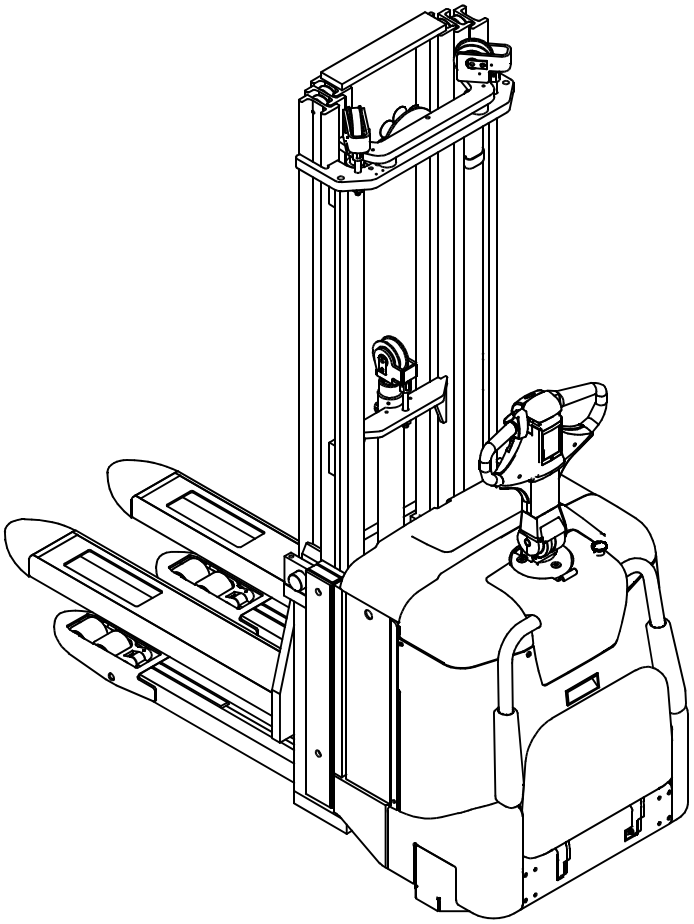
Service Manual

en



7SLL12.5/7SLL12.5F/7SLL16/7SLL16F

Valid from serial number: 711956-

Order number: 222641-040
Issued: 2004-12-20 ITS

TOYOTA
INDUSTRIAL EQUIPMENT

Contents

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Presentation of the truck – M2

Main components

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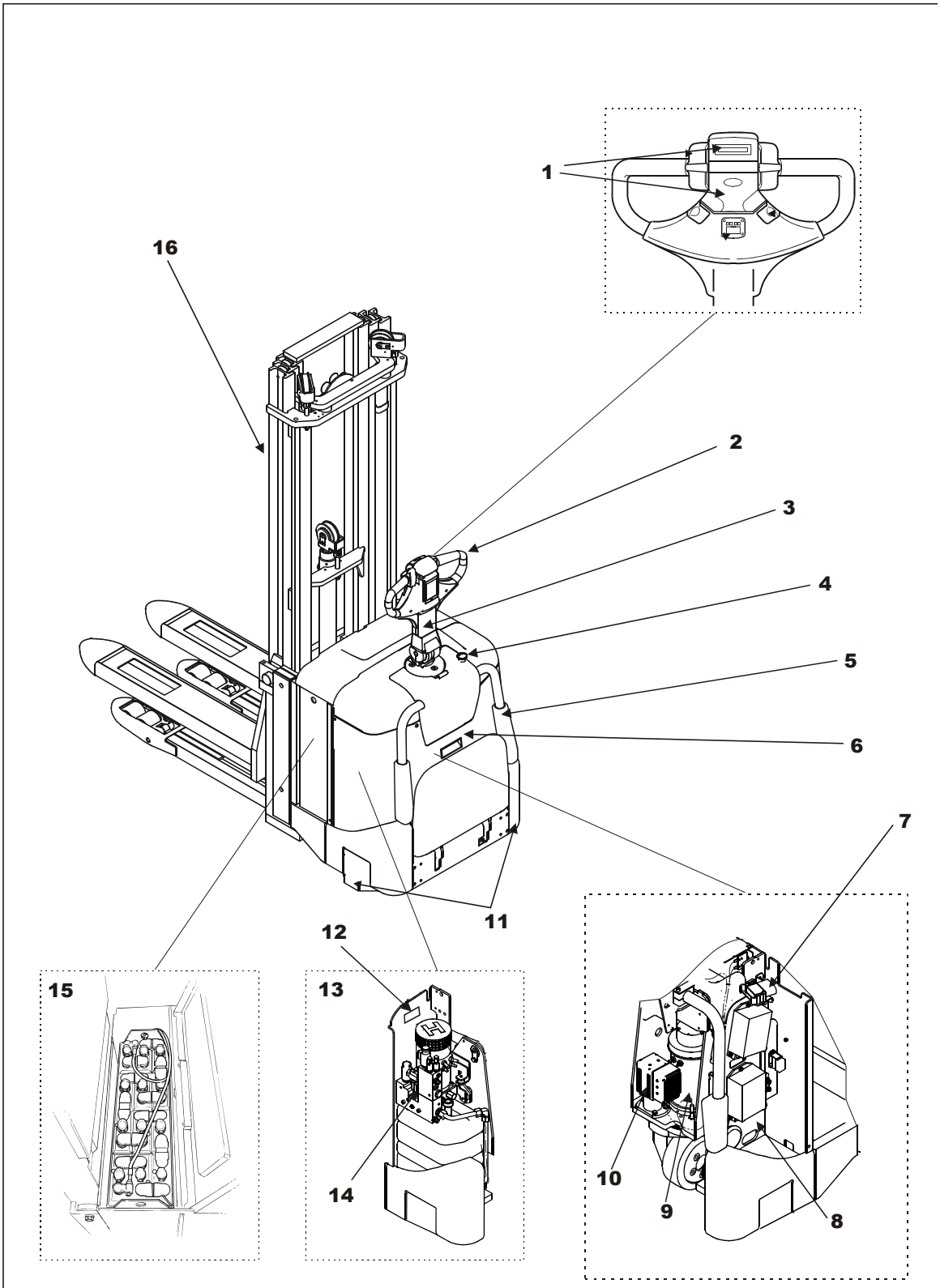

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4-Destruction instructions - M6

4.1 General

These instructions have been drawn up as a part of Toyota's environment management program. An important motive is, by taking nature into consideration, to economise with resources. In other words, you should try to recycle material as far as possible, thus minimising the discharge of environmentally hazardous substances.

These disassembly instructions are based on an F code (truck family) and are further divided into C codes (parts and functions on the truck). These C-codes are:

- 0000 Chassis
- 1000 Motors
- 2000 Transmission/drive gear
- 3000 Brake/belt/wheel systems
- 4000 Steering system
- 5000 Electrical system
- 6000 Hydraulics/pneumatics
- 7000 Working function - lift mast
- 8000 Auxiliary/installation equipment
- 9000 Accessories/optional equipment

The instructions do not tell you the type of material the parts are made of, but refer you to different material containers where the parts should be collected. Some plastics are marked, which means that some of the instructions refer to the marking to determine the collection container to use.

4.2 Procedure

When sorting a component part you must know what plastic parts, liquids, environmentally hazardous substances and metals that it includes.

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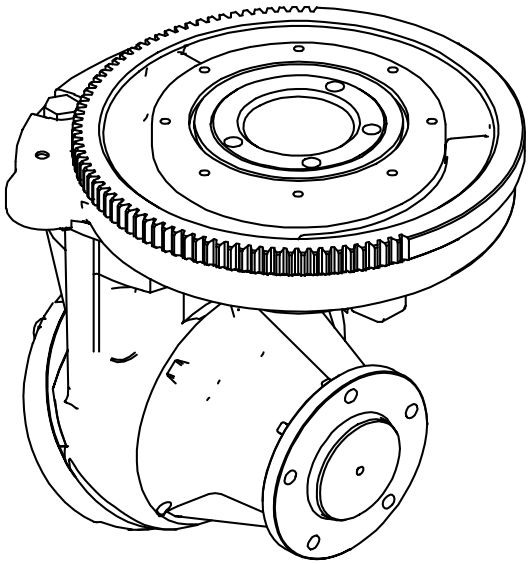
4.13 Drive unit/gear (2550)



4.13.1 Dismantling

- Drain the oil from the gearbox.
- Remove the gearbox from the drive motor (se SM).
- Remove the drive wheel.

4.13.2 Material handling

The oil should be handled as hazardous waste.

The gearbox is placed in a container intended for iron and steel scrap.

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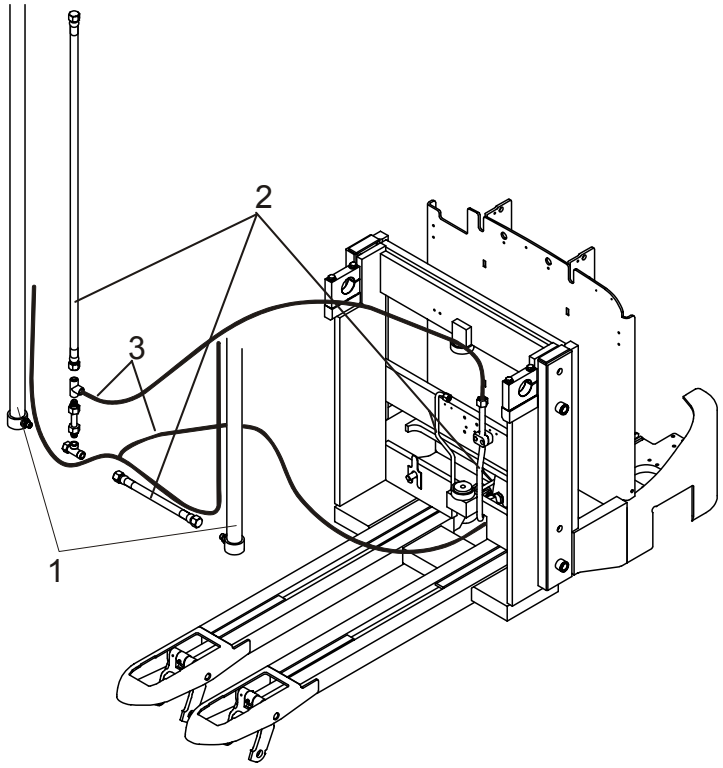
4.23 Chassis-mounted hydraulic oil lines (6230) (and main lift cylinder (6610))



4.23.1 Dismantling

- Remove the cylinder.
- Drain the cylinders of all oil.
- Destroy the cylinder by cutting it into two (1).
- Remove the hydraulic oil lines (see 2).
- Remove the hydraulic hoses (3).

4.23.2 Material handling

The oil should be handled as hazardous waste.

Place the cylinder and hydraulic oil lines in a container intended for iron and steel scrap.

Place the hydraulic hoses in a container intended for oil-contaminated material.

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6- Maintenance schedule – P2

Table 9: Maintenance schedule

I:Inspect, rectify and change if necessary **T:** Tighten. **C:** Clean **L:** Lubricate.
M:Control measurement, rectify if necessary

Pos. no.	Work to carry out						
	Interval in hours - may vary due to application	**5**	**20**	**80**	**500**	**1000**	**3000**
	Interval in days/weeks/months - may vary due to application	**1d**	**1w**	**1m**	**6m**	**12m**	**36m**
0000	**Chassis**						
0000.1	Inspect all shafts, links and clamping pins					I	
0000.2	Inspect possible damage on the chassis; open the battery cover and use it as an aid					I	
0000.3	Check the cover locks					I	
0000.4	Check finger guard					I	
0000.5	Check signs and stickers					I	
0000.6	Inspect the operator platform				I		
0380.3	Press grease into grease nipples **(Note 6)**				I/L		
0380	**Fork carriage**						
0380.1	Check for crack formation and damage					I	
0380.2	Check clearance in bushes and links					I	
0380.3	Press grease into grease nipples **(Note 6)**				I/L		
0380.4	Check the lift limit switch					I	
0380.5	Inspect the guides for wear and lubricate them **(Note 6**)				I/L		
0380.6	Inspect the load support (Option)				I		
0450	**Frame-mounted components**						
0450.0	Inspect the motor plate links and turning pipe					I	

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8-Tools – P4

8.1 Super Seal connectors

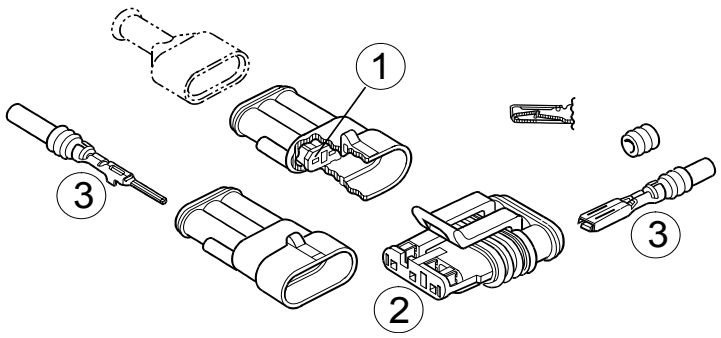
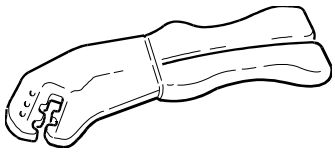
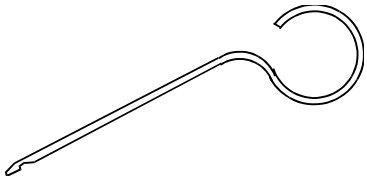
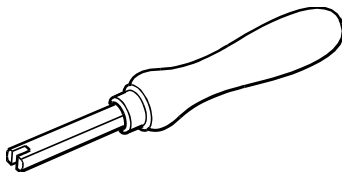
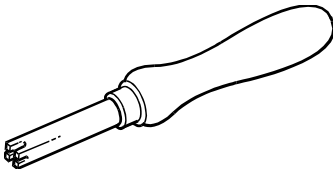
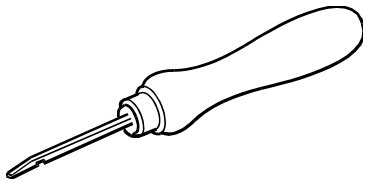


Figure	Number	Application
	159232	Tools for fitting pins/sleeves
	159229	Tools for loosening locks (1)
	159230	Tool for fitting secondary locks 1-2 poles (2)
	159231	Tool for fitting secondary locks 3-6 poles (2)
	159228	Tools for removing pins/sleeves (3)

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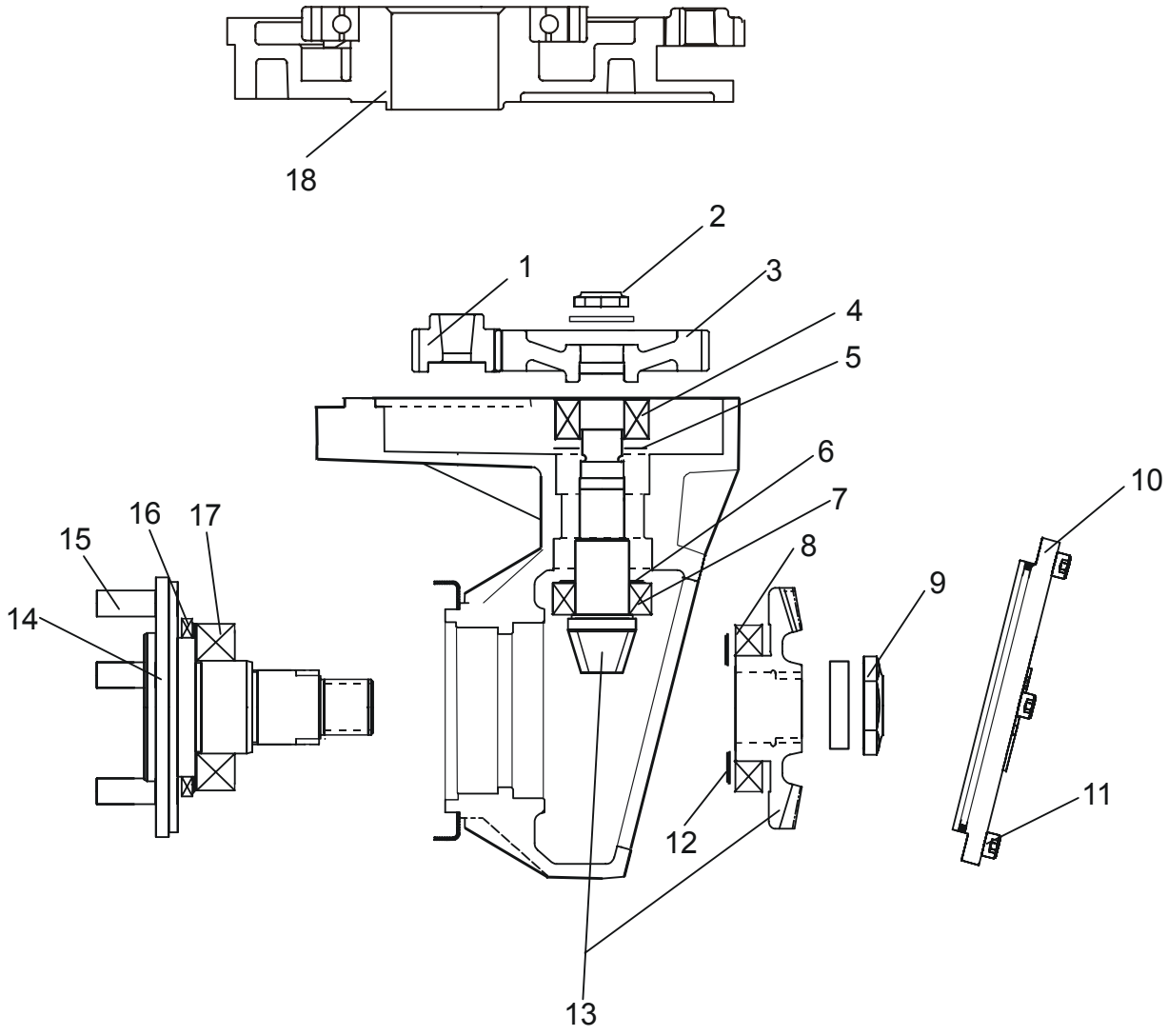
10-Drive unit/gear – 2550



12.2 Equipment list and electrical diagram

The following table shows a summary of the major electrical components of this truck.

Table 17: Electrical equipment list summary

Symbol	Function	Description	Associated signal names	Inf.
Energy and main power isolation				
G1	Main electrical power source	Traction battery 24 V		
X1	Battery connection / isolation	Connector		
K10	Main contactor	Contactor	A1:OUT MAIN CONTACTOR	7
Equipment protection				
F 1	Drive motor protection	Fuse 125 A		
F 3	Pump motor protection	Fuse 160 A		
F 50	Operating circuit protection, A2	Fuse 7,5A	A5:INPUT ENABLE B+	
F 51	Operating circuit protection A1	Fuse 7,5 A		
F 52	Steer servo motor protection	Fuse 30 A	A5:POWER SUPPLY 24VDC	
F 53	Operating circuit protection, A5	Fuse 3 A		3
Control and Signal processing				
A1	Traction and peripherals power control	Transistor regulator		
A2	Control of truck functions	Electronic card		1
A3	Lift power and signal control	Transistor regulator		
A5	Steering servo	Electronic card		3, 2
A6	Display of truck functions	Display unit		1
A17	PIN log in and data entry	Keypad		1

12.2.7 Electrical wiring diagram 7 of 15

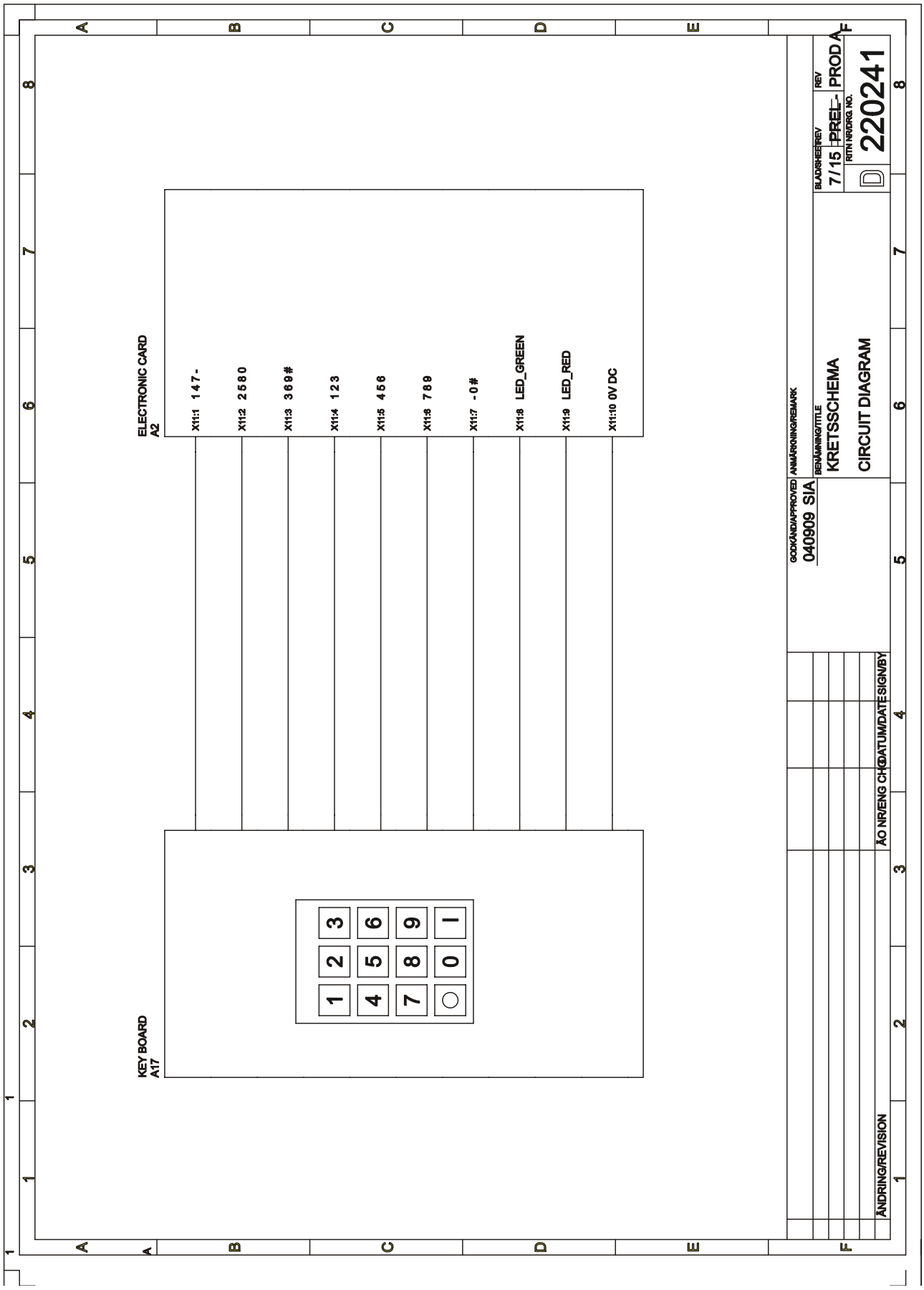
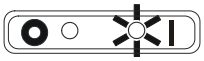
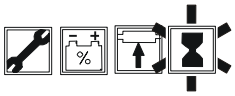
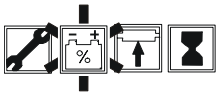
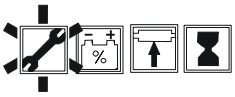


Table 18: Functional description

Event:	**1. Battery connected**
Action(s)	Connect the traction battery [X1, G1]
Influencing elements	Main power fuses ok [F1, F3] Operating circuit fuses ok [F50, F51, F52, F53] PTC resistor ok [R1]
Resulting conditions	24V (control) supplied directly to [A2], [A5] and via R1 to [A1], [A3], [A5] Curtis status LED blinks once every 5 seconds.[A1]
Event:	**2. Switch on (PIN-code entry)**
Prior event(s)	1
Action(s)	Enter valid PIN-code and press  [A17]
Influencing elements	Emergency switch-off closed [S21] [INP.SUPPLY +24V] high Tiller arm in drive not activated [S10] [INP.TILLER ARM IN DRIVE POS] low
Resulting conditions	Power lamp  lights. Main display shows hour meter reading and  for 4 seconds followed by battery condition as a percentage of full charge and  [A6] Mechanical brake remains on [Y1, A1:OUT.BRAKE] high Main contactor output remains high [A1:OUT.MAIN CONTACTOR] and Main contactor remains open [K10]
Event:	**3. Tiller am lowered for driving**
Prior event(s)	2
Action(s)	Lower tiller arm handle
Influencing elements	Tiller arm in drive sensor [S10]
Resulting conditions	Tiller arm in drive sensor activates [S10] [INP.TILLER ARM IN DRIVE POS.] high Brake solenoid control [A1:OUT.BRAKE] remains high Brake remains on [Y1] Main contactor output [A1:OUT.MAIN CONTACTOR] goes low Main contactor closes [K10] 24V (power) supplied to [A1],[A3] & [A5]

Fault symbol lights. 

The most recently occurred error will be displayed. The display will alternate between the fault code and the hour meter reading when the fault occurred. If the fault code log contains more than one fault code, these can be displayed by repeatedly operating the speed control L1.

12.6.3 List of fault codes

NOTE!

The text “Restart the truck!” in the following tables always means switching the truck off completely by removing the battery connector [X1], reconnecting and then switching the truck on again.

Table 21: List of fault codes

Code	Description	Possible cause / *Hint or Solution*
C3	TLS: Shock sensor values above limit	A shock sensor has reported values above limit. Driving may be too tough Make sure that the shock sensor limits are correct. Make sure that the shock sensor is correct located./*Brake activates and stops the truck. A TLS reset command* activates the truck.
C4	TLS: Truck set out of use	Possibility to set the truck “out of use” with a TLS command. / *Truck can´t be used before a TLS command sets the truck “in use”*
C19	Default parameter value warning	"Certain parameter value(s) may be outside their normal max-min range. These parameter values will be reset to their default values. / " It may be necessary to check the settings of all parameters if this code is displayed
C20	Butterfly warning	Problem with butterfly sensor [L1]. Butterfly may have been activated during start up or faulty sensor(s).[A2] / *Check action of butterfly*
C21	Lift/Lower control warning	Lift / Lower control for the forks may have been activated during start up or faulty sensor / *Check action of Lift / Lower control*
C28	Emergency switch warning	Emergency switch activated [S21] No voltage supply to Traction transistor regulator [A1]. Harness problem. / *Check emergency switch is not depressed. Check wiring.*

Resetting errors

To reset an error turn S17 to off and then on again.

Error	Reset when
OVERVOLTAGE	Battery voltage falls below 33 V
THERMAL CUTBACK	The temperature is within allowed range
THROTTLE FAULT 1, 2	Error has been fixed
LOW BATTERY VOLTAGE	When battery voltage exceeds 16 V

Safety

The regulator is a high-power component. When working on a battery operated vehicle, necessary precautions should be taken. This includes, but is not limited to, correct training, use of eye protectors, avoiding use of lose-fitting clothes, removal of watches and jewellery, and use of insulated tools only.

WARNING!

Risk of short-circuiting.
Remove all watches, jewellery and always use insulated tools only.

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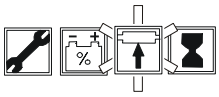
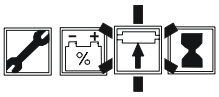
12.8.4 Setting Driver parameters

To change the value of a particular driver parameter carry out the following:

- Switch on the truck and log in with the appropriate PIN-code. This is important if the truck has more than one set of Driver parameters active. Any changes made will only be in effect when that particular “driver” is logged in.
- Select the required parameter using [L1].
- Press Horn button S18.

Parameter symbol flashes.  .

- Set parameter value by repeatedly operating speed control L1 up or down
- Press Horn button S18 once to confirm the new setting.

Parameters symbol lights. (stops flashing). 

- Switch off the truck by pressing  on the keypad

You have now completed a parameter change and the next time you start the truck the new parameter setting will be valid.

For detailed descriptions and effects of these parameters.see the section “12.8.6Summary of driver parameters” on page 54

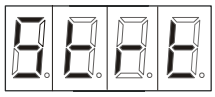
12.8.5 Setting Service parameters

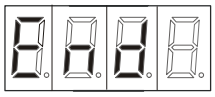
To set any of the Service parameters, a suitable CAN service key must be plugged into the truck’s external CAN connector [X41]. Service parameters are not driver specific. When a CAN service key is plugged in, it is not necessary to enter a PIN-code prior to pressing  on the key pad. Once the CAN service key is plugged in, the procedure is the same as setting Driver parameters.

For detailed descriptions and effects of these parameters see the section “12.8.8Summary of service parameters” on page 56.

NOTE!

Truck handling.
Modifying specific truck parameters will change the driving characteristics of the truck.
Do not change any parameters without the necessary know how.

- Switch off the truck by pressing  on the keypad.
- Press  on the keypad. The display shows 
- With truck's rated load + 100 kg on the forks, lift the forks above the initial lift height.
- Press and hold depressed the horn button [S18].

The calibration sequence will now commence. The lift pump motor will start and the forks will lift. During this procedure the system pressure is analysed and the calibrated value is shown on the display. The whole procedure lasts approximately 6 seconds. After the lift pump motor stops the display will show the calibration value for 3 seconds followed by  .

- Release the horn button [S18].

SAFETY NOTE!

Releasing the horn button [S18] before the calibration is complete stops all truck's functions and therefore functions as a "dead man's handle"

- Switch off the truck by pressing  on the keypad.

Press  on the keypad. Automatic max. load calibration is now complete

- Value 4 : Manual calibration of maximum load

SAFETY NOTE!

Under <u>no</u> circumstances shall the maximum load setting be increased above the truck's rated load capacity + 100 kg.

The maximum load can be set manually in this mode without the requirement of a test load on the forks. It is necessary, therefore to establish the correct value to be entered. See Table 32: below

- Select parameter #36 and set its value to 4.
- Switch off the truck by pressing  on the keypad.
- Press  on the keypad. The display shows the present value stored.
- Press the horn button [S18]

Table 36: Configurable option list

Argument #1	Argument #2	Argument #3	Argument #4
Argument #0 = 1: Option button controls Spider output			
0:Spider 0 1:Spider 1	0:Digital out 1 1:Digital out 2 2: Digital out 3 3: Digital out 4	1-6:option button 1-6	Type of function: 0:momentary 1:toggling
Argument #0 = 2:Reduced drive speed controlled by Spider digital input			
0:Spider 0 1:Spider 1	0-7:Digital in 1-8	0-12:reduced speed 40-100% (i.e. 40+5*arg3 e.g. 4: 40+5*4=60%)	0:high speed range 1:low speed range 2: both ranges
Argument #0 = 3:Activate Spider output at certain machine movements			
0:Spider 0 1:Spider 1	0:Digital out 1 1:Digital out 2 2: Digital out 3 3: Digital out 4	To select activating movement, see Table 37:	Output mode: 0: steady on 1: flashing 1Hz 2: flashing 2Hz
Argument #0 = 4:Pull main contactor controlled by Spider digital input			
0:Spider 0 1:Spider 1	0-7:Digital in 1-8	0-30:Hold time 0-30 minutes	Not used
Argument #0 = 5: Lift/Lower controlled by Spider digital inputs			
0:Spider 0 1:Spider 1	0: Lift, digital in 1 Lower, digital in 2 Lower inhibit, in 3 1: Lift, digital in 2 Lower, digital in 3 Lower inhibit, in 4 2: Lift digital in 3 Lower digital in 4 Lower inhibit in 5 3: Lift digital in 4 Lower digital in 5 Lower inhibit in 6 4: Lift digital in 5 Lower digital in 6 Lower inhibit in 7 5: Lift digital in 6 Lower digital in 7 Lower inhibit in 8	0: Lower inhibit disabled 1: Lower inhibit enabled	0: Fork lift/lower 1: Support arm lift/lower
Argument #0 = 6:Lift height restriction with override			
0:Spider 0 1:Spider 1	0-7: Restriction switch at digital in 1-8	1-6: Override, option switch 1-6	Not used

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14-Main lift chain system – 7120

14.1 General

Applies to all machines with a mast.

14.2 Checking the chain setting

The lift chains must be adjusted at regular periods due to stretching, see below. The chain setting is checked during servicing as set out in the maintenance schedule.

Any adjustment is made with the chain mounting bolts.

Adjust the fork height according to C code 7100, 7420, 7700 and 7800 as applicable.

14.3 Chain inspection

The chains are exposed to two types of wear, outline wear and stretching. Wear to the bolts and disc holes is caused by stretching. The chains are also affected by the environment they are used in.

14.3.1 Noise

If lubrication has been insufficient there will be metallic friction on the chain and this will result in noise.

The chain should be replaced.

14.3.2 Surface rust

Surface rust is easy to recognize as the chain will be reddish brown. Deep-seated rust has generally started and the chain has impaired strength.

The chain should be replaced

14.3.3 Rusty links

Fretting corrosion results in a reddish brown powder being visible by the outer discs. It can also appear as if the chain is bleeding when lubricated.

The chain should be replaced.

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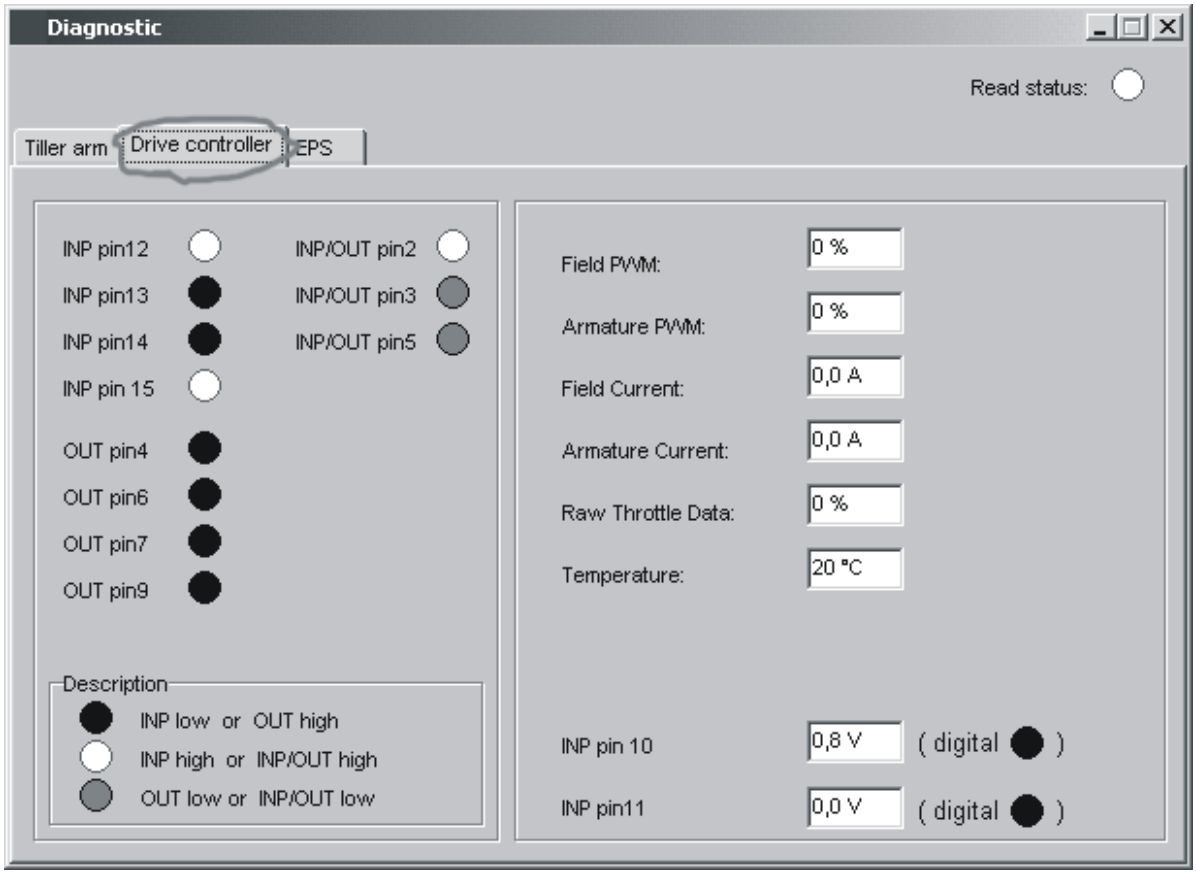
15.3.3 Icons

Icon	Description
	***Node OK*** is shown when contact is made with a node and no errors have been reported.
	***Node not connected*** is shown when there is no contact with a node in the network.
	***Node not OK*** is shown when an error has been reported by a node. Click on node to obtain more information.
	***Program version*** is shown when information is available on which software is installed. Click to obtain more information.
	***Information*** is shown when a node has information on, for example, error codes.
	***Truck report*** See “15.7Truck report function” on page 8
	***Parameters*** is shown when a node has information on a parameter.
	*Diagnostics*
	*Exit*

15.9.3 “Drive Controller” tab



Clicking on the *Drive Controller* tab will display a dialog showing the following:

- Status of digital inputs and outputs of the transistor regulator. *pin* refers to the motor controller pin designations as given in the circuit diagram.
- *Field PWM* - The effective drive output supplied to the field circuit as a percentage.
- *Armature PWM* -The effective drive output supplied to the armature circuit as a percentage
- *Field current* - The current flowing in the field circuit in Amperes.
- *Armature current* -The current flowing in the Armature circuit in Amperes
- *Raw throttle data* - The received speed control signal as a percentage.
- *Temperature* - The temperature of the output stage of the transistor controller in degrees Celcius
- *Inp pin 10* -The input voltage from the pressure sensor *“digital o”* indicates the digital status of the input.
- *Inp pin 11*-The input voltage from the man-on platform sensor. *“digital o”* indicates the digital status of the input