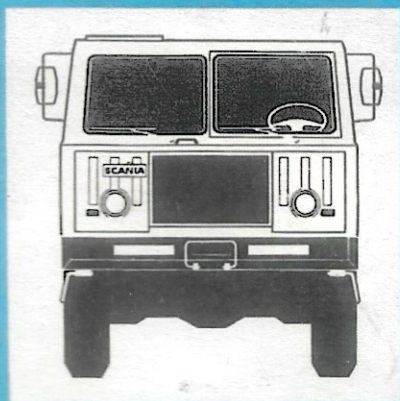


# SCANIA

# SBA 111

# SBAT 111

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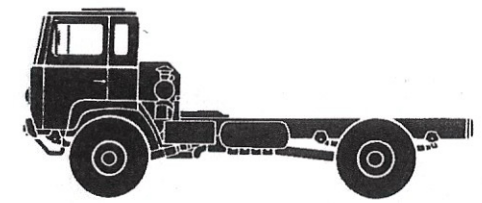
operator's manual

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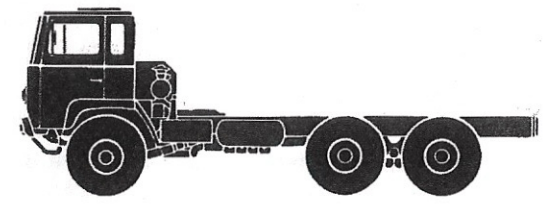


# SCANIA

**SBA 111**



**SBAT 111**



## FOREWORD

This operator's manual describes the truck and its maintenance. If you follow the instructions and use the advice given, the truck will always be in good condition.

The design particulars and specifications in this operator's manual were current at the time of going to press, but since the design of Scania trucks is constantly being improved, we must reserve the right to carry any modifications we consider necessary without prior notice.

Södertälje, February 1977

# SCANIA

Marketing Sector  
Service

## ENTER HERE

Chassis type..... No..... The plate is located on the seat box on the right-hand side. The number is also stamped on the right-hand side member of the frame just behind the front axle.

Engine type..... No..... The plate is located on the engine thermostat housing.

Gearbox type GA 763 No..... The plate is located on top of the gearbox.

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# TECHNICAL SPECIFICATIONS

## INTERNATIONAL UNITS OF MEASUREMENT

Since 1973, Scania have gradually changed to the international SI system for units of measurement (Système International d'Unités). During a transitional period, the units previously used are given in brackets after the SI units. The following units are affected in the Operator's Manual:

**Power** is given in kilowatt (kW) instead of horsepower (hp). 1 kW = 1.36 hp (metric) = 1.34 hp (UK, US).

**Force** is given in newton (N) instead of kilogramme-force (kgf) (kilopond, kp, in some countries) or pound-force (lbf). 10 N = 1.02 kgf = 2.25 lbf.

**Torque** is given in newton metre (Nm) instead of kilogramme-force metre (kgf.m) or pound-force foot (lbf.ft). 10 Nm = 1.02 kgf.m = 7.38 lbf.ft.

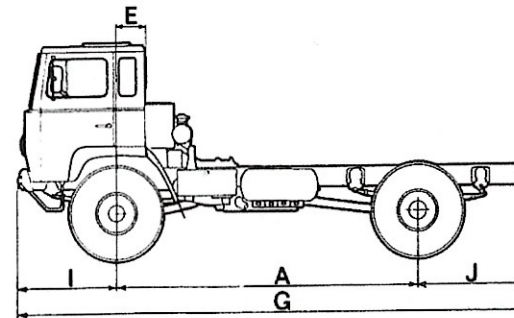
**Volume** is given in cubic decimetre (dm<sup>3</sup>) instead of litre or gallon. 1 dm<sup>3</sup> = 1 litre = 0.220 gal (UK) = 0.264 gal (US).

Pressure should be given in pascal (Pa), but since this unit is very small, it has been agreed that:

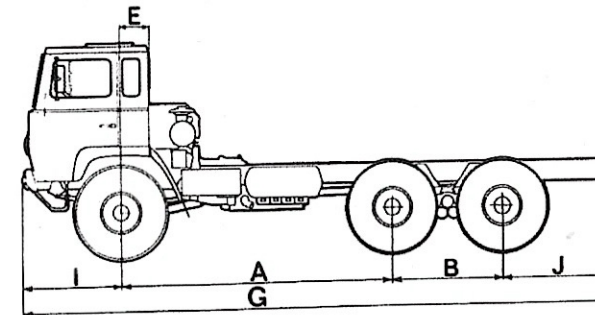
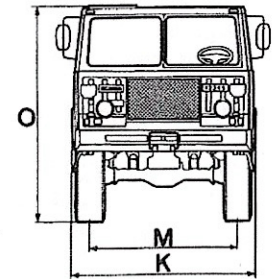
**Pressure** is given in bar instead of kilogramme-force per square centimetre (kgf/cm<sup>2</sup>) or pound-force per square inch (lbf/in<sup>2</sup> or p.s.i.). 1 bar = 1.02 kgf/cm<sup>2</sup> = 14.5 p.s.i. (= 100 000 Pa).

## CHASSIS DIMENSIONS, mm (14.00—20 tyres)

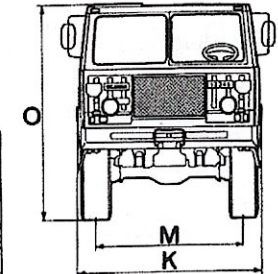
	SBA 111	SBAT 111
Wheelbase.....	A = 4 000	A + B = 3 550 + 1 480
Front overhang .....	I = 1 315	
Rear overhang .....	J = 1 435	
Chassis length .....	G = 6 750	G = 7 780
Chassis width .....	K = 2 475	
Track, front and rear.....	M = 2 020	
Front axle centre to rear edge of cab.....	E = 375	
Height at chassis weight.....	O = 2 840	O = 2 820
Ground clearance at max. axle load		
front .....	410	410
rear .....	410	400
Clearance angle at max. axle load		
front.....		45°
rear.....		38°
Angle of break between wheels at max. axle load.....	142°	136°



SBA 111



SBAT 111



## WEIGHTS, kg

	SBA 111	SBAT 111
Chassis weight, incl. driver and equipment		
front .....	4 620	4 670
rear/bogie .....	1 960	3 610
total .....	6 580	8 280
Max. permissible load		
front axle .....	6 200	5 800
rear axle/bogie .....	7 500	13 200
Gross vehicle weight .....	13 700	19 000
Max. permissible trailer weight .....	6 300	12 000
Max. permissible train weight.....	20 000	31 000

## CAPACITIES, dm<sup>3</sup> (l)

	SBA 111	SBAT 111
Fuel tank .....	167	
Cooling and heating system .....	47	
Container for windscreen and headlamp washers .....	7	

## Oil volumes

Engine .....	
Power steering gear .....	
Gearbox .....	
Hub reduction gear .....	
Central gear .....	
Winch, worm gear .....	
Winch, jaw coupling .....	

<b>SBA 111</b>		<b>SBAT 111</b>
----------------	--	-----------------

21.0
3.81)
32.0
0.62)
4.0
3.5
0.2

## GENERAL PERFORMANCE

Climbing ability .....	
Climbing ability with trailer at gross train weight .....	
Overturning angle, side .....	
Wading depth .....	
Turning circle diameter .....	
Max. speed with gear selector in S position .....	
Max. speed with gear selector in D position .....	

60 %		
28 %		
40 %		
800 mm		
18.0 m		19.0 m
approx. 50 km/h		
approx. 85 km/h		

## ENGINE

Number of cylinders .....	
Cylinder bore .....	
Piston stroke .....	
Piston displacement .....	
Maximum full-load speed .....	
Output at maximum full-load speed as per ISO gross 2534 .....	
Output at maximum full-load speed as per DIN 70020 .....	
Max. torque as per ISO gross 2534 .....	
Max. torque as per DIN 70020 .....	
at a speed of .....	
Compression ratio .....	
Pump setting before TDC .....	
Firing order .....	
Injector opening pressure .....	
Valve clearances, cold engine	
intake .....	
exhaust .....	
Direction of engine rotation viewed from the front .....	
Fuel .....	

<b>D11</b>		<b>DS11</b>
------------	--	-------------

6		
127 mm		
145 mm		
11 dm <sup>3</sup> (l)		
2 200 r/min		
162 kW (220 hp)		221 kW (300 hp)
153 kW (208 hp)		218 kW (296 hp)
795 Nm		1130 Nm
(81 kgf m)		(115 kgf m)
775 Nm		1090 Nm
(79 kgf m)		(111 kgf m)
1 200 r/min		1 300 r/min
23°		20°
16:1		
1-5-3-6-2-4		
205—213 bar (kgf/cm <sup>2</sup> )		
0.35 mm		
0.80 mm		
Clockwise		
Diesel fuel oil <sup>3)</sup>		

## ELECTRICAL SYSTEM

System voltage .....	
Batteries, number .....	
voltage .....	
capacity .....	
earthed pole .....	
Generator type .....	
max. current .....	
Starter motor output .....	
Voltage regulator setting .....	
Fuses .....	

24 V
2
12 V
135 Ah or 152 Ah <sup>1)</sup>
Negative
Alternating current <sup>1)</sup>
35 A or 45 A <sup>1)</sup>
4.4 kW (6 hp)
28 V

8 A, 16 A suspended fuse if a battery heater is provided.  
Automatic cut-out for the circulation pump, if an engine heater circulation pump is provided.

## Bulbs

Headlamps .....			
Parking lights, front .....			
Tail lamps .....			
Stop lights .....			
Riding lights, front edge of cab ...			
Side riding lights <sup>1)</sup> .....			
Direction indicators .....			
Interior lighting in cab .....			
Map-reading lamp .....			
Instrument lighting .....			
Reversing light <sup>1)</sup> .....			
Blackout lighting front <sup>1)</sup> .....			
Blackout lighting, riding lights rear <sup>1)</sup> .....			
Blackout lighting, stop lights <sup>1)</sup> ...			
Indicating lamps,			

Power	Holder	Number of bulbs
-------	--------	-----------------

75/70 W	P43t	2
4 W	BA9s	2
10 W	BA15s	2
21 W	BA15s	2
5 W	SV8.5	2
5 W	SV8.5	2
21 W	BA15s	6
15 W	SV8.5	1
5 W	SV8.5	1
2 W	W2.1 x 9.5d	4
25 W	BA15s	1
15 W	SV8.5	2
3 W	SV5.5	2
3 W	SV5.5	2

central warning .....	}	2 W	W2.1 x 9.5d	1
engine oil pressure ..				
charge .....				
brake pressure .....				
full beam .....				
truck direction				
indicators .....				
trailer direction				
indicators .....				
gearbox oil				
temperature .....				
coolant temperature ..				
engine heater				
circulation pump <sup>1)</sup> ...				
reversing light <sup>1)</sup> ....				

1) Optional extra

1) About 2.5 dm<sup>3</sup> (l) required for an oil change  
2) About 0.4 dm<sup>3</sup> (l) required for an oil change  
3) See this heading

parking brake .....  
interlock valve .....  
driving wheel  
disengagement .....  
differential lock,  
rear axle or axles .....  
differential lock,  
front axle .....  
front wheel drive .....  
battery heating<sup>1)</sup> .....  
central power  
take-off<sup>1)</sup> .....  
winch<sup>1)</sup> .....

Power Holder Number of bulbs

2 W BA9s 1

### POWER TRANSMISSION SYSTEM

Gearbox with transfer box  
type .....

type designation .....

Gear ratios, gearbox ratio<sup>2)</sup>  
hydraulic 1st .....  
hydraulic 2nd .....  
hydraulic 3rd .....  
mechanical 1st .....  
mechanical 2nd .....  
mechanical 3rd .....  
hydraulic reverse .....

Gear ratios, transfer box  
road gear .....  
cross-country gear .....

Central gears, type designation  
front axle .....  
(back) rear axle ....  
front rear axle .....  
ratio .....

Hub reduction, type .....  
ratio .....

	SBA 111	SBAT 111
Fully automatic with manually, electro-pneumatically controlled transfer box		
		GA 763
		6.3:1
		3.6:1
		2.5:1
		1.67:1
		0.94:1
		0.66:1
		6.3:1
		1.60:1
		2.42:1
		RP620
	RP620	RP620
	—	RBP620
		1.353:1
		Planetary
		4.125:1

1) Optional extra

2) The hydraulic ratios are the relationships between the output and input torques.

Winch power take-off, type EGA 763,  
type .....

speed .....

permissible power ...  
direction of rotation ..

Central power take-off, type EGA  
760 (optional extra), type .....

speed .....

permissible power ...  
direction of rotation ..

Front power take-off, type EGA 761  
(optional extra), type .....

speed .....

permissible power at  
1500 r/min,  
continuous .....

direction of rotation ..

### BRAKE SYSTEM

Foot brake, type .....

compressor working  
pressure .....

air receiver capacity ..

Parking brake, type .....

safety valve setting

### STEERING SYSTEM

Steering gear, type .....

### WINCH (Optional extra)

Ratio of worm gear .....

Rope type .....

Rope length .....

Rope diameter .....

Tractive force, outer turn of rope ..

Tractive force, inner turn of rope ..

SBA 111 | SBAT 111

Electro-pneumatically controlled  
jaw coupling  
Approx. 0.7 x engine speed at  
moderate power  
Engine output  
Anti-clockwise, viewed from the  
front

Electro-pneumatically controlled  
jaw coupling  
0.6 x engine speed  
Engine output  
Clockwise, viewed from the front

Permanently engaged  
1.1 x engine speed

26 kW (35 hp)  
Clockwise, viewed from the front

Dual circuit, compressed air,  
direct-acting drum brakes

6.7—8.0 bar (kgf/cm<sup>2</sup>)  
110 dm<sup>3</sup> (l)  
spring brake  
9.8 bar (kgf/cm<sup>2</sup>)

Hydraulic power steering gear

	18:1
199-strand with steel core	
60 m	50 m
17 mm	19 mm
60 kN (6000 kgf)	75 kN ( 7500 kgf)
85 kN (8500 kgf)	100 kN (10000 kgf)

## WHEELS

Tyres sizes .....	14.00—20 or 400/65—26.5/14 <sup>1)</sup>
Rim .....	10.00—20 or 12.00—26.5 with tyre lock <sup>1)</sup>

Air pressure in bar (kgf/cm<sup>2</sup>)

Wheel location	Surface			
	Road	Cross-country	Desert sand	Extremely loose sand (20 km/h max.)
Front	4.5	3.5	2.3	1.7
Rear (SBA111)	5.5	4.5	3.1	2.3
Bogie (SBAT111)	4.7	3.8	2.6	1.9

For mixed driving on roads, rough ground and/or in the desert, the values for cross-country operation are recommended.

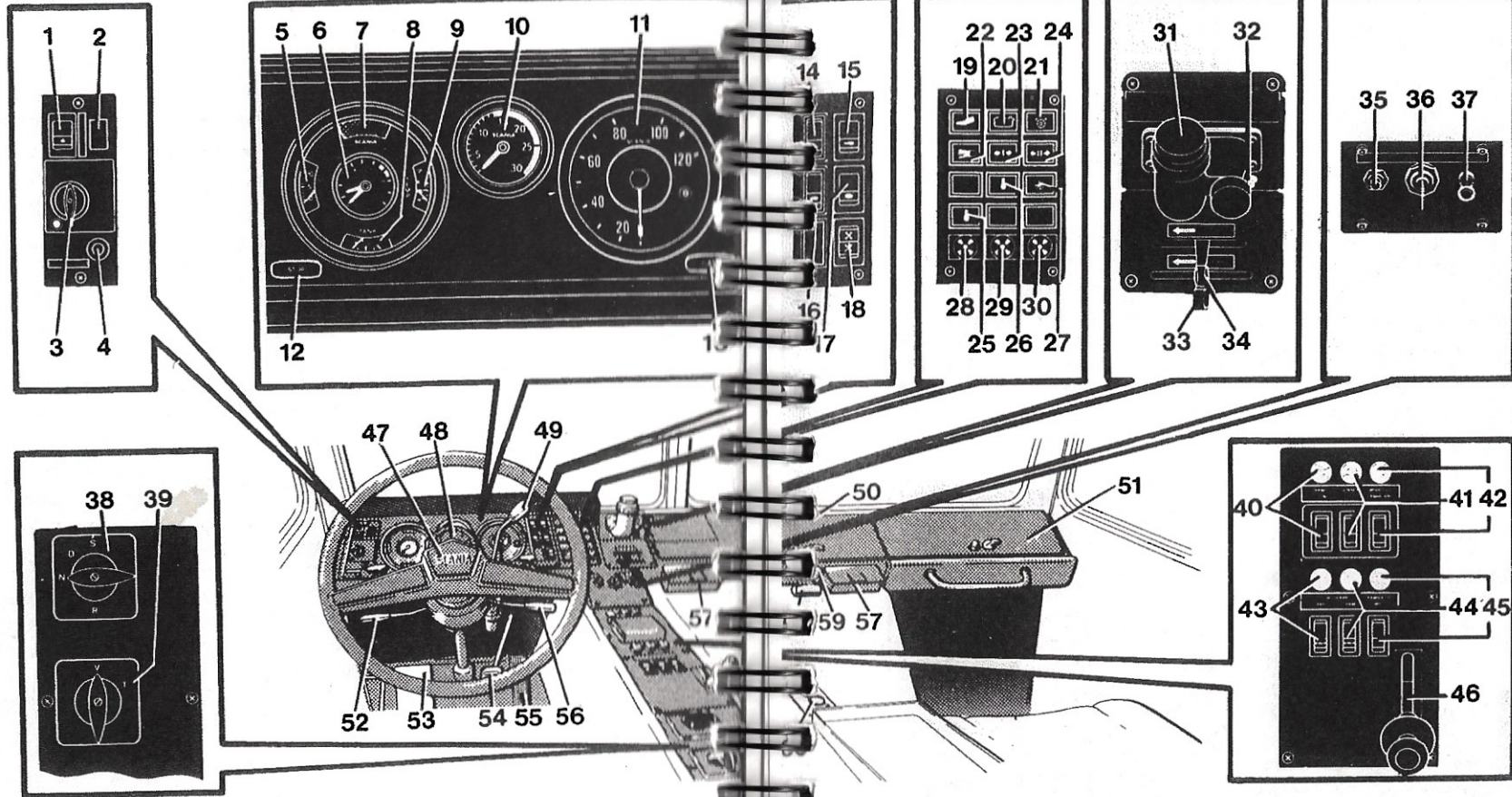
## DIESEL FUEL OIL SPECIFICATION

Characteristics	Requirements	Test method
Solid impurities	no impurities	Visual inspection
Water content	max. 0.05 % by vol.	ASTM D 95
Sediment content	max. 0.01 % by weight	ASTM D 473
Density at +20°C	0.82—0.86 g/cm <sup>3</sup>	ASTM D 1298
Cetane number	45 min.	ASTM D 613
Flash point, Pensky-Martens	+40°C min.	SIS 021811
Viscosity at +20°C	2.0—6 mm <sup>2</sup> /s (cSt)	ASTM D 445
Pour point	summer: —10°C max. winter: —25°C max.	ASTM D 97
Distillation temperatures		
50 % distillate	to be specified	
90 % distillate	+340°C max.	ASTM D 86
Carbon residue		
Ramsbottom (on 10 % residuum)	max. 0.20 % by weight	ASTM D 524
Ash content	max. 0.01 % by weight	ASTM D 482
Sulphur content	max. 0.7 % by weight	ASTM D 1551
Corrosion	max. No. 1 on corrosion scale	ASTM D 130 (3 hours at +100°C)

1) Optional extra

## DESCRIPTION

# Instruments, switches, indicating lamps and controls



- |  |   |   |  |  |  |
|--|---|---|--|--|--|
| 1. Switch for reversing light            | 12. Stop control                              | 22. Ind. lamp for full beam                     | 31. Starting aid injector  | 40. Centr. Power take-off switch and ind. lamp     | 50. Fuse box   |
| 2. Ind. lamp for reversing light         | 13. Hand throttle                             | 23. Ind. lamp for direction indicator           | 32. Automatic cut-out for engine heater circ.                            | 41. Winch power take-off switch and ind. lamp      | 51. Glove compartment  |
| 3. Switch for blackout lighting          | 14. Switch for hazard warning light           | 24. Ind. lamp for trailer direction indicator   | 33. Cab heating control  | 42. Driving wheel disengaging switch and ind. lamp | 52. Direction indicator and full and dipped beam control stalk |
| 4. Socket 24V for inspection lamp        | 15. Switch for instrument lighting            | 25. Ind. lamp for coolant temp.                 | 34. Windscreen defroster control   | 43. Rear axle difflock switch and ind. lamp        | 53. Engine brake and cross-country brake switch                |
| 5. Oil pressure gauge                    | 16. Switch for automatic dipped beam          | 26. Ind. lamp for gearbox oil temp.             | 35. Starter button   | 44. Front axle difflock switch and ind. lamp       | 54. Brake pedal  |
| 6. Brake air pressure gauge              | 17. Switch for engine heater circulation pump | 27. Ind. lamp for engine heater circ. pump      | 36. Switch (contact key) for main power supply, instruments and lighting | 45. Front wheel drive switch and ind. lamp         | 55. Accelerator pedal  |
| 7. Central warning lamp                  | 18. Switch for cab ventilation fan            | 28. Ind. lamp for parking brake                 | 37. Parking brake interlock valve control                                | 46. Parking brake lever                            | 56. Windscreen and headlamp wiper and washer control stalk     |
| 8. Fuel gauge                            | 19. Ind. lamp for engine oil pressure         | 29. Ind. lamp for parking brake interlock valve | 38. Gear selector for gearbox  | 47. Horn   | 57. Ashtray  |
| 9. Coolant temp. gauge                   | 20. Ind. lamp for charge                      | 30. Ind. lamp for battery heater                | 39. Gear selector for transfer box                                       | 48. Wheel angle indicator                          | 58. Document holder  |
| 10. Tachometer                           | 21. Ind. lamp for brake air pressure          |   |  | 49. Trailer brake and winch brake control lever    | 59. Map reading light  |
| 11. Speedometer, odometer and trip meter |   |   |  |  | 60. Radiator blind control                                     |

17-9/118

1. Switch for reversing light  
(Optional extra)

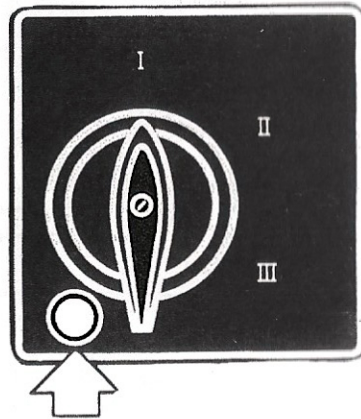


2. Indicating lamp for reversing light

The lamp lights up when the reversing light is switched on.

3. Switch for blackout lighting  
(Optional extra)

To enable the switch to be turned, the latch button at the arrow must be depressed, whilst at the same time turning the knob.



**Position I** The blackout lighting is switched off and the ordinary lighting is switched on.

**Position II** The blackout lighting, interior lighting and ordinary external lights are switched off. The central warning lamp is inoperative. All other indicating and warning lamps are operative.

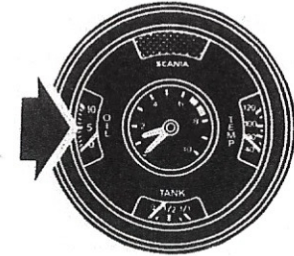
**Position III** The blackout lighting is switched on. The interior lighting and ordinary external lights are switched off. The central warning lamp is inoperative. All other indicating and warning lamps are operative.

4. Socket 24V for inspection lamp

The socket provides 24V when the contact key is depressed or the parking light is on.

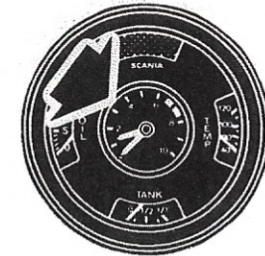
5. Oil pressure gauge

When the engine is warm, the oil pressure should be 6.0—1.5 bar (kgf/cm<sup>2</sup>). If the oil pressure should drop below 1.0 bar (kgf/cm<sup>2</sup>), the indicating lamp for engine oil pressure and the central warning lamp will light up.



6. Brake air pressure gauge

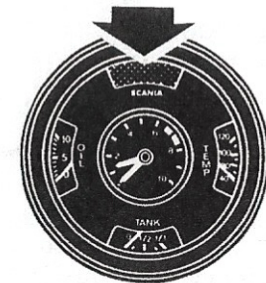
The orange pointer indicates the air pressure in the front circuit, and the white pointer indicates the pressure in the rear circuit. In normal driving, both pointers should be within the green area. The pressure will then be between 6.7 and 8.0 bar (kgf/cm<sup>2</sup>).



7. Central warning lamp

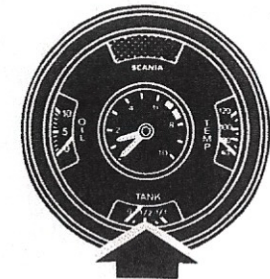
The lamp warns the driver of low oil pressure in the engine, low air pressure in the compressed air system, high coolant temperature, high hydraulic fluid temperature in the gearbox and loss of battery charging. The lamp also flashes when the hazard warning flasher is switched on. The warning lamp for the function which has caused the warning will also light up.

**N.B. Never drive the truck when the central warning lamp is flashing repeatedly.**



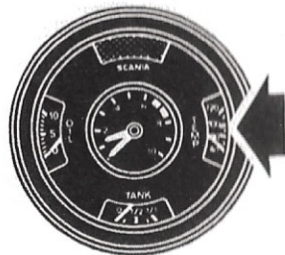
8. Fuel gauge

The pointer indicates the fuel available as a proportion of the total tank capacity. Keep an eye on the gauge and avoid running the tank dry.



### 9. Coolant temperature gauge

The pointer indicates the temperature of the coolant in the engine. The normal operating temperature is 70—90° C.



### 10. Tachometer

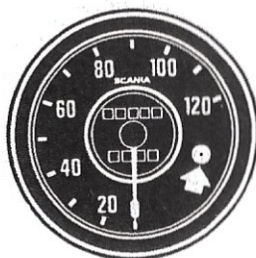
The pointer indicates the engine speed. When driving the truck, the pointer must be within the green area. If the pointer is within the red area, the engine is likely to be damaged by overspeeding.



### 11. Speedometer, odometer and trip meter

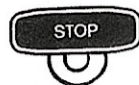
The pointer indicates the road speed in km/h. The upper counter indicates the total distance driven.

The lower counter is a trip meter which can be used to measure individual journeys. The trip meter can be zeroed by means of the arrowed screw.



### 12. Stop control

The engine will be stopped when the handle is pulled out.



### 13. Hand throttle

The engine speed can be controlled manually by means of the hand throttle, in addition to the usual pedal control.



### Switches 14—18

#### 14. Hazard warning light

When the hazard warning light is switched on, all direction indicators and the central warning lamp will flash.



#### 15. Instrument lighting

The instrument lighting is switched on with the interior cab lighting. The brightness of the instrument lighting can be controlled with this switch. The switch has two positions  
upper position: half intensity  
lower position: full intensity



#### 16. Automatic dipped beam

When the switch is on and the main switch is set to 0, the dipped beam and parking light will be switched on automatically as soon as the alternator is charging.

The automatic dipped beam provides reduced light intensity, and the ordinary dipped beam should therefore be used when driving in the dark. When the alternator stops charging, e.g. when the engine stops, the dipped beam will be switched off.



#### 17. Circulation pump for engine heater (optional extra)

When the engine heater is used, the circulation pump must be switched on to provide efficient heating and prevent the heater from overheating.



### 18. Cab ventilation fan

The switch has three positions:  
intermediate position: switched off  
upper position: half power  
lower position: full power



### Indicating lamps 19—30

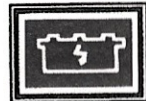
#### 19. Engine oil pressure

The lamp will light up if the engine oil pressure should drop below 1.0 bar (kgf/cm<sup>2</sup>). The central warning lamp will flash at the same time. If the lamp should light up when the truck is being driven, the engine must be stopped immediately and the fault must be repaired before restarting the engine.



#### 20. Charge

The lamp will light up when the alternator is not charging. The central warning lamp will flash at the same time. If the lamp should light up when the truck is being driven, the fault must be repaired as soon as possible.



#### 21. Brake air pressure

The lamp will light up if the pressure in any of the brake circuits should drop too low. At the same time, a warning buzzer will sound and the central warning lamp will flash. If the lamp should light up when the truck is being driven, stop immediately and repair the fault before restarting.



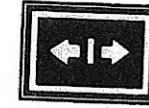
#### 22. Full beam

The lamp will light up when the full beam is switched on.



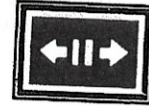
#### 23. Truck direction indicators

The lamp will flash when the truck direction indicators are flashing.



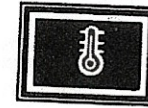
#### 24. Trailer direction indicators

The lamp will flash when the direction indicators of the trailer are flashing.



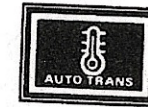
#### 25. Engine temperature

The lamp will light up if the temperature of the coolant in the engine should become excessive (above 96° C). At the same time, the central warning lamp will flash.



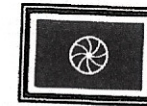
#### 26. Oil temperature in gearbox

The lamp will light up if the oil temperature in the gearbox should become excessive (above 135° C). At the same time, the central warning lamp will flash. If the lamp should light up when the truck is being driven, stop immediately. Check the oil level. If the oil level is between the specified max. and min. levels and the oil does not show any visible changes, run the engine with the gear selector set to N until the lamp has been extinguished, to enable the oil to cool down. If the lamp is still alight, the truck must not be driven.



#### 27. Engine heater circulation pump (Optional extra)

The lamp will light up when the circulation pump is switched on.



#### 28. Parking brake

The lamp can be dimmed, and will light up when the parking brake is applied.



PARK BRAKE

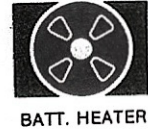
### 29. Parking brake interlock valve

The lamp can be dimmed, and will light up when the air pressure in the parking brake circuit has dropped below the level at which the interlock valve is actuated.

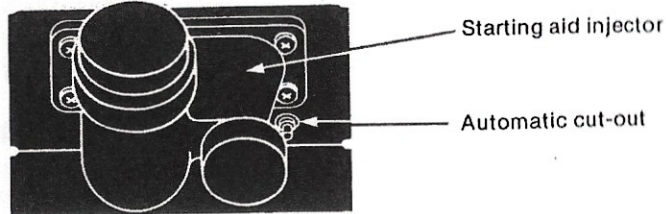


### 30. Battery heater (Optional extra)

The lamp can be dimmed, and will light up when the battery heater is operating.



### 31. Starting aid injector (Optional extra)

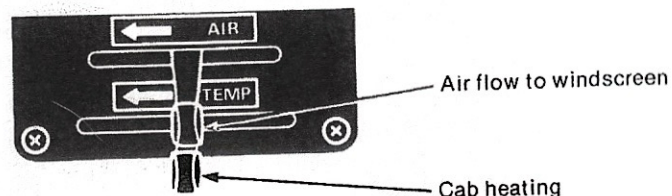


### 32. Automatic cut-out for engine heater circulation pump (Optional extra)

The cut-out will trip if the pump motor current should surge, which may be the case if the pump should seize, due to the fact it has not been used for a long time. (See under Operation)

### 33. Cab heating control

The lever controls the temperature of the incoming air. The temperature is increased by moving the lever to the left.



### 34. Windscreen defroster control

The lever controls the flow of air supplied to the windscreen. The air flow will increase when the lever is moved to the left. The fan can be started to increase the air flow further.

The heat supply to the floor area is controlled by two dampers under the instrument panel.

### 35. Starter button

When the button is depressed, power will be supplied to the starter motor, provided that contact key is also depressed.

### 36. Switch (contact key) for main power supply to the instruments and lighting

When the contact key is depressed, the main switch will be closed. The lighting is switched on by turning the key to the right.



**Position 0.** All lighting is switched off. (However, if the automatic dipped beam switch is on and the alternator is charging, the dipped beam and parking lights will be switched on.)

**Position 1.** Parking lights and instrument lighting are switched on.

**Position 2.** Parking lights, instrument lighting and full or dipped beam are switched on. Switching over full beam to dipped beam is carried out by means of the stalk below the steering wheel.

### 37. Parking brake interlock valve control

If the air pressure in the parking brake circuit has dropped, e.g. after the truck has been parked for a long time, the interlock valve will be actuated. This valve prevents involuntary release of the parking brake when the air pressure has risen to the normal value. To reset the valve, keep the control handle pulled out until the warning lamp is extinguished. The parking brake can then be released.

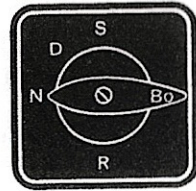
38. Gear selector for gearbox

The gear change programme in the gearbox is selected by means of the selector switch.

**Setting Gear**

- N Neutral
- D Drive (Fully automatic gear change)
- S Locked gear (H2)
- Bo Tow start
- R Reverse

See also under Driving.

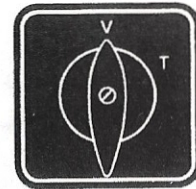


39. Gear selector for transfer box

**Setting Gear**

- V Road gear for normal driving on roads
- T Cross-country gear for driving on rough ground. The front wheel drive is engaged automatically when the cross-country gear is engaged.

The gear change programmes are the same for road and cross-country gears.



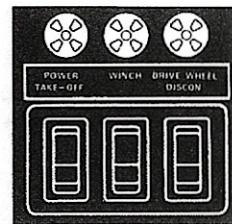
40. Central power take-off switch and indicating lamp (Optional extra)

When the switch is pushed down, the power take-off will be engaged. The indicating lamp will light up at the same time.

41. Winch power take-off switch and indicating lamp

When the switch is pushed down, the winch power take-off will be engaged. The indicating lamp will light up at the same time.

The switches are placed under a lid.



40 41 42

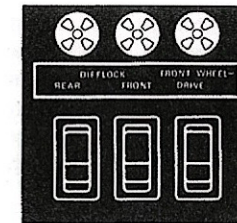
42. Driving wheel disengaging switch and indicating lamp

When the switch is pushed down, the transfer box is set to neutral so that winching, for example, can be carried out without the assistance of the driving wheels. The indicating lamp will light up at the same time.

43. Rear axle differential lock switch and indicating lamp

44. Front axle differential lock switch and indicating lamp

When the switch is pushed in, the differential locks will be engaged. The rear axle differential lock or locks are engaged by means of switch 43, independently of the front axle differential lock. The front axle differential lock is engaged by means of switch 44. This lock cannot be engaged without the rear axle differential lock or locks being engaged.



43 44 45

45. Front wheel drive switch and indicating lamp

When the switch 45 is pushed down, the front wheel drive will be engaged. The indicating lamp will light up at the same time. The front wheel drive is engaged automatically when the cross-country gear is engaged.

46. Parking brake lever

The brake is applied when the lever is pushed back. To release the brake, the collar on the lever must be lifted before the lever can be pushed forward.

#### 47. Horn

The horn is controlled by the button in the centre of the steering wheel.

#### 48. Wheel angle indicator

The wheel angle indicator shows the angle of the front wheels.



Wheel angle indicator

#### 49. Trailer brake and winch brake control lever

The trailer can be braked using this control stalk, without braking the towing vehicle. (See also Braking under Driving.) The control is also used as a brake for the winch when this is engaged.

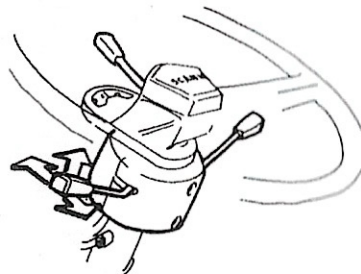


Trailer brake and winch brake control lever

#### 52. Direction indicator, and full and dipped beam control stalk

The lever has four positions.

- The central position is the neutral position
- Forward or backwards: right-hand or left-hand direction indicator.
- Towards the steering wheel: change-over between full and dipped beam and headlamp flasher.

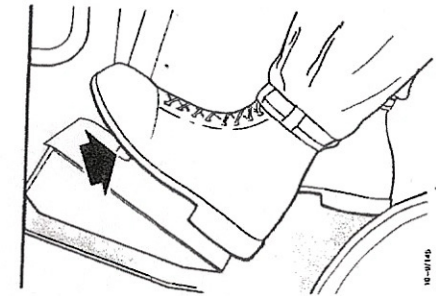


Direction indicator, and full and dipped beam stalk

#### 53. Engine brake and cross-country brake foot switch

The switch has two functions:

- Engine brake function when the accelerator pedal is released.
- Cross-country brake. With the cross-country gear engaged in the transfer box, the foot switch, in addition to the above engine brake function, also electrically actuates a valve which admits air at a pressure of 1.7 bar (kgf/cm<sup>2</sup>) into the brake cylinders. (See also under Brake system)

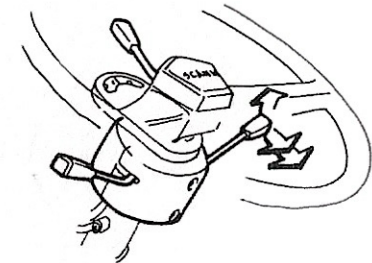


Engine brake and cross-country brake foot switch

#### 56. Windscreen and headlamp wiper and washer control stalk

The lever has four positions. The upper position is the neutral position.

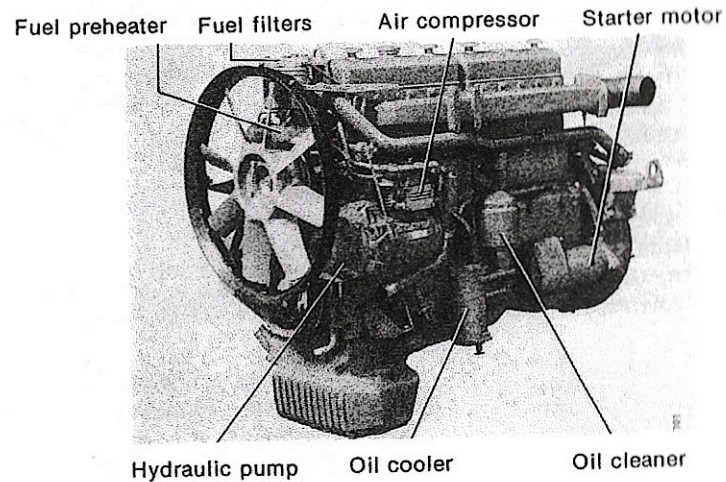
- First position down: windscreen wipers, half speed
- Second position down: windscreen wipers, full speed
- Towards the steering wheel: windscreen washers and, if the lights are switched on, headlamp washer and wipers



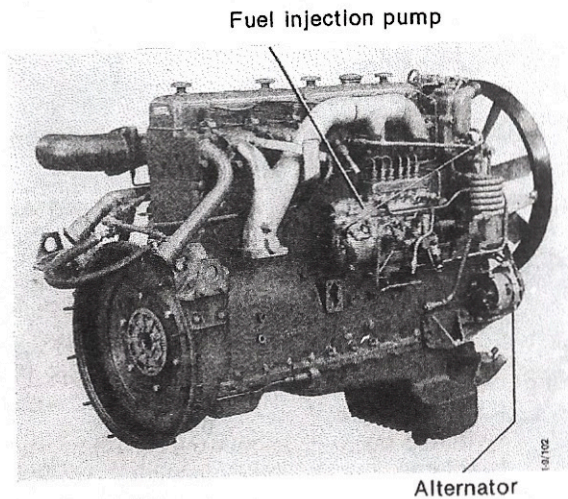
Stalk for windscreen and headlamp wipers and washers

# Engine

The D11 and DS11 engines are in-line, six-cylinder, four-stroke diesel engines with direct injection.



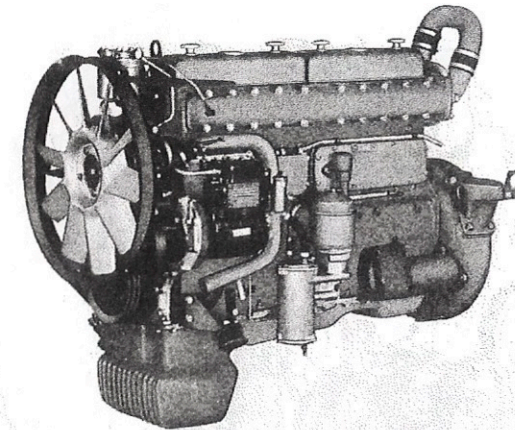
D11 engine, left side, viewed from the front



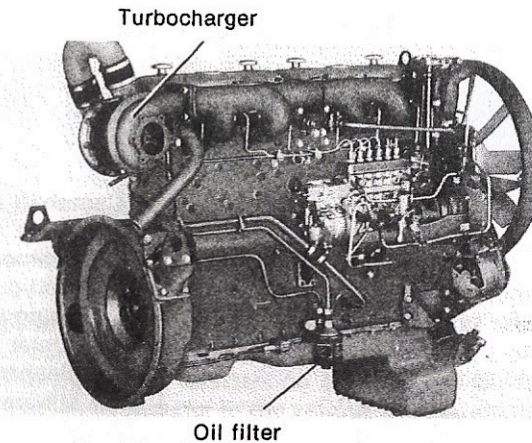
D11 engine, right side, viewed from the rear

The basic design is the same, but the DS11 engine differs from the D11 by being turbocharged.

The engine block and the upper half of the crankcase are cast as one unit. The cylinder liners are of the "wet" type and can be replaced. Each of the two cylinder heads covers three cylinders.



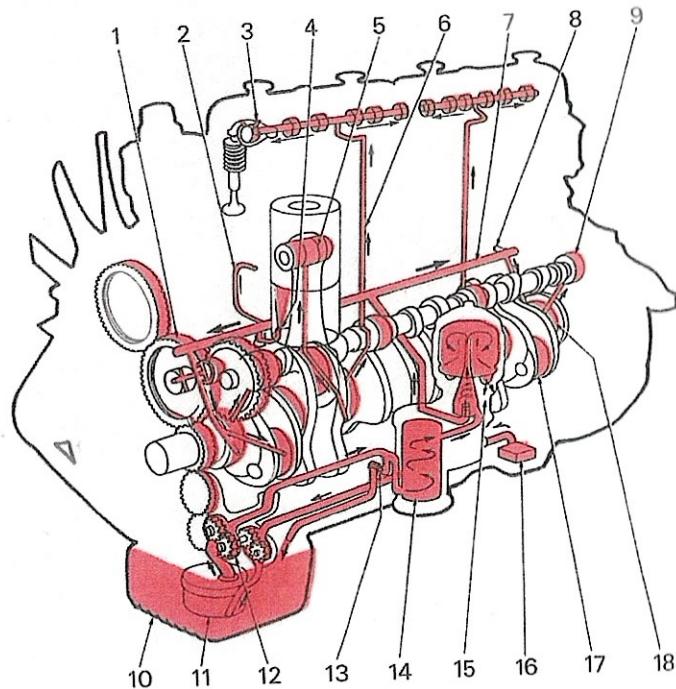
DS11 engine, left side, viewed from the front



DS11 engine, right side, viewed from the rear

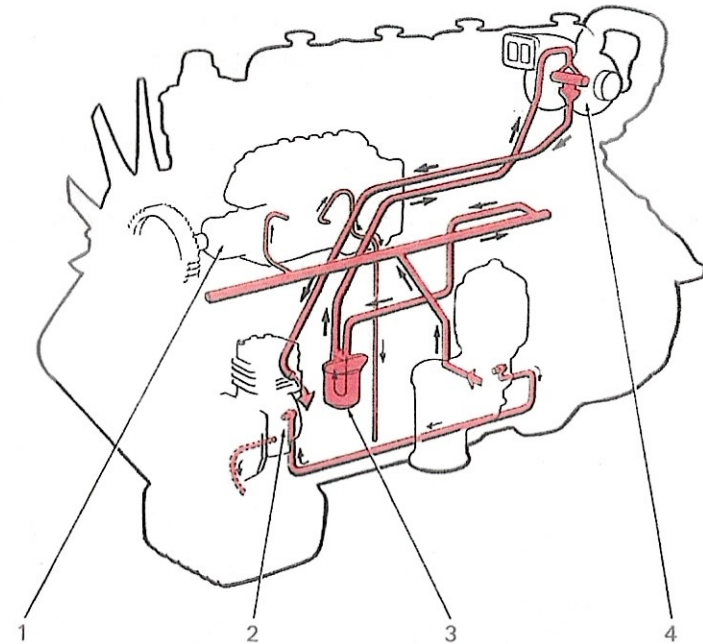
## LUBRICATION SYSTEM

The engine lubrication system includes oil sump, oil pump with oil transfer section, oil cleaner, oil cooler and pressure reducing valve.



- |  |                     |
|--|---------------------|
| 1. Timing gears  | 9. Camshaft bearing |
| 2. Oil passage to the injection pump                       | 10. Oil sump        |
| 3. Rocker arm mechanism                                    | 11. Oil strainer    |
| 4. Spray nozzle for piston cooling                         | 12. Twin oil pump   |
| 5. Gudgeon pin   | 13. Reducing valve  |
| 6. Oil passage to rocker arm mechanism                     | 14. Oil cooler      |
| 7. Distribution passage                                    | 15. Oil cleaner     |
| 8. Tapping for connecting the oil pipe to the turbocharger | 16. Oil strainer    |
|  | 17. Big-end bearing |
|  | 18. Main bearing    |

The fuel injection pump camshaft casing and governor, and the turbocharger bearings (DS11 engine) are lubricated by the engine lubrication system. The turbocharger lubricating oil flows through a separate filter located on the right-hand side of the engine.



1. Fuel injection pump
2. Compressor
3. Oil filter
4. Turbocharger

Lubrication system for auxiliaries

### Oil pump

The oil pump, which is of the gear type, is located at the front of the oil sump. It assures lubrication of the engine on gradients of up to 35° in all directions. The pump delivers the oil through the oil cooler and then through the oil cleaner and out to the various lubrication points. The pressure reducing valve maintains the lubricating oil pressure within set value. The transfer pump section feeds oil from the rear to the front of the oil sump.

### Oil cleaner

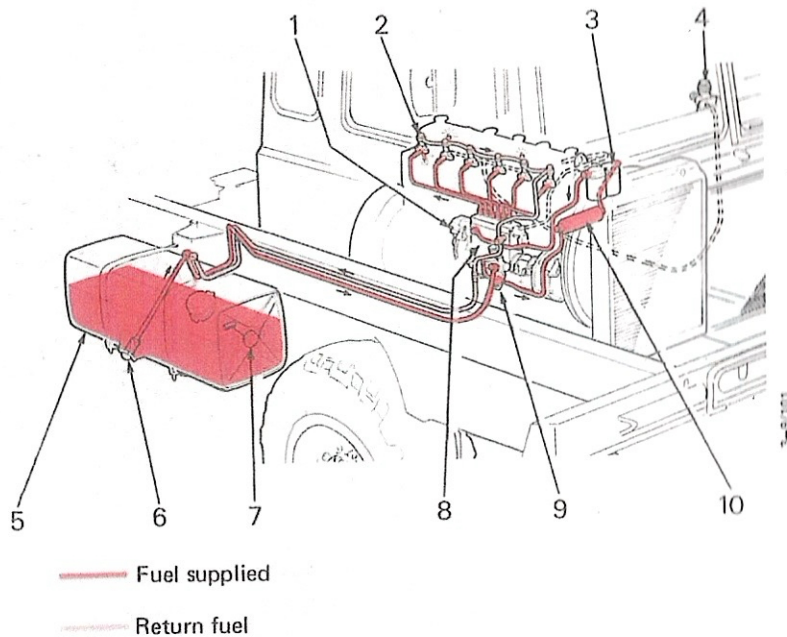
The oil cleaner consists of a cyclone section for coarse purification and a centrifugal section for fine purification. In both sections, the impurities are forced outwards by centrifugal force. They are deposited on the rotor wall in the centrifugal section.

### Oil cooler

The oil cooler is located adjacent to the oil cleaner. The oil is cooled by the coolant flowing from the cooling system.

### FUEL SYSTEM

The fuel system incorporates the fuel tank and filter, pre-filter, feed pump, fuel preheater (optional extra), fuel filters, injection pump and injectors.



- |  |  |
|--|--|
| 1. Governor                                  | 6. Tank filter                         |
| 2. Injector                                  | 7. Fuel level indicator                |
| 3. Fuel filters                              | 8. Fuel injection pump                 |
| 4. Starting aid injector<br>(Optional extra) | 9. Feed pump and pre-filter            |
| 5. Fuel tank                                 | 10. Fuel preheater<br>(Optional extra) |

The feed pump draws fuel from the tank through the pre-filter and delivers it through the fuel preheater and fuel filter to the injection pump, which distributes the fuel to the injectors. The quantity of fuel injected is determined by a governor, which is actuated by the position of the accelerator pedal and by the engine speed.

### Fuel tank with filter

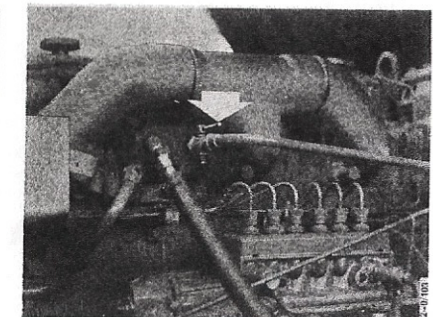
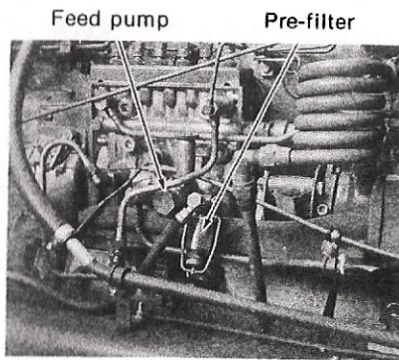
The tank is located on the right-hand side of the truck. The tank filter consists of a strainer which separates coarser impurities.

### Pre-filter

The filter consists of a nylon strainer.

### Feed pump

The feed pump is a plunger pump driven by the injection pump camshaft. A hand pump is provided for bleeding the fuel system.



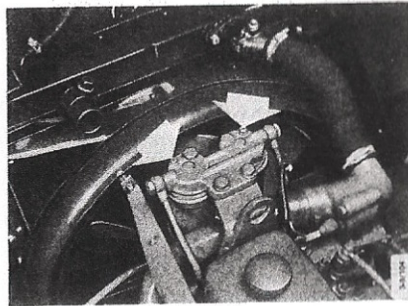
Shut-off cock for fuel preheater

### Fuel preheater (optional extra)

In the fuel preheater, the fuel is heated by the engine coolant, which prevents paraffin precipitation at low temperature. The engine output is reduced when the fuel is too hot. The preheater must therefore be shut off at temperatures above 0° C.

## Fuel filters

The fuel filters consist of two paper elements connected in parallel. Final fine filtering of the fuel takes place in these filters.



Fuel filters

## Fuel injection pump

The fuel injection pump is provided with a centrifugal governor and is lubricated by the engine lubrication system. It has a high lubricating oil level to counteract gradients of up to 35°. The pump also has a cold-starting device which facilitates starting in cold weather. The DS11 engine incorporates a smoke limiter, which reduces the smoke density of the exhaust gases at low engine speed.

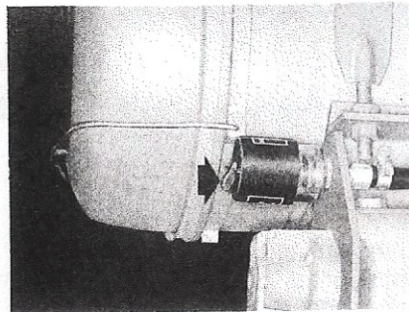
## Injectors

The function of the injectors is to supply the fuel into the cylinders in the form of a fine mist. Excess fuel from the injectors and the injection pump is returned to the tank via a return pipe.

## INTAKE AND EXHAUST SYSTEMS

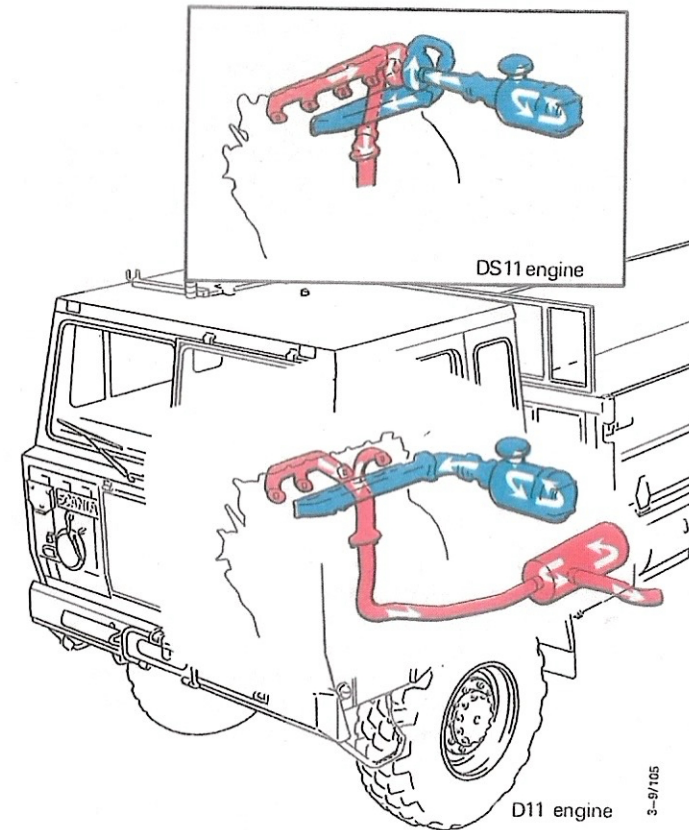
### Air cleaner

The air cleaner is of the dry type and consists of a pre-filter and filter cartridge. A pressure indicator indicates when the filter cartridge is excessively choked.



Pressure indicator

In the pre-filter, which constitutes the air filter cover, coarse particles are removed from the air by the air being induced to rotate and the particles being thrown outwards by centrifugal force. The main cleaner consists of a paper element.



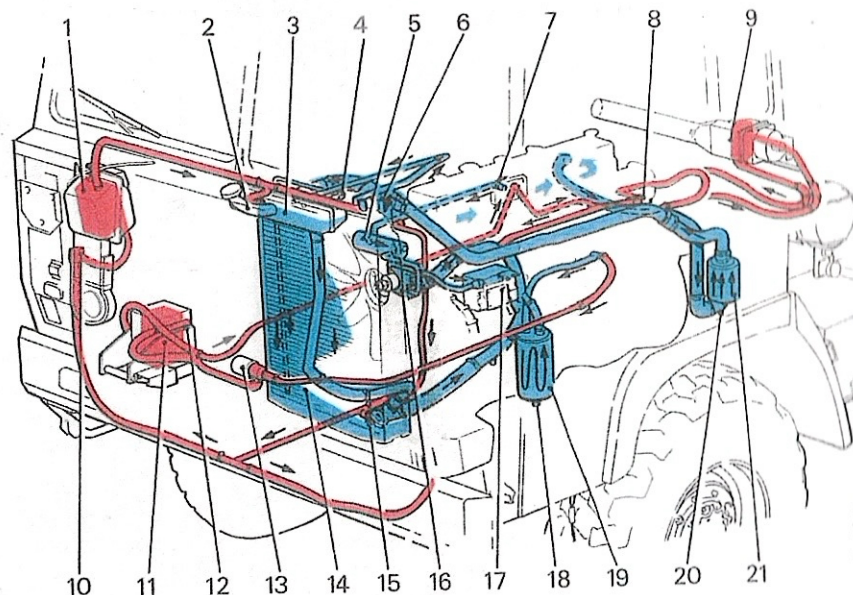
Intake and exhaust systems

## Turbocharger

The DS11 engine is equipped with a turbocharger. The engine exhaust gases drive a turbine which in turn drives a centrifugal compressor. This compressor increases the air supply to the engine, which allows a higher output to be obtained from the engine.

## COOLING SYSTEM

The cooling system includes a centrifugal pump, which is driven by V-belts from the crankshaft, a radiator with expansion tank, a fan with fan housing and fan ring, and two thermostats with different opening temperatures.



— Cooling system for engine, gearbox and compressor  
 — Circuits for heating system and engine heater

- |  |   |
|--|---|
| 1. Heater  | 11. Engine heater (optional extra)                      |
| 2. Filler pipe                                       | 12. Drain plug  |
| 3. Expansion tank                                    | 13. Circulation pump for engine heater (optional extra) |
| 4. Pressure relief and make-up valve                 | 14. Radiator  |
| 5. Fuel preheater (optional extra)                   | 15. Drain cock  |
| 6. Thermostat housing                                | 16. Coolant pump  |
| 7. Shut-off cock for fuel preheater (optional extra) | 17. Compressor  |
| 8. Shut-off cock                                     | 18. Drain plug  |
| 9. Heater for personnel cabin (optional extra)       | 19. Oil cooler, engine                                  |
| 10. Thermostat                                       | 20. Drain plug  |
|  | 21. Oil cooler, gearbox                                 |

The pump forces the coolant through passages in the engine block and cylinder heads. The direction of flow is shown by the arrows in the figure. The figure also shows that the engine cooling system also cools the oil in the automatic transmission, the air compressor cylinder heads and the engine lubricating oil. The system is also used to heat the driver's cab and personnel cabin, if any.

## Engine heater (optional extra)

The engine heater is connected by hoses to the engine cooling system and is secured at the front underneath the right-hand side of the front bumper. A blow torch is used for heating. Circulation in the cooling system is improved by a circulation pump located under the front cover. This pump is switched on by a switch on the instrument panel. (See also under Operation)

## Electrical system

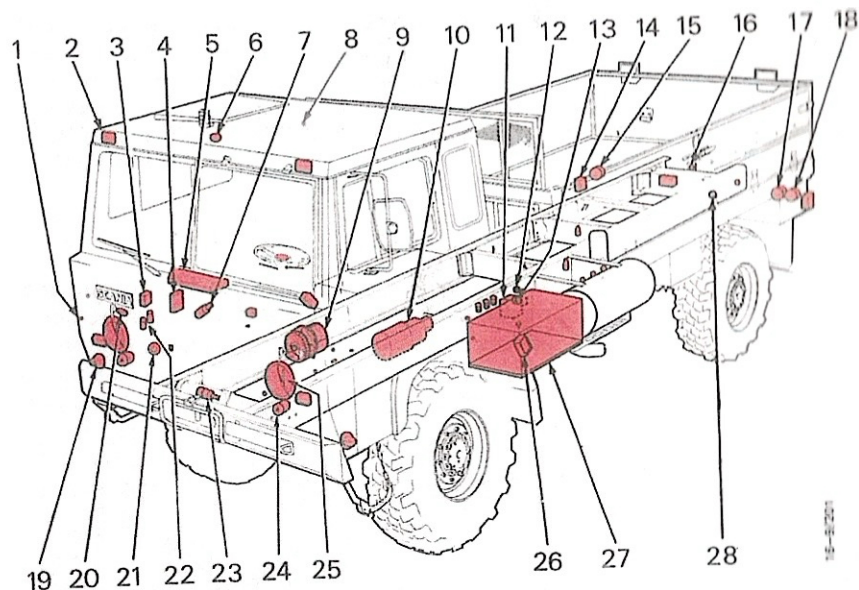
The electrical system has a 24 volt supply and is provided with an alternator. The electrical system is connected to the batteries when the contact key is pressed in. This can be kept switched on by three independent holding circuits, each with its own relay. The circuits are energised when 1) the contact key for the main switch is pressed in, 2) the parking lights are on, 3) the alternator is charging.

## BATTERIES

The truck has two 24-volt lead-acid batteries connected in series. As an optional extra, the truck can be equipped with batteries of the cold-starting type and an insulated battery box which can be heated.

## INSULATED BATTERY BOX (optional extra)

The box is made of glass fibre reinforced plastic and is of sandwich construction, in which the intermediate layer is thermally insulating. At a battery temperature of +20° C and an ambient temperature of -20° C, it takes at least two days for the battery temperature to drop to the ambient air temperature. The cooling rate during the first day is about 1° C per hour.



1. 2-pole socket
2. Riding lights
3. Voltage regulator
4. Relay box
5. Fuse box
6. Cab interior lighting
7. Windscreen wiper motor
8. 2-pole socket for inspection lamp
9. Alternator
10. Starter motor
11. Battery main switch
12. 3-pole 24 V socket
13. Starting assistance connection
14. Side riding light
15. Tail lamp

16. Socket for connecting trailer electrical system
17. Reversing light (optional extra)
18. Tail lamp
19. Direction indicators
20. Headlamp wiper motor
21. Horn
22. Pumps for windscreen and headlamp washers
23. Circulation pump for engine heater (optional extra)
24. Fan motor
25. Headlamp
26. Side riding light
27. Battery box with battery
28. Socket for connecting electric crane

Electrical system

### BATTERY HEATING DEVICE (optional extra)

The batteries are mounted on a testing plate with electric coils. The plate is only heated when the alternator delivers a charging current and the temperature of the battery electrolyte is lower than +9° C. A sensor which senses the temperature is located in one of the battery filler holes. When the temperature is lower than +9° C, the sensor actuates a control

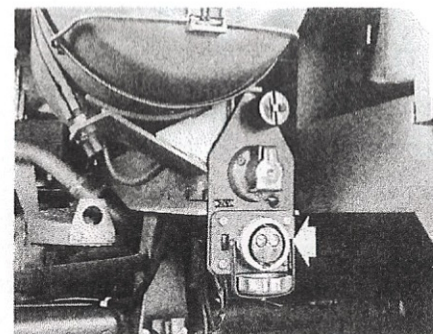
unit which switches on the power supply to the heating plate. The power supply is not interrupted until the battery electrolyte has reached a temperature of +15° C. Due to the heat accumulated in the plate and the battery cases, overheating to about +25° C normally takes place.

The battery electrolyte heating rate is about 1° C per 5 minutes. The heating time from 0° C to +15° C is therefore about one hour and 15 minutes.

An indicating lamp on the instrument panel lights up when the battery is being heated.

### STARTING ASSISTANCE CONNECTION

A socket for connecting the starting assistance cable is provided on the left-hand side of the truck under the air cleaner. This socket can be used when another vehicle with the same system voltage (24 V) requires starting assistance or when the battery capacity is insufficient.



Starting assistance connection

### ALTERNATOR

The alternator, which is located at the front on the right-hand side of the engine, has a built-in rectifier.

A separate voltage regulator is provided for controlling the charging voltage.

### STARTER MOTOR

The starter motor is secured to the flywheel housing on the left-hand side of the engine. The motor is controlled by a push-button switch on the instrument panel.

## FUSES

A number of fuses protect the electrical functions of the truck against overloading. The fuses are located in a fuse box underneath the left-hand cover on the instrument panel. A chart of the fuses is also provided. Two of the fuses are reserved for connecting optional extras.

If the truck is provided with a circulation pump for the engine heater, an automatic cut-out is also provided on the instrument panel.

Always use the correct rating of fuse

1 8 A	2 8 A	3 8 A	4 8 A	5 8 A	6 8 A	7 8 A	8 8 A	9 8 A	10 8 A	11 8 A	12 8 A							
Flashing direction indicator	Traffic warning lights	Central warning/Stop relay	Battery cut-out, Relay 2	L dipped beam	R dipped beam	Heating fan, Buzzer	Tachometer	Combination instrument	Starter motor	Battery cut-out, Relay 3	Differential locks	Warning lights	Air dryer	Reserve	Windshield wipers and washers	L full beam	Warning light	R full beam

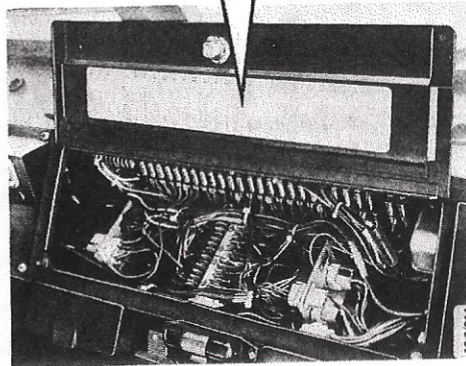
A

1 8 A	2 8 A	3 8 A	4 8 A	5 8 A	6 8 A	7 8 A	8 8 A	9 8 A	10 8 A	11 8 A	12 8 A	1 16 A							
Reserve (Screened light)	Battery cut-out	Traffic warning lights	Cab light	Back-up light/head lamp (Personnel transport cab)	Horn	Battery cut-out	Map reading lamp	Brake lights	Socket for inspection torch	Reserve	Headlight wipers and washers	L park light, L tail light	Park light, L tail light (L side mark light)	R tail light (R side mark light)	Front wheel drive, power take-off	Drive wheel disc, clutch	Warning lamp for gear oil	Gearbox	(Battery heater) (Loose fuse)

B

C

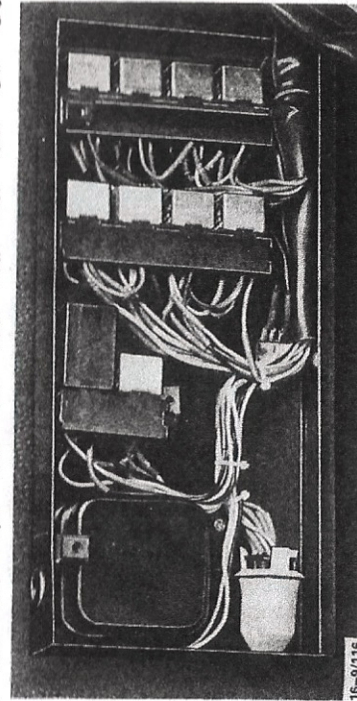
D



Fuse box and chart of fuses

## RELAYS

Most of the relays in the truck are located in a relay box on the right-hand side of the engine casing in the cab. Relays marked with the same letter are interchangeable.



Relay box

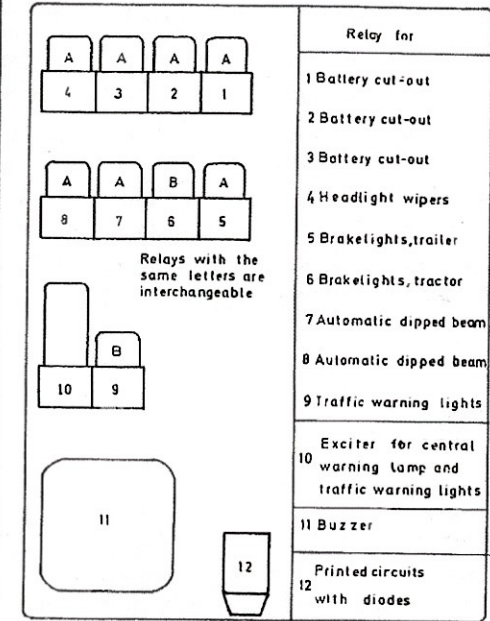
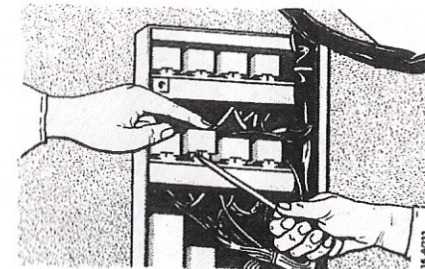


Chart of relays

When removing a relay, first check that the main switch (contact key) is not depressed.



Removing a relay

## ELECTRICAL SOCKETS

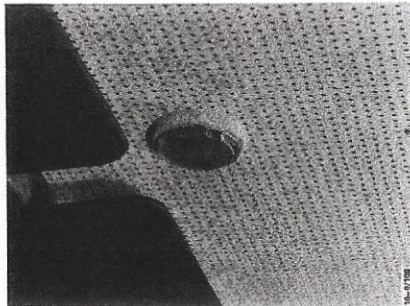
The locations of the sockets are shown in the overall view of the electrical system.

1. Two 2-pole sockets at the front of the cab. They can be used for an inspection lamp or blackout lighting.
  8. Two-pole socket for inspection lamp.
  12. Three-pole socket for personnel cabin connection.
  13. Starting assistance connection under air cleaner.
  16. Socket for connecting trailer electrical system. At the rear on the tubular cross-member.
  28. Socket for connecting a 16 kNm (1.6 ton m) crane. At the rear on the inside of the left-hand frame member.
- A 2-pole socket for an inspection lamp is also provided on the left-hand side of the instrument panel.

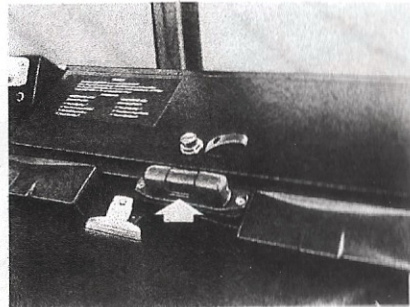
## LIGHTING

The external lighting is shown in the overall view of the electrical system. Interior lighting includes instrument lighting, roof lighting in the cab and a map-reading lamp at the bottom edge of the instrument panel.

The roof light is switched on by rotating the glass clockwise. The map-reading lamp is switched on by raising the shade.



Roof light in the cab

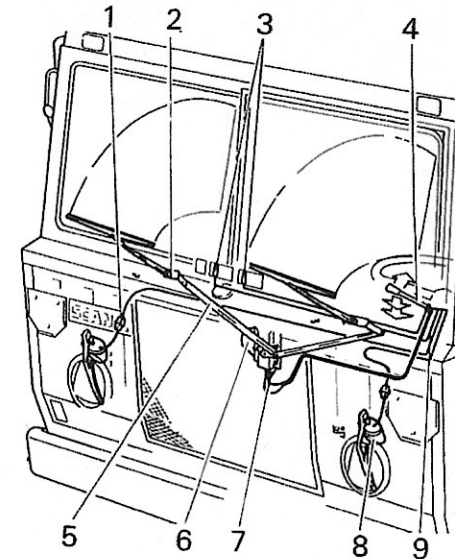


Map-reading lamp

## WINDSCREEN WIPERS/WASHER AND HEADLAMP WIPERS/WASHERS

### Wipers

The windscreen wipers are driven by an electric motor which is located inside the hinged front cover. The motor rotates and turns a crank which actuates the windscreen wipers by means of link rods. The left-hand link rod can be disconnected when the left-hand window is to be opened. See Opening the hinged windscreen.



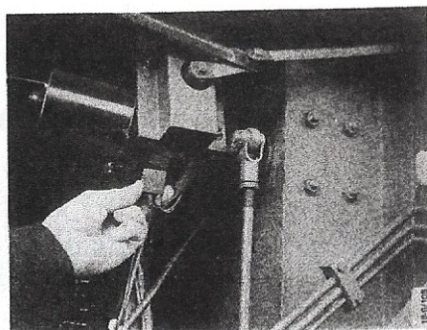
- |                        |                           |
|------------------------|---------------------------|
| 1. Connector           | 6. Windscreen wiper motor |
| 2. Wiper shaft bearing | 7. Plug                   |
| 3. Fuses               | 8. Headlamp wiper motor   |
| 4. Control stalk       | 9. Electrical cables      |
| 5. Crank               |                           |

Each of the headlamp wiper motor has its own electric motor whose output shaft describes an oscillating motion. The wiper motors are located behind the front panel.

When the electrical system of the truck is live, the supply cable to the windscreen wiper motor is also live, even in the parked position. The electric motor crank can be rotated by hand past the parked position. The motor will then start and rotate one revolution back to the parked position.

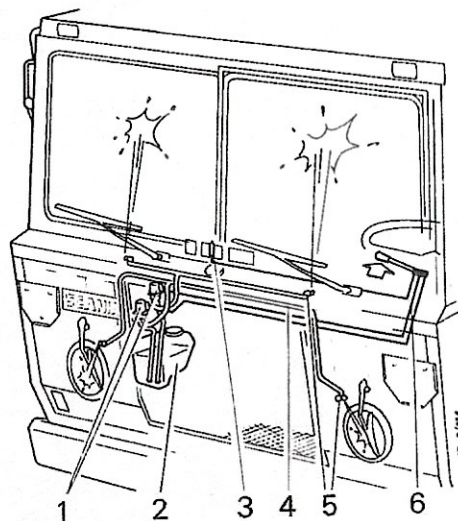
**This involves a risk of injury to the hands or damage to tools.**

**Always remove the plug on the wiper motor before commencing work on the wiper equipment.**



Removing the plug

### Washers



- |                     |                      |
|---------------------|----------------------|
| 1. Washer motors    | 4. Hoses             |
| 2. Liquid container | 5. Washer nozzles    |
| 3. Fuse             | 6. Electrical cables |

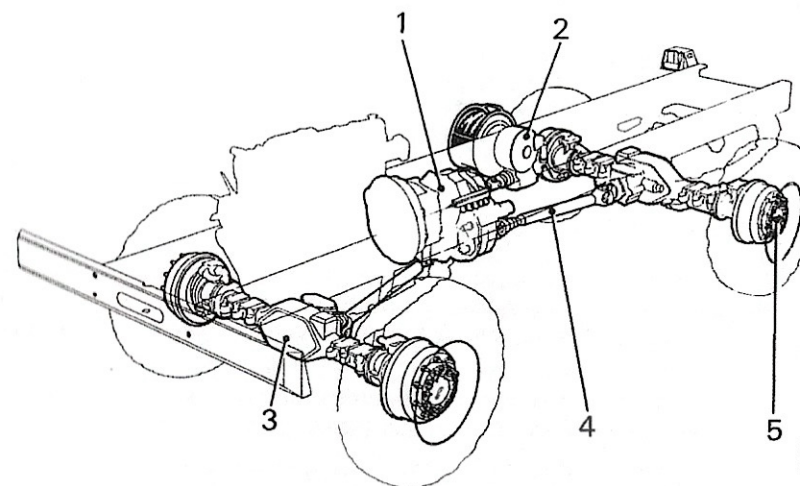
The windscreen and headlamp washers are supplied by separate pumps. The pumps are located behind the front cover. The upper pump supplies the windscreen washers and the lower pump the headlamp washers.

The wipers and washers are controlled by the right-hand stalk below the steering wheel. The headlamp wiper and washer motors are connected to the lighting circuits and only work when the parking lights or the headlamps are switched on.

### Power transmission system

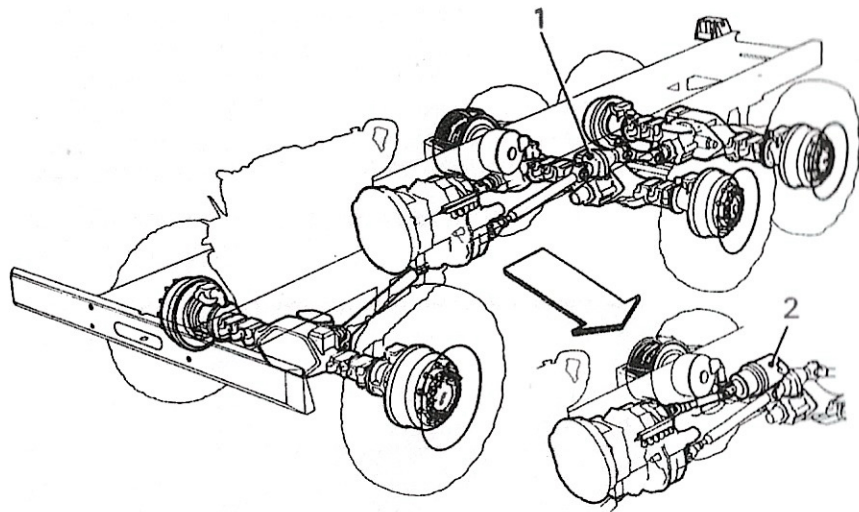
The SBA111 and SBAT111 have all-wheel drive. The SBA111 has two axles and the SBAT111 three axles. Each axle has a centrally located central gear, two hub reduction gears and a manually engaged differential lock. The power transmission also includes the winch drive and drive for the hydraulic equipment, e.g. for trucks provided with a 55 kNm (5.5 ton m) crane. The power to axles, winch and hydraulic equipment is transmitted by means of propeller shafts.

The gearbox consists of a fully automatic, electro-hydraulically controlled gearbox, integral with a manual, pneumatically controlled transfer box.



- |                           |                       |
|---------------------------|-----------------------|
| 1. Gearbox                | 4. Propeller shaft    |
| 2. Winch (optional extra) | 5. Hub reduction gear |
| 3. Central gear           |                       |

Power transmission system of the SBA111



1. Dividing gear
2. Hydraulic pump for extra hydraulic equipment

Power transmission system of the SBAT111

### Gearbox

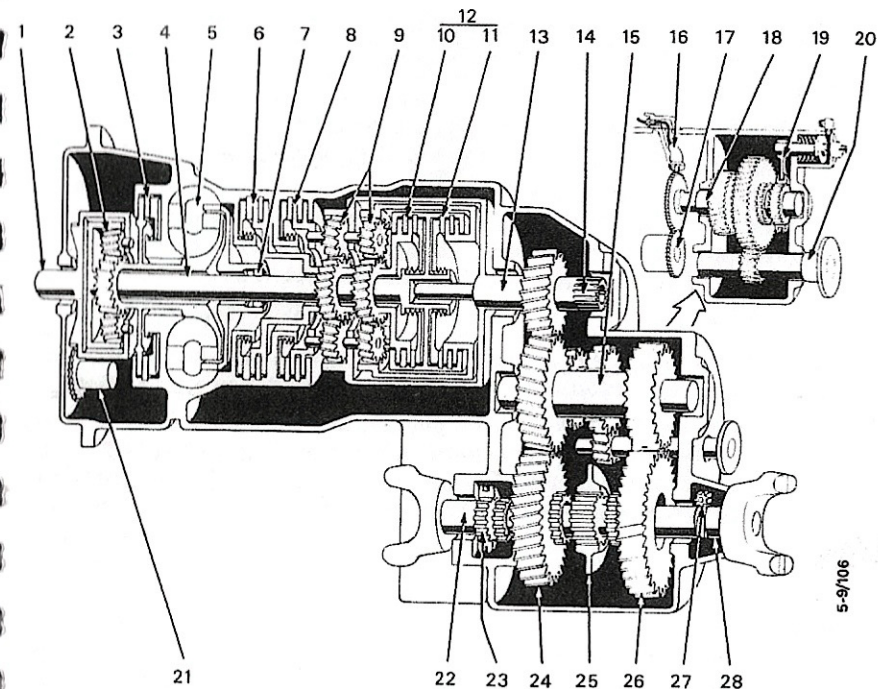
The GA 763 gearbox consists of a fully automatic gearbox with six forward ratios and one reverse ratio, integrated at the rear with a two-speed transfer box and a hydraulic torque converter, which replaces the conventional disc clutch.

The gearbox incorporates three different systems, i.e. a mechanical system, a hydraulic system and an electrical system.

- The mechanical system consists of the gearcase, shafts, the front single planetary gear and rear double planetary gear and five hydraulically controlled disc clutches.

The function of this system is to reduce the speed of the engine and to transmit the engine torque to the transfer box.

The different ratios are obtained when the disc clutches lock different parts of the planetary gears.



1. Input shaft
2. Front planetary gear
3. Clutch for mechanical gear
4. Centre shaft
5. Hydraulic torque converter
6. Clutch for 2nd gear
7. Free-wheel
8. Clutch for 1st gear
9. Rear double planetary gear
10. Clutch for reverse gear
11. Clutch for forward gear
12. Clutches for 3rd gear (10 + 11)
13. Output shaft to transfer box
14. Connection for central power take-off
15. Intermediate shaft
16. Electric frequency transmitter
17. Rear hydraulic oil pump
18. Lateral intermediate shaft
19. Clutch units for winch power take-off
20. Side shaft for winch power take-off
21. Front hydraulic oil pump
22. Output shaft to front axle
23. Clutch units for front wheel drive
24. Gearwheel for road gear
25. Clutch and synchromesh units for road and cross-country gears
26. Gearwheel for cross-country gear
27. Worm drive for speedometer drive
28. Output shaft to rear axle

Gearbox

- The hydraulic system consists of hydraulic oil pumps, torque converter, electro-hydraulic solenoid valves, hydraulic cylinders and oil coolers.

The hydraulic oil pumps generate a hydraulic oil pressure which actuates the disc clutches via hydraulic cylinders. The solenoid valves route the oil to the appropriate hydraulic cylinders.

The torque converter consists of pump impeller, guide vanes and turbine wheel. The pump impeller sets the oil in motion and the energy of the oil is transmitted to the turbine wheel.

The transmission oil is cooled in the oil cooler by the engine coolant.

- The electrical system consists of a number of electro-hydraulic solenoid valves, automatic control unit and switches.

The automatic control unit receives signals which indicate the positions of the gear selectors, the accelerator pedal position and speed of the truck. It determines the appropriate gear on the basis of these signals and transmits electrical signals to the solenoid valves, which engage the appropriate gear.

### Gearbox reduction ratios

The various reduction steps for the forward gears in the gearbox are obtained when disc clutches lock different parts of the rear double planetary gear. This enables three ratios to be obtained. Each such ratio can then be combined either with hydraulic transmission via the torque converter (hydraulic gears) or with a clutch for mechanical gear which disengages the torque converter (mechanical gears).

Even when the torque converter is engaged, two thirds of the torque is transmitted directly, mechanically across the annulus of the front planetary gear to the centre shaft. This splitting of the torque results in lower power losses than if the whole torque were to be transmitted by the torque converter.

If the engine does not have the capacity to drive the wheels despite maximum throttle, all of the engine power is converted to heat in the torque converter. This is known as stalling.

The following reduction ratios can be obtained:







Gear	Power path
H1	Across the torque converter and 1st gear
H2	Across the torque converter and 2nd gear
H3	Across the torque converter and 3rd gear
M1	Across the clutch for mechanical reduction and 1st gear
M2	Across the clutch for mechanical reduction and 2nd gear
M3	Across the clutch for mechanical reduction and 3rd gear
Neutral	No gear engaged
H Reverse	Across the torque converter and reverse gear

H = Hydraulic reduction      M = Mechanical reduction

In hydraulic gears H1, H2 and H3, a reduction is obtained through the torque converter in addition to the mechanical reductions in the rear planetary gear. In the mechanical gears M1, M2 and M3, step-up is obtained in the front planetary gear.

- With the gear selector in position N, no gear is engaged.
  - In normal driving forward, the gear selector is set to D. The gearbox automatically changes up and down between the four gears H1, H2, H3 and M3. If engine braking is required, the foot switch on the cab floor is depressed. When the speed is reduced and the accelerator pedal is released, the gearbox changes down below about 60 km/h through gears M3 → M2 → M1 → H1.
  - In position S, gear H2 is always engaged. This gear locking facility is designed for driving where repeated gear changes up and down are not desirable, e.g. driving on ice. Position S can also be used in order to prevent gearchanges up when driving uphill for long stretches at speeds between 20 and 35 km/h if the engine temperature tends to be too high.
- N.B. Position D gives a lower ratio and higher tractive effort than position S at speeds below 18 km/h.**
- In position Bo, gear M1 is engaged. This position is intended to enable the engine to be tow-started.
  - In position R, the hydraulic reverse gear is engaged.

### Summary

Gear selector gearbox	Type of driving	Gear
 N	—	Neutral
 D	Normal driving	H1 ↔ H2 ↔ H3 ↔ M3
 D	Engine braking <sup>1)</sup>	H1 ← M1 ← M2 ← M3
 S	Special driving	H2
 Bo	Tow-start	M1
 R	Reversing	H Reverse

H = Hydraulic reduction      M = Mechanical reduction

<sup>1)</sup> The button on the cab floor is depressed. When the cross-country gear in the transfer box is engaged, the cross-country brake function is also engaged. See also under Driving.

## TRANSFER BOX

The transfer box incorporates three different systems, i.e. a mechanical system, a pneumatic system and an electrical system.

- The mechanical system consists of three gearwheels, intermediate shafts, shifter sleeve for road and cross-country gear (neutral position = driving wheels disengaged), coupling sleeve for winch and output shafts forward and to the rear. An extra power take-off can be connected directly after the input shaft for driving the hydraulic pump on trucks with extra hydraulic equipment.
- The pneumatic system consists of electro-pneumatic solenoid valves and actuating cylinders. The solenoid valves route the compressed air to the appropriate cylinders.
- The electrical system consists of electro-pneumatic solenoid valves and switches. The solenoid valves consist of solenoids which control the air supply to the cylinders.

### Transfer box gear reduction ratios

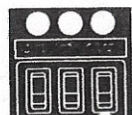
The transfer box has three positions.



V Road gear for driving on good roads.



T Cross-country (off-road) gear for driving on rough ground. The front wheel drive is engaged automatically and the cross-country braking function is engaged when the button on the cab floor is depressed.



Driving wheel disengagement

Regardless of whether position V or T is engaged, the transfer box can be set to the neutral position by a switch. No torque is then transmitted to the wheels. This position is used, for example, when winching without driving wheel assistance and when towing the truck.

### Front wheel drive control

Front wheel drive is engaged by a switch. Air is supplied to a compressed air cylinder, which actuates a coupling unit.

## POWER TAKE-OFFS

### EGA 763

The power take-off is intended for driving the winch. The power take-off is incorporated in the right-hand side of the transfer box and is driven by the front gearwheel of the intermediate shaft. The power take-off is controlled electro-pneumatically by means of a switch in the cab and a solenoid valve and compressed air cylinder on the gearbox.

### EGA 760 (optional extra)

The power take-off is located centrally at the rear of the transfer box and is driven from the upper shaft of the transfer box through a coupling sleeve. The power take-off can be used, for example, for driving a hydraulic pump for a crane.

The power take-off is controlled electro-pneumatically by means of a switch in the cab, solenoid valve on the gearbox and a compressed air cylinder on the power take-off.

### EGA 761 (optional extra)

The power take-off is located on the front right-hand side of the gearbox and is driven by the input shaft via an intermediate gearwheel.

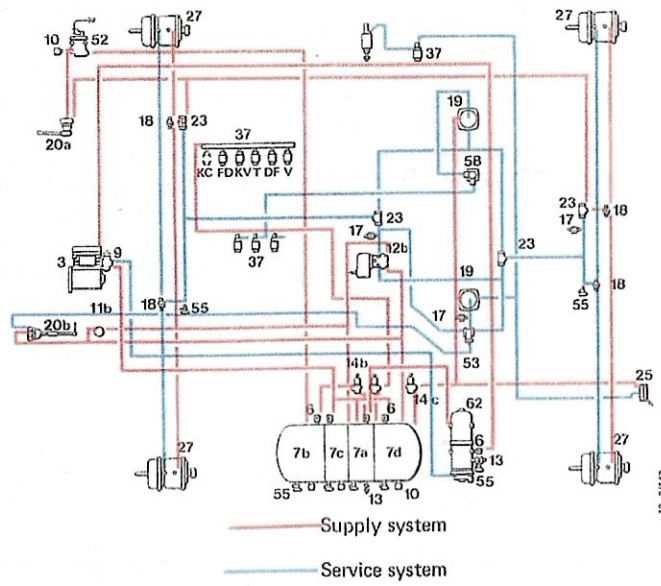
The power take-off is permanently engaged.

## Brake system

The trucks are equipped with direct-acting air brakes. The brake system may be divided into supply system, foot brake, parking brake and trailer brake.

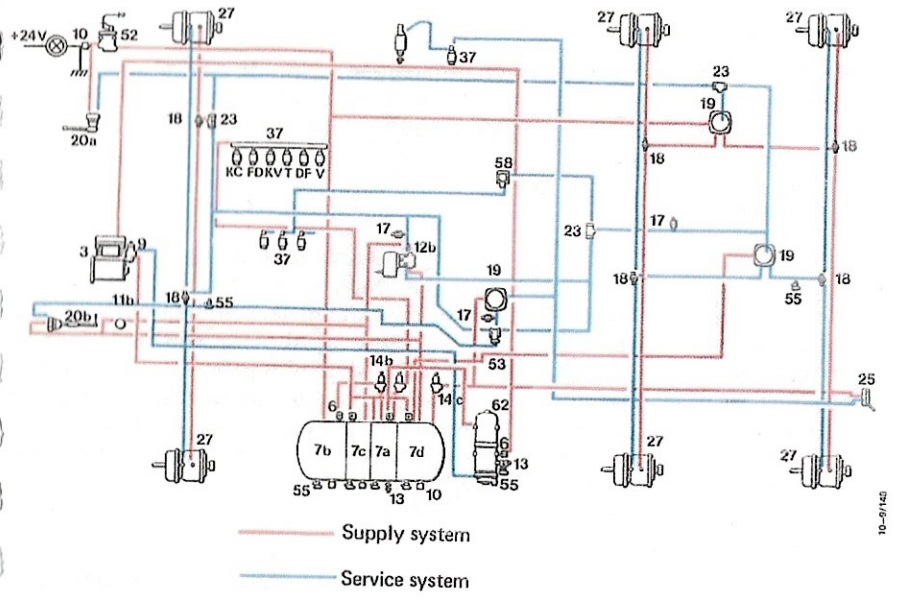
### SUPPLY SYSTEM

The supply system delivers compressed air to the various functions. The system consists of a compressor driven by the engine, pressure regulator, warning system for low air pressure, air dryer and air receiver.



Brake system diagram for the SBA111

- |                                    |                                     |
|------------------------------------|-------------------------------------|
| 3. Compressor                      | 17. Stop light switch               |
| 6. Check valve                     | 18. Quick-venting valve             |
| 7. Air pressure tanks              | 19. Relay valve                     |
| a = for equalisation               | 20a. Parking brake valve            |
| b = for parking brake              | 20b. Hand control valve for trailer |
| c = for front circuit              | brake and winch brake, if any       |
| d = for rear circuit               | 23. Double check valve              |
| 9. Pressure regulator              | 25. Trailer coupling                |
| 10. Low pressure indicator         | 27. Spring brake cylinder           |
| 11b. Compressed air gauge, double; | 37. Solenoid valve                  |
| orange pointer for front circuit,  | 52. Interlock valve                 |
| white pointer for rear circuit     | 53. Three-way valve                 |
| 12b. Foot brake valve              | 58. Pressure limiting valve         |
| 13. Safety valve                   | 62. Air dryer                       |
| 14. Pressure regulating valve      |                                     |

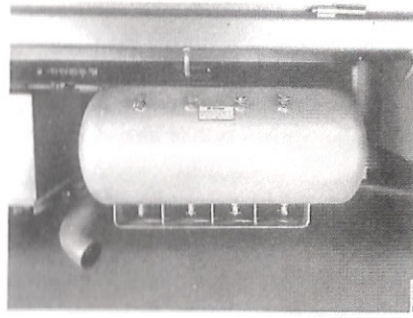


Brake system diagram for the SBA111

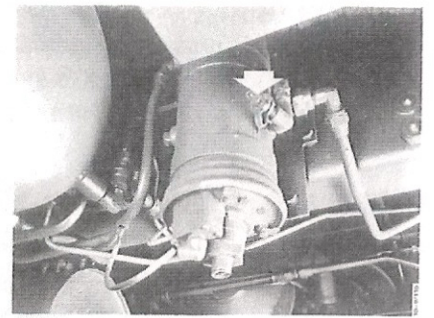
### Air pressure tank

The air pressure tank is divided into four sections. Each section is provided with an instrument tapping and drain cock.

The compressed air system must not be filled from the tappings on the air pressure tank but must be filled from the tapping behind the air dryer. (See Releasing the parking brake under Towing.)



Air receiver



Charging connection for compressed air

## FOOT BRAKE

The foot brake is divided into two independent circuits and is operated by the brake pedal. One circuit serves the front wheel brakes, and the other the rear wheel brakes. The compressed air for each circuit is stored in separate air receivers.

## PARKING BRAKE

The parking brake consists of a spring brake for each wheel, i.e. the brake is kept applied by a powerful spring in each spring brake cylinder (27). The brake is released by compressed air which is supplied through the normal control valve (20). An air pressure of about 5 bar (kgf/cm<sup>2</sup>) is required to release the parking brake. The parking brake circuit has a separate air pressure tank 7b. The parking brake circuit also includes an interlock valve (52), designed to prevent accidental release of the parking brake when the brake system is being charged, if the hand control valve has been left in the released position.

## TRAILER BRAKE

The trailer brake system is connected to the truck brake system by a coupling 25.

The actuating pressure to the trailer is controlled by a relay valve (19) from the foot brake valve (12b). It is also possible to brake the trailer only by means of the control valve for trailer brake (20), whose control lever is located below the steering wheel.

## CROSS-COUNTRY (OFF-ROAD) BRAKE

The cross-country brake is an extra control system for the foot brake, which is applied at a specific reduced air pressure. The cross-country brake only operates when the transfer box gear selector is in position T (Cross-country gear). The brake is operated by means of the button on the cab floor. (See also Braking under Driving.)

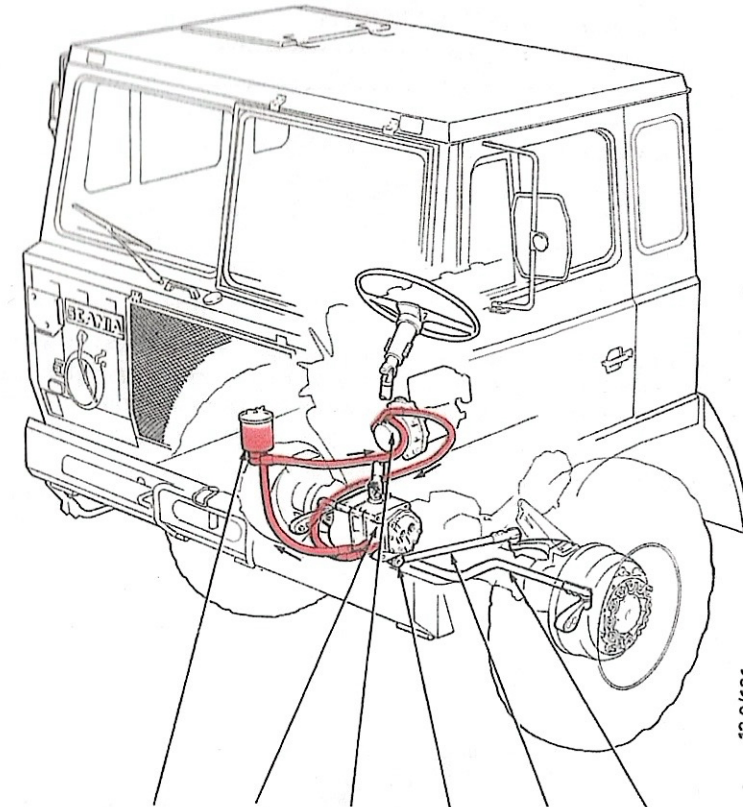
## WINCH BRAKE

A winch brake is provided on trucks equipped with a winch. This brake is connected to the truck brake system.

## Steering system

The truck is equipped with hydraulic power steering gear, which considerably reduces the steering wheel effort required.

In the event of a fault in the hydraulic system, the steering gear will act mechanically, but will require a higher effort at the steering wheel.



1. Hydraulic fluid container
2. Power steering gear
3. Hydraulic pump
4. Steering worm sector arm
5. Drag link
6. Track rod

Steering system

## Wheel angle indicator

A wheel angle indicator, which indicates the angle of the front wheels, is provided below the steering wheel.



Wheel angle indicator

13-9/101

13-9/128

# Frame, springs and wheels

## FRAME

The frame consists of two longitudinal channel-section members joined together by cross-members.

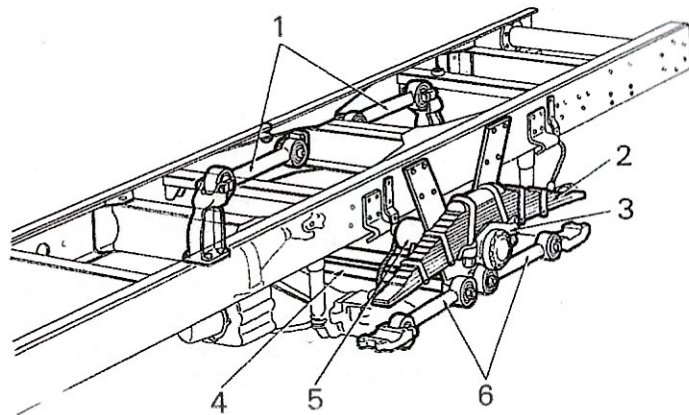
The front and rear cross-members are tubular in section and are extremely robust to give the frame the torsional rigidity and strength required when driving on rough ground.

## SPRINGS

The rear and front springs are both leaf springs. On the SBA111 and on the front of the SBAT111, the front ends of the springs are rigidly suspended in pivot bolts. At the rear, the springs are suspended in spring shackles.

The rear spring system on the SBAT111 is of the balanced bogie type, with one spring on either side. The springs are pivoted at the centre in main bearings, and at their outer ends absorb the vertical forces from the truck axles.

All axles have double-acting hydraulic shock absorbers.



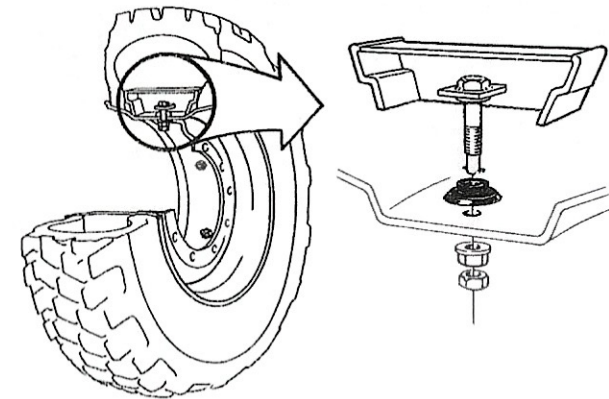
- |                           |                          |
|---------------------------|--------------------------|
| 1. Upper reaction struts  | 4. Bar                   |
| 2. Spring                 | 5. Bogie suspension axle |
| 3. Spring bearing housing | 6. Lower reaction struts |

Bogie of the SBAT111

## WHEELS

The Scania SBA111 and SBAT111 are fitted with sheet steel wheels and tyres with cross-country or sand treads. All wheels are single and identical.

As an optional extra, the trucks can be fitted with tyre locks which prevent the tyre from sliding off the rim in the event of a puncture. This device makes it possible to drive with a punctured tyre for a distance of up to 10 km.



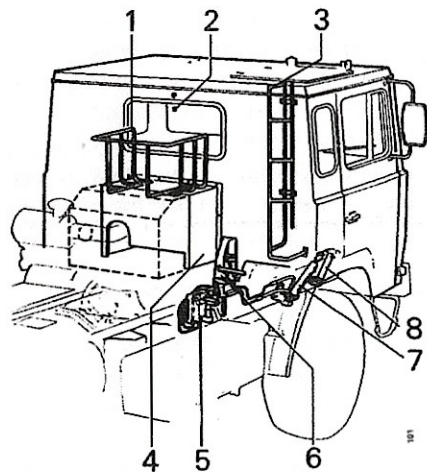
Tyre with tyre lock

## Body

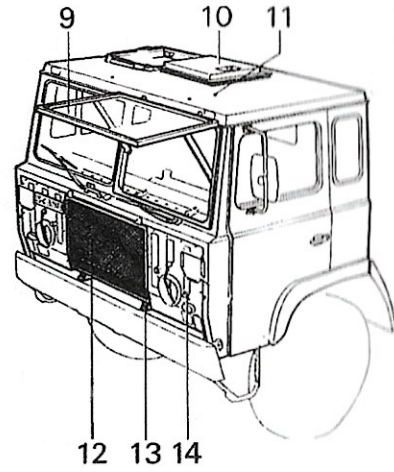
The cab can be tipped forward by means of an hydraulic device.

The front cover can be opened and the two front plates removed.

The roof is fitted with a hinged hatch and mounting holes for roof rack.



- 1. Basket (optional extra)
- 2. Hole for speaking tube
- 3. Ladder (optional extra)
- 4. Engine guard (dotted lines refer to the SBAT111)
- 5. Cab tilting pump
- 6. Rear cab bracket
- 7. Tilting cylinder

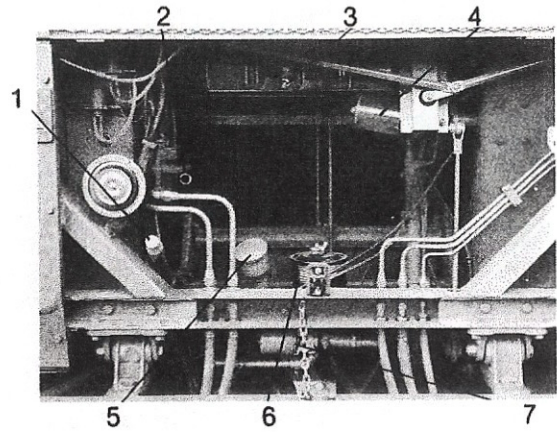


- 8. Mechanical stay
- 9. Opening window (optional extra)
- 10. Roof hatch
- 11. Mounting holes for roof rack, sign or the like
- 12. Hinged front cover
- 13. Front cab bracket
- 14. Bracket for blackout lights

Cab

### FRONT COVER

When the front cover is opened, the parts shown in the figure will be visible.

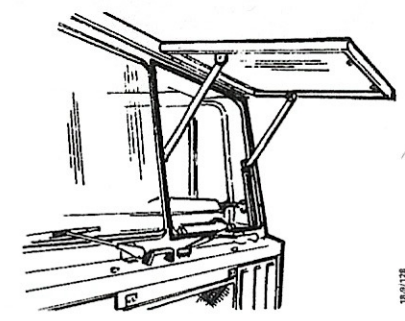


- 1. Engine dipstick
- 2. Chain for cold starting control
- 3. Sight glass for coolant level
- 4. Windscreen wiper motor
- 5. Filler pipe for engine oil
- 6. Fluid container for power steering
- 7. Circulation pump for engine heater (optional extra)

### WINDOWS

The truck windows are of hardened glass, except for the two windscreens, which are of laminated glass. The door side windows consist of sections, which can be raised and lowered, and pivoted ventilation windows (quarter lights). Each side window can be wound down by means of a handle on the inside of the door. The ventilation windows can be opened after releasing a catch.

On some trucks, the windscreen on the driver's side can be opened. See also: Opening the hinged windscreen.

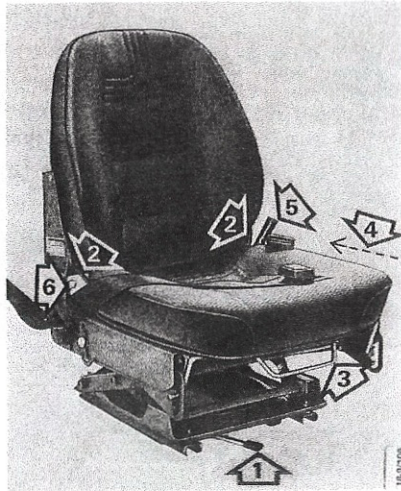


Windscreen open

### DRIVER'S SEAT

The seat consists of a seat cushion, a backrest and a sprung frame. The frame is mounted on two rails which are secured to distance pieces bolted into the cab floor. The seat suspension is provided by a transverse torsion spring at the rear of the frame. A hydraulic shock absorber prevents the seat from rocking.

The seat can be adjusted to different positions to enable different drivers to obtain a comfortable driving attitude.



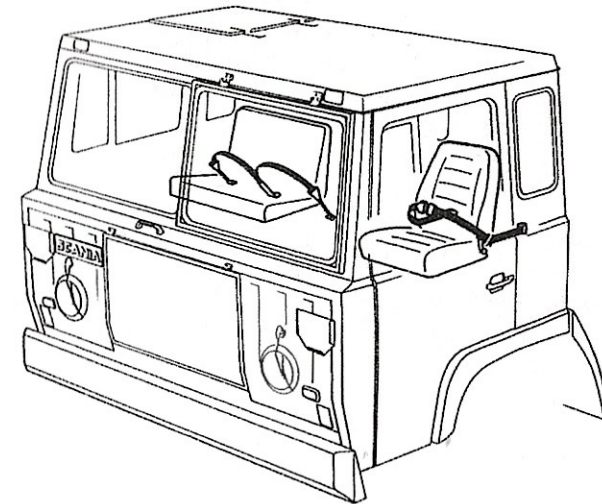
Driver's seat

**Adjustments available:**

1. Fore-and-aft adjustment: The seat can be slid along the floor rails. Move the lever to the right.
2. Backrest rake: Four positions. Press one of the buttons.
3. Height adjustment of front of seat: Five positions.  
Raising: Lift the cushion.  
Lowering: Pull handle 3 forward. Lower to the desired position.
4. Height adjustment of rear of seat: Three positions. Push the seat cushion back and set the desired position.
5. Suspension stiffness: The initial preloading of the torsion spring is infinitely variable by means of lever 5, so that the stiffness of the springing can be matched to the weight of the driver.  
Stiffer suspension: Pull out the handle on the lever, turn it so that the plus sign (+) is at the front and then move the lever upwards and downwards.  
Softer suspension: Proceed in the same way, but with the handle turned so that the minus sign (—) is at the front.
6. Suspension indicator: When the correct adjustment has been made, the pointer will be at the same level as the front edge of the seat. If the pointer is outside the edge, the spring force is too high, and if the pointer is inside the edge, the spring force is too low.  
When driving on rough ground, it may sometimes be advisable to adjust the suspension so that the springing is rendered inoperative.

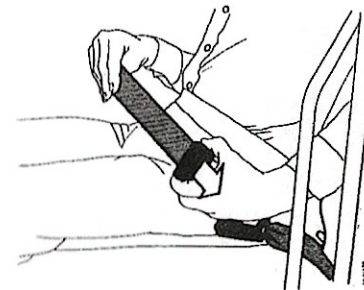
**SEAT BELTS (Optional extra)**

As an optional extra the seats in the driver's cab and personnel cabin and benches can be fitted with seat belts of the lap-strap type. The belts are adjustable.

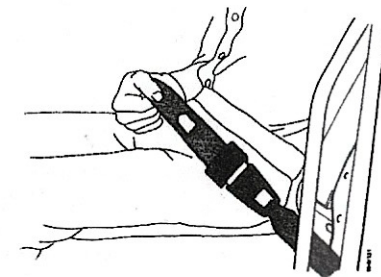


**Seat belt adjustment**

- If the belt needs to be lengthened, first slacken the upper half of the waist band and then pull out the adjusting buckle to the desired length.
- If the belt needs to be shortened, pull in the top half of the waist band.



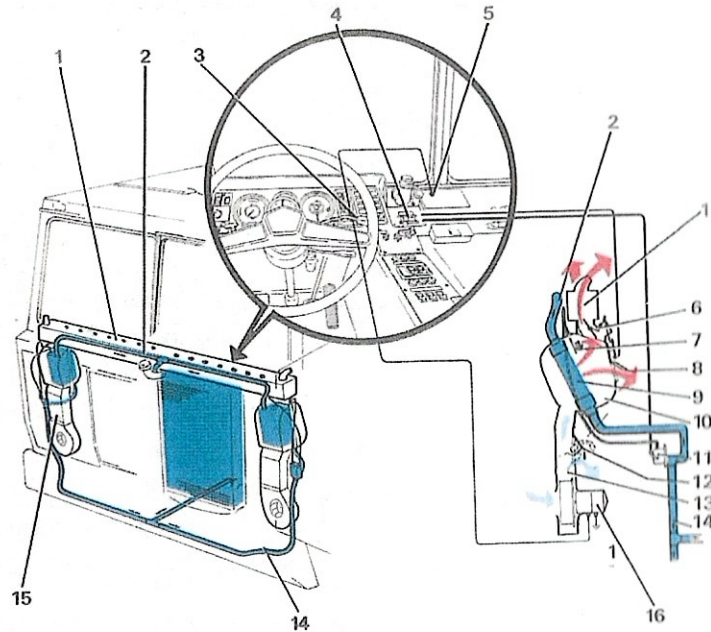
Lengthening seat belt



Shortening seat belt

## HEATING SYSTEM

Two identical heaters are secured to the front wall of the cab inside the cab front panels. Fresh air is drawn in through openings in the front panels and then flows through a coolant-heated air heater in each heater unit. The desired temperature of the hot air is controlled by a thermostat which is set by means of the TEMP lever on the instrument panel. The thermostat then maintains a constant temperature in the cab. The air flow to the windscreens is controlled by a damper which is set by means of the AIR lever on the instrument panel.



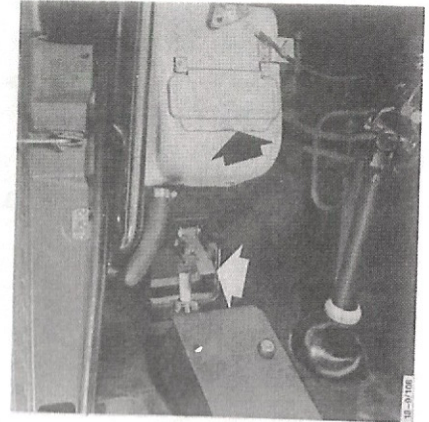
Water  
Hot air  
Cold air

- |  |                       |
|--|-----------------------|
| 1. Windscreen frame                        | 9. Air heater         |
| 2. Water outlet pipe                       | 10. Hot air box       |
| 3. Switch for fan motors                   | 11. Thermostat        |
| 4. Control handles for air and temperature | 12. Footwell damper   |
| 5. Fuse for fan motors                     | 13. Lower air duct    |
| 6. Upper air duct with damper              | 14. Water supply pipe |
| 7. Sensor                                  | 15. Heater unit       |
| 8. Damper                                  | 16. Fan with motor    |

The air flow is dependent on the speed of the truck and on the speed of the electric motor driven fan in each heater. The fan motors have two speeds, which are controlled by switch 18 on the instrument panel.

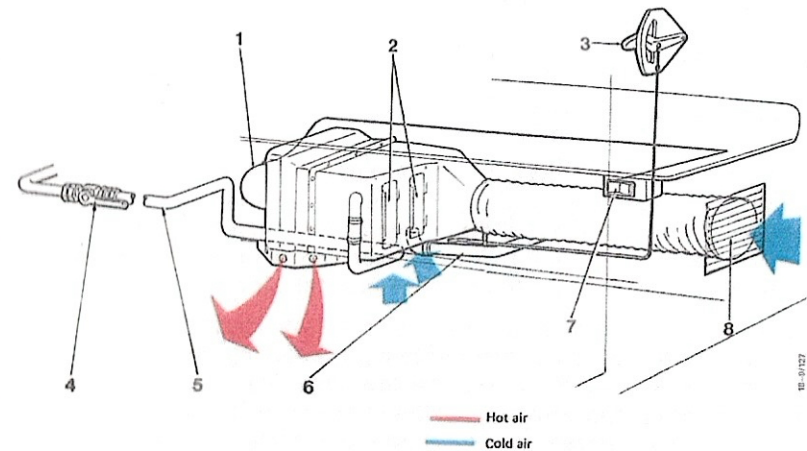
The air flow to the floor is controlled by means of a damper on each hot air box under the instrument panel.

Fresh air can also be supplied directly to the cab floor by means of a separate foot-controlled damper, without passing through the air heater.



Dampers for hot and cold air

Trucks with personnel cabins have an extra heater for heating the cabin. Fresh air is taken in through an opening in the side of the cabin. The desired temperature of the hot air is set by the lever on the cabin wall. The air flow is controlled by a fan, which is regulated by the switch on the bench. The hot water flow is controlled by a tap under the bench.



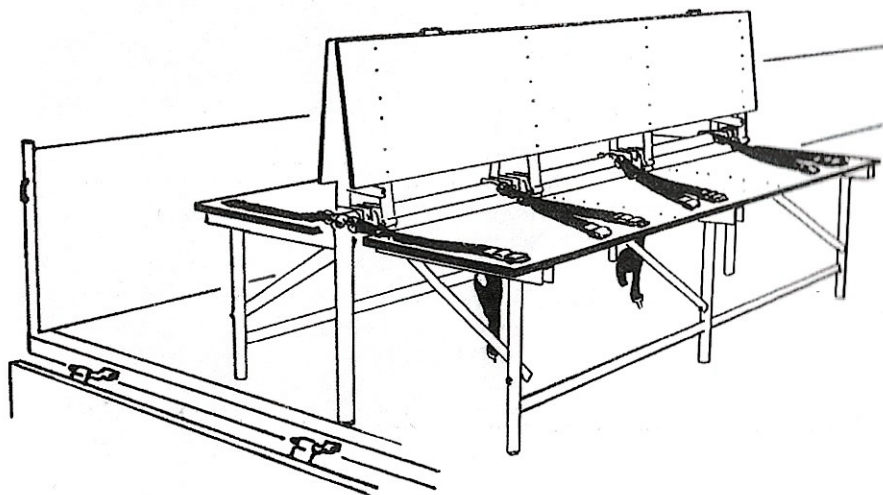
- |  |                         |
|--|-------------------------|
| 1. Fan motor                             | 5. Water supply pipe    |
| 2. Air intake from cabin (recirculation) | 6. Water outlet pipe    |
| 3. Air damper control                    | 7. Switch for fan motor |
| 4. Temperature control tap               | 8. Outdoor air intake   |

Personnel cabin heating system

## BENCHES FOR MOUNTING ON THE PLATFORM

(optional extra)

The platform is prepared for securing benches which can accommodate a maximum of 14 people. The benches consist of sections and can be folded up. The legs of the benches are placed in special mounting holes and are secured by belts with hooks which are hooked into the platform.

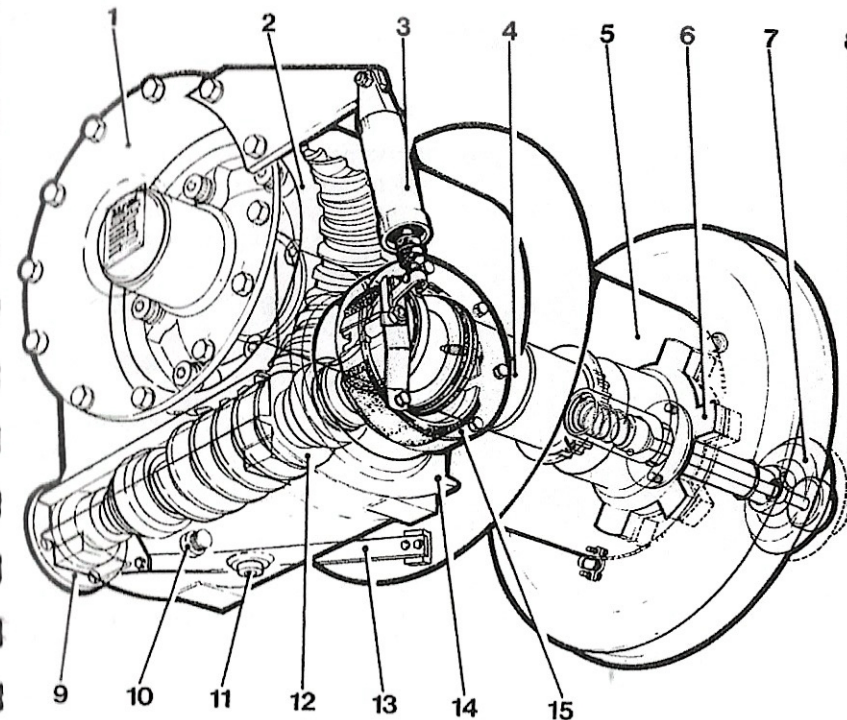


## Winch (optional extra)

The winch is secured to the right-hand frame member. It is driven by a propeller shaft from the winch power take-off on the transfer box. The power take-off is engaged and disengaged by means of switch 41 on the instrument panel to the right of the driver and is driven when the gear selector is set to D (R) and the transfer box selector is set to T.

The drive shaft is bolted to a flange on the worm gear shaft. From the worm gear, the torque is transmitted to a jaw coupling, one half of which is mounted on the winch drum. The jaw coupling is engaged or disengaged by sliding the coupling handle in or out. A locking button locks the handle in the inserted and withdrawn positions.

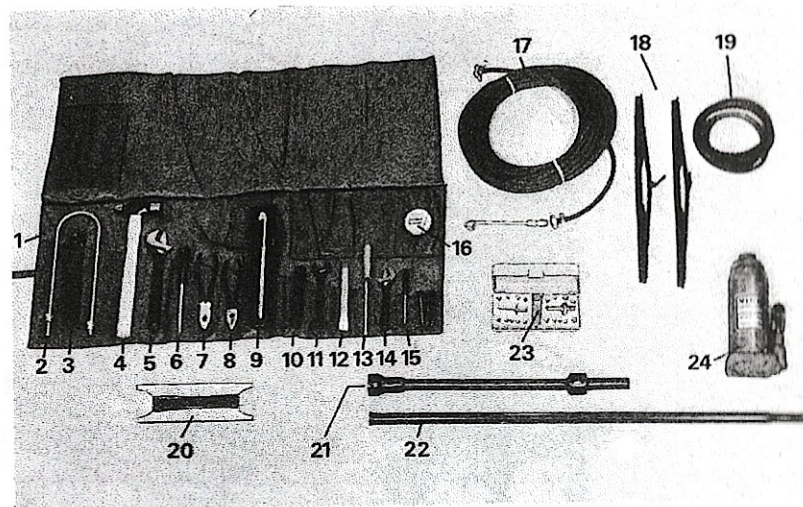
A brake drum mounted on the worm shaft extension is applied by means of compressed air. The compressed air flow is controlled by means of the stalk under the steering wheel or the foot brake pedal. The winch is automatically prevented from being overloaded by the torque converter. When the turbine wheel is stationary at maximum throttle, maximum tractive effort is obtained at the winch rope.



- |                             |                        |
|-----------------------------|------------------------|
| 1. Wormwheel end            | 8. Locking button      |
| 2. Wormwheel                | 9. Driver              |
| 3. Brake actuating cylinder | 10. Filler plug        |
| 4. Drum shaft               | 11. Drain plug         |
| 5. Rope drum                | 12. Worm               |
| 6. Jaw coupling             | 13. Spinning brake     |
| 7. Jaw coupling handle      | 14. Winch gear housing |
|                             | 15. Winch brake        |

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## Tools and spare parts



1. Tool bag
2. Spare fuel pipe
3. Allen key for oil plug in engine
4. Hammer
5. 10" adjustable spanner
6. 7 x 150 mm screwdriver
7. Gas burner pliers
8. Universal pliers
9. Tyre gauge
10. Socket spanner, 19 mm
11. Open end, 19 x 22 mm
12. Chisel
13. Combination screwdriver
14. 6" adjustable spanner
15. 3.2 x 75 mm screwdriver
16. Insulating tape
17. Tyre pumping hose with nozzle
18. Windscreen wiper blades
19. V-belts
20. 1.5 mm steel wire
21. Wheel nut spanner
22. Lever for cab tilting pump, wheel nut spanner and jack
23. Box of bulbs and fuses
24. Jack

## OPERATION

### Running in

Before the truck leaves the factory, the engine has been bench tested and the finished truck road-tested. In conjunction with delivery of the vehicle, and during the initial period after it has been taken into service (running-in period), a number of inspections and adjustments must be made, in addition to the normal periodic maintenance. One of the reasons for this is that gaskets tend to settle slightly during this initial period. These measures should consequently be undertaken where appropriate, even after one or some of the units in the truck have been reconditioned. See "Maintenance" section.

We recommend that a certain amount of care be taken during the running-in period and high continuous loads and high speeds should be avoided.

This applies up to 5000 km, although it is always worth-while exercising a certain amount of caution for a further 5000 km.

### Inspections and checks before driving

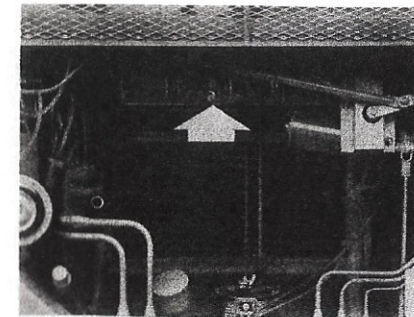
#### (daily inspection)

Before the truck is moved, check whether leakage has occurred. If any leaks are detected, the leak must be traced and repaired.

Open the front cover

Grip the bottom of the radiator grille and pull forward. The front cover is retained in the open position by a catch.

#### Check the coolant level



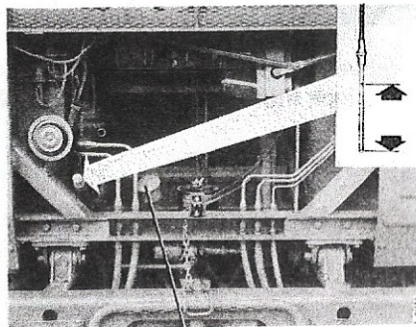
Sight glass for coolant

- The coolant level can be checked through the sight glass on the expansion tank of the cooling system. The coolant must be visible in the glass when the engine is warm and cold. Topping up should be carried out with the engine running. **Release the cap carefully if the engine is warm.** Top up with clean water up to the top of the filler pipe, if necessary.
- If the coolant contains glycol, a mixture of glycol and water should be used when topping up. The glycol content should be checked at regular intervals. The coolant must contain the correct proportion of corrosion inhibitor (see section "Maintenance instructions, Cooling system").

**Never top up the radiator with water when the engine is hot. The considerable temperature difference may cause cracking.**

### Check the oil level in the engine

- The level must be between the level marks on the dipstick. If the oil level is below the bottom mark, the engine must be topped up with oil. Always top up with the same grade of oil as that already in the engine (see section "Maintenance instructions, Engine").



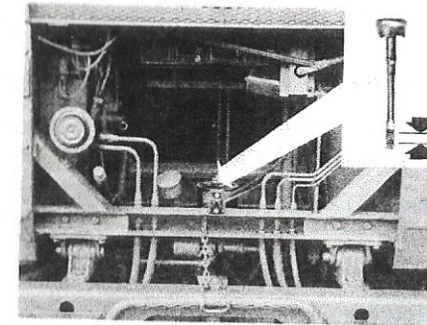
Topping up

Dipstick and filler pipe for engine oil.

### Check the hydraulic fluid level in the power steering container

- The level must be between the level marks on the dipstick when the engine is running. When the engine is stationary, the fluid level in the container will be about 20 mm higher.

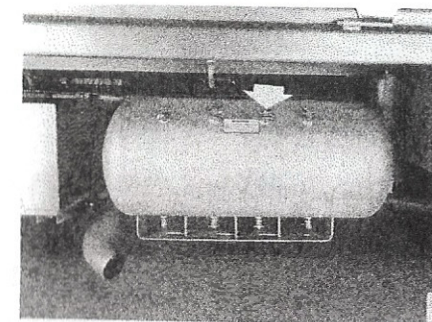
- Top up with fluid of the same grade as that already in the steering system (see section "Maintenance instructions, power steering gear").



Oil dipstick for hydraulic fluid

### Check the tyre pressures

- Check the tyre pressures. Particulars of the recommended tyre pressures are given in the section headed "Technical specifications". If the tyres need to be pumped up, connect the tyre pumping hose to the instrument terminal on the equalising air pressure tank. Start the engine, pull the hand throttle and pump up the tyres.
- Check that there is no external damage to the tyres and that all valves are fitted with valve caps.
- Check that the wheels are not damaged and that none of the wheel nuts are loose.



Instrumental terminal

### Check the lights

- Check that the headlamp glasses are intact and clean, and that the lighting is operating correctly.
- Check that the tail, stop, side riding and blackout lights are clean and operating correctly.
- Check that the direction indicators are working correctly and are intact and clean.

For bulb changing, see section "Maintenance instructions, Electrical system".

### Check the horn, washers and wipers

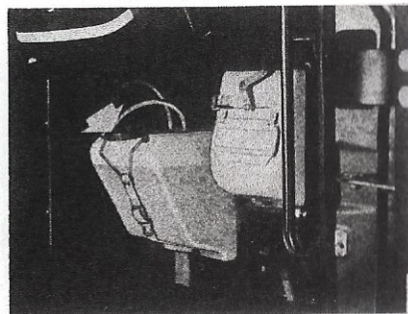
Check that

- the horn is working
- the windscreen wipers are working and that the wiper blades are intact and lie firmly against the windscreen throughout their length
- the windscreen washers are working and that the liquid container is full.

Switch on the dipped beam and check that

- the headlamp wipers and washers are working.

Top up the liquid container with water, if necessary. In cold weather, ethyl alcohol must be added to the washing water to prevent freezing. If more than 40 % alcohol is added, there is risk of damaging the paintwork.



Liquid container

### Check the windows, mirrors, reflectors, signs and plates, mudguards

Check that

- the windows are intact and clean
- the reflectors are intact and clean
- the number plates are intact and clean
- the rear view mirrors are intact and correctly adjusted
- the mudguards are intact.

### Check the tow hitch

Check that

- the tow hitch is not damaged
- the tow hitch is locked. The locking handle must be in the locked position

If a trailer is hitched to the truck, check that

- the trailer is properly secured to the truck
- the cables between the truck and trailer are not damaged and that they are correctly connected.

### Check the instruments, warning lamps, controls

Check the operation of warning and indicating lamps for:

- Engine oil pressure
- Charge
- Brake pressure
- Interlock valve
- Parking brake
- Battery heater
- Engine temperature
- Engine heater circulation pump
- Gearbox oil temperature
- Direction indicators
- Full beam
- Hazard warning lights (central warning lamp)

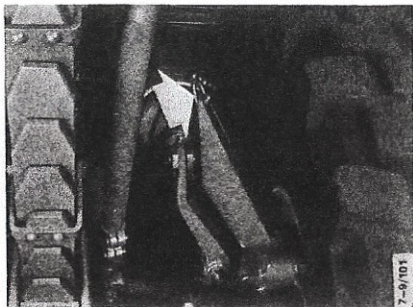
Check that the indicating lamps for the engine and transmission oil pressures light up and that the charge lamp lights up when the contact key is pushed in. If anyone of these warning lamps is alight, the central warning lamp must flash. The lamps must go out when the engine is started and runs at high idling speed. When the brake pressure is below 4.9 bar (kgf/cm<sup>2</sup>), the warning lamp for low brake pressure must light up, the central warning lamp must flash and the warning buzzer must sound. **Never drive the truck when the central warning lamp is flashing.**

## Check the brakes

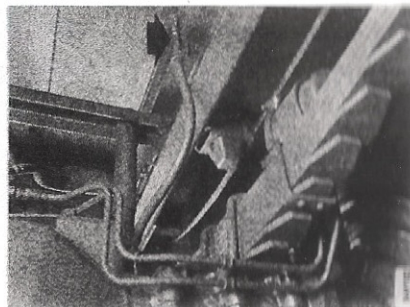
Drive the truck and test the brakes. Check that the brakes are applied evenly and do not cause the steering to "pull" to one side. Check the parking brake by driving the truck at low speed and applying the parking brake. The truck must stop in a few metres without "pulling" to one side. The checks also apply to the trailer. **Keep an eye on the road behind you when carrying out brake tests.**

## Checks after driving on rough ground or across water

- Check that no vital parts of the truck chassis, such as track rod, drag link and brake pipes have been damaged.
- Carry out brake tests.
- Lubricate the universal joints.
- Check that the vent pipes for the central gears and hub reduction gears are undamaged. If it is suspected that water may have entered through the vent pipes, check for any signs of water in the oil. If the oil contains water, it must be changed.



Vent pipe, hub reduction gear



Vent pipe, central gear

## Starting the engine

The starting procedure varies depending on the temperature of the engine and the ambient temperature.

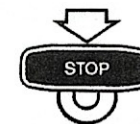
**Note.** If the engine is equipped with a turbocharger (DS11 engine), the engine speed must not exceed 1000 r/min during the first 30 seconds. This will ensure that the turbocharger will receive adequate lubrication before being accelerated to a high speed.

### BEFORE STARTING

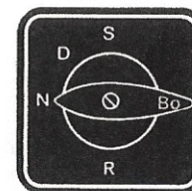
If the fuel tank has been run dry or if the engine has not been running for an extended period of time, the fuel system must be bled before a starting attempt is made. See Fuel system under the heading Maintenance.

### STARTING A HOT ENGINE AND STARTING AT AMBIENT TEMPERATURES ABOVE APPROX. 0° C

1. Check that the stop control is pushed in.



2. Check that the gear selector is in the neutral position N.



3. Push in the contact key and check that the warning lamps for charge and oil pressure light up.
4. Depress the accelerator pedal fully.
5. Press the starter button.
6. Release the starter button and the accelerator pedal when the engine has started.
7. Warm up the engine. See Warming up the engine.

## STARTING A COLD ENGINE AT AMBIENT TEMPERATURES BELOW APPROX. 0° C

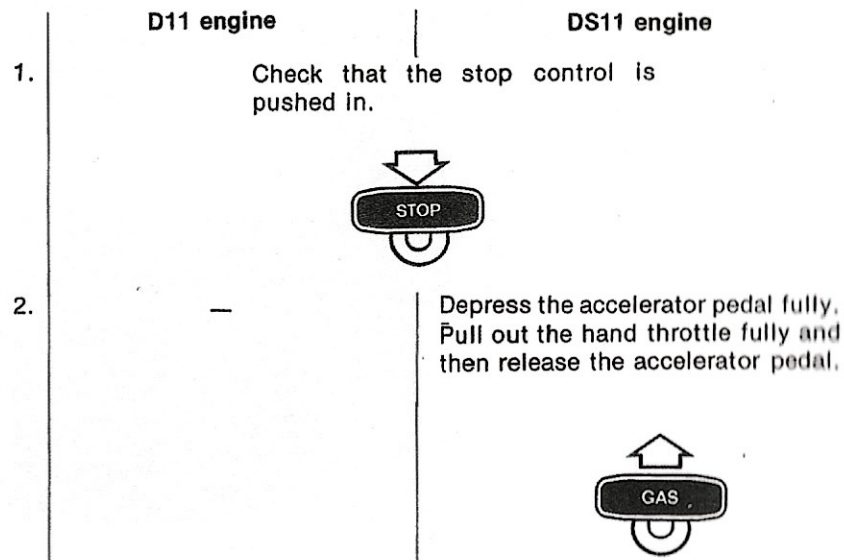
If the truck is equipped with a starting aid injector or a Thermostart inlet air preheater, these accessories should be used at temperatures below -10° C.

The cold starting device of the fuel injection pump should be engaged. The injection pump control rod will then be at the front limit of its stroke, which provides an extra amount of fuel for starting. During cold weather, engagement may be rendered difficult by the lubricating oil being viscous in the fuel injection pump.

**Note.** The operations must be carried out in the correct order, since the risk is otherwise involved that the control rod will never reach the cold-starting position.

**Note.** Prepare for cold starting in accordance with points 1—3 below while the engine is warm if the weather is expected to be cold during the next starting attempt.

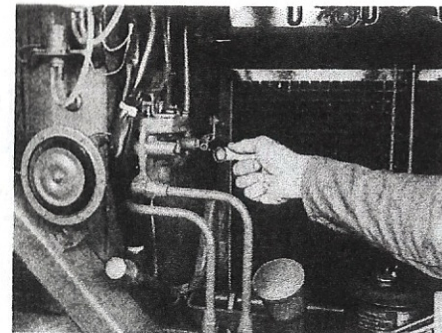
At temperatures below -10° C or if the batteries are not fully charged, there is a risk of the battery power only being sufficient for one attempt to start the engine. **Prepare this attempt carefully.**



## D11 engine

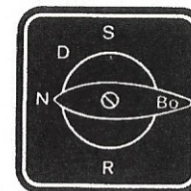
## DS11 engine

Pull the chain of the cold-starting device several times at a gentle pace. In spite of the oil being viscous, the control rod of the pump is then certain to reach its end position.



Chain for cold-starting device

Check that the gear selector is in the neutral position N.



Push in the contact key and check that the warning lamps for charge and oil pressure light up.

Press the accelerator pedal down fully and keep it in this position.

Press the starter button. Keep it depressed until the engine starts.

8. When the speed has reached a maximum of 1000 r/min, set to a suitable idling speed.
9. Warm up the engine. See Warming up the engine.

### STARTING A COLD ENGINE WITH THE AID OF THE STARTING AID INJECTOR (optional extra)

If the truck is equipped with a starting aid injector, this should be used in order to facilitate starting at temperatures below  $-10^{\circ}\text{C}$ .

**Note.** The starting aid injector must not be used in conjunction with engine heater.

- |    | D11 engine  | DS11 engine   |
|----|---|---|
| 1. | Check that the stop control is pushed in.   |   |
| 2. | —   | Depress the accelerator pedal fully. Pull out the hand throttle fully and then release the accelerator pedal. |
| 3. | Pull the chain of the cold-starting device several times at a gentle pace. In spite of the viscosity of the oil, the control rod of the pump will then be certain to reach the limit of its stroke. |   |
| 4. | Check that the gear selector is in the neutral position N.  |   |
| 5. | Push in the contact key and check that the warning lamps for charge and oil pressure light up.  |   |
| 6. | Remove the cover of the starting aid injector and retract the puncturing pin.   |   |
| 7. | Place a cartridge in the container and refit the cover.   |   |

8. Puncture the cartridge by pressing down the puncturing pin firmly. (At ambient temperatures below  $-20^{\circ}\text{C}$  one additional cartridge should be used as follows: Wait for 10 seconds to allow the fluid of the first cartridge to run into the pump. Do not pump. Continue at item No. 6.)
9. Depress the accelerator pedal fully and keep it depressed.
10. Press the starter button and simultaneously pump the starting aid injector pump. Keep the starter button depressed and continue pumping until the engine continues to run unaided.
11. When the speed has reached a maximum of 1000 r/min, set to a suitable idling speed.
12. Warm up the engine. See Warming up the engine.

### STARTING A COLD ENGINE BY MEANS OF THE THERMOSTART INLET AIR PREHEATER (optional extra)

If the truck is fitted with a Thermostart, this must be used to facilitate starting at temperature of below  $-10^{\circ}\text{C}$ .

- |    | D11 engine                                | DS11 engine  |
|----|---|--|
| 1. | Check that the stop control is pushed in. |  |
| 2. | —   | Press the accelerator pedal down fully. Pull out the hand throttle fully and then release the accelerator pedal. |

3.

Pull the chain of the cold-starting device several times at a gentle pace. In spite of the viscosity of the oil, the pump control rod will then be certain to reach the limit of its stroke.

4.

Check that the gear selector is in the neutral position N.

5.

Press the contact key and check that the warning lamps for charge and oil pressure light up.

6.

Switch on the Thermostart by means of the switch on the instrument panel.

7.

Press the starter button after 15 s. The Thermostart must also be switched on when the starter motor is running. If the engine does not fire within about 10 seconds, release the starter button for about 10 seconds but keep the Thermostart switched on. Then press the starter button again.

The Thermostart may be used for a short while after starting to improve the running of the engine.

Keep the starter button depressed until the engine continues to run unaided.

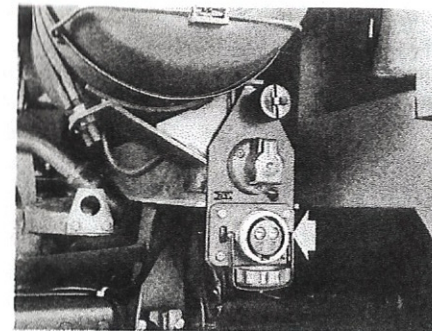
When the speed has reached 1000 r/min, set to a suitable idling speed.

8.

Warm up the engine. See Warming up the engine.

### STARTING THE ENGINE BY MEANS OF STARTING ASSISTANCE CABLE

If the starting capacity of the batteries is low, extra batteries (24 V) may be connected to the electrical system of the truck at the socket underneath the air cleaner. Cables may also be drawn from another vehicle with the same system voltage (24 V). Employ the usual starting procedure.



Assisted starting socket

### STARTING THE ENGINE BY TOW-STARTING

**N.B.** When tow-starting, always use a rigid tow-bar, since when the engine is stationary, the compressor does not supply the brake system with compressed air.

When the engine is not running, there is no power assistance in the steering gear. The necessary steering wheel effort is then considerably higher than usual.

If there is no pressure in the brake system, the parking brake can be released according to the instructions under Towing.

1. Make preparations for starting in accordance with the instructions under Starting the engine.
2. Set the transfer box selector to V or T. In position T, starting will take place at a lower road speed than in position V. If the compressed air system is not pressurised, the transfer box will not change gear.
3. Set the gearbox selector to Bo.
4. Press the accelerator pedal and begin towing.
5. When sufficient speed (about 20 km/h with the gear selector in position V and about 15 km/h in position T) has been attained, the engine will rotate.
6. When the engine has started, immediately turn the gear selector to N.

**N.B.** If this is not done quickly enough, there is a risk that the tow bar or the vehicles will be damaged as the driving wheels are mechanically coupled to the engine.

## Warming up the engine

You may drive off immediately after starting the engine, but preferably with a light load and at a moderate speed until the engine has reached its normal operating temperature. Moderate loading of a cold engine provides better combustion and faster warming up than warming up at idling speed. If the brake pressure is too low, however, the engine may have to be driven at idling speed to allow the compressor to build up pressure in the compressed air system. Particularly in cold weather, the engine must then be run at low speed (600—800 r/min). At low speed, combustion is better and the amount of white smoke produced is substantially reduced.

## Stopping the engine

Set the gear selector to neutral. Apply the parking brake and pull out the stop control. Then push in the stop control.



**Engines equipped with a turbocharger (DS11) must not be "revved up" before being stopped. Otherwise there is a risk that the turbocharger will be damaged due to lack of lubrication.**

**Prepare a cold start while the engine is warm if the weather is expected to be cold during the next starting attempt.**

## Driving

**N.B. The truck must never be driven while the buzzer is sounding or the central warning lamp is flashing.**

If full lock has been reached, or if the wheels are prevented from being turned further by a solid obstruction, the hydraulic assisting force in the steering gear will be fully utilised if an attempt is made to turn the steering wheel further. In this case, the hydraulic pump will operate at maximum pressure and this will lead to increased oil temperature.

During extended periods of maximum loading, i.e. more than half a minute, there is a risk of overheating and damage to the pump. Therefore, avoid holding the steering wheel at either stop for a long period or forcing the wheels round when they are blocked by an obstruction.

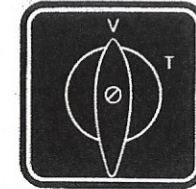
If a fault should occur so that the power assistance is not available, the steering gear will operate mechanically, but the steering wheel effort will be higher.

After being stationary for a long time, the gearbox systems may be drained of oil. It may then take a while before the truck can be driven after starting the engine. Set the gear selector to N and keep the engine speed at 1000 r/min for 10 seconds.

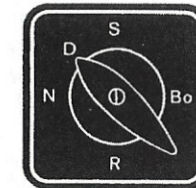
- The engine can only be started if the gear selector is in position N. This position is also used when the truck is stationary for an extended period with the engine running.

## DRIVING ON ROADS

- Set the transfer box selector to V (road gear).

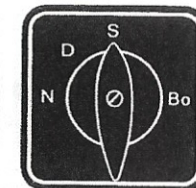


- Set the gearbox selector to D.



- Release the parking brake.
- Depress the accelerator pedal. The automatic gear changing mechanism will ensure that the correct gear is always engaged.

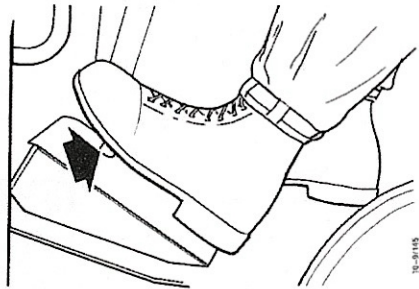
- Set the gearbox selector to S at speeds of around 0—30 km/h when repeated changes up and down are not required.



- Drive normally with the drive only on the rear axle (axles). Use the front wheel drive when driving on a slippery or loose surface.

## Engine braking

- The gearbox engine braking programme is selected by releasing the accelerator pedal and depressing the switch on the cab floor. The button need not be kept depressed.

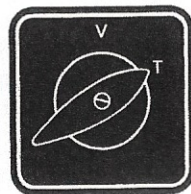


- The engine braking programme is operative until the accelerator pedal is again depressed, and the ordinary gearbox programme will then be operative.
- When driving on the ordinary gear-changing programme, a mechanical gear is automatically disengaged when the brake pedal is depressed, so that the engine will be prevented from stopping if the wheels should lock on a slippery surface. However, when the engine braking programme is switched on (by means of the button on the cab floor), the brake pedal will not disengage the mechanical gear, since the engine braking and braking with the foot brake must be able to operate simultaneously.

**Therefore, avoid engine braking on a slippery surface.**

## DRIVING IN ROUGH TERRAIN

- Set the transfer box selector to T (cross-country gear).

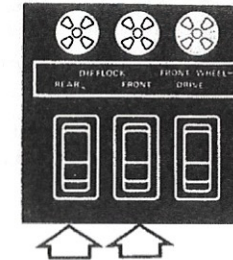


The automatic gear selector will prevent changing to cross-country gear at speeds above 18 km/h.

The cross-country gear can therefore be preselected as follows:

1. Set the transfer box selector to T in good time before driving off the road.
  2. Release the pedal, brake the truck and drive out onto the rough terrain.
- The gearbox gear positions are used in the same way as when driving on a good road.
  - The angle of the front wheels can be read off on the wheel angle indicator in front of the steering column.

## Using the differential locks



The differential locks must be used when the surface is such that there is a risk of the wheels spinning.

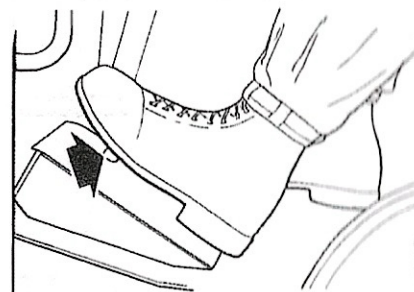
**The differential locks must not be used when the wheels have good traction.**

- The differential locks may be engaged while the truck is running.
- The differential locks must not be engaged if any of the driving wheels are spinning.**
- Be prepared to engage the differential locks just before difficult passages
  - Use mainly the rear axle differential lock (locks)
  - In some cases, it may be necessary also to engage the front axle differential lock
  - The differential lock of the front axle alone cannot be engaged, but can be preselected and can be engaged at the same time as the differential lock (locks) of the rear axle (axles)
  - The differential locks make it difficult to drive round bends and should therefore be disengaged, if possible, before approaching sharp bends
  - When the truck is halfway round a bend, stresses in the jaw couplings of the differential locks may cause them to remain engaged even though the switches are in the off positions.

## Using the cross-country brake

Use the cross-country brake when passing obstructions, mainly when driving away from obstructions, but also use it to obtain a smooth run when driving up onto stones, stumps or the like. The cross-country brake should not be used on long uphill gradients.

Keep the button on the cab floor depressed and depress the accelerator pedal until the braking effort is overcome. When driving downhill, it may be necessary to use the foot brake as well.



Foot switch

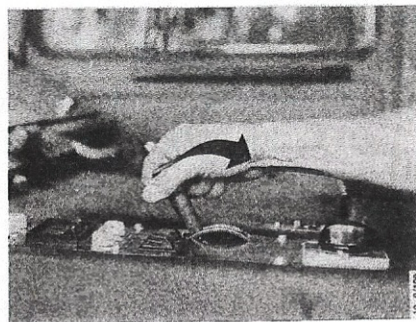
Always use the cross-country brake with discretion. Unnecessary use will increase the fuel consumption and the brake wear.

## BRAKING Foot brake

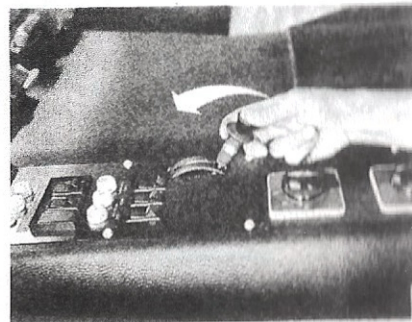
To achieve smooth but at the same time effective braking, the brake pedal must be depressed most forcefully at the beginning of braking. When the truck speed is reduced, the brake pedal can be gradually released. When the truck has stopped, the brake pedal must only be pressed down sufficiently for the truck to be kept stationary. Do not waste compressed air — avoid pumping the pedal.

## Parking brake

- To apply: Push the lever to the rear to the latched position.
- To release: Lift the latch on the lever and then push the lever forward.



Applying

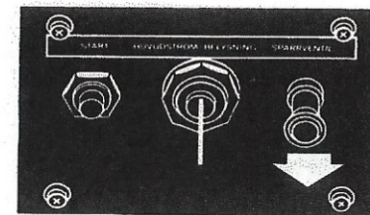


Releasing

## Interlock valve

If the air pressure in the parking brake system has dropped, e.g. if the truck has been parked for a long time, the parking brake is automatically blocked by the interlock valve and cannot be released until the air pressure has exceeded about 5 bar (kgf/cm<sup>2</sup>). The pressure of the parking brake system is not indicated on the compressed air gauge of the central instrument. When the brake has been blocked, the warning lamp for the interlock valve will light up. To release the parking brake, the blocking must first be cleared.

- Pull out the interlock valve control until the control lamp is extinguished.
- Release the parking brake.



Interlock valve control

## Braking with the engine

See under Driving on roads.

## Braking the trailer

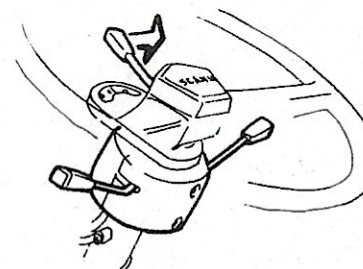
The hand control for the trailer brake should not normally be used when driving on main roads.

Braking of the trailer only requires extreme caution and a good knowledge of the characteristics of the vehicle when braking.

The manual control must not be used as a parking brake.

**Incorrect handling may cause accidents.**

The lever is also used to control the winch brake.



Operating lever for trailer brake and winch brake

## Towing

**A rigid tow bar must be used when towing the truck with a depressurised brake system.**

If the suspected cause of the truck having to be towed is a fault in the gearbox or its control system, the propeller shafts must be disconnected before the vehicle is towed.

- Press the switch for driving wheel disengagement. To ensure gear changing in the transfer box, the electrical system in the truck must be live and the compressed air system must be pressurised.
- In the event of a dead electrical system: Draw current from another vehicle by means of the starting assistance cable and press the switch for driving wheel disengagement.
- If the compressed air system is not pressurised: Fill the compressed air system of the truck by connecting a hose from another vehicle to the tapping behind the air dryer. Press the switch for driving wheel disengagement.

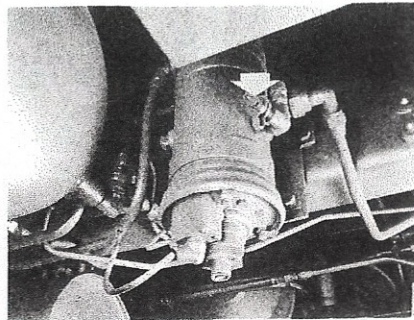
### Releasing the parking brake

If the parking brake system is not pressurised and the engine is not running, the parking brake can be released in two ways.

#### 1. Releasing with compressed air

If the towing goes on for a long time without the engine running, the pressure in the parking brake circuit may drop to the extent that the brakes are applied. Ensure that the pressure remains at normal working level by filling the parking brake circuit. The brake pressure gauge does not show the pressure in this circuit.

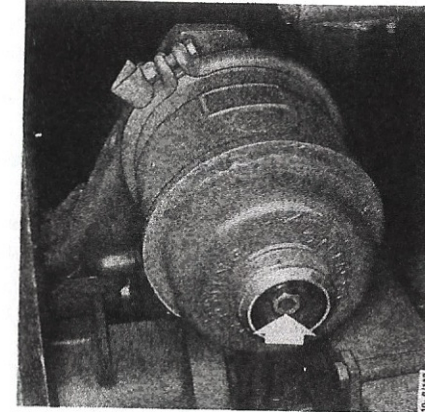
- Connect a tow bar to the towing vehicle.
- Push the parking brake lever forward to released position.
- Fill the compressed air system by connecting a hose from the equalisation tank on another vehicle to the tapping on the air dryer.
- When the bottom valve on the air dryer "blows", the system is full.



Filler tap for compressed air

#### 2. Releasing mechanically

- Connect a tow bar to the towing vehicle.
- Remove the covers on all the spring brake cylinders.
- Unscrew the trip screws until they can be turned easily.
- Place the covers in a clear visible place in the cab.
- When the truck is left, the wheels must be blocked so that the vehicle will not roll away.
- Attach a note to the steering wheel stating that the brakes are inoperative.



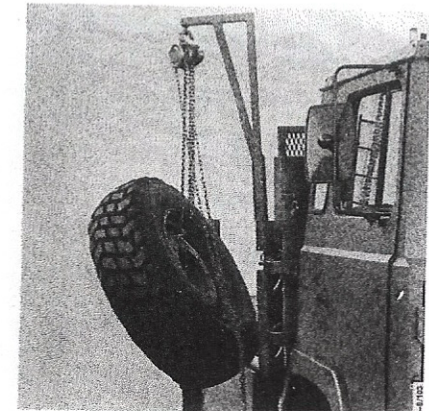
Trip screw

## Changing a wheel

### Using the lifting jib (optional extra)

**N.B. Max load of 200 kg**

1. Secure the lifting jib in the socket on the front of the frame.
2. Release the spare wheel.
3. Secure the lifting block in the spare wheel.
4. Lower the wheel down onto the ground. Hoist the other wheel up in the reverse order to lowering.



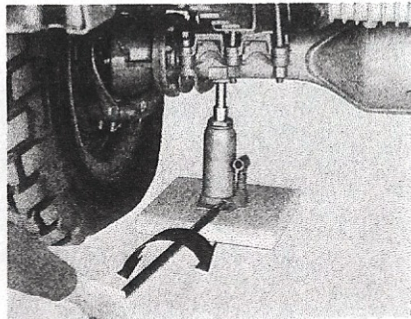
Lifting block

### Using the jack

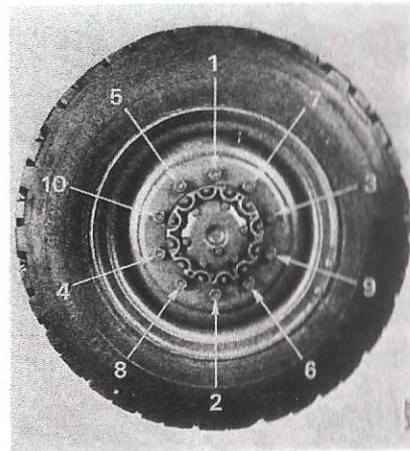
1. Check that the parking brake is on.
2. Place the jack on the baseplate shown in the figure, fit the jack guide and screw up the adjusting screw so that the guide rests against the axle housing.
3. Check that the valve is closed (turn clockwise).
4. Pump the jack until the wheel is clear of the ground.

### Change the wheel

1. Slacken the wheel nuts with the wheel nut wrench and lift off the wheel.
2. Clean the wheel studs.
3. Lift on the spare wheel.
4. Place the wheel nuts in position and tighten them with a torque of 500 Nm (50 kgf m) in the order shown in the figure.
5. Lower the truck by opening the valve (turn anti-clockwise). (optional extra)



Positioning the jack and operating the valve

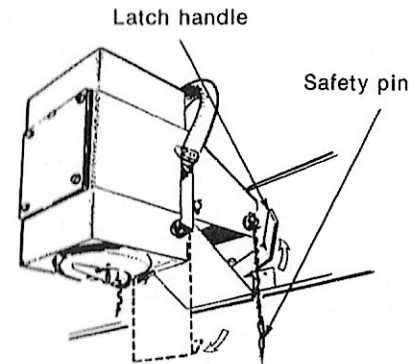


Tightening the wheel nuts

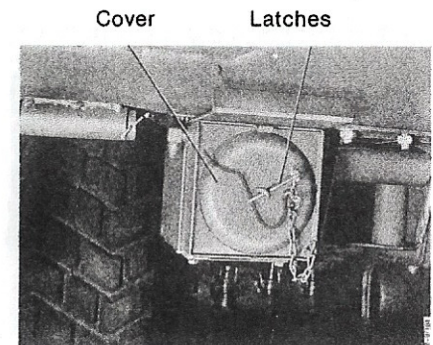
### Preheating the engine by means of the engine heater (optional extra)

**N.B. When using the engine heater, starting aid injector must not be used, as this will cause preignition in the cylinders and will make starting difficult.**

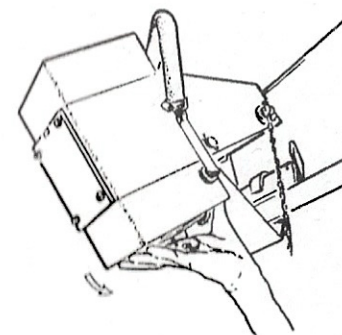
1. Remove the safety pin and lift the latch.
2. Push the engine heater upwards so that the locking flap drops down.
3. Lower the engine heater and lock it with the latch.
4. Remove the filler cap for the coolant and do not replace it throughout the heating procedure.
5. Remove the latches for the cover at the front and then remove the cover.
6. Check that the rear smoke cover is open.



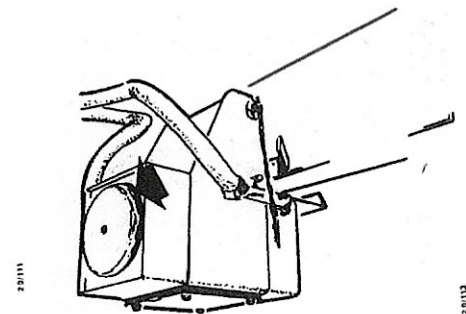
1. Engine heater raised



5. Engine heater lowered, viewed from front

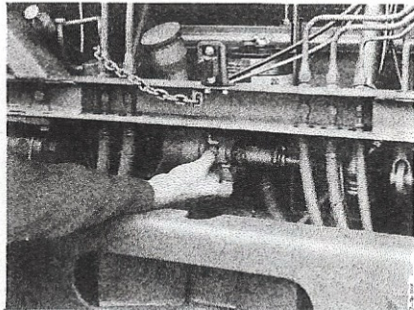


2-3. Lowering

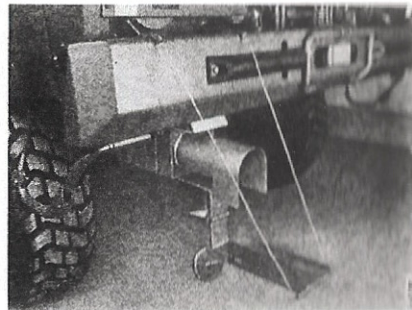


6. Smoke cover

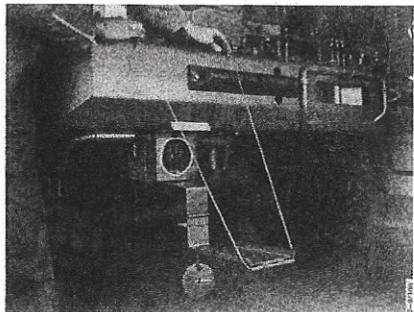
7. Press the contact key and start the circulation pump by means of the switch on the instrument panel. Check that the indicating lamp lights up. If it does not light up, this may be due to the fact that the automatic cut-out on the instrument panel has tripped. The cut-out is tripped when there is a surge of current to the pump, which may happen if the pump should seize after having been inoperative for a long time. The fault can be remedied by rotating the shaft between the pump motor and pump housing by hand. The pump is located behind the front cover.
8. Fit the support plate and adjust the suspension cables so that the plate is horizontal.
9. Fit the flame guard.
10. Light the blow torch (see instructions for use).
11. Reduce from full to half flame using the knob on the main burner.
12. If the torch is lit outside the flame guard, it must be held halfway into the flame guard for a short while.



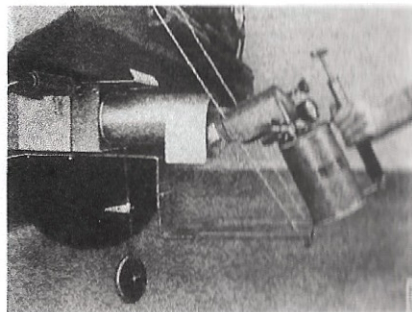
Circulation pump



9. Flame guard

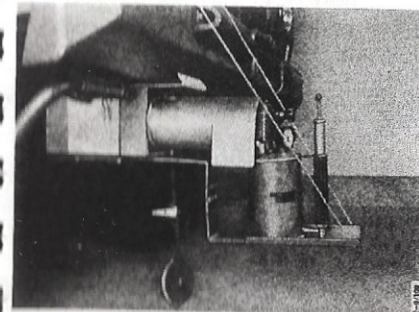


8. Support plate

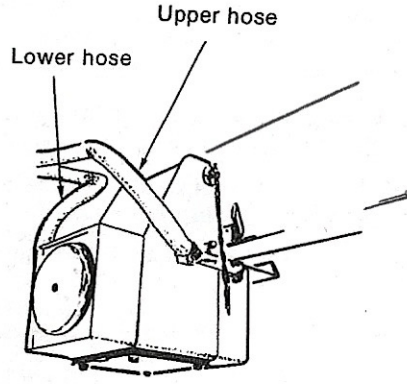


12. Preheating

13. Place the blow torch on the support plate and push it in under the flame guard so that the flame burns steadily.
14. Check that the coolant is circulating, by feeling the hoses. The upper hose (left-hand hose viewed from the front) will become lukewarm after a few minutes. Then increase the flame of the blow torch to full flame.  
  
If the lower hose (right-hand) next to the heater also becomes warm very quickly, this indicates that the coolant is not circulating. In that case, reduce the flame or stop the heating process, check the circulation pump and make another attempt.
15. Continue heating until the return coolant from the engine in the lower hose becomes lukewarm. Then remove the blow torch and start the engine.
16. Remove the flame guard and support plate.
17. Replace the cover and latches.
18. Raise the heater.
19. Insert the safety pin.
20. Replace the radiator filler cap.

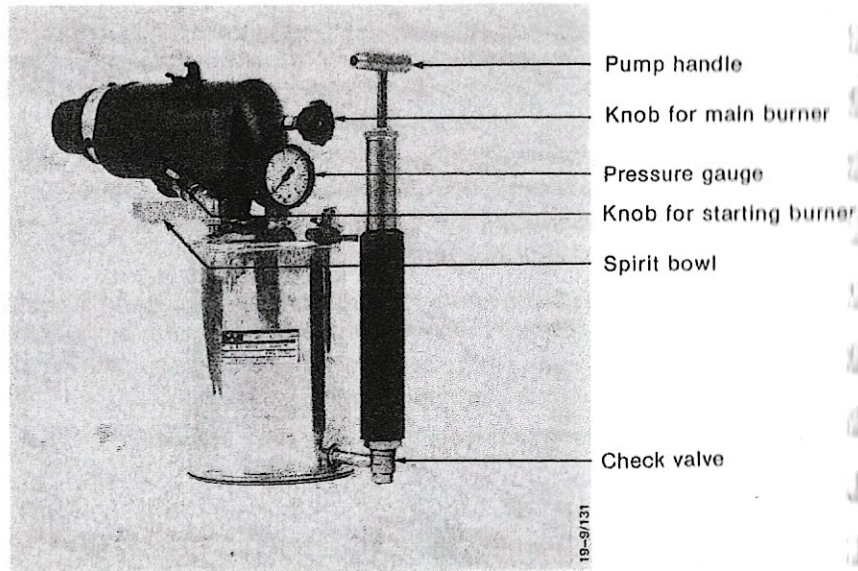


13. Blow torch in position



14. Hoses

## INSTRUCTIONS FOR USING THE BLOW TORCH (optional extra)



### Topping up with fuel

Fuel: Paraffin

**CAUTION. Fuel must not be poured in the vicinity of a naked flame or when the blow torch is very hot.**

1. Unscrew the filler cap. Allow the pressure in the receiver to drop for a few seconds before the cap is removed.
2. Top up the fuel to the filler hole; the receiver is then 3/4 full. A funnel and filter should be used.
3. Screw on the cap so that it seals. Do not tighten too hard.

### Preparations for lighting and preheating

The blow torch has a starting burner as well as a spirit bowl. The starting burner is normally used, but the spirit bowl can be used for extra preheating. Both can be used at the same time.

1. Check that the main burner knob and the starting burner knob are closed.
2. Pump up the pressure in the receiver to about 1 bar (kgf/cm<sup>2</sup>).
3. Place the blow torch on an insulated surface, with the main burner in the wind direction or underneath the engine heater wind shield.
4. Hold a burning match or a steel wire with a burning wick in front of the starting burner and set the starting burner knob so that the flame burns steadily.
5. Check the flame of the starting burner.
6. Pump up as necessary during preheating.

**N.B. Too high a pressure in the receiver will extinguish the starting burner.**

### Extra preheating

At low outdoor temperatures, it is advisable to preheat with both the starting burner and lighting spirit.

Fill the spirit bowl with methylated spirit and light the spirit.

**N.B. Use a safety can.**

### Lighting

**CAUTION. The blow torch must not be lit by means of another blow torch or with a producer gas match. The high temperature will damage the burner.**

1. When the starting burner has been alight for 5—10 min (longer in cold weather) and the spirit in the spirit bowl has almost burnt away, carefully open the main burner knob so that the torch is lit. Allow the torch to burn on half flame for 1—2 min. During this time, the starting and main burner may both burn.

If violent flames are produced, shut off the main burner knob and continue preheating.

2. Shut off the starting burner knob.
3. Pump up as necessary to about 1 bar (kgf/cm<sup>2</sup>).
4. Open the main burner knob fully.

**N.B. The flame will flare up if the pressure is too high and the receiver is cold, or when the blow torch is shaken as a result of hard pumping or when it is carelessly carried.**

5. Pump up the pressure to a maximum of 3 bar (kgf/cm<sup>2</sup>) after a few minutes.

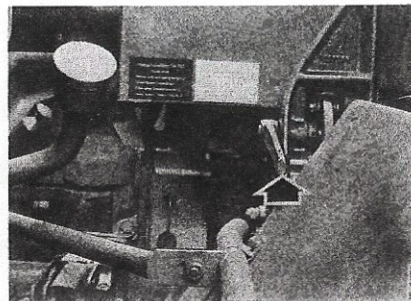
## Extinguishing

1. Shut off the main burner knob and keep it shut off until it is used again.
2. Allow the pressure in the receiver to drop by unscrewing the filler cap.
3. Screw down the cap after a few seconds.
4. Top up with fuel when the blow torch has cooled down. This will avoid condensation in the receiver. (Comparable to filling the fuel tank of a vehicle.)

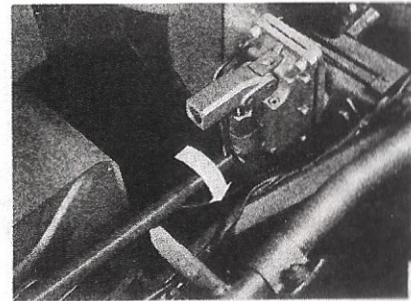
## Tilting the cab

### Tilting

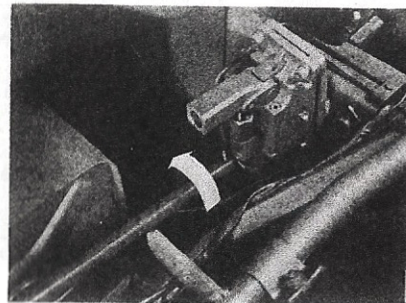
1. Apply the parking brake.
2. Check that there are no loose parts in the cab which may be damaged or may damage the interior of the cab.
3. Check that there is sufficient space above and in front of the truck so that the cab will move freely when tipped up.
4. Close the doors.
5. Release the locking shackles on the rear edge of the cab (one on each side).
6. Turn the valve on the pump to the right by means of the pump rod.
7. Pump until the cab has passed its top equilibrium position. It will then drop down towards its front limit position by its own weight or with the assistance of gentle pump strokes. In extreme cold, the hydraulic fluid in the system will be viscous and pumping may therefore be sluggish. Pump slowly, otherwise there is a risk that air may be drawn into the system.



Locking shackle

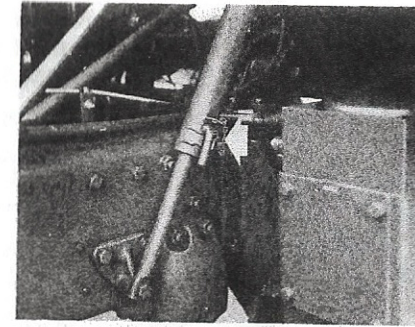


Closing the valve



Opening the valve

8. Lock the cab in the raised position by inserting the locking pin into the mechanical cab support.



Cab support

**CAUTION.** Never lean under a raised cab without it being properly locked.

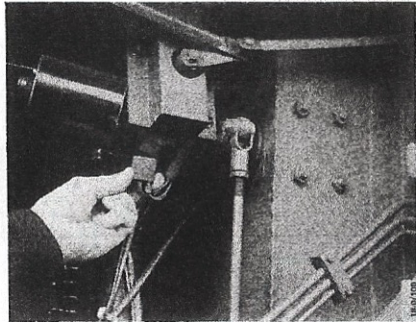
### Lowering

1. Remove the locking pin in the cab support.
2. Turn the valve on the pump to the left.
3. Pump back the cab.
4. Lock the cab with both the locking shackles.

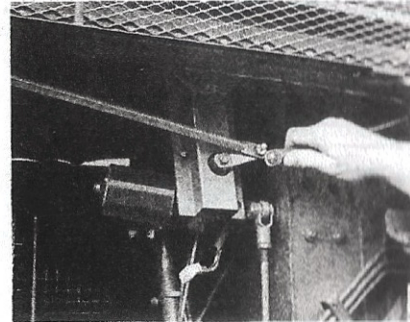
## Opening the hinged windscreen

(applies to trucks with hinged windscreen)

1. Remove the plug on the wiper motor located on the inside of the radiator grille. **If this is not done, there is risk of your hands being injured or tools being damaged. (See also under Electrical System.)**
2. Unhook the link rod for the left-hand windscreen wiper from the motor lever.
3. Move down the wiper arm from the windshield.

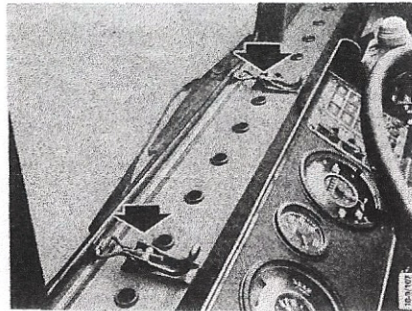


Removing the plug

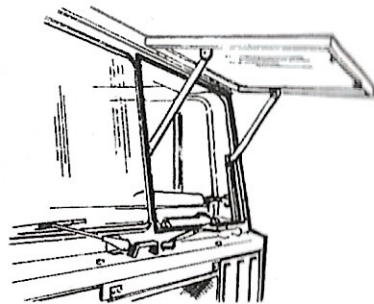


Unhooking the link rod

4. Release the fasteners in front of the instrument panel.
5. Open the window. The locking pins will lock the stays as soon as the windscreen is in the open position.



Fasteners



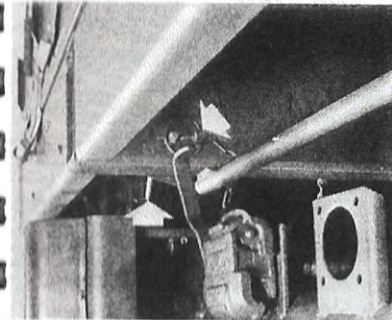
Windscreen opened

## Using the supports for the tailgate

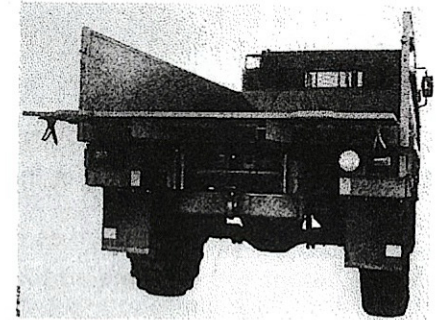
(applies to trucks with standard platform)

The supports may be used when transporting long loads, when the tailgate cannot be raised.

1. Remove the safety pins and pull out the locking pins.
2. Withdraw the tailgate supports and lower the tailgate.



Locking pins and safety pins



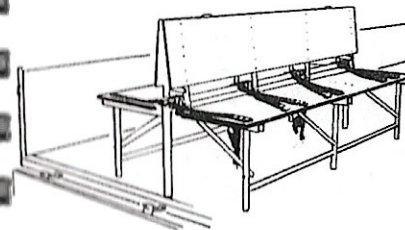
Tailgate resting on the tailgate support

## Benches on the platform (optional extra)

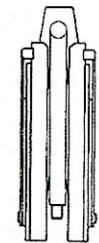
### Erecting the benches

Space is available for 2 benches on the platform.

The benches can be folded up and measure 1860 x 590 x 170 mm when folded.

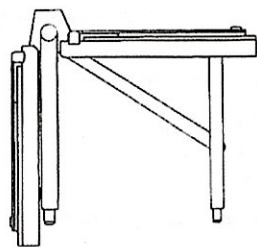


Bench on platform

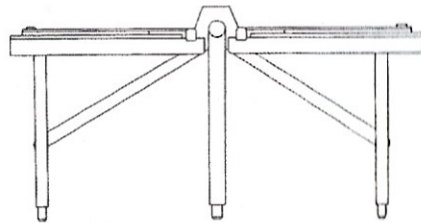


Folded bench

1. Raise one seat and pull down the legs and stays.
2. Lock the stays with the wing nuts.
3. Raise the second seat in the same way.

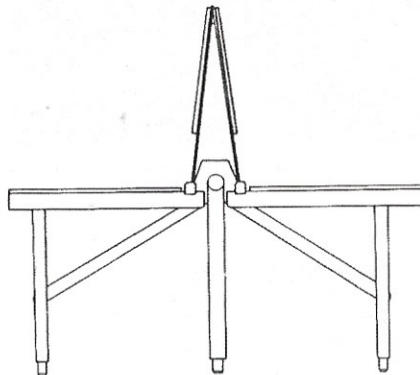


1. One seat raised

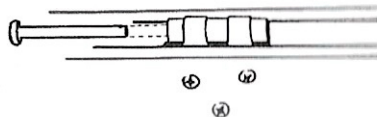


3. Both seats raised

4. Raise the backrest
5. Lock the backrests to each other with the locking pin.
6. Fit the legs into their holes in the platform.

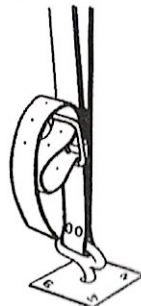


4. Bench in raised condition



5. Locking pin for backrest

7. Hook the leather strap hooks into their holes in the platform and tension the straps.



7. Retaining strap

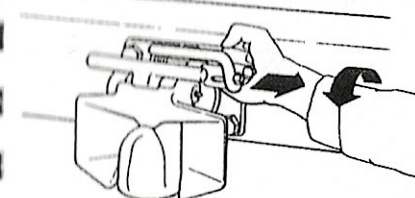
### Removing the benches

The benches are removed in the reverse order to that described for erecting them.

## Tow hitch Ringfeder 663 (optional extra)

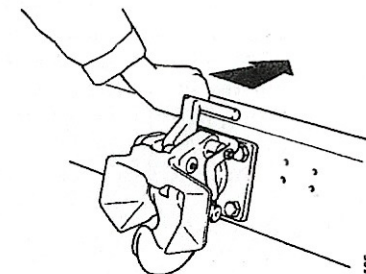
### Opening the tow hook

1. Pull out the latch and lock it by turning a quarter of a turn anti-clockwise.
2. Push the handle forward to open the tow hook.



Latch

11-9/103



Operating handle

11-9/106

### Connecting the tow lug

1. Hold the tow lug at the same height as the tow hook.
2. Reverse the truck. The tow hook will be engaged and locked automatically when the lug enters the tow hook opening.
3. If the tow hook does not lock automatically because of incorrect position of the tow bar, the operating handle can be pulled back manually until the latch moves into the locked position.

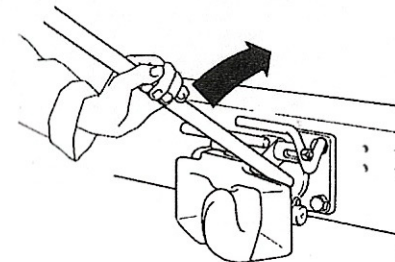
**Always check that the tow is locked.**

### Disengaging the tow lug

1. Pull out the latch and turn it a quarter of a turn anti-clockwise.
2. Push the operating handle forward.

**CAUTION. When the tow hook is opened, the tow bar will drop down.**

3. If the operating handle binds because the tow hook is loaded, it can be released by prising it with a crowbar or the like.



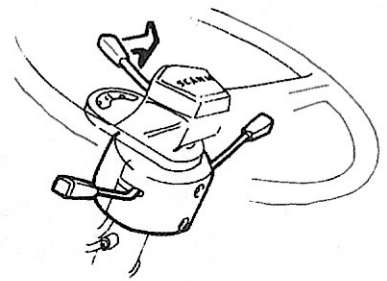
Opening with the hook loaded

11-9/105

# Using the winch (optional extra)

**CAUTION.** When handling the winch, the brake must always be applied, except during winching.

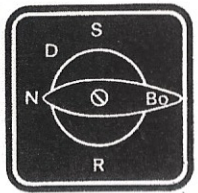
**CAUTION.** If the contact key is withdrawn or the electric power supply is otherwise interrupted, the winch brake will be released.



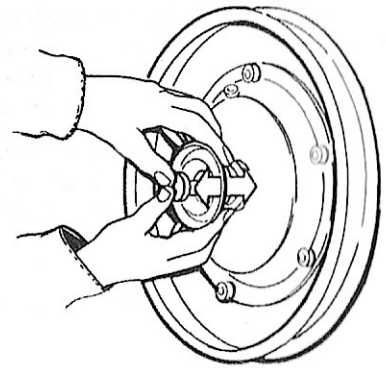
Winch brake operating lever

## Preparation

1. Apply the parking brake.
2. Set the gear selector to N.



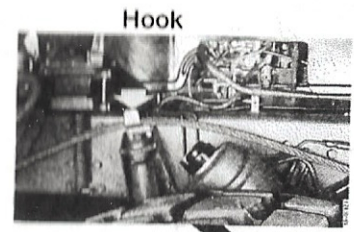
3. Release the rope drum by pressing the latch button and pulling out the jaw coupling handle.



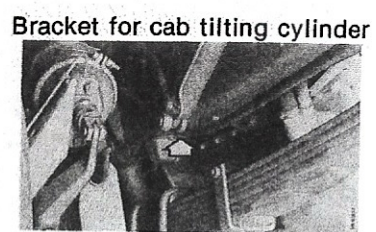
Engaging and releasing the rope drum

4. Pull out the rope by hand and check that it is running correctly through the guide rollers and rope guides, see figure.

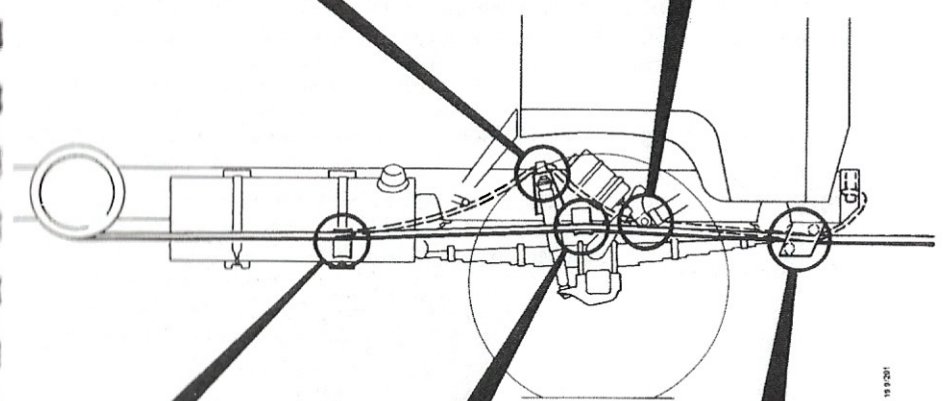
If the truck is to be driven before winching, the rope must be suspended on the suspension hook above the shock absorber. Ensure that it is placed behind the cab tilting cylinder bracket. It will otherwise catch in the wheel when the truck is taking a left-hand bend. This rope suspension may only be used as a stand-by position when driving on rough ground where the need for winching is expected to arise.



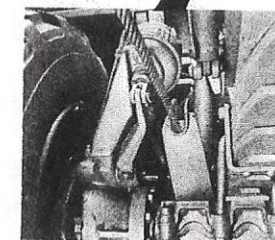
Hook



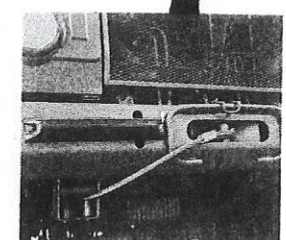
Bracket for cab tilting cylinder



Rope guide



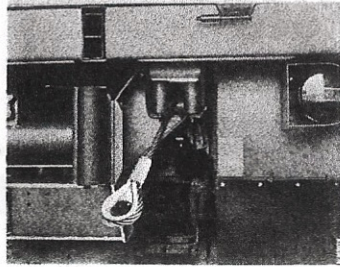
Rope guide



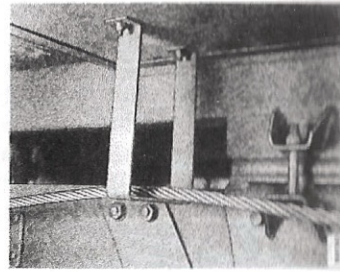
Guide rollers

==== Rope in stand-by position  
 ===== Rope in winching position

Running the winch rope forward



Guide rollers, rear



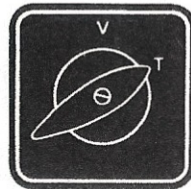
Rear rope guide (SBAT111 only)

5. Anchor the rope.
6. Stretch the rope and engage the rope drum by pressing the latch button and pushing in the jaw coupling handle. At the same time turn the drum backwards and forwards so that the jaw coupling will engage more easily.
7. Open the right-hand side window. An assistant should have the winch under supervision and should call to the driver if, for example, the rope starts to become entangled.

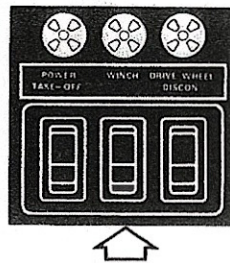
**Winching of own vehicle**

**Winching of another vehicle or load**

8. Set the gear selector of the transfer box to T and check that the gearbox selector is set to N.



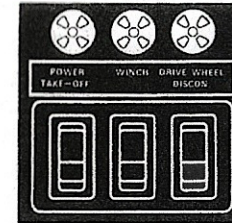
9. Engage the winch power take-off.



**Winching of own vehicle**

**Winching of another vehicle or load**

Press the switch for driving wheel disengagement.



Winching with driving wheel assistance should only be carried out in exceptional cases and is only possible with the rope running forward.

When winching with driving wheel assistance, the switch must not be depressed.

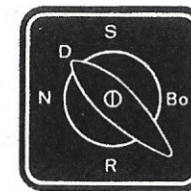
**N.B. The truck will catch up with the winch rope if the driving wheels do not skid. A slack rope will easily become entangled and kinked in the rope drum. Therefore, avoid winching with driving wheel assistance, if possible.**

**Winching in**

**Winching-in own vehicle**

**Winching-in another vehicle or load**

Set the gearbox selector to D.



Gently release the winch brake to tension the rope.

### Winching-in own vehicle

13. Release the parking brake and adjust the winching speed and effort with the accelerator pedal.

### Winching-in another vehicle or load

Adjust the winching speed and effort with the accelerator pedal.

**N.B. The foot brake pedal must not be used during winching.**

When the brake pedal is depressed, the winch brake will be applied. Winching with the winch brake applied will damage the brake.

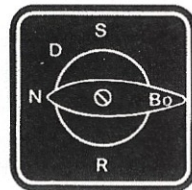
Owing to the torque converter, the automatic transmission automatically protects against overloading of the winch. Full effort is obtained when the torque converter stalls, i.e. the turbine wheel is stationary and all of the engine output is converted to heat. If full effort on a single rope is not sufficient, double the rope.

**Stalling is only permissible for a short duration (about 10 seconds), to prevent the oil in the torque converter from overheating.**

### Winching out

#### Winching-out own vehicle

11. Set the gearbox selector to N.



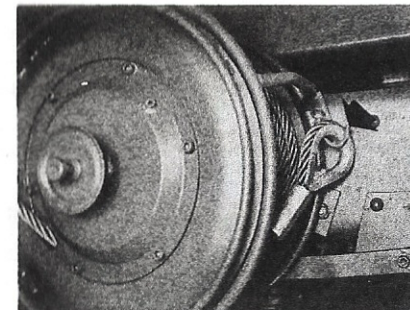
#### Winching-out another vehicle or load

12. Release the parking brake and the winch brake. Adjust the winching-out speed with the brake pedal. Check that the parking brake is applied. Adjust the winching-out speed with the trailer brake lever.

### After winching

1. Apply the winch brake with the trailer brake lever.
2. Apply the parking brake.
3. Set the gearbox selector to N.
4. Release the rope at the anchor point.

5. Tension the rope.
6. Set the gearbox selector to D.
7. Wind up the rope onto the rope drum. Engine idling speed is often sufficient. Control the speed with the trailer brake lever. Stop when there is about 2 m of rope left.
8. Disengage the winch power take-off.
9. Disengage the rope drum by pulling the jaw coupling handle.
10. Wind up the last section of rope by hand.
1. Hook the rope end onto the hook on the winch. Lock the rope drum by pushing in the jaw coupling handle.



Suspension of rope end

# MAINTENANCE

## Running-in maintenance

In addition to the periodic maintenance, running-in maintenance must be carried out during the running-in period after 500 km, but before 2 500 km, although not later than 6 months after delivery.

This work is best carried out by means of certain special tools, and should therefore normally be executed by an authorised workshop. The running-in maintenance required is listed below:

- Change the engine oil
- Clean the centrifugal oil cleaner
- Check the oil sump retaining bolts and the lubricating oil cleaner intermediate piece
- Change the oil in the transmission, central gears and hub reduction gears
- Retighten the cylinder head bolts
- Adjust the valve clearances
- Look for possible water, oil and fuel leakage
- Tighten the bolts (nuts) on the intake and exhaust manifolds and side covers of the engine
- Tighten the hose clips on the hoses in the cooling, heating and intake systems
- Change the compressor air filter
- Tighten the mounting bolts of the compressor, injection pump and injection pump drive coupling
- Tighten the power steering gear mountings at the bracket and frame
- Adjust the V-belt tension
- Tighten the bolts (nuts) of the engine and gearbox mountings and the retaining bolts and nuts of the flywheel housing, transfer box and central gear housings
- Tighten the bolted joints of the tubular cross-members
- Tighten the nuts of the spring clamps
- Check the compressed air system for leaks in accordance with this operator's manual
- Check the strokes of the brake cylinder push-rods
- Check the toe-in
- Check the caster angle
- Tighten the wheel nuts with the specified torque
- Carry out a functional check

### In addition, on the DS11 engine

- Change the turbocharger oil filter

### In addition, on the SBAT111

- Tighten the bogie suspension axle mountings
- Tighten the bogie transverse bars in the bogie suspension axle mounting
- Tighten the reaction stay mounting in the axle housing and cross-member of the frame

## Periodic maintenance

To enable the truck to operate satisfactorily, it must receive maintenance. The period maintenance is divided up into:

- lubrication
- condition maintenance

**Lubrication** is dependent on the mileage covered and is carried out every 5 000 km. Besides lubrication according to the lubrication chart, some other checks must also be made. Particulars of lubrication are given under the heading Lubrication. Note that several additional points are added every 30 000 km.

**Condition maintenance** is dependent on time and is carried out

- daily
- monthly
- annually

Condition maintenance is carried out at these intervals regardless of the distance driven. The monthly and annual maintenance is specified under the headings Monthly maintenance and Annual maintenance respectively. The daily maintenance is specified under Running, Checks before driving.

A detailed description of the maintenance points in the various maintenance schedules is given for each unit under Maintenance instructions.

## LUBRICATION

### Lubrication chart

Lubricate the following points with universal grease. Detailed instructions are given under Maintenance instructions.

	Number of nipples (on each side)
1. Front guide rollers <sup>1)</sup> .....	4
2. Front spring bolts .....	2 (1)
3. Ball joints in drag link <sup>2)</sup> .....	2
4. Universal joints <sup>2)</sup> .....	4
5. Front brake levers .....	2 (1)
6. Drive shaft universal joints <sup>2)</sup> .....	4 (2)
7. Kingpins .....	4 (2)
8. Front brake eccentric shafts .....	2 (1)
9. Ball joints on track rod <sup>2)</sup> .....	2 (1)
10. Front spring shackles .....	4 (2)
11. Spline couplings <sup>2)</sup> .....	2
12. Universal joints for winch drive <sup>1)</sup> .....	2
13. Spline coupling for winch drive <sup>1)</sup> .....	1
14. Platform mountings .....	2
15. Rear spring bolts .....	2 (1)
16. Rear brake eccentric shafts .....	2 (1)
17. Rear brake levers .....	2 (1)
18. Rear spring shackles .....	4 (2)
19. Tow hitch .....	3
20. Rear guide rollers .....	4
Front cover hinges .....	2
Roof hatch hinges .....	2
Windscreen hinges <sup>3)</sup> .....	2
Door hinges .....	4 (2)

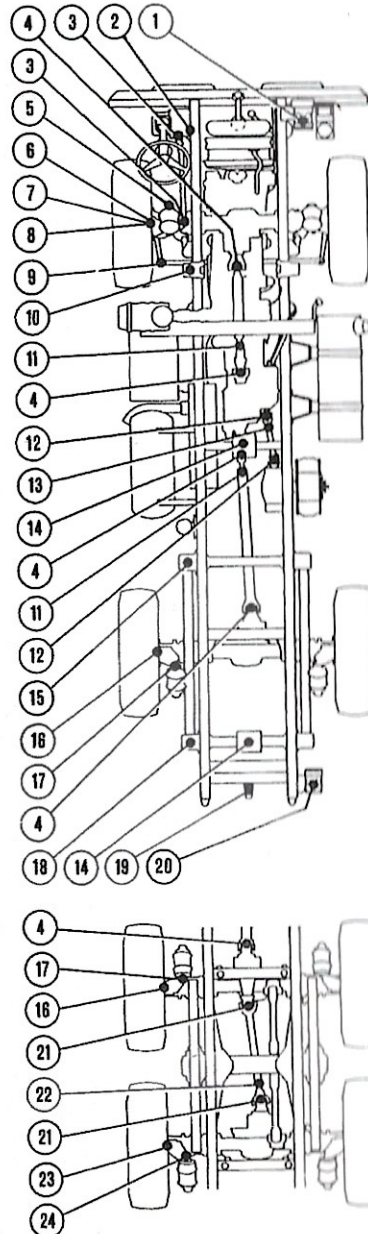
Additional grease lubrication points on the SBAT111

21. Universal joints <sup>2)</sup> .....	2
22. Spline coupling <sup>2)</sup> .....	1
23. Brake eccentric shafts .....	2 (1)
24. Brake levers .....	2 (1)

1) Only on trucks fitted with a winch.

2) Preferably molybdenum disulphide grease of the multi-purpose type on lithium base, containing 3—4% molybdenum disulphide.

3) Only trucks fitted with hinged windscreen.



Lubricate the following points with an oil can:

- Winch disengagement coupling
- Driver's seat springing and adjustment controls
- Brake pedal bearings
- Accelerator pedal bearings
- Linkage for accelerator control
- Foot brake linkage
- Interlock valve

### Maintenance in conjunction with lubrication every 5000 km

#### Engine

- Change the engine oil.
- Dismantle and clean the oil centrifugal cleaner.
- Change the turbocharger oil filter (SBAT 111).
- Clean the coarse separator in the air cleaner.

#### Brake system

- Change the compressor air filter.

#### Steering system

- Check the hydraulic fluid level.

#### Power transmission system

- Check the oil level in the central gears and hub reduction gears.
- Check the oil level in the gearbox.

#### Frame, springs, wheels

- Check the oil level in the spring bearings (SBAT111).

#### Winch

- Check the oil level in the winch worm gear.
- Fill with oil in the winch jaw coupling.

### Additional maintenance points every 30 000 km

#### Engine

- Change the fuel filters and clean the pre-filter.
- Clean the filter cartridge in the air cleaner.

#### Power transmission system

- Change the hydraulic fluid in the gearbox.
- Change the oil in the central gears and hub reduction gears.

#### Winch

- Change the oil in the winch worm gear and jaw coupling.

## MONTHLY MAINTENANCE

### Engine

- Check the intake and exhaust manifold retaining nuts, check that the turbocharger is firmly secured and that the pipes are intact.
- Check the gaskets, joint and connections in the exhaust system for leaks. Feel with the hand and listen.
- Check that the exhaust pipe and silencer are properly secured and that there is no external damage.
- Check the mountings of the cooling system components.
- Check the radiator, cooling system hoses, pipes, connections and cocks for leakage.
- Check the condition of the cooling system hoses (cracks, wear, burns or damage due to oil).
- Measure the freezing point of the coolant if the temperature is liable to drop below 0° C.
- Check that the heaters and controls are working properly.
- Check the lubrication system for leakage at the oil filter, oil sump, oil cooler, rocker box covers and oil pipes (engine running).
- Check operation of the centrifugal oil cleaner.
- Check the mountings of the fuel system components, i.e. fuel tank pipes, injection pump, delivery pipes and injectors, and that they are not damaged.
- Check the fuel system for leaks.
- Check that the warranty or official seals are intact.
- Check the operation of the accelerator pedal, hand throttle, stop control and cold starting device.
- Check the pressure indicator on the air cleaner. Clean the filter cartridge as necessary.
- Check that the V-belts are intact and adequately tightened.

### Electrical system and instrumentation

- Clean the batteries, battery holder and terminal posts, as necessary and smear the terminal posts with petroleum jelly.
- Check that the terminal posts and batteries are secure.
- Check the battery electrolyte level and top up with distilled water as necessary. At the same time, check that the cell caps are intact and that the vent holes are clean.
- Check that the battery heating cables and battery plug and cable connection are intact. Also check that all other visible cables are secured, that their insulation is undamaged and that they cannot be damaged against sharp edges.

### Power transmission system

- Check that there is no external damage to cables and air hoses.
- Check the gearbox, axle gears and hub reduction gears for leakage.
- Check that the propeller shafts are not damaged.

### Brake system

- Check the tightness of the compressed air system.
- Check the operation of the air dryer by draining the air pressure tanks.
- Check the operation of the air dryer heater.
- Check that the air pressure tanks, drain cocks and pipe connections are not damaged.
- Check operation of the trailer coupling and ensure that it is not damaged.
- Check the thickness of the brake linings.
- Check the stroke of the brake cylinder push rods. Adjust the manual brake levers.<sup>1)</sup>

### Steering system

- Check that none of the links and rods is bent or otherwise damaged.
- Check the power steering system for leakage (engine running).

### Frame, springs, wheels

- Check that there are no cracks in the frame side members and cross members.
- Check that none of the spring leaves is broken or displaced.
- Check the shock absorbers for leakage.

### Cab and body

#### Check that:

- all doors and covers are intact and locked and that all the loose equipment is secured
- doors, locks, door stops, hinges and weather strips are intact and work satisfactorily
- window regulators are working properly
- the cab securing device is working properly
- the bumper and mud flaps are secure and undamaged

### Winch

- Check that the controls and brake are operating satisfactorily.
- Clean and inspect the winch rope and rope guides.
- Check for oil leaks.

1) Automatic brake levers must be reconditioned after 150 000 km.

## ANNUAL MAINTENANCE

### Engine

- Adjust the valve clearances.
- Tighten the connections of the oil pipes to the turbocharger and ensure that they are secure. Check for leaks.
- Tighten the hose clips on the hoses in the cooling, heating and intake systems.
- Check the cooling system for leakage using a pressure testing unit and check the operation of the relief valve.
- Check the operation of the radiator blind by pulling it up and down.
- Tighten the connections of the fuel pipes and the retaining bolts for the tank fittings and tank filter.
- Check the threaded connections of the fuel pipes and the banjo coupling screws of the pre-filter and fuel filter. Check for damage, wear, leaks and corrosion on pipes, hoses, tank and other components in the fuel system. Check the operation of the fuel preheater shut-off cock.
- Measure the high and low idling speeds using the tachometer, and check the warranty and official seals of the fuel injection pump.
- Check that the injection pump setting is correct, using the markings on the pump coupling and flywheel.
- Tighten the bolted joints of the injection pump drive coupling.
- Tighten the retaining bolts for the exhaust pipe and the bolts of the rubber mountings of the exhaust pipe.

### Electrical system and instrumentation

- Check the battery voltage and acid content.
- Tighten the retaining bolts and check all cable connections on the starter motor, alternator and voltage regulator.
- Adjust the headlamp setting, if necessary.

### Power transmission system

- Check gear change speeds and stalling speed by roadtesting.
- Check the propeller shaft, universal joints and power take-off shafts for play or damage.

### Brake system

- Check pressure distribution between front and rear circuits, check valves, pressure control valve and safety valve.
- Check braking effort of the foot brake and parking brake when driving.

### Steering system<sup>1)</sup>

- Change the oil and the filter cartridge.
- Check the tyre wear. Measure the toe-in if the tyre wear is considered abnormal. Measure all other wheel angles if the toe-in is correct.  
N.B. If damage is suspected on any component of the front assembly or front axle mounting, the axle spacing on the right-hand and left-hand sides must also be measured and compared.
- Check that the ball joints in the front assembly are free from play and that there is no damage to the track rod, drag link and associated arms.
- Tighten the power steering gear mounting bolts and check the hydraulic hoses for cracks and wear.
- Check and, if necessary, adjust the power steering tooth clearances.
- Check the operation of the power steering gear.

### Frame, springs, wheels

- Check for loose bolts and rivets, cracking and damage to chassis frame.
- Retighten the nuts on the spring clamps and check the spring leaves and spring clamps for damage.
- Tighten the shock absorber bolts and check for leaks.
- Measure the bearing clearance at the wheel hub, using a dial indicator.
- Check the tyres and wheels for damage.

### Cab and body

- Check the cab mountings and test the performance of the cab latches.
- Test the operation of door locks, door hinges and window regulators, and the closing mechanism of the windscreen.
- Check that the mudguards and mud flaps are secure.
- Check that the rear-view mirrors are secure and that their adjustment is maintained when driving the truck on uneven road surfaces.
- Check the operation of cab tilting device and check for leaks.

### Tow hitch

- Check that the tow hitch is secure. Check for damage and cracks. If cracks are suspected, crack detection must be carried out.

### Winch

- Check that the winch is secure.

<sup>1)</sup> It is recommended that the power steering gear be reconditioned after 200 000 km.

Road test with functional checks on:

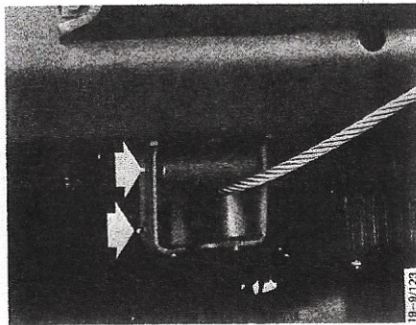
- Engine brake — cross-country brake
- Brake system
- Gear change points and stalling speed
- Steering system
- Instruments
- Indicating lamps
- All controls
- Windscreen washers and wipers
- Headlamp washers and wipers

## Maintenance instructions

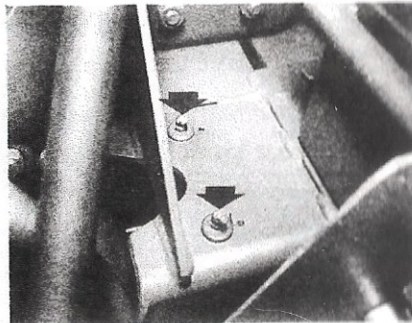
### GREASE LUBRICATION POINTS

See also Lubrication chart.

1. Front guide rollers (only on trucks fitted with a winch)  
Four grease nipples. Lubricate until grease seeps out. Check that the rollers rotate freely.



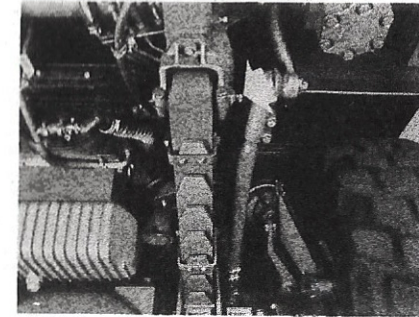
Horizontal rollers



Vertical rollers

2. Front spring bolts

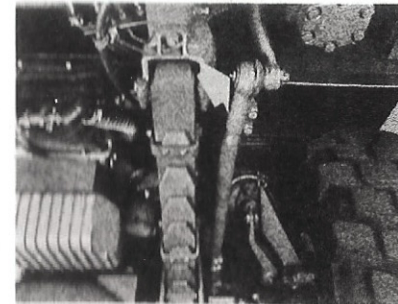
Two grease nipples. One at the front end of each spring. If possible, relieve the load on the front wheels and lubricate until grease seeps out.



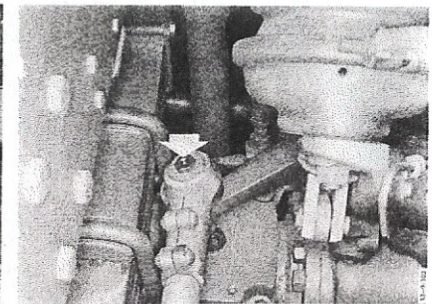
Front spring bolt nipple

3. Ball joints in the drag link

Two grease nipples. One at each end. Lubricate until grease seeps out. Preferably use molybdenum disulphide grease (see note 2 on the Lubrication chart).



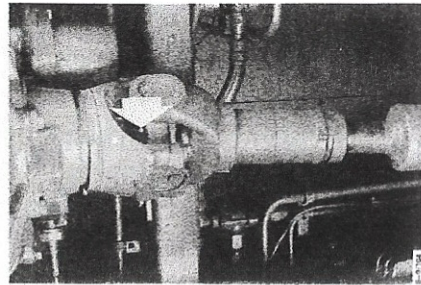
Steering link, front joint



Steering link, rear joint

#### 4. Universal joints

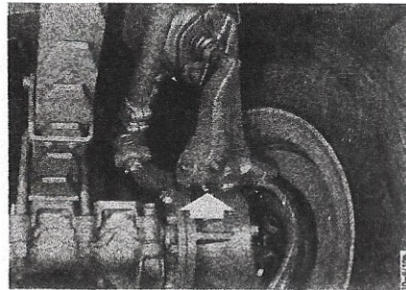
The SBA111 has four grease nipples. The SBAT111 has a further two nipples on the two rear universal joints (see point 21). Lubricate until grease seeps out. Preferably use molybdenum disulphide grease (see note 2 on the Lubrication chart).



Universal joint

#### 5. Front brake levers

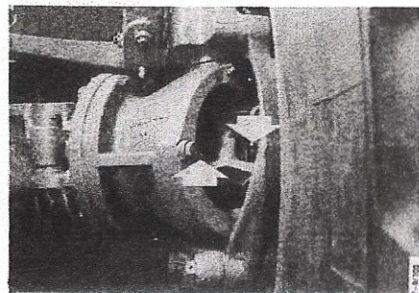
Two grease nipples. One on each wheel. Lubricate until grease seeps out.



Front brake lever

#### 6. Drive shaft universal joints

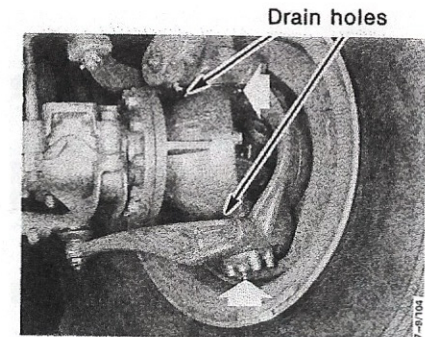
Two grease nipples in each drive shaft universal joint. Lubricate until grease seeps out. Preferably use molybdenum disulphide grease (see note 2 on the Lubrication chart).



Drive shaft universal joint

#### 7. Kingpins

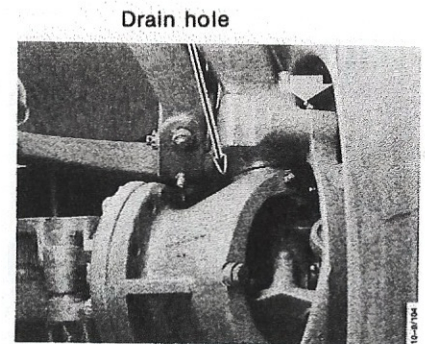
Two (three) grease nipples on each front wheel. The upper kingpins have two grease nipples which can be used optionally, depending on which is most easily accessible. Turn the wheels to full lock and lubricate until grease seeps out of the drain hole.



Kingpin grease nipples

#### 8. Front brake eccentric shafts

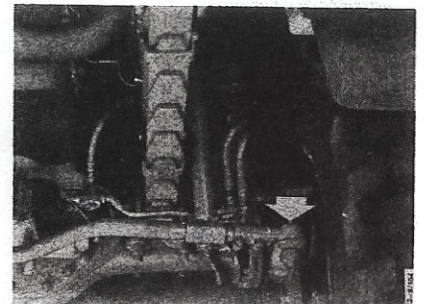
One grease nipple on each front wheel. Lubricate until grease seeps out of the drain hole. Lubricate carefully so as not to damage the eccentric shaft seals.



Front brake eccentric shaft

#### 9. Ball joints on track rod

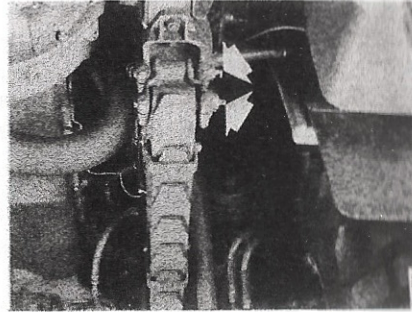
Two grease nipples. One in each ball joint. Lubricate until grease seeps out. Preferably use molybdenum disulphide grease (see note 2 on the lubrication chart).



Ball joint on track rod

10. Front spring shackles

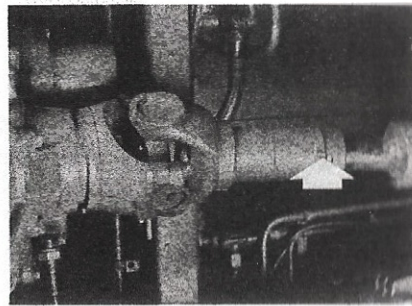
Four grease nipples. Two at the rear end of each spring. Lubricate until grease seeps out.



Front spring shackle

11. Spline couplings

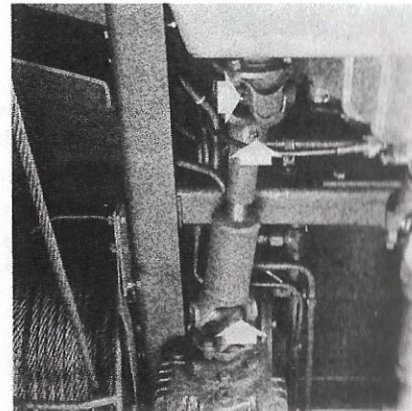
The SBA111 has two grease nipples. One on each propeller shaft. The SBAT111 has an additional nipple on the rear propeller shaft (see point 22). Preferably use molybdenum disulphide grease (see note 2 on the lubrication chart). Lubricate until grease seeps out.



Spline coupling

12, 13. Universal joints and spline couplings, winch drive

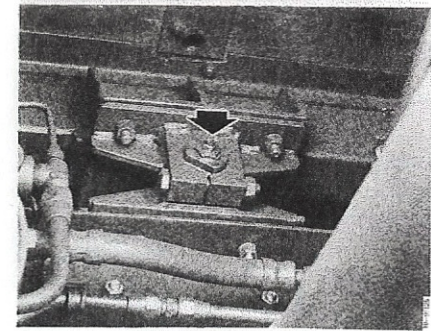
Three grease nipples. One on each universal joint and one on the shaft. Lubricate until grease seeps out.



Winch, universal joints and spline coupling

14. Platform mountings

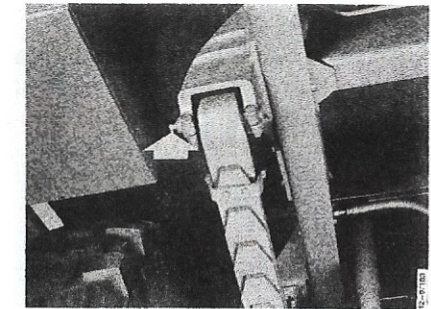
Two grease nipples. One in each platform bracket. Lubricate until grease seeps out.



Platform mounting

15. Rear spring bolts

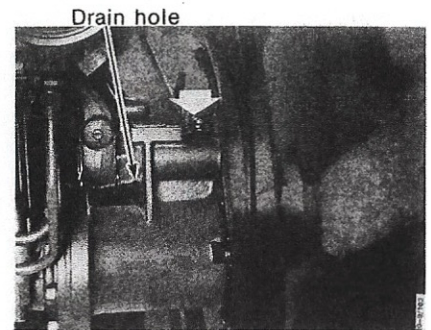
SBA111 only. Two grease nipples. One at the front end of each rear spring. If possible, relieve the rear wheels of load and lubricate until grease seeps out.



Rear spring bolt

16. Rear brake eccentric shafts

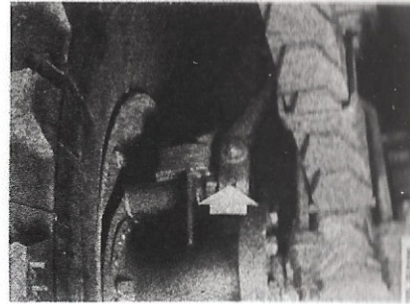
One grease nipple on each rear wheel. The SBA111 has two and the SBAT111 four (see point 23). Lubricate until grease seeps out of the drain hole. Lubricate carefully so as not to damage the eccentric shaft seals.



Rear brake eccentric shaft

17. Rear brake levers

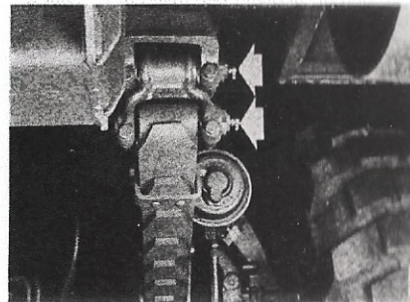
One grease nipple on each brake lever. The SBA111 has two and the SBAT111 four (see point 24). Lubricate until grease seeps out.



Rear brake lever

18. Rear spring shackles

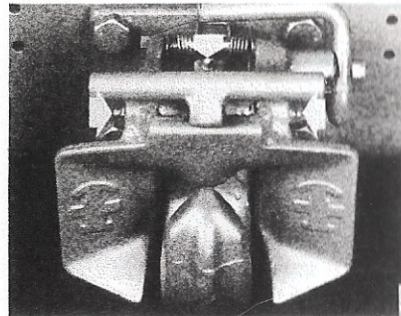
SBA111 only. Four grease nipples. Two at the rear end of each rear spring. Lubricate until grease seeps out.



Rear spring shackle

19. Tow hitch Ringfeder 663 (Optional extra)

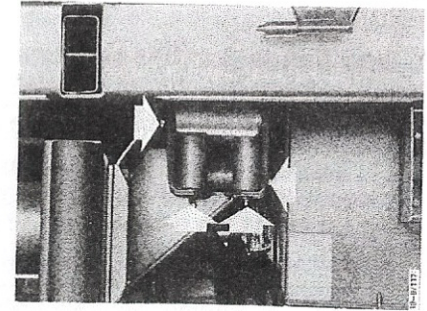
Three grease nipples. Lubricate until grease seeps out.



Tow hitch

20. Rear guide rollers (only trucks fitted with winch)

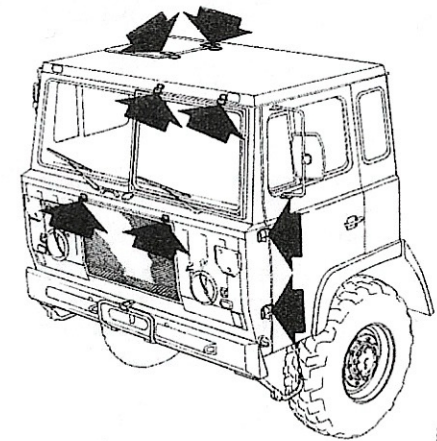
Four grease nipples. Lubricate until grease seeps out. Check that the rollers rotate freely.



Rear guide rollers

Front cover hinges, windscreen hinges, roof hatch hinges, door hinges

10 grease nipples. Lubricate until grease seeps out. Wipe clean.



Cab, grease nipples

Additional grease lubrication points on the SBAT111

21. Universal joints

See point 4

22. Spline coupling

See point 11

23. Brake eccentric shafts

See point 16

24. Brake levers

See point 17

## ENGINE

### Lubrication

Engines without turbocharger (D11 engines) must be lubricated with an oil which meets the requirements of American specification MIL-L-2104B (API CC).

Engines with a turbocharger (DS11 engines) must be lubricated with an oil which meets the requirements of American specification MIL-L-2104C (API CD).

SAE 10W	at ambient temperatures below $-10^{\circ}\text{C}$
SAE 20 (SAE 20W)	at ambient temperatures between $-10^{\circ}\text{C}$ and $+10^{\circ}\text{C}$
SAE 30	at ambient temperatures above $+10^{\circ}\text{C}$

**Never use flushing oil in the engine.**

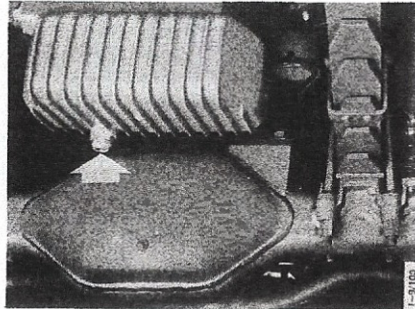
Volume: 21 dm<sup>3</sup> (l)

### Oil level check

See Inspection and checks before driving.

### Oil change

Drain the oil through the drain hole at the bottom of the oil sump. It is advantageous if the oil is drained when the engine is hot, since it then flows easily. The drain plug is fitted with a magnet which must be cleaned whenever the oil is changed.



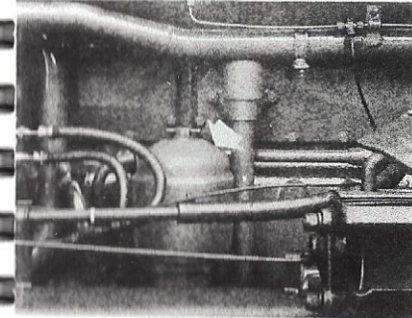
Drain plug for the engine oil

### Oil cleaner

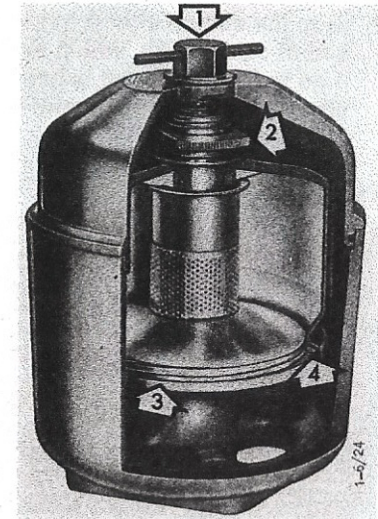
During routine cleaning, the centrifugal cleaner should contain a certain amount of dirt in the rotor. If not, this indicates that the cleaner is not working properly. The reason must be established immediately. If the deposit exceeds the maximum permissible thickness of 20 mm when cleaning at the recommended intervals, the lubricating oil cleaner must be cleaned more frequently.

### Dismantling

1. Remove the cover by removing nut 1.
2. Lift out the rotor section, unscrew nut 2 about three turns (to protect the upper bearing). If the nut is difficult to unscrew, turn the rotor upside down and clamp the nut in a vice. Rotate the rotor anti-clockwise by hand or by using a screwdriver between the outlet ports. **The rotor itself must not be clamped in a vice.**
3. Grip the outside of the rotor and lightly tap the nut with the hand or a plastic mallet so that the rotor bowl is released from the bottom plate.
4. Remove the funnel-shaped metal strainer resting on the central section. If the strainer is struck, carefully prise with a knife at the lower edge at 3, between the central section and the strainer.



Oil cleaner location



Oil cleaner components

## Cleaning

1. Scrape off the dirt deposits on the walls of the rotor bowl, using a knife or similar implement. If the layer of dirt is more than 20 mm thick on cleaning, the cleaner must be cleaned more frequently.
2. Wash the parts in diesel oil.

## Reassembly

1. Fit O-ring 4 in position in the rotor casing. Make sure that the ring is undamaged. Replace the ring if at all damaged.
2. Assemble the rotor parts and tighten rotor nut 2 firmly by hand. Make sure that the steel washer under the nut is correctly in position.
3. Replace the rotor and check that it rotates freely by spinning it by hand.
4. Fit the cover and tighten nut 1 firmly by hand.

## Functional check

The rotor runs at a fairly high speed. It will therefore normally continue rotating for about a minute after the engine has stopped, provided that the lubricating oil has reached the correct operating temperature. During part of this subsequent rotation, a humming sound should normally be heard from the rotor. Slight vibration can also be felt by placing the hand on the cleaner casing.

Operation of the cleaner can be checked as follows:

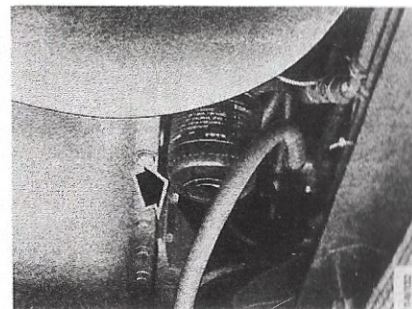
1. Start the engine.
2. Stop the engine after it has run for a while and listen for the humming sound of the rotor, which indicates that the rotor is running normally. If no humming sound is heard or no vibration is felt in the casing, the cleaner should be dismantled for checking.

## Turbocharger

### Changing the oil filter

Remove the old filter, discard it and fit a new filter as follows:

1. Oil the rubber gasket of the filter
2. Tighten the filter by hand until the gasket is firmly down.
3. Tighten a further half turn.
4. Start the engine and check that there are no leaks.



Oil filter of the turbocharger

## Fuel system

### Changing the fuel filters

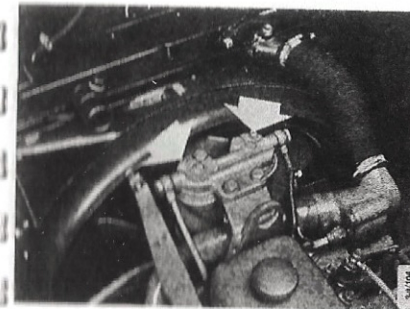
When changing the filters or carrying out any other work on the fuel system, extreme cleanliness must be observed to prevent dirt from entering into the injection equipment and causing breakdowns.

1. Wash the outside of the filters before unscrewing and discarding the cartridges.
2. Screw on the new filters by hand until the gasket is firmly down and then tighten them a further half turn.
3. Bleed the fuel system as described below.
4. Start the engine and check that the gaskets seal properly.

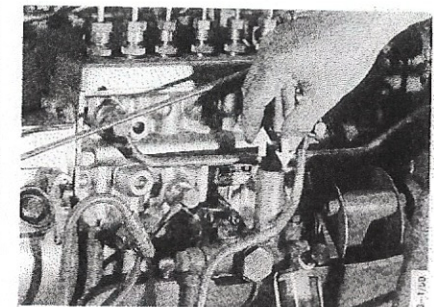
### Bleeding

1. Open the bleed screws on the fuel filters.
2. Unscrew the knurled handle of the manual pump to enable the plunger to be pulled up.
3. Pump until fuel free from air flows from the bleed screws.
4. Close the bleed screws and screw down the manual pump plunger.

Bleeding can be carried out without opening the bleed screws, but will then take longer.



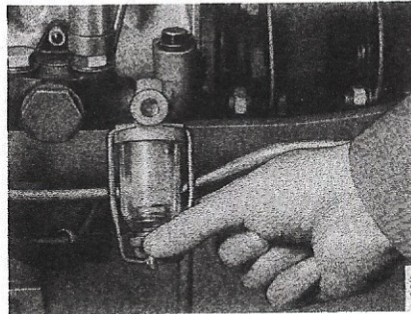
Fuel filters



Manual pump

### Cleaning the pre-filter

1. Unscrew the knurled nut.
2. Move the spring clamp forward and remove the filter bowl downwards.
3. Wash the nylon gauze in petrol (gasoline) or diesel oil.
4. Check the gasket. If it has become hard or damaged it must be replaced.
5. Reassemble the filter.
6. Start the engine and check the gasket for leakage.



Pre-filter

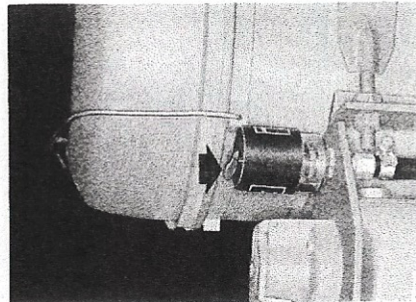
### Air cleaner

Check that the pressure indicator underneath the air cleaner does not show a red area in the indicator glass. When the red area of the plunger is fully visible, the air cleaner cartridge must be cleaned or replaced. Then reset the indicator plunger by pressing the button at the arrow.

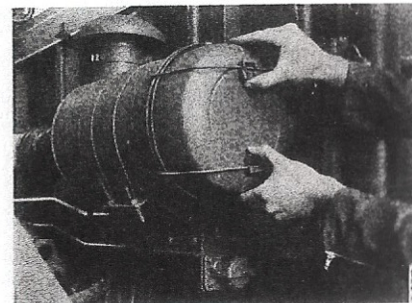
### Cleaning the coarse separator

The coarse separator forms the air cleaner cover.

1. Unscrew the retaining clamps.
2. Remove the cover.



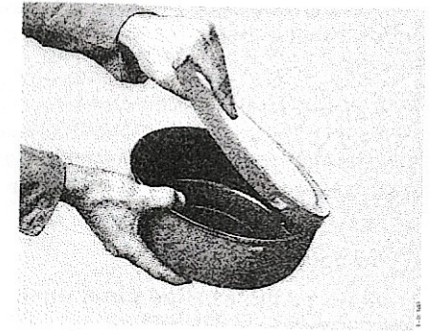
Pressure indicator



Removing the coarse separator

3. Remove the plastic cover.
4. Wipe clean.
5. Reassemble in reverse order.

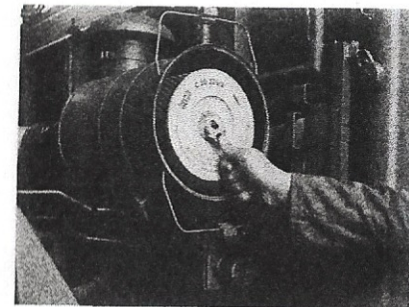
The arrow on the cover must point upwards.



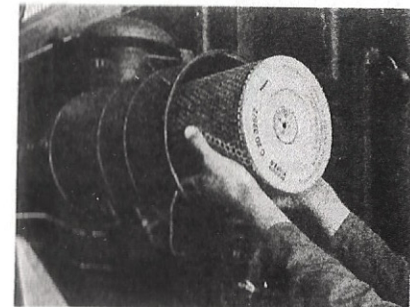
Coarse separator

### Cleaning the filter cartridge

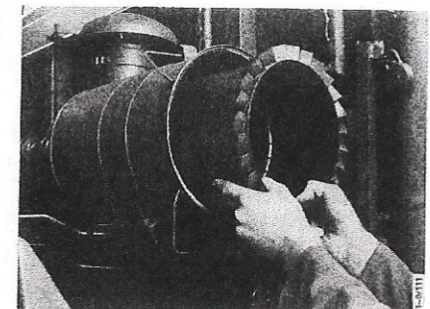
1. Remove the nut.
2. Withdraw the filter cartridge carefully so as not to damage it.
3. Withdraw the guide vane cylinder and clean it.



Nut for the filter cartridge



Filter cartridge



Guide vane cylinder

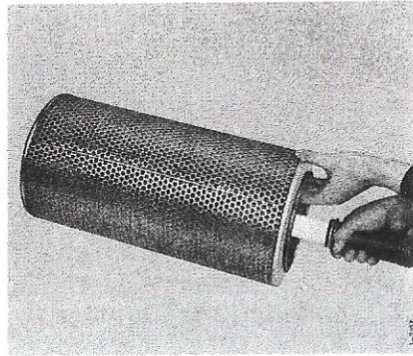
The cartridge can be cleaned about 4 times before being replaced. Air or water can be used for cleaning, depending on the type or degree of fouling.

#### Cleaning with compressed air:

Blow clean the filter cartridge with dry compressed air from the outside and the inside. Direct compressed air nozzle diagonally towards the filter cartridge. Do not use air at a higher pressure than 5 bar (5.0 kgf/cm<sup>2</sup>).

#### Cleaning with water:

1. Immerse the cartridge in a mixture of lukewarm water and detergent.
2. Move the cartridge backwards and forwards several times.
3. Rinse thoroughly with clean water.
4. Allow the filter to dry.
5. Check that the filter cartridge is undamaged by inserting a lamp and inspecting the outside.
6. Fit the filter cartridge and the coarse separator in the reverse order to dismantling.



Checking the filter cartridge

If necessary, also clean cover of the air cleaner intake.

Release the clamp and remove the cover.

Wash the cover or blow it clean.

## Cooling system

### Coolant

The coolant consists of water, an anti-corrosion agent and glycol, if sub-zero temperatures are expected. The anti-corrosion agent protects the metal components of the engine from attack by the coolant. The glycol prevents the coolant from freezing at temperatures below 0° C.

### Scania anti-corrosion agent

The corrosion inhibitors present in the coolant on delivery are eventually used up and it is therefore necessary for anti-corrosion agent to be added at regular intervals. "Scania anti-corrosion agent" should be added every 30 000 km (450 hours) at the rate of 1 dm<sup>3</sup> (litre). When changing the coolant, 1.5 dm<sup>3</sup> (litre) of "Scania anti-corrosion agent" must be added to the fresh coolant. Then add 1 dm<sup>3</sup> (litre) every 30 000 km (450 hours). The "Scania anti-corrosion agent" is alkaline and must therefore be handled carefully in concentrated form. Follow the instructions on the pack. Rinse thoroughly with water if the liquid should come into contact with your skin or eyes.

### Glycol

On delivery, the cooling system is filled with a mixture of glycol and water. Topping up with water dilutes the mixture, thereby reducing the glycol content and the degree of frost protection. If there is a risk of freezing, the freezing point must therefore be checked at regular intervals. Frost protection is improved by topping up with glycol. From the point of view of corrosion protection, the glycol used should meet the requirements of BS 3151 and should be fortified with 0.1 % by weight of benzotriazol (BTA).

Remember that the anti-corrosion additives contained in the glycol are gradually used up. A mixture of pure glycol and water without anti-corrosion additives is very aggressive and can quickly lead to major damage to the engine cooling system.

If "Scania anti-corrosion agent" is not added to the glycol mixture according to the above recommendations, the glycol mixture must be changed every 30 000 km (450 hours). The glycol must then meet the above requirements. The glycol content must be at least 25 % by volume.

**In trucks used in climates where there is no risk of freezing, the glycol mixture should be drained and the cooling system should be filled with pure water to which "Scania anti-corrosion agent" has been added.**

## Glycol concentrations

Freezing point	°C	-10	-20	-25	-30	-35	-43
Percentage by volume of ethylene glycol	%	25	35	40	45	50	55
Total amount of glycol	dm <sup>3</sup> (l)	12	17	19	22	24	26

Note that maximum frost protection is obtained at a glycol content of 60 per cent. A higher glycol content will only reduce the frost protection.

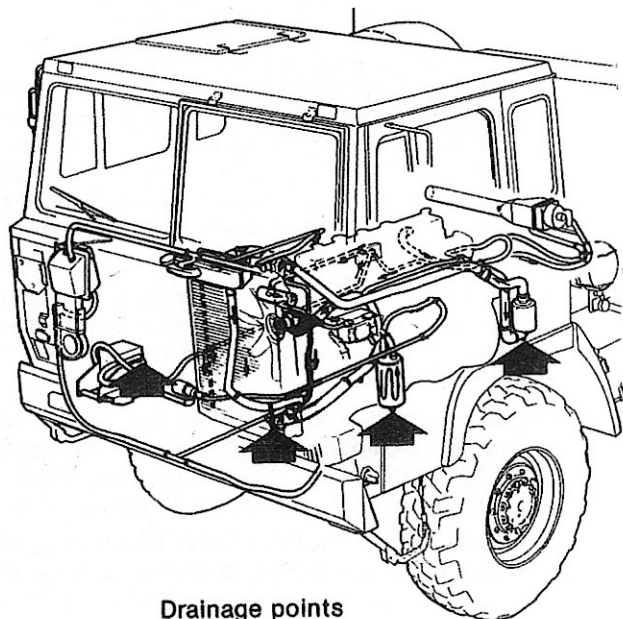
## Water

The water in the coolant must be clean. Make sure that it is free from solid impurities such as sand, sludge and the like.

The water should not be acidic or alkaline (a pH value of 6—9 is desirable).

## Changing the coolant

Regular addition of "Scania anti-corrosion agent" according to the instructions will ensure that the coolant can generally be used for several years without having to be changed. However, if the coolant appears to be contaminated, i.e. sludgy and cloudy, it must be changed. The simplest way to check the cleanliness of the coolant is to open a drain cock and allow a little coolant to flow into a collecting vessel. The coolant should be clear and transparent.



Drainage points

## Draining the cooling system:

1. Remove the filler cap carefully if the engine is hot. Hot water and steam may spray out through the filler opening.
2. Lower the engine heater, if fitted.
3. Open the drain cocks and plugs.

## Flushing the cooling system:

Flush the cooling system through until clean water flows through the drain cocks.

## Topping up with coolant:

1. Close the drain cocks and plugs.
2. Top up with coolant until the level reaches the filler opening.

Always add clean water to the coolant.

Add 1 dm<sup>3</sup> (litre) of "Scania anti-corrosion agent" every 30 000 km or 450 hours.

3. Start the engine and run it at idling speed for about 10 minutes.
4. Top up until the level reaches the filler opening.

## Before the truck is driven, the cooling system must be completely full.

Check the freezing point of the coolant regularly if there is a risk of sub-zero temperatures.

Change the coolant if it is contaminated.

## GEARBOX

### Hydraulic fluid

The hydraulic fluid must meet one of the specifications below:

- 
- ATF Type A Suffix A
  - ATF Ford ESW-M 2C 33-E/F
  - ATF Dexron meeting the Allison C-2 specification
- 

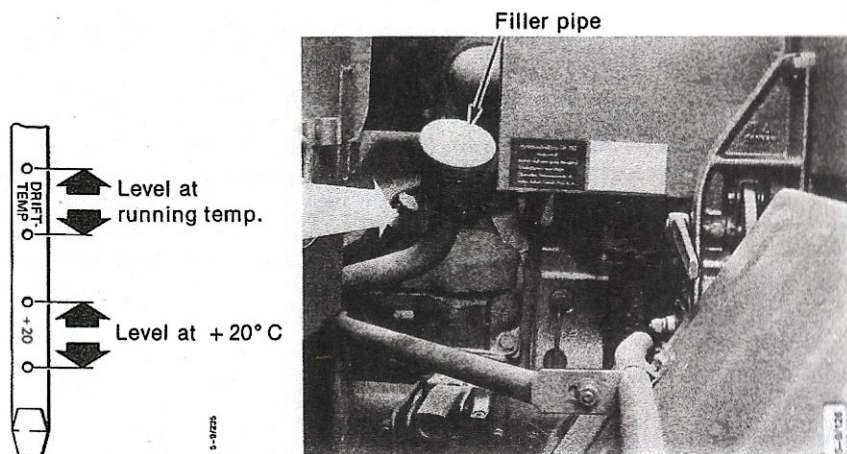
Volume: 32 dm<sup>3</sup> (l)

### Checking the level

The hydraulic fluid level in the gearbox should be checked while the engine is running, using the dipstick behind the cab on the right-hand side.

The hydraulic fluid expands on heating, so the dipstick is provided with two measurement ranges. One range is for +20° C and the other is for running temperature. In the winter, the hydraulic fluid level may not even be visible on the dipstick. The check should therefore always be carried out after running the truck, when the gearbox is warm. The level must then be within the upper measurement range of the dipstick. Wipe the dipstick before checking the level, e.g. with paper or a clean cloth. Cotton waste must not be used.

1. Start the engine
2. Set the gear selector to position R, then to position D and finally to position N
3. Set the engine to an idling speed of about 800 r/min
4. Check the oil level



Oil dipstick and filler pipe

If the level is too high or too low, this may lead to high temperature in the gearbox.

If the level is too low:

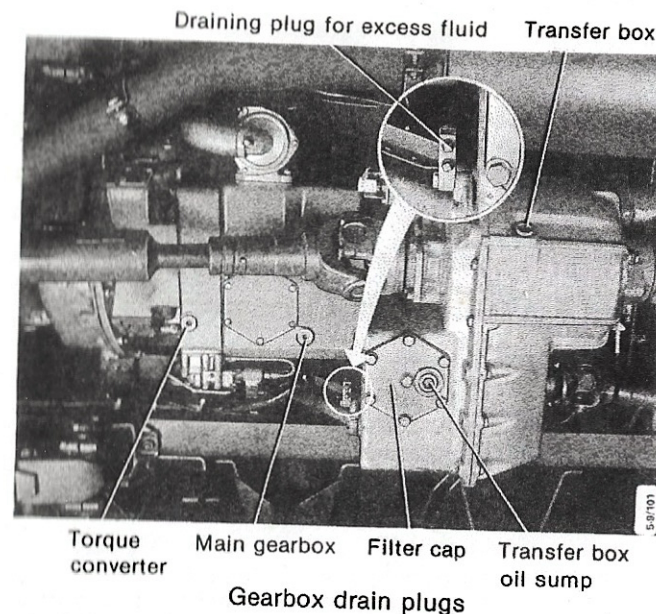
Top up with 1/2 dm<sup>3</sup> (l) of oil at a time, until the correct level is obtained.

### Changing the hydraulic fluid

The hydraulic fluid must be changed every 30 000 km. Observe maximum cleanliness.

#### Draining:

Drain off the fluid while the engine is at rest. Draining should be carried out immediately after a run, while the hydraulic fluid is still hot and will drain easily.



1. Remove the four drain plugs and allow the hydraulic fluid to drain out. Burnt and discoloured fluid indicates hot running, which may have been caused by incorrect fluid level, low hydraulic pressure and slipping clutches.
2. Remove the filter cap gently.
3. Clean the filter thoroughly by washing with paraffin, and blow it clean. Be careful not to damage the filter. Do not use any tools when cleaning. The presence of metal chips or swarf indicates damage to the gearbox.

### Topping up:

1. Fit the drain plugs.
2. Pour the hydraulic fluid through the filler pipe.
3. Start the engine and run it for a few minutes.
4. Check the level according to the above instructions. Adjust if necessary by topping up or draining, so that the level will reach the upper mark on the dipstick.

### Draining excess fluid:

1. Start the engine
2. Set the gear selector to D.
3. Remove the plug as shown in the figure entitled "Gearbox drain plugs" and drain out the required amount of fluid.

## FRONT AND REAR AXLES

### Lubrication

The axles must be lubricated with a transmission oil to the American specification MIL-L-2105 B.

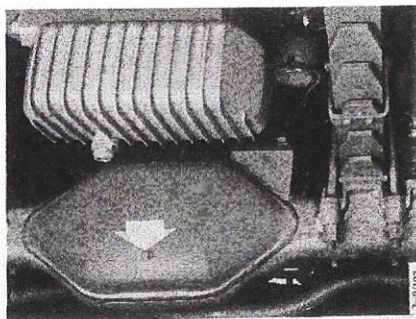
SAE 80	at ambient temperatures below $-10^{\circ}\text{C}$
SAE 90	at ambient temperatures between $-10^{\circ}\text{C}$ and $+30^{\circ}\text{C}$
SAE 140	at ambient temperatures above $+30^{\circ}\text{C}$

### Volumes:

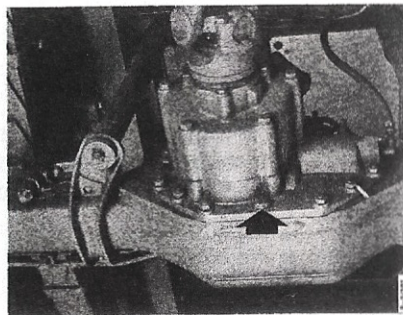
Central gear	4.0 dm <sup>3</sup> (l)
Hub reduction gear	0.6 dm <sup>3</sup> (l)

(When changing the oil, about 0.4 dm<sup>3</sup> is required.)

### Central gear



Central gear, level plug



Central gear, drain plug

### Checking the oil level

The oil must be up to the level of the filler hole.

### Changing the oil

1. Remove the combined level and filler plug.
2. Remove the drain plug and drain out the oil.
3. Apply Permatex or similar sealing compound to the drain plug and fit it back.
4. Top up oil until it reaches the level of the filler hole.
5. Apply Permatex or similar sealing compound to the filler plug and refit it. Do not overtighten.

### Hub reduction gear

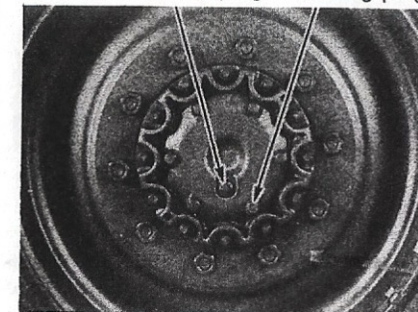
#### Checking the oil level

1. Remove the level plug and clean it.
2. Set the level and filler hole to the lowest position. The oil must be up to the level hole.
3. Top up with oil as necessary.

#### Changing the oil

1. Remove one of the cover bolts.
2. Set the hole to the lowest position and allow the oil to flow out. The oil can also be drawn up through the combined level and filler hole.
3. Fit the drain plug.
4. Top up with the correct volume of oil, pouring it through the combined level and filler hole, and adjust the level as necessary.
5. Turn the wheels so that the hole is at the bottom and adjust the level if necessary.
6. Fit the combined level and drain plug.

Level/filling plug    Draining plug

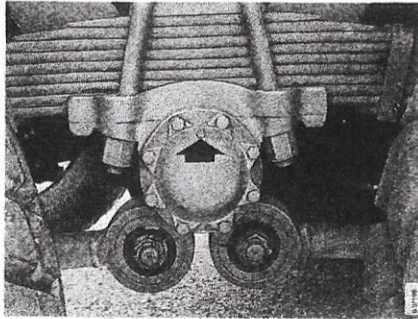


Hub reduction gear

### Spring bearings (SBAT111 only)

#### Checking the level

The oil must be up to the combined level and filler hole.



Spring bearing

### POWER STEERING GEAR

The power steering gear should be reconditioned after 200 000 km.

#### Hydraulic fluid

The hydraulic fluid must meet one of the specifications below:

Automatic Transmission Fluid Type A Suffix A

ATF Dexron

ATF Ford ESW-M 2C 33-E/F

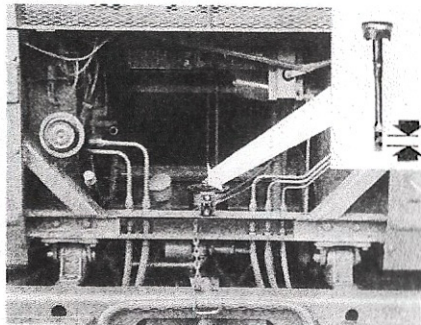
Avoid mixing hydraulic fluids of different specifications.

Hydraulic fluid volume: approx. 3.8 dm<sup>3</sup>

When changing the fluid, however, about 2.5 dm<sup>3</sup> (l) is required.

#### Checking the level

The oil level should be checked when the engine is running and must be between the level marks on the dipstick. When the engine is at rest, the level will be about 2 cm higher.

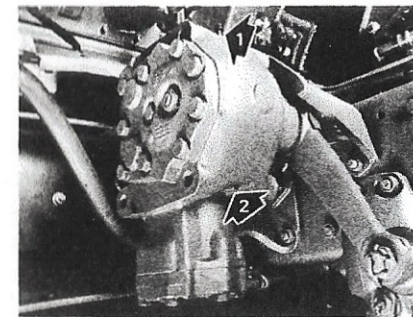


Dipstick

**Observe the utmost cleanliness, to prevent dirt or foreign matter falling into the container.**

#### Bleeding

1. Start the engine and run it at idling speed. Check the hydraulic fluid level. Top up as necessary.
2. Turn the steering wheel from lock to lock. Top up with hydraulic fluid as necessary.
3. Connect a transparent hose to the bleeding nipple and back off the nipple so that the air will escape. Also allow some of the hydraulic fluid to flow out until it is free from air bubbles. Collect the hydraulic fluid in a clean vessel. The fluid can be reused, provided that it has been allowed to stand until the air bubbles have disappeared (about 24 hours).
4. Do not pour the fluid directly from the bleeding nipple and back to the container. The air in the fluid will only return into the system. Stop the engine and check the hydraulic fluid level again after about 2 min. The level must be 1.5—2 cm higher than the level with the engine running. If the level should rise much higher, this indicates that there is air still in the system.
5. Remove the hose and fit protective sleeve on the bleeding nipple.



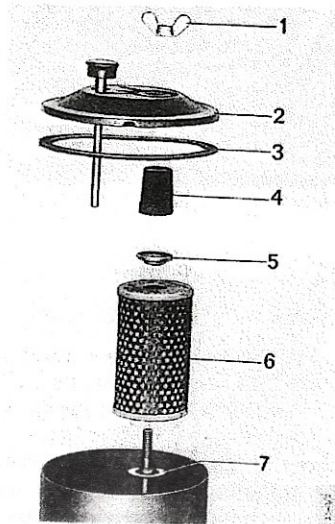
1. Bleeding nipple 2. Drain plug

#### Changing the hydraulic fluid and filter

The hydraulic fluid and filter must be changed once a year.

1. Block the front axle up and place an oil collecting vessel under the power steering gear.
2. Remove the drain plug.
3. Turn the steering wheel to the right lock and run the engine on the starter motor for a short while (stop control pulled out), so that the hydraulic fluid will be pumped out of the container.
4. Back off the bleeding nipple slightly. This will make it easier for the fluid to drain.

5. Turn the steering wheel from lock to lock until more hydraulic fluid flows out.
6. Retighten the bleeding nipple.
7. Remove wing nut 1 retaining the hydraulic fluid container cover 2.
8. Lift up the cover so that filter cartridge 6 is accessible.
9. Remove sleeve 4, centre ring 5 and the filter cartridge. If steel washer 7 under the filter cartridge has also been lifted up, it must be replaced in position.
10. Insert the new filter cartridge, centre ring and sleeve in the order listed. Check cover gasket 3 and place it on the cover.
11. Fill the hydraulic fluid container with hydraulic fluid.
12. Run the engine on the starter motor for a few revolutions (stop button pulled out).
13. Top up the hydraulic fluid in the container.
14. Start the engine and run it at idling speed. N.B. Observe the hydraulic fluid level. The container must be kept roughly half full. (Check occasionally with the dipstick.)
15. Bleed the system (see under Bleeding).

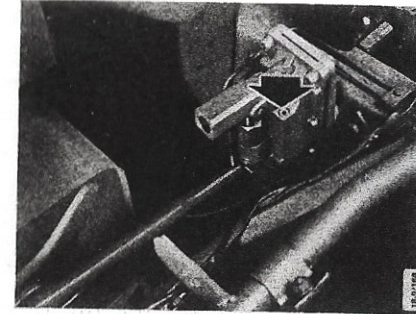


Components of the hydraulic fluid container.

## CAB TILTING HYDRAULIC DEVICE

Checking and topping up the hydraulic fluid

Unscrew the filler plug at the top of the pump. The hydraulic fluid should come up to the lower edge of the filler hole. If the fluid level is too low, top up with the same type of hydraulic fluid as that used for the power steering gear.



Filler hole

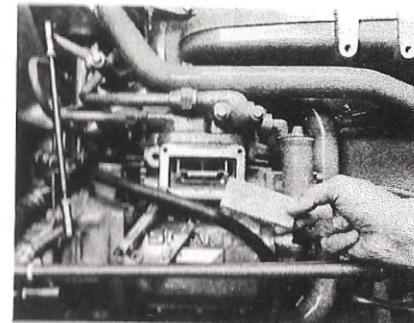
## BRAKE SYSTEM

Changing the compressor air filter

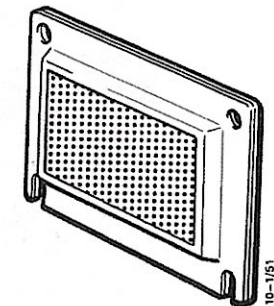
Two different filter designs occur.

Previous design:

1. Remove the two upper bolts and one of the lower bolts retaining the cover plate. The fourth bolt need only be slackened and the cover plate can then be removed and the gasket twisted off.
2. Discard the old filter and clean the filter housing, filter holder and cover plate.
3. Fit a new filter and check that the edges of the filter seal against the filter housing. A leaky filter will quickly increase the compressor wear.



Air filter, previous design



Air filter, present design

Present design:

1. Remove the screws and remove the filter. Discard the filter.
2. Check that the gasket is not damaged. Change the gasket if necessary.
3. Fit a new filter.

#### Checking the pressure regulator

1. Check that the regulator cuts out the compressor at a pressure of about 8.0 bar (kgf/cm<sup>2</sup>) (pressure gauge on the instrument panel).
2. Depress and release the brake pedal repeatedly and check on the pressure gauge that the regulator cuts the compressor back in when the pressure has dropped to about 6.7 bar (kgf/cm<sup>2</sup>) in one of the brake circuits.

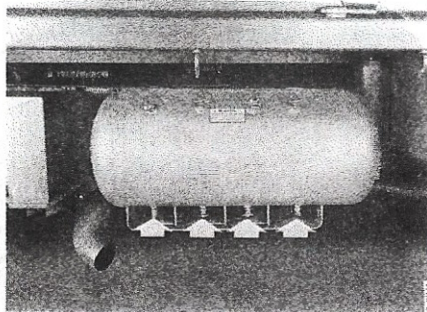
#### Checking the compressed air system for leaks

1. Stop the engine when the pressure has risen to about 7 bar (kgf/cm<sup>2</sup>). Depress the brake pedal. Then check the pressure drop on the gauge on the instrument panel while the pedal is depressed. A pressure drop in excess of 1 bar (kgf/cm<sup>2</sup>) over a period of 5 minutes indicates abnormal leakage and should be investigated and corrected.

#### Checking the air dryer

1. Drain the air pressure tanks and check whether water is running out. Small quantities of water may be present. The presence of larger quantities of water indicates that the air dryer is not working.
2. Check the operation of the heater as follows (winter): Preferably check this when the truck has been standing outdoors and the temperature of the air dryer has dropped to below +12° C.

Press the contact key and feel with the hand that the bottom of the air dryer begins to warm up within one minute. The temperature of the air dryer should rise to about +30° C.



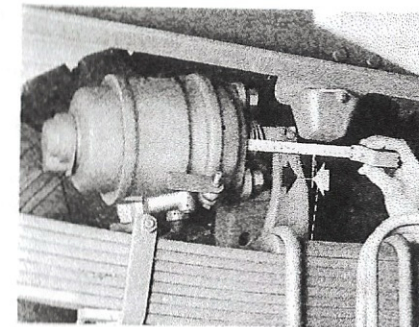
Drain cocks

#### Checking the stroke of the brake cylinder push rods

1. Release the parking brake and then measure and record the projections of the push rods on all brake cylinders.
2. Apply the parking brake and measure again.

The difference between the measured values is the stroke. The brake cylinders will provide the correct brake effort when the stroke is 25—44 mm. If the stroke exceeds 44 mm, the effort of the brake cylinder will be reduced.

The automatic brake levers allow the entire stroke range to be utilised. However, manual brake levers must be adjusted when the stroke approaches the upper limit.



Checking the stroke

#### Adjusting manual brake levers

Before the upper limit of stroke is reached, the brakes must be adjusted. All brake adjustments must be carried out very carefully, to enable the shortest permissible stroke to be obtained. Simultaneous braking of both wheels on a given axle requires the same stroke of the brake cylinders on both wheels. Adjustment is made on the brake levers. Each brake lever incorporates a worm gear with which the eccentric shaft can be rotated in relation to the lever. The worm in this gear is provided with a hexagonal head. Push the locking sleeve in with a socket spanner and turn the worm until the correct stroke of the brake cylinder push rod is obtained.

#### Automatic brake levers

The automatic brake levers are self-adjusting and should not therefore be adjusted manually. On the other hand, their operation should be checked and the push rod stroke should be measured every month. After 150 000 km, the automatic brake levers must be reconditioned.

### Checking the thickness of the brake linings

While checking the strokes of the brake cylinder push rods, the thicknesses of the brake linings must also be checked. The check is carried out through the inspection covers on the brake shields. The brake linings must be replaced in good time before the maximum height of lift of the brake shoes has been utilised.

With new brake drums of their original size, this corresponds to a lining thickness of at least 6 mm. In the case of worn and/or bored-out drums, the linings must be replaced when they are thicker by an amount which corresponds to the increase in the bore of the brake drums.

### WHEELS AND TYRES

The useful life of the tyres may vary considerably, depending on the maintenance and the way the truck is driven. Incorrect wheel alignment, low tyre pressure, unbalanced wheels, overloading, etc. all result in quicker tyre wear. Check the tread depth regularly and remove stones and other hard objects jammed in the tyre tread.

For tyre pressures, see Technical specifications.

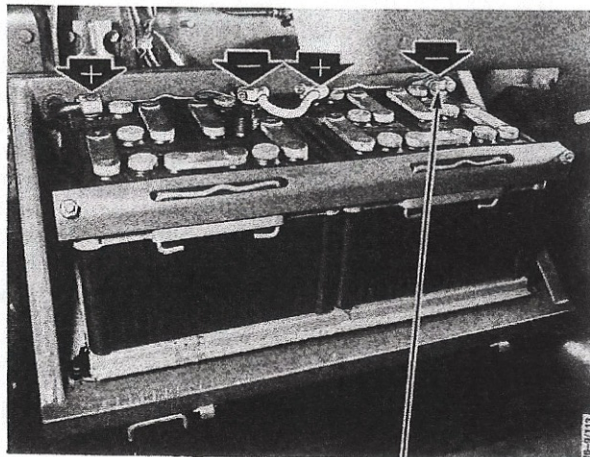
### Changing the wheels

See under Inspection and checks before driving.

### ELECTRICAL SYSTEM

#### Batteries, cables, starter motor and alternator

When carrying out work on the electrical system, first disconnect the earth connection to prevent short-circuiting.



Earth connection  
Battery connection

When carrying out welding work on the truck, the positive and negative cables must be disconnected. Connect the welding unit near the point of welding and to the part which is to be welded.

- Clean the batteries, battery carrier and terminal posts.
- Smear the terminal posts with petroleum jelly.

#### Check that

- the terminal lugs and batteries are secure
- the cell covers are intact and the vent holes are clean
- the electrolyte level is 10–15 mm above the electrode plates. Top up with distilled water as necessary.
- Connect the batteries with the correct polarity. If the polarity is incorrect, the electrical system will be dead.
- Battery chargers must be connected with the correct polarity.
- If the battery capacity is insufficient, starting current may also be obtained by connecting a cable between the starting assistance connectors of two vehicles. See Starting the engine by means of starting assistance cable.

#### Checking the battery charge

Check the battery charge by means of a hydrometer. The density of the electrolyte in a fully charged battery should be 1.28. If it has dropped down to 1.20, the battery must be recharged at a service station. However, the alternator will generally keep the batteries sufficiently charged.

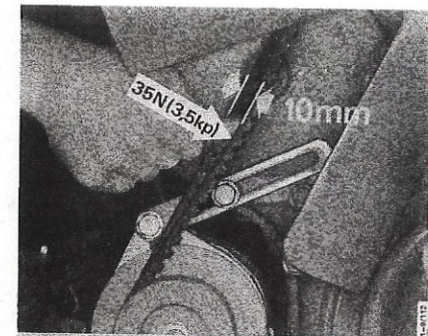
In the winter, take particular care to ensure that the batteries do not become discharged. The electrolyte in a flat battery will freeze at about  $-5^{\circ}\text{C}$  and the battery will be ruined.

#### Checking and adjusting the tension of the V-belts

##### Checking

Apply a force of about 35 N (3.5 kgf) to the belt.

The belt should then deflect 10 mm. Check that the belts are intact and check by feel that there is no play in the fan shaft.



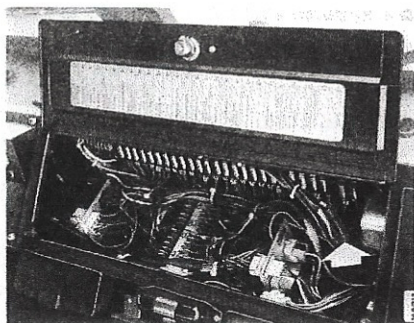
V-belts

## Adjusting

1. If necessary, slacken the alternator retaining bolts and the tensioning screw.
2. Move the alternator as far as necessary to obtain the correct belt tension.
3. Tighten the alternator.
4. Check the belt tension as above.

## Battery heater (optional extra)

Heating of the batteries in the summer is unnecessary. The control unit fuse-link in the fuse box behind the instrument panel can then be removed.



Fuse box with fuse-link

## Bulbs

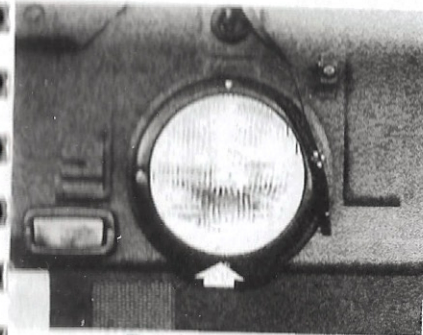
### Changing the bulbs

When changing bulbs, avoid touching the new bulbs with your fingers. Always wear gloves or use the bulb carton or other protection when fitting a new bulb. Scrape off any oxide on the bulb holder, contact springs, etc. to ensure good contact.

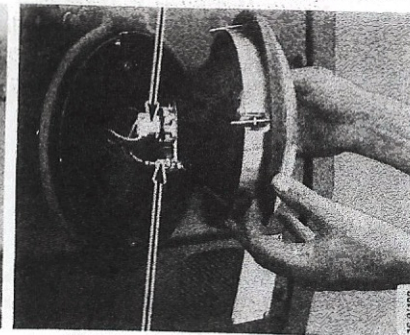
## Headlamps

1. Undo the headlamp retaining screw, lift the wiper arm and unhook the headlamp.
2. Undo the electrical connection to the lamp.
3. Remove the bulb.
4. Fit the new bulb. Hold the bulb holder. Do not touch the reflector or bulb with your fingers. Replace the headlamp in the reverse order to removal. Check the rubber gasket of the headlamp.

## Connection for full and dipped beams



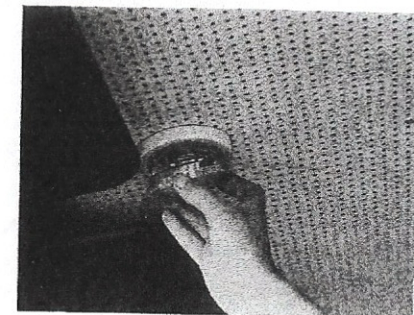
Retaining screw



Connection for parking light  
Removing the headlamp

## Cab lighting

Push in the glass while turning it anti-clockwise.

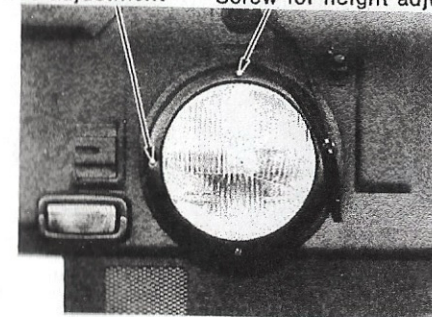


Cab lighting

## Adjusting the headlamps

The headlamps can be adjusted by means of the adjusting screws. The adjustment must be carried out by a mechanic, using headlamp setting equipment.

Screw for side adjustment      Screw for height adjustment



Headlamp adjusting screws

## Checking the headlamp washers and wipers

The headlamp washers and wipers must be regularly checked and the wiper blades must be replaced when necessary. Defective wipers can damage the glass and hence also the pattern of light emitted.

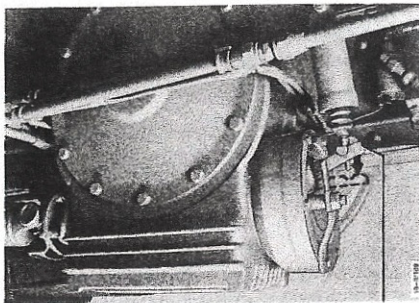
## WINCH (optional extra)

### Checking the winch

- Check that the winch controls and brakes (according to separate instructions below) are working properly.
- Clean and check the winch rope and rope guides.
- Check that there are no oil leaks.

### Checking the winch brake:

1. Disengage the rope drum.
2. Push in the contact key. If necessary, start the engine and let the air pressure rise.
3. Set the transfer box selector to T.
4. Engage the winch power take-off.
5. Depress the driving wheel disengagement switch.
6. Get an assistant to check that the winch brake push rod moves when the brake pedal is depressed. Repeat the procedure with the trailer brake lever instead.
7. Check that the winch brake is not applied by rotating the propeller shaft by hand when the brake pedal and the trailer brake lever are not engaged.



Push rod

Winch brake

## Lubrication

The winch must be lubricated with the same type of oil as the rear and front axles.

### Volumes:

Worm gear 3.5 dm<sup>3</sup> (l)  
Jaw coupling 0.2 dm<sup>3</sup> (l)

### Worm gear

#### Checking the level

Remove the plug and check the oil level. The oil should be up to the combined level and filler hole.

#### Changing the oil

Drain the oil through the drain hole and fill with fresh oil.

### Jaw coupling

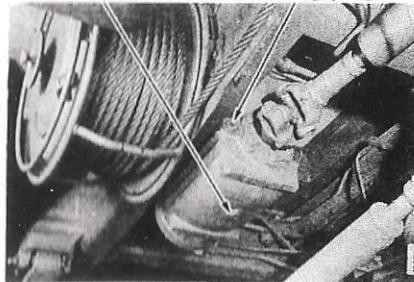
#### Filling with oil (every 5000 km)

Rotate the drum so that the hole is at the top. Remove the plug and fill with 0.05 dm<sup>3</sup> (l) oil.

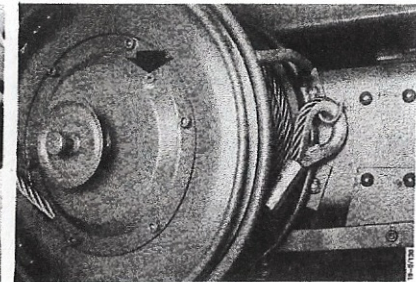
#### Changing the oil (every 30 000 km)

Remove the plug and rotate the winch drum so that the filler and drain hole is at the top. Allow the oil to drain out into a collecting vessel. Rotate the drum so that the hole is at the top. Fill 0.2 dm<sup>3</sup> (l) oil.

Draining plug Level/filling plug



Worm gear

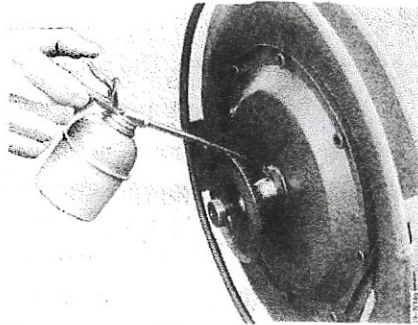


Jaw coupling

## Disengagement mechanism

### Lubrication

Pull the jaw coupling handle out fully. Oil the shaft with a few drops of oil in the lubricating hole. Move the handle back and forth a few times so that the oil will run down. On trucks fitted with a DS11 engine, a nipple with check valve is fitted in the lubricating hole. Force oil into the nipple with an oilcan.



Disengagement mechanism

## UPHOLSTERY

### Cleaning

Clean the fabric upholstery with a tepid soap solution. Moisten a piece of cloth in the soap solution and rub off any stains.

Clean the plastic upholstery with a mixture of tepid water and detergent. A medium-hard brush can be used to remove any remaining dirt.

## SIMPLE FAULT TRACING

No electric power when the contact key is depressed

- Check fuse B2

12 8 A	1 8 A	2 8 A	3 8 A	4 8 A	5 8 A
R. full beam	Reserve (Screened light)	Battery cut-out	Traffic warning lights	Cab light Back-up light/head lamp (Personnel transport cab)	Horn

The electric power supply is interrupted when the contact key is released

- Check fuse A7 and relay 3

5 8 A	6 8 A	7 8 A	8 8 A	9 8 A
Heating fan, Battery Tachometer Combination instrument	Starter motor	Battery cut-out, Relay 2	Differential locks Warning lights Air driver	Reserve

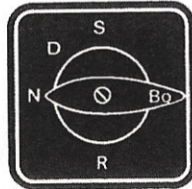
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A	A	A	A									
4	3	2	1									
				1 Battery cut-out								
				2 Battery cut-out								
				3 Battery cut-out								
				4 Headlight wipers								

See Fuses and Relays

Relays marked with the same letter are mutually interchangeable.

The starter motor does not run when the start push-button is depressed, in spite of the remainder of the electrical system being live.

- Check that the gear selector is set to "N".

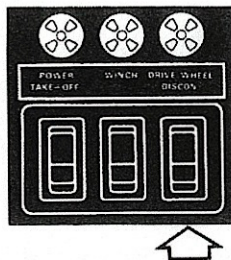


- Check fuse A6

	5 8 A	6 8 A	7 8 A	8 8 A
	Heating fan, Buzzer Tachometer Combination instrument	Starter motor	Battery cut-out, Relay 3	Differential locks Warning lights Air driver

The engine runs but fails to drive the truck

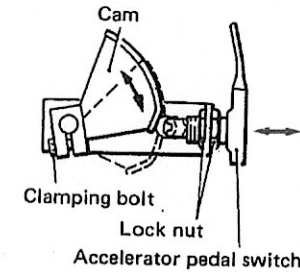
- Check that the gear selector is in the correct position.
- Check that the switch for driving wheel disengagement is not depressed.



- Check that fuses C1 and C2 are intact.

1 8 A	2 8 A	3 8 A	4 16 A
L park light, L tail light Pos. light, Instr. light L side mark light	R park light R tail light R side mark light	Front wheel drive, Power take-off Wire - wheel disc on, Winch Warning lamp for gear oil	Gearbox (Battery heater) (Loose fuse)

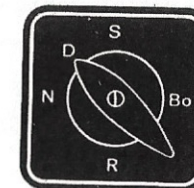
- Check that the accelerator pedal switch inside the front cover is actuated by the accelerator pedal. If the accelerator pedal switch is not actuated the traction developed by the engine will be reduced.



- Check that the oil level in the gearbox is correct.
- Check the electrical connections to the gearbox at the solenoid valves and plugs to the right in the fuse box.

The gearbox fails to change gear when the truck is being driven

- Check that the gear selector is set to "D".



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