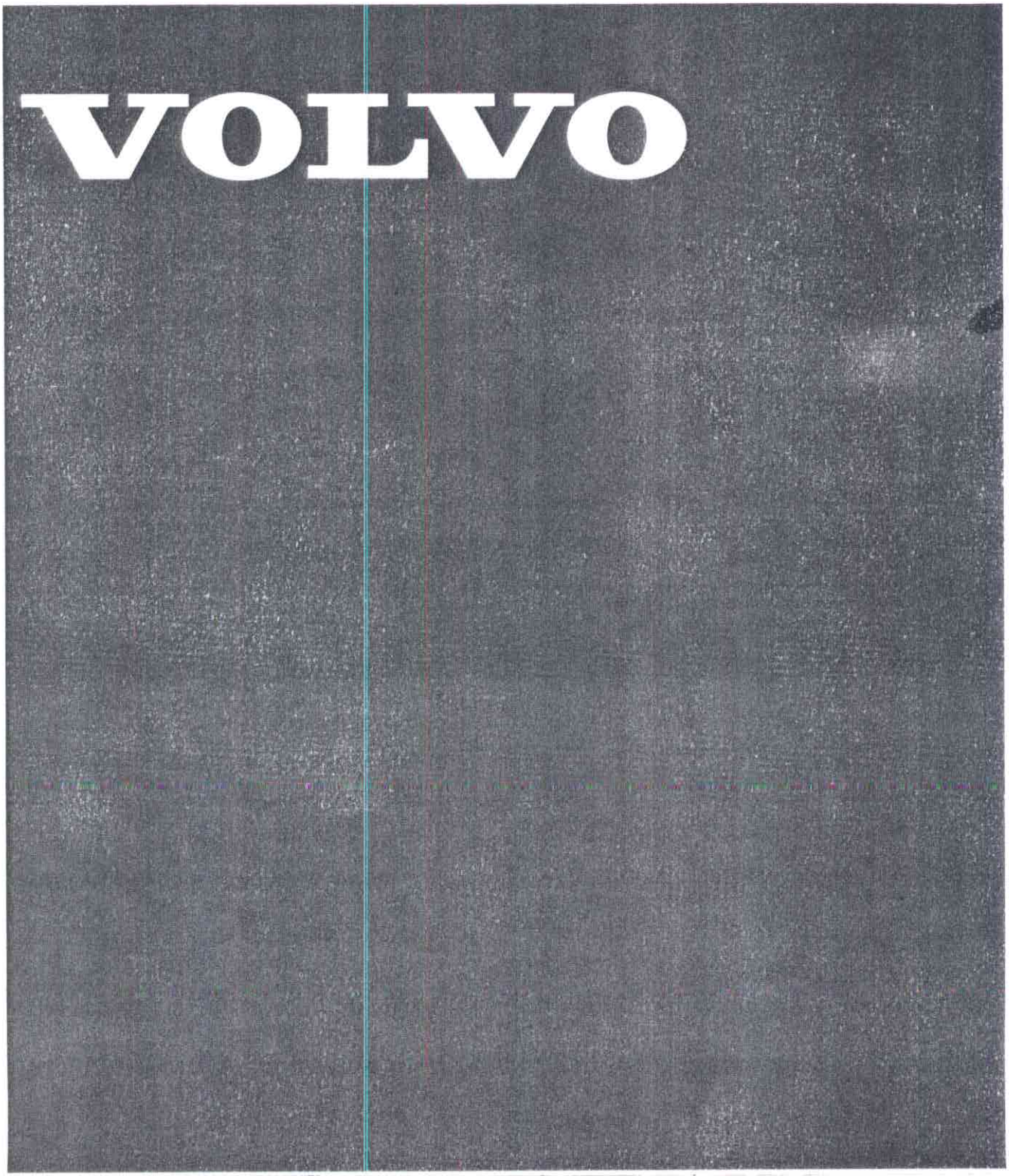
Service Manual

Section 3

Electrical System
C303
CIVIL

Trucks



Contents

Group 30 General

Specifications

Battery

Type	Noack 12H60B or corresponding
Number	One
System voltage	12 V
Capacity	60 Ah
Electrolyte specific gravity:	
Fully charged battery	1.28
When re-charging should be done	1.21
Recommended charging current	6.0 A

Alternator

Type	Bosch 14V/55A 0120400686
Output	770 W
Max. amperage	55 A
Max. speed	200 r/s (12000 r/min)
Direction of rotation	Clockwise
Ratio, engine-alternator	1:1.72
Rotor, resistance	4.0–4.4 ohm
Stator, resistance	0.14–0.15 ohm
Min.-diameter of slip rings	31.5 mm
Maximum permissible radial throw for slip rings	0.03 mm
Max. permissible radial throw for rotor body	0.05 mm
Min. length of brushes	14 mm
Brush spring force	3–4 N
Tightening torque for pulley	40 Nm (4 kgf m = 30 lbf ft)
Output test (at approx. 14 V)	
Alternator should generate min. 25A at alternator speed	25 r/s (1500 r/min)
engine speed	14.5 r/s (870 r/min)
Alternator should generate min. 55A at alternator speed	100 r/s (6000 r/min)
engine speed	58 r/s (3500 r/min)

Charging regulator

Type	Bosch AD 14 V
Control voltage	At 67 alternator r/s (4000 r/min)
Engine speed	39 r/s (2300 r/min)
Cold regulator read off within 30 secs, lower pair of contacts	13.9–14.8 V
Load current (regulated by lower pair of contacts)	28–30 A
Load current (regulated by upper pair of contacts)	3–8 A

Starter motor

Type	Bosch GF 12 V 1.1 Ps
Voltage	12 V
Direction of rotation	Clockwise
Output	Approx. 810 W (1.1 h.p.)
Number of brushes	4
Test values, mechanical	
Rotor end float	0.05–0.3 mm
Brush spring tension	11.5–13.0 N 1.15–1.30 kgf (2.5–3.0 lbf)

Distance from pinion to ring gear	1.2–4.4 mm (0.048–0.173")
Rotor brake frictional torque	0.22–0.40 Nm 2.2–4.0 kgf m (16–30 lbf ft)
Pinion idling torque	0.13–0.18 Nm 1.3–1.8 kgf m (9.5–13.0 lbf ft)
Backlash	0.35–0.50 mm (0.014–0.020")
Minimum diameter of commutator	33 mm (1.3")
Minimum length of brushes	13 mm (0.5)
Test values, electrical (with a battery capacity of 135 Ah)	
Unloaded starter motor 11.5 V and 30–50 A	96.7–130.0 r/s (5800–7800 r/min)
Locked starter motor (rotor) 6 V and 330–420 A	0 r/s
Control solenoid cut-in voltage	Min. 7.5 V

Ignition system

Firing sequence	1-5-3-6-2-4
Ignition timing (vacuum governor disconnected)	10° at 13.3 r/s (800 r/min)
Basic firing position (engine switched off)	10° B.T.D.C.
Spark plugs	W 200 T 35 or corresponding
Spark plugs, electrode gap	0.7–0.8 mm
Spark plugs, tightening torque	35–40 Nm 3.5–4.0 kgf m (26–30 lbf ft)
Ignition coil, condenser	0.45 μF
Spark plug cables, damper resistance at 20°C (68°F)	1000 Ω at distributor 5000 Ω at spark plug

Distributor

Type	PFU 6
Direction of rotation	Anti-clockwise
Cam angle (dwell angle)	39°–45°
Breaker contacts, gap	Min. 0.25 mm (0.010")
contact pressure	5.0–6.3 N (0.5–0.63 kgf = 1–1.4 lbf)

Centrifugal governor

Advance, total		11.5–13.5 distr. degrees
Advance begins at	10.2–12.1 distr. r/s	(610–725 distr. r/min)
Values, 5°	14.3–16.7 distr. r/s	(860–1000 distr. r/min)
10°	26.3–32.9 distr. r/s	(1575–1975 distr. r/min)
Advance, maximum, at	37.5 distr. r/s	(2250 distr. r/min)

Vacuum governor (positive)

Advance, total		4–6 distr. degrees
Advance begins at	10.7–16.0 kPa	(80–120 mm Hg) (3–5")
Values at 2.5 distr. degrees	15.3–21.3 kPa	(115–160 mm Hg) (4.5–6.3")
Advance, maximum, at	23.3–25.3 kPa	(175–190 mm Hg) (7–7.5")

Lighting

Bulbs

	Qty	Output	Socket	Type
Headlamps	2	60/55 W		H 4
Direction indicators	4	23 W	Ba 15 s	
Parking lights	2	4 W	Ba 9 s	
Stop lights	2	23 W	Ba 15 s	
Tail lights	2	10 W	Ba 15 s	
Interior lighting	2	10 W	S 8.5	

Indicator and warning lights

Fullbeams	1	2 W	Ba 9 s
Direction indicators	2	2 W	Ba 9 s
Diff. locks	2	2 W	Ba 9 s
Front-wheel drive	1	2 W	Ba 9 s
Battery charging	1	2 W	Ba 9 s
Oil pressure	1	2 W	Ba 9 s
Brakes	1	2 W	Ba 9 s

Instruments

Speedometer	1	2 W	Ba 9 s
Coolant temperature gauge	1	2 W	Ba 9 s
Fuel gauge	1	2 W	Ba 9 s

Switches

Lights	1	2 W	Ba 7 s
Windscreen wipers	2	2 W	Ba 7 s
Washers	1	2 W	Ba 7 s
Hazard warning lights	1	2 W	Ba 7 s
Headlamp wipers	1	2 W	Ba 7 s

Fuses

Qty	Rated current
18	8 A

ore carrying out any repairs, disconnect the negative lead n the battery.

cables have been coloured in order to facilitate identation.

following cable colours are used:

l	Blue BL	Green GN	Black SB
iite	Brown BN	Yellow Y	Grey GR

en about to do any electrical welding work on the vehicle, connect both battery cables and the cables to the charging ulator. The welding machine should be connected as near possible to where the welding is to take place and on same main component. For example, if the frame is to welded, the welding machine should be earthed to the ne.

ayout wiring diagram has been made for the following ctions:

inction	Group	Illustration
Lighting, instruments and switches	35	
Windscreen headlamp washers (hose routing)	36	
Direction indicators with hazard warning flashers	36	
Windscreen wipers with relay	36	
Windscreen wiper parking	36	
Headlamp wipers	36	
Coolant temperature gauge with sender	38	
Fuel gauge with sender	38	
Engaging front-wheel drive	38	
Engaging vacuum contacts	38	
Warning devices for warning lamp marked "Brake"	38	

onnection designations on various mponents

listing below is to show the association between wire nection and the component terminal designation.

om	To
Group 31	
Battery	30 Starter motor
Starter motor	B+ Alternator
Starter motor	30 Ignition switch

From	To
Group 32	
61 Ignition switch across battery charging warning light	61 Alternator
Group 33	
50 Ignition switch	50 Solenoid, starter motor
Group 34	
15 Ignition switch	15 Ignition coil
75 Ignition switch	Fuses B2, B3, B4 and B5
75 Ignition switch across battery charging warning light	61 Alternator
Group 35	
56 Lighting switch across relay for headlight flashers	56 Step relay
56a Step relay	56a Fullbeams
56b Step relay	56b Dipped beams
58 Lighting switch across relay for parking lights	Fuses A2, A3, A4 and A5
81a Step relay	56a Fullbeams
Group 36	
49a Flasher unit	56 Direction indicator lever
L Direction indicator lever	Left direction indicator
L Switch for hazard warning lights	Left direction indicator
R Direction indicator lever	Right direction indicator
R Switch for hazard warning flashers	Right direction indicator
C Flasher unit	Indicator light, direction indicator
C2 Flasher unit	Indicator light, direction indicator (trailer)
53 Switch for wipers	Headlamp wiper motors and windscreen wiper motors, low speed
53a Switch for wipers	Wiper motors, wipers', parking position
53b Switch for wipers	Windscreen wipers, full speed
53e Switch for wipers	Windscreen wipers, brake coil
31 Wiper motor	Chassis connection
85 Relay coil (possibly via sender)	Chassis connection
86 Relay coil	Battery + (direct or across switch)
87 Relay (possibly via terminal 30)	Consumer
87a Relay	Consumer
30 Battery "+" (direct or across switch)	Relay
30 Relay	Consumer
Group 38	
G Instruments	Senders

Group 31. Battery

Construction and Function

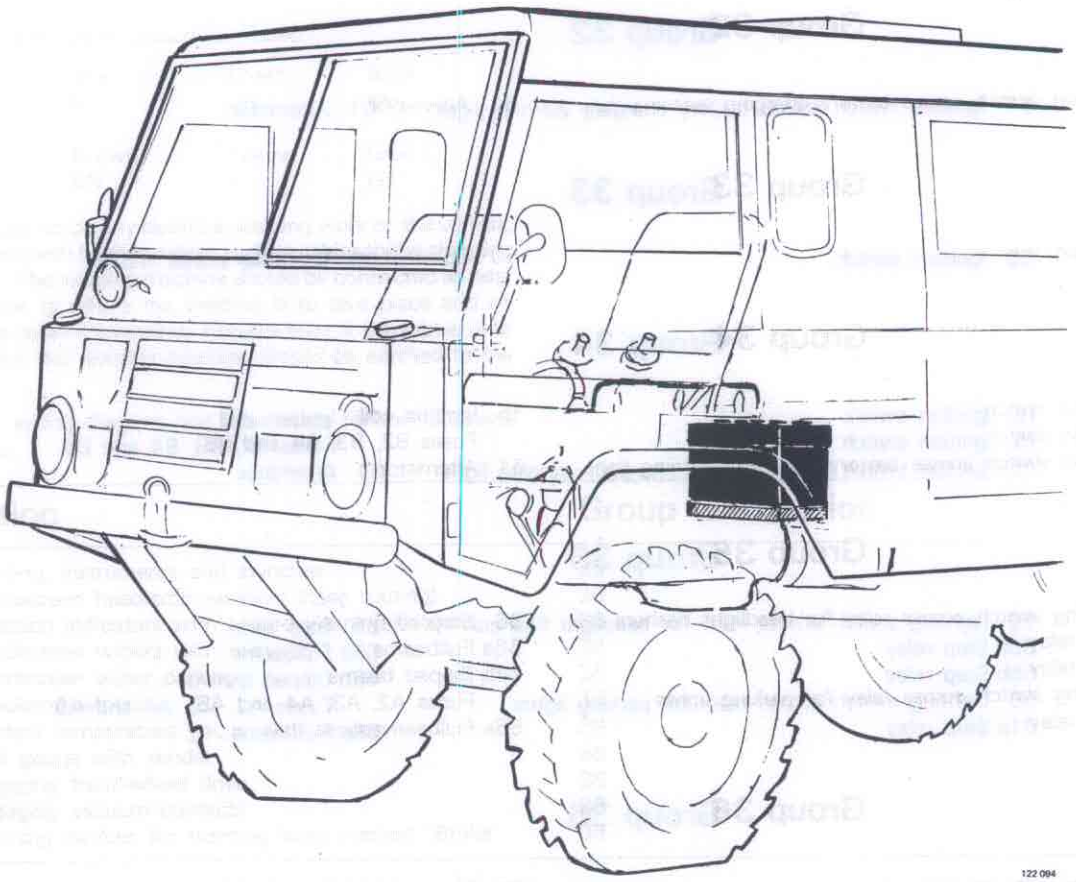


Fig. 31–1. Battery

attery

e battery is situated on the left-hand side, behind the driv-s seat.

consists of a 12-volt lead-type battery with a capacity 60 Ah.

ıe battery negative pole (–) is wired to the vehicle chassis.

apacity

ıe capacity of the battery is given in ampère hours (ab-eviated Ah). When we say that a battery has a capacity twenty hours, we mean that the battery develops, e.g.,) A during 20 hours. It then has a capacity of 60 Ah.

The capacity of a battery depends among other things on its ambient temperature. A low temperature has a negative effect on the capacity. When we indicate the capacity of a battery, we very often mean the capacity at 20°C (68°F).

Capacity differences at different temperatures:

100 % capacity at 20°C (68°F) gives about 55 % capacity at –18°C (0°F)
70 % capacity at 20°C (68°F) gives about 35 % capacity at –18°C (0°F)
40 % capacity at 20°C (68°F) gives about 25 % capacity at –18°C (0°F).

Battery

When replacing the battery, make sure that the new one is connected up with the correct polarity (minus to vehicle chassis).

The battery cables must not be disconnected when the engine is running.

To ensure that the battery operates without any trouble, always maintain the fluid at the prescribed level. Make sure that it is about 5 mm (3/16") above the cell plates. Top-up if necessary with sufficient distilled water. Also make sure that the battery cable shoes are fixed securely. The cable shoes and pole studs should be coated with a light layer of grease, e.g., Bosch Ft 40 V 1 or corresponding.

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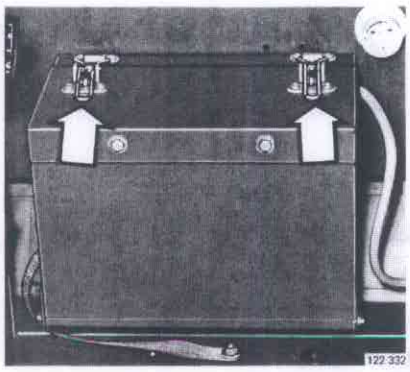
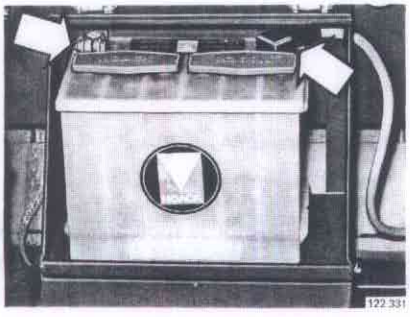
Changing the battery

Removal

1. Unclasp the lock clasps and fold down the cover.



2. Remove the insulation across B+.
3. Disconnect the battery cables from the battery.
4. Remove the battery.



Installation

1. Place the battery in the battery box.
2. Grease the studs and cable shoes with suitable grease, e.g., Bosch Ft 40 V 1 or corresponding.
3. Connect the battery cables to the battery and fit the insulation across B+. Fit the cover over the battery.

Group 32. Alternator

Construction and Function

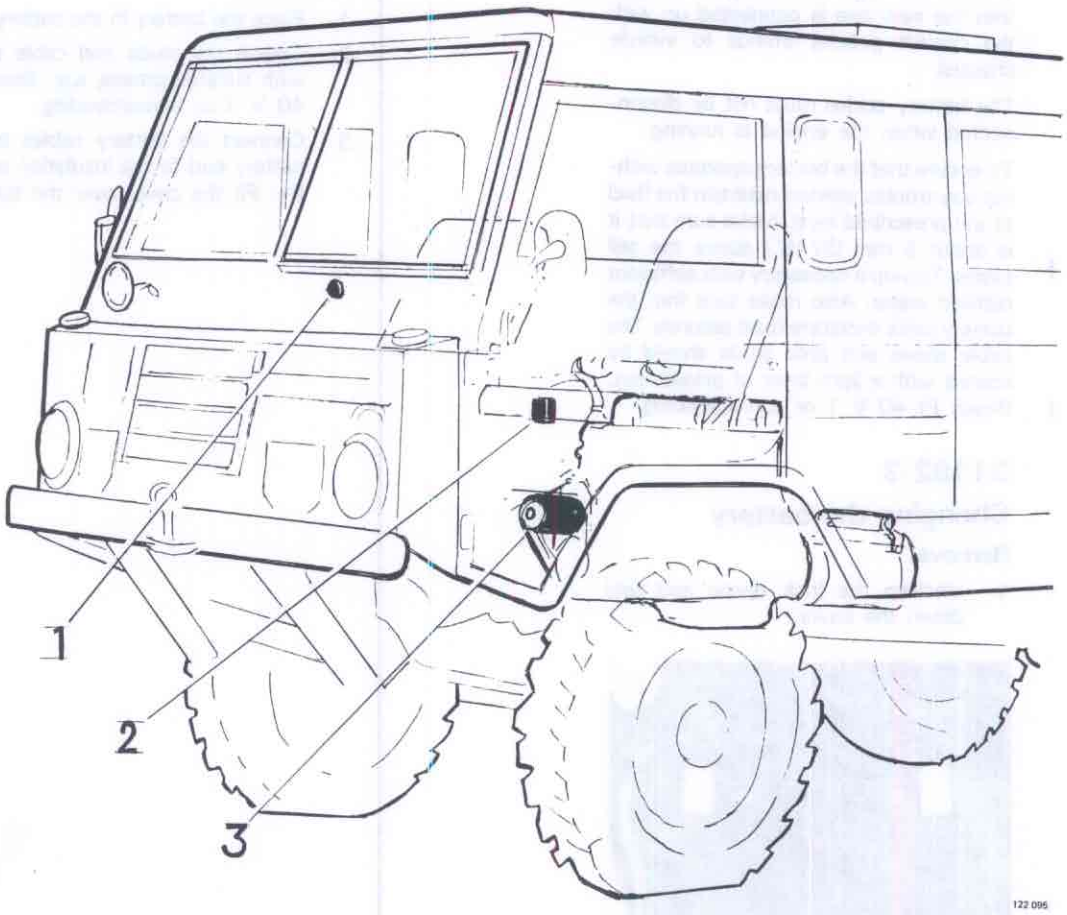


Fig. 32–1. Alternator

1 Battery charging warning light
2 Charging regulator
3 Alternator

ternator

alternator is situated on the right-hand side of the engine is driven by two belts from the crankshaft pulley. The nator develops an output of max. 770 W.

The charging regulator is mounted on the right-hand side of the rear engine casing lock device. The battery charging warning light is on the instrument panel.