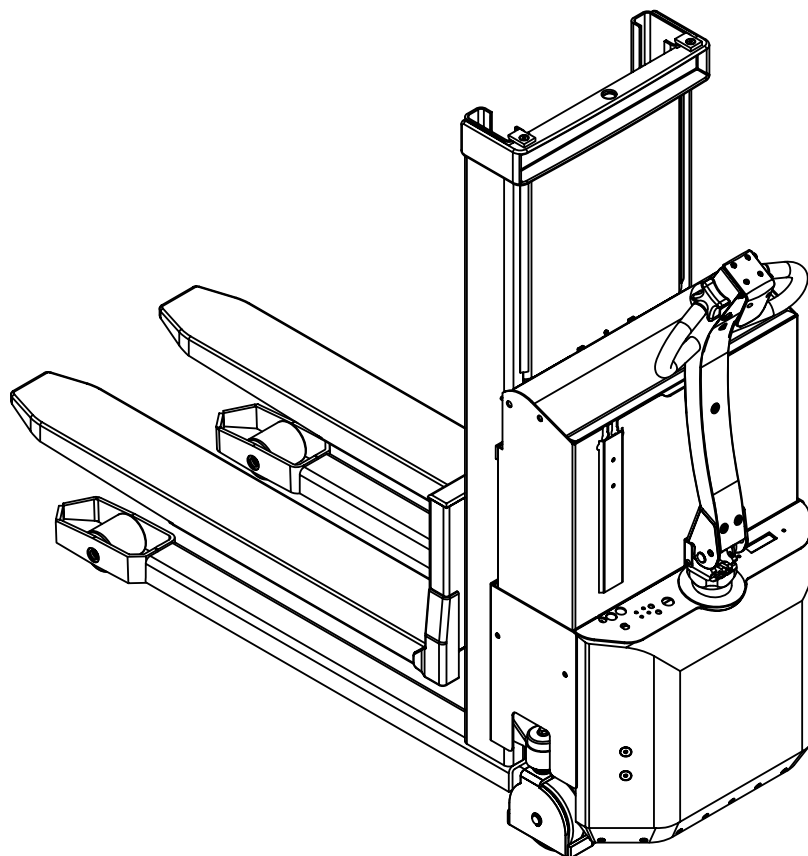
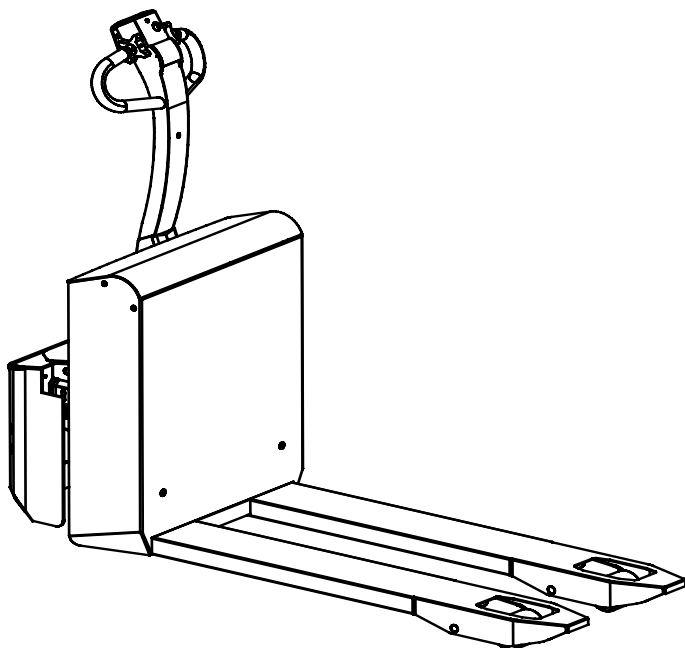


SERVICE MANUAL

- LOGIFLEX SELF 1001
- PANTHER MINI (PM 1400)
- PANTHER MAXI (PM 1800)



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This Service Manual consists of:

- 1) Instruction manual and spare parts list**
- 2) Electric diagrams**
- 3) Hydraulic diagrams**
- 4) Instructions and forms for Service Check**

Logitrans controller

The Logitrans controller is an electronic control unit which uses microprocessor technology and has been developed specially for Logitrans.

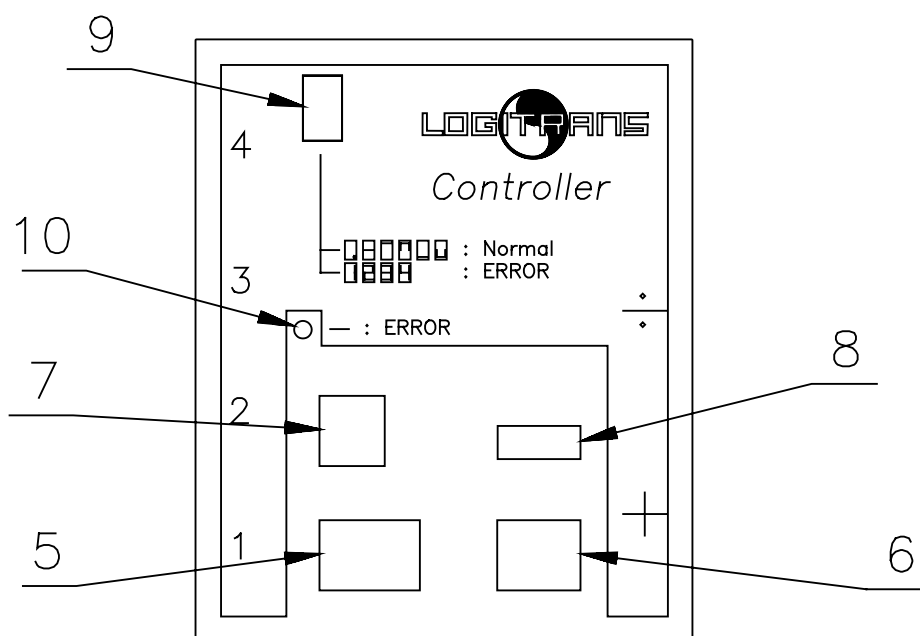
The forward/reverse function is fully electronically controlled by a Power FET system.

The variable speed is controlled by the handle employing two Hall effect units and a magnet.

In this system there are no moving parts. The electronic unit is completely enclosed and therefore unaffected by dust and water.

It is possible to set a range of parameters so that the truck will have the exact characteristics the customer requires. A number of special functions are also available in the controller:

- Battery meter - continuously indicates the residual capacity of the battery.
- Hour meter.
- Counter for the number of battery charging cycles carried out.
- Counter for the number of battery discharges to under 15% of battery capacity that have occurred.



The serial no. of the controller is printed on the side of the box. It can also be read by a PC .
The following connectors are available on the controller:

- + and ÷ Power supply from the battery (through the main relay).
- 1 - 4. Connections to the drive motor, see diagram for cable connections.
- 5. 15-pin socket for diverse connections:
Power supply, raise, lower, main relay, handle position, etc.
- 6. 12-pin socket for the handle cable.
- 7. 9-pin socket, partly used by the display/battery indicator (optional extra), partly for communication with a PC or hand terminal .
- 8. 4-pin socket is connected to the raise/lower functions - can be used for remote control.
- 9. Mini display for displaying operational messages, see ***“Operational messages on the Logitrans controller mini display”***.
- 10. Diode - illuminates to indicate a defective controller which must be sent to the factory for repair.

The table below shows a list of the parameters and values used by the **Logitrans controller** and the equipment needed to read and/or set them.

- A: The values can be read on a display/battery indicator fitted to the truck (Panther MAXI/SELF).
 B: The parameters/values can be set/read by means of a hand terminal.
 C: The parameters/values can be set/read by means of a PC.
 D: The value is factory-set as standard on Panther MINI/MAXI
 E: The value is factory-set as standard on SELF.

Parameter (can be set)	Text in hand terminal	A	B	C	D	E
1 Max. speed	Maximum speed		X	X	100%	100%
2 1st. reduced speed	1. reduced speed		X	X	100%	34,5%
3 2nd. reduced speed	2. reduced speed		X	X	34,5%	34,5%
4 Minimum output				X	9,8%	9,8%
5 Safety forward output				X	49,8%	49,8%
6 Max. current	Maximum current		X	X	200A	200A
7 Acceleration slope	Acc. slope		X	X	1,50s	3,00s
8 Max. temperature				X	74°C	74°C
9 Safety forward time				X	5,0s	5,0s
10 Battery 90%	Battery 90%		X	X	24,14V	24,14V
11 Battery 70%	Battery 70%		X	X	23,84V	23,84V
12 Battery 50%	Battery 50%		X	X	23,54V	23,54V
13 Battery 25%	Battery 25%		X	X	23,24V	23,24V
14 Battery 15%	Battery 15%		X	X	22,95V	22,95V
15 Battery charging voltage				X	27,52V	27,52V
16 A/D start voltage				X	2,35V	2,35V
17 A/D 100% voltage				X	1,82V	1,82V

Value (cannot be set)	Text in hand terminal	A	B	C
18 Total hours	Total hours	X	X	X
19 Subtotal hours	Subtotal hours	X	X	X
20 No of charges	No of charges		X	X
21 No of discharges	No of discharges		X	X
22 Serial no.				X
23 Programme version				X
24 Memory				X
25 Error counters				X
26 Error messages		X		
27 Battery meter		X		

Comments:

1. **Maximum speed** Governs the power directed to the motor in % of maximum power. This leads to a given wheel speed depending on load. 100% is 6 km/h, with no load and on a flat surface.
2. **1st reduced power** Governs the reduced effect sent to the motor. Is not functional when the value is 100%.
This function can be used to set an extra top speed (lower than true top speed) selected and deselected by a switch. When the switch is open the top speed is reduced. When the switch is closed the top speed is equal to the maximum speed as above. The switch must be connected to the positive pin and pin 14 of the 15-pin socket (see circuit diagram). The speed available is not proportional to the power used, e.g. 34% is approximately 3 km/h with no load. This parameter is used on SELF to reduce the maximum speed to 3 km/h when the forks are raised higher than 50 cm.
3. **2nd reduced speed** Not used.
4. **Minimum power** The power the truck starts with when the drive grip is turned.
5. **Safety forward power** The maximum power sent to the motor when the safety switch is activated. Acceleration is the same as normal operation (see point 7).
6. **Maximum power** The maximum power sent to the motor upon starting. A reduction of this will give less tractive power.
7. **Acceleration slope** The time difference from no power to full power when the drive grip is turned full extent.
8. **Maximum temperature** The maximum internal temperature of the controller. If this value is reached the controller will shut down. After a short cooling period operations may be resumed.
9. **Safety forward time** The time the vehicle can drive (forwards) when the safety switch is activated.
10. **Battery 90%** The voltage of the battery when 90% charged. The controller loads the battery and measures in fractions of a second when the truck starts to move.
11. **Battery 70%** As above.
12. **Battery 50%** As above.
13. **Battery 25%** As above.
14. **Battery 15%** As above.
15. **Battery charg. voltage** When this voltage is exceeded, the counter "No. of charges" increases by one (see point 20). At the same time, the "subtotal counter" is zeroed (see point 19).
16. **A/D start voltage** The voltage given by the Hall effect units to start moving.

17. *A/D 100% voltage* The voltage given by the Hall effect units to enable maximum power (but see points 1, 2 and 3).
18. *Total hours* Total controller hours.
19. *Subtotal hours* Hours operated since last battery charge (see point 15).
20. *Number of charges* Measures the number of charges by counting how many times the voltage exceeds the voltage “Battery charging voltage” (see point 15).
21. *Number of discharges* Measures how many times the voltage falls below the voltage given by “Battery 15%” (see point 14).
22. *Serial No.* The controller serial No. - for factory use only.
23. *Program version* The controller program version No. - for factory use only.
24. *Memory* The controller memory No. - for factory use only.
25. *Error counters* The following event counters can be seen in the PC program.

Current limiter forwards/current limiter reverse:

Counts the number of times the maximum current for operations forwards/reverse has been exceeded, i.e. the controller has been overloaded. This has error message No. 3 in the mini display and error messages No. 30 and 31 in the display, see point 26.

Error on Hall units:

Connection to handle is incorrect.

This has error message No. 1 in the mini display and error messages No. 10 - 14 in the display.

Error in hour counter:

For factory use only.

Overheated:

Counts the number of times the maximum temperature has been exceeded, i.e. the controller has been overloaded. This has error message No. 4 in the mini display and error message No. 40 in the display.

Extra counter 1/extra counter 2: Not used.

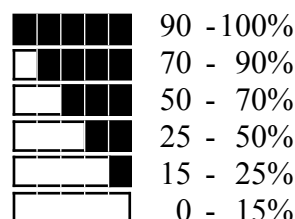
26. *Error messages* See “Logitrans controller display.”
27. *Battery meter* Indicates on the display/battery indicator the charge state of the battery depending on the settings of the parameters in points 10 - 14:

Total Sub: batt:
00005 01,2

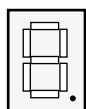
18

19

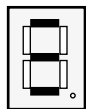
27



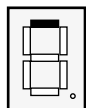
Operating messages in mini-display for Logitrans Controller



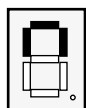
Standby



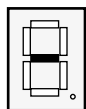
PC program connected



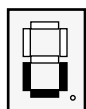
100% FORWARD



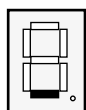
Regulated FORWARD



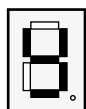
Handle tilted. Control ready to operate.



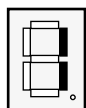
Regulated reverse



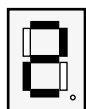
100% reverse



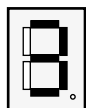
Safety forward is activated (belly switch)



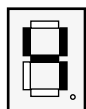
Hall inputs defective : There can be a lead defect. Check that the message is displayed even when the battery current is too low.



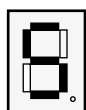
Memory fault : Check the operating parameters with the PC program.



Motor protector, current limitation: Motor overloaded. After a short pause, operation can be restarted. If appropriate, check the parameter **Maximum current** in the PC program.



Motor control overhear : Motor overloaded. After a pause of a few minutes, operation can be restarted. If appropriate, check the operating parameter **Maximum temp** in the PC program.



Motor control defective : Replace.



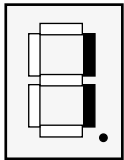
Motor control defective : Replace.

Controller - error

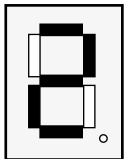
Error on controller:

Error on the display:

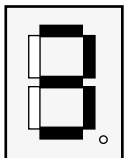
Cause:



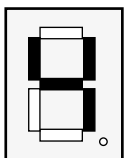
- 10. Hall_forward input
- 11. Hall_forward
- 12. Hall_reserve input
- 13. Hall_reserve
- 14. Hall forward and reserve



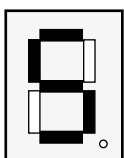
- 20. Memory
- 21. Memory
- 22. Memory



- 30. Power system for forward
- 31. Power system for reverse



- 40. Motor control temp.



- 50. Defective motor control

All faults can be caused by a discharged battery.

Display on Logitrans Controller

Operating messages appear on a display that is connected to the controller (Panther MAXI, SELF). The messages are more specifically concerned with controller faults.

On Panther MINI a hand terminal has to be connected to the controller to show the operating messages.

The display shows **Fault counter No. XX** in the bottom line when a fault occurs.

The significance of these numbers is as follows:

Fault counter No.

10. Hall_forward input

Input lead OK. Chassis lead or PCB in handle can be defective.

11. Hall_forward

Lead to Hall_forward input or +5 volt to Hall_PCB can be defective.

12. Hall_reverse input

Input lead OK. Chassis lead or PCB in handle can be defective.

The error 12 arises in the one driving direction, if the magnet in the circuit board for handle is placed wrongly.

13. Hall_reverse

Lead to Hall_reverse input or +5 volt Hall_PCB can be defective.

14. Hall forward and reverse

Lead to +5 volt for Hall_PCB can be defective.

Error code 14 or 31 is in 95% of the cases caused by the battery or a bad connection.

A: Make sure that the battery is fully charged by measuring an acid density of 1.28 kg/l. with an acidometer (discharged at 1.13 kg/l). When you check the acid level of each battery cell, you also have to check that the acid level does not vary more than 0.04 kg/l, because this error could be caused by one bad battery cell. If the difference is more than 0.04 kg/l in one battery cell, the cell is defect. The capacity on a maintenance free battery has to be measured with a highload tester.

B: This fault could also be caused by a bad or lose connection to the battery. Check the cables and the connections. All cables must be intact. On the tubular cells all the small cables between the battery cells must be cleaned for verdigris and tightened with 23 Nm. Check that the cable connections from the battery to the truck is tightened.

C. If this does not remove the error 14, the source of error is the circuit board for handle or the wire connection to the circuit board.

20, 21 and 22 Memory

Error 2 is a fault in the eeprom (memory) in the controller.

Error 2 is often caused by a deep discharged battery, where the controller drops out with an error 14 because of the low voltage. If this happens during a write process in the controller, where drive hours etc. are being stored, the error 2 will occur.

Other fault causes:

- not all legs inside the multi plugs connected to the controller is at equal height
- a broken battery indicator house. Water could make corrosion on the electrical print
- a squeezed wire to the battery indicator

To repair the controller, reset it by removing the 5 A fuse. After 2 minutes insert the fuse again and see, if the error code 2 has been reset. If the fault is not reset, the controller will have to be replaced or repaired. Repair is only possible in Logitrans DK.

To avoid this deep-discharged battery on trucks delivered before 28 November 2007 (serial no. 074E24051530), please set the controller parameter "2nd reduced speed" to 34,5%. This will reduce the speed, when the battery is 85% discharged.

30. Power system for forward

This fault can also occur if more current is to be transferred to the motor than specified in the operating parameter **Maximum current**. If the fault repeats itself, contact Logitrans.

31. Power system for reverse

As above. Please also see the error description under "error 14".

40. Temperature error on the controller

This error code should only arise, if the temperature inside the controller exceeds 74°. The error will normally disappear, as soon as the temperature drops. If the error code does not disappear by itself, reset the controller by removing the 5 A (7,5 A) fuse.

50. Defective controller

Error code 5 indicates a short circuit in the controller. In some cases the error diode will be on. Remove the current for the controller by removing the 5 A (7.5 A) control current fuse for 1 minute. Place the fuse again. A defective battery or loose battery cables will also result in error code 5.

If the error code 5 does not disappear, the controller has to be exchanged.

Drive motor

Wheel bandage

It is recommended that the wheel bandage is replaced when it is worn down to less than 5 mm thickness.

Wheel bandage replacement

- Remove motor cables. Note their position - they must be refitted exactly the same.
- Remove the M5 screws which secure the wheel bandage.
- Screw 3 M6 screws into the threaded holes to extract wheel.
- Fit new wheel bandage and O-ring so that the two dowels match the holes.
- Carefully strike the wheel bandage into position and screw in the screws.
- Tighten the screws.
- Fit cables - in the same position as before!

Brake - see drawing on page 13.

- To regulate the braking torque resulting from daily operation, turn screw D.
- Periodically, check clearance C. When it is more than 0.7 mm the brake needs adjustment thus:
 - Loosen 3 screws **A**
 - Adjust 3 screws **B** until C is 0.2 mm
 - Tighten screws **A** while holding screws **B**
 - Check clearance **C**
- When the brake lining has worn to less than 5 mm (E) it must be replaced.
- Under all circumstances, replace the brake lining after 500 hours of operation.
- Check the resistance in the brake coil (especially if the brake is not working):
The resistance between the two leads must be about 25 ohm.
If not, the brake must be replaced.

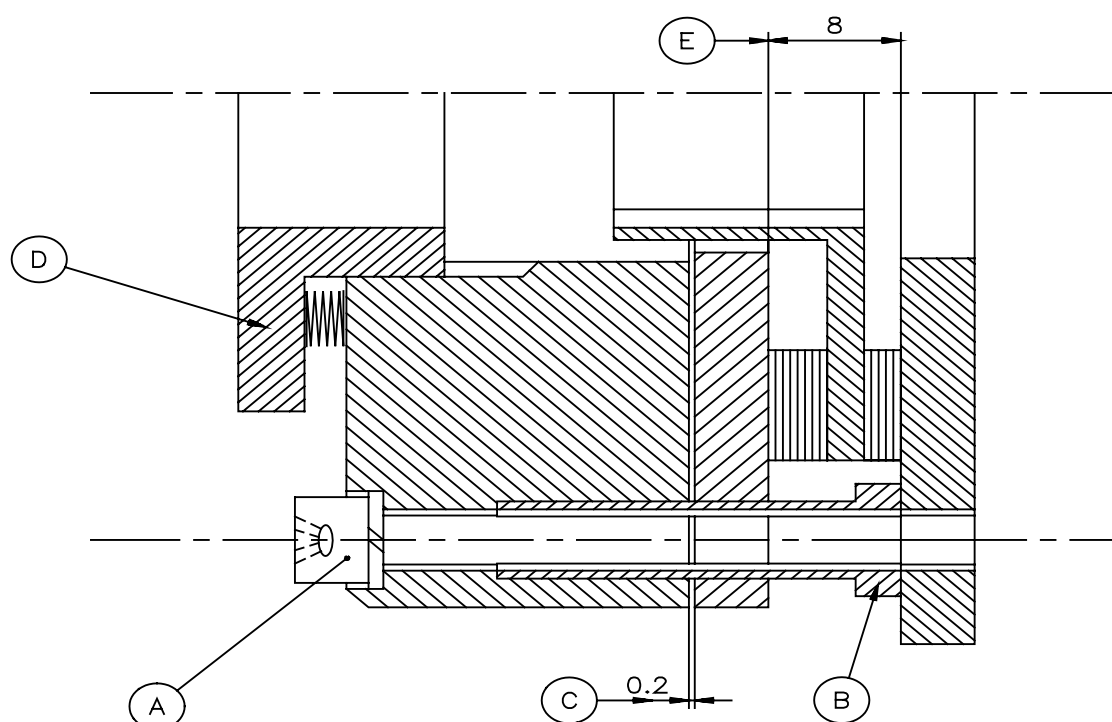
Brushes

- Check the brushes after 250 hours of operation. New brushes are 20 mm long and when more than half this length is worn away, the carbons should be replaced. In any event they should be replaced after 500 hours of operation.

Lubrication

NOTE:

- Normally, grease need not be replenished. Only when the truck has been operating in very warm surroundings, replenishment becomes necessary.
- Grease must be replaced after two years, or not later than after 1000 hours of operation.
- The recommended type of grease is AGIP GR MU/EP1.



Brake on wheel motor

Pump unit

Hydraulic oil

Oil change

Draining of oil

Filling in oil

Oil quantity

Lubrication

Battery

Described in the manual

Brushes in the pump motor

It is not possible to change brushes in the pump motor.

