

SMCS - 5063,5705

i08062541

Telehandler

TH3510D (S/N: TH21-UP; TH31-UP)

TH357D (S/N: TD61-UP; TD71-UP)

TH408D (S/N: TH41-UP; TH91-UP)

TH514D (S/N: MWG1-UP)

Troubleshooting assistance is now available for the joystick control assembly on the machines listed above. This procedure will assist in correct diagnosis of a joystick control assembly.

WARNING

Do not operate or work on this product unless you have read and understood the instruction and warnings in the relevant Operation and Maintenance Manuals and relevant service literature. Failure to follow the instructions or heed the warnings could result in injury or death. Proper care is your responsibility.



Illustration 1 g06311091
541-7470 Joystick Control As

Use the procedures below contained in this media if one of the following diagnostic codes relating to the joystick control assembly is present:

- 6617 - Joystick CANBUS Failure
- 9976 - Joystick Internal Failure

Before you troubleshoot the joystick control assembly, perform a visual inspection of the machine and the installation itself. Specific checks and tests may be necessary in order to identify the root cause of any subsequent issues.

6617 - Cabin Joystick CANBUS Failure

When this diagnostic code is present, the following responses will occur:

Description

Cabin joystick CAN bus not detected within CAN bus time-out interval and hydraulics are prevented.

Troubleshoot

Perform Troubleshooting CAN bus using detailed procedure and Pin/Contact table below.

9976 - Cabin Joystick Internal Failure

When this diagnostic code is present, the following responses will occur:

<https://sis2.cat.com/#/service-detail?>

serialNumber=TH9&ieSystemControlNumber=i08062541&mediaNumber=M0117259&infoType=-1&hideDocumentStructure=false

Description

Cabin joystick feedback disagree for 500Ms, hydraulic functions and engine start are prevented or engine speed returns to closed throttle RPM.

Troubleshoot

Perform Troubleshooting CAN bus using detailed procedure and Pin/Contact table below.

Electrical Troubleshooting of Code 6617 and 9976

The possible causes by one of these diagnostic codes are listed below:

- The CAN signal circuit for the joystick is open
- The CAN signal circuit for the joystick is shorted to the +battery circuit
- The joystick has failed
- The power circuit or the ground circuit has failed
- The generic cab module has failed. This is unlikely

The following diagrams show component locations essential for the subsequent electrical troubleshooting guide:

Power Distribution Circuit - Power to Ignition Switch +30

The power distribution circuit establishes the flow of power to the major electrical components, ending at the ignition switch.

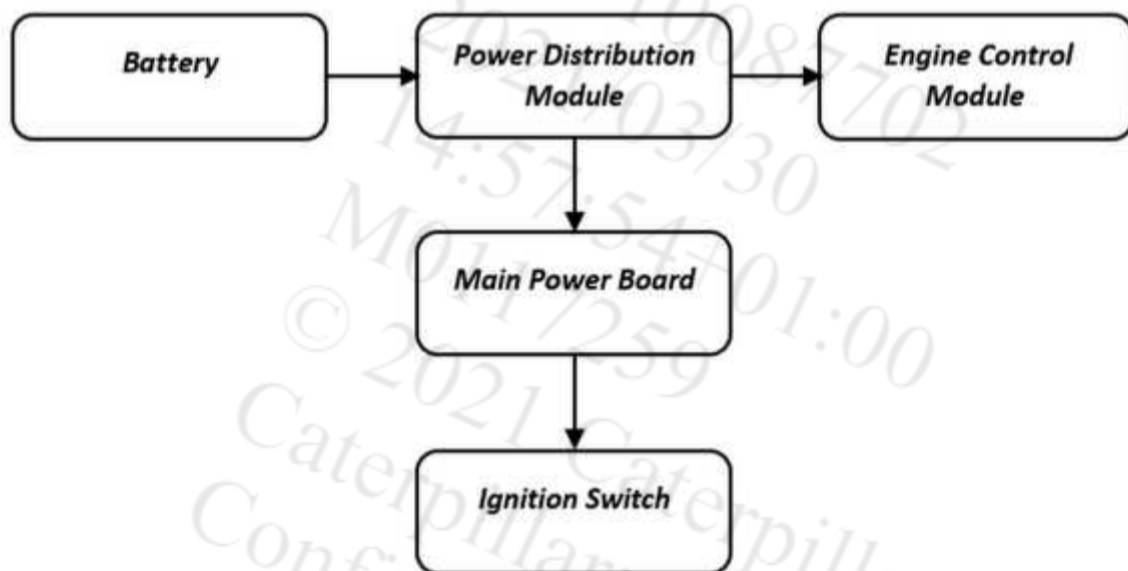
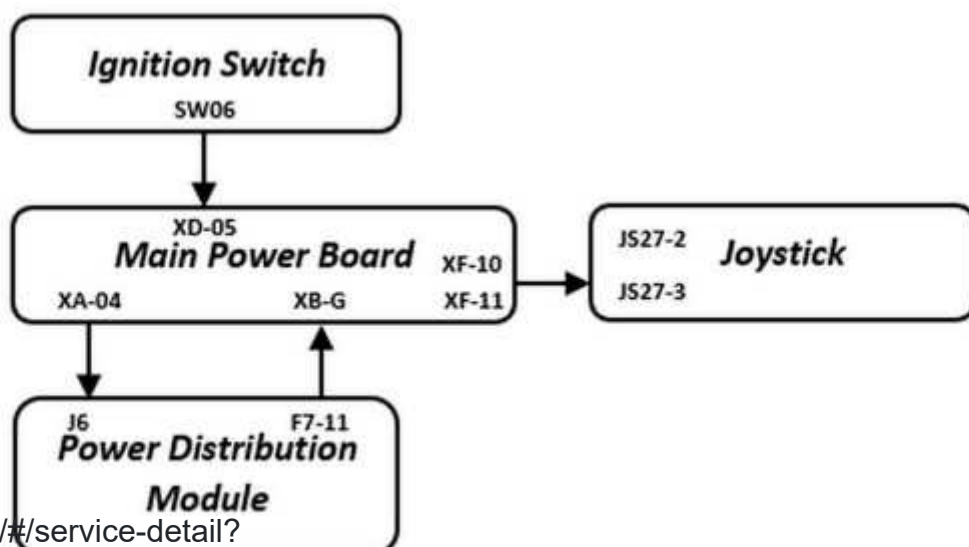


Illustration 2

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Power Distribution Circuit - Power to Joystick +15

The key ignition power distribution circuit establishes the flow of electricity to all the individual circuits including the joystick control assembly.



Power Distribution Circuit - Ground to Joystick (GND)

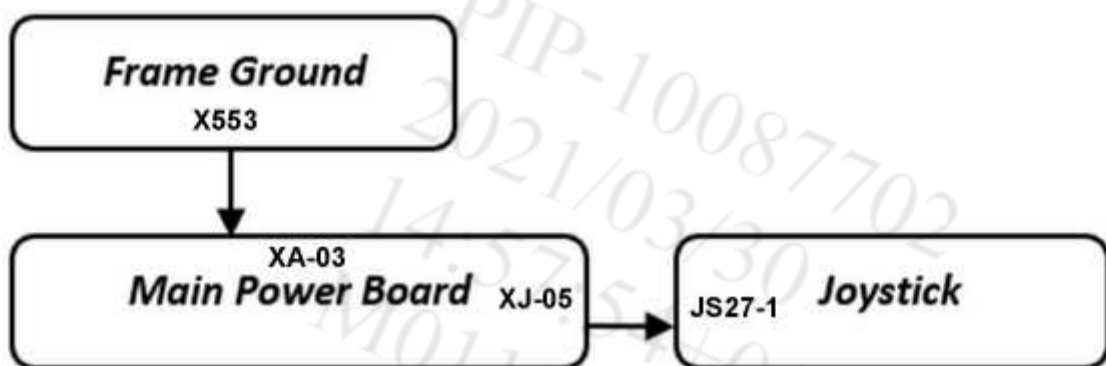


Illustration 4

CAN Circuit - CAN Line 1 Terminators

CAN Terminators Line 1 (Location of Resistors)			
Location	Connector	Pin High	Pin Low
Internal rear frame module	CO402	B1	E1
On bus bar M514 near joystick	MS514	A	B

Table 1

CAN Circuit - CAN Line 1 Block Diagram

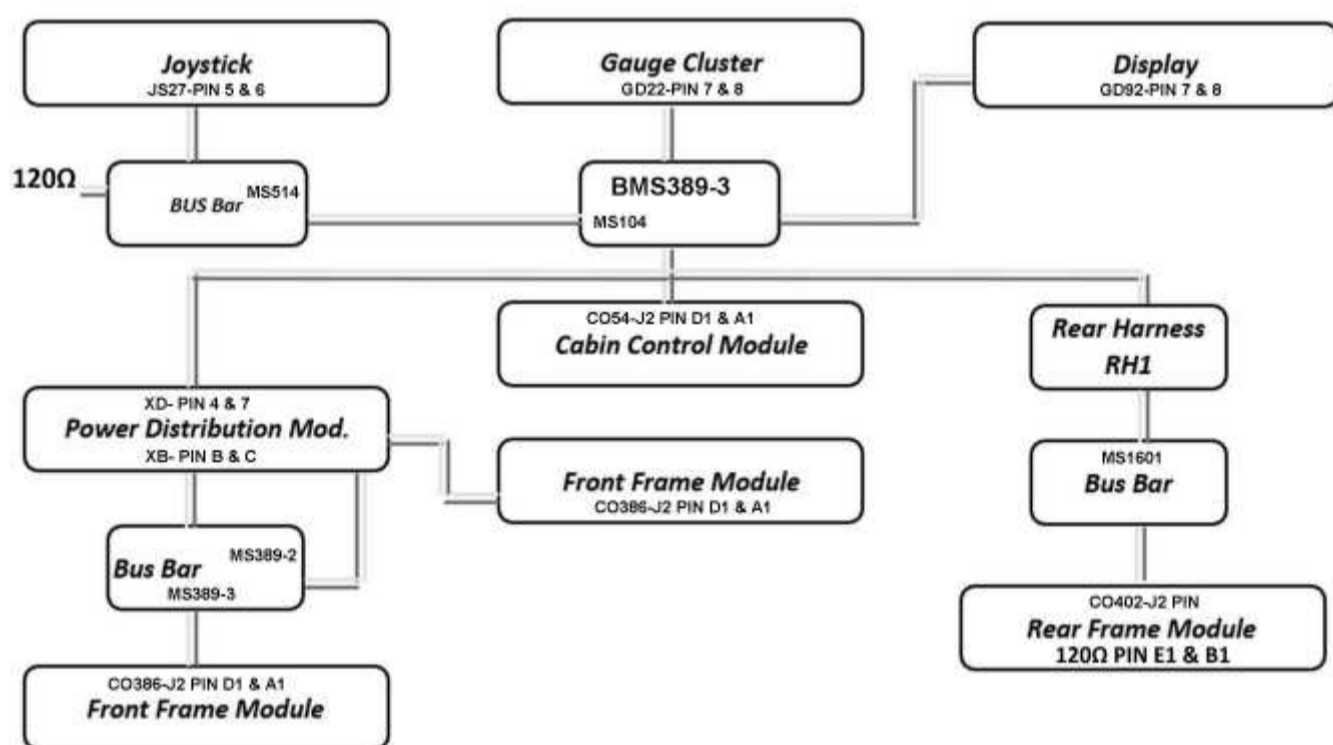


Illustration 5

Pin Overview		
Description	Joystick	Cabin Control Module (CCM) and Power Distribution
CAN High	JS27-6	J2 - A1(CCM)
CAN Low	JS27-5	J2 - D1(CCM)
Power (Key)	JS27-3	XF - 10(MPB)
Power (Key)	JS27-2	XF - 11(MPB)
Ground	JS27-1	XJ - 05(MPB) or GND

Table 2

Test Step 1 - Visual Inspection of the Joystick

Perform a visual inspection of the joystick, the wiring and the hardware that is associated with the joystick control assembly.

Expected Result

There is no apparent damage to the joystick, the wiring or the hardware that is associated with the joystick control assembly.

Results

- OK - There is no apparent damage to the joystick, the wiring or the hardware that is associated with the sensor. Proceed to Section "Test Step 2- Check CAN High Signal".
- NOT OK - There is apparent damage to the joystick, the wiring or the hardware that is associated with the joystick control assembly.

Repair

Replace the joystick control assembly.

Test Step 2- Check CAN High Signal

Note: Use the **146-4080** Digital Multimeter Gp or an equivalent and two **7X-1710** Multimeter Probes or equivalents for the measurements in this procedure.

- Turn the key start switch to the ON position. Do Not start the engine.
- Locate the joystick connector JS27. To access, remove the four **8T-4753** Screws securing the joystick, pull out the joystick.
- At the back of the harness connector of the joystick, insert a **7X-1710** Multimeter Probe or equivalent along the CAN High wire (contact JS27-6) and another **7X-1710** Multimeter Probe or equivalent along the ground wire (contact JS27-1).
- Measure the voltage across the contact 6 and contact 1 (machine ground).

Expected Result

The voltage that is measured is approximately between ~2.6 DCV and ~ 2.9 DCV. Proceed to Section "Test Step 3 - Check CAN Low Signal".

Repair

If the voltage measured on CAN High is approximately 12 DCV, CAN High is likely shorted to battery - Repair or replace the harness.

If the voltage measured is 0 DCV, CAN High likely has an open wire or is shorted to ground. Repair or replace the harness.

Test Step 3 - Check CAN Low Signal

- Leave the key switch at the ON position.
- Measure the voltage across contact 5 and contact 1 (machine ground).

Expected Result

The voltage that is measured is approximately between ~2.1 DCV and ~2.4 DCV. Proceed to Section "Test Step 4 - Check the Terminating Resistors".

Repair

If the voltage measured on CAN Low is approximately 12 DCV then most likely CAN Low is likely shorted to battery - Repair or replace the harness.

If the voltage measured is 0 DCV, CAN Low likely has an open wire or is shorted to ground. Repair or replace the harness.

Test Step 4 - Check the Terminating Resistors

- De-energize the system.
- Disconnect the CAN bus resistor from MS514-3 from the BUS bar, which is located underneath the right-hand side panel (near the joystick base mount) and measure the resistance between pin A and B.

I. Disconnect connector J2 from the rear frame module located in the back of the frame and measure resistance across pin D1 and A1.

Expected Result

The resistances measured are $120 \pm 12 \Omega$. Proceed to Section "Test Step 5 - Check for Power at the Joystick".

Repair

Replace the terminating resistor that did not measure $120 \pm 12 \Omega$.

Test Step 5 - Check for Power at the Joystick

- A. Do not disconnect the harness connector from the joystick control assembly.
- B. Turn the key start switch and the electrical master switch to the ON position.
- C. At the back of the harness connector for the joystick, insert a **7X-1710** Multimeter Probe or an equivalent along the voltage supply wire (JS27 - Pin 2 or Pin 3).
- D. Measure the voltage from contact 2 or 3 to frame ground.

Expect Result

The voltage is ± 12.0 DCV.

Results

- OK - The voltage is ± 12.0 DCV. Proceed to Section "Test Step 6 - Check for Proper Ground at the Joystick".
- NOT OK - The voltage is not ± 12.0 DCV. The + battery circuit in the machine harness has failed.

Repair

Check if Fuse F3 on the Main Power Board is OK. If NOT OK, replace with a 10-amp fuse. If fuse is OK, then repair or replace the machine harness. STOP.

Pin Overview		
Description	Joystick	Cabin Control Module (CCM) and Power Distribution
CAN High	JS27- 6	J2 - A1 (CCM)
CAN Low	JS27- 5	J2 - D1 (CCM)
Power (Key)	JS27- 3	XF- 10 (CCM)
Power (Key)	JS27 - 2	XF- 11 (CCM)
Ground	JS27- 1	XJ - 05 (MPB) or GND

Table 3

Test Step 6 - Check for Proper Ground at the Joystick

- A. The machine harness remains connected to the joystick control assembly.
- B. Turn the key start switch and depress the electrical master switch to the OFF position.
- C. Remove the **7X-1710** Multimeter Probe or an equivalent from the voltage supply wire (contact 2 or 3).
- D. At the back of the harness connector for the sensor, insert a **7X-1710** Multimeter Probe or an equivalent along the ground wire (JS27 - Pin 1).
- E. Measure the resistance from contact 1 to frame ground.

Expected Result

The resistance is less than 5 ohms.

Results

- OK - The resistance is less than 5 ohms. The ground circuit is correct. Proceed to Section "Test Step 7 - Test the Harness".
- NOT OK - The resistance is greater than 5 ohms. The ground circuit in the machine harness has failed.

Repair

Repair or replace the machine harness. STOP.

Test Step 7 - Test the Harness

- Turn the main disconnect switch to the OFF position.
- Inspect the harness connections that are related to the CAN bus - refer to Illustration 5 for the block diagram. Make sure that connectors are clean and tight.
- Check the connectors for proper mating, ensure that all the seals are present and in place.
- Check the harness for signs of damage or abrasion caused by frame edges or rubbing.
- Check the wires at the connector. Ensure that the wires are secured tightly into the connector.
- Check the exposed wires at the connectors for nicks or signs of abrasion.
- Check for moisture inside the connector. Ensure there is NO dielectric grease applied. Remove from connector if applied.
- Check the connector for dirty contacts or corroded contacts. (Green oxidation).
- Check each pin and each socket of the machine harness connector. Ensure that the contacts are properly installed. The contacts should mate correctly when the two pieces of the connector are placed together.
- Disconnect the connector(s) of:
 - a. Joystick (JS27)
 - b. Cabin Control Module (CCM)
 - c. Main Power Board (MPB) as per Table 4
- Measure the resistance from the following contacts that are provided in the Table 4.

Resistance Measurements			
Measurement	Contacts Joystick	CCM or Main Power Board	Expected Result in Ω
A	JS27- 6 CAN H	J2 - A1 (CCM)	0 to 5 Ω
B	JS27- 6 CAN H	J2 - D1 (CCM)	54 to 66 Ω
C	JS27- 5 CAN L	J2 - D1 (CCM)	0 to 5 Ω
D	JS27- 5 CAN L	J2 - A1 (CCM)	54 to 66 Ω
E	JS27- 3 PWR Key	XF - 10 (MPB)	0 to 5 Ω
F	JS27- 2 PWR Key	XF - 11 (MPB)	0 to 5 Ω
G	JS27- 1 GND	XJ - 05 (MPB) OR GND	0 to 5 Ω

Table 4

Expected Result

The resistance values agree with the Table 4.

Result

- OK - The resistance values agree with the table. Proceed to Section "Test Step 8 - Check if the Diagnostic Code Remains"
- NOT OK - Any of the measurements A, C, E, F, or G do not agree with the Table 3

Repair

Repair or replace the harness.

Test Step 8 - Check if the Diagnostic Code Remains

- A. Inspect the contacts of the harness connectors and clean the connectors.
- B. Reconnect all the harness connectors.
- C. Turn the electrical master switch and the key start switch to the ON position.
- D. Operate the machine.
- E. Check for any active codes.

Expected Result

The code 6617 or 9976 is active.

Results

- YES - The code 6617 or 9976 is active. The diagnostic code has not been corrected. The joystick control assembly may have failed
- NO - The code 6617 or 9976 is not active. The diagnostic code does not exist currently

Repair

The initial diagnostic code was probably caused by a poor electrical connection at one of the harness connectors that was disconnected and reconnected. Resume normal machine operation. STOP.

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