CAT® Lift Trucks

Service Manual

Controller

FC/MC

EP13PNT	ETB21-00011-01999 / ETB21-02001-49999
EP15PNT	ETB21-50011-51999 / ETB21-52001-99999
EP16CPNT	ETB22-00011-01999 / ETB22-02001-49999
EP18CPNT	ETB22-50011-51999 / ETB22-52001-99999
EP16PNT	ETB23-00011-01999 / ETB23-02001-49999
EP18PNT	ETB23-50011-51999 / ETB23-52001-99999
EP20PNT	ETB24-00011-01999 / ETB24-02001-99999

EP16CPN	ETB27-00011-01999 / ETB27-02001-49999
EP18CPN	ETB27-50011-51999 / ETB27-52001-99999
EP16PN	ETB28-00011-01999 / ETB28-02001-49999
EP18PN	ETB28-50011-51999 / ETB28-52001-99999
EP20PN	ETB29-00011-01999 / ETB29-02001-99999

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6.5 Run Time Diagnostics

Availability of operation:
○: Yes, ×: No, △: Partially operable, *: Applicable

Code	Fault	Error condition	Display						Fault history record	Steering operation	Lift lowering	Restriction	To return to normal
			I CON										
			Battery	Brake fluid	Overheat	Mast interlock	Driving interlock	Exclamation					
E0	Traction Motor R.H., Overheating	Motor (145°C [293°F]or higher, -25°C [-13°F] or lower)			*				*	○	○	Driving power reduction	Cool
E1	Traction Motor L.H., Overheating	Motor (145°C [293°F] or higher, -25°C [-13°F] or lower)			*				*	○	○	Driving power reduction	Cool
E2	Pump Motor, Overheating	Motor (145°C [293°F] or higher, -25°C [-13°F] or lower)			*				*	○	○	Pump power reduction	Cool
E5	Traction Inverter R.H., Overheating	MOSFET (100°C [212°F] or higher, -25°C [-13°F] or lower) Capacitor (110°C [230°F] or higher, -25°C [-13°F] or lower)			*				*	○	○	Driving power reduction	Cool
E6	Traction Inverter L.H., Overheating	MOSFET (100°C or higher, -25°C [-13°F] or lower) Capacitor (110°C [230°F]or higher, -25°C [-13°F] or lower)			*				*	○	○	Driving power reduction	Cool
E7	Pump Inverter, Overheating	MOSFET (100°C [212°F] or higher, -25°C [-13°F] or lower) Capacitor (110°C [230°F] or higher, -25°C [-13°F] or lower)			*				*	○	○	Pump power reduction	Cool
		MOSFET (105°C [221°F] or higher), Capacitor (115°C [239°F] or higher)			*				*	○	○	Control power reduction (Load handling restricted to 1s)	Cool
E9	P5 Controller Overheating	Thermistor (IMS 100°C [230°F], -25°C [-13°F], Capacitor 110°C [230°F], -25°C [-13°F])			*				*	○	○	Driving power reduction	Cool
		MOSFET (105°C [221°F] or higher) Capacitor (115°C [239°F] or higher)			*			*	*	○	○	Normal stop	Turn key OFF
14	Traction Motor Current Sensor R.H. Fault	Current sensor offset mean value is ±120A or more						*	*	○	○	Normal stop	Turn key OFF
15	Traction Motor R.H., Over-current	Current value exceeding 586Arms in 1.6 mm sec., or exceeding 631 Arms in 1 m sec., or exceeding 781 Arms instantaneously.						*	*	○	○		Turn key OFF

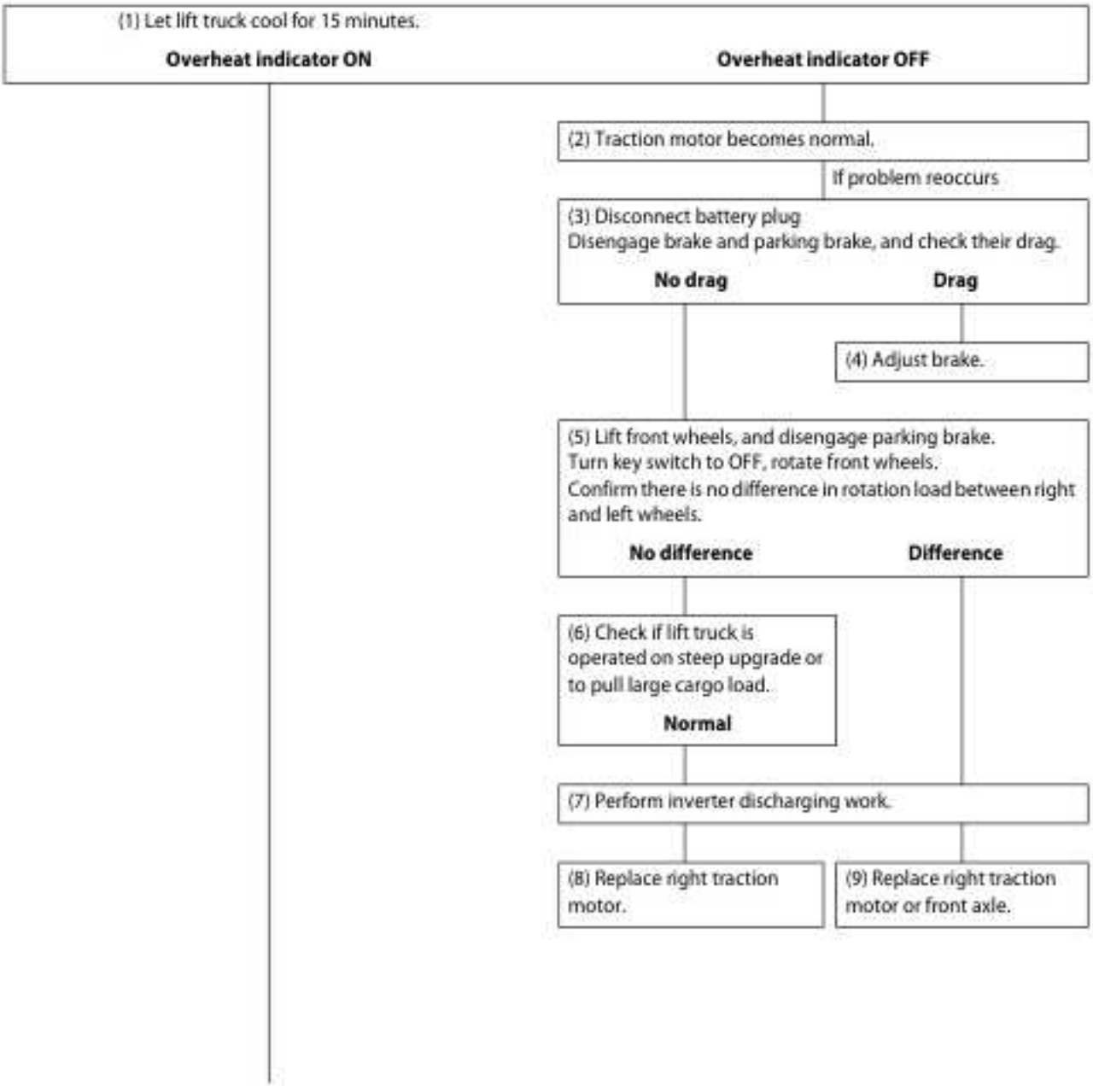
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3. Troubleshooting

3.1 Traction Motor R.H.,Overheating (E0)

Code: E0	
Situation	Controller/motor overheat indicator ON. Poor pulling power and acceleration. Normal pump motor and power steering operations. Service tool "Alarm status" and "E0" displayed.
Possible cause	Overheating of right side traction motor, faulty right side traction motor or thermal sensor, faulty or open harness wiring, faulty right traction inverter DSP card, abnormal power supply of logic unit, brake or parking brake drag, abnormality in front axle, faulty display unit.
Trigger of the code	Motor temperature is out of range of -25 °C to 145 °C (-13 °F to 293 °F). Recovers when motor temperature is in range of -20 to 70 °C (-4 to 158 °F).

Checks



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(8) (Already disconnected E-01, E-02 and E-06)
Resistance between
E-02-5 (3) and E-02-6 (4) of harness side connectors

60 Ω ± 5% — **Other than 60 Ω ± 5%**

(9) Repair or replace main harness.

(10) Perform CAN check of pump inverter fault (65).

(11) Connect connector E-06 of traction inverter.
(Already disconnected. E-02 and E-01)
Measure resistance of CAN with connector E-02 disconnected.
Resistance between E-02-5 (3) and E-02-6 (4) of harness side connectors

60 Ω ± 5% — **Other than 60 Ω ± 5%**

(12) Replace DSP card of traction inverter.

(13) Measure voltage between E-06-18 (11) and E-06-20 (12).
Confirm value is 8 ± 2 V.
Measure voltage between E-06-17 (10) and E-06-20 (12).
Confirm value is from 14 ± 2 V.

Normal — **Abnormal**

(14) Disconnect battery plug, then perform inverter discharging work.

(15) Replace DSP card of traction inverter.

(16) Replace power supply card of logic unit.

If fault remains

(17) Disconnect E-03, E-04, E-05, E-06, E-07, E-08.
Reconfirm step (13) after power ON.

Normal — **Abnormal**

(18) After step (14), connect E-07.
Reconfirm step (13).

Normal — **Abnormal**

(19) Repair or replace main harness.

(20) After step (14), connect E-06.
Reconfirm step (13).

Normal — **Abnormal**

(21) Replace DSP of traction inverter Right.

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5. Setup Option

5.1 Outline

The logic unit is equipped with a memory module that retains recorded data even if the main power is turned off.

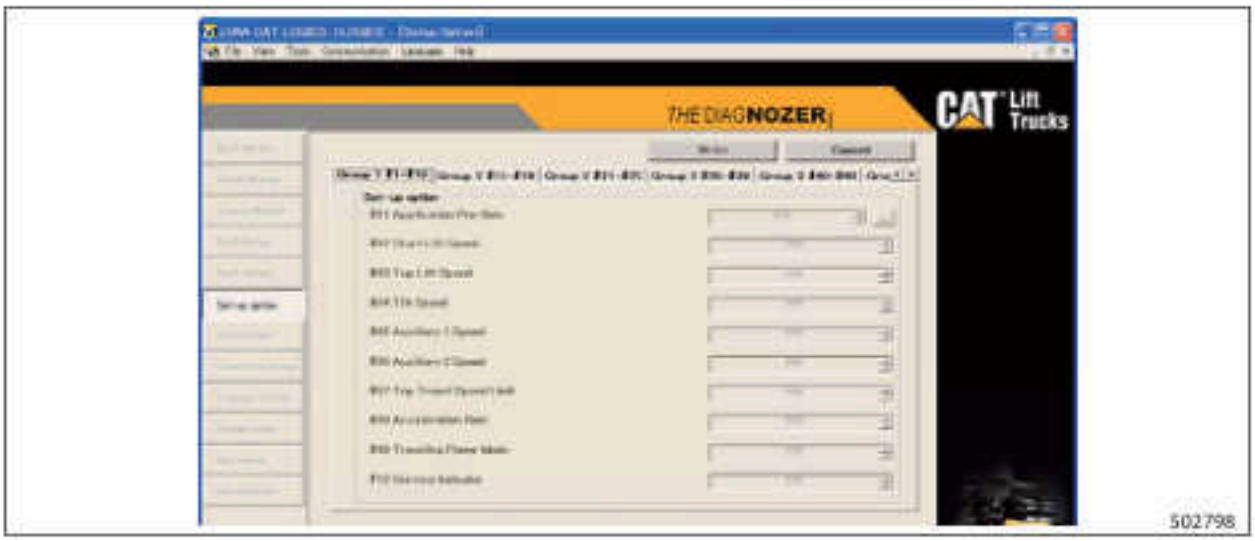
The model information and various features are set before factory shipment.

The setup options are categorized from Group 1 to Group 3 according to the feature levels.

Setup group

Group	Description
Group 1	Basic function (#1 to #10)
Group 2	Detailed function (#11 to #39)
Group 3	Model information (#40 to #55)

The Group 1 and 2 are available to set the default value in a one-step operation and can be customized in accordance with applications. Since the Group 3 is for model information, it is required to be set to the same value as actual control system. It will not work properly if the model information is different.
When setting the setup option data for the first time after the assembly is completed or the logic card is replaced, be sure to set Group 3 data first, then the default data of Group 1 and 2, with the "service tool" in each setup mode.



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