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1. COMPONENTS**1.1 GENERAL****BULBS**

Dipped beam light	70 W
Main beam light	70 W
Parking light	5 W
Rear light	10 W
Rear fog light	21 W
Reversing light	21 W
Stop light	21 W
Direction indicator lamp	21 W
Front fog light	70 W
Front spot lights	70 W
Interior lighting	10 - 21 W
Bunk lamp	21 W
Stepwell lighting	5 W
Marker light	5 W

Max. current and wire diameter (mm ²)				
Wire diameter	Up to 2 m	2 - 4 m	4 - 8 m	From 8 m
0.5	3	1.5	0.5	
1	9	5	4	
1.5	22.5	13.5	7.5	6
2.0	30	17	10	8
2.5	37.5	22.5	12.5	10
3.0	47	27	16	13
4	60	36	20	16
4.5	69	43	24	19
6	90	54	30	24
7.5	114	73	40	33
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

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Alternator

NCB1

Max. current 80 A
 Rated voltage 28 V

NCB2

Max. current 100 A
 Rated voltage 28 V

Battery

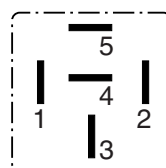
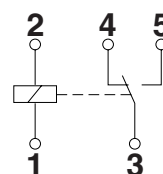
Voltage 12 V
 Max. capacity 128 Ah

Optional:

Voltage 12 V
 Max. capacity 170 Ah

Mini relay (20 A)

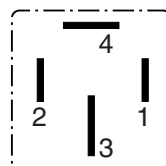
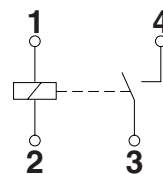
Resistance value of coil approx. 250 Ω
 Measured between points 1 and 2



E501287

Relay (50 A)

Resistance value of coil approx. 175 Ω
 Measured between points 1 and 2



E501288

CDS hand-held transmitters

Battery type (2x) CR1620, 3 V

1.2 TIGHTENING TORQUES

Alternator

Drive pulley
B+ connection

80 Nm \pm 5 Nm
15 Nm

Earth connection

Chassis

35 \pm 10 Nm

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1. BATTERIES

1.1 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 OVERFLOWS, BATTERY ACID SPILLS FROM PLUG HOLES	
Possible cause	Remedy
Battery overfilled	Siphon off some of the fluid
Overcharging	Check charging voltage Check/repair charging circuit

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

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

SYMPTOM: RELATIVE DENSITY TOO HIGH (> 1.290)	
Possible cause	Remedy
Topped up with battery acid instead of distilled water	Siphon off some of the fluid and top up 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 sulphated (plates have hardened)	Replace the battery

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

SYMPTOM: 1 OR 2 CELLS BUBBLE EXCESSIVELY UNDER HIGH LOAD (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 if the vehicle has a tail lift)	Replace with battery of a higher capacity (170 Ah)
Often too deeply discharged	Intermediate charging with rectifier
Not recharged after deep discharge (white deposits)	Always charge the battery after deep discharge
Alternator capacity too low	Use alternator with higher capacity (100 A)

SYMPTOM: THE BATTERY HEATS UP DURING USE AND CONSUMES A LOT OF FLUID	
Possible cause	Remedy
Overloading, or charging voltage too high	Check the charging circuit (voltage regulator)

SYMPTOM: BATTERY HAS EXPLODED	
Possible cause	Remedy
Fire or sparks during or just after charging	Ensure good ventilation and exercise due caution as regards fire and sparks
Short circuit between the battery terminals	Exercise caution when storing conductive material (for example, tools)
Internal defect (loose connection)	Replace the battery

SYMPTOM: DEFECTIVE ALTERNATOR AND/OR DIODES (RADIO AND OTHER POLARITY SENSITIVE EQUIPMENT NOT WORKING)	
Possible cause	Remedy
Reversed battery polarity, or incorrect charging	Discharge the battery and charge in the correct direction Replace the battery and/or alternator if necessary

SYMPTOM: BATTERY HAS NO VOLTAGE	
Possible cause	Remedy
Internal open circuit	Replace the battery
Battery very deeply discharged	Charge the battery and test it; replace if necessary

1.2 SERVICE LIFE

The service life of a battery is significantly shortened if it used “cyclically”.

This means that the batteries are used a lot without their being charged.

For example when using a tail lift, cab heater, microwave oven or cooler box.

This is why batteries in commercial vehicles and vehicles used for international transport often fail prematurely (within 1.5 years).

The battery must be charged whenever the voltage measured across one battery falls below 12.5 V. If the battery is not charged, the “sulphating” process will begin.

This is a chemical reaction in the battery that produces lead sulphate. Lead sulphate adheres to the battery plates and can cause short-circuiting between the plates, reducing the capacity of the battery.

However, most lead sulphate breaks down when the battery is recharged.

If a battery is used (discharged) while it is not being charged by the alternator, short-circuiting between the battery plates will occur sooner.

This reduces the capacity and consequently the service life of the battery.

2. ALTERNATOR

2.1 FAULT-FINDING TABLE

SYMPTOM: ALTERNATOR NOT PRODUCING POWER WHEN IDLING	
Possible cause	Remedy
Open circuit in connection 15 on alternator	Repair connection 15
Connection 15 on alternator short-circuited to earth	Repair connection 15
Internal defect	Replace regulator

SYMPTOM: ALTERNATOR WARNING (YELLOW)	
Possible cause	Remedy
Open circuit in "S" connection	Measure the regulated alternator voltage with as many consumers as possible switched on and with the engine turning above idling speed
Open circuit in "L" connection	Check/repair wiring
Open circuit in connection 15	Increase the engine speed to approx. 1500 rpm. If voltage is now present, check connection 15 on the alternator
Voltage difference between "B+" and "S" connections is greater than 2.5 V	Check all contacts between alternator and B+ (contact resistors) Internal battery resistance too high
Voltage too low < 16 V	Check alternator drive. Check wiring on contact resistors

SYMPTOM: ALTERNATOR VOLTAGE HIGH (RED)	
Possible cause	Remedy
Voltage too high > 31 V	Measure voltage
Internal defect	Replace regulator/alternator

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3. 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 without reading errors and it can be used to trace virtually any faults.
2. The "Multimeter" function of DAVIE XD can be used to carry out all the measurements that can be made with an ordinary, separate multimeter.
3. 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).

3.1 SHORT CIRCUITS

A short circuit is caused by a positive wire shorting somewhere to earth. This can generate a very high current. In most cases this will cause a fuse to blow.

To remedy this failure, use a test lamp of approximately 70 W. First check the diagram to see which consumers are connected to the fuse in question and then switch them all off.

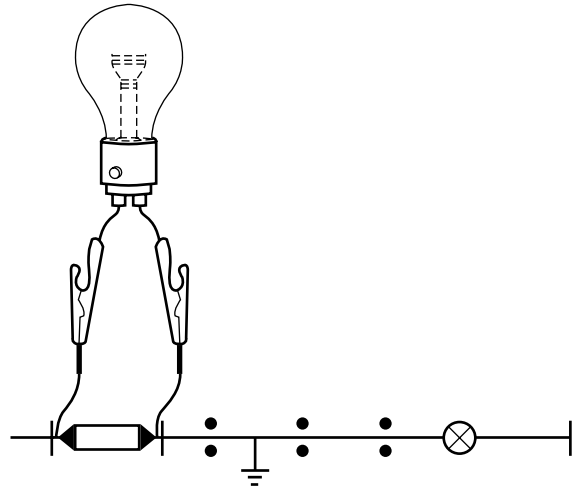
Remove the fuse and connect the test lamp in its place. Now switch each of the consumers on and off one by one. If the lamp comes on very brightly when a consumer is switched on, the fault is almost certainly in the wiring of that consumer. Now check the diagram to see via which connectors the consumer 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.

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.



W 5 03 013

3.2 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.

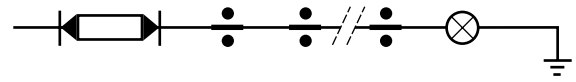
Stop at the first wiring connection that has no voltage. The open circuit will be between this connection and the previous one.

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.

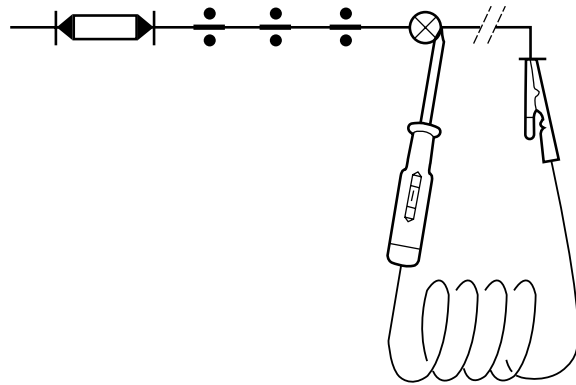
Ensure that the relevant circuit is switched on. Connect one end of the test lamp to earth and the other end to the earth connection of the component to be checked.

If the test lamp comes on, 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

DIAGNOSTICS**5**

Fault finding

LF45/55 series**3.3 EARTHING PROBLEMS**

Earthing problems are mainly caused by corrosion between the contact surfaces of electrical connections.

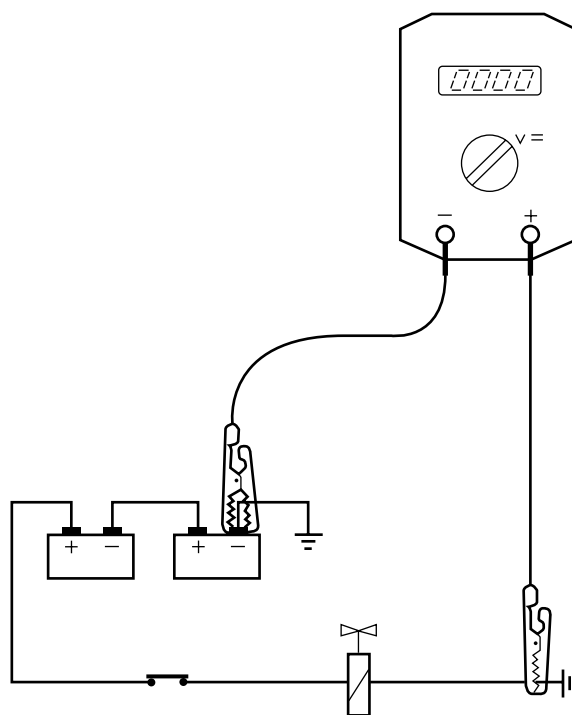
Earthing problems can only be detected using a multimeter (preferably digital). A digital tester is preferable because usually only a few volts will be measured and an analogue meter is generally not precise enough for this purpose. To find out whether a specific earthing point has a good earth connection, use a voltmeter to measure the voltage between the negative battery pole and this earthing point.

Switch on as many consumers as possible. If there is a correct earth connection, **no** voltage should be found.

In practice, however, a loss of approx. 0.5 volts will often be measured.

If the reading is higher, the earth connection must be checked carefully.

In this way, the earth connections of all consumers can be checked and measured.

**1**