 V or more during backward tilting
[NG] Less than 4 V during backward tilting

OK
↓

SAS ECU defect

NG
↓

Mini lever ECU defect

(B)



Key switch: OFF
Disconnect CN100, CN101, CN102 and CN 125, and check continuity with a tester.

(REC) ~ (REC)	OK	NG
CN125-3 ~ CN101-13	Continuity	No continuity
CN125-1 ~ CN102-13	↑	↑
CN125-2 ~ CN102-12	↑	↑
CN125-1 ~ CN125-2	No continuity	Continuity
CN125-2 ~ CN125-3	↑	↑
CN125-3 ~ CN125-1	↑	↑

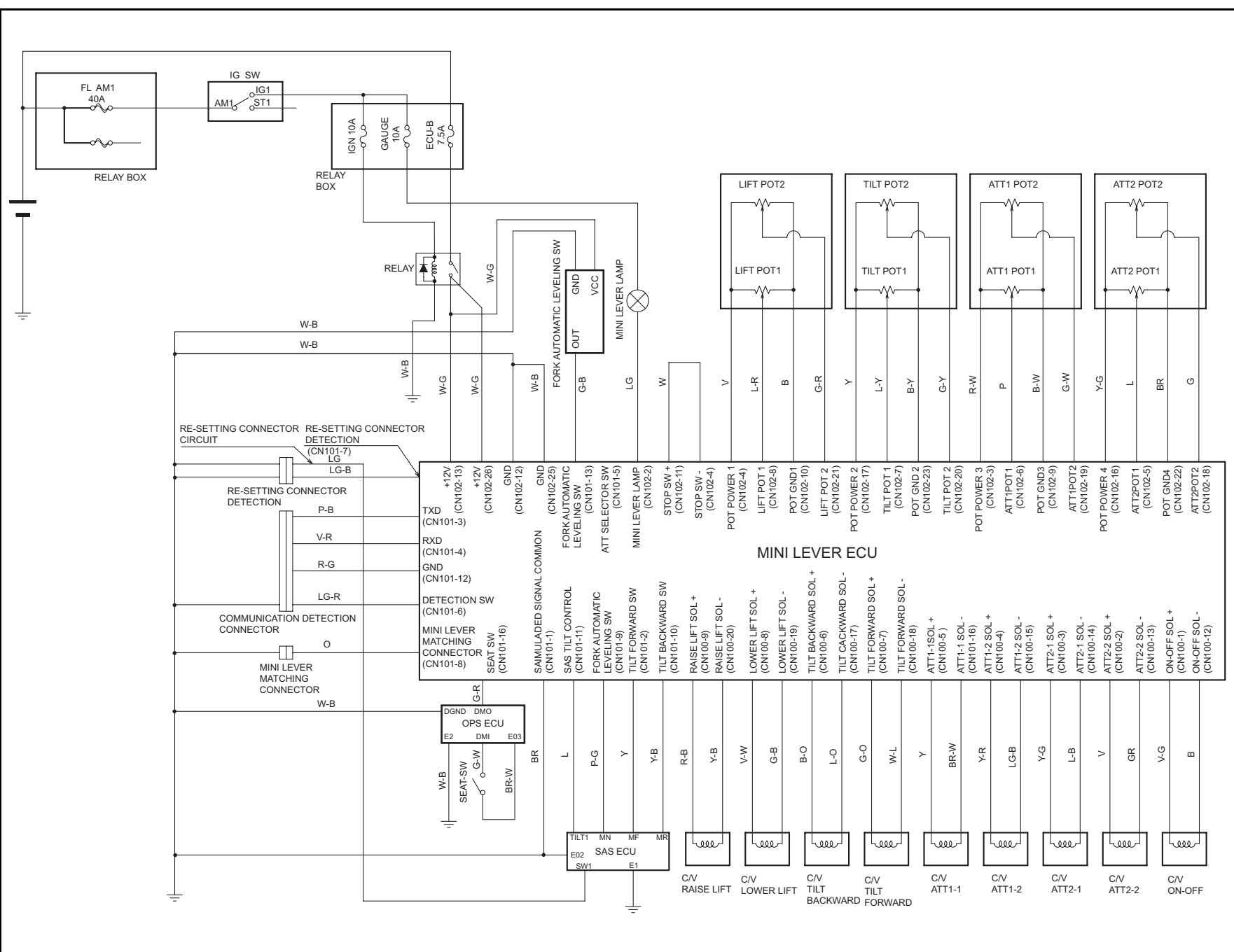
OK
↓

Fork automatic leveling
switch defect

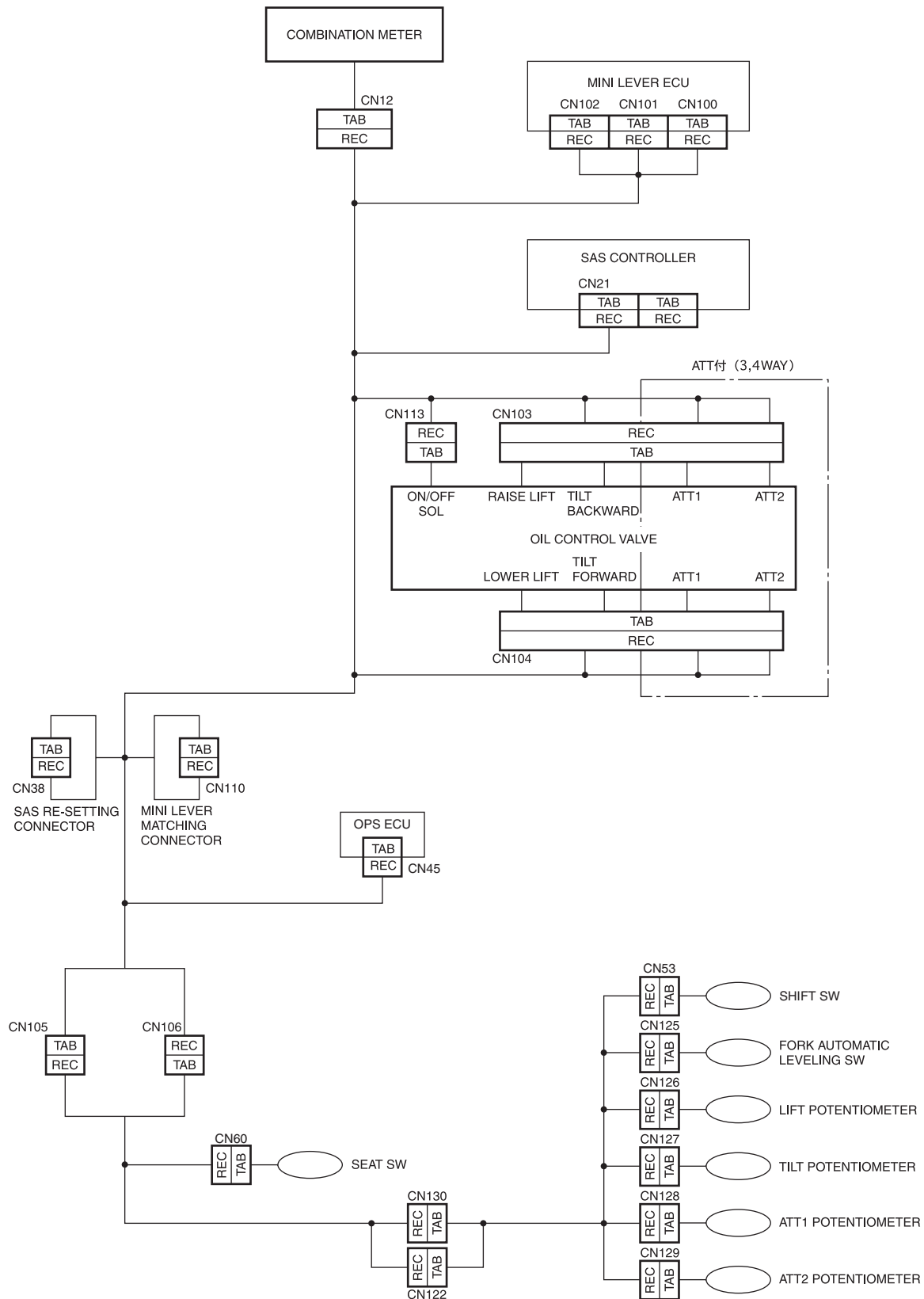
NG
↓

Harness defect

CONTROLLER SEQUENCE



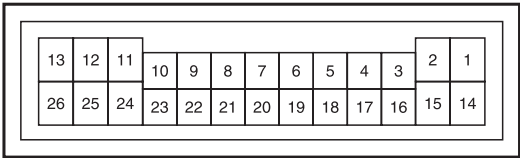
CONNECTOR LAYOUT



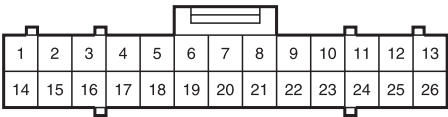
Note:
Connector Nos. are only the mini lever, and they do not agree with the SAS and OPS connector Nos.

CONNECTOR DIAGRAMS

CN21

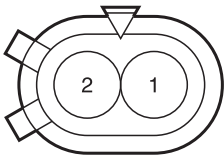


TAB

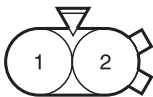


REC

CN38



TAB

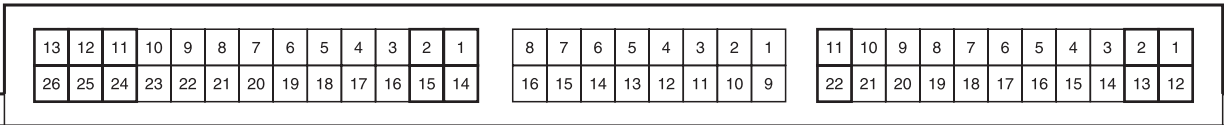


REC

CN102

CN101

CN100

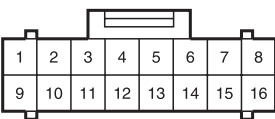
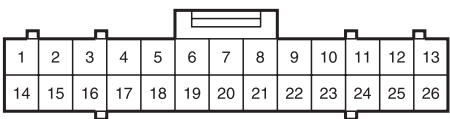


TAB

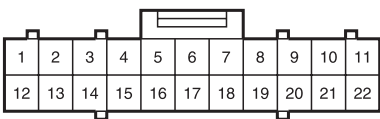
CN102

CN101

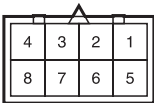
CN100



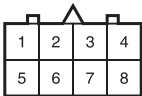
REC



CN103,CN104

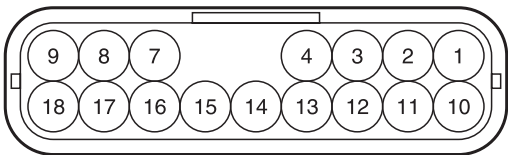


TAB

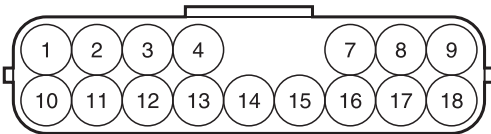


REC

CN105,CN130

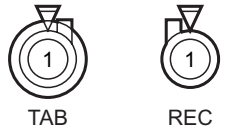


TAB

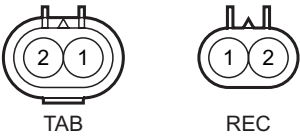


REC

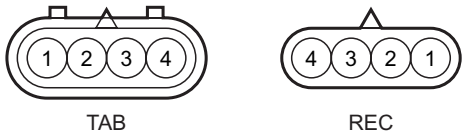
CN110



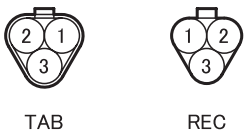
CN60, CN113



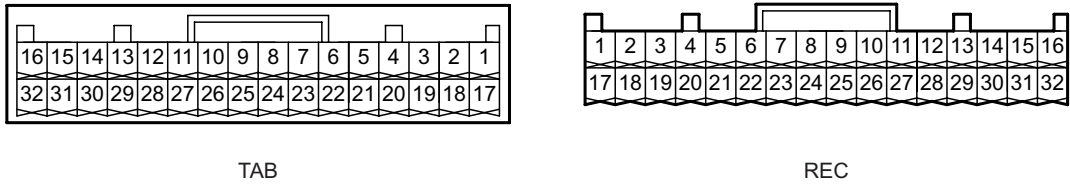
CN126, CN127, CN128, CN129



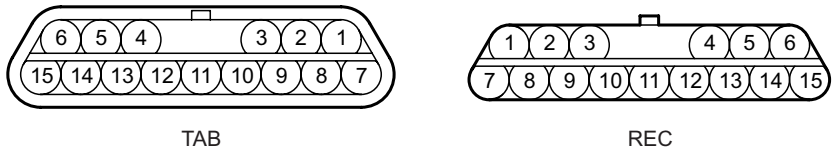
CN125



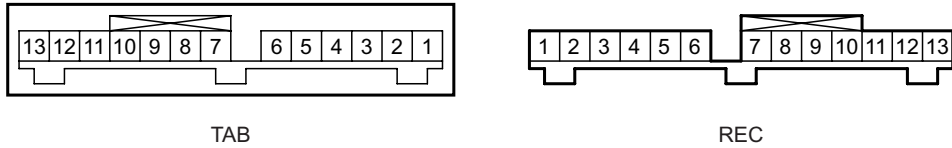
CN45



CN106, CN122



CN12



SAS

	Page
RE-SETTING	6-2
RE-SETTING PROCEDURE (VEHICLE WITH MINI LEVER)	6-2
CUSTOMIZE	6-4
CUSTOMIZE PROCEDURE (VEHICLE WITH MINI LEVER)	6-4
TROUBLESHOOTING	6-5
TROUBLESHOOTING BY ERROR CODE	6-6
TROUBLESHOOTING BY PHENOMENON	6-10
CONNECTOR LAYOUT (SAS, OPS)	6-15
CONTROLLER SEQUENCE (SAS, OPS)	6-16
CONNECTOR DIAGRAMS (SAS, OPS)	6-17

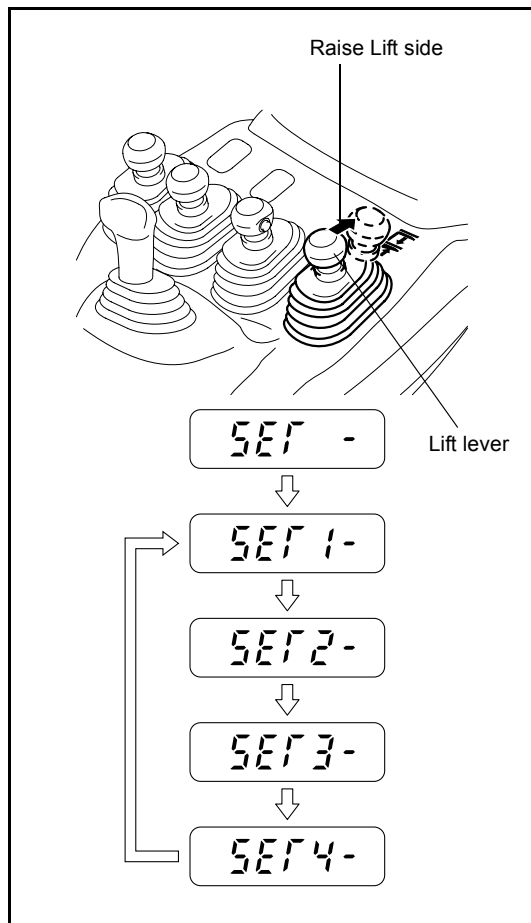
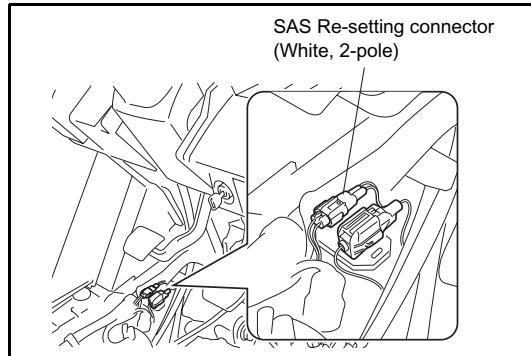
RE-SETTING

Re-setting of the mini-lever specification vehicle is possible either by the hour meter and the lift lever or by the plug-in analyzer.

For the method by the plug-in analyzer, refer to page 15-40 in repair manual No. CE026.

This manual describes the method by the hour meter and the lift lever.

Refer to page 15-21 in repair manual No. CE026 for the standard vehicle conditions for the re-setting operation.



RE-SETTING PROCEDURE (VEHICLE WITH MINI LEVER)

Note:

Turning the key switch ON (or starting engine) after disconnecting the re-setting connector causes an error (error code 41) to be displayed and stored to the controller, for which care must be taken.

1. Turn the key switch ON (or start the engine).
2. Disconnect the re-setting connector (white color).
 - (1) The hour meter display reads "SET" and the SAS lamp turns ON.

Note:

Upward lift operation is disabled after re-setting connector disconnection until the end of re-setting. (Downward lift operation is possible).

3. Operate the lift lever for 2 seconds or more in the up direction until the re-setting mode (SET1) is displayed.
4. Display the set number subject to the re-setting.
 - (1) Set number display changes sequentially each time the lift lever is operated (for less than 2 seconds) in the up direction.

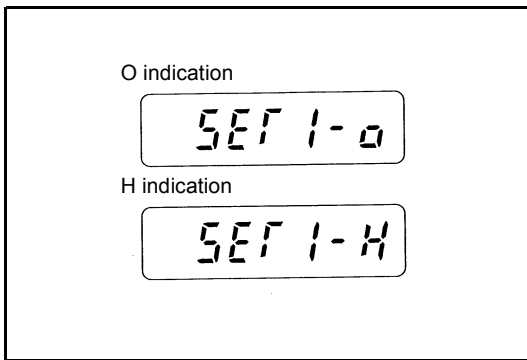
Note:

Be careful since re-setting starts if you operate the lift lever in the up direction for two seconds or more.

Set No.	Object of re-setting
SET1	Fork stop position with automatic leveling
SET2	Forward tilting limit position and no-load standard load
SET3	Tires in straight traveling position
SET4 *1	—

*1: Indication may be made but actually it is not used.

5. Set the sensor of the display set number to the standard state (or check if it is in the standard state). (See page 15-21 in the Repair Manual (No. CE026))



6. Execute re-setting by operating the lift lever for 2 seconds or more in the up direction.
O indication: Re-setting is completed. (SAS lamp starts to blink)
H indication: Check for the sensor abnormality, disconnection of the harness and the short-circuit since the signal voltage value is outside the re-setting rang. (Read the troubleshooting section.)

Note:

- For re-re-setting, repeat Step 6.
 - To make a separate re-setting, repeat Steps 4 to 6.
7. Connect the re-setting connector and turn the key switch OFF.

CUSTOMIZE

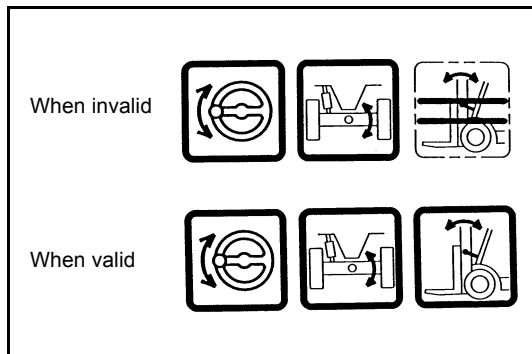
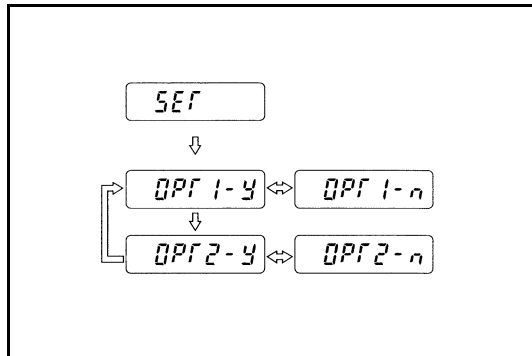
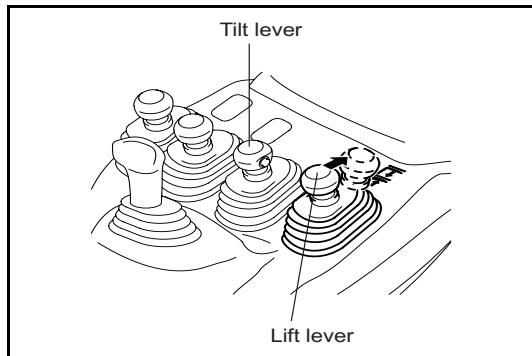
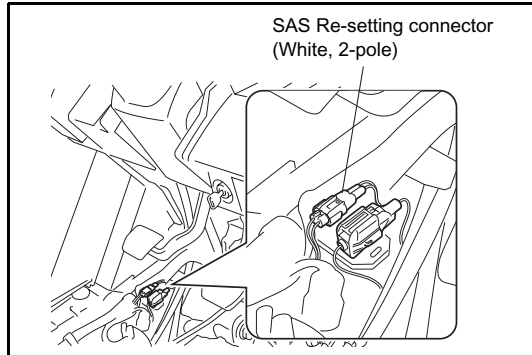
Customize operation of the mini-lever vehicle is possible either by the hour meter and the lift lever or by the plug-in analyzer.

Refer to page 15-42 in repair manual No. CE026 for the method by the plug-in analyzer.

This manual describes the method by the hour meter and the lift lever.

Caution:

When the customize is changed, maintain the caution label of "CAUTION FOR OPERATION."



CUSTOMIZE PROCEDURE (VEHICLE WITH MINI LEVER)

Note:

Turning the key switch ON (or starting engine) after disconnecting the re-setting connector causes an error (error code 41) to be displayed and stored to the controller, for which care must be taken.

1. Turn the key switch ON (or start the engine).
2. Disconnect the re-setting connector. (white color)
 - (1) The hour meter display reads "SET" and the SAS lamp turns ON.

Note:

Upward lifting is disabled after re-setting connector disconnection until the end of customize operation. (Downward lift operation is possible).

3. With the tilt lever kept operated for 5 seconds or more in the backward tilt direction, operate the lift lever in the up direction until the option set mode (OPT1) is displayed, and then return both levers.
4. Display the option number to change the option set.
 - (1) The displayed set No. changes each time the lift lever is operated (for less than 2 seconds) in the up direction.

Option No.	Control name
OPT1	Mast forward tilt angle control
OPT2*	—

*: Displayed but not in use.

5. When the lift lever is operated for 2 seconds or more in the up direction until the SAS lamp blinks, the display changes from y to n (y→n) or from n to y (n→y).

y: Control valid
n: Control invalid

Note:

Upward lifting is disabled after re-setting connector disconnection until the end of customize operation. (Downward lift operation is possible).

6. Connect the re-setting connector and turn the key switch OFF.
7. Perform the maintenance of caution label.
If the control is invalidated:
Remove the pertinent validation indication to replace with invalid indication.
If the control is validated:
Replace the caution label to indicate valid control.

TROUBLESHOOTING

Troubleshooting is described only for the portion changed by adoption of the OPS.

List of Reference Pages for Error Codes and Sub Error Codes

Without analyzer (SST)			With analyzer (SST)		
Error code	Error description	Page	Error code	Error description	Page
63	Tilt lever switch abnormality	6-6	63-1	Tilt lever switch simultaneous ON	6-6
			63-2	Forward tilt switch short circuit for 2 minutes	6-6
			63-3	Backward tilt switch short circuit for 2 minutes	6-6
64	Tilt solenoid abnormality	6-8	64-1	Tilt solenoid abnormality	6-8

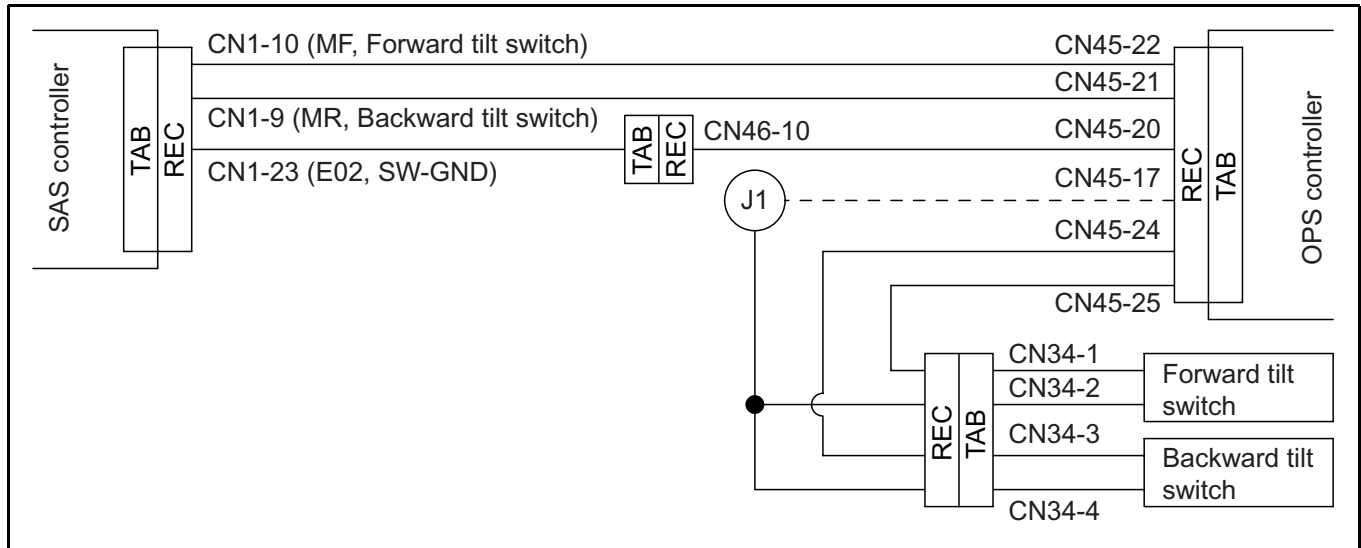
List of Pages to Be Referenced by Phenomenon

	Description	Page to be referenced	
		Without analyzer	With analyzer
Active mast function controller	The active mast rear tilt speed control is not regulated, or the backward tilting speed is always slow.	6-10	6-13
	The mast does not perform front tilt.	See "Mast forward tilting fails." section in OPS Troubleshooting.	

TROUBLESHOOTING BY ERROR CODE

- Error code 63 (Tilt lever switch abnormality)
- Error code 63-1 (Both tilt lever switches ON at the same time)
- Error code 63-2 (Forward tilt switch 2-minute short circuit)
- Error code 63-3 (Backward tilt switch 2-minute short circuit)

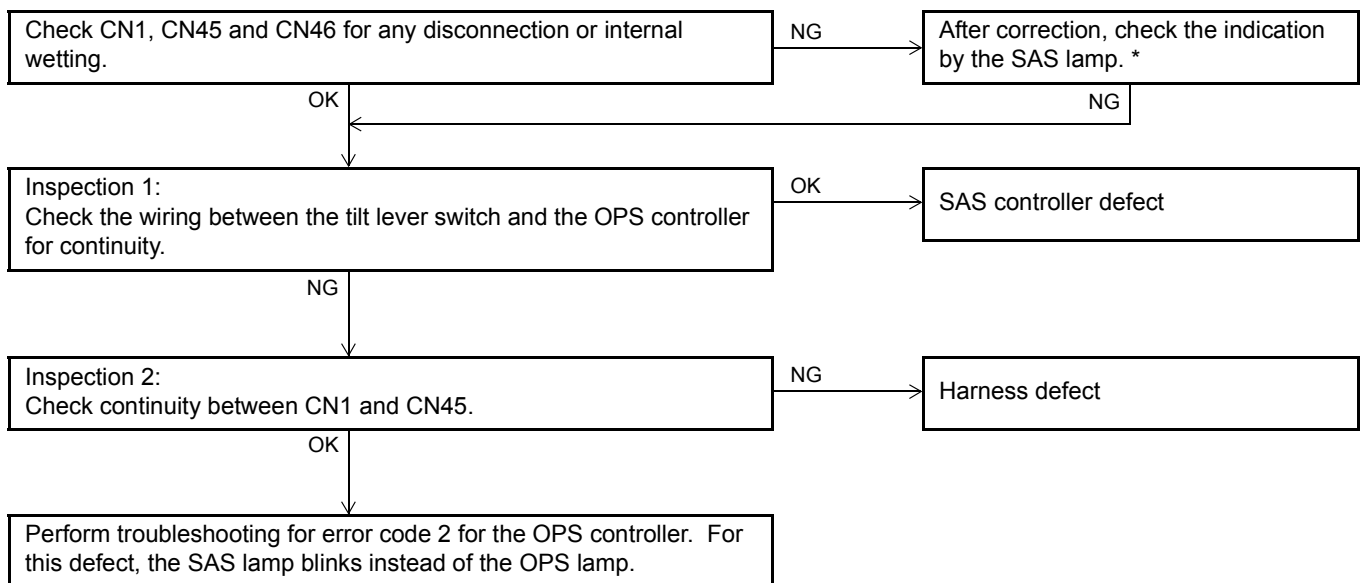
Related Portion



Estimated Causes:

- | | |
|------------------------------|-----------------------------------|
| ① Connector contact defect | ④ Backward tilt switch defect |
| ② Harness defect | ⑤ Tilt switch installation defect |
| ③ Forward tilt switch defect | ⑥ Controller defect |

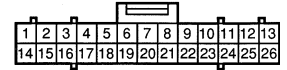
Error code 63



* After the ignition switch is turned ON, make sure that the SAS lamp is lit upon tilting forward and backward. Make sure that the 2-minute waiting SAS lamp blinks when the tilt lever is on the neutral position.

Inspection 1:

Check continuity through the tilt lever switch wiring.
Turn the key switch OFF and disconnect CN1.



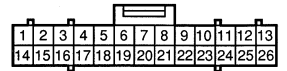
CN1 (REC)

Standard:

Circuit tester		Lever at neutral position	Lever at forward tilt position	Lever at backward tilt position
Digital type	CN1-10 (+) ~ CN1-23 (-)	No continuity	Continuity	No continuity
	CN1-9 (+) ~ CN1-23 (-)	No continuity	No continuity	Continuity
Analog type	CN1-10 (-) ~ CN1-23 (+)	No continuity	Continuity	No continuity
	CN1-9 (-) ~ CN1-23 (+)	No continuity	No continuity	Continuity

Inspection 2:

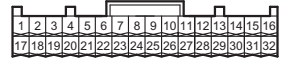
Check continuity between CN1 and CN45.
Turn the key switch OFF and disconnect CN1 and CN45.



CN1 (REC)

Standard:

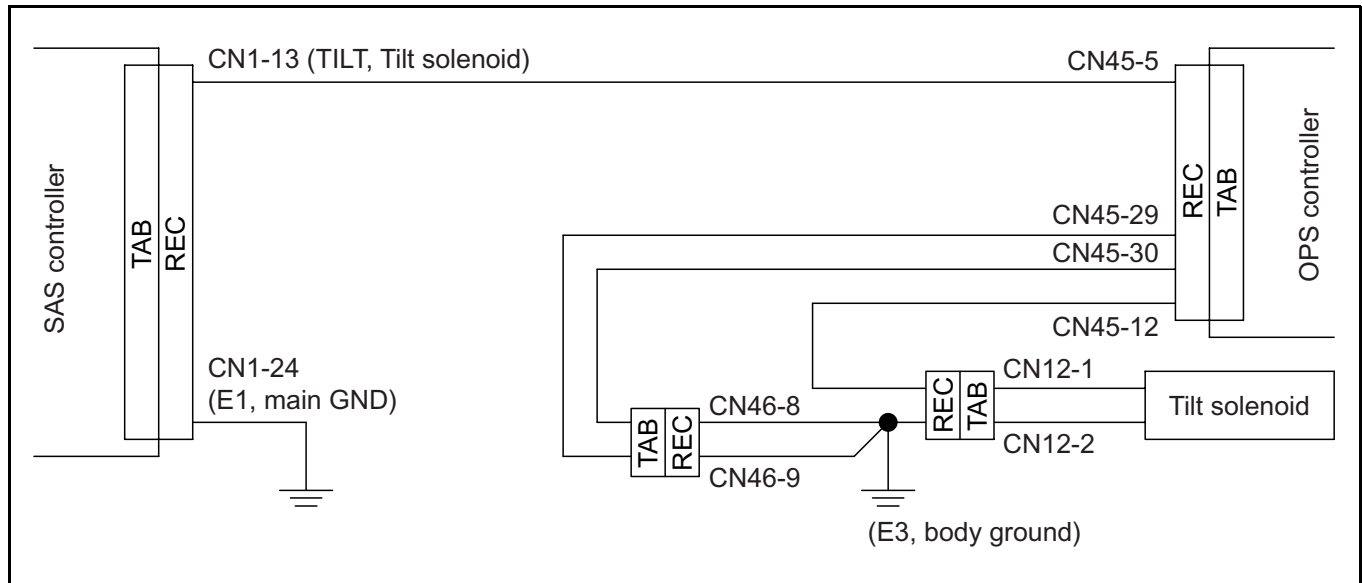
CN1-10 ~ CN1-9 : No continuity
 CN1-10 ~ CN1-23 : No continuity
 CN1-9 ~ CN1-23 : No continuity
 Between CN1-10 and frame : No continuity
 Between CN1-9 and frame : No continuity



CN45 (REC)

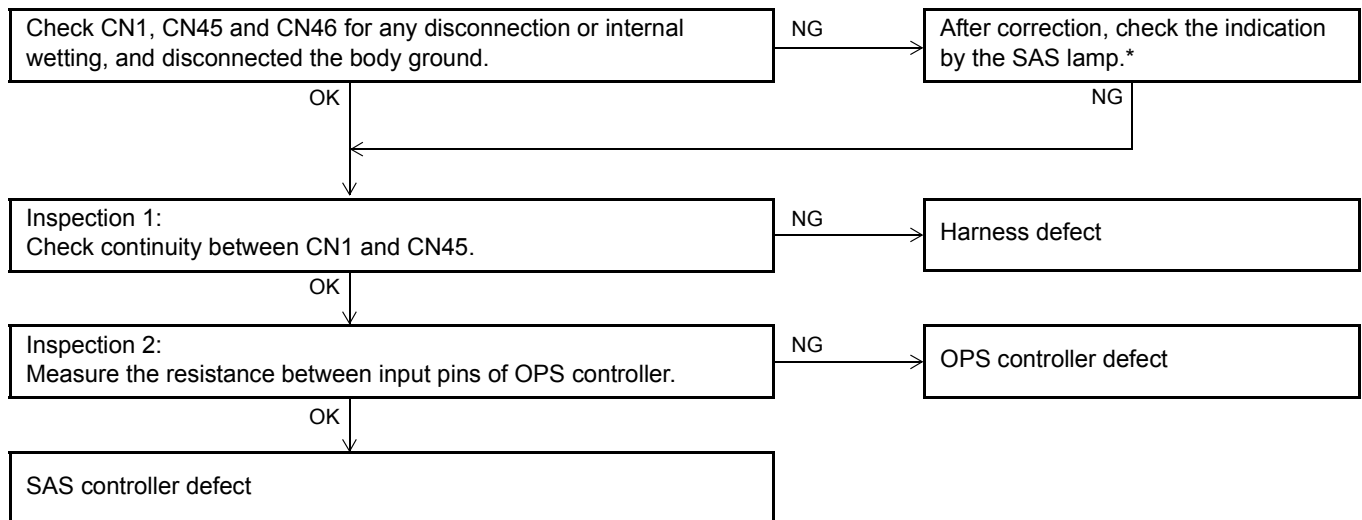
● Error Code 64 · 64-1 (Tilt solenoid abnormality)

Related Portion



Estimated Causes:

- ① Connector contact defect
- ② Harness defect
- ③ SAS controller defect
- ④ OPS controller defect



* After correction, check the indication by the SAS lamp.

Start the engine and operate for forward and backward tilting to check if the SAS lamp blinks.
The SAS lamp must not blink.

Inspection 1:

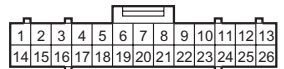
Check continuity between CN1 and CN45.
Turn the key switch OFF, and disconnect CN1 and CN45.

Standard:

- Discontinuity check
 - CN1-13 ~ CN45-5: Continuity
 - CN1-24 ~ CN45-29: Continuity
 - CN1-24 ~ CN45-30: Continuity
- GND fault check
 - CN1-13 ~ CN1-24: No continuity
- +B shorting check
 - CN45-5 ~ CN45-32: No continuity
- Ignition line shorting check
 - CN1-13 ~ CN1-11: No continuity



CN45 (REC)



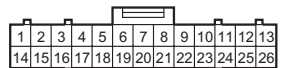
CN1 (REC)

Inspection 2:

Measure the resistance between input pins of the OPS controller.
Turn the ignition switch OFF, and disconnect CN45.

Standard:

CN45-4 ~ CN45-31: Approx. 800Ω (at 20°C)

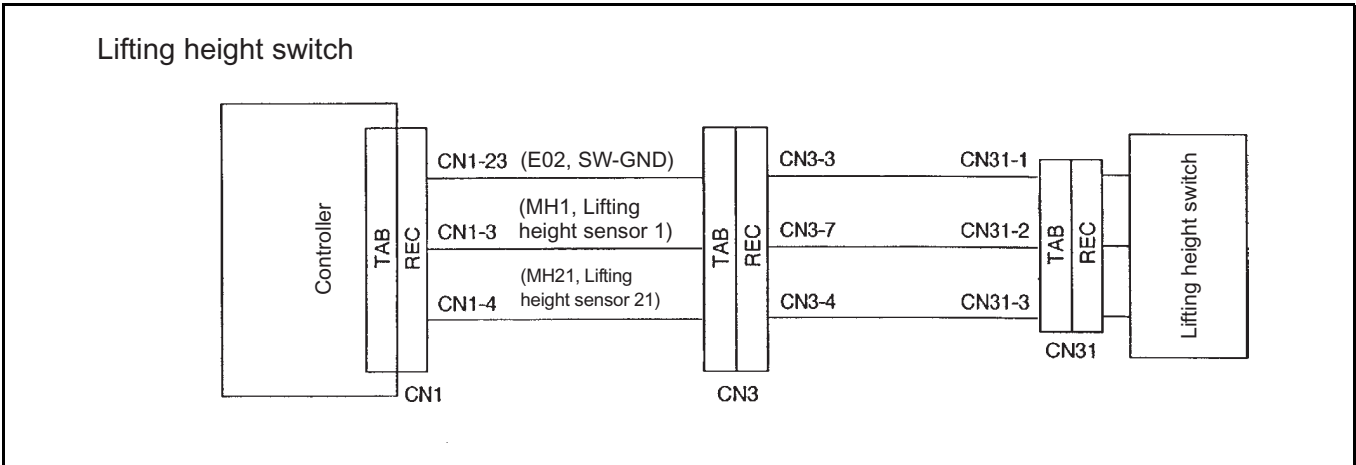
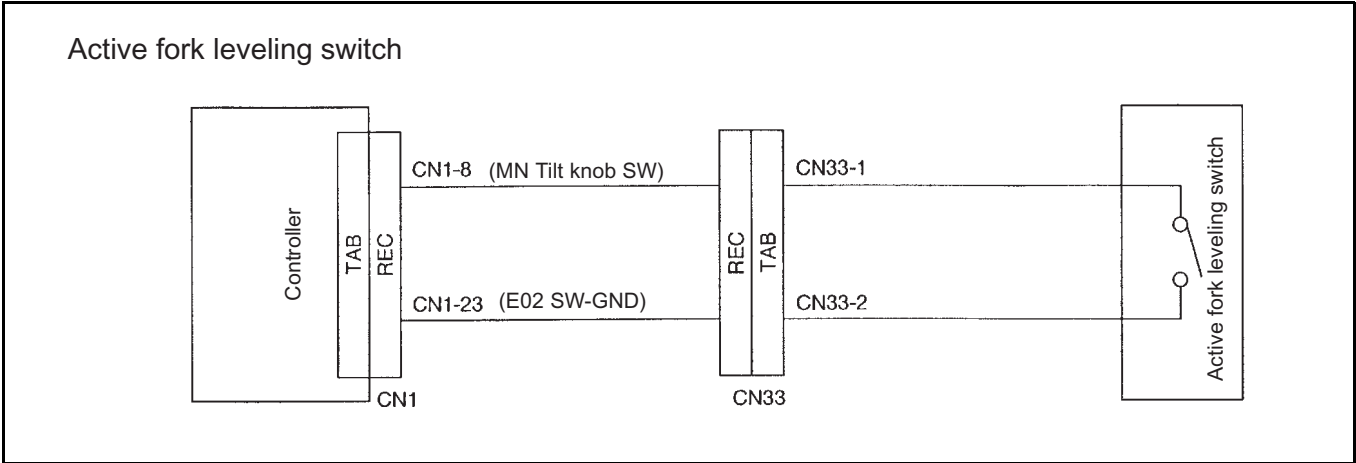


CN1 (REC)

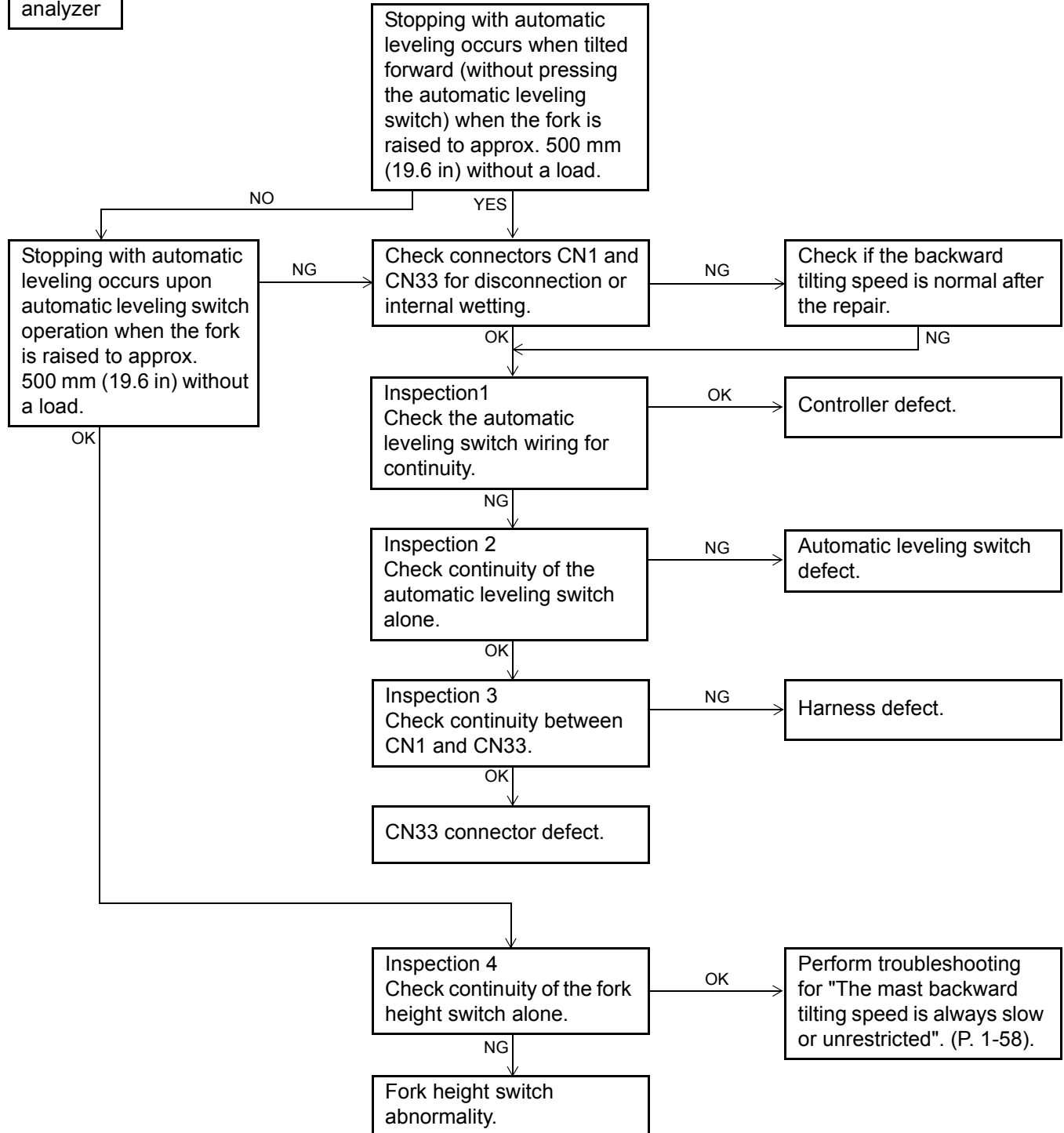
TROUBLESHOOTING BY PHENOMENON

- The active mast rear tilt speed is not regulated, or the backward tilting speed is always slow.

Related Portion

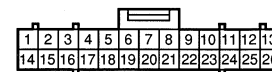


Without analyzer



Inspection 1:

Check continuity of the active fork leveling switch wiring.
Key switch OFF, CN1 disconnection.



CN1 (REC)

Standard:

	Active fork leveling switch free	Active fork leveling switch depressed
CN1-8 ~ CN1-23	No continuity	Continuity

Inspection 2:

Check continuity of the active fork leveling switch only.
Key switch OFF, CN33 disconnection.



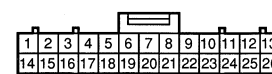
CN33 (TAB)

Standard:

	Active fork leveling switch free	Active fork leveling switch depressed
CN33-1 ~ CN33-2	No continuity	Continuity

Inspection 3:

Check continuity between CN1 and CN33.
Turn the key switch OFF and disconnect CN1 and CN33.



CN1 (REC)

Standard:

CN1-8 ~ CN33-1: Continuity

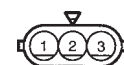
CN1-23 ~ CN33-2: Continuity



CN33 (REC)

Inspection 4:

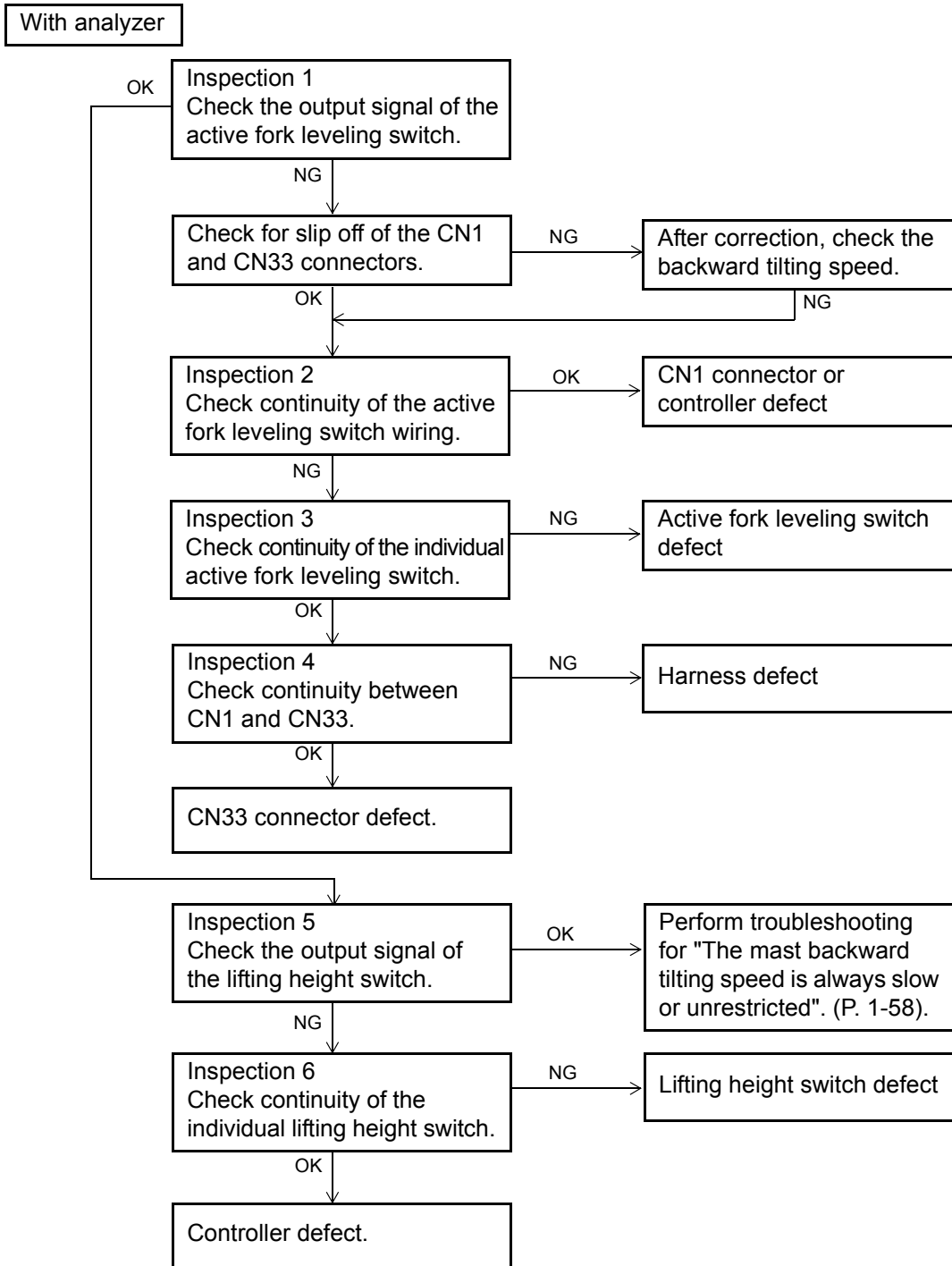
Check continuity of the lifting height switch only.
Key switch OFF, CN31 disconnection.



CN31 (REC)

Standard:

	Low lifting height	High lifting height
CN31-1 ~ CN31-2	Continuity	No continuity
CN31-1 ~ CN31-3	No continuity	Continuity



Inspection 1

Check the output signal of the active fork leveling switch.

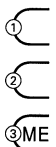
Turn the key switch ON (with the engine in stopped state).

Analyzer: MAIN MENU → SAS MENU → ANALYZER MENU → IN OUT MENU → MAST DATA

Standard:

	Active fork leveling switch free	Active fork leveling switch depressed
KNOB	OFF	ON

MAST DATA (2/2)				SAVE
TILT	FWD	OFF		↓
	BWD	OFF		
	KNOB	OFF		
HEIGHT	SW1	ON		
	SW21	OFF		
	SW22	OFF		

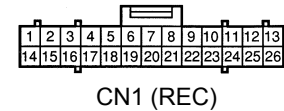


Inspection 2:

Check continuity of the active fork leveling switch wiring.
Key switch OFF, CN1 disconnection.

Standard:

	Active fork leveling switch free	Active fork leveling switch depressed
CN1-8 ~ CN1-23	No continuity	Continuity



Inspection 3:

Check continuity of the active fork leveling switch only.
Key switch OFF, CN33 disconnection.

Standard:

	Active fork leveling switch free	Active fork leveling switch depressed
CN33-1 ~ CN33-2	No continuity	Continuity



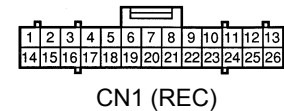
Inspection 4:

Check continuity between CN1 and CN33.
Key switch OFF, CN1 and CN33 disconnection.

Standard:

CN1-8 ~ CN33-1: Continuity

CN1-23 ~ CN33-2: Continuity



Inspection 5:

Check the output signal of the lifting height switch.

Turn the key switch ON (start the engine).

Analyzer: MAIN MENU → SAS MENU → ANALYZER MENU → IN OUT MENU → MAST DATA

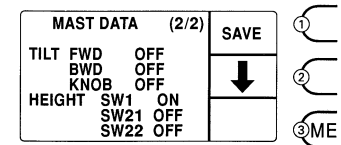
Standard:

When the fork height is 500 mm (19.6 in). the LIFTING HEIGHT output shall be as follows:

SW1: ON

SW21: OFF

SW22: OFF



Inspection 6:

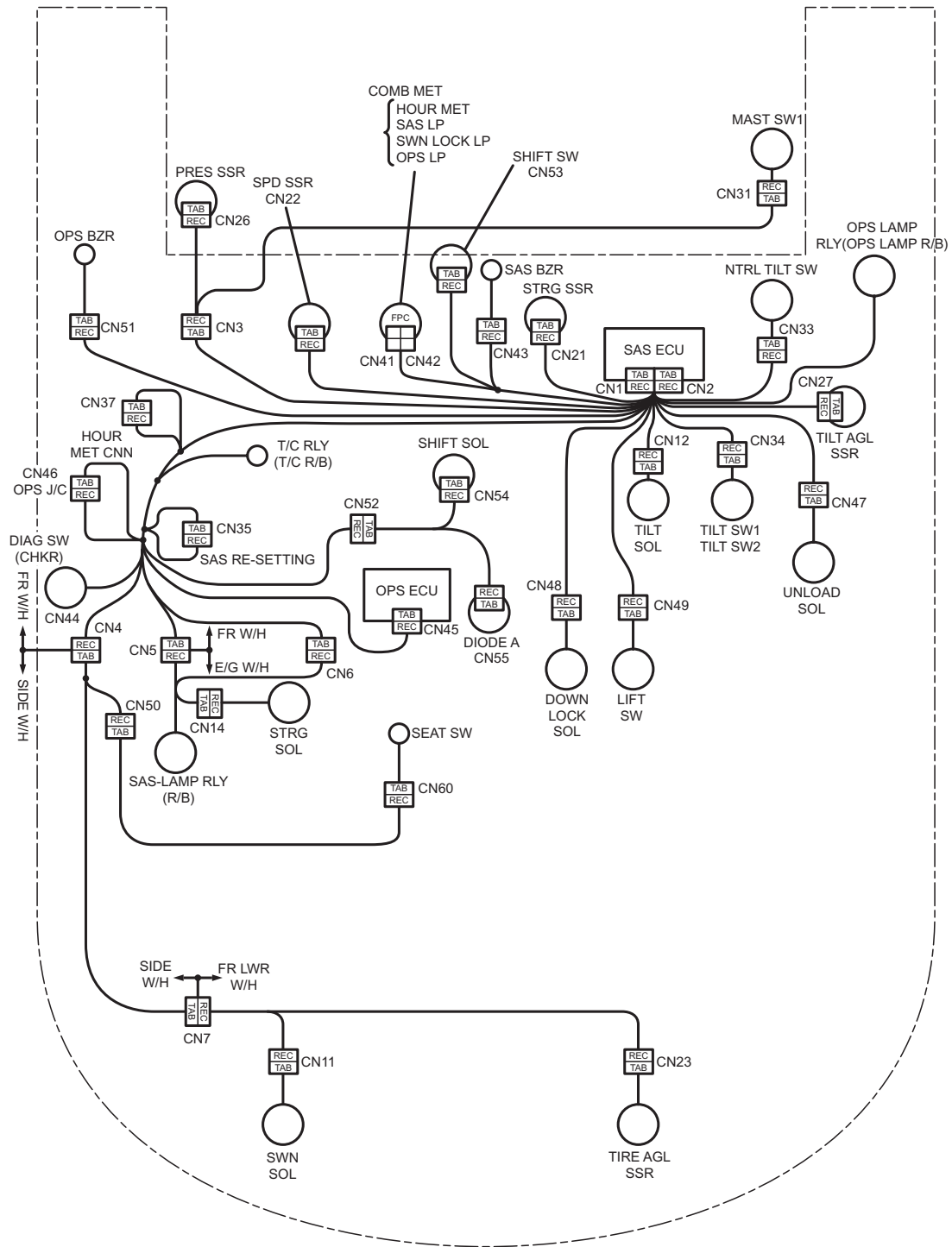
Check continuity of the lifting height switch only.
Key switch OFF, CN31 disconnection.

Standard:

	Low lifting height	High lifting height
CN31-1 ~ CN31-2	Continuity	No continuity
CN31-1 ~ CN31-3	No continuity	Continuity



CONNECTOR LAYOUT (SAS, OPS)



CONTROLLER SEQUENCE (SAS, OPS)

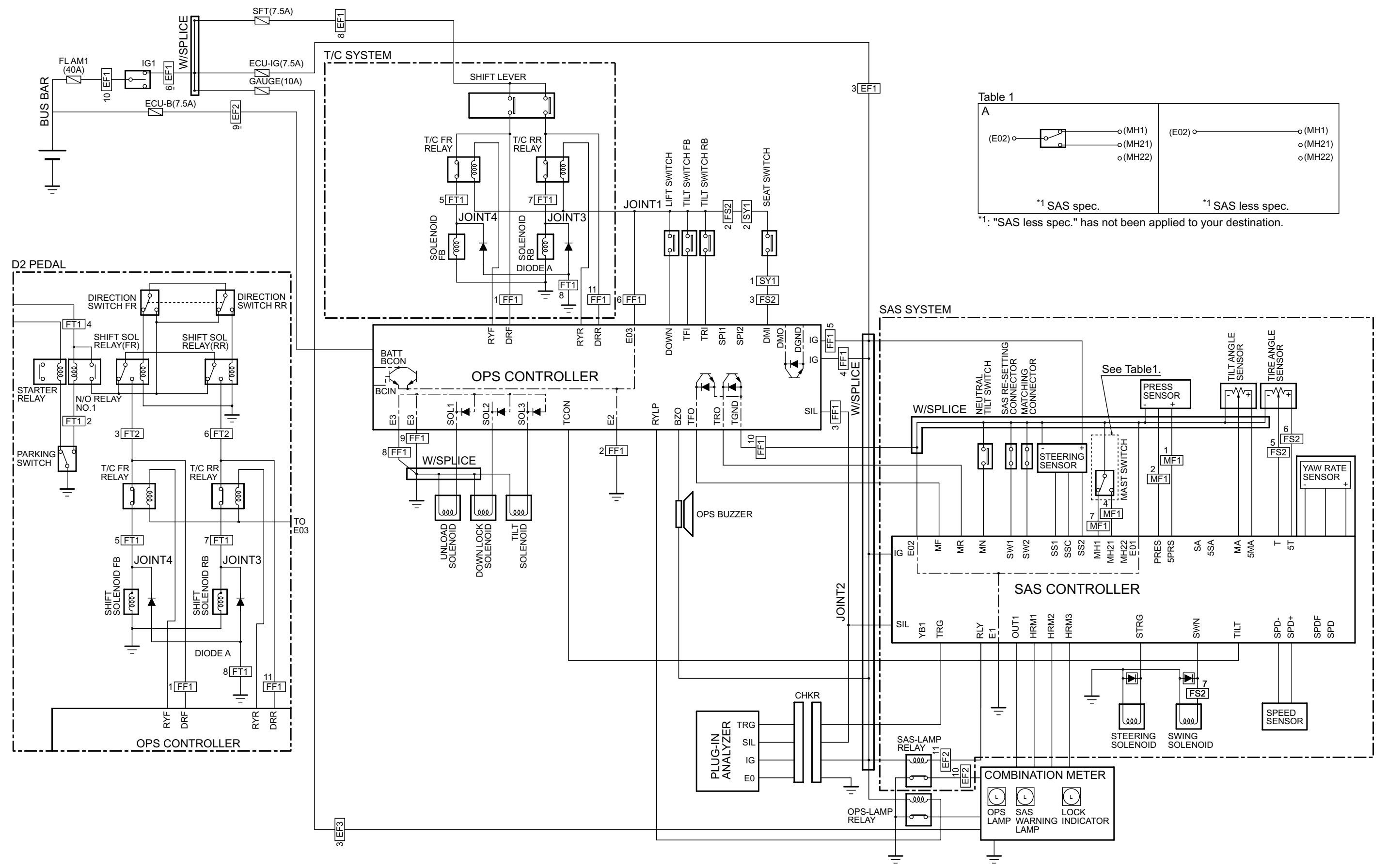


Table 1

A

(E02) ○	○ (MH1) ○ (MH21) ○ (MH22)	(E02) ○	○ (MH1) ○ (MH21) ○ (MH22)
---------	---------------------------------	---------	---------------------------------

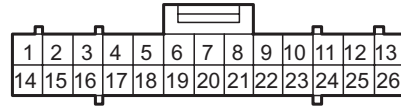
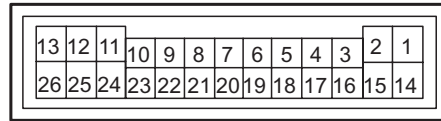
*1 SAS spec.

*1 SAS less spec.

*1: "SAS less spec." has not been applied to your destination.

CONNECTOR DIAGRAMS (SAS, OPS)

CN1



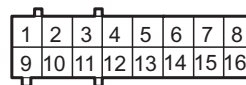
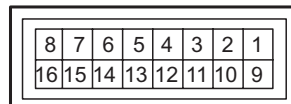
TAB

No.	C	J
1		5PRS
2		SIL
3		MH1
4		MH21
5		MH22
6		SW2
7		SW1
8		MN
9		MR
10		MF
11		IG
12		TLT2
13		TLT1
14		5MA
15		5T
16		YR
17		MA
18		PRES
19		-
20		T
21		SA
22		E01
23		E02
24		E1
25		SWN
26		STRG

REC

No.	C	J
1	G-	CN3-1
2	V	CN46-3
3	L-	CN3-7
4	L-B	CN3-4
5	-	-
6	LG-B	CN44-23
7	LG	CN35-1
8	P-G	CN33-1
9	Y-B	CN45-21
10	Y	CN45-22
11	B-R	W/SPLICE-Y(IG)
12	-	-
13	L-	CN45-5
14	G-R	CN27-1
15	P-B	CN4-6
16	-	-
17	Y-G	CN27-2
18	G-Y	CN3-2
19	-	-
20	G-W	CN4-5
21	-	-
22	BR-	W/SPLICE-A
23	BR-	W/SPLICE-A
24	W-B	BODY EARTH05
25	L-B	CN4-7
26	L-W	CN6-11

CN2

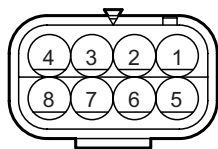


TAB

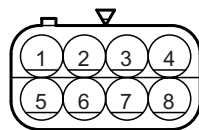
No.	C	J
1		RLY
2		-
3		HRM1
4		SPD+
5		SPD-
6		SS1
7		SS2
8		5SA
9		OUT1
10		SPDF
11		HRM3
12		HRM2
13		SPD
14		SSC
15		YB1
16		TRG

REC

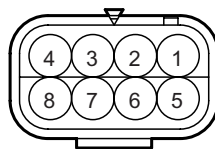
No.	C	J
1	L-W	CN5-11
2	-	-
3	V-G	CN41-4
4	G-B	CN22-1
5	G-R	CN22-2
6	Y-R	CN21-3
7	V-W	CN21-4
8	-	-
9	L-O	CN42-9
10	P-B	CN6-5
11	P-L	CN42-12
12	V-R	CN41-3
13	P-	CN6-7
14	LG-B	CN21-5
15	-	-
16	L-B	CN44-14

CN3 (MF1)**TAB**

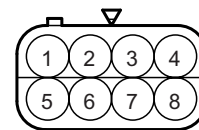
No.	C	J
1	G	CN1-1
2	G-Y	CN1-18
3	BR	W/SPLICE-A(E)
4	L-B	CN1-4
5	BR	W/SPLICE-A(E)
6	-	-
7	L	CN1-3
8	-	-

**REC**

No.	C	J
1	G	CN26-3
2	G-Y	CN26-2
3	BR-W	CN31-1
4	L-B	CN31-3
5	BR	CN26-1
6	-	-
7	L	CN31-2
8	-	-

CN4 (FS2)**TAB**

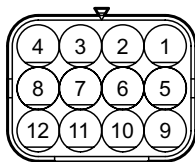
No.	C	J
1	Y-B	*
2	BR	CN50-2
3	G-W	CN50-1
4	BR	CN7-3
5	G-W	CN7-2
6	P-B	CN7-1
7	L-B	CN7-4
8	-	-

**REC**

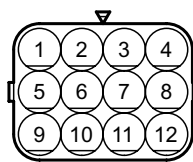
No.	C	J
1	Y-B	*
2	BR-W	JOINT 1
3	G-W	CN45-23
4	BR	CN1-22
5	G-W	CN1-20
6	P-B	CN1-15
7	L-B	CN1-25
8	-	-

Note:

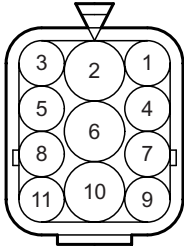
- *: Terminal not related to SAS and OPS.
 - Parenthesized connectors are used also for other functions than SAS.
- For function other than SAS, see the electrical wiring diagram in Section 7.

CN5 (EF2)**TAB**

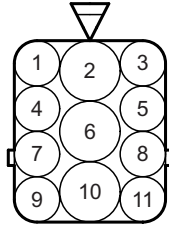
No.	C	J
1	R-L	*
2	R-B	*
3	R-W	*
4	G-Y	*
5	R-Y	*
6	W	*
7	LG-B	*
8	W-B	BODY EARTH 05
9	W-R	CN45-32
10	P-G	CN41-1
11	L-W	CN2-1
12	W-B	BODY EARTH 02

**REC**

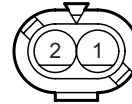
No.	C	J
1	R-L	*
2	R-B	*
3	R-W	*
4	G-Y	*
5	R-Y	*
6	W	*
7	LG	*
8	W-B	STARTER RLY(-S)
9	W-R	F=ECU-B
10	P-G	SAS-LAMP RLY(B)
11	L-W	SAS-LAMP RLY(+S)
12	W-B	CN14-2,*

CN6 (EF1)**TAB**

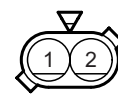
No.	C	J
1	B-	*
2	B-W	*
3	B-R	W/SPLICE-Y (IG)
4	B-W	*
5	P-B	CN2-10
6	B-Y	*
7	P-	CN2-13
8	L	CN53-6
9	W-B	OPS-LAMP RLY (L)
10	W-L	*
11	L-W	CN1-26

**REC**

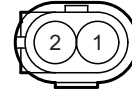
No.	C	J
1	B-	*
2	B-W	*
3	B-R	F=ECU-IG (L) SAS-LAMP RLY (-S)
4	B-W	*
5	-	-
6	B-Y	*
7	-	-
8	L	F=SFT
9	W-B	SAS-LAMP RLY (L)
10	W-L	*
11	L-W	CN14-1

CN12**TAB**

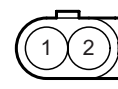
No.	C	J
1	R	Phorting: (+)
2	B	Phorting: (-)

**REC**

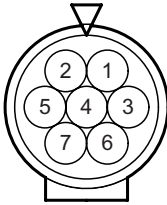
No.	C	J
1	GR-R	CN45-12
2	W-B	W/ SPLICE-Z (E)

CN14**TAB**

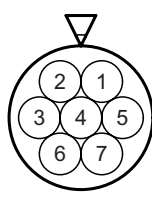
No.	C	J
1	L-W	CN6-11
2	W-B	CN5-17

**REC**

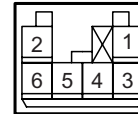
No.	C	J
1		Phorting: (+)
2		Phorting: (-)

CN7 (LS1)**TAB**

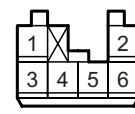
No.	C	J
1	P-B	CN4-6
2	G-W	CN4-5
3	BR-	CN4-4
4	L-B	CN4-7
5	W-B	BODY EARTH03
6	-	-
7	-	-

**REC**

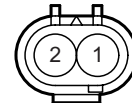
No.	C	J
1	P-	CN23-1
2	G-W	CN23-2
3	W-B	CN23-3,CN24-1
4	L-B	CN11-1
5	W-B	CN11-2
6	-	-
7	-	-

CN21**TAB**

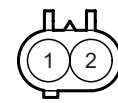
No.	C	J
1	-	1G(12V)
2	-	GND
3	-	SS1
4	-	SS2
5	-	SSC
6	-	*

**REC**

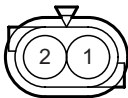
No.	C	J
1	B-R	W/ SPLICE-Y (IG)
2	BR-	W/ SPLICE-A (E)
3	Y-R	CN2-6
4	V-W	CN2-7
5	LG-B	CN2-14
6	-	*

CN22**TAB**

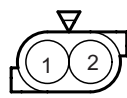
No.	C	J
1		+S
2		-S

**REC**

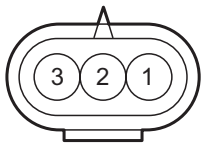
No.	C	J
1	G-B	CN2-4
2	G-R	CN2-5

CN11**TAB**

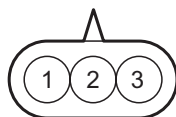
No.	C	J
1	-	Phorting: (+)
2	-	Phorting: (-)

**REC**

No.	C	J
1	L-B	CN7-4
2	W-B	CN7-5

CN23**TAB**

No.	C	J
1	-	Sensor power supply
2	-	Sensor output
3	-	Sensor GND

**REC**

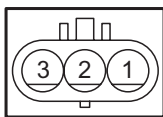
No.	C	J
1	P-	CN7-1
2	G-W	CN7-2
3	W-B	CN7-3

CN33**TAB**

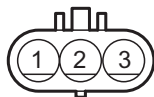
No.	C	J
1	BR	5V or GND
2	BR	GND or 5V

**REC**

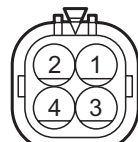
No.	C	J
1	P-G	CN1-8
2	BR	W/SPLICE-A

CN26**TAB**

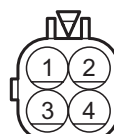
No.	C	J
1	-	GND (Ground)
2	-	Vout (output)
3	-	Vcc power supply

**REC**

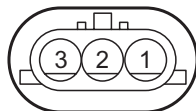
No.	C	J
1	BR	CN3-5
2	G-Y	CN3-2
3	G	CN3-1

CN34**TAB**

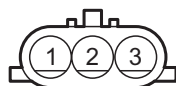
No.	C	J
1	R	Forward tilt side (+)
2	BR	Forward tilt side (-)
3	R	Backward tilt side (+)
4	B	Backward tilt side (-)

**REC**

No.	C	J
1	P-G	CN45-25
2	BR-W	JOINT 1
3	P-L	CN45-24
4	BR-W	JOINT 1

CN27**TAB**

No.	C	J
1	-	Power supply
2	-	Sensor output
3	-	GND

**REC**

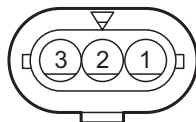
No.	C	J
1	G	CN1-14
2	Y-G	CN1-17
3	BR	W/SPLICE-A

CN35**TAB**

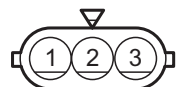
No.	C	J
1	BR-	

**REC**

No.	C	J
1	LG-	CN1-7

CN31**TAB**

No.	C	J
1	BR-W	CN3-3
2	L	CN3-7
3	L-B	CN3-4

**REC**

No.	C	J
1	BR	COM
2	W	NC
3	R	NO

CN37**TAB**

No.	C	J
1	P-G	CN5-10
2	W-B	BODY EARTH02

**REC**

No.	C	J
1	L-W	CN43-1
2	Y-B	CN41-6

CN43**TAB**

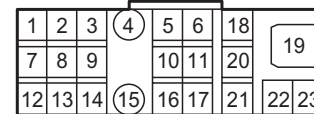
No.	C	J
1	B	GND
2	R	Power supply

**REC**

No.	C	J
1	L-W	SAS relay
2	R-G	Fuse

CN41**REC**

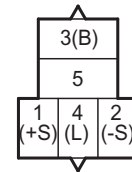
No.	C	J
1	P-G	CN5-10
2	Y-R	*
3	V-R	CN12-2
4	V-G	CN2-3
5	-	*
6	Y-B	CN37-2
7	W-B	BODY EARTH02
8	V-	*
9	-	-
10	LG-R	*
11	-	-
12	G	OPS-LAMP RLY (B)
13	Y-	*

CN44**REC**

No.	C	J
1	V	JOINT 2
2	-	*
3	BR-W	BODY EARTH02
:		
:		
:		
:		
:		
12	B-R	W/ SPLICE-Y (IG)
13		*
14	L-B	CN2-16
:		
:		
22	BR	W/ SPLICE-A (E)
23	LG-B	CN1-6

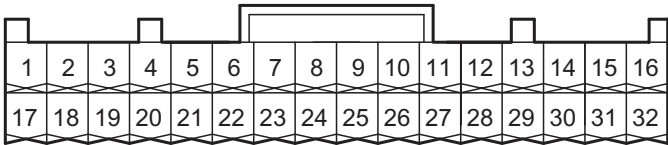
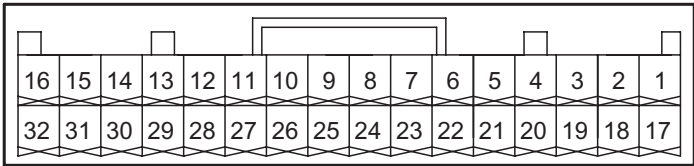
CN42**REC**

No.	C	J
1	-	-
2	LG-B	*
3	W-B	BODY EARTH02
4	R-W	*
5	-	-
6	R-G	*
7	Y-B	*
8	R-	*
9	L-O	CN2-9
10	-	-
11	G-	*
12	P-L	CN2-11
13	W-B	BODY EARTH02

SAS Lamp relay (Base side)

No.	C	J
1	L-W	CN5-11
2	B-R	CN6-3,F=ECU-IG
3	P-G	CN5-10
4	W-B	STARTER RLY(-S),CN6-9
5	-	-

CN45



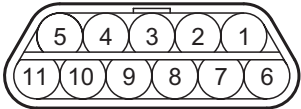
TAB

No.	C	J
1		SIL
2		-
3		DRF
4		DRR
5		TCON
6		-
7		-
8		RYLP
9		BZO
10		RYF
11		RYR
12		SOL3
13		SOL2
14		SOL1
15		IG
16		IG2
17		E03
18		-
19		-
20		TGND
21		TRO
22		TFO
23		DMI
24		TRI
25		TFI
26		DOWN
27		-
28		-
29		E3
30		E3
31		E2
32		BATT

REC

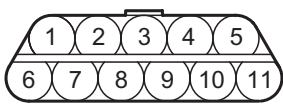
No.	C	J
1	V	CN46-3
2	-	-
3	G-R	CN46-1
4	R	CN46-11
5	L	CN1-13
6	-	-
7	-	-
8	O	OPS-LAMP RLY (-S)
9	W-G	CN51-2
10	G	T/C FR RLY (+S)
11	Y-R	T/C RR RLY (+S)
12	GR-R	CN12-1
13	GR-L	CN48-1
14	GR-G	CN47-1
15	B-R	CN46-5
16	B-R	CN46-4
17	BR-W	CN46-6
18	-	-
19	-	-
20	BR	CN46-10
21	Y-B	CN1-9
22	Y	CN1-10
23	G-W	CN4-3
24	P-L	CN34-3
25	P-G	CN34-1
26	P-B	CN49-1
27	-	-
28	-	-
29	W-B	CN46-9
30	W-B	CN46-8
31	W-B	CN46-2
32	W-R	CN5-9

CN46



TAB

No.	C	J
1	G-R	CN45-3
2	W-B	CN45-31
3	V	CN45-1
4	B-R	CN45-16
5	B-R	CN45-15
6	BR-W	CN45-17
7	-	-
8	W-B	CN45-30
9	W-B	CN45-29
10	BR	CN45-20
11	R	CN45-4



REC

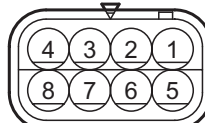
No.	C	J
1	G-R	T/C FR RLY (B)
2	W-B	BODY EARTH10
3	V	CN1-2
4	B-R	W/SPLICE-Y (IG)
5	B-R	W/SPLICE-Y (IG)
6	BR-W	T/C RR RLY (-S)
7	-	-
8	W-B	W/SPLICE-Z (E)
9	W-B	W/SPLICE-Z (E)
10	BR	W/SPLICE-A (E)
11	R	T/C RR RLY (B)

CN47**TAB**

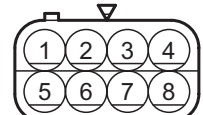
No.	C	J
1	W	-
2	W	-

**REC**

No.	C	J
1	GR-G	CN45-14
2	W-B	W/ SPLICE-Z (E)

CN52 (FT1)**TAB**

No.	C	J
1	Y-R	*
2	G	*
3	L-B	*
4	L	*
5	L-W	CN54-1
6	-	-
7	L-R	CN54-2
8	W-B	W/SPLICE-F (E)

**REC**

No.	C	J
1	Y-R	*
2	G	*
3	R-Y	*
4	G-W	*
5	L-W	T/C FR RLY (L)
6	-	-
7	L-R	T/C RR RLY (L)
8	W-B	BODY EARTH02

CN48**TAB**

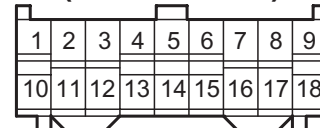
No.	C	J
1	W	-
2	W	-

**REC**

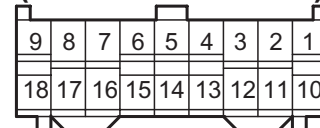
No.	C	J
1	GR-L	CN45-13
2	W-B	W/ SPLICE-Z (E)

CN53

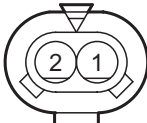
**(LH SHIFT LEVER)
(MINI LEVER)**



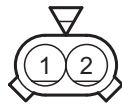
(RH SHIFT LEVER)

**REC**

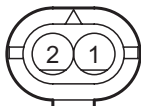
No.	C	J
1	R	T/C RR RLY (B)
2	R-Y	*
3	B/B-Y	*
4	-	-
5	G-R	T/C FR RLY (B)
6	L	CN6-8
7	B-W	*
8	R-G	*
9	-	-
10	-	-
11	-	-
12	-	-
13	-	-
14	-	-
15	-	-
16	-	-
17	-	-
18	-	-

CN49**TAB**

No.	C	J
1	R	-
2	B	-

**REC**

No.	C	J
1	P-B	CN45-26
2	BR-W	JOINT1

CN50 (SY1)**TAB**

No.	C	J
1	G-W	CN60-1
2	BR	CN60-2

**REC**

No.	C	J
1	G-W	CN4-3
2	BR	CN4-2

CN51**TAB**

No.	C	J
1	-	-
2	-	-

**REC**

No.	C	J
1	B-R	W/SPLICE-Y (IG)
2	W-G	CN45-9

CN54**TAB**

No.	C	J
1	-	FB
2	-	RB

**REC**

No.	C	J
1	L-W	CN52-5
2	L-R	CN52-7

CN55

TAB			REC		
No.	C	J	No.	C	J
1	-	+	1	L-W	JOINT4
2	-	-	2	W-B	BODY EARTH02
3	-	+	3	L-R	JOINT3

CN57 (FT2)

TAB			REC		
No.	C	J	No.	C	J
1	R-W	*	1	R-W	*
2	B	*	2	B	*
3	G-R	SFT SOL RLY (FR) (NO)	3	G-R	T/C FR RLY (B)
4	R-G	*	4	R-G	*
5	B-W	*	5	B-W	*
6	R	SFT SOL RLY (RR) (NO)	6	R	T/C RR RLY (B)

CN60

TAB			REC		
No.	C	J	No.	C	J
1	-	+	1	G-W	CN50-1
2	-	-	2	BR	CN50-2

SFT SOL RLY (FR)

REC		
No.	C	J
1	W-L	*
2	L-B	*
3	G-R	CN57-3
4	W-B	*
5	G-W	*

SFT SOL RLY (RR)

REC		
No.	C	J
1	W-G	*
2	L-B	*
3	R	CN57-6
4	W-B	*
5	G-W	*

T/C FR RLY
(Base side, in T/C R/B)

REC		
No.	C	J
1	BR-W	T/C RR RLY (-S)
2	G	CN45-10
3	L-W	CN52-5
4	G-R	CN46-1, CN53-5 or CN57-3
5	-	-

T/C RR RLY
(Base side, in T/C R/B)

REC		
No.	C	J
1	BR-W	T/C FR RLY (-S),CN46-6
2	Y-R	CN45-11
3	L-R	CN52-7
4	R	CN46-11, CN53-1 or CN57-6
5	-	-

OPS-LAMP RLY
(Base side, in OPS R/B)

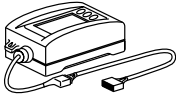
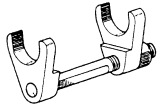
REC		
No.	C	J
1	O	CN45-8
2	B-R	W/SPLICE-Y (IG)
3	W-B	CN6-9
4	G	CN41-12
5	-	-

APPENDIX

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WIRING DIAGRAM (2005.8 ~)	7-5

SST LIST

★ : Newly adopted SST

Illust.	Part number	Part name	Section	
			1	4
	★ 09240-23323-71	Plug-in analyzer	○	
	09610-10161-71	Oil control valve spring remover and replacer		○

SERVICE STANDARDS LIST

MATERIAL HANDLING SYSTEM

Oil leak test			
Lift cylinder oil leak amount	cm ³ (in ³)	Standard	8 (0.49) or less
Tilt cylinder oil leak amount (total for lift and tilt)	cm ³ (in ³)	Standard	16 (0.98) or less

OIL CONTROL VALVE

OIL COMNTROL VALVE				
Relief set pressure MPa (kgf/cm ²) [psi]	Lift	1 ton series	Standard	17.8 ^{+1.7} ₀ (182 ⁺¹⁷ ₀) [2590 ⁺²⁴⁰ ₀]
		2·3 ton series	Standard	18.7 ^{+1.7} ₀ (191 ⁺¹⁷ ₀) [2720 ⁺²⁴⁰ ₀]
		J 3.5 ton series	Standard	↑
	Tilt	1 ton series	Standard	11.8 ^{+1.7} ₀ (120 ⁺¹⁷ ₀) [1710 ⁺²⁴⁰ ₀]
		2·3 ton series	Standard	14.7 ^{+1.7} ₀ (150 ⁺¹⁷ ₀) [2130 ⁺²⁴⁰ ₀]
		J 3.5 ton series	Standard	15.7 ^{+1.7} ₀ (160 ⁺¹⁷ ₀) [2280 ⁺²⁴⁰ ₀]

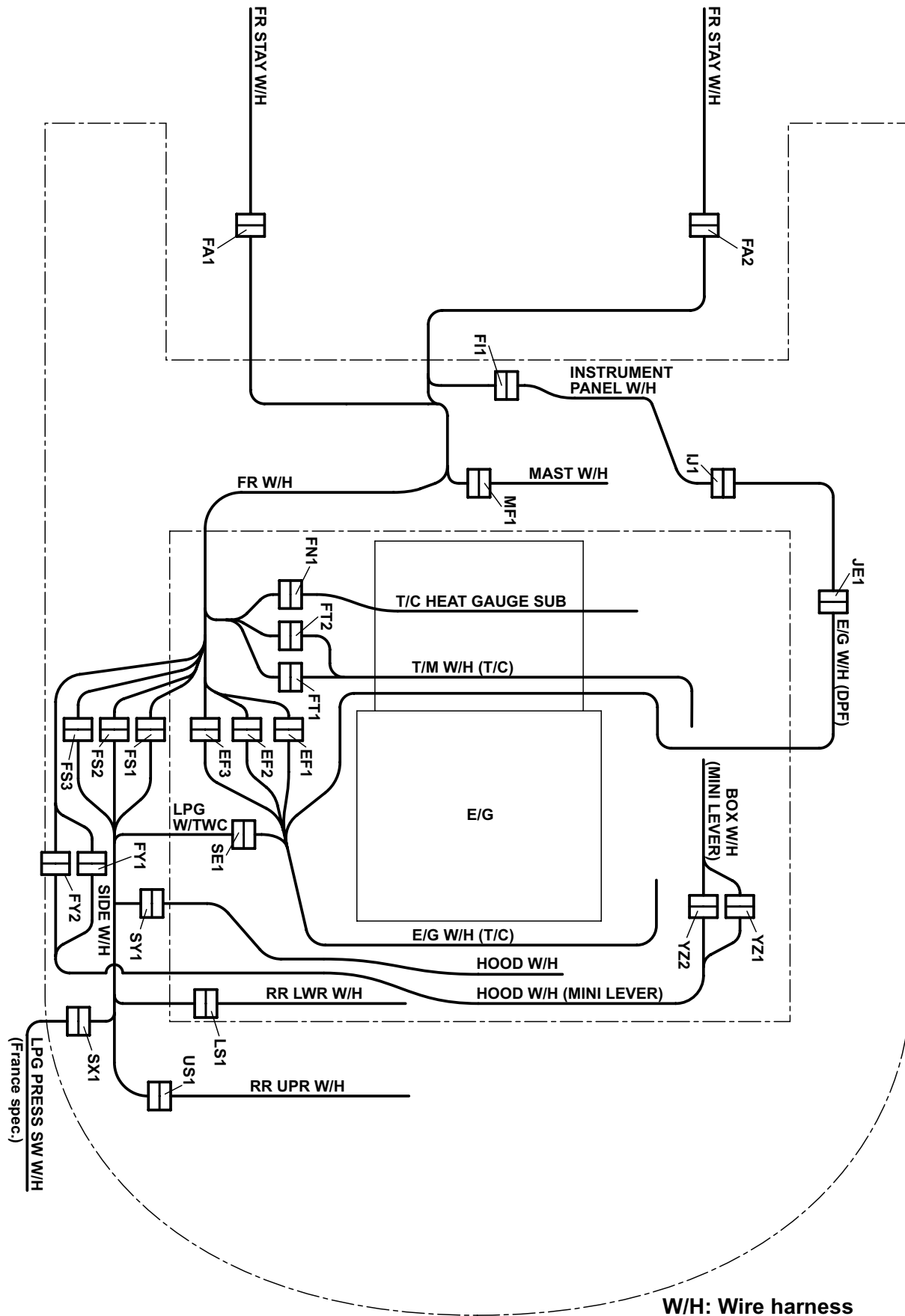
WIRING DIAGRAM (2005.8 ~)

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Note:

This manual shows only the wiring diagrams changed in August 2005. For wiring diagrams not shown in this manual, refer to the Parts & Service News Ref. No. CB-4009 (published in May 2005).

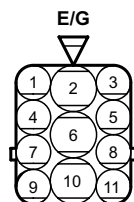
WIRE TO WIRE LIST (ROUTE)



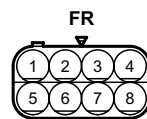
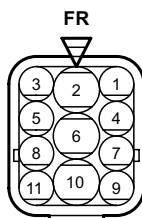
Portion	Symbol
E/G	E
FR	F
T/M	T
Side	S
RR LWR	L
RR UPR	U
Instrument panel	I
FR STAY	A
Mast	M
HOOD	Y

OPT

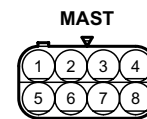
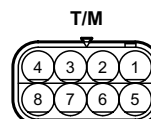
Portion	Symbol
DPF display	J
T/C heat gauge	N
DPF FL	P
LPG PRESS SW (France spec.)	X
Mini lever Box	Z



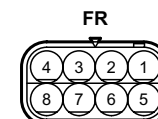
EF1 (DG) (CN6)



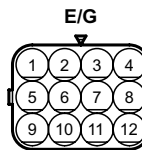
FT1 (GR)



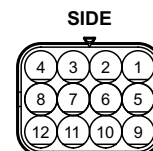
MF1 (GR) (CN3)



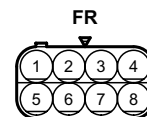
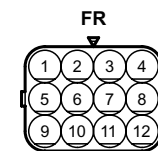
EF2 (CN5)



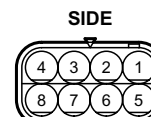
FN1



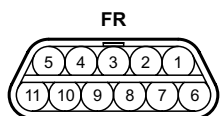
FS1



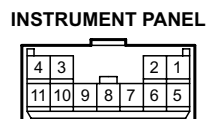
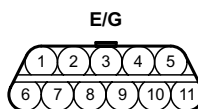
FS2 (GR) (CN4)



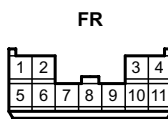
FS3



EF3



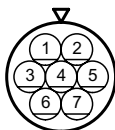
F11



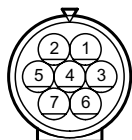
SE1



RR LWR

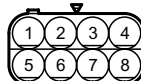


SIDE

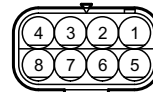


LS1 (GR) (CN7)

SIDE



RR UPR



US1 (GR)

SIDE



LPG PRS

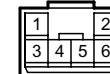


SX1

FR



FR STAY

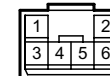


FA1

FR

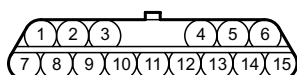


FR STAY

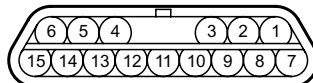


FA2 (B)

INSTRUMENT PANEL

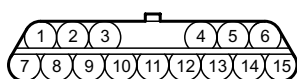


DPF SUB

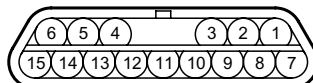


IJ1

DPF SUB



E/G



JE1

SIDE

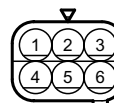


HOOD

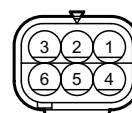


SY1 (B) (CN50)

FR

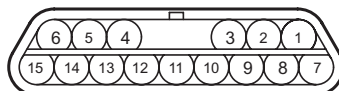


T/M

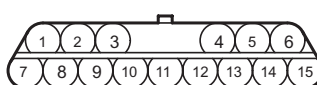


FT2 (CN57)

HOOD

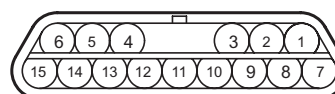


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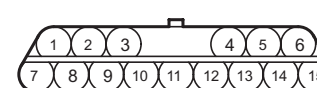


FY1 (NA) (CN61)

BOX

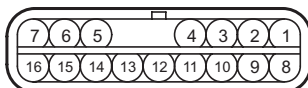


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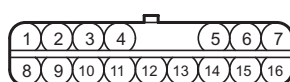


YZ1 (NA) (CN63)

FR

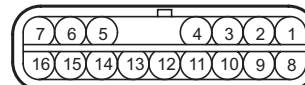


HOOD

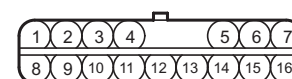


FY 2 (NA) (CN62)

BOX

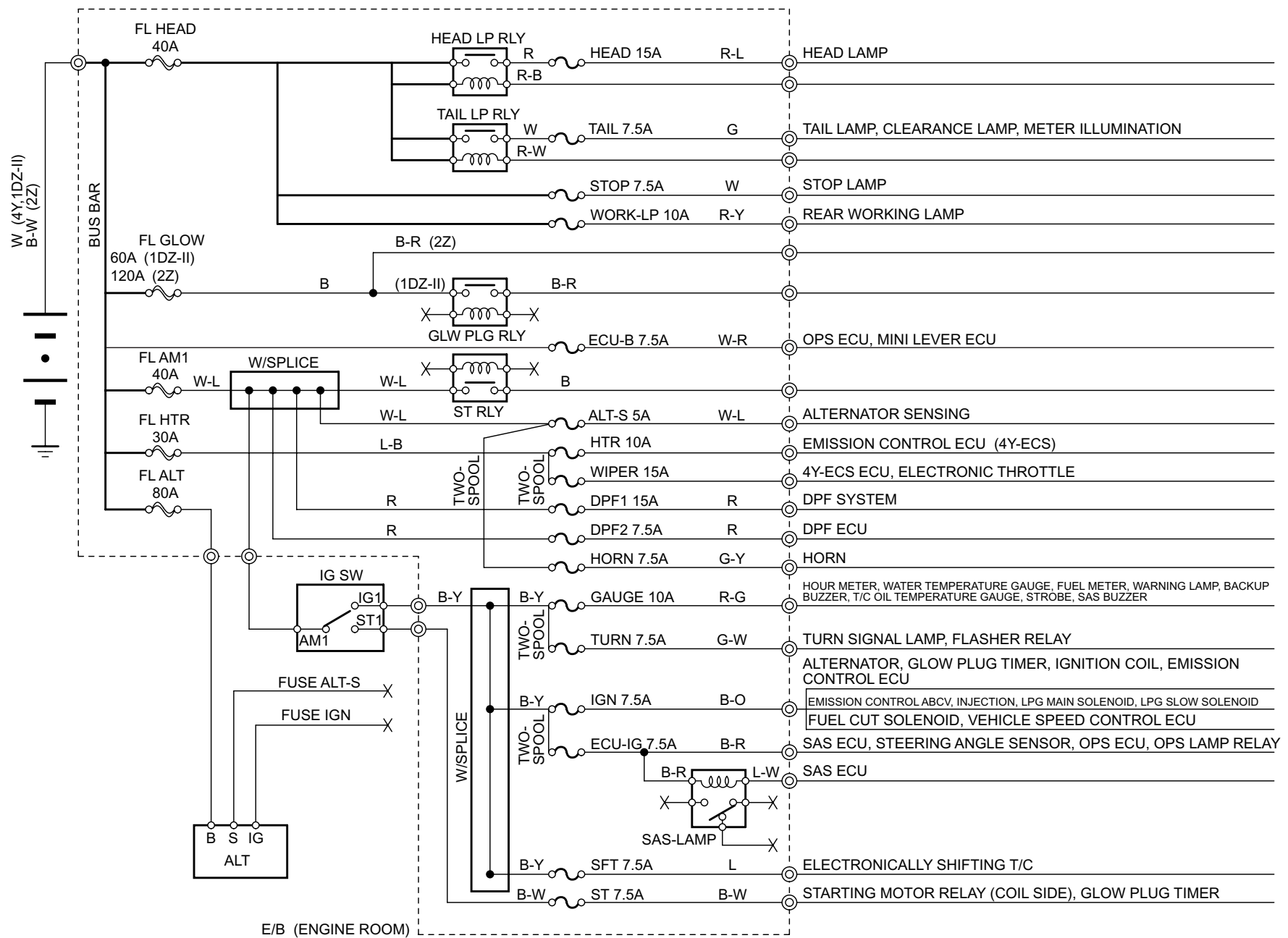


HOOD

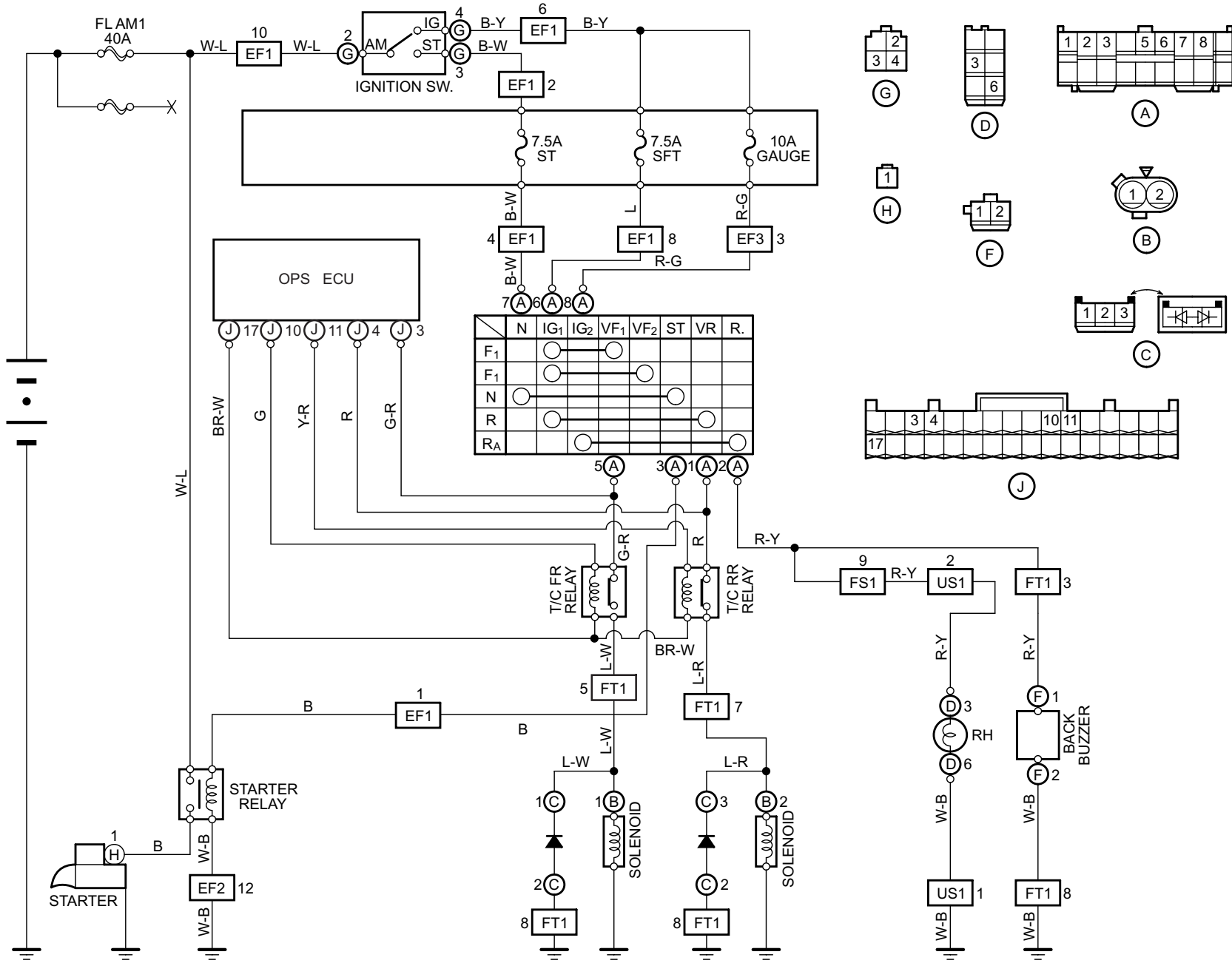


YZ2 (NA) (CN64)

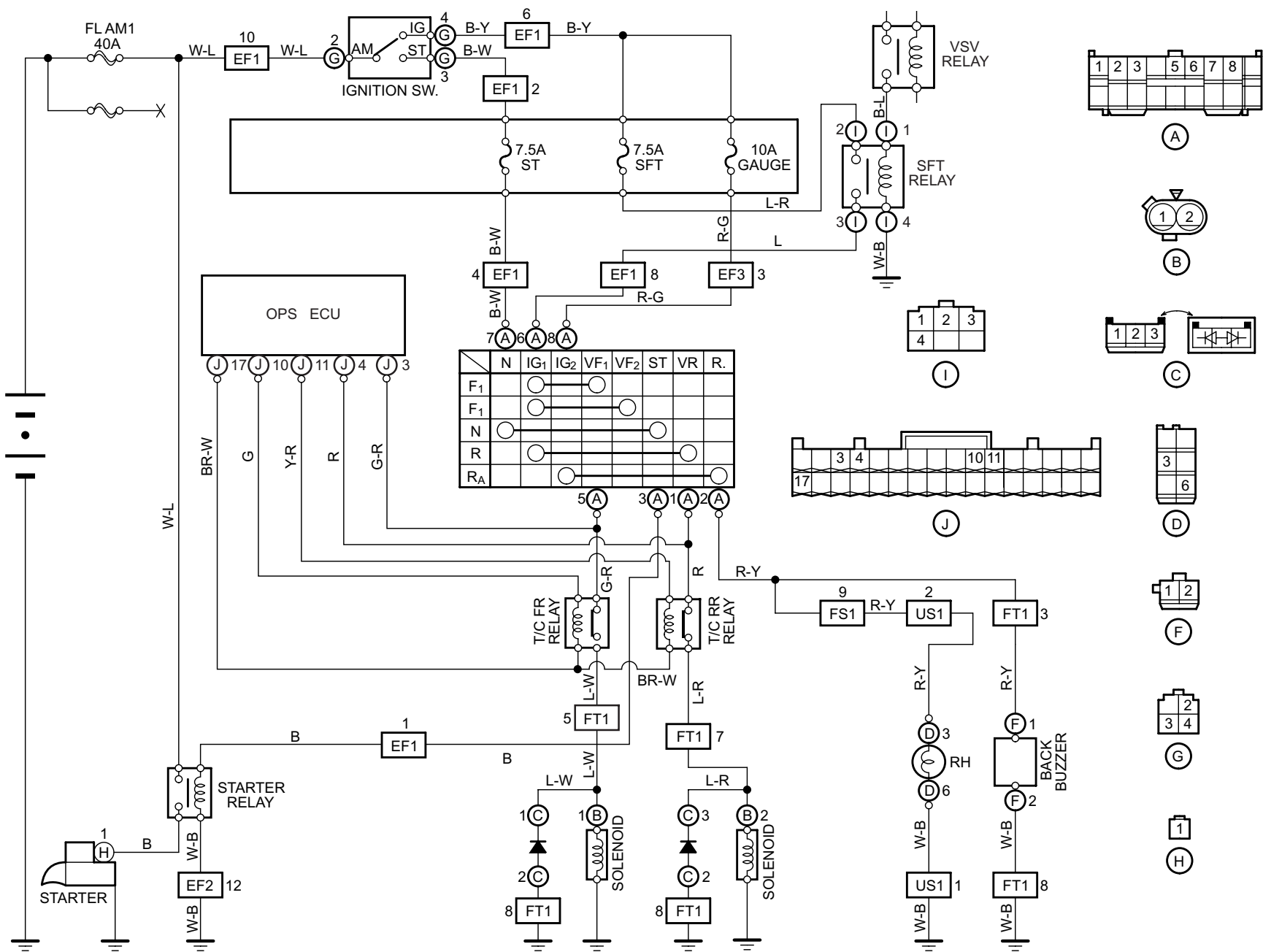
POWER FUSES (R/B)



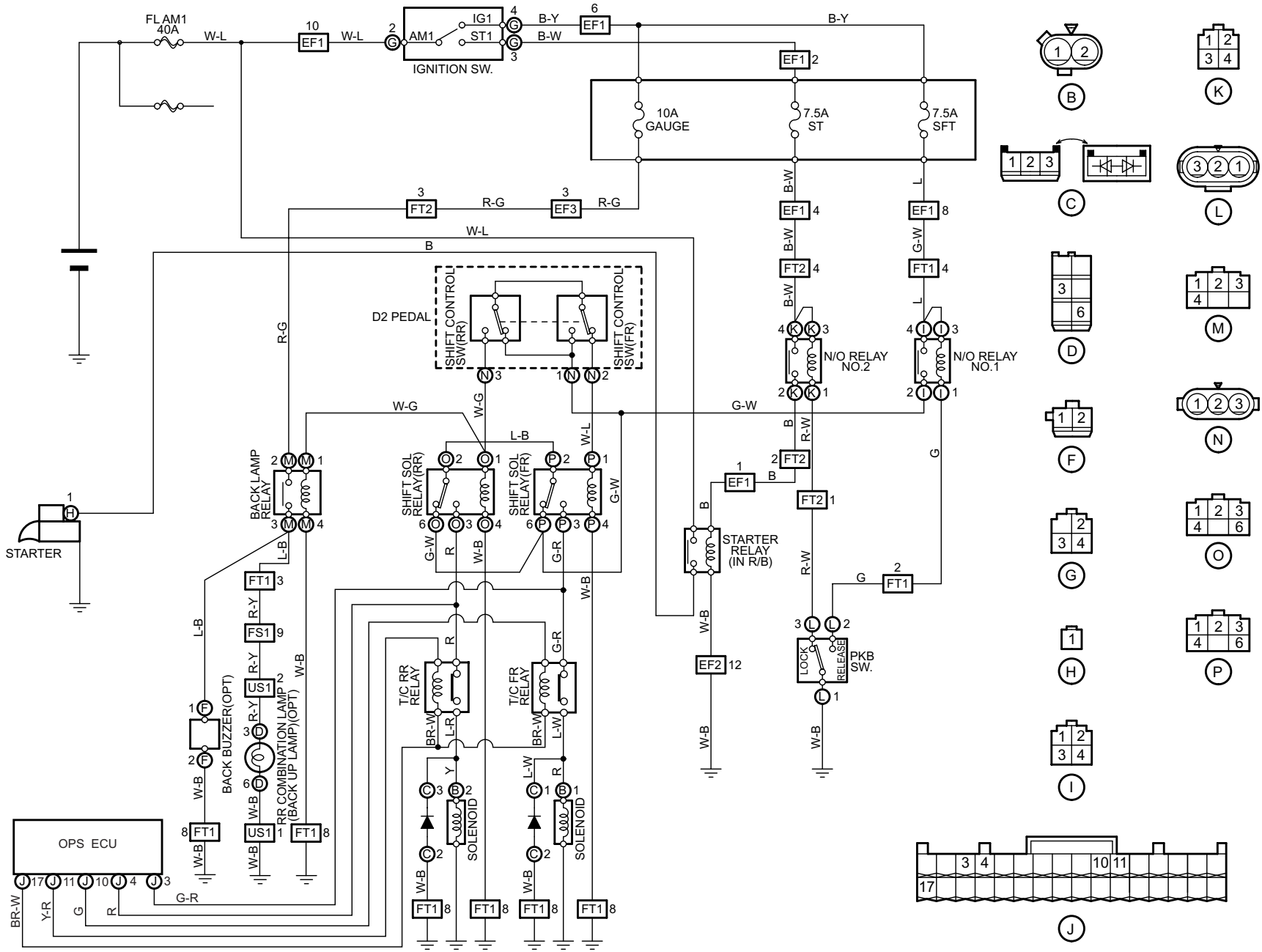
ELECTRICAL SHIFT TORQUE CONVERTER



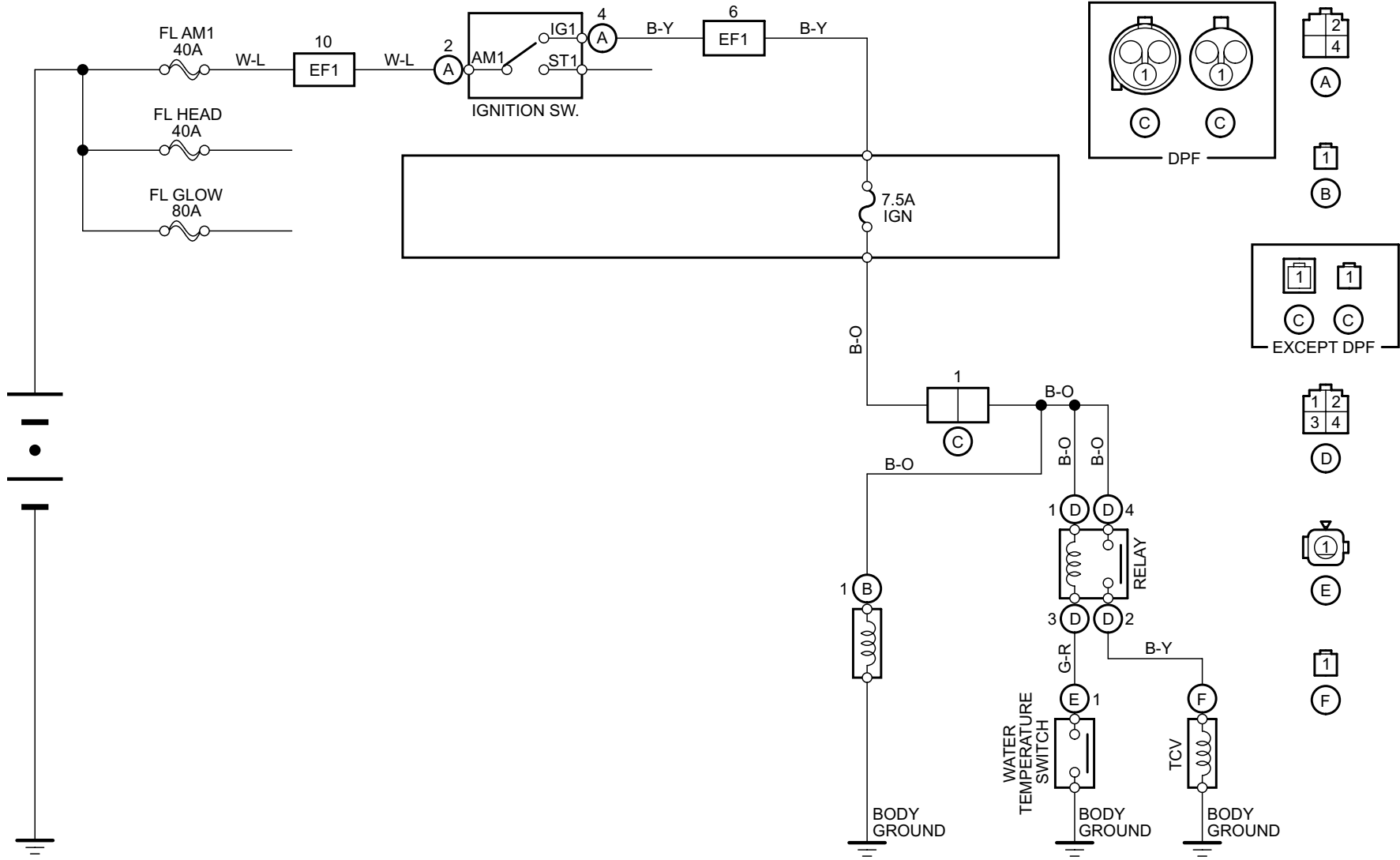
7-11



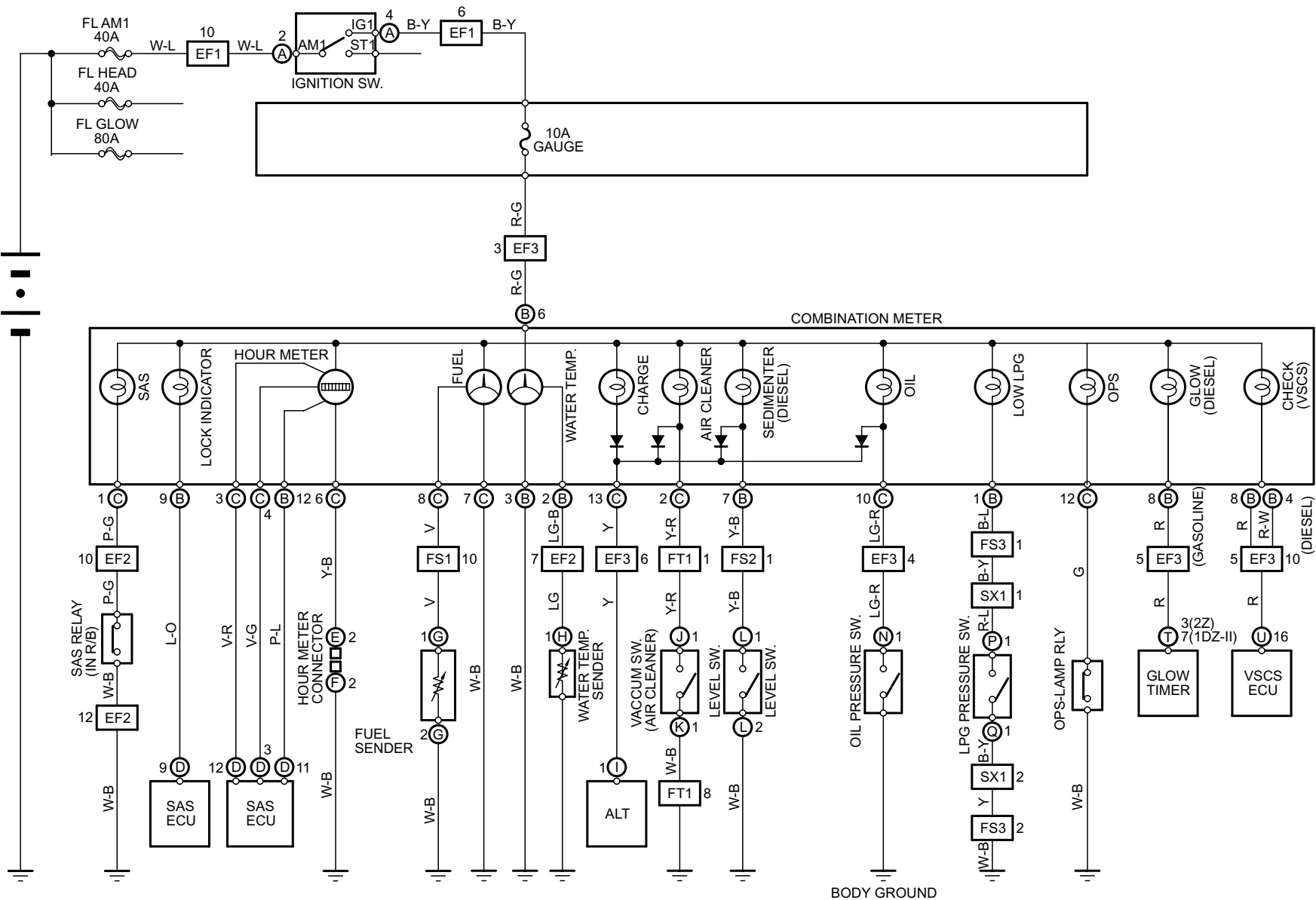
ELECTRICAL SHIFT TORQUE CONVERTER (D2 PEDAL)



7-13

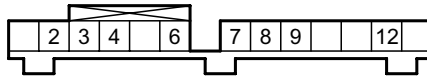


COMBINATION METER

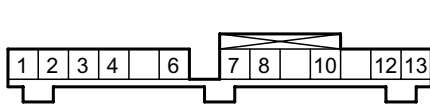




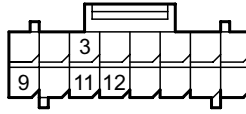
(A)



(B)



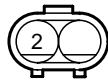
(C)



(D)



(E)



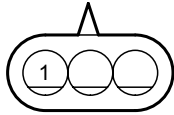
(F)



(G)



(H)



(I) (4Y, 2Z, 1DZ-II)



(J)



(K)



(L)



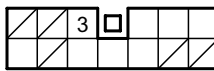
(N)



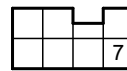
(P)



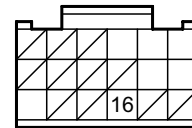
(Q)



(T) (2Z)



(T) (1DZ-II)



(U)