CAT® Lift Trucks

Service Manual

Controller

EP16N	**ETB15-20011-up**
EP18N	**ETB15-70001-up**
EP20CN	**ETB17-20011-up**

For use with EP16N-EP20CN Chassis Service Manual. **99759-68111**

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Setup Options (Group 1)

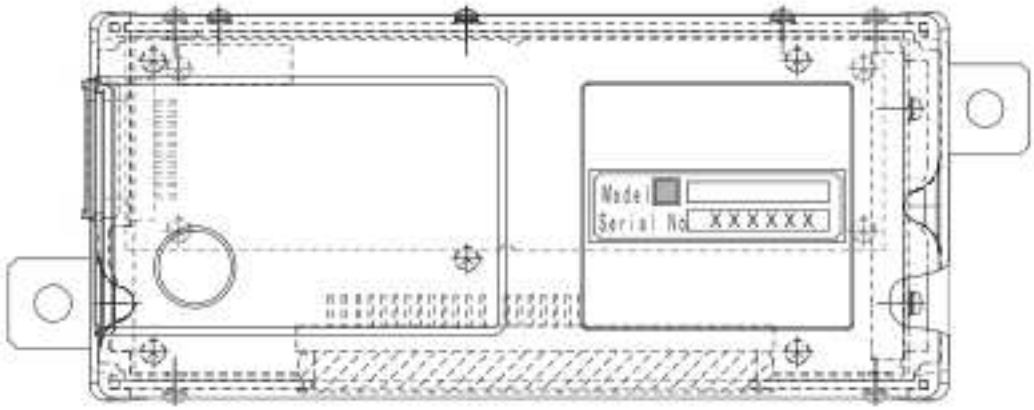
Option #	Title of Option	Description	Range	Default Value
#1	Application Pre-Sets (Truck Operation Mode)	The value setting of the following 7 items are registered beforehand. Top travel speed, Acceleration rate, Traveling power, Regen adjustment, Start lift speed, Top lift speed, Tilt speed. Refer to the explanation for details.	A, b, C, d, E (1)	A
#2	Start Lift Speed	Beginning lift speed Start lift speed cannot exceed top lift speed. (1: SLOW → 10: FAST)	1 to 10	1
#3	Top Lift Speed	Lift speed when operating the lever at maximum	1 to 10	6
#4	Tilt Speed	Speed setting for tilt	1 to 10	5
#5	Auxiliary 1 Speed	Speed setting for attachment 1	1 to 10	3
#6	Auxiliary 2 Speed	Speed setting for attachment 2	1 to 10	1
#7	Top Travel Speed Limit	Maximum travel speed	5 to 17 [km/h]	15
#8	Acceleration Rate	Choice of acceleration rate (1: SLOW → 5: FAST)	1 to 5	3
#9	Traveling Power	Choice of power characteristic (1: ECONOMY, 2: STANDARD, 3: HIGH POWER)	1, 2, 3	2
#10	Service Indicator	This function notifies service personnel that maintenance time is approaching or has passed. It means the lapsed time when setting up. Approached: !LED flashes (20 hour) Passed :!LED turn on and power reduction (selected) (2) Refer to the explanation for details.	0, 0.1, 100, 150, ...950, 1000, =0.1 (6 min.), =100, =150, ..=950, =1000 (In increments of 50 [hour]) "=": power reduction 0: no action	0

NOTICE: (1) Before changing, when parameter data are different from the values of the selected mode, the truck mode indicator (A to E) flashes.
When the truck mode is changed, all parameter data is replaced by the set values of the selected mode.

(2) The data from the truck hour meter at set time is saved apart from the selected value. If the key switch is turned off without setting the DRS switch to R, the data at set time is maintained.
When the DRS switch is set to R, the data at set time is replaced by the current truck hour meter data.

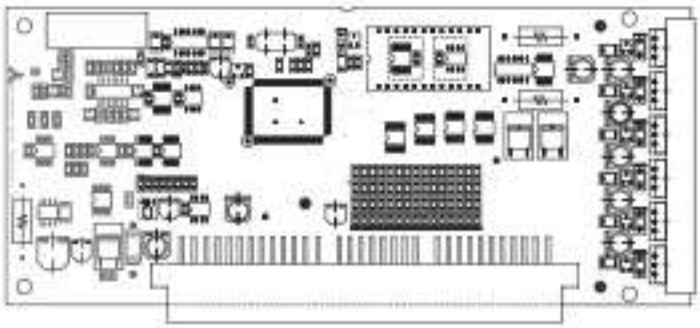
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Logic unit

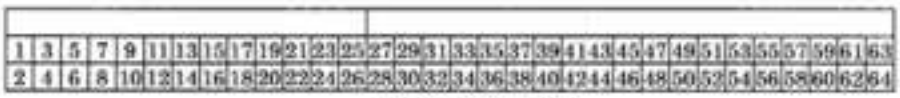


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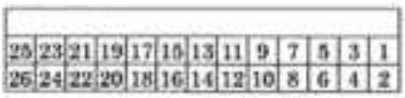
Logic card



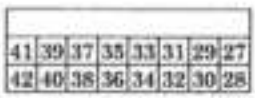
CN1



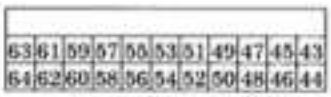
Logic card side CN1



Harness B side CN3



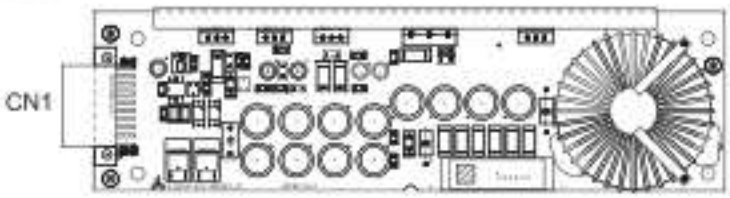
Harness B side CN2



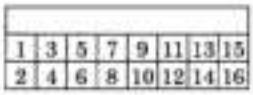
Harness B side CN1

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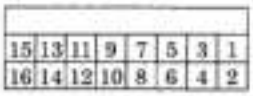
Power supply card



CN1



Power supply card side CN1



Harness B side CN4

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The Service Tool connector exists on harness B CN21.

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Run Time Diagnostics

Fault	How to detect	Display								Steering operation	Result	To return to normal
		LED							Code			
		Error	Brake Oil	Parking Brake	Battery Low	Over Temp.	Seat Belt	Service Indicator				
Traction Motor R.H., Overheating	Thermistor (145 °C, -25 °C)					*			E0	○	Power reduction	Cool
Traction Motor L.H., Overheating	Thermistor (145 °C, -25 °C)					*			E1	○	Power reduction	Cool
Pump Motor, Overheating	Thermistor (135 °C, -25 °C)					*			E2	○	Power reduction	Cool
Traction Inverter R.H., Overheating	Thermistor (IMS 100 °C, -25 °C, Capacitor 110 °C, -25 °C)					*			E5	○	Power reduction	Cool
Traction Inverter L.H., Overheating	Thermistor (IMS 100 °C, -25 °C, Capacitor 110 °C, -25 °C)					*			E6	○	Power reduction	Cool
Pump Inverter, Overheating	Thermistor (IMS 100 °C, -25 °C, Capacitor 110 °C, -25 °C)					*			E7	○	Power reduction	Cool
Brake Oil, Low Level	Level sensor (Contact)		*							○		Turn key off
Traction Motor Current Sensor R.H. Fault	Out of nomal range	■							14	○	Line contactor off(*) Pump contactor hold	Turn key off
Traction Motor R.H., Over-current	More than 492 Amps (1.6 ms), 557 Amps (1 ms)	■							15	○	Line contactor off Pump contactor hold	Turn key off
Traction Motor R.H., Stall Timer	Measure time (set by SUO #20) while stalling	■							16	○	Line contactor off Pump contactor hold	Turn key off
Traction Motor Current Sensor L.H. Fault	Out of nomal range	■							24	○	Line contactor off(*) Pump contactor hold	Turn key off
Traction Motor L.H., Over-current	More than 492 Amps (1.6 ms), 557 Amps (1 ms)	■							25	○	Line contactor off Pump contactor hold	Turn key off
Traction Motor L.H., Stall Timer	Measure time (set by SUO #20) while stalling	■							26	○	Line contactor off Pump contactor hold	Turn key off
Pump Motor Current Sensor Fault	Out of nomal range	■							34	×	Line contactor off(*) Pump contactor off(*)	Turn key off
Pump Motor Over-current	More than 985 Amps (1.6 ms), 990 Amps (1.0 ms)	■							35	×	Line contactor off Pump contactor off	Turn key off
Line Contactor Fault	Check voltage of power circuit	■							40	×	Line contactor off(*) Pump contactor off(*)	Turn key off
Pump Contactor Fault	Check voltage of power circuit	■							42	×	Line contactor off(*) Pump contactor off(*)	Turn key off
Traction Motor R.H. Open	Traction R.H. Motor Open	■							45	○	Line contactor off Pump contactor hold	Turn key off
Traction Motor L.H. Open	Traction L.H. Motor Open	■							46	○	Line contactor off Pump contactor hold	Turn key off
Pump Motor Open	Pump Motor Open	■							47	×	Line contactor off Pump contactor off	Turn key off
Accelerator Sensor Fault	Accel SW ON: Below 0.3V Accel SW OFF: More than 1.41V Below 0.2V, More than 4.8V	■							51	○	Line contactor off Pump contactor hold	Turn key off
Traction Motor R.H. Pulse Input Fault	Out of nomal range (5800 rpm)	■							52	○	Line contactor off Pump contactor hold	Turn key off
Traction Motor L.H. Pulse Input Fault	Out of nomal range (5800 rpm)	■							53	○	Line contactor off Pump contactor hold	Turn key off
PC Lever Fault	Below 0.1V, More than 4.9V	■							54	○	Disable lever op.	Turn key off
PC Solenoid Fault	Below 0.16A, More than 1.9A	■							55	○	Disable solenoid	Turn key off
PC Solenoid Current Leak	More than 0.18A	■							56	×	Line contactor off Pump contactor off	Turn key off
Pump Motor Pulse Input Fault	Out of nomal range (4000 rpm) With no rotation input during output	■							57	×	Line contactor off Pump contactor off	Turn key off
Display Communication Fault	When serial communication is not going on	■							60	○	Indicate if it possible	Turn key off
Logic Card Initialize Faiture	SUO Gr. 03 and default setting are not set	■							61	×	Line contactor off Pump contactor off	Turn key off
Logics Fault	Parity check of SUO data Sum check of ROM and RAM	■							62	×	Line contactor off Pump contactor off	Turn key off
Traction Inverter R.H. Fault	When CAN communication is not going on Sum check of ROM & RAM Initial mode SW setting Fault	■							63	×	Line contactor off Pump contactor off	Turn key off
Traction Inverter L.H. Fault	When CAN communication is not going on Sum check of ROM & RAM Initial mode SW setting Fault	■							64	×	Line contactor off Pump contactor off	Turn key off

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Problem: Line Contactor Fault (40)

(1) Situation
Display: "40". All truck operations inhibited.
Line contactor OPEN and pump contactor OPEN.

(2) Possible cause
Faulty line contactor, faulty main harness, faulty logic unit, faulty right traction inverter, faulty left traction inverter.

(3) How the error code is triggered
Inverter voltage data is checked when contactor is closed (400 mS).

(4) Checks
Turn off power, then turn on power again. Confirm error code display.
Error code 40 / Error code 63 or 64

(5) Block wheels, then confirm line contactor operation in self-diagnostics mode [14]. See page 1-40.
Not operated / Operated

(6) See troubleshooting for code "63" or "64". See page 2-77 to 2-80.

With service tool / Without service tool

(7) Check DC voltage of right and left traction inverters with monitor. These values should be same as battery voltage.
Right inverter value abnormal / Left inverter value abnormal

(8) Disconnect battery plug, then perform inverter discharging work. See page 1-43.

(9) Disconnect battery plug, then perform inverter discharging work. See page 1-43.

(10) Disconnect battery plug, then perform inverter discharging work. See page 1-43.

(11) Replace right traction inverter. See page 1-44.

If fault remains

(12) Replace right traction inverter. See page 1-44.

(13) Replace left traction inverter. See page 1-44.

(14) Disconnect battery plug, then perform inverter discharging work. See page 1-43.

(15) Replace left traction inverter. See page 1-44.

(16) Disconnect battery plug, then perform inverter discharging work. See page 1-43.

(17) Check to see if line contactor tip moves smoothly.
Check line contactor tip for melting.
Normal / Abnormal

(18) Measure resistance of contactor coil.
[44Ω at -30 ˚C(-22 ˚F) to 65Ω at 80 ˚C(176 ˚F)]
Within range / Out of range

(19) Disconnect connectors CN1 and CN4 of logic unit. Check continuity between CN4-13(4) and contactor coil plus(+)(249). Check continuity between CN1-59 and contactor coil minus(-)(247).
Continuity / No continuity

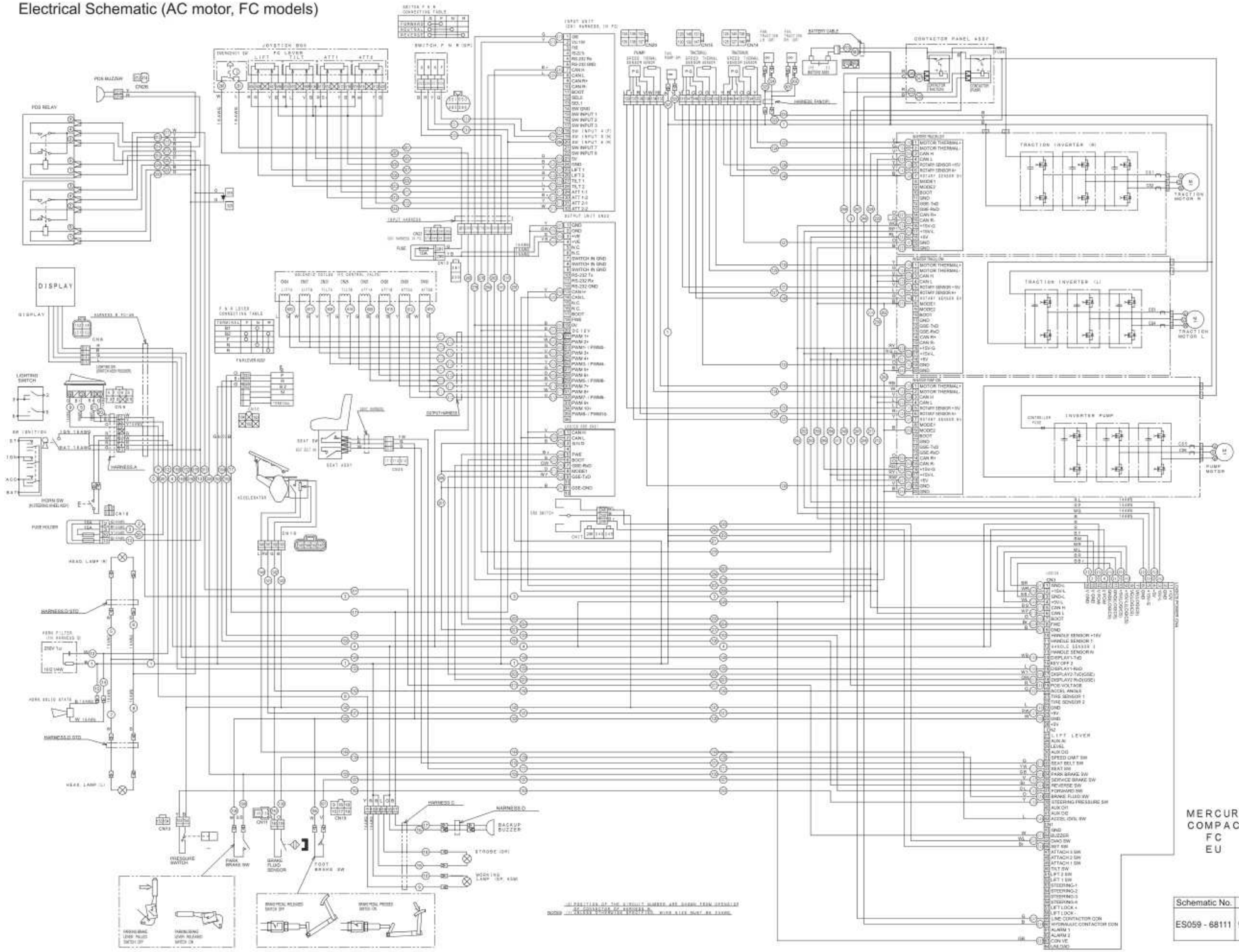
(20) Replace line contactor. See Chassis & Mast.

(21) Perform inverter discharging work, then replace logic card of logic unit. See page 1-49.

(22) Repair or replace harness.

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Electrical Schematic (AC motor, FC models)



Schematic No.	Used for	Truck Model	Serial No.
ES059 - 68111	99759 - 68111	EP16N	ETB15 - 20011 -up
		EP18N	ETB15 - 70001 -up
		EP20CN	ETB17 - 20011 -up

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