

VOLVO LIGHT CROSS-COUNTRY TRUCK SERIES

OWNER'S MANUAL

C 303

G. S. CARGO

C 304

**MORTAR CARRIER
GUN TOWER
AMBULANCE**

C 306

6x6 G. S. CARGO

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GENERAL

This vehicle has three variants, two two-axle versions and one three-axle version. It is intended for driving on highways and for cross-country operation. The two-axle variants are known as the C 303 and C 304, and the three-axle variants as the C 306. They have a common designation, the C-series.

Generally the usual mode of operation is rear-wheel drive, but front-wheel drive can also be engaged when necessary.

The vehicle's cross-country traversability is increased due to the fact that the front and rear axles are provided with mechanical differential locks.

| | | | |
|--------------------------------------|-----|--------|---|
| Indicator lights in switches: | | | |
| full beams/dipped beams switch | 2 W | Ba 7 s | 1 |
| windscreen wipers | 2 W | Ba 7 s | 2 |
| windscreen washer | 2 W | Ba 7 s | 1 |
| emergency warning lights | 2 W | Ba 7 s | 1 |

Ignition system

| | |
|--|--|
| Firing sequence | 1-5-3-6-2-4 |
| Spark plugs, type designation | Bosch W 200 T 35 |
| electrode gap | 0.7-0.8 mm (0.028-0.032 in.) |
| tightening torque | 35-40 Nm (3.5-4.0 kpm = 25-29 lbftf) |
| firing setting | 10° B.T.D.C. at 10-13 rev/sec (600-800 rev/min) |
| Distributor, direction of rotation | Anti-clockwise |
| breaker points gap | min. 0.25 mm (0.010") |

Power transmission system

| | |
|---|------------------------|
| Clutch lever clearance | 4-5 mm (0.16-0.20 in.) |
| Gearbox, type designation | ZF S4-18 |
| reduction 1st gear | 3.85:1 |
| 2nd gear | 2.08:1 |
| 3rd gear | 1.39:1 |
| 4th gear | 1:1 |
| reverse | 4.13:1 |
| Auxiliary gearbox, type designation | VOLVO FD 51 |
| reduction, high | 1:1 |
| low | 2.39:1 |
| Differential carriers, reduction, C 303 | 2.91:1 |
| C 304 and C 306 | 3.44:1 |
| Wheel carriers, reduction | 2.06:1 |
| Total axle reduction, C 303 | 6.0:1 |
| C 304 and C 306 | 7.1:1 |

Brake system

| | |
|-----------------------------|---|
| Service brakes, type | two-circuit, vacuum-hydraulic with drum brakes |
| brake pedal clearance | 10 mm (0.4") |
| Parking brake, type | Mechanical prop. shaft brake |
| clearance | 2-3 ratchet notches |

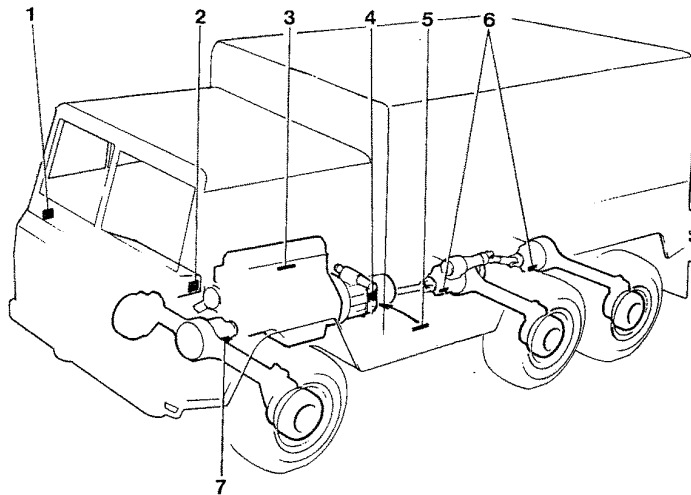
Steering system

| | |
|---|---------------------|
| Steering gear, type | ZF, worm and roller |
| number of turns from stop to stop | 5.1 |

Wheels

| | |
|-----------------------------------|--------------------------|
| Tyres C 303 | 280/85x16 4-ply, special |
| C 304 and C 306 | 280/85x16 6-ply, special |
| Disc wheels with rims, size | 7.5 L-16 |

Data Plates



Data plates

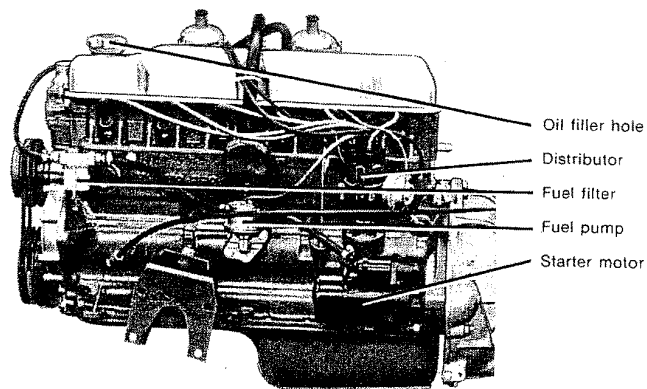
- 1 Volvo Data plate
- 2 Volvo Data plate
- 3 Engine part number and serial number
- 4 Gearbox type designation, part number and manufacturing number
- 5 Auxiliary gearbox type designation, part number and manufacturing number
- 6 Rear differential carrier component and manufacturing numbers
- 7 Front differential carrier component and manufacturing numbers

CONSTRUCTION AND FUNCTION

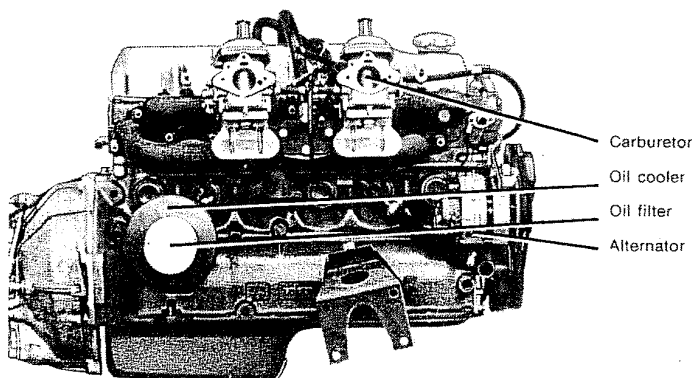
Engine

GENERAL

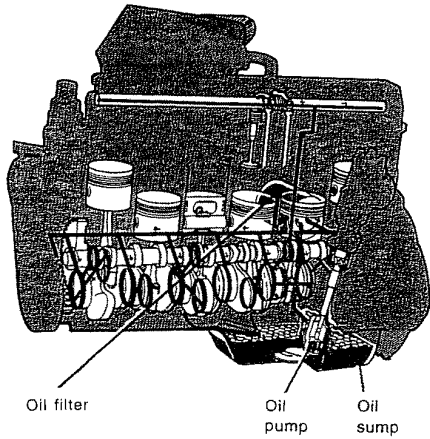
The engine is an in-line, six-cylinder, water-cooled, overhead valve unit with two horizontal carburetors. The engine block is made of special cast-iron and is cast in one piece. The cylinder liners are drilled directly in the block. The block has separate intake and exhaust channels, one for each valve.



B 30 A Engine from left



B 30 A Engine from right



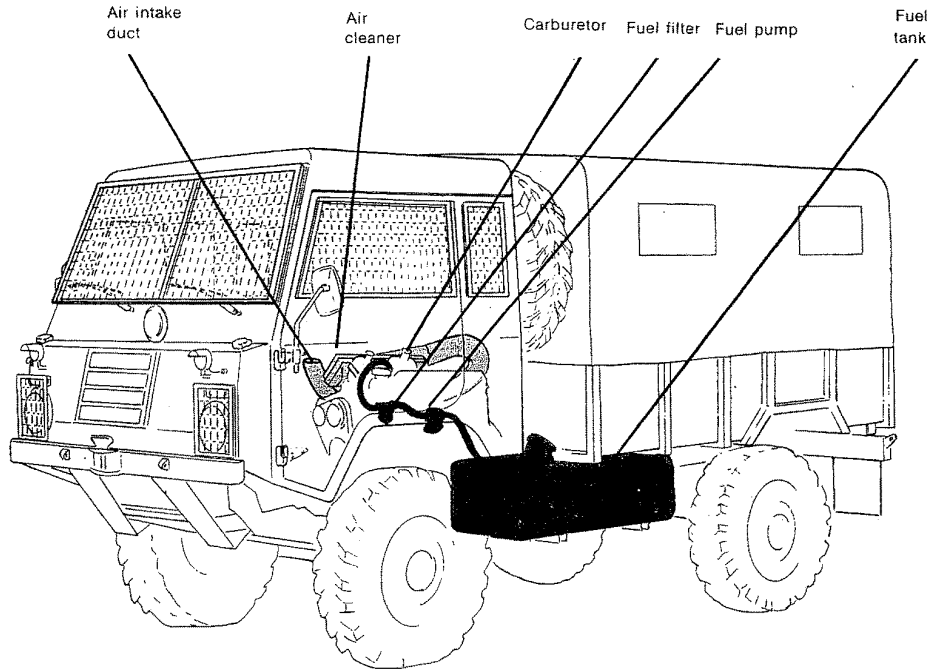
Lubricating system

LUBRICATING SYSTEM

The driving force behind the engine lubricating system is the gear-driven pump. The pump is driven via the camshaft gear. Oil is pumped from the pump through the oil filter and channels to the various lubricating points. A relief valve built into the oil pump prevents the pressure from becoming excessive. The oil filter is of the full-flow type, i.e., all the oil passes through the filter before going out to the various lubricating points of the engine.

An oil cooler is fitted between the oil filter and cylinder block.

FUEL SYSTEM



Fuel system

Fuel pump

The fuel pump is of the diaphragm type and is driven by the camshaft. It sucks fuel from the fuel tank and pumps it through a fuel filter to the carburetors. The fuel filter is mounted on the left-hand side of the engine.

Carburetors

The engine is provided with two horizontal carburetors of the Zenith-Stromberg type.

INTAKE SYSTEM

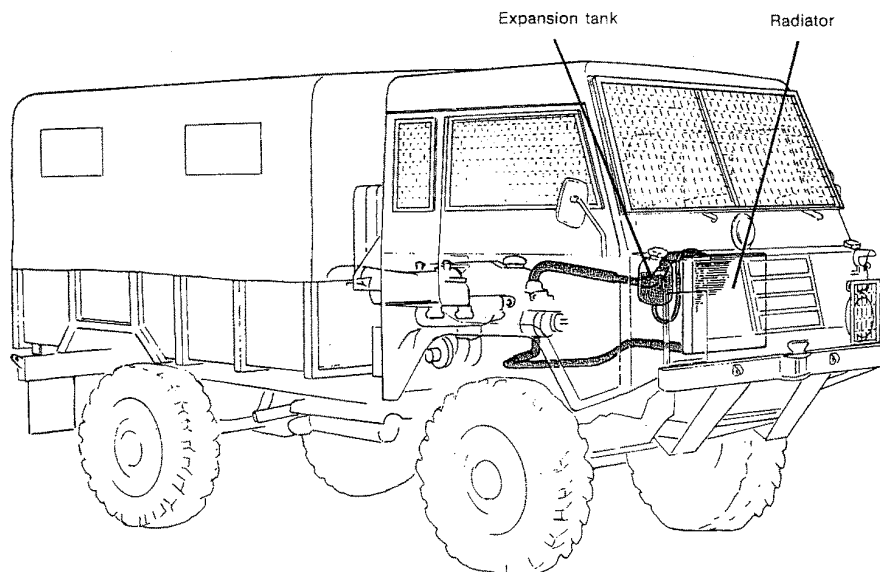
Air cleaner

The air cleaner functions both as a cleaner for the incoming air and as an intake silencer. It is provided with a replaceable paper insert.

COOLING SYSTEM

The engine has a sealed cooling system. The coolant is circulated round the system by means of a centrifugal pump. A double-operating thermostat ensures that the engine is heated up rapidly. It also ensures that the engine is maintained at a temperature most suitable to all operating conditions.

An expansion tank prevents air from circulating with the coolant, since this could cause corrosion in the cooling system.



Cooling system

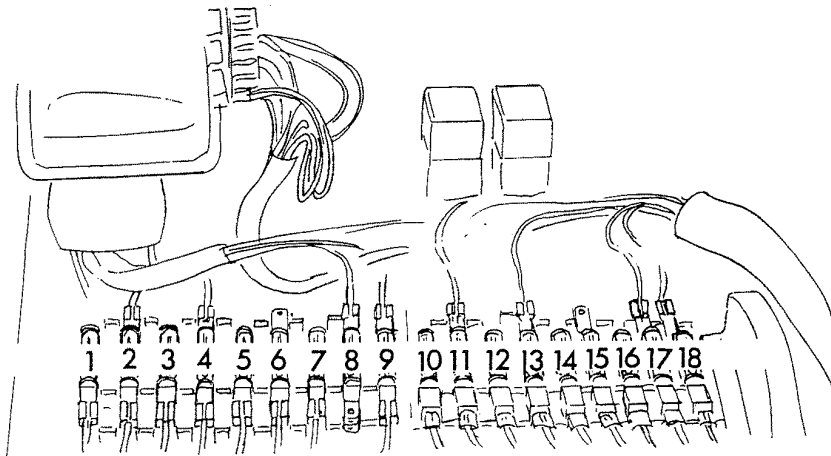
Electrical system

LIGHTING COMPONENTS

The vehicle's lighting at the front consists of two headlights with full beam and dipped-beam arrangement as well as two lights which are used as parking lights and direction indicators. Up front there are also two removable blackout lights. At the rear there are two lamp clusters containing the tail, directional indicator and brake lights as well as a blackout light and parking brake light.

FUSES

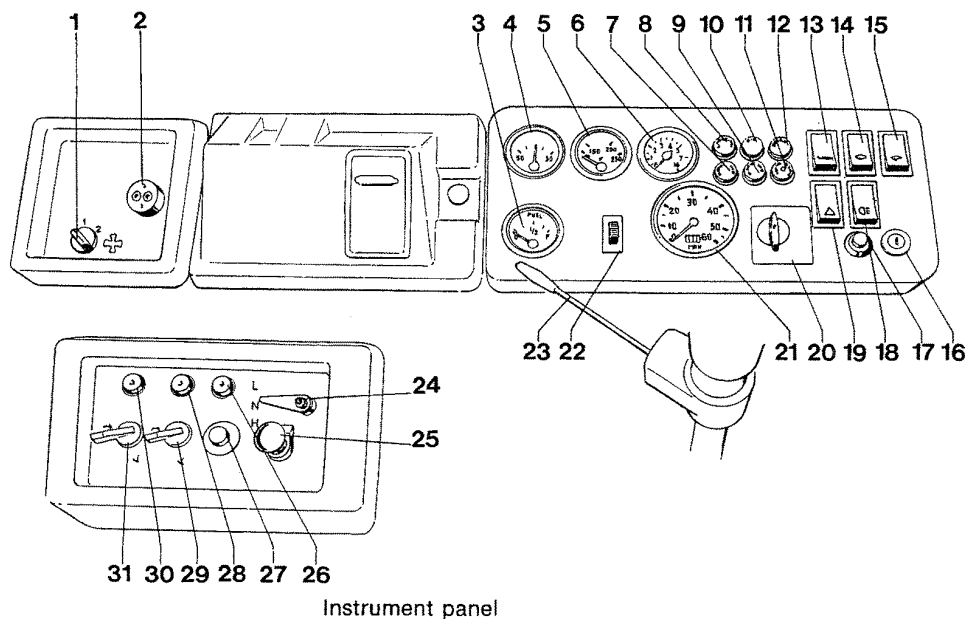
The electrical equipment is protected by fuses grouped behind the dashboard stowage locker. Always make sure you use the right type of fuse when replacing fuses. A plate located next to the fuseboard as well as the following list tell you which components are protected by the various fuses.



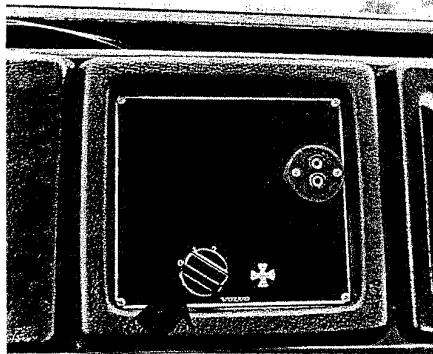
Fuses

- | | |
|--|---|
| 1 Full beam, left Full beam control light | 13 Step relay |
| 2 Full beam, right | 14 Wiper motor Rheostat |
| 3 Dipped beam, left | 15 Direction indicators Light relay |
| 4 Dipped beam, right | Brake circuit warning light |
| 5 Position light, front left | 16 Fuel and coolant temp gauges Oil pressure warning light |
| 6 Position light, tail | Horn |
| 7 Position light, front right | Washers |
| 8 — | 17 Differential lock Ace wheel drive |
| 9 Cab light | Fan |
| 10 Black-out light, front left and tail | 18 Socket outlet |
| 11 Black-out light, front right | |
| 12 Stop light | |

INSTRUMENTS, SWITCHES, INDICATOR/WARNING LIGHTS AND CONTROLS



- | | |
|--------------------------------------|--|
| 1 Fan switch | 19 Emergency warning flasher switch |
| 2 Inspection lamp socket | 20 Blackout light switch |
| 3 Fuel gauge | 21 Speedometer |
| 4 Ammeter | 22 Instrument panel light |
| 5 Temperature gauge | 23 Direction indicator lever |
| 6 Oil pressure gauge | 24 Indicator for High and Low gear range |
| 7 Direction indicator light, vehicle | 25 Choke |
| 8 Battery charging warning light | 26 Indicator light for front wheel drive |
| 9 Direction indicator light, trailer | 27 Push-push button for front wheel drive |
| 10 Oil pressure warning light | 28 Indicator light for front axle differential carrier |
| 11 Full beam indicator light | 29 Control switch for front axle differential carrier |
| 12 Warning light for parking brake | 30 Indicator light for rear axle differential carrier |
| 13 Windscreen washer switch | 31 Control switch for rear axle differential carrier |
| 14 Left windscreen wiper switch | |
| 15 Right windscreen wiper switch | |
| 16 Ignition | |
| 17 Starter button | |
| 18 Headlight switch | |

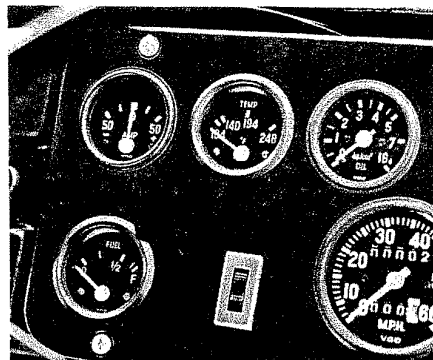


Fan switch

Fan switch

The switch has three positions:

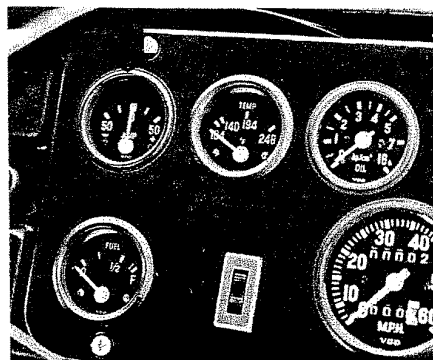
- 0 — OFF
- 1 — FULL OUTPUT
- 2 — HALF OUTPUT



Fuel gauge

Fuel gauge

The fuel gauge indicates the approximate amount of fuel in the tank. It is marked "full", "half" and "empty". It starts functioning when the ignition is switched on.



Ammeter

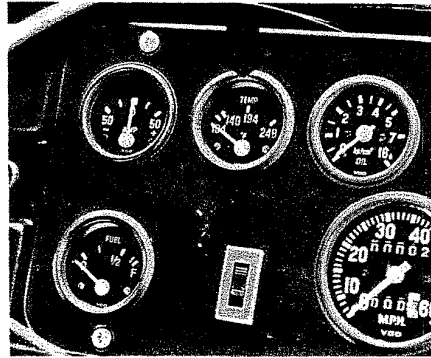
Ammeter

The ammeter indicates the current in the system and also battery discharge. At low engine speed it is quite normal for the ammeter pointer to swing to negative (-). The ammeter needle should swing to positive (+) when engine speed is increased, unless there are a great many power consumers switched on at the same time.

However, if the ammeter pointer points to a low value, this indicates low charging probably due to poorly tensioned drive belts which are slipping on the pulleys.

Temperature gauge

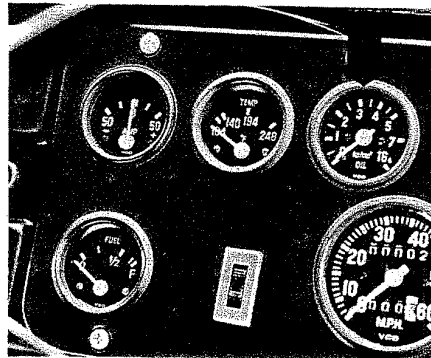
The temperature gauge indicates the temperature of the coolant in the engine and thereby the engine operating temperature. Normally the temperature should not exceed 194° F. Should the gauge pointer repeatedly go above 194° F, check the coolant level and the tension on the drive belts, see page 44.



Temperature gauge

Oil pressure gauge

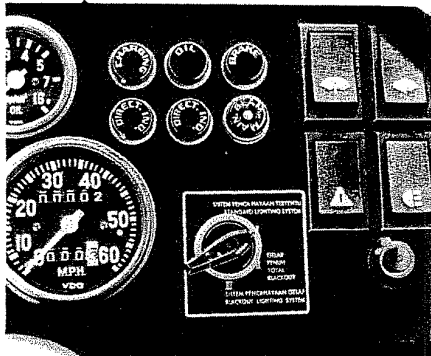
The oil pressure gauge indicates the pressure of the oil in the engine lubricating system. The pressure is dependent on engine speed and temperature. Normally the pressure should be 3 kp/cm² (43 lbf/in²) when the engine is warm. Should pressure drop near to zero while the engine is running, stop the engine immediately and find out the reason for this.



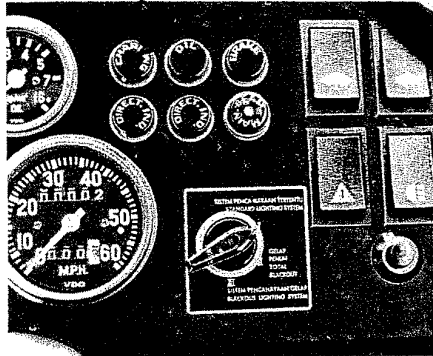
Oil pressure gauge

Battery charging warning light

This light goes on red when the alternator is not charging or is charging excessively. It also lights when the ignition is switched on but goes out again when the engine starts. Should it go on during driving, this indicates either a fault in the electrical system or also the drive belts are poorly tensioned and are slipping on the alternator pulley.



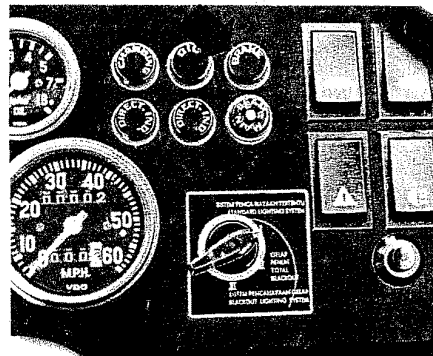
Battery charging warning light



Oil pressure warning light

Oil pressure warning light

This light goes on red when the engine oil pressure is too low. It goes on when the ignition is switched on but goes out again when the engine has started. Never start driving until the light goes out.

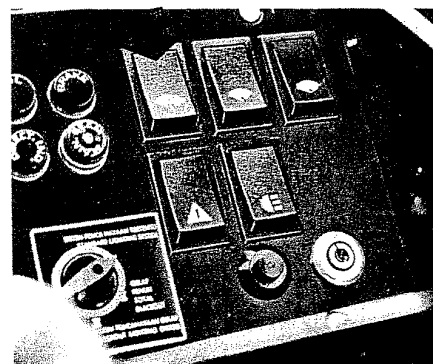


Warning light for parking brake

Warning light for parking brake

This goes on red when the ignition is switched on and if:

- the parking brake is applied
- the brake pedal has to be depressed further than normal because the brakes are worn.



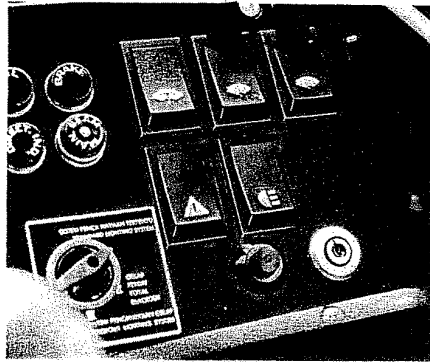
Windscreen washer switch

Windscreen washer switch

To engage the windscreen washer, push in this switch. The washer can also be used when the windscreen wipers are disengaged. The fluid container is on the left under the dashboard and is filled through the opening at the front of the vehicle, left-hand side.

**Left windscreen wiper switch
Right windscreen wiper switch**

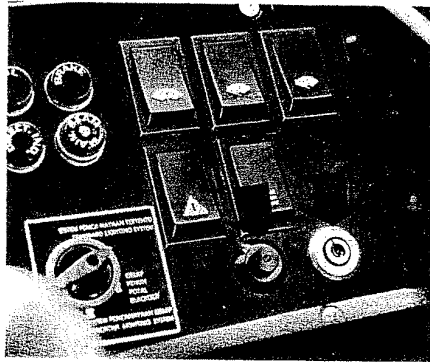
The windscreen wipers can be switched to two speeds:
half speed = switch pushed in one notch
full speed = switch pushed in fully.



Windscreen wiper switch

**Ignition
Starter button**

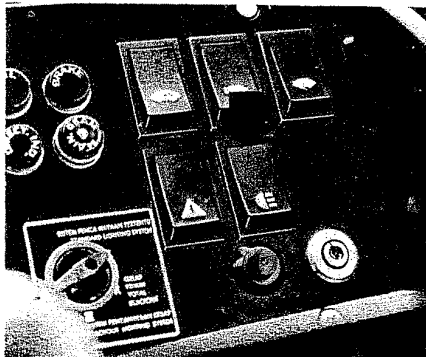
The ignition is engaged by turning the ignition key clockwise. To start the engine first switch on and then push in the starter button.



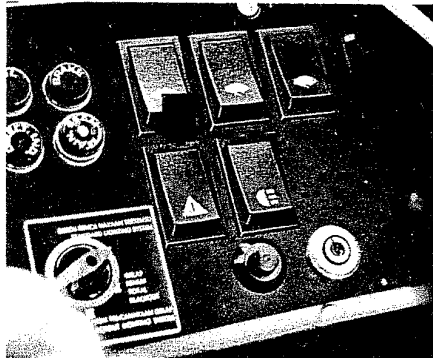
Ignition and starter button

**Direction indicator lever
Indicator light for fullbeams**

Pushing the switch into the first notch switches on the vehicle's parking light. Pushing the switch in fully switches on the fullbeams or dipped headlights. To switch between fullbeams and dipped headlights, use the direction indicator lever (23), which is pulled towards the steering wheel. The blue indicator light (11) goes on when fullbeams are switched on.



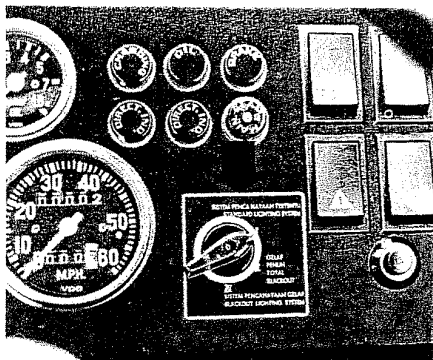
Direction indicator lever



Switch for emergency warning flashers

Switch for emergency warning flashers

Pushing in this switch turns on all the vehicle's direction indicators. A red warning light in the switch blinks in unison with them. These emergency warning lights can be switched on irrespective of whether the ignition is turned on or not.



Black-out light switch

Black-out light switch

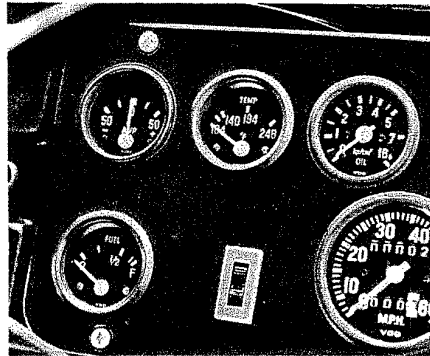
The following happens when the headlights are switched off:

- I with the switch in this position, the black-out light is switched off, but the stop light functions.
- II with the switch in this position the black-out light is switched off as well as the stop light.
- III with the switch in this position the black-out light is switched on and the stop light contact connected to the stop light for black-out operation.

With the switch in positions II and III, the vehicle headlights, direction indicators and other lighting are switched off. But the instrument lighting and the warning lights for oil pressure, choke, battery charging, differential carriers and front wheel drive function.

Speedometer

The speedometer indicates the speed at which the car is being driven. It houses a tripmeter which runs up to a maximum 999 miles and is zero-set with a small knob under the dashboard.



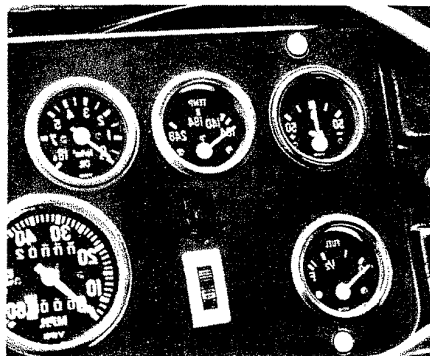
Speedometer



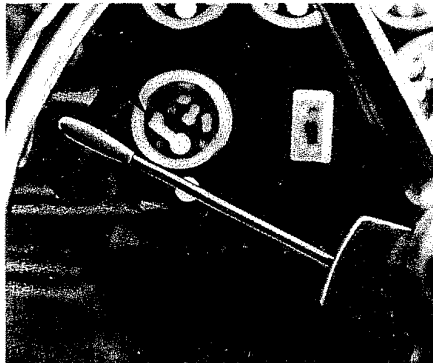
Knob for zero-setting the tripmeter

Instrument panel light switch

Turning this switch either dims or strengthens the instrument panel light. Moving the knob from the bottom position upwards gradually increases the lighting, which is fully on when the knob is in the upper position. The instrument panel light functions irrespective of whether the headlights are switched on or not.



Instrument panel light switch



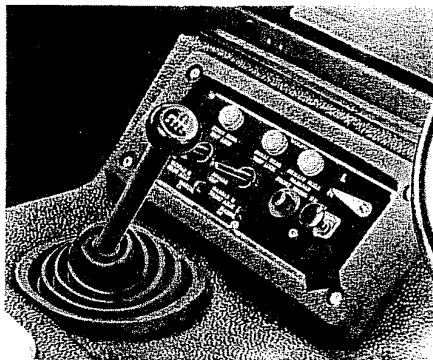
Direction indicator lever and indicator lights

Direction indicator lever and indicator lights also lighting switch and fullbeam flasher.

The direction indicators are operated by means of the lever attached to the steering column under the steering wheel. The panel indicator lights for these direction indicators, for both vehicle and trailer, flash a green light in unison with the direction indicators. When the direction indicators are used when driving without a trailer, both the indicator lights switch on during the first flashing of the direction indicators.

To switch from fullbeams to dipped beams and vice-versa, move the lever on the steering column towards the steering wheel and then release it. The headlight switch (18) should then be pushed in fully. In other words the headlights should be switched on.

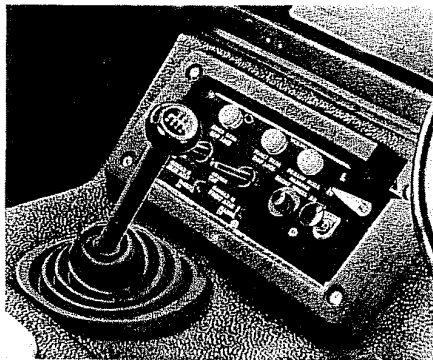
But this lever can also be used for flashing with the headlights even when the headlights are not switched on. All you have to do is move the lever towards the steering wheel. The headlights remain on as long as the lever is pulled towards the steering wheel. Once you release it, the headlights go out.



Choke

Choke

Use the choke to assist starting the engine when it is cold.



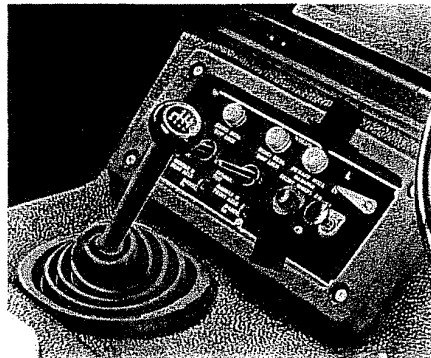
High-gear and low-gear range indicator

High-gear and low-gear range indicator

Low-gear range is engaged when the indicator points to L and the high-gear range is engaged when it is at H. No gear is engaged when the indicator is at N (neutral).

**Front-wheel drive push button
Front-wheel drive indicator light**

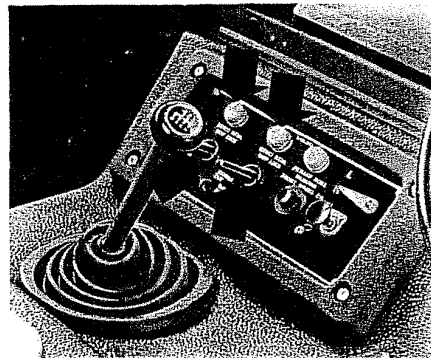
To engage the front-wheel drive when operating in the high-gear range, push in the button. This lights the indicator light (amber). Front-wheel drive is engaged automatically when operating in the low-gear range. Front-wheel drive is used in combination with the high-gear range when driving on ground that is not firm or is slippery.



Front-wheel drive push button

**Control switch for rear axle differential carrier
Indicator light for rear axle differential carrier
Control switch for front axle differential carrier
Indicator light for front axle differential carrier**

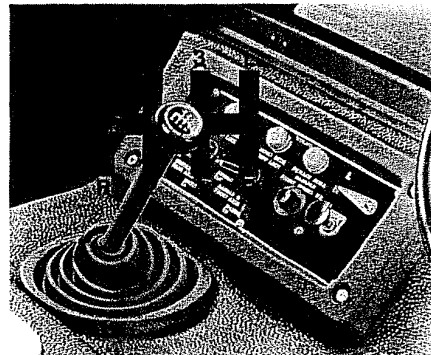
Use the respective switches to engage or disengage the differential carrier on the front or rear axle. The indicator light for the differential carrier in question goes on when the carrier is engaged.



Control switch for differential carrier

Gear lever

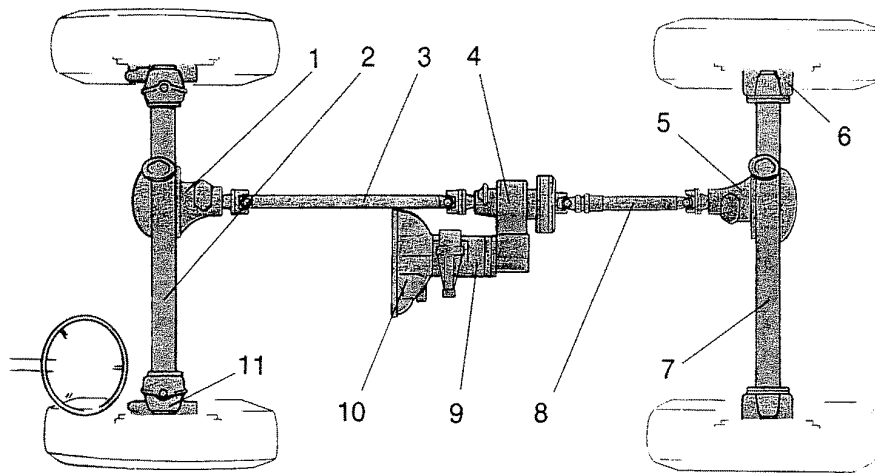
The gear lever operates both the main gearbox and the auxiliary gearbox. The adjacent picture shows the various gear positions for the lever.



Gear lever

Power transmission

GENERAL



Power transmission, C 303 and C 304

- | | | |
|--|----------------------|---|
| 1 Front axle carrier | 4 Auxiliary gearbox | 8 Propeller shaft for rear axle carrier |
| 2 Front axle | 5 Rear axle carrier | 9 Clutch |
| 3 Propeller shaft for front axle carrier | 6 Rear wheel carrier | 10 Front wheel carrier |
| | 7 Rear axle | |

CLUTCH

The clutch, which transfers power from the engine to the gearbox, is of the single, dry-plate type. Pressure on the clutch pedal is transmitted to the engaging fork via a wire.

GEARBOX

Note that the gear lever operates both the gearbox and the auxiliary gearbox. The gearbox is four-speed and fully synchronized. All gears except reverse are in constant mesh with each other. Engaging a gear causes the corresponding gear wheel to mesh with the mainshaft by an engaging sleeve.

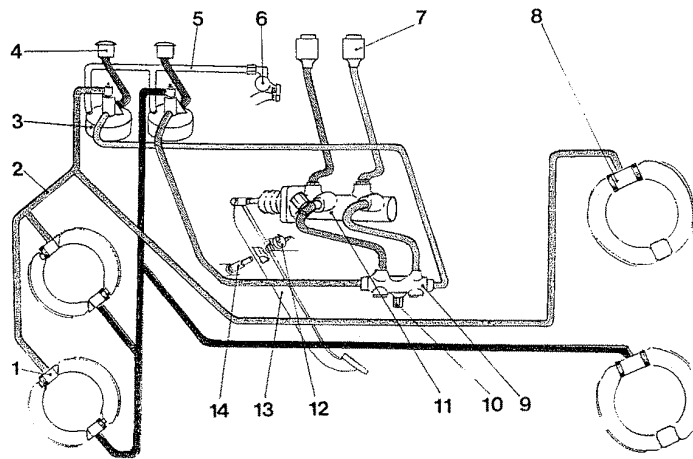
AUXILIARY GEARBOX

The auxiliary gearbox is synchronized and has two speeds, high and low as well as neutral. It is operated by the gear lever, which also operates the ordinary gearbox.

Brake system

GENERAL

The vehicle is fitted with two brake systems, one for the service brake and the other for the parking brake. These systems are independent of each other.



Brake system

- | | |
|--------------------------------|--------------------------------|
| 1 Wheel cylinder, front wheels | 8 Wheel cylinder, rear wheels |
| 2 Brake line | 9 Warning valve |
| 3 Servo unit | 10 Contact, press. diff. |
| 4 Air cleaner | 11 Master cylinder |
| 5 Vacuum line | 12 Contact for stop lights |
| 6 Suction pipe | 13 Brake pedal |
| 7 Brake fluid reservoir | 14 Contact, brake pedal travel |

SERVICE BRAKES

The brake system here is of the two-circuit type with drum brakes.

One circuit operates on the front wheels and the right rear wheel. The other operates on the front wheels and the left rear wheel.

Each circuit has a vacuum power unit and a brake fluid container.

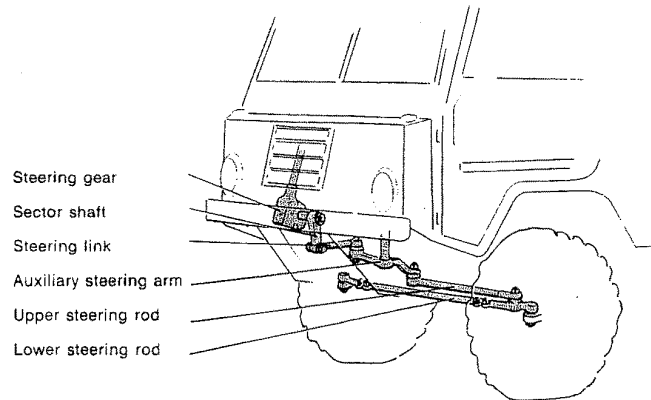
If the brake pedal has to be depressed too far due to the brakes being worn, then a warning light goes on.

PARKING BRAKE

The parking brake is a mechanical brake operating on the propeller shaft with internal shoes which are fixed to the rear end of the auxiliary gearbox. A warning light goes on when the parking brake is applied.

Steering system

The steering gear is of the rack and pinion type. The steering system includes two steering rods, an upper and a lower, as well as a steering link.



Steering system

Frame, suspension and wheels

FRAME

The frame is comprised of two, box-profile side members which are linked to four crossmembers. The front and rear crossmembers are of the box type while the two intermediate are gas-tight tubular beams which function as vacuum tanks.

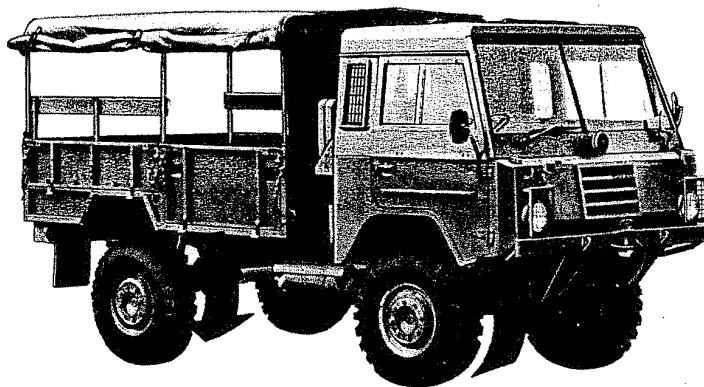
SUSPENSION

Both rear and front suspensions are of the spring leaf type. The leading end of the springs is suspended by means of spring shackles. The vehicle is provided with hollow rubber springs both front and rear.

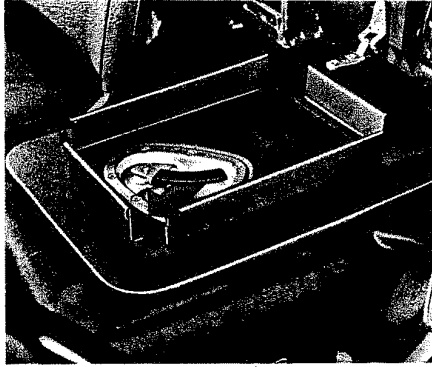
The shock absorbers are of the hydraulic, double operating, telescopic type.

WHEELS

The wheels are of the disc type. The tyres may either be of the tubeless type or contain tubes. The tyres have an arrowed pattern. They should be fitted so that this pattern on the rear tyres points straight forward in the same direction as travel and in the opposite direction on the front tyres.



Tyre pattern must face in direction shown by arrows



Inspection cover

Body

INSPECTION COVER

Under the stowage locker between the front seats there is an inspection cover. Remove this cover when you want to get at the following components:

- Oil dipstick
- Oil filler cap
- Drive belts
- Carburettors