CONTENTS

0

1. COMPONENTS

1.1 GENERAL

Bulbs

Headlight (main beam)		halogen	70 W
Headlight (dipped beam)		halogen	70 W
Parking light		spherical bulb	5 W
Rear light		spherical bulb	2 x 5 W
Rear fog lamp		spherical bulb	21 W
Reversing light		spherical bulb	21 W
Stop light		spherical bulb	21 W
Direction indicator lamp		spherical bulb	21 W
Marker light		spherical bulb	5 W
Side marker light		special type	3 W
Combilamp:	fog lamp	halogen	70 W
	spotlight	halogen	70 W
Interior lighting		spherical bulb	10 and 21 W
Bunk light		spherical bulb	10 W
Stepwell lighting		spherical bulb	5 W
Marker light		spherical bulb	5 W
Work lamp:	white	halogen lamp	70 W
	yellow	spherical bulb	35 W

Max. current and wire diameter (mm^2)				
Wire diameter	**< 2 m**	**2 - 4 m**	**4 - 8 m**	**> 8 m**
1	9	5	4	
1.5	22.5	13.5	7.5	6
2.5	37.5	22.5	12.5	10
4	60	36	20	16
6	90	54	30	24
10	150	90	50	40
16	240	144	80	64
25	375	225	125	100
35	525	315	175	140
50	750	450	250	200
70	1050	630	350	280
95	1425	855	475	380
120	1800	1080	600	480

0

Alternator

NCB1

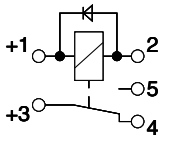
Max. current	80 A
Rated voltage	28 V

NCB2

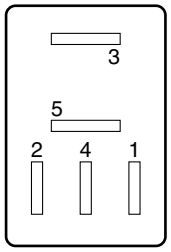
Max. current	100 A
Rated voltage	28 V

Micro relay

Maximum cut in current making connection between points 3 and 5:	10 A
Maximum cut out current breaking connection between points 3 and 4:	5 A



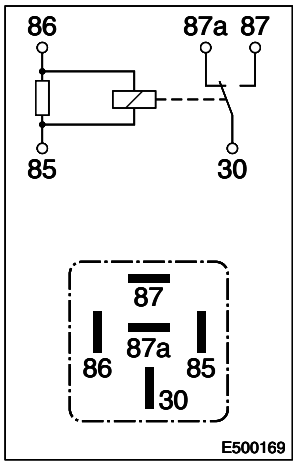
E500146



E500147

Mini relay

Maximum cut in current making connection between points 30 and 87:	20 A
Maximum cut out current breaking connection between points 30 and 87a:	10 A



E500169

Handheld transmitter CDS

Battery type (2x)	CR1620, 3 V

1.2 TIGHTENING TORQUES

Tightening torques

Drive pulley	80 Nm ± 5 Nm
B+ connection	15 Nm
Chassis earth connection	65 Nm

0

CONTENTS

1

1. FAULT FINDING

The following test equipment and tools can be used to trace faults.

1. The best instrument for this is a digital multimeter. This instrument can be used to measure voltages, currents and resistances avoiding reading errors, and it can be used to trace virtually any faults.
2. Many, but not all, faults are easily traced by means of warning lamps. Failures caused by poor earthing cannot normally be detected by a warning lamp or buzzer.

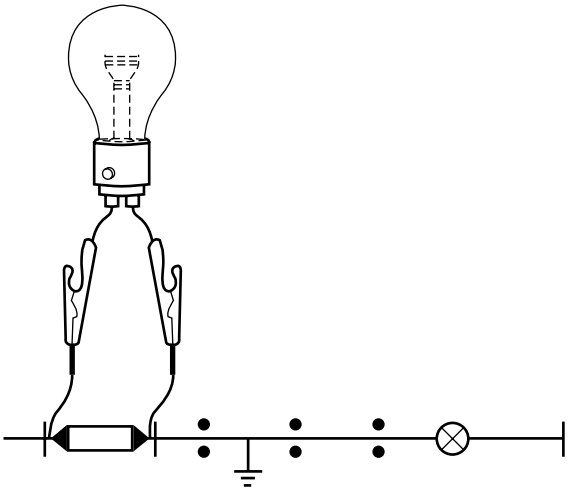
The most frequently occurring faults are:

a. short circuit
b. open circuits
c. earthing problems (poor earthing due to corrosion).

1

1.1 SHORT CIRCUITS

A short circuit is caused by a positive wire shorting to earth somewhere. In most cases this will cause a fuse to blow.
To remedy this failure, use a test lamp of approximately 70W. First check the diagram to see which consumers are connected to the fuse in question, and then switch them all off.
Remove the fuse and connect the test lamp in its place. Now switch each of the consumers on and off one by one. If the lamp comes on very brightly when a consumer is switched on, the fault is almost certainly in the wiring of that consumer. Now check the diagram to see via which connectors the consumer is connected.
Now disconnect the first wiring connection (as seen from the fuse).
If the lamp is still bright, the fault is between the fuse and this wiring connection.

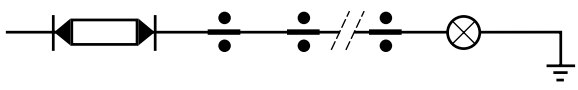


W 5 03 013

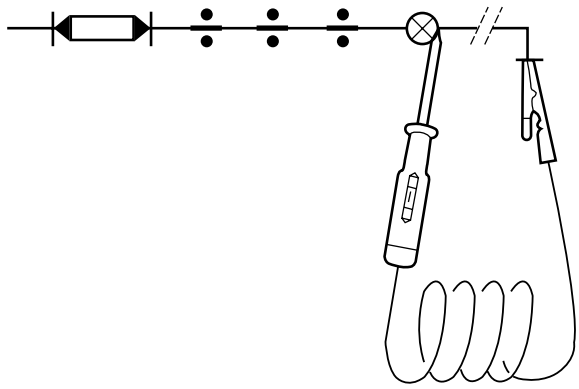
If, however, the lamp goes out, the fault is somewhere further on in the wiring.
Now reconnect the connectors and disconnect the next wiring connection. If the lamp is still bright, the failure is between these two wiring connections.
However, if the lamp goes out again, the fault-finding procedure must be continued.
The faulty wiring section can be found in this way.

1.2 OPEN CIRCUIT

Suppose a consumer is not functioning. The fault may be in the consumer itself, or there may be an open circuit in the wiring.
First switch on the consumer. Then check the consumer for voltage using a test lamp. If no voltage is found, first check whether the fuse is still intact.
If there is voltage at the fuse, check the wiring from the fuse to the consumer. This means every wiring connection must be checked.
Stop at the first wiring connection that has no voltage. The open circuit will be between this connection and the previous one.
However, if there was a voltage at the consumer, there may still be an open circuit in the negative (earth) wiring. Check this using a test lamp.
Ensure that the relevant circuit is switched on.
Connect one end of the test lamp to earth and the other end to the earth connection of the component to be checked.
If the test lamp lights up, the earth connection of the component is interrupted. If the test lamp does **not** light up, the earth connection will in many cases be in good condition.
If both the positive and negative connections are in good order, the consumer in question must be replaced.



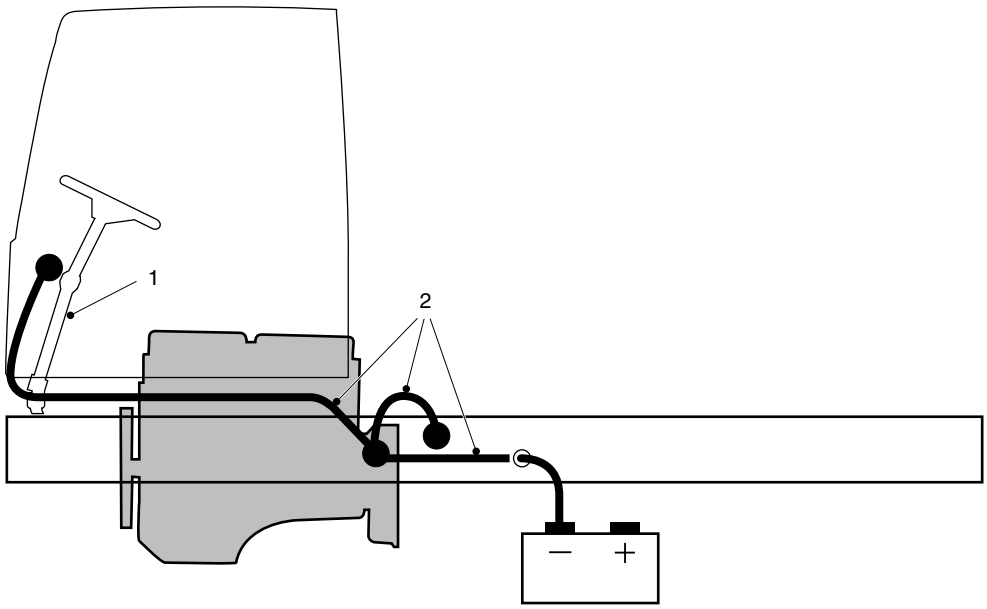
W 5 03 015



W 5 03 016

1.3 EARTHING PROBLEMS

Earthing problems are mainly caused by corrosion between the contact surfaces of electrical connections.
A poor earth connection of the main earth circuit (2) between cab and chassis may result in a current through the steering shaft (1).



E502316

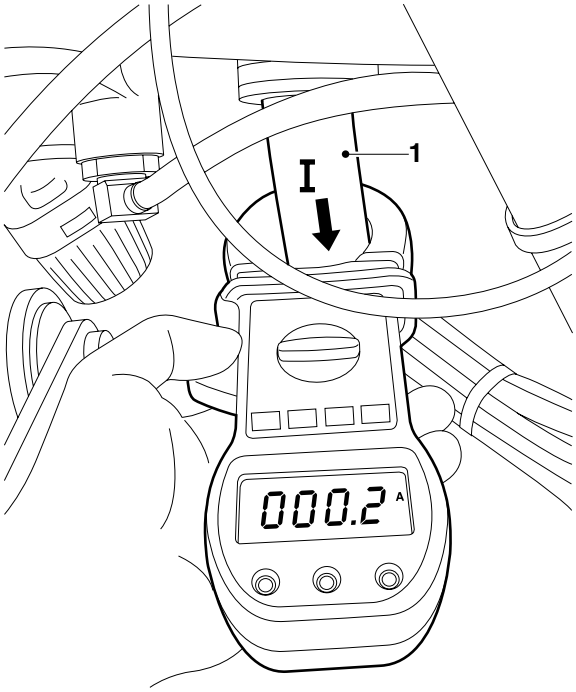
To check this main earth connection, two complementary tests must be carried out.
- A current measurement using a current probe.
- A voltage loss measurement using a multimeter.

A current probe, which is a special tool (DAF no. 1453183), must be used for a current measurement; this measures the current through the steering shaft (1).

The current measurements have to be carried out while the cab is in the driving position.

INSPECTION 1, MEASURING THE SYSTEM CURRENT

1. Open the grille.
2. Switch on vehicle ignition and as many consumers as possible, e.g.:
   - dipped beam
   - heater fan in position 4
   - spotlights, etc.
3. Use the current probe to check whether the power consumption through the battery cable at the battery is between 20 A and 40 A. Switch on extra consumers if this is not the case until the power consumption is between 20 A and 40 A.
4. Then measure the system current through the steering shaft (1) using the probe. Make sure that the current probe is placed in the right position (direction of current) and its jaws are closed around the steering shaft.
5. Depending on the measured current value, the following actions need to be carried out:



E502267

Measured current value	Measures to be taken
< 2.0 A	- The main earth connections are in good order, end of inspection 1. Continue with inspection 2.
≥ 2.0 A and < 5.0 A	- Inspect - and if necessary repair - all main earth connections from the cab to the negative battery terminal between the following points: - battery earth and cab earth - cab earth and flywheel housing earth - flywheel housing earth and chassis earth - chassis earth and battery earth **Note:** A voltage loss measurement must be carried out to identify which earthing point is in poor condition. This measurement is described later on in this procedure. - The current value through the steering shaft must be less than 2.0 A after repair. Otherwise one or more earth connections are not yet in good order and the main earth connections must be inspected again and if necessary repaired. - If the current value is < 2.0 A, the main earth connections are in good order: end of inspection 1. Continue with inspection 2.
≥ 5.0 A	- Inspect - and if necessary repair - all main earth connections from the cab to the negative battery terminal between the following points: - battery earth and cab earth - cab earth and flywheel housing earth - flywheel housing earth and chassis earth - chassis earth and battery earth **Note:** A voltage loss measurement must be carried out to identify which earthing point is in poor condition. This measurement is described later on in this procedure. - The current value through the steering shaft must be less than 2.0 A after repair. Otherwise one or more main earth connections are not yet in good order and the earth connections must be inspected again and if necessary repaired. - If the current value is < 2.0 A, the earth connections are in good order. **Note:** A high current through the steering shaft can affect the mechanical condition of the steering shaft bearing.

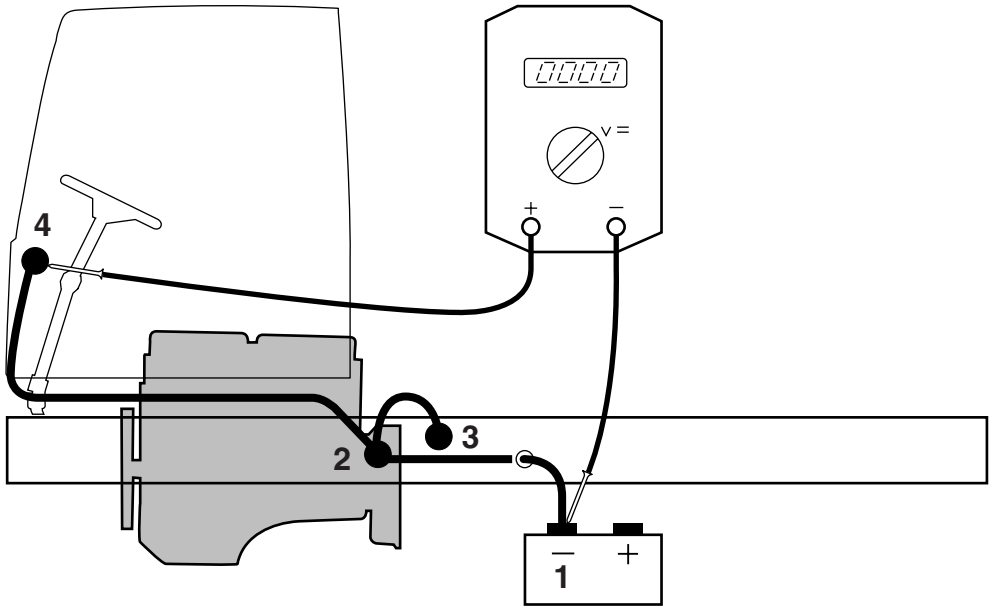
INSPECTION 2, MEASURING THE STARTING CURRENT

Measure the starting current through the steering shaft while starting, using the current probe.
This measurement must be carried out with the probe's "Max Hold" function. Make sure that the current probe is placed in the right position (direction of current) and its jaws are closed around the steering shaft.

Measured current value	Measures to be taken
< 5.0 A	- Main earth connections are in good condition; end of inspection 2: vehicle is OK.
≥ 5.0 A	- Inspect - and if necessary repair - all main earth connections from the cab to the negative battery terminal between the following points: - battery earth and cab earth - cab earth and flywheel housing earth - flywheel housing earth and chassis earth - chassis earth and battery earth **Note:** A voltage loss measurement must be carried out to identify which earthing point is in poor condition. This measurement is described later on in this procedure. - The starting current value through the steering shaft must be less than 5.0 A after repair. Otherwise one or more main earth connections are not yet in good order and the main earth connections must be inspected again and if necessary repaired. - If the current value is < 5.0 A, the earth connections are in good order; end of inspection 2: vehicle is OK.

1

MEASURING VOLTAGE LOSS



E502269

1 negative battery terminal
2 flywheel housing
3 chassis
4 bulkhead lead-through connector

To find out whether a specific earthing point has a good earth connection, measure the voltage loss between the negative battery terminal and this earthing point.

The figure shown is an example; the actual course of the earth connection may differ somewhat depending on vehicle type and production date.
The consumers that were switched when the current was measured should now be switched on as well, i.e. the power consumption should be between 20 A and 40 A.
If the earth connection is good, the voltage loss should be less than 0.5 V.

2. BATTERIES

2.1 FAULT-FINDING TABLE

SYMPTOM: NEW BATTERY HEATS UP CONSIDERABLY DURING FILLING	
Possible cause	**Remedy**
Inadequate formation because of storage in unsuitable or damp conditions over a long period	Allow to cool Charge fully Check the relative density

SYMPTOM: BATTERY ACID LEAKING FROM THE PLUG HOLES	
Possible cause	**Remedy**
Battery overfilled	Siphon off some of the fluid
Overcharging	Check the charger and repair if necessary

SYMPTOM: ELECTROLYTE LEVEL TOO LOW	
Possible cause	**Remedy**
Leaking battery	Replace the battery
Excessive gas development due to charging current being set too high	Check/repair the charger

SYMPTOM: RELATIVE DENSITY TOO LOW (<1.240) STARTING TROUBLE	
Possible cause	**Remedy**
Power consumer left on by mistake	Charge the battery
Insufficient charging	Check/repair the charger
Short circuit in the charging circuit	Check the charging circuit

SYMPTOM: DENSITY IS TOO HIGH (>1.290)	
Possible cause	**Remedy**
Topped up with acid instead of distilled water	Siphon off the fluid and fill with distilled water If necessary, repeat this after mixing (charging)

1

SYMPTOM: STARTING TROUBLE POOR STARTING TEST RESULT POWER FAILS UNDER LOAD	
Possible cause	**Remedy**
- Discharged battery	Charge the battery
- Worn battery (plates corroded and worn away)	Replace the battery
- Defective battery (“dead cell”)	Replace the battery
- Battery too small	Replace with battery of a higher capacity
- Battery sulphated (plates have hardened)	Replace the battery

SYMPTOM: BURNT-IN BATTERY TERMINALS	
Possible cause	**Remedy**
- Clamps not securely fitted, or poor contact	Have the battery terminals repaired, fit the clamps properly or replace the clamps if necessary

SYMPTOM: 1 OR 2 CELLS BUBBLE EXCESSIVELY UNDER HIGH LOADS (STARTING OR STARTING TEST)	
Possible cause	**Remedy**
- Defective cells	Replace the battery
- Leaking cell partition	Replace the battery

SYMPTOM: BATTERY DISCHARGES VERY FAST (DOES NOT RETAIN POWER)	
Possible cause	**Remedy**
- Insufficient charging	Check the charging. Is the charging time (driving time) sufficient?
- Short circuit in charging circuit	Check the charging circuit
- Major self-discharging, for example due to contamination	Clean the battery
- Battery sulphated (on examining the plates, they are found to be hard and, in some cases, whitened)	Replace the battery

SYMPTOM: SHORT BATTERY LIFE	
Possible cause	**Remedy**
- Wrong type of battery chosen (for example in the case of tail lifts)	Install Super Heavy Duty or semi-traction battery
- Often too deeply discharged	Intermediate charging with rectifier
- No recharging after deep discharge (white deposits)	Always charge the battery after deep discharge