



***Dear driver,***

*This driver's manual was worked out for familiarising with operation and basic maintenance of Your new AVIA truck and it should provide you with important information from point of view of safe operation.*

*We recommend you to read it carefully and to follow instructions mentioned in it.*

*This way, you will gain pleasant and safe vehicle operation without problems.*

*For long-term vehicle life and certain operational reliability, it is necessary to have vehicle repaired and maintained in some of our numerous authorised repair shops.*

*We would like to take advantage of this occasion to thank you for purchasing product of AVIA company and assure you about our interest of your maximum satisfaction..*

*We wish you to cover many thousands kilometres without accident.*

**AVIA ASHOK LEYLAND MOTORS s.r.o.**

Praha - Letňany  
Czech republic

## Cargo truck documentation

### Owner's Manual

To become perfectly familiar with the vehicle, it is necessary to study thoroughly Owner's manual and all additional instructions that are part of your vehicle documentation (e.g. Owner's Manual of automobile radio, certificate of warranty for battery etc.).

### Service Booklet

Documentation also contains Service Booklet that contains:

- n Identification data of vehicle
- n Basic warranty conditions
- n Warranty registration certificate
- n Record of regular service inspections
- n Labour activities, maintenance intervals
- n Record of car body inspections
- n Specific Activities and maintenance
- n Contract repair shops list

## Information

Components of equipment that are designated with \* are series mounted only on certain models or they are delivered only as exceptional equipment.

### Warning!

**n It is necessary to adhere at maximum rate the texts in this frame (Warning!).**

In the case of vehicle sale, it is necessary to hand over complete documentation.

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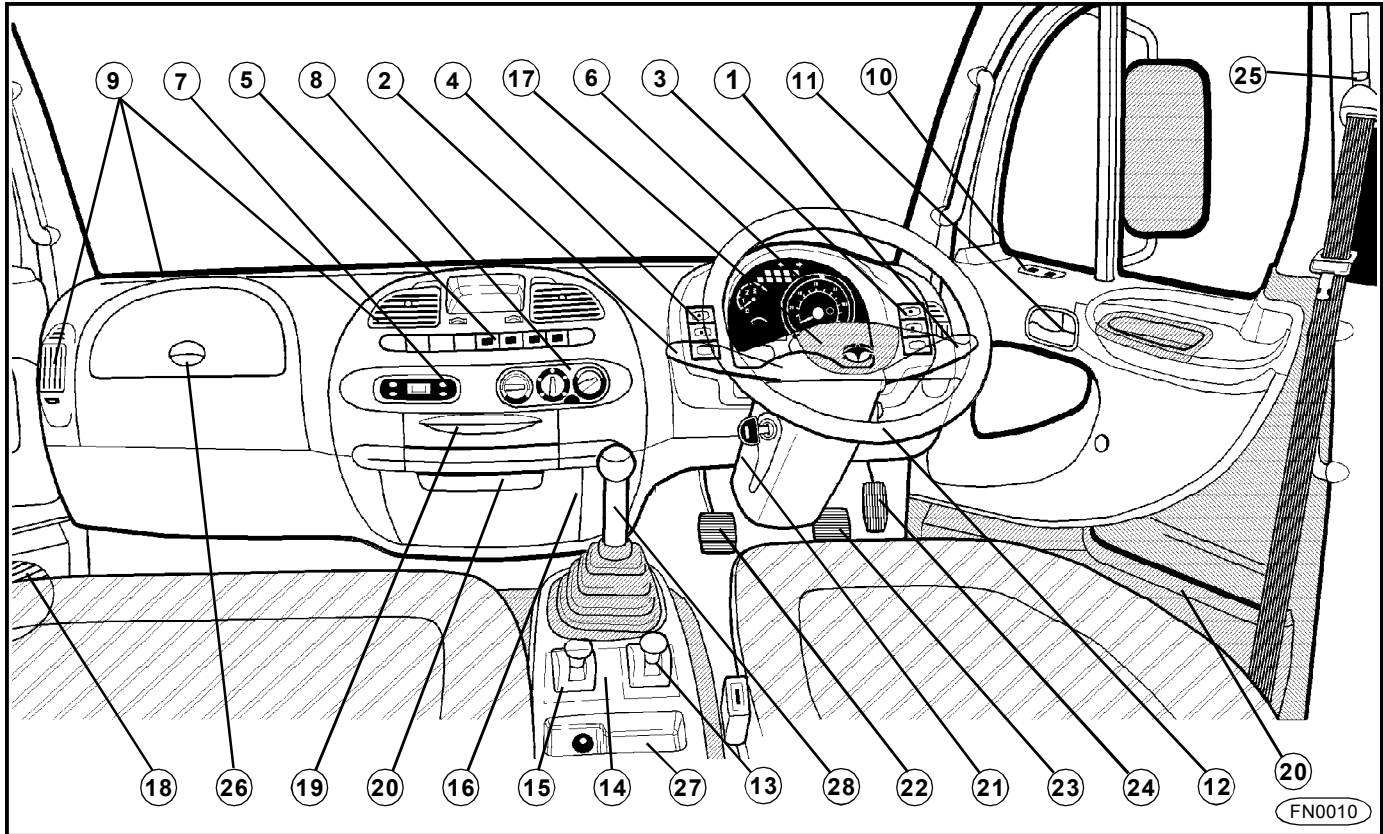
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## DESCRIPTION

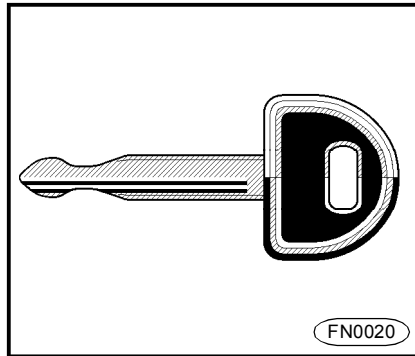
### Compartment



- |                                                |                                                 |
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| 5 Controls                                     | 25 Safety belt height adjustment*               |
| -auxiliary drive*                              | 26 Storage compartment (with cover *), fuse box |
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| -cruise control - ON/OFF (ISBe)                |                                                 |
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| 6 Measurement instruments and indicator lights |                                                 |
| 7 Digital clock*                               |                                                 |
| 8 Heating control                              |                                                 |
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## DESCRIPTION

### Keys

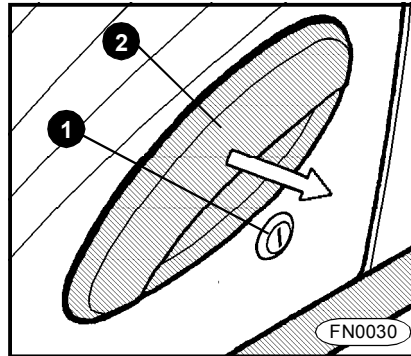


**n** Two keys are delivered - it is advised to hide one of them outside vehicle as a spare key.

**n** A label is fastened to keys where key number is stamped. It is advised to hide it outside vehicle and record the number.

**n** When vehicle is equipped with recording speedometer, key for opening it is delivered with vehicle.

### Door

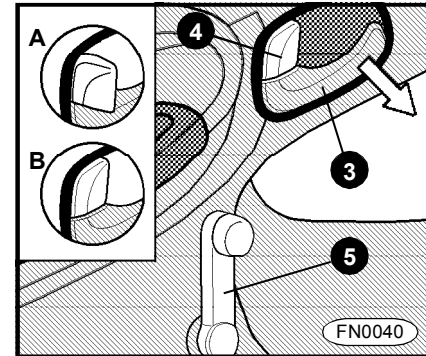


#### Exterior side

It is possible to lock and unlock both doors by means of key from exterior side. Key is inserted into lock (item 1). Grasping the door handle (item 2) and pulling outside results in door opening.

**Unlocking** - Insert the key, turn the key 90° counter clockwise and back to the basic position, where the key can be removed.

**Locking** - Insert the key, turn the key slightly clockwise and back to the basic position.



#### Inner side

**n** (item 4)

**A** - Unlocked door

**B** - Locked door (Door locked this way cannot be opened from both exterior and inner side).

**n** Pulling lever (item 3) door is opened from inner side.

**n** Turning winder handle (item 5) results in window opening and vice versa.

## Electric window winder\*

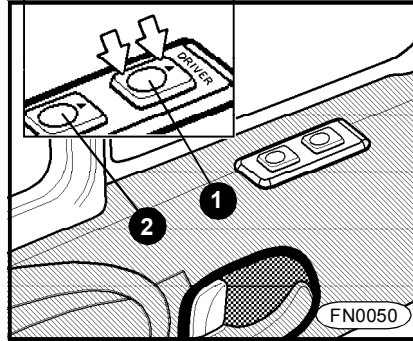
### Central door lock\*

Central door lock is possible to lock or unlock from driver's side both doors.

#### Warning!

n Before leaving vehicle, always remove ignition key from switch-box.

n It is necessary to take care of closing rear and side doors of van-type truck and it is not permitted to transport such cargo that disables proper door closing. If van-type truck damage occur due to improper rear or side door closing manufacturer exclude the truck from warranty.



n It is possible to wind windows only when key is in position **ON**.

n Winding operates for the time of pressing the button.

n Controls are placed on upper part of doors.

n Both windows can be controlled from the place of driver.

n Right side window can be controlled from the place of front seat passenger.

n Control (item 1) - for window on driver's side.

n Control (item 2) - for window on front seat passenger's side.

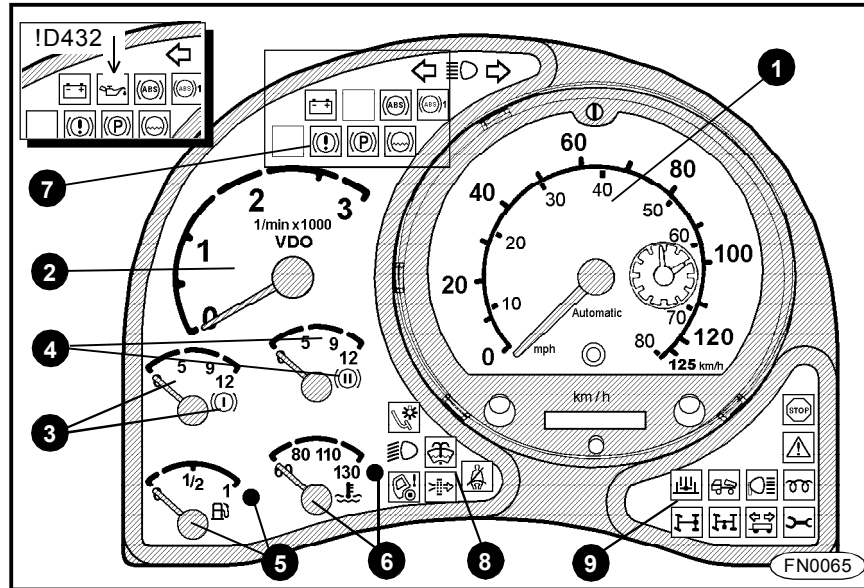
n Pressing of rocker switch front side results in opening window, pressing the other side window is closed.

#### Warning!

Take care of grip - mechanism is able to create such force that could result in injury.

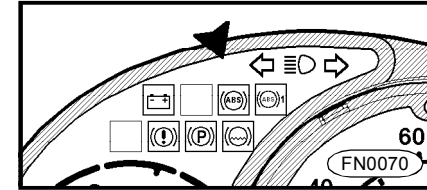
## DESCRIPTION

### Instrument panel - indicators



- |                                              |                                                       |
|----------------------------------------------|-------------------------------------------------------|
| 1 Recording speedometer                      | 5 Fuel reserve indicator, reserve fuel indicator lamp |
| 2 Engine revolution indicator                | 6 Coolant temperature indicator, indicator lamp       |
| 3 Pressure gauge of brake system circuit I.  | 7 Indicator lamp block I.                             |
| 4 Pressure gauge of brake system circuit II. | 8 Indicator lamp block II.                            |
|                                              | 9 Indicator lamp block III.                           |

### Indicator lamps



#### Direction Indicator lamp



**n** According to switched on flasher light control, left or right indicator lamp flashes.  
**n** Shorter time interval of flashing indicates damage of flasher lamp bulb (it is necessary to replace burnt bulb immediately).

#### High-beam headlights

It glows when high-beam headlights are switched on.



#### Battery charging

**n** It glows when ignition is switched on, after engine starting it should be switched off.

**n** When indicator lamp is not switched off or it starts glowing during driving, it is necessary to stop vehicle and engine and proceed according to chapter **Malfunctions and their repair**.



#### **Engine lubrication**

(only D432)

**n** It glows when key is in position ON, after engine starting it should be switched off.

**n** When indicator lamp is not switched off or it starts glowing (shine through) during driving, it is necessary to stop vehicle and engine and proceed according to chapter **Malfunctions and their repair**.



#### **ABS (vehicle)**

**n** It glows when key is in position ON (for check of diode function), after short time interval it should be switched off.

**n** When indicator lamp is not switched off after short time interval or it starts glowing during driving, it is necessary to stop vehicle and proceed according to chapter **Malfunctions and their repair**.

#### **Warning!**

**The indicator lamp may start shine through in irregular intervals with low light intensity. This shining through does not indicate failure, but it is caused by continuous inspection of ABS control unit.**



#### **Brake system failure**

**n** It glows when key is in position ON (for check of diode), after short time interval it should be switched off.

**n** When indicator lamp is not switched off after short time interval or it starts glowing during driving, it is necessary to stop vehicle and proceed according to chapter **Malfunctions and their repair**.



#### **Parking brake**

**n** It glows when parking brake is applied and when air pressure is lower.

**n** When it glows, it isn't possible to move off or when it starts glowing during driving, it is necessary to stop vehicle and proceed according to chapter **Malfunctions and their repair**.

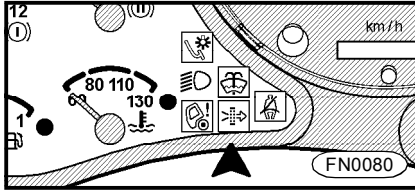


#### **Minimum level of braking fluid**

**n** It glows when key is in position ON (for check of diode function), after short time interval it should be switched off.

**n** When indicator lamp is not switched off after short time interval or it starts glowing during driving, it is necessary to stop vehicle and proceed according to chapter **Malfunctions and their repair**.

## DESCRIPTION



### Brake lamp

n It glows when brake lamp bulb is burnt.

n It is necessary to replace the faulty bulb.



### Low-beam headlamps

It glows when low-beam headlamps are switched on.



### Tilting of cab

It glows when the cab is improperly fixed in rear support (it is necessary to repair at once).



### Minimum washer fluid level\*

It glows in the case of washer fluid small quantity.



### Air cleaner (clogged)

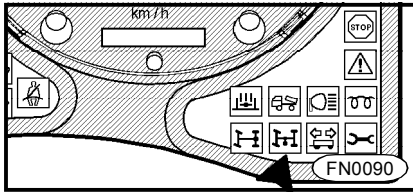
n It glows in case of clogged air filter.

n It is necessary to replace air filter element.



### Safety belt\*

Necessity of safety belt fastening is noticed.



### Exhaust brake\*

It glows when exhaust brake operates (only D432, 422).



### Differential lock

It glows when differential lock is activated.



### Cargo area tipping

It glows when cargo area is tipped.



### Auxiliary drive\*

It glows when auxiliary drive is activated.



### Reverse lamp

It glows when reverse gear is engaged.



### Flasher lights of trailer\*

**n** It glows when flasher lights are activated and trailer is towed.

**n** Shorter time interval of flashing indicates damage of flasher lamp bulb (it is necessary to replace burnt bulb immediately)



### Engine – stop ISBe

**n** It glows when switchbox is in position "ON" (for checking operation)

After short time it must go out.

**n** It glows in a case of serious defect of engine.

**n** If it will not go out after short interval, or if it will glow during drive, you must stop vehicle and follow chapter "Malfunctions and their remedy".



### Engine-warning. ISBe

**n** It glows when switchbox is in position "ON" (for checking operation)

After short time it must go out.

**n** It glows in a case of mistake or defect of engine component.

If it will not go out after short interval or if

it will glow during drive, you must stop vehicle and follow chapter "Malfunctions and their remedy".



### Glowing plugs

It glows after turning ignition key in switchbox to position „ON“. For ISBe only at lower environmental temperatures. After switching off, it is possible to start engine.



### Engine – maintenance ISBe

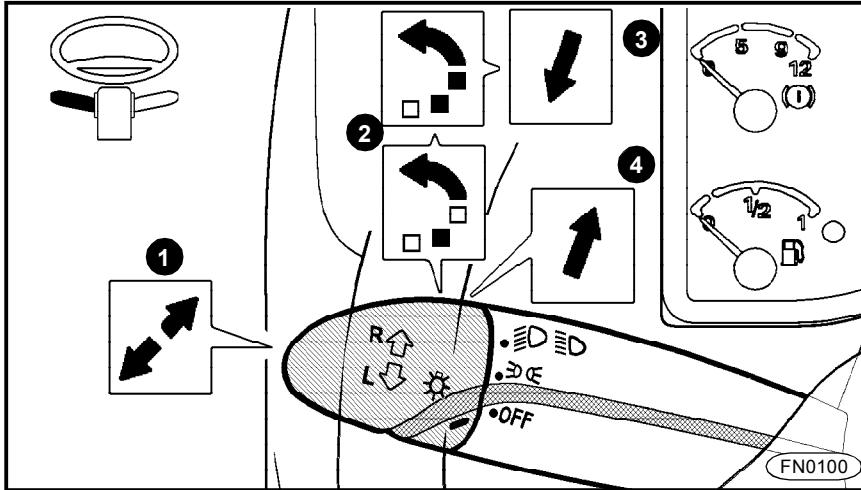
**n** It glows when the switchbox is in position "ON" (for checking operation). After short time it must go out.

**n** It glows in a case of necessary maintenance (exchange of oil).

**n** If it will not go out after short interval, or if it flickers or if it will glow during drive, you must stop vehicle and follow chapter "Malfunctions and their remedy".

## DESCRIPTION

### Combined switch over switch



#### 1 Flasher lamps

Flasher lamps are active when key is in position **ON**. They are set by vertical movement, perpendicular to steering wheel centreline.

R ↑ right flasher lamps - shift control lever upward

L ↓ left flasher lamps - shift control lever downward

#### 2 Position lamps and low beam headlights

They are switched on by turning tip of control lever.

Lamps that have their symbol aligned with notch shine

**OFF** Lamps are switched off  
☞☞☞ Position lamps are switched on

☞☞☞☞ Low beam headlights are switched on (alternatively main beam headlights)

n Audible signal indicates open doors and burning lights.

#### 3 Low and high beam switch over

n To switch on high beam headlamp, press control lever in direction from steering wheel (high beam is indicated by indicator lamp).

n Switching over is performed by pulling control lever to original position.

#### 4 Headlamp flasher

n Pull slightly control lever to steering wheel (high beam indicator lamp are switched on).

n Lamps glow for the time of holding the lever.

#### 5 Windscreen washer

n Wiper and washer are active when key is in position **ON**.

n Washer is switched on by pressing to the end of control lever. Washer pump is activated for the time of pressing the switch.

## 6 Windscreen wiper

It is switched on by turning the end of control lever:

**OFF** Wiper is switched off

**INT** Position for selection of pulsating wiper time interval (in this position it is possible to select arbitrary interval that is gradually controlled by rotary ring (item 7).

**LO** Slow and uninterrupted wiping.

**HI** Fast and uninterrupted wiping.

## 7 Selector of pulsating wiping interval

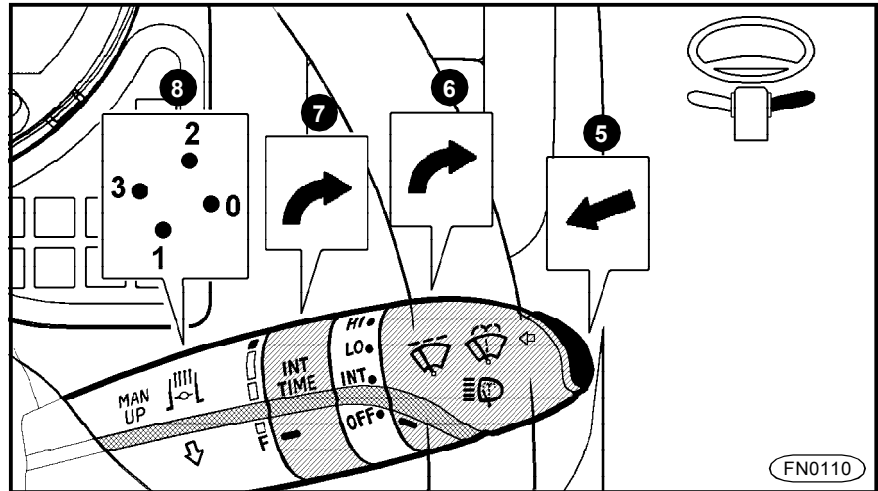
Interval is the shortest in position F, turning of ring increases the interval.

## 8 Exhaust brake\*

**Position 0** - push combined switch in direction from driver forwards and downwards - the engine brake is switched off.

**Position 1** - pull the switch in direction to driver backwards and downwards - the engine brake is on during operation of break pedal.

**Position 2** - push the switch in direction from driver forwards and upwards - the engine brake is on after too sensing



accelerator pedal (at revolutions higher than idle speed).

**Position 3** - pull the switch in direction to driver backwards and upwards - the engine brake is on after loosening accelerator pedal or during operation of break pedal as well.

**It is recommended to engage & disengage the engine brake at least once a week - engine brake service-life is extended in this way.**

## Warning!

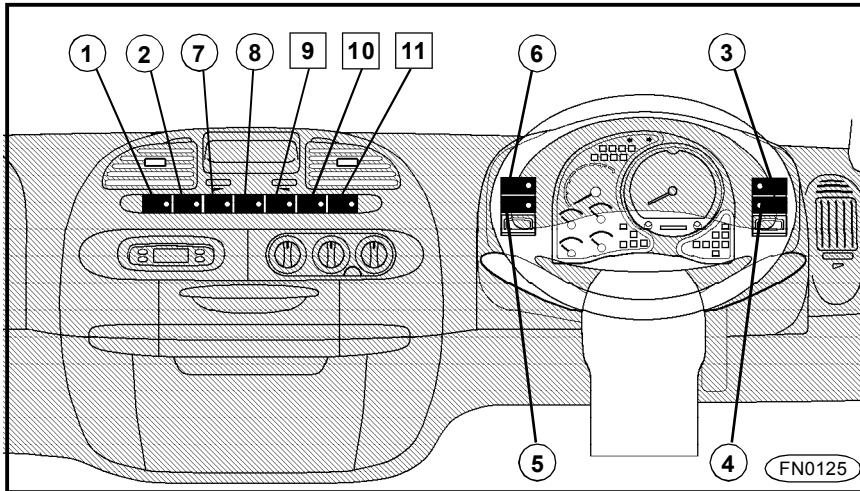
**n** By actuating the accelerator pedal - the engine brake is disengaged automatically from its action.

**n** Action of the engine brake is signalled by a warning lamp.

**n** Signalling by the warning lamp depends on action of the engine brake, not at all on the switch position.

## DESCRIPTION

### Controls



#### 1 Auxiliary drive \*

n It is engaged when vehicle is motionless when engine speed is low for about 6s.

n When engine is running, it is necessary to press clutch pedal.

n Engaged drive is indicated by indicator lamp.

#### 2 Differential lock engaging

n It is engaged when vehicle is motionless when engine speed is low for about 6s.

n Use only for the time necessary to overcome more severe driving conditions.

n Engaged lock is indicated by indicator lamp.

#### Warning!

It is possible to engage items 1. and 2. only under air pressure higher than 0.55 MPa - otherwise engaging isn't reliable.

It is recommended to engage & disengage the differential lock at least once a week - differential lock service-life is extended in this way (it is effective especially for the EATON final drives).

#### 3 Warning lights

n Indicated by lamp, placed in control.

n It is possible to switch on even when ignition is switched off.

#### 4 Outside rear-view mirror heating

It is indicated by bulb in control.

#### Warning!

Allow heating to operate for needed time.

## 5 Rear fog lamps

n It is possible to switch rear fog lamps on only when low beam, high beam or front fog lamps are switched on.

n Owing to dazzle effect they are allowed to use under fog, heavy rain and snow conditions.

n It is indicated by bulb in control.

## 6 Front fog lamps

n Fog lamps shine when position lamps and low or high beam lamps are switched on.

n It is indicated by bulb in control.

## 7 Cargo space illumination\*

It is indicated by bulb in control.

## 8 Air conditioner

n Cooling device operates only when engine is running.

n Air conditioner does not operate, when rotary switch of blower is in off position.

n Signalled by bulb in control.

## 9 Reset / coast

**ISBe**

n It resets speed, adjusted on cruise control.

n It is possible by this switch to reduce revolution of engine during drive or with P.T.O..

## 10 Cruise control switch

**ISBe**

n It is used for switch ON cruise control or P.T.O..

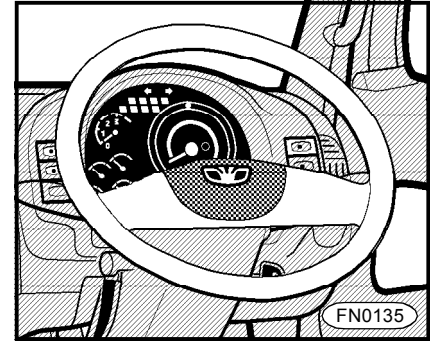
## 11 Set / accelerate

**ISBe**

n It sets real speed to memory of cruise control.

It is possible to increase revolution of engine during driving or using P.T.O..

n During diagnostic testing, of switch pressing will set next defect code.

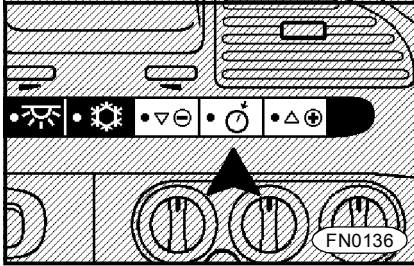


## Acoustic horn

Control of acoustic horn is located in the centre of steering wheel.

## DESCRIPTION

### Cruise control ISBe



n Cruise control keeps adjusted speed (engine revolution during driving or using P.T.O.) without using accelerator pedal.

n Three control elements in central panel of dashboard are used.

n Cruise control begins operation above approx. 48 km/h, using P.T.O. up to 48 km/h (optional).

#### Adjustment of cruise control

n Press "Cruise control" switch ON.

n Reach required speed and then press shortly switch "Set/accelerate": Now the speed is adjusted in memory and the engine will keep this speed without using accelerator pedal.

n It is possible to increase speed by accelerator pedal. After releasing pedal, the speed of the vehicle will be influenced again by the cruise control (of course, "Cruise control (main)" switch must be in the ON position.

n All functions will be cancelled after actuating clutch pedal, brake pedal or by switching "Cruise control" switch to OFF position. Operation of cruise control will be restored by short pressing of switch "Reset / coast" it means that it is not necessary to adjust cruise control again.

#### Adjustment of P.T.O. revolutions at parking of vehicle.

n Adjustment of P.T.O. revolutions when the truck is at stand still.

n Press switch "Cruise control".

n Increase revolutions by pressing "Set / accelerate" switch (range of adjustable revolutions is 950 - 3000 rev./min.). By holding switch, revolutions increase continuously. By pressing switch, revolutions increase by steps (approx. 25 rev./min.).

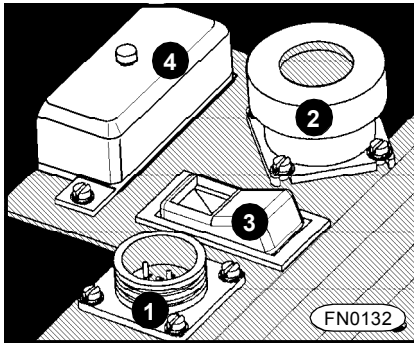
n By pressing switch "Reset / coast", 1200 rev./min. will be set automatically.

#### Warning!

n If cruise control is not used, "Cruise control" switch must be in the OFF position.

n Speed of the vehicle can be influenced by climbing or by weight of load. Therefore use cruise control only during driving on level ground or when differences of landscape elevation are only small.

## Diagnostic sockets



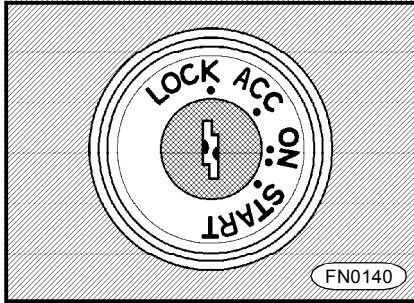
- 1 Socket for ABS diagnostics
- 2 Socket for engine diagnostics  
ISBe
- 3 Switch of engine diagnostics  
ISBe
- 4 Fuse box for voltage changer  
(fuses 2x 5A)

**n** Diagnostic sockets are placed under package compartment in the instrument panel.

**n** Access is facilitated after removing bottom of the package compartment that is loosened by rotating two turnable holders (rotation direction is marked on the cover).

## DESCRIPTION

### Switchbox and steering lock



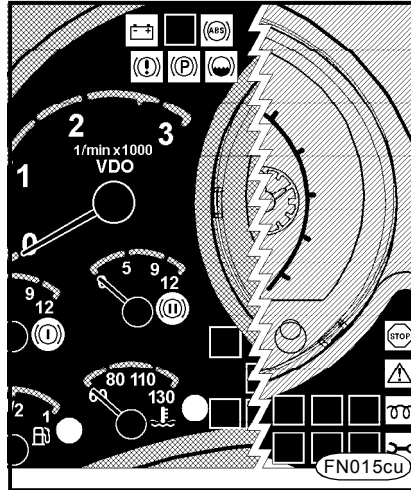
#### Switching positions

##### n Position "LOCK"

Only in this position, it is possible to insert and remove ignition key. Merely recording speedometer, electric clock or radio are connected. Only in this position, steering wheel shaft is automatically locked.

##### n Position "ACC"

Steering is unlocked, electric circuits that are connected through switchbox are without voltage. After switching over from position "ON" to this position, engine is stopped.



##### n Position "ON"

Following indicator lamps glow: (see fig.)—battery charging, (*engine lubrication only D432*), brake system malfunction, parking brake, minimum level of brake liquid, glowing plugs, ABS, coolant temperature, fuel reserve. In the case of engine ISBe, also following indicator lamps glow: engine—stop, engine—warning, engine—maintenance. After few seconds, only following indicator lamps

remain to glow: battery charging, (*engine lubrication only D432*), possibly glowing plugs. After glowing indicator lamp will go out, engine is ready to start. Electrical circuits, connected to switchbox, are under voltage.

#### Warning!

If after short time any indicator lamp, which is tested only itself, will glow, it is necessary to follow Chapter "Malfunction and their remedy".

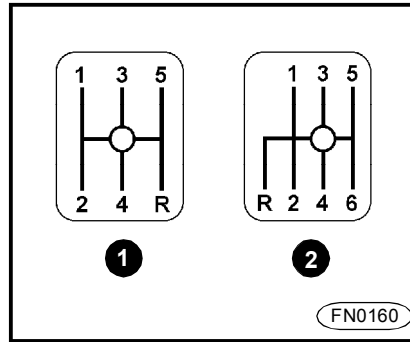
## Gear-shifting lever

### n Position "START"

The engine can start only if gears are disengaged, without using accelerator pedal. Position is not locked. For re-starting, turn back ignition key to position "ACC" - that prevents from restarting of running engine that could result in starter motor damage.

### Warning!

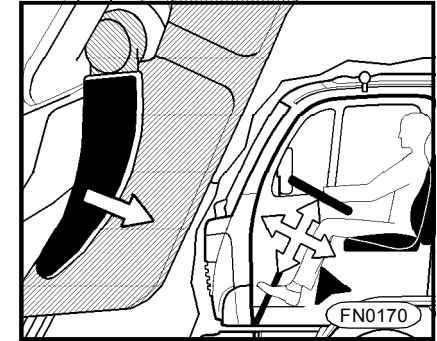
n Function of switchbox is assured when battery master switch is on.  
n Do not switch off battery master switch or disconnect battery terminals when engine is running to prevent alternator or some electric device damage.



| Position | Gearbox type | Number of gears |
|----------|--------------|-----------------|
| 1        | ZF S5-42     | 5               |
| 2        | ZF 6 S 850   | 6               |

Gear changing is performed mechanically by means of gear shifting lever, when clutch pedal is depressed.

## Steering-wheel inclination adjustment



n Release steering wheel pulling control lever in direction to yourself and adjust steering wheel position to required position.

n After adjustment, press control lever in forward direction up to stop.

### Warning!

To adjust steering wheel during drive isn't acceptable.

## DESCRIPTION

### Heating and ventilation

n The truck cabin is heated by a hot water heating. It is possible to use it after coolant is heated up in the cooling&heating water circuit after the engine is started.

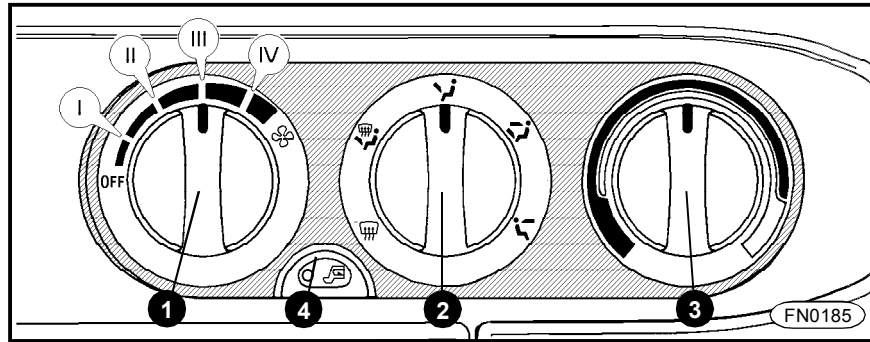
n Heating is controlled and regulated by turning of heating controls located on instrument panel.

n Heating valve control (item 3) regulates quantity of water flowing through heating element and so temperature of outlet air (when turning to red field, hot air is produced and vice versa).

n Control (item 1) regulates fan speed and so quantity of air that comes through the system. Speed is adjustable in four steps.

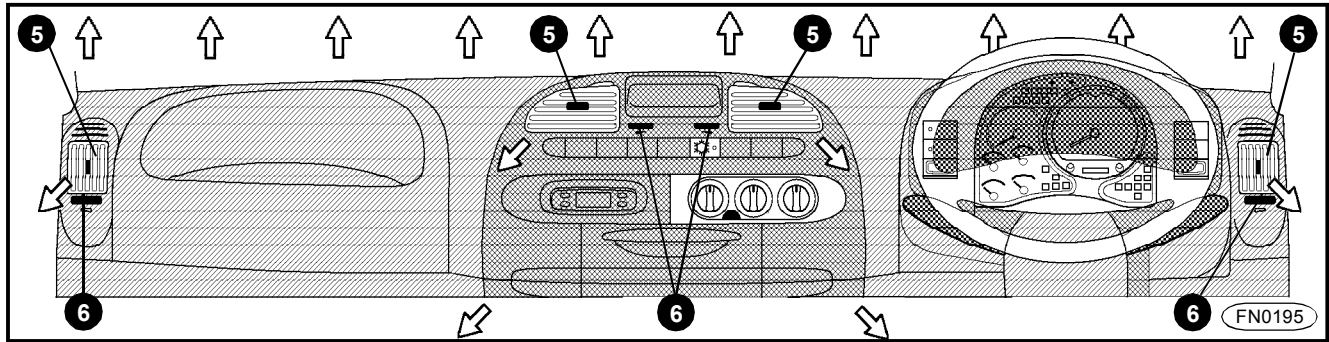
n Air flow direction control (item 2) enables to select direction of air outlet (The way of cab heating).

n Button (item 4) switches on or off mode of circulating air in cab.



n Rib inclination (item 5) of air outlet can change angle of air flow. Quantity of air flowing from individual vent hole can be controlled by wheels (item 6).

- 1 Heating fan control
- 2 Air flow direction control
  - to heads of crew
  - to legs and heads of crew
  - to legs of crew
  - to legs, windscreen and side windows
  - to windscreen and side windows
- 3 Heating valve control - temperature regulation of outlet air.
- 4 Mode of circulating air.



### Removing hoarfrost and bedewed windows

- n (item 1) up to stop to position IV.
- n (item 3) to the left up to stop.
- n (item 2) turn to position .
- n Close vent holes by control wheels.

### Removing icing from windscreen

- n (item 1) up to stop to position IV.
- n (item 3) to the left up to stop.
- n (item 2) turn to position .
- n Switch mode of air circulation,
- n Close vent holes by control wheels.

### Maintaining windows in status without bedew under higher humidity.

When windows are constantly bedewed (e.g. in rain), it is necessary:

- n (item 1) to position II or III.
- n (item 2) turn to position .
- n (item 3) if necessary to area of heating.

### Ventilation

- n (item 1) to required position.
- n (item 3) to the right stop.
- n (item 2) turn to position .

### Pleasant heating

- n (item 1) to position II or III.

- n (item 3) to required heating output.
- n (item 2) turn to position .

### Maximum heating

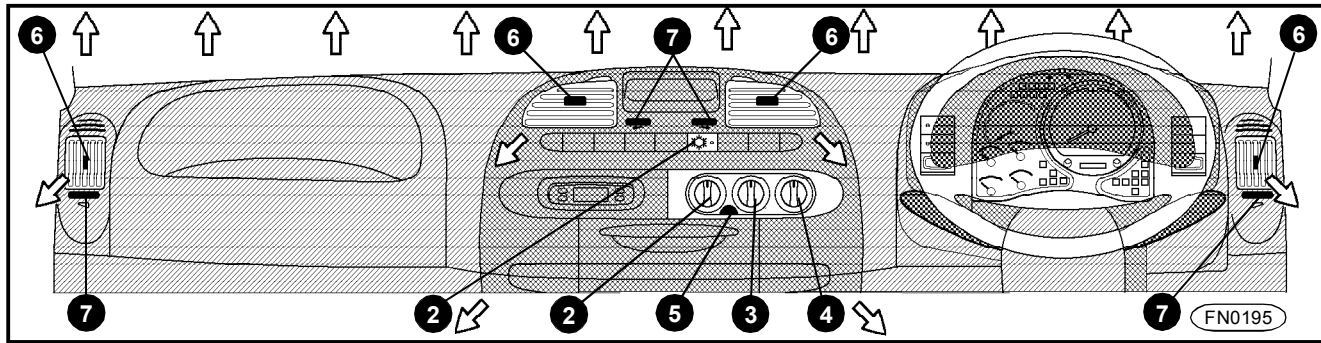
- n (item 1) to position IV.
- n (item 2) turn to position .
- n (item 3) to the left up to stop.
- n Switch on mode of circulating air.

### Warning!

Heating output is dependent on coolant temperature. Maximum heating output is obtained after heating engine to operation temperature.

## DESCRIPTION

### Air conditioner\*



**n** Air conditioner is combined cooling and heating equipment.

**n** Cooling unit of air conditioner cools air and removes moisture out of air.

**n** Cooling device operates only when engine is running.

#### Controls

**n** Air conditioner is switched on (off) by control (item 1) designated with symbol ☀ (indicated by bulb located in control). **n** Air conditioner doesn't operate when rotary switch is in off position.

**n** Control of heating valve (item 4) regulates temperature of inlet air (turning to red field - hot air and vice versa). It is possible to use it even when air conditioner is switched on.

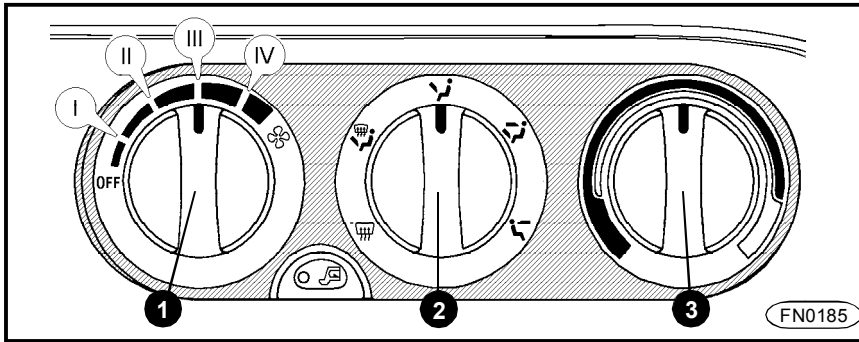
**n** Control (item 2) regulates fan speed and so quantity of air passed through

system. Speed of air flow is adjustable in four steps.

**n** Control of air flow direction (item 2) enables to select direction of air outlet (way of cab heating)

**n** Button (item 5) switches on (off) mode of air circulation in cab (indicated by bulb located in control).

**n** Travel of air outlet fins (item 6) can change angle of air flow. Air quantities regulated by wheels (item 7).



### Optimal cooling

- n (item 1) to requested position (positions II and III are optimal)
- n (item 3) up to stop to the right, temperature can be regulated according to need by means of turning to the left.
- n (item 2) turn to position 
- n Press switch with symbol  (bulb in control glows)
- n In this mode, exterior air is sucked and cooled.

### Maximum cooling

- n Close all windows
- n (item 1) to position IV
- n (item 3) up to stop to the right
- n (item 2) turn to position 
- n Press control with symbol  (bulb in control starts to glow)
- n Switch mode of air circulation on

### Warning!

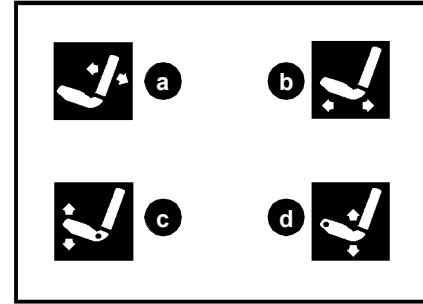
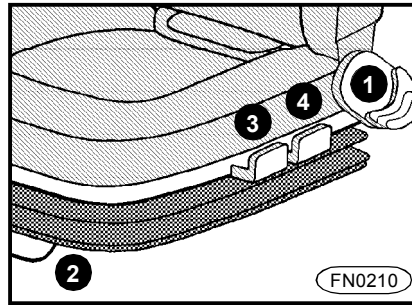
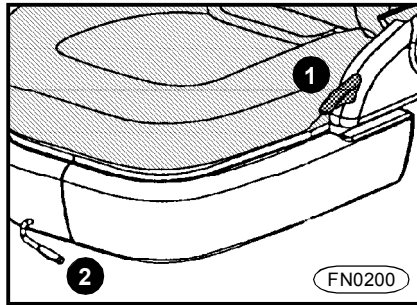
It isn't recommended to smoke when air circulation in cab mode is on.

### Warning!

- n If vehicle is parked on direct sun, open windows before switching on of air conditioner.
- n It is recommended to operate air conditioner at least once a week - it extends life of air conditioner.

## DESCRIPTION

### Seats



#### Adjustment of seat backrest inclination (a)

Tilting of seat backrest backwards is performed by control lever (item 1) lifting and pressing to backrest in backward direction. Tilting of seat backrest forwards is performed by control lever (item 1) lifting and slight pressing to backrest in backward direction and consequential release of backrest that automatically tilts forwards. The backrest is secured by releasing the small lever.

#### Adjustment in longitudinal direction (b)

n Longitudinal shift is released by pulling control lever (item 2) upwards and

then it is possible to adjust seat to required position. The seat is released by releasing the small lever.

n Seat should be adjusted so that driver can safely control pedals.

#### Adjustment of seat squab incline (c) and height (d) on the driver's pneumatically sprung seat\*

n Front part of seat is adjustable by lever (item 3).

n Rear part of seat is adjustable by lever (item 4).

n Regulation in upward direction is performed in released status.

#### Proper adjustment of seats

n Backrest should be adjusted so that driver could hold steering wheel in its highest point by slightly wrinkled hands.

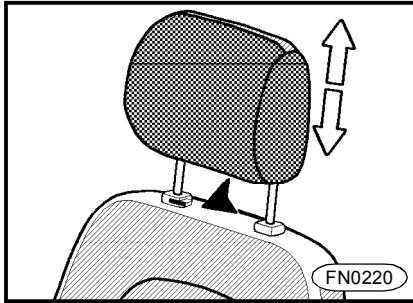
n Quick and safe manipulation with necessary controls that are important for driving must be secured.

n It must result in free holding of body for maximal protective effect of safety belts.

#### Warning!

For precautionary reasons, driver's seat is allowed to adjust only when vehicle stops.

## Headrests



### Warning!

n Good adjustment of headrest effectively supports nape during rear impact.

n For precautionary reasons, driver's headrest is allowed to adjust only when vehicle stops.

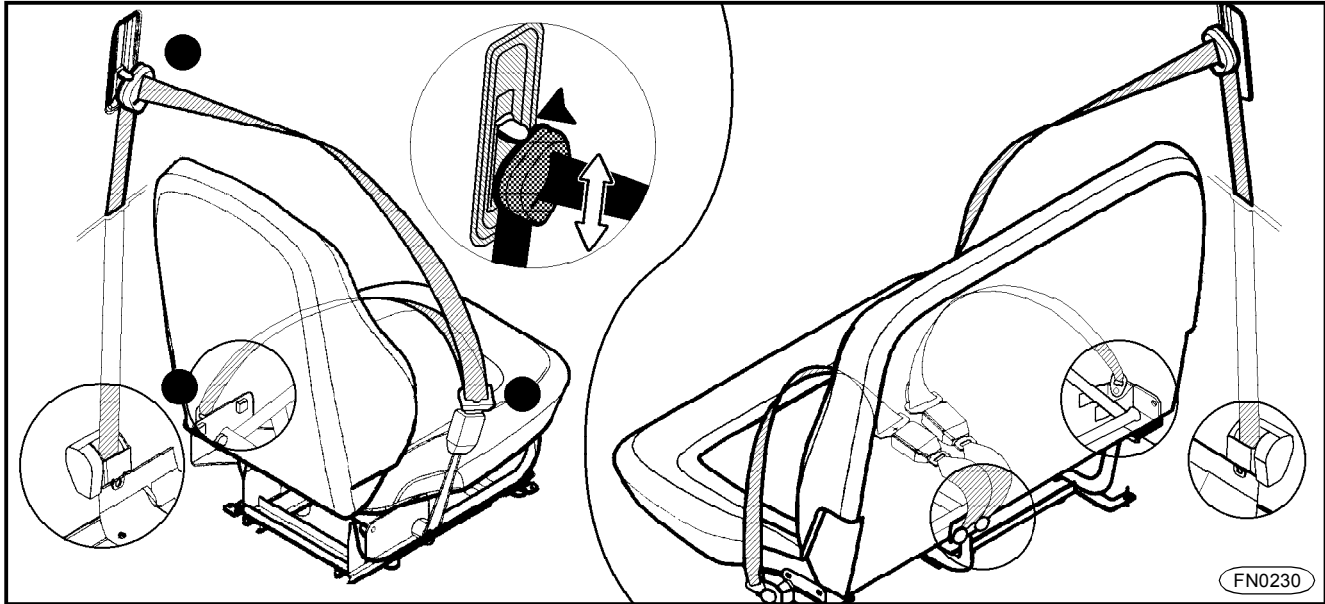
n Headrests are height-adjustable.

n For height adjustment of headrest, press stop in direction to back wall.

n Adjust headrest so that its position recommends to physical dimensions of driver's figure.

## DESCRIPTION

### Safety belts



**n** The truck cabin is equipped with pre-loaded three-point seat belts of outward seats.

**n** The middle seat features two-point seat belt with mechanical adjustment.  
**n** Safety belts are used as passenger protection in case of accident.

**n** Safety belts must be used during each drive - even in city traffic.

### **Use of safety belts**

- n** Necessity to use safety belts is signalled by relevant indicator lamp\*.
- n** Take safety belt catch and slowly draw over thorax and pelvis.
- n** The belt must fit tightly to centre of shoulder and pelvis.
- n** When the belt is during pulling out locked, release it and let it wind back and then pull it out again.
- n** Insert catch into belt lock that corresponds to the seat. The belt is properly fixed after snap into lock.
- n** The belt is released after pressing red lock stopper.

### **Height-adjustment of safety belts\***

- n** Due to height adjustable upper bearing of belt, it is possible to adapt belt best way to physical dimensions of figure.
- n** For height-adjustment, press button in downward direction, turn upper belt bearing in direction to yourself (upwards) and adjust to requested position.

### **Warning!**

- n** Belt must not lie over rigid or easy fractured objects that could be e.g. in your clothing, in pockets.
- n** Safety belts that went through accident or they are damaged must be unconditionally replaced by new belts.
- n** Take care of the belt not to be twisted and to lie over pelvis and at least over soft parts of body.
- n** Maximum effect can be reached with proper seating position in cab.
- n** One seat belt is allowed to bind only one person.
- n** Maintain safety belts clean (dirt influences on winding mechanism). For cleaning, it is recommended to use soft soap solution.
- n** When safety belt is damaged, let it replaced.

## DESCRIPTION

### Rear view mirrors

**n** Vehicles are equipped with heated rear view mirrors.

**n** Heating is switched on by control that is placed on instrument panel and it is indicated by indicator lamp placed directly on control.

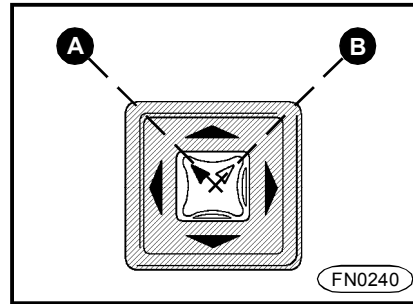
**n** Heating is used for necessary time.

#### Warning!

**n** For safety reasons, mirrors must be adjusted before drive.

**n** It is necessary to pay attention of judgement about size and distance of vehicle or another objects that are visible in side convex mirror (objects look smaller and they are displayed more distant then it is in reality).

### Rear view mirror remote control\*



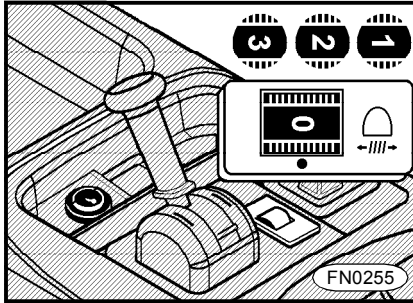
**n** Turn control to select between left and right mirror.

To the left - left mirror - position **A**.

To the right - right mirror - position **B**.

**n** Requested position of mirror is reached by skewing of four-position control.

## Headlamps inclination adjustment



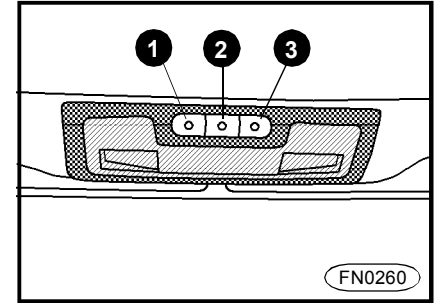
- n** Regulation wheel changes headlamp inclination.
- n** Basic adjustment is performed with vehicle without cargo load (notch of adjustment control aligned with nought).
- n** Payloads of given version are mentioned in table **Weights and weight on axles**.

|   | Percentage of payload |     |     |      |
|---|-----------------------|-----|-----|------|
|   | 30%                   | 50% | 70% | 100% |
| K | 1                     |     | 2   | 3    |
| N | 1                     |     | 2   | 3    |
| L |                       | 1   |     | 2    |
| E |                       | 1   |     | 2    |

### Warning!

**It is obligatory for driver to adjust headlamps inclination according to actual vehicle load with cargo.**

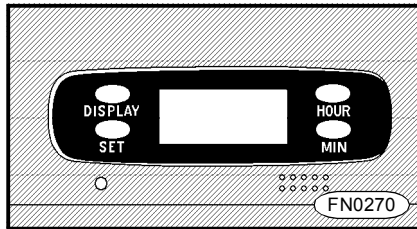
## Cab interior illumination



- n** Ceiling light bulbs are switched on by controls located directly on lamp.
- n** Controls (item1) and (item 2) switch on (off) illumination of driver's side.
- n** Control (item 3) switches on (off) illumination of front-seat passenger 's side.

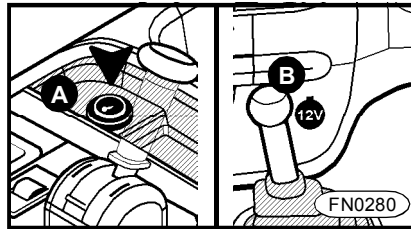
## DESCRIPTION

### Digital clock\*



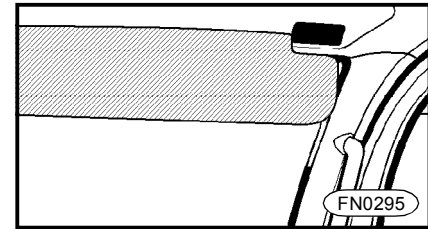
- n Button „**HOUR**“ adjusts individual hours.
- n Button „**MIN**“ adjusts individual minutes.
- n Button „**SET**“ clears minutes to whole hours.
- n Button „**DISPLAY**“ illuminates clock when switchbox is in position „**LOCK**“. Clock is illuminated for time of button holding.

### Socket / cigarette lighter



- n Socket (pos. A) may be used for connection of cigarette lighter or additional current consumer having 24V supply. To use the socket \* (pos. B) for current consumers having 12 V supply
- n Cigarette lighter is switched on by pressing to extension piece. After of heating of heating element in lighter, extension piece springs up. Remove heated lighter and use it immediately (element quickly loses heat energy).

### Sun visors

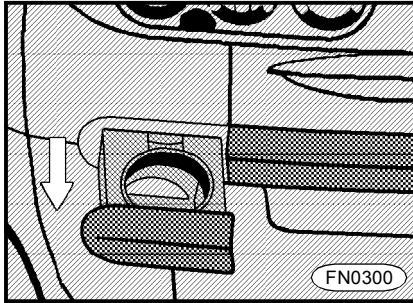


- n Sun visors are located above windscreen in ceiling panel.
- n They can be lowered according to need.
- n Adjust sun visors to protect against bedazzlement.

### Warning!

- n During manipulation with lighter take a good care of burn.
- n When lighter does not spring up after about 30 seconds, it is necessary to remove it to prevent heat damage.

## Cup holder

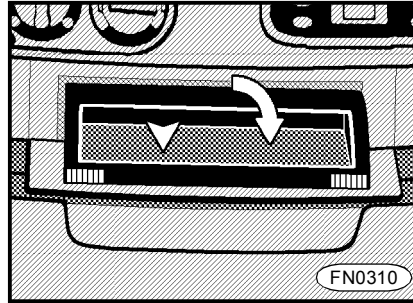


- n Eject holder by pressing and subsequent release.
- n After use drop it in.

### Warning!

- n Do not use cup holder when vehicle moves.
- n Do not use cup holder for carrying another objects.

## Ashtray

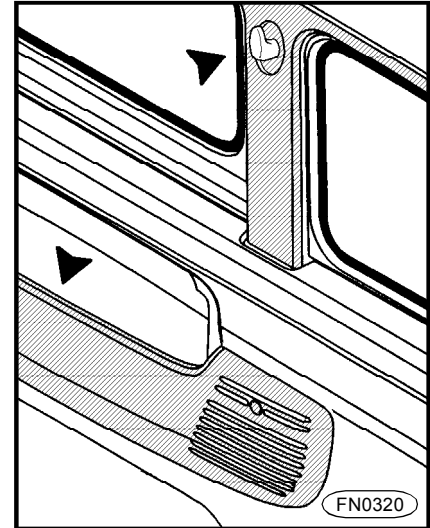


- n Open by pulling to yourself.
- n For cleaning, remove only metal shield insert.

### Warning!

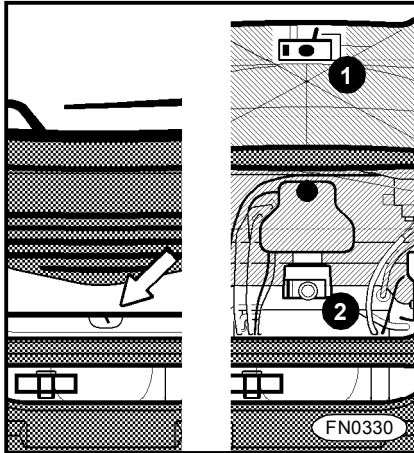
Due to danger of fire, do not put paper or another inflammable objects.

## Hanger, storage pocket



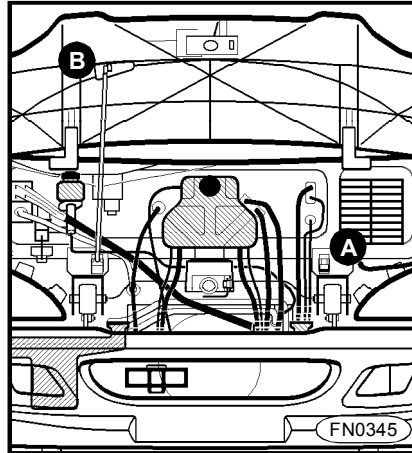
## DESCRIPTION

### Engine bonnet



#### Opening of engine bonnet

- n** Press bonnet in its lower part, depress releasing lever (item 1) in direction to the left.
- n** Lift the bonnet.
- n** Remove strut from holder (item A) and lock lifted bonnet so that the end of strut is fixed in hole (item B).



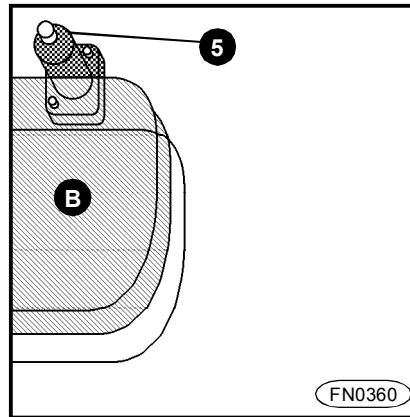
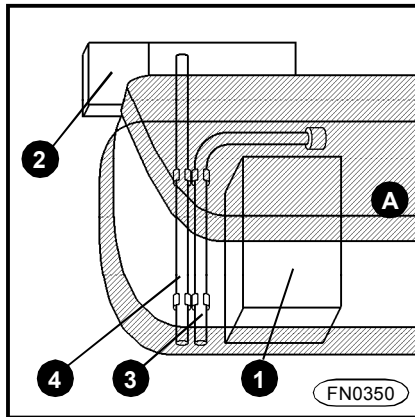
#### Shut the bonnet

- n** Raise bonnet.
- n** Remove strut and place it to holders (item A).
- n** Lower bonnet to its vertical position and press its lower edge, till it engages lock (item 2).
- n** Engaging features acoustic effect.

#### Warning!

It is necessary to check bonnet lock before every drive.

## Tools and equipment



**A** - Front-seat passenger's seat

**B** - Driver's seat

**n** Tools and equipment are placed under the co-driver's seat and access to them is facilitated after lifting the seat squab.

**n** Hydraulic jack is fixed to floor behind driver's seat.

**n** Tools must be properly fixed.

### Warning!

**n** Improperly fixed tools can injure passengers during drive or it can cause unpleasant vibrations - therefore it is necessary to fix them properly.

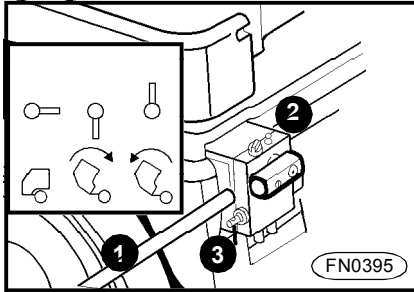
**n** Jack that is delivered with vehicle is intended only for this vehicle type. The jack must not lift another vehicle or weight.

**n** Proper fixing of tools and equipment is necessary during driving and cab tilting.

|                                             |        |
|---------------------------------------------|--------|
| Wrench 19 x 24                              | item 1 |
| 2 x Bolt for sprig brake actuator unlocking |        |
| Bar extension                               |        |
| Cartridge of bulbs                          |        |
| First aid kit                               |        |
| Warning triangle                            | item 2 |
| Wheel nut spanner                           | item 3 |
| Bar for jack and cab tilting                | item 4 |
| Hydraulic jack                              | item 5 |

## DESCRIPTION

### Hydraulic tilting of cab



#### Tilting of cab

- n Adjust lever of distributor (item 3) to vertical position in upward direction (see schematic figure on pump).
- n Insert bar (item 1) into hydraulic pump (item 2) and pump. Hydraulic locks of rear bearings will be opened and then cab starts tilting.
- n It is necessary to tilt cab up to completely tilted state - partial tilting is not acceptable for entry under cab.
- n When the cab is tilted, let lever of distributor in upward direction.

#### Lowering of cab

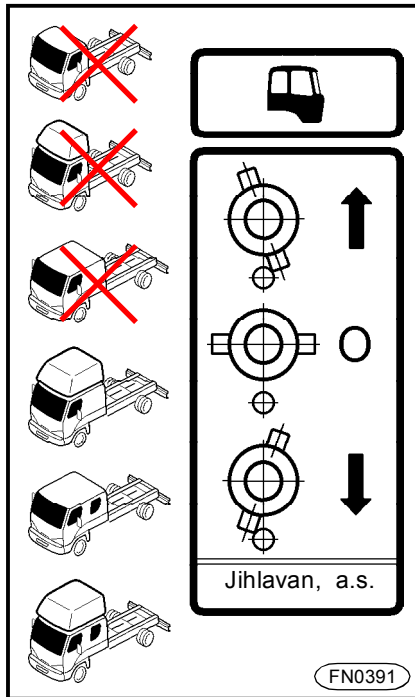
- n Adjust lever of distributor (item 3) to vertical position in downward direction.
- n Pump until locks of rear bearings fix the cab.
- n After fixing the cab by hydraulic locks, adjust lever of distributor to horizontal position.

### Instructions for cab tilting

#### Warning!

- n Before tilting stop engine, shift neutral gear.
- n Secure free objects and properly close doors.
- n Before tilting open bonnet.
- n During tilting proceed with maximum care.
- n Work under tilted cab also demands maximum care.
- n To stay under tilted cab isn't acceptable.
- n To stay under partially tilted cab isn't acceptable.
- n Require height of workshop for tilting is 3000 mm, with supplementary body 3800 mm.

## Tilting of special version cabs



### Tilting of cab

**n** to set the distributor to the position -  
**n** to pump up to the complete cabin tilting (the cabin is not tilted over beyond the zero point)

a note: the cabin starts lifting only after several strokes of a lever

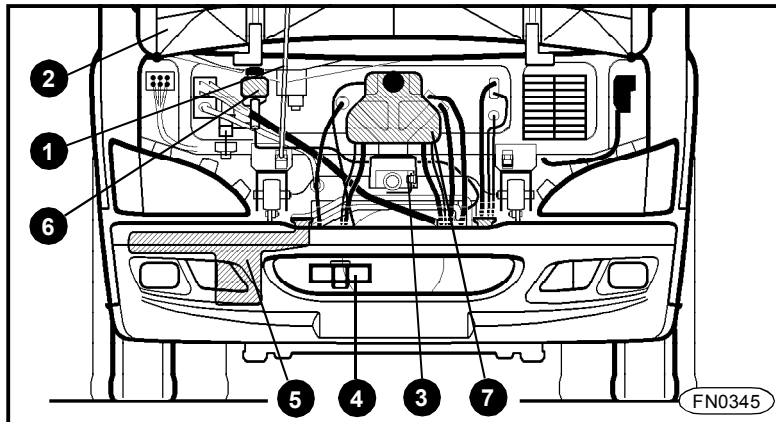
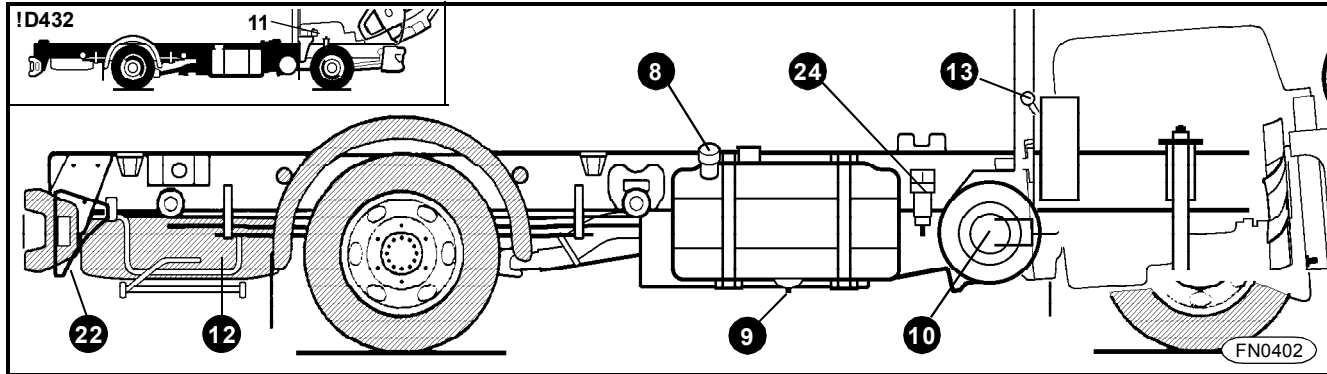
### Lowering of cab

**n** to set the distributor to the position -  
**n** to pump up to closing of locks, and further, till there is an increased resistance on the lever

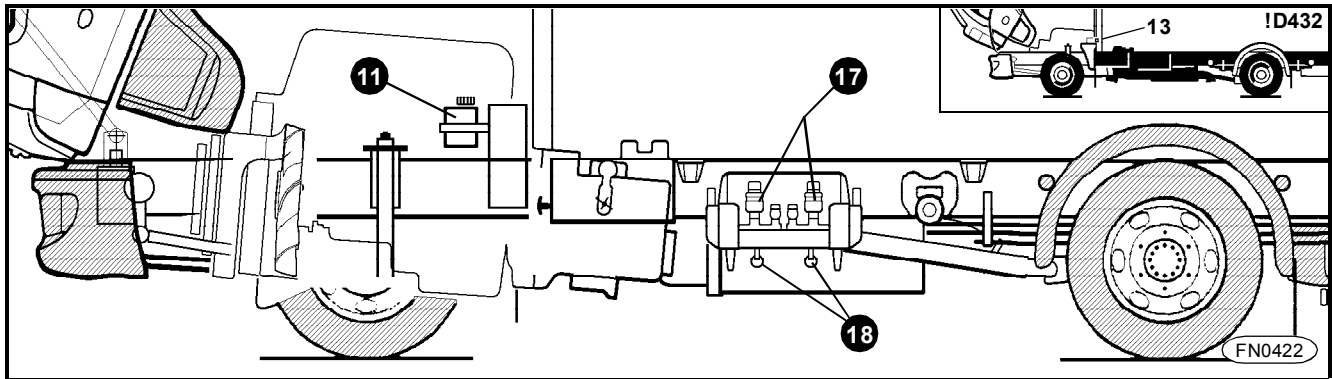
**n** to set the distributor to the position -  
**n** to pump approx. 15 strokes for delimiting position of the cabin pin in the middle of an oval hole in a cylinder eye  
**n** to set the distributor to the position **O**

## DESCRIPTION

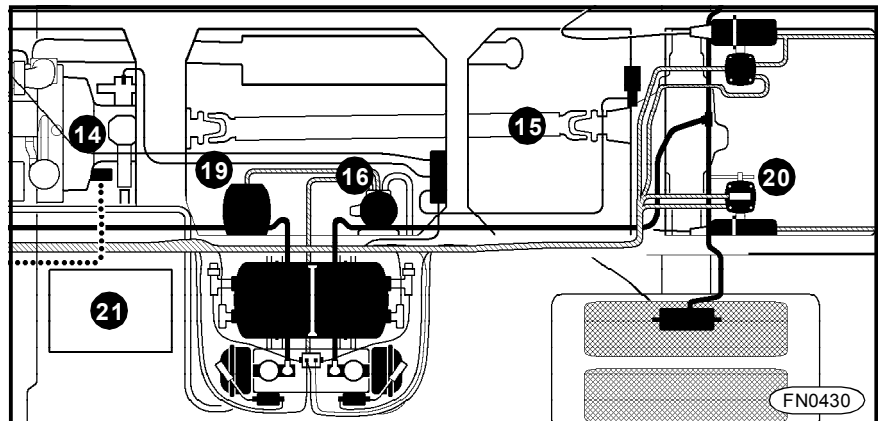
### Chassis and cab



- 1 Strut
- 2 Bonnet
- 3 Bonnet lock
- 4 Place of fixing for towing
- 5 Washer tank
- 6 Clutch fluid tank
- 7 Coolant expansion tank
- 8 Fuel tank filler neck
- 9 Fuel tank draining plug
- 10 Air cleaner
- 11 Power assisted steering fluid tank
- 12 Spare wheel (two positions - according to vehicle versions)



- 13 Oil level dipstick
- 14 Gearbox
- 15 Propeller shaft
- 16 Air pressure equaliser with air drier
- 17 Brake fluid tank
- 18 Draining valve
- 19 Air tank 4.5 l
- 20 Load dependent brake control device
- 21 Battery box with battery master switch
- 22 Wheel chock
- 24 Fuel filter



## OPERATING INSTRUCTIONS

### Inspection before drive

- n Adjustment of headlamps in dependence on load of cargo.
- n Lock of cab in rear bearings.
- n Lock of bonnet.
- n Quantity of oil in engine.
- n Quantity of fuel in fuel tank.
- n The condition of tensioning belts.
- n Quantity of coolant in coolant-expansion tank.
- n Quantity of fluid in clutch circuit.
- n Quantity of fluid in tank of mono-block power assisted steering.
- n Quantity of fluid in equalising brake fluid reservoirs.
- n Operation of driving and parking brake.
- n Quantity of liquid in washer tank.
- n Tire pressure and state.
- n Function of exterior illumination, flasher and brake lamps.
- n Check air intake piping system.
- n Check air cleaner restriction.
- n Drain fuel-water separator.
- n Inspect cooling fan.
- n Inspect engine.

### Running-in of vehicle

- n Running-in of new vehicle or vehicle after overhaul is finished after covering 3 000 km (nevertheless engine of vehicle will feature maximum possible power practically after covering additional several thousands kilometres.
- n During running-in, do not use engine at speed above 3/4 maximum engine speed or under full power at low engine speed.
- n It is necessary to avoid sudden acceleration, drive at high engine speed and sudden braking.
- n Cold engine must not be run at high engine speed.
- n Do not drive at too low engine speed.
- n Vehicle must not be loaded with an excess cargo.

#### Warning!

**The way of running-in is decisive for vehicle life.**

### Maintenance

- n For maximum use value, economic and safe operation and for maximum possible vehicle life, it is necessary to perform all maintenance works in defined and regular intervals according to service booklet.
- n Vehicle maintenance shall be performed by **authorised repair shops** that are familiar with vehicle design, they do their job proficiently, they have necessary equipment and they are in contact with manufacturer.

#### Warning!

**n It is recommended to engage & disengage the engine brake at least once a week - engine brake service-life is extended in this way.**

**n It is recommended to engage & disengage the differential lock at least once a week - differential lock service-life is extended in this way (it is effective especially for the EATON final drives).**

## Engine starting

**n** Insert ignition key into switchbox and turn it to position „ON“. Indicator lamps displayed in picture on previous page of the manual.

**n** Engine starting is possible only when no gear is engaged. Leave accelerator pedal in idling position.

**n** After glow plug indicator lamp switching off, start engine by turning ignition key to position „START“ and hold it (engine cranks for time of holding the key in this position) till engine start running, but at the most 10 seconds .  
.When restarting, minimum interval of restarting is 30 seconds.

### Warning!

**n** When after switching over to position „ON“, indicator lamps of brake system malfunction, parking brake, minimum level of brake fluid or ABS (and for engine ISBe also indicator lamps: engine-stop, engine - warning, engine-maintenance) remain glow even after short time interval, driving is not acceptable and it is necessary to identify malfunction according to chapter Malfunctions and their remedy.

**n** When starting warm engine, you should also wait for glow plug indicator lamp switching off.

**n** During winter season, use winter fuel and engine oil of oil grade for ambient climate conditions.

**n** After engine starting, release key. It turns back to position „ON“. After reaching regular engine run, indicator lamps (of lubrication only D432) and battery charging must be switched off. When they aren't switched off, a malfunction must

found out according to chapter Malfunctions and their remedy.

### Warning!

**n** If indicator lamp of battery charging, (lubrication only D432), parking brake (and for . engine ISBe also indicator lamps: engine-stop, engine-warning, engine-maintenance) aren't switched off after engine starting, driving isn't acceptable.

**n** Vehicle must not move whatever way, when master switch isn't on, ignition key isn't inserted into switchbox and turned to position "ON". In this position, steering is unlocked. Before beginning of drive, verify free rotation of steering wheel.

**n** Do not run cold engine at high speed - hazard of damage.

### Warning!

*Only D432. It is not permitted to bleed fuel system by towing the vehicle (injection pump is lubricated by fuel).*

## OPERATING INSTRUCTIONS

### During drive

**n After vehicle start up, test operation of driving brake.** Testing of brake effect is important namely in winter season, after washing vehicle by pressure stream or after wade (running through deep water-hole). Rapid drying is performed by repeated braking.

**n** Do not brake intensively, it results in too rapid and excessive wear of tires and brake system and also this way of braking threatens road traffic.

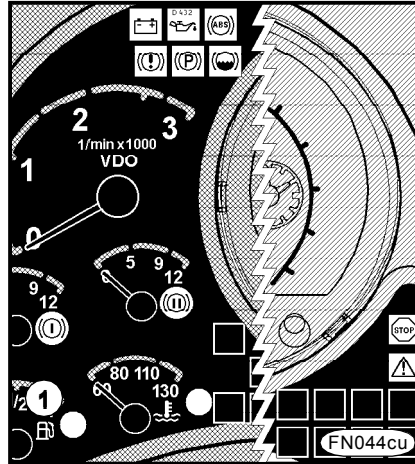
**n** Press accelerator pedal fluently.

**n** Depress clutch pedal up to stop.

**n** Engage gears fluently to prevent engine from load shock. Before engaging the gear of opposite direction then vehicle movement, stop vehicle completely to prevent damage of gearing mechanism.

**n** Prior to shifting the reverse gear on the ZF 6 S 850 gearbox, it is necessary - after releasing the clutch - to wait for 3 to 5 seconds (because of stopping a shaft in the gearbox) and then to shift the reverse gear.

**n** Drive without running engine and also without engaged gear is not acceptable.



**n** During drive, it is necessary to watch indicator lamps.

**n** When during drive any indicator lamp (shown in the figure above ) starts glow, you must stop the truck. When indication lamp „Lubrication of engine D432“ or „Engine-stop ISBe“ glows - it is necessary to stop engine as well. Follow procedure given chapter **Malfunctions and their remedy.**

When indicator lamp of engine coolant

temperature glows, it is necessary to reduce vehicle speed, shift gear down, stop vehicle as soon as possible and cool engine at higher speed (1200 - 1500 rpm).

### Warning!

**Engine must not be stopped, after engine coolant temperature indicator lamp starts glow.**

When reserve fuel indicator lamp starts glow, approx. 16 l of fuel is available.

## Engine stopping

n Stop engine by switching over the ignition key in switchbox from position "ON" to position "ACC".

*(Only D432) Electromagnet of stopping device that is located on injection equipment is instrumental to engine stopping. After switching over the ignition key, it closes fuel into injection equipment.*

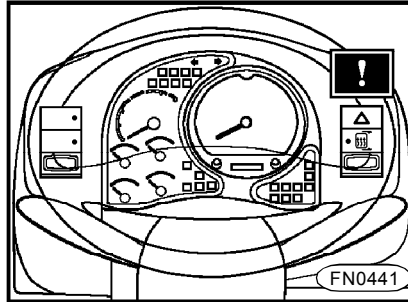
### Warning!

n Never stop engine by means of switching off the battery master switch - there is danger of electric system and alternator damage.

n (only ISBe) Switch OFF battery master switch only after 30seconds after switching OFF the switchbox (computer calculates data during this time)

n You can remove ignition key from switchbox only after entire vehicle stopping.

n Before stopping engine from full load leave engine running in low speed for 1 minute minutE (see the label on the dashboard).



## The Neutral gear

### Warning!

Do not leave the engine running idle or having revolutions up to 1,000 per minute without engine load within the period more than 10 minutes. When there is a longer engine run using these two modes - temperature of combustion space is going down to values when fuel combustion is not complete any more. This fact can cause creation of carbon in surroundings of injection nozzle holes and piston rings which leads - through its results - to engine damage. As well during lower temperatures, all oil which penetrates through valve sealings into exhaust ducts can not be burned there. This non-burned oil can cause damaging to a turbocharge.

## Engine for D family vehicles

### ISBe 150 30

- Diesel
- Sixteen valve
- Maximum power  
110 kW / 2 500 rpm<sup>-1</sup>

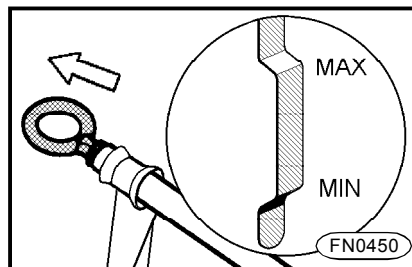
### ISBe 170 30

- Diesel
- Sixteen valve
- Maximum power  
125 kW / 2 500 rpm<sup>-1</sup>

### D432.100

- Diesel
- Sixteen valve
- Maximum net power acc. EEC 85  
100 kW / 2 400 rpm<sup>-1</sup>

## Engine lubricating system



### Inspection and oil type

**n** It is necessary to check regularly quantity of oil in engine (during operation, part of oil is consumed).

**n** During inspection, vehicle must stand on horizontal plain.

**n** Perform inspection before starting when oil level is steady.

**n** Pull out oil dipstick, dry it by clean patch and insert it back into hole up to stop.

**n** After subsequent pulling out, oil level must be between notches on oil dipstick. It must not exceed **MAX** margin because excessive smoke of engine could occur.

**n** When oil level is under notch **MIN**, it is necessary to fill-in oil.

**n** For filling-in use same oil.

**n** Oil change interval according to **Service booklet**.

**n** Marking of engine oil that is filled in

### Warning!

**n** Oil and oil filter change is performed by **Authorised workshop**.

**n** Insufficient quantity of oil in engine can result in engine damage.

**n** Pay attention to cleanness during manipulation with oil.

**n** When suspicion of oil degradation appears (presence of water), immediately contact authorised workshop.

**n** Oil should be disposed with respect of environment.

| Engine oil specification<br>A C E A | Recommended oil grade<br>S A E |
|-------------------------------------|--------------------------------|
| E5                                  | 10 W - 40                      |

production plant is printed on self-adhesive label that is stuck on cover of oil filler neck on cylinder head cover.

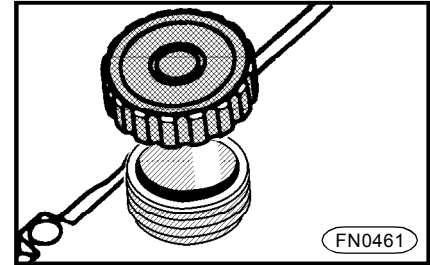
**n Fundamentally use only approved engine oils**

**n** We do not recommend use special ingredients of oil because some ingredient in contact with current marked lubrication oil may result in their degradation and subsequent engine damage.

**Warning!**

**n Losses caused by neglecting of oil system are excluded from warranty.**

**n Engines, that are damaged by use of additional ingredient in oil, are excluded from warranty.**



**Filling-in engine oil**

**n** Screw out cap of oil filler neck.

**n** During filling-in, keep maximum cleanliness of surrounding area.

**n** After filling-in, oil level must not exceed notch **MAX**.

**n** After filling oil to required level, close filler neck with cover.

## OPERATING INSTRUCTIONS

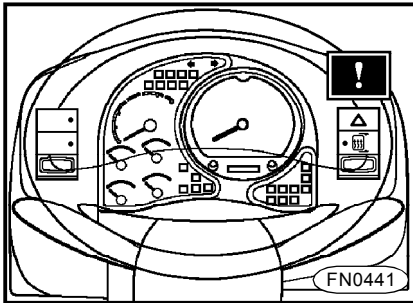
### Turbocharger

n Keep maximum cleanliness and prevent from mechanical damage of impeller of centrifugal blower by intake of mechanical impurities (for example operation without intake air cleaner).

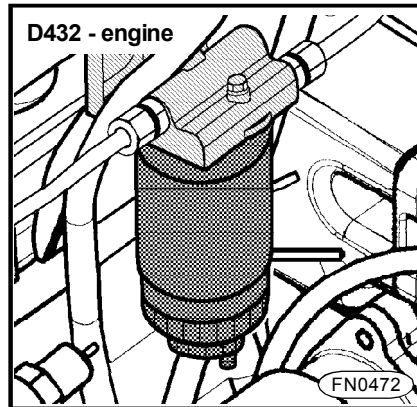
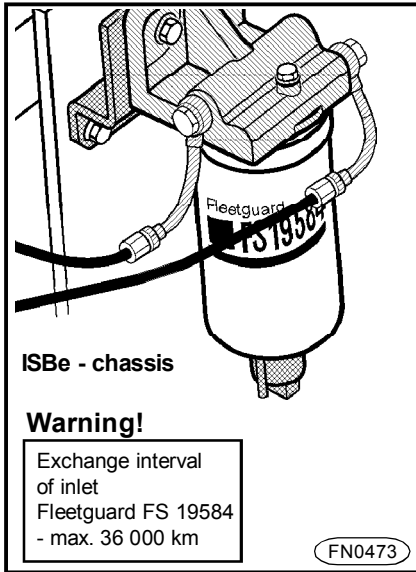
n Before stopping engine from full load leave engine running in low speed for 1 minute (see the label on the dashboard) to enable turbocharger cooling by oil and so prevent from turbocharger shaft coking .

#### Warning!

**For maximum life of turbocharger, it is necessary to take care of air cleaner and all intake system cleanliness.**

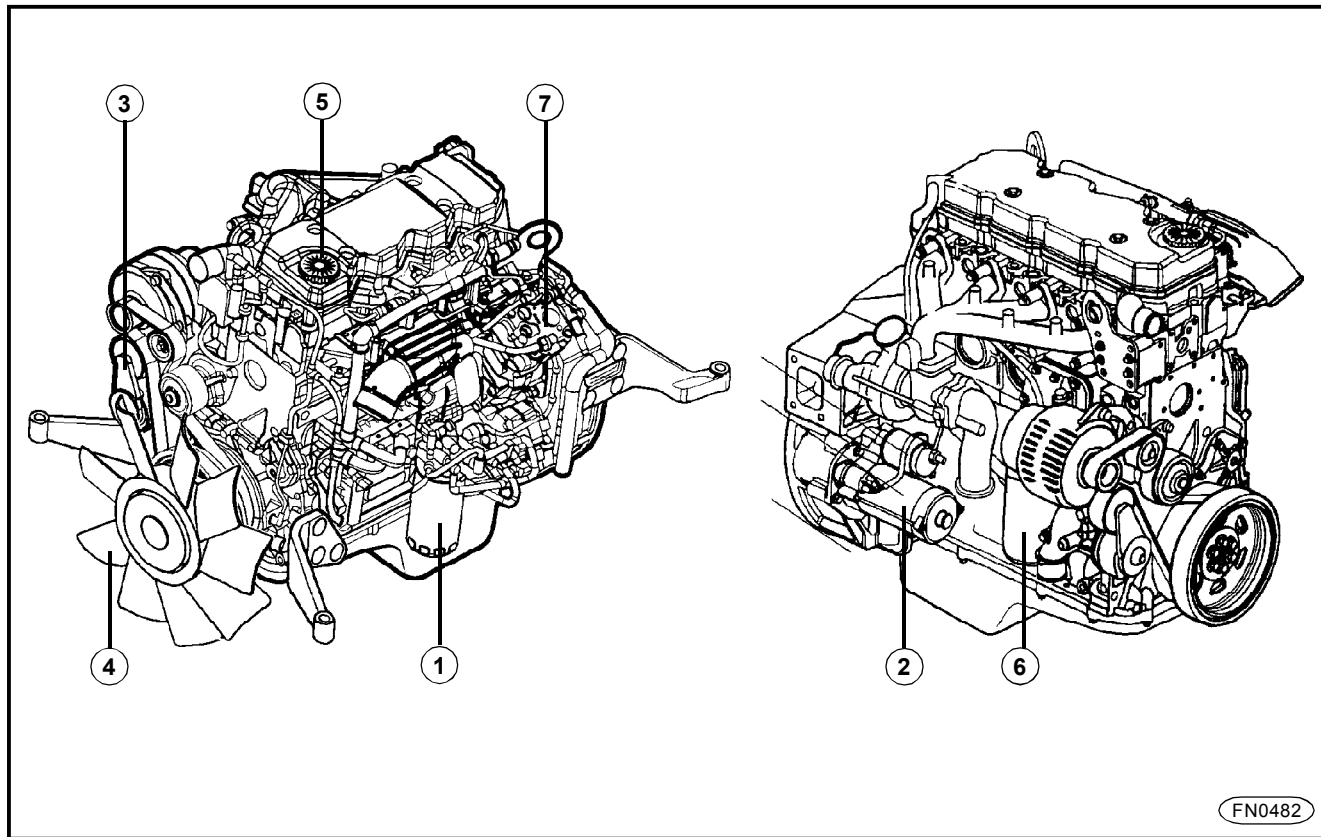


## Fuel filter draining



The fuel filter is drained by draining water after unscrewing drain screw at the bottom of the filter. To screw in the drain screw after dripping off impurities.

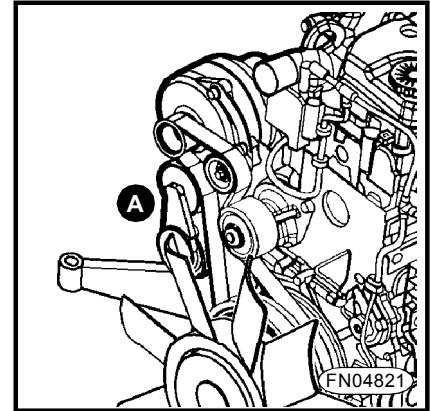
## Cummins ISBe engine



FN0482

- 1 Fuel filter
- 2 Starter motor
- 3 Tightening pulley
- 4 Fan with viscous fan clutch
- 5 Filler neck for oil filling
- 6 Oil filter
- 7 Compressor

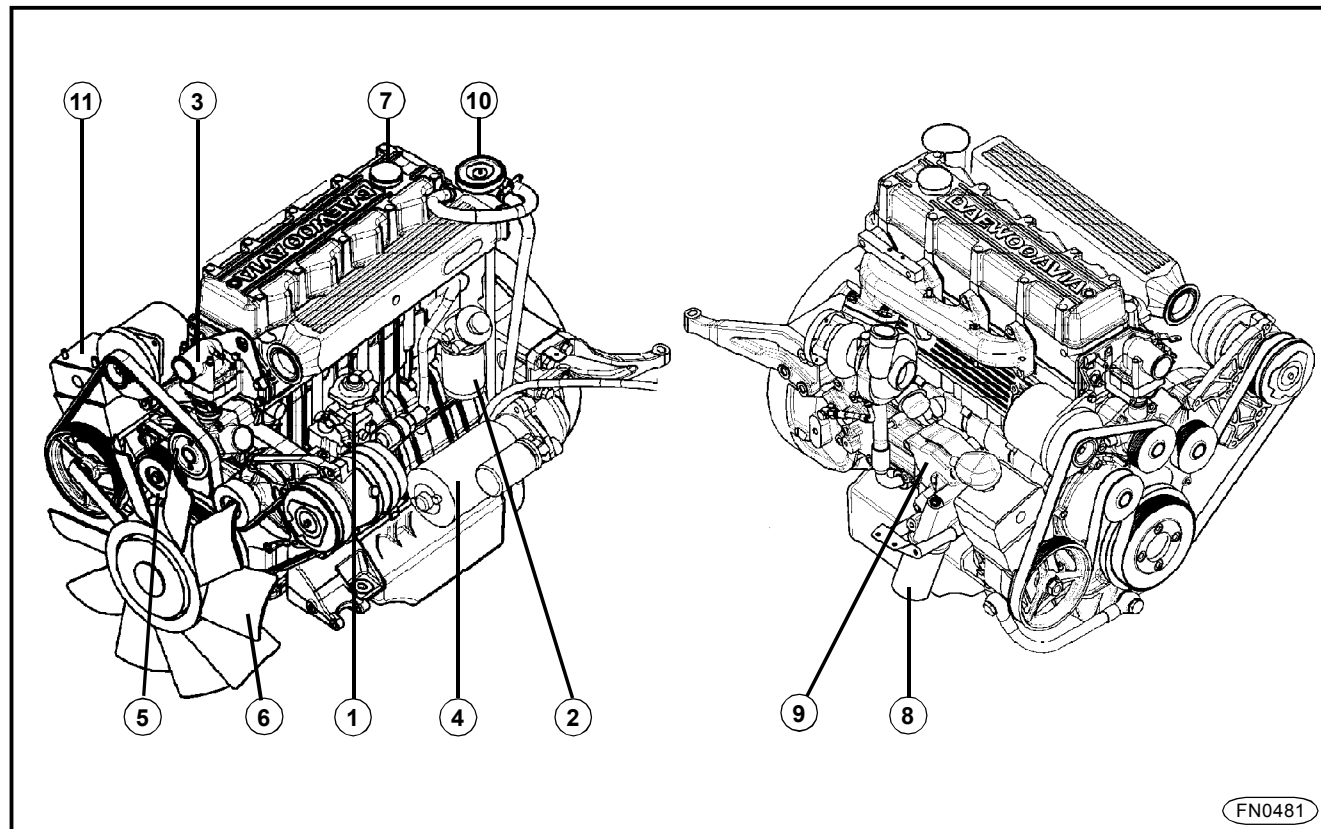
## Tensioning of belts - ISBe



**n** The belt is automatically tensioned by pulley (item A) that provides constant tension.

**n** When the belt is damaged, it is necessary to replace it at once.

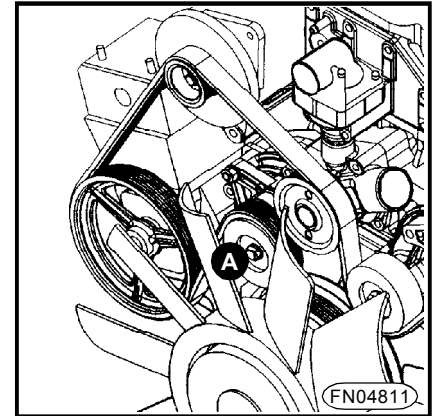
## DWAV D432 engine



FN0481

- 1 Injection equipment
- 2 Single stage fuel filter with manual pump
- 3 Coolant pump with thermostat
- 4 Starter motor
- 5 Tightening pulley
- 6 Fan with viscous fan clutch
- 7 Filler neck for oil filling
- 8 Oil filter
- 9 Oil heat exchanger
- 10 Oil separator
- 11 Compressor

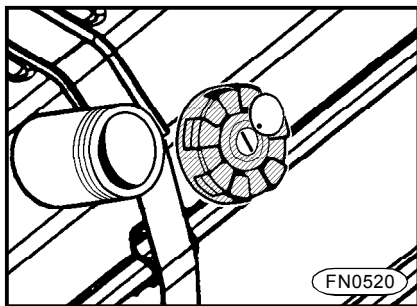
## **Tensioning of belts - D432**



**n** The belt is automatically tensioned by pulley (item A) that provides constant tension.

**n** When the belt is damaged, it is necessary to replace it at once.

## Fuel tank



**n** To prevent from aeration of fuel system, never must occur empty fuel tank.

**n** Fuel tank volume is 120 l (200 l\*). Float device is installed into fuel tank. Fuel quantity in tank is monitored by fuel level gauge on instrument panel.

**n** Minimum fuel reserve is 16 l (20 l\*) and it is indicated by indicator lamp in fuel level gauge.

**n** Fuel level gauge that is located on instrument panel is operational after inserting and turning ignition key in switchbox to position „ON“.

**n** Fuel tank neck is secured by lockable fuel filler cap.

## Fuel

**n** For engine operation use only diesel fuel according to SN EN 590 (656506). Preferably use diesel fuel with low contents of sulphur (0.05% mass) that is commonly available in the market.

**n** In winter season, it is necessary to use such diesel fuel that features filterability (brand CFPP) corresponding to climate conditions.

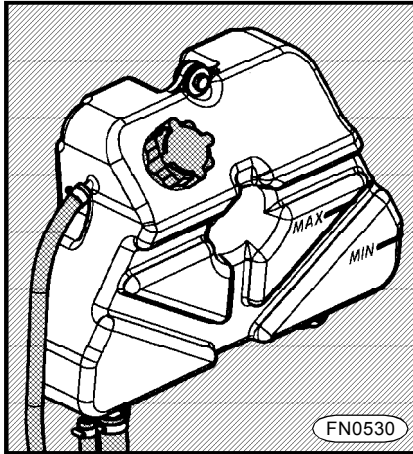
**n** To ensure operation under low temperatures, ingredients improving its filterability could be applied. Mixing is performed according to instructions of manufacturer.

### Warning!

**n Use of bio-diesel fuel is prohibited.**

**n Do not mix diesel fuel with petrol.**

## Cooling system



### Coolant inspection and filling in

- n Check level regularly.
- n Level must vary between **MAX** and **MIN** notches at cold engine (level can slightly exceed **MAX** notch at hot engine). When the level is lower, it is necessary to fill in coolant.
- n Use antifreeze coolant in correct rate of distilled water (**see instructions in packing of chemical**).
- n Year-round use of antifreeze coolant

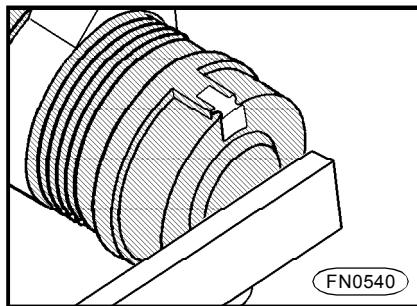
protects cooling system and heating system from corrosion and deposits. Therefore antifreeze chemical concentration must not be decreased by adding water not even in summer season (always fill in with portion of antifreeze chemical).

- n Beware of paint muck.
  - n Before winter season, carry out prophylactic inspection of antifreeze coolant state and concentration in cooling system.
  - n To clean the radiator using pressure air or a flow of heat water from the engine side before start of the summer period and whenever there is contamination of the front surface.
- Check coolant expansion cap.

### Warning!

- n Authorised workshops perform coolant change.
- n Do not open coolant expansion tank cap of hot engine, it could result in scald.
- n Engine must not run without thermostat.
- n Coolant expansion tank prevents from aeration of cooling and heating circuit. Therefore it is necessary to inspect its level.
- n When engine is used to be overheated, it is necessary to advice authorised repair shop.

## Air cleaner



### Warning!

n Filter element change is performed in authorised repair shop.  
n After drive through dusty area filter element change interval is shorter.

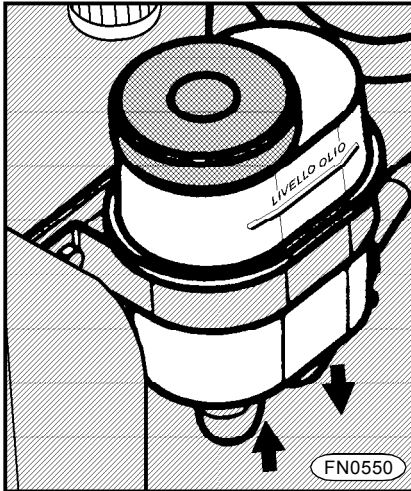
n Interval of filter element replacement is specified in service booklet.

n Clogged filter element is indicated by indicator lamp. When indicator lamp starts glowing, contact immediately authorised repair shop.

n Regardless of indicator lamp glowing, interval of replacement, according to service booklet, must be kept.

n State of air cleaner and intake system features substantial influence to life of turbocharger.

## Steering



### Inspection and filling in of steering oil

n Check level regularly.

n Oil level in tank must vary near notch „LIVELLO OLIO“. when the level is lower, it is necessary to fill in oil of Specification **ATF D II**.

n When you find out clearance in steering mechanism, it is necessary to perform adjustment or repair in authorised repair shop.

n When sudden increase of steering wheel control forces occur, stop vehicle immediately and check quantity of oil in tank of monoblock power-assisted steering and damage of hydraulic circuit.

### Warning!

n Change of oil and oil filter perform authorised repair shops.

n When filling in of oil must be performed unusually often, advice authorised workshop.

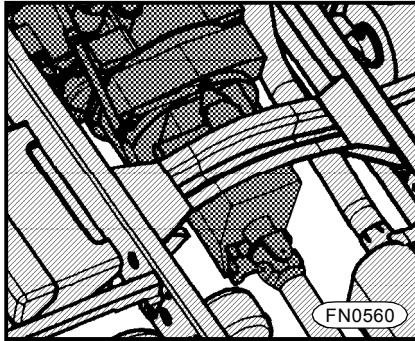
n Do not start engine, when oil isn't in circuit of power assisted steering.

n Take care of cleanliness during manipulation with oil.

n Oil should be disposed with respect of environment.

## OPERATING INSTRUCTIONS

### Gearbox



| Specification<br>of gear oils<br>A P I | Viscosity<br>oil grade<br>S A E |
|----------------------------------------|---------------------------------|
| GL - 4                                 | 80 W<br>80 W - 90<br>85 W - 90  |

#### Warning!

- n Oil change is performed in authorised repair shop.
- n For towing vehicle with stopped engine and without engaged gear, disconnect propeller shaft to prevent from gearbox damage due to insufficient lubrication.
- n Do not start engine, when oil is not in gearbox.

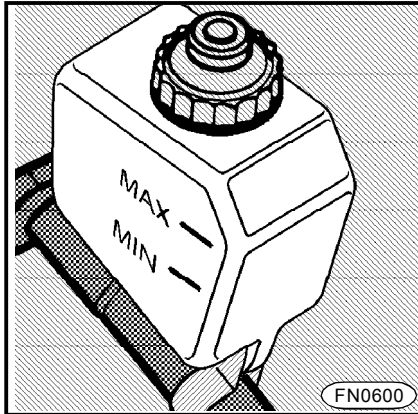
n Inspections of oil quantity and state are performed during service inspections.

n Inspect visually leaking of gearbox. When you find out leaking, contact authorised repair shop.



## OPERATING INSTRUCTIONS

### Clutch



#### Check of fluid and filling in

n It is necessary to inspect regularly quantity of fluid in circuit.

n Level must vary between **MIN** and **MAX** notches. When level is lower, it is necessary to fill-in liquid of specification **DOT3, DOT4, DOT4+ or SAE J 1703**.

n Clutch control is performed by hydraulic transmission with compressed air booster.

n When aeration of liquid circuit occurred (poor clutch disengaging), advice authorised repair shop.

n During clutch disc wear, automatic adjustment of clutch system occur, that result in fluid press up to reservoir (increase of fluid in reservoir).

#### Warning!

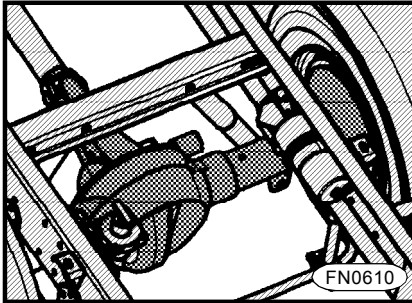
n Authorised workshop carry out change of fluid.

n After air escape from air system (e.g. due to leaking during long-lasting immobility of vehicle) disable of air booster occur that increases force for pedal depress up to 500 N.

n When filling in of fluid must be performed unusually often, advice authorised workshop.

n Fluid is harmful.

## Rear axle



**n** Inspections of oil quantity and state are performed during service inspections.

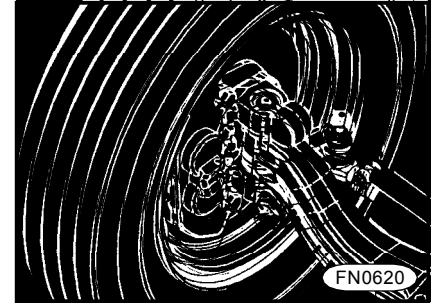
**n** Inspect visually leaking of rear axle. When you find out leaking, contact authorised repair shop.

| Gear oils specification<br>A P I | Recommended<br>oil grade<br>S A E   |
|----------------------------------|-------------------------------------|
| GL - 5                           | 90 H<br>80 W - 90 H<br>85 W - 140 H |

### Warning!

**Authorised workshop carry out change of oil.**

## Front axle



**n** When wear of front wheel tire tread is irregular, check and possibly order front axle geometry adjustment in authorised repair shop.

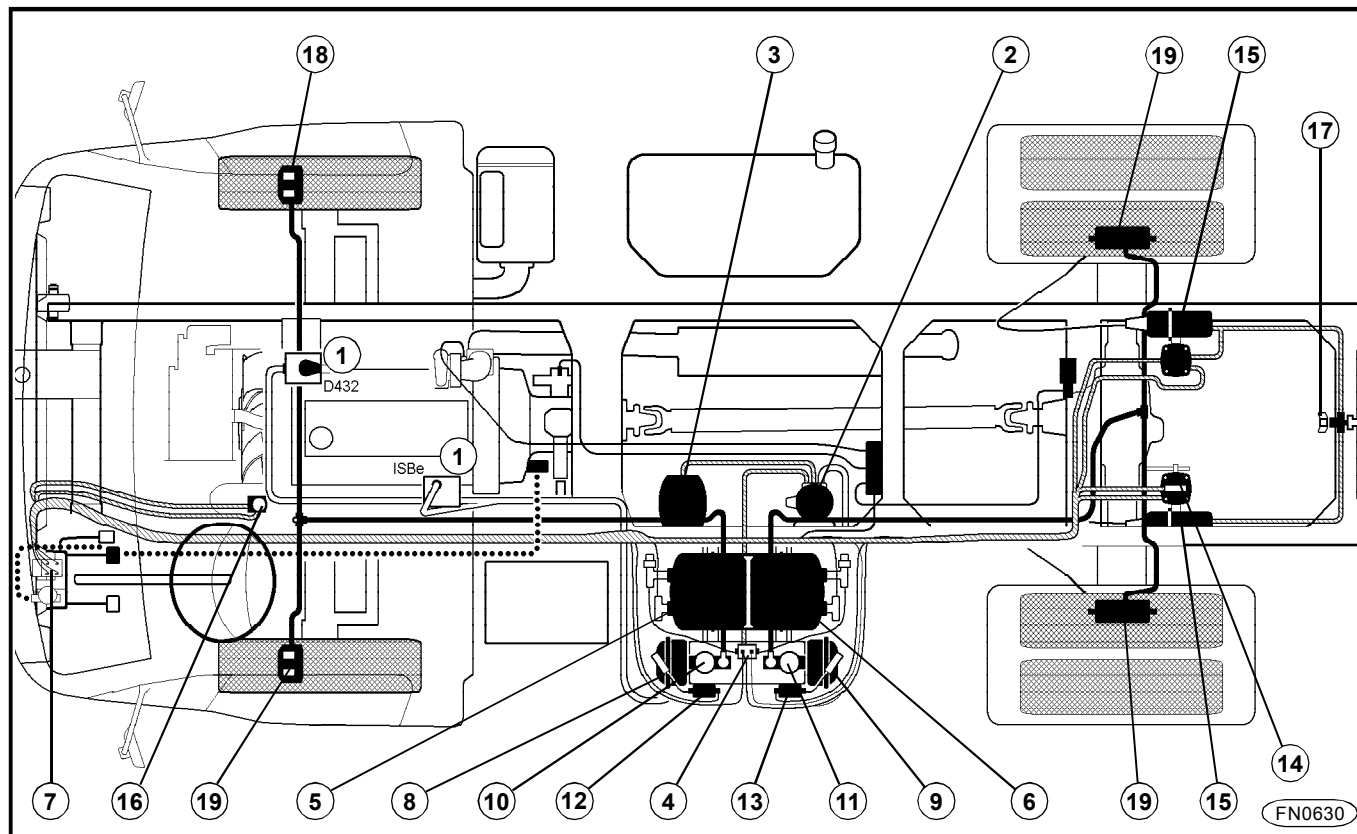
**n** Life of dampers and their function depend on way of driving and kind of service.

### Warning!

**Order all repairs, change of charges or adjustment in authorised repair shop.**

## OPERATING INSTRUCTIONS

### Brake system



- 1 Compressor
- 2 Air pressure equaliser with air drier
- 3 Air tank 4.5 l
- 4 Four-way valve
- 5 Air tank 14 l
- 6 Air tank 14 l
- 7 Brake control valve
- 8 Air-hydraulic converter (I. circuit)
- 9 Air-hydraulic converter (II. circuit)
- 10 Brake fluid tank (I. circuit)
- 11 Brake fluid tank (II. circuit)
- 12 ABS valve (I. circuit)
- 13 ABS valve (II. circuit)
- 14 Load-dependent automatic regulator - air
- 15 Spring brake actuator
- 16 Manual brake valve of parking brake
- 17 Minimum air pressure switch of spring actuated
- 18 Front brake device
- 19 Rear brake device

## Driving brake

n Front axle features disc brake, rear axle features drum brake with built-in parking brake device.

n Driving brake system is double circuit, air-hydraulic.

n Vehicles are equipped by default ABS system.

n First circuit of air valve controls air-hydraulic converter of rear brake device.

n Second circuit of air valve controls air-hydraulic converter of front brake device.

n Braking force of rear axle wheels is controlled in dependence on vehicle load by means of automatic load-dependence regulator.

### Correct function of driving brake system is indicated by:

1. Air pressure gauge monitoring pressure in I and II circuit.
2. Indicator lamp of minimum air pressure.
3. Indicator lamp of brake fluid level in tank.
4. Indicator lamp of ABS.

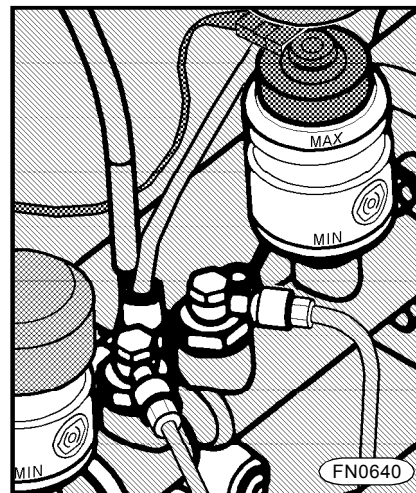
### Air pressure in driving brake circuit

Nominal pressure  
**0.81±0.02 MPa (8.1 bar)**

Minimum pressure  
**0.45 MPa (4.5 bar)**

### Warning!

Driving with glowing indicator lamp of driving brake minimum air pressure isn't acceptable. If it isn't possible to reach minimum air pressure level i.e. indicator lamp glows after longer engine run, malfunction is in air section of driving brake circuit that must be repaired immediately.



### Brake fluid inspection and type

n It is necessary to check quantity of brake fluid.

n Level must vary between **MAX** and **MIN** notches.

n Tanks are equipped with indicators of brake fluid level.

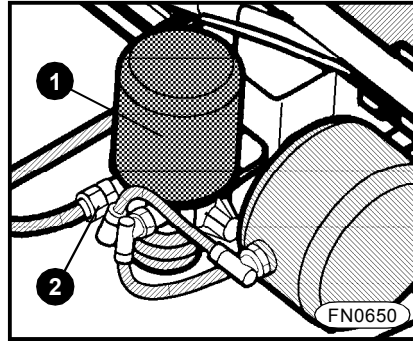
n Use brake fluid according to standard **DOT 3, DOT 4 or SAE J 1703.**

### Brake fluid filling in

- n For filling in use the same brake fluid.
- n Remove protective cover of brake devices. The cover can be removed after dismantling of three bolts. Remove cover in direction backwards and down.
- n Remove protective cover.
- n Open filler neck of tank.
- n During filling in, keep maximum cleanliness of surrounding area.
- n After filling in of liquid between notches **MIN** and **MAX** close tank, place protective cover and covering lid of brake devices.

### Warning!

- n Drive with indicator lamp of brake fluid level glowing isn't acceptable.
- n Mixing with brake fluid of another specification isn't acceptable.
- n Fluid is harmful.



### Air pressure equaliser with air drier

- n It is used for cleaning and drying of air that is delivered from compressor and for regulation of service pressure in tanks.

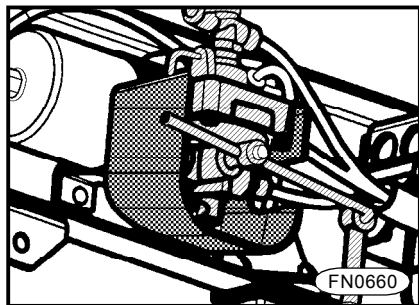
### Change of drier filter (item 1)

- n Change drier filter after **1 to 2 years of operation** or immediately in case of finding condensed water in air tank (condensed water is found out in draining valves during regular inspection).
- n **Drier must be without pressure.**
- n Before change, clean surface of drier and release cup nut (item 2) of inlet to release pressure.
- n Clean upper part of body, slightly grease sealing of new cartridge and manually tighten to torque of about **15 Nm**.

### Warning!

Used filter should be disposed with respect of environment (it contains oil).

## Brake lining inspection

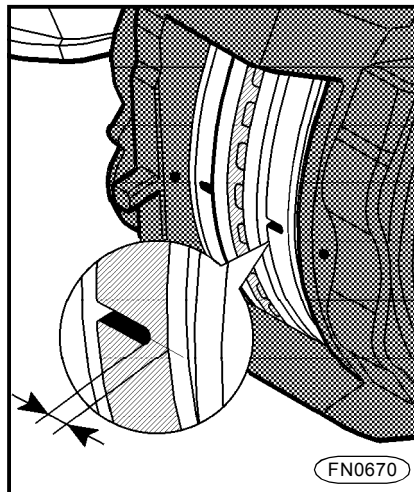


### Automatic load-dependent regulator

**n** Load-dependent regulator is used to regulation of air pressure that flow into diaphragm cylinder.

**n** Perform all adjusting works in authorised repair shop. During operation, perform only visual inspection of connection between regulator lever and rear axle, free run of regulator lever and leaking or equipment.

**n** Operator only order, according to vehicle type, adjustment in the case that values printed in label, placed in cab, do not correspond to reality.



### Front brake equipment

**n** Front axle features disc brake.

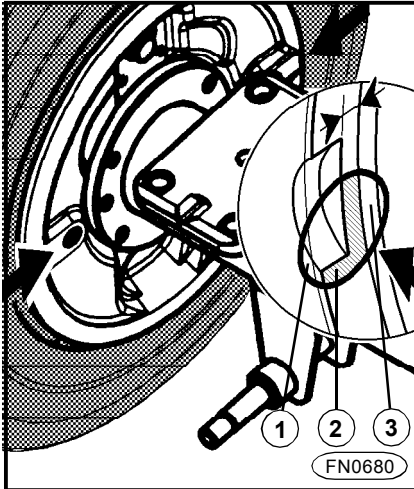
**n** Replace brake pads when grove in their centre (see fig.) isn't visible.

**n** Minimum thickness of brake pads is **1.5 mm**.

**n** Replace brake lining only by lining of approved type.

### Warning!

Brake pads change is performed by authorised repair shops.



### Rear brake equipment

- 1 Drum
- 2 Brake lining
- 3 Metal shoe

n Rear axle features drum brake.  
n Decrement of brake lining is visible in inspection window of brake support plate that is closed by rubber cap.

- n Replace brake linings when cut-out isn't visible.
- n Minimum thickness of brake linings is **1.5 mm**.
- n Replace brake linings only by linings of approved type.

### Warning!

**Brake lining change is performed by authorised repair shops.**

## OPERATING INSTRUCTIONS

### Anti - Blocking - System

ABS considerably contributes to improvement of active driving safety of vehicle. Decisive asset comparing with common brake system is in the fact that maximum possible manoeuvrability is maintained under full brake on slippery road because wheel blocking does not occur.

It cannot be expected that ABS shorten braking track under all circumstances. When wheel circumferential speed owing to vehicle speed is too low and wheel has tendency to blocking, brake pressure of this wheel is decreased. Brake pressure is controlled separately for each axle. This way, brake effect is equalised and maximum of driving stability is maintained.

This regulation process results in pulsation movement of brake pedal. To enable ABS to regulate most effectively, brake pedal must remain depressed  
- **never cadence brake!**

#### Warning!

**n After turning key in position ON, indicator lamp of ABS must always glow. When ABS indicator lamp together with indicator lamp of brake fluid level aren't switched off within several seconds after ignition switching on or when they start glow during drive, equipment is in disorder, vehicle is braked without ABS function. In this case, it is necessary to advice authorised repair shop.**

**n Higher safety that ABS brings must not lead to suffer whatever risk!**

**n All repairs and modification are performed in authorised repair shop.**

## Emergency brake

Brake system is solved so that in case of brake system malfunction, emergency braking effect is secured.

**When loss of driving brake effects occur, reason could be the following:**

**n** Failures of hydraulic circuit (loss of brake fluid). Malfunction is indicated by indicator lamp of brake fluid minimum level.

**n** Failures of driving brake air part. Due to loss of air it is indicated by indicator lamp of minimum air pressure.

**n** In both cases, brake system secures emergency braking.

### Warning!

Emergency brake use always means jeopardy of vehicle operation safety because emergency brake effect is substantially lower than driving brake effect.

### Conclusion

**n Before every drive and during drive, check state of braking system by means of indicator lamps.**

**n** Verify state of bulbs of brake system indicator lamps by turning ignition key in switchbox from position „ACC“ to position „ON“, when indicator lamps should be on.

**n** After several seconds, indicator lamps must be automatically switched off.

**n** After switching off, it is possible to start drive.

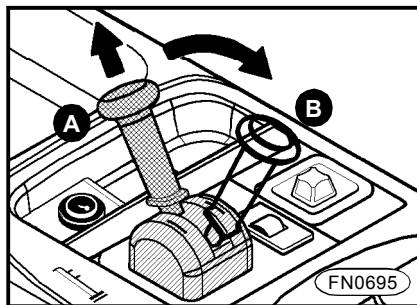
### Brake system devices

Operator performs continuous inspections of state and function of brake system. When failure or even suspicion of failure is found out it is recommended to order diagnostics and possible remedy in authorised repair shop.

### Warning!

Whatever unprofessional intervention to brake system isn't acceptable, because it is necessary to do all repairs and modifications in authorised repair shops.

## Parking brake



n Parking brake is spring-actuated, effecting by means of mechanical gear to rear axle wheels.

n Energy that is necessary for vehicle braking is accumulated in spring of spring brake actuator, loaded by compressed air.

n Parking brake is controlled by manual brake valve that is located behind gear shift lever.

### Brake, brake release

n For state „Brake“ it is necessary to shift brake valve lever to rear position (item A), where it is locked by slight lift (to prevent from spontaneous brake release).

n For brake release slightly lift the lever and shift it to front position (item B).

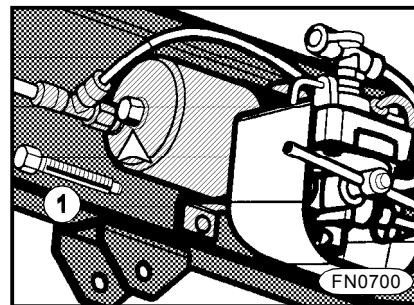
### Warning!

n Use of parking brake during drive is dangerous, skid and decreased vehicle manoeuvrability might occur. During drive, use parking brake only in case of highest need.

n Driving with indicator lamp of spring actuator minimum pressure glowing isn't acceptable - vehicle is braked.

n Nominal pressure in spring brake actuator:  $0.81 \pm 0.02$  MPa.

Minimum pressure in spring brake actuator:  $0.52 \pm 0.05$  MPa.



### Unlocking of spring brake actuator cylinder

- only for purposes of towing.

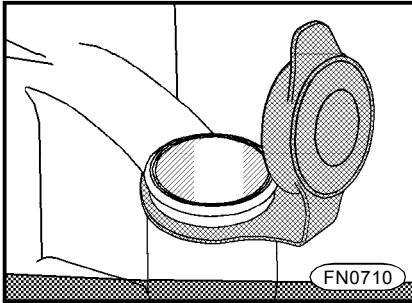
n Secure vehicle against movement by wheel chock.

n Screw in special bolt (item 1) that is part of vehicle equipment, instead of screwed plug in centreline of actuator up to bolt head.

### Warning!

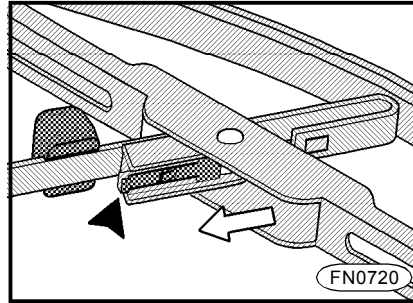
Use only bolts that were delivered as part of vehicle equipment.

## Washer and wiper



### Washer tank

- n Washer tank is located in front bumper.
- n Washer tank features volume of 7.5 l.
- n It is possible to fill in fluid after opening front bonnet.
- n Minimum level of washer fluid is indicated by appropriate indicator lamp\*.
- n For filling in the tank, use water with ingredient of glass cleaning chemical (e.g. **Glacidet**). In winter season, mix the chemical in such ratio that fluid does not freeze (see instructions printed in packing).



### Wipers

- n To secure required outlook for the safety reasons, it is necessary to maintain wiper blade in good conditions.
- n To ensure good wiping it is necessary to clean regularly wiper blades by solution for glass washing.
- n Nozzles for washing wiped surface are placed on wiper arm.
- n Stream direction from nozzles can be adjusted by needle.
- n Complete housing with nozzles is freely movable along wiper arm.

### Replacement of wiper blade.

- n Tilt wiper arm.
- n Turn wiper blade to horizontal position.
- n Depress spring plastic lock and concurrently pull wiper blade out of attachment.
- n For mounting, proceed opposite way.

### Warning!

- n Do not use wiper with dry windscreen - glass can be scratched.
- n Do not use wiper when windscreen is covered by snow layer - clean it at first.
- n In winter season, make sure whether wipers aren't frozen to windscreen.

## OPERATING INSTRUCTIONS

### Tyres and wheels

n Check pressure in tyres before every drive. It is also important to check their state (let inspect their damage in tyre repair shop).

n Label of tyre inflation is located in cab or in chapter **Technical data**.

n Tyres must not have on tread or side-wall any cracks or another damage that uncover tyre cord layer.

n When wear of front wheel tire tread is irregular, check and possibly adjust front axle geometry.

n Depth of tread profile grooves and notches must be at **least 1.6 mm**. Tyres designated as REGROOVABLE can be deepen by cutting profile grooves (specialist must perform it).

n Only balanced tyres in good conditions are allowed to mount on front wheels and all wheels must be in good technical condition.

n Only tyres determined for given vehicle type by vehicle manufacturer and tyre manufacturer are allowed to be used.

n Protect tyres from oil and fuel.

n When vehicle is put out of service for longer period, it should be slightly lifted to release tyres.

n Keep dismantled wheels (tyres) in dry and dark place

n Check tightening of wheel bolt nuts in intervals according to **Service booklet**.

n Instead of that check tightening of wheel bolt nuts after covering first 50 - 100 km after each dismantle of wheel by torque of **330 ± 25 Nm**.

#### **Tyre life depends on:**

n Way of driving

n Proper tyre inflation

n Environment where vehicle serves.

n Front axle geometry

n Proper load distribution over the freight surface

#### **Wheels and their parameters**

Front axle wheels - 2 balanced

Rear axle wheels - 4 unbalanced

Spare wheel - 1 balanced

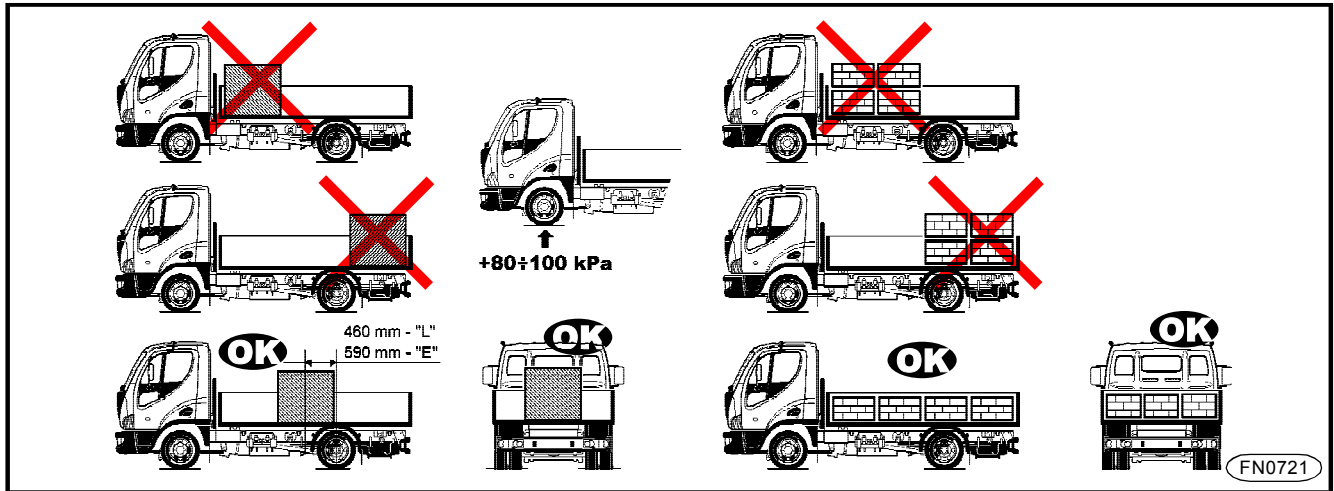
Disk wheel **17,5 x 6,00**

Tyres **205/75R 17,5**

(radial) **215/75R 17,5**

**ALL STEEL TUBELESS**

## Load transport



Especially when operating the vehicle on a highway and when transporting to a major distance, it is necessary to follow subsequent instructions

**n** Not to exceed the maximum permitted weight upon the front axle.

D 60 - D 75 = 2800 kg,

D 80 - D 90 = 3200 kg

**n** To increase tire pressure of the front axle by 80 to 100 kPa. However, the maximum permitted tire pressure assigned by the tire producer must not be exceeded.

**n** To take care of correct load distribution on loading area.

- to place the load in the middle of loading area.

- to place the load evenly on loading area.

**n** If tires will be exchanged, it is necessary to prefer:

a) tires having higher carrying capacity - (215/75R17,5).

b) tires that are determined by the producer to be used on highway traffic.



## Electric equipment

**n** Connectors of all vehicle electric appliance must be connected properly and polarity must not be confused.

**n** Perform battery charging always out of vehicle.

**n** Battery master switch and battery terminal must not be disconnected when engine is running.

**n** During manipulation on vehicle when short circuit could occur, battery master switch must be disconnected.

**n** During splashing and washing of vehicle, protect starter motor, alternator, glowing regulator and battery case against penetration of water, to prevent from short circuit.

**n** For safety reasons, During standstill (garage etc. ), during long operational brake, leaving vehicle or after finding out failure of electric system, switch off battery master switch.

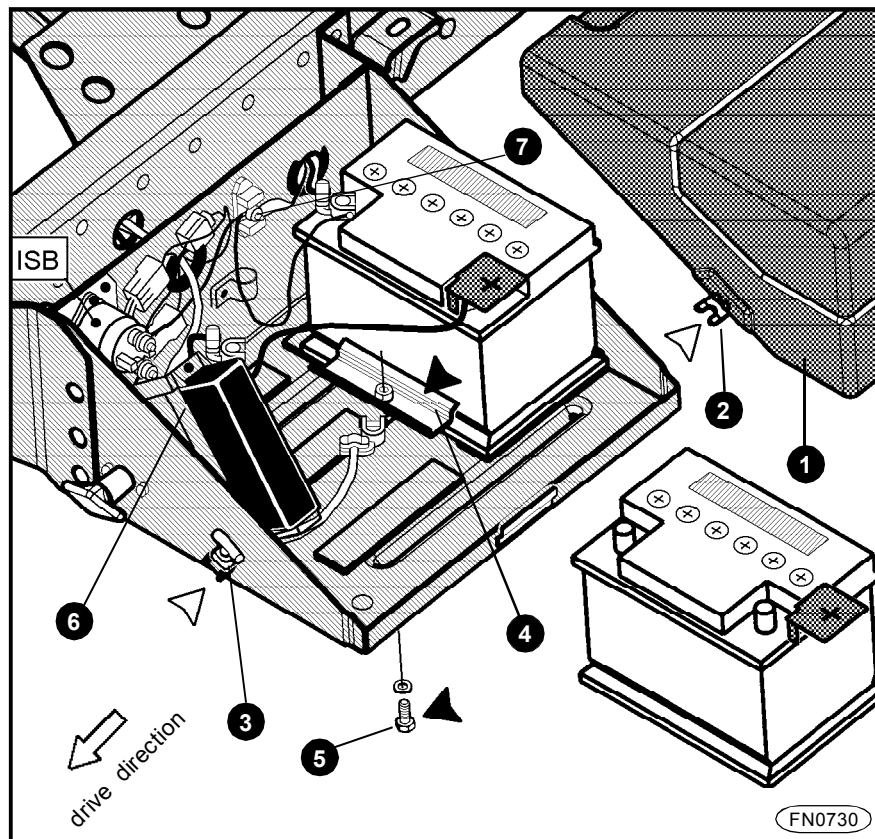
**n** During risk of fire, switch off electric system.

### Warning!

**n When engine is stopped, use of electric appliance discharges battery.**

**n To weld using electric arc is prohibited - there is a danger of damaging the alternator, engine control unit and ABS control unit.**

## Battery attachment



- 1 Plastic cover
- 2 Clip of holder
- 3 Rubber holder
- 4 Profiled battery holder
- 5 Bolt of battery holder
- 6 Fuse box
- 7 Central earthing point

## Battery

**n** Regulations for operation and maintenance are part of certificate of warranty that is handed over with vehicle.

**n** To check regularly each six month : battery condition, electrolyte level and retightening of ground screw (pos. 7 - figure on the adjacent page).

**n** During disconnecting of battery terminal, always start with negative pole terminal ("-"). Dismantling of battery terminal, it is necessary to work carefully to prevent from short circuit between ("+" ) battery connector and vehicle ground by means of tools. After cleaning and connecting back of terminals, positive terminal of battery ("+" ) must be connected again to battery master switch.

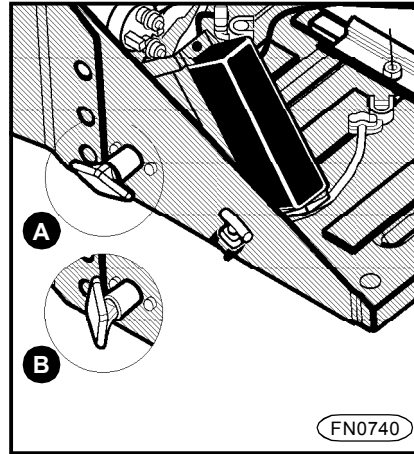
**n** Damaged battery must be replaced by battery of the same capacity, voltage, current rating and the same size.

### Warning!

**n** Always charge battery outside vehicle.

**n** Used battery should be disposed with respect of environment.

## Battery master



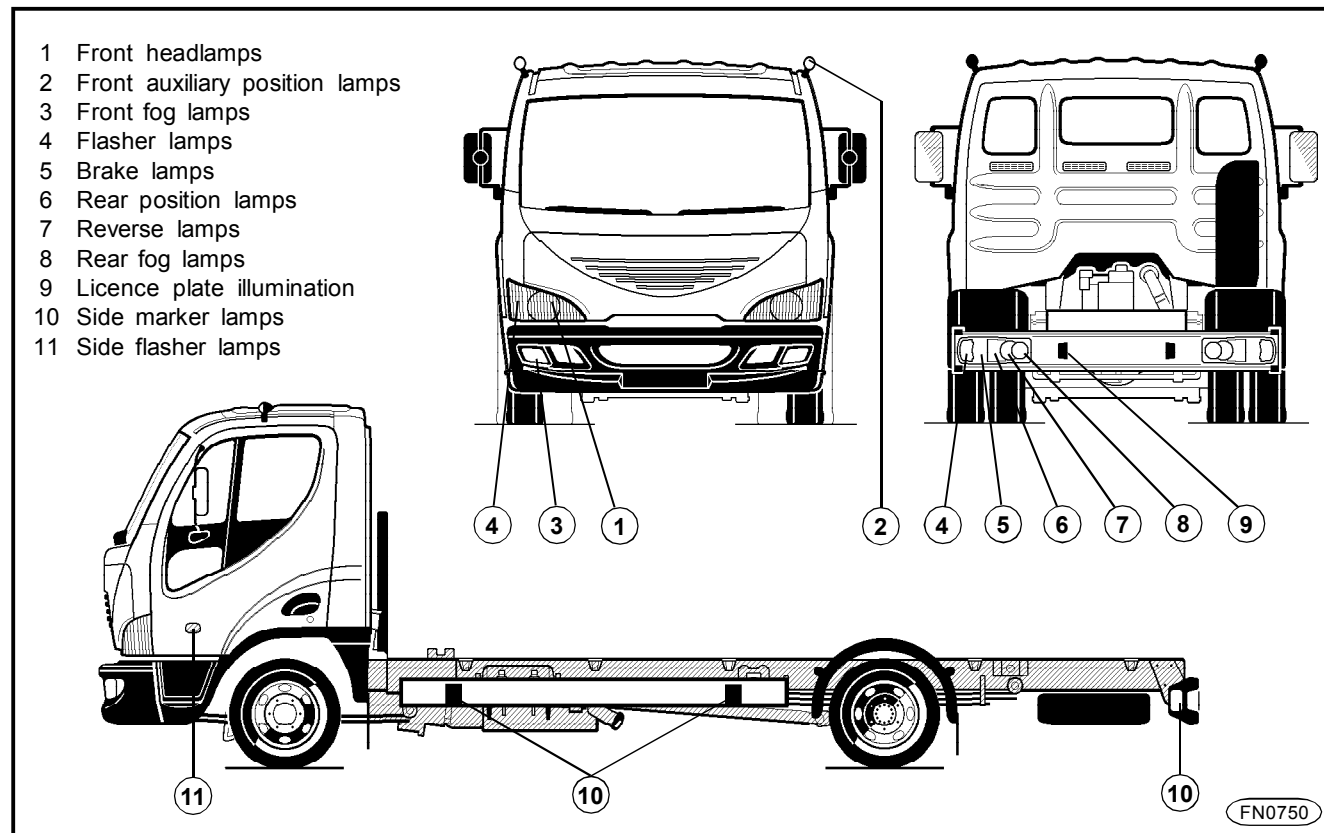
A Battery master switch connected

B Battery master switch disconnected

## Alternator

### Warning!

When engine is running, alternator terminals must not be disconnected and battery master switch must not be switched off - alternator must not run without load.

**Headlamps and lamps - location**

## Care of vehicle

### Warning!

In the case when vehicle is equipped with superstructure which tail board in tilted state covers rear lamps, driver is obliged, under reduced visibility, tilted tail board and staying on public road, to place warning triangle behind vehicle. Driver is also warned about this obligation by special label that is located in cab and visible from driver's place.

### Cleaning compounds

n the matter of cleaning compounds or another chemicals it is necessary to follow advice of manufacturer namely regarding to interior or exterior of vehicle.

n Unsuitable cleaning compounds can degrade of vehicle parts.

n Some evaporable chemicals as acetone, thinners, cleaning compounds as detergents, bleachers or another aggressive chemicals should not be used instead of compounds that are recommended cleaning spots from textile. Also petrol and diesel fuel must not be used.

n Work only when doors are open (vapours of some chemicals are harmful.

### Care of vehicle interior

it is important to use proper cleaning compounds and procedures (see instructions of cleaning compounds). When you don't keep this principles, after cleaning, spots on interior material can appear that are removable very difficult way.

### Components of plastic

n For cleaning of plastic components in interior, moist cloth is enough.

n After basic cleaning by moist cloth, use chemicals that are determined to this purpose.

### Safety belts

Clean only by soapy water.

### Warning!

n It is necessary to maintain safety belts clean - dirt influences operation of winding device.

n Before winding in, safety belts must be completely dry.

n Do not clean safety belts chemical way.

## OPERATING INSTRUCTIONS

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### Door and window seal

Occasionally use chemicals for preservation of rubber and so improve their life and resistance against frost.

### Windows

**n** Use window cleaning compounds.  
**n** In winter, scratch off ice by scraper determined to this purpose.

### Care of vehicle exterior

**n** Frequent wash and conservation are good protection of vehicle against negative influences of environment.  
**n** Regular care maintains value of vehicle.  
**n** It is necessary to use proper cleaning compounds and procedures (see instructions on packing). When you don't keep this principles, spots that is very difficult to remove can remain on vehicle exterior.

### Washing of vehicle

**n** The best way how to maintain paint in good condition as long as possible is frequent washing of vehicle.  
**n** Wash vehicle by warm or cold water.  
**n** Do not use hot water and do not wash in direct sunshine.  
**n** At first soak out impurity in bigger quantity of water.  
**n** After soaking out, clean by soft sponge from roof downwards by solution of water and car-shampoo in ratio according to instructions of manufacturer on packing. During washing, it is necessary to wash sponge frequently.  
**n** After washing, flush vehicle thoroughly (chemicals must not dry on paint) and wipe by deerskin.

### Warning!

**It is necessary to wash vehicle with respect of environment.**

### Waxing and polishing

**n** Regular waxing and washing result in superb shine and easier following washing.  
**n** Wax is applied on dry body.

### Warning!

**Polish and wax must not be applied to components of plastic.**

### Body paint damage

Every paint damage should be repaired at once due to rapid corrosion of bare metal. Do the work in professional workshop.

## **Engine**

### **1. Starter motor does not turn engine crankshaft**

**A) Malfunction:** Battery master switch is switched off  
Remedy: Switch on battery master switch

**B) Malfunction:** Battery is discharged  
Remedy: Charge battery according to certificate of warranty of manufacturer handed over with vehicle

**C) Malfunction:** Faulty electric system  
Remedy:  
- Clean poles and terminals of battery  
- Check and possibly clean interconnection between engine and battery  
- Check connection of cables to starter motor and possibly tighten

**D) Malfunction:** Faulty starter motor  
Remedy: In authorised repair shop

**E) Malfunction:** Blown fuse  
Remedy: Replace fuse, When new fuse is blown immediately, let it check in authorised repair shop

### **2. Starter motor turns engine crankshaft slowly**

**A) Malfunction:** Battery is discharged  
Remedy: Charge battery according to certificate of warranty of manufacturer handed over with vehicle

**B) Malfunction:** Faulty electric system  
Remedy:  
- Clean poles and terminals of battery  
- Check and possibly clean interconnection between engine and battery  
- Check connection of cables to starter motor and possibly tighten

**C) Malfunction:** Faulty starter motor  
Remedy: In authorised repair shop

## MALFUNCTIONS AND THEIR REMEDY

---

### Engine

#### **3. Starter motor turns engine crankshaft, impossible to start engine**

**A) Malfunction:** No fuel in tank  
Remedy: Fill in fuel and bleed fuel system

**B) Malfunction:** (only D432) Interrupted electric current supply to electromagnet of injection equipment stopping device  
Remedy: In authorised repair shop

#### **4. Engine stops after starting**

**A) Malfunction:** Too low idle speed adjusted  
Remedy: In authorised repair shop

**B) Malfunction:** Faulty fuel supply  
Remedy: See paragraph 3, items A)

**C) Malfunction:** Fuel filter element is clogged  
Remedy: In authorised repair shop

**D) Malfunction:** Penetration of air into fuel system  
Remedy: In authorised repair shop

## **Engine**

### **5. Engine doesn't feature full power**

**A) Malfunction:** Fuel filter is clogged with impurities  
Remedy: See paragraph 4, item C)

**B) Malfunction:** Improper function of injection equipment  
Remedy: In authorised repair shop

### **6. Engine knocks**

Remedy: In authorised repair shop

### **7. Engine excessively smokes**

**A) Malfunction:** Faulty or improperly adjusted injection equipment or fuel injectors  
Remedy: In authorised repair shop

**B) Malfunction:** Faulty turbocharger  
Remedy: In authorised repair shop

### **8. Engine is overheating**

**A) Malfunction:** Insufficient quantity of coolant  
Remedy: Check leaking of cooling circuit Remedy Malfunction and fill in coolant

**B) Malfunction:** Insufficient efficiency of radiator  
Remedy: Clean radiator surface

**C) Malfunction:** Thermostat Malfunction  
Remedy: In authorised repair shop

**D) Malfunction:** Improper function of viscous fan clutch  
Remedy: In authorised repair shop

#### **Warning:**

**When indicator lamp of engine coolant temperature glows, it is necessary to reduce vehicle speed, shift gear down, stop vehicle as soon as possible and cool engine at higher speed (1200 - 1500 rpm). Engine must not be stopped, after engine coolant temperature indicator lamp start glow.**

## MALFUNCTIONS AND THEIR REMEDY

---

### Engine

**9. Thermometer of heated engine doesn't operate**

Remedy: In authorised repair shop

**10. Engine lubrication indicator lamp glows or shines through (only D432)**

Remedy: Check engine oil level height, if need fill in.  
When malfunction proceeds, let vehicle tow in authorised repair shop Do not start engine till malfunction remedy

## **Engine**

### **11. "Engine . stop" indicator lamp glows (only ISBe)**

**Defect:** Serious problem of the engine ( mostly temperature of coolant, temperature of filling air, oil pressure)

**Repair:** Vehicle must stop as soon as possible.

Make diagnostic test by accelerator pedal – press pedal three time and loosen pedal. If indicator lamps flicker code of defect, the problem with engine is very serious and you must contact authorized repair shop Cummins.

Driving is strictly prohibited. If during diagnostic test indicator lamp “engine – stop” together with indicator lamp “engine – warning” glow permanently, it is possible to drive vehicle.

### **12. "Engine – warning" indicator lamp glows (only ISBe)**

**Defect:** Defect in engine system or defect of engine component.

**Repair:** Vehicle can operate, but only to the nearest authorized repair shop, which must repair defect. This situation is not emergency case.

### **13. "Engine – maintenance" indicator lamp glows (only ISBe)**

**Defect:** It is necessary to make maintenance.

**Repair:** If this lamp flickers during starting, it is necessary to make maintenance (exchange engine oil etc.) After maintenance (e.g. oil exchange), it is necessary to restart signal of this indicator lamp.

#### **Warning:**

When indicator lamp 11,12,13 glow, driver will stop engine, check engine oil level and coolant level, fill the engine oil and the coolant if necessary and follows procedures 11, 12, 13, given above.

## MALFUNCTIONS AND THEIR REMEDY

### Engine

#### 14. Diagnostic test (only ISBe)

**Defect:** The warning light will remain glowing:

„engine-stop“

red



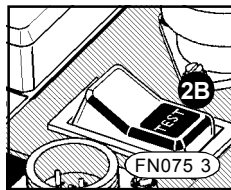
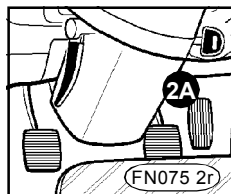
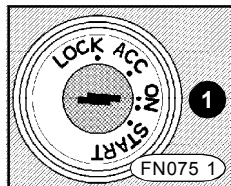
„engine -warning“

orange



„engine maintenance“

blue



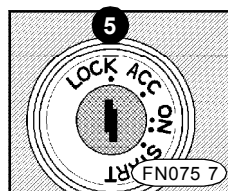
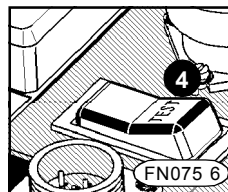
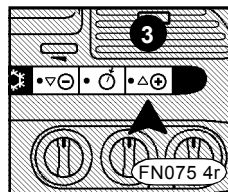
A defect kind (a three to four-digit numerical defect code) decides on the fact which of the warning lights is glowing.

To start a diagnostic test:

An ignition lock key must be in the position ON (1) – warning lights are glowing

2A by the accelerator pedal - 3x to depress and release or 2B through the separate switch of on-board engine diagnostic that is placed under a glove box in the instrument panel.

Turning on will occur: of the orange **engine warning indicator lamp** and after turning off – the red light of **stop of engine check up** starts to flash a defect code.



Turning on of the defect code (the red light) permanently repeats; if another defect occurs it is necessary to press a switch of the cruise control 3 having the sign +

And the process of turning on of the numerical defect code starts repeating, and that, either turning on the same defect code (that means no another defect code exists any more) or another one turns on that is noted down, and by repeated pressing the cruise control switch + another turning on of the defect code occurs till the period that the first defect code 115 is turned on again. After termination of the diagnostic test: to return the switch 4 of the on-board diagnostic and the ignition box key 5 to the initial position (turned off). And to wait approx. 30 seconds.

#### Warning!

If the blue warning light of „engine maintenance“ is lighting, make a visit to the nearest contractual repair shop.



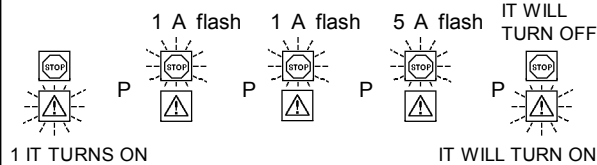
## Engine

## Electric equipment

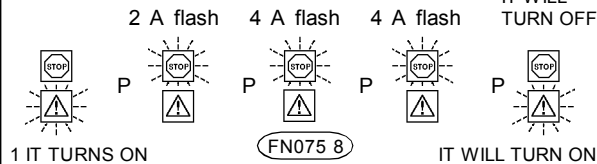
### Example of defect codes

P=Pause

#### Defect code 115:



#### Defect code 244:



**Stop of engine check up** will turn on a numerical defect code.

Example of classifying the code number is obvious from the figure.

-after turning off the orange warning lamp

-1x the red one will flash

-a pause 1 to 2 sec

-1x the red one will flash

-a pause 1 to 2 sec

-5x the red one will flash

-a pause 1 to 2 sec

-the orange one will turn on again (an end of turning on the defect codes) the defect code = 115

### **1. Battery charging indicator lamp glows**

#### **A) Malfunction: Malfunction is in circuit of charging**

Remedy: At first inspect whether all lines of alternator, storage battery and battery master switch are properly tightened, perhaps connected to proper terminal. Also inspect whether connections including ground cable of storage battery aren't corroded.

#### **B) Malfunction: (only D432) Released or broken alternator belt**

Remedy: Tension belt properly, Replace damaged belt by new one in authorised repair shop.

### **2. Battery charging indicator lamp doesn't glow with switchbox switched over to position „ON“**

Remedy: In authorised repair shop

## MALFUNCTIONS AND THEIR REMEDY

### **Monoblock hydraulic power-assisted steering**

#### **1. Oil leaking from hydraulic circuit**

**Malfunction: Leaking connections**

Remedy: Tighten released connections, check oil level height and perhaps fill in and contact authorised repair shop.

#### **2. Malfunctions of individual equipment**

Remedy: In authorised repair shop

### **Brake**

#### **1. Reduced braking effect**

**Malfunction: Aired brake system**

Remedy: In authorised repair shop

**Malfunction: Worn brake pads or linings**

Remedy: Inspection of brake pads or linings, when they are worn replace them in authorised repair shop

#### **2. Reduced braking effect - brake fluid level indicator lamp glows**

Remedy: Failure of hydraulic circuit I or II

Stop vehicle immediately. Find out reason of failure and according to possibility remedy directly on the spot. Fill in brake liquid. When malfunction cannot be repaired directly, continue driving with respect of lower efficiency of emergency brake **(see chapter Emergency brake).**

It is necessary to have it repaired in contract repair shop.

## **Parking and spring-actuated brake**

### **3. Reduced braking effect with indication of pressure decrease in driving brake air circuits and in spring actuated brake**

**Malfunction:** Failure of driving brake air circuit I or II.

**Remedy:** Unlock spring actuated cylinders (see chapter Parking brake) and tow into authorised repair shop

**Malfunction:** Released or torn belt

**Remedy:** Tighten belt, replace damaged belt in authorised repair shop.

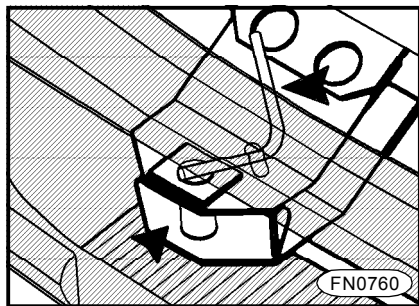
### **4. Parking brake locked, indicator lamp of minimum air pressure in spring-actuated brake glows, vehicle cannot move**

**Remedy:** Unlock spring actuated cylinders (see chapter Parking brake) and tow vehicle into authorised repair shop

### **5. Indicator lamp of ABS glows**

**Remedy:** Equipment isn't in order, vehicle is braked without function of ABS. Only ordinary brake system of the vehicle is functional. In this case it is necessary to advice authorised repair shop. Drive must be accommodated to given situation.

## Towing



### Towing

- n Fix towing bar to central part of front bumper by means of pin.
- n When you tow vehicle with stopped engine without engaged gear, disconnect propeller shaft to prevent gearbox damage due to insufficient lubrication and unlock spring-actuator cylinder according to chapter Parking brake.
- n Weight ratio of towed and towing vehicles must be at least **1.4 : 1**.

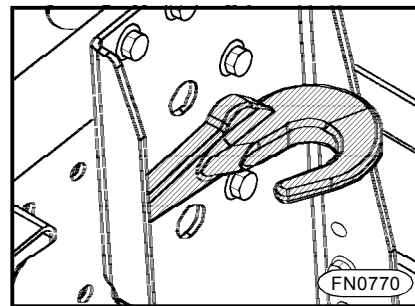
### Warning!

- n When engine is stopped, boosters of steering and brakes do not operate.
- n For towing, use only tow bar, another connection is not acceptable.

### Operating sequence of propeller shaft disconnecting

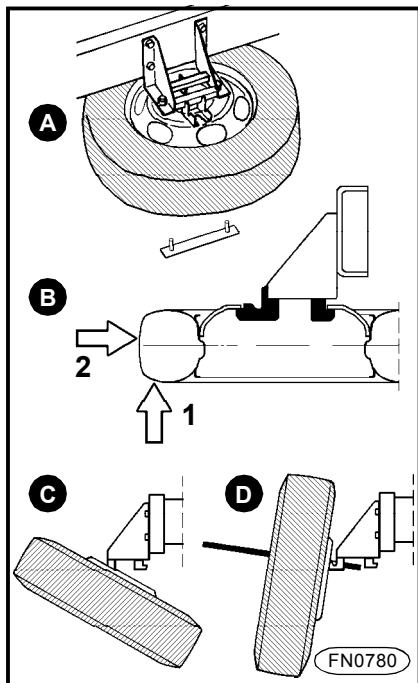
- n Secure vehicle against spontaneous movement.
- n Dismantle bolts fixing propeller shaft from gearbox flange.
- n Fix propeller shaft to vehicle frame suitable way.
- n After towing and repair of vehicle, mount propeller shaft back to gearbox flange, tighten self-locking nuts to torque **Mk = 60 ± 10 Nm**.

## Towing hook



Special hook for safe fixing of cable during vehicle rescue is welded to vehicle frame.

## Spare wheel carrier (N, L, E)



### Dismantle of spare wheel

n Dismount spring cotter pin and two nuts to release thrust plate (fig. A).

n Lift wheel by tyre (fig. B) in place of point 1 and depress lifted wheel in place of point 2 in direction to vehicle centre (vehicle swing follows (fig. C) - beware of injury).

n Remove wheel from carrier.

### Spare wheel mounting

n Lift wheel by means of cab lift bar so that it remains hanging in slots of carrier front bracket (fig. D).

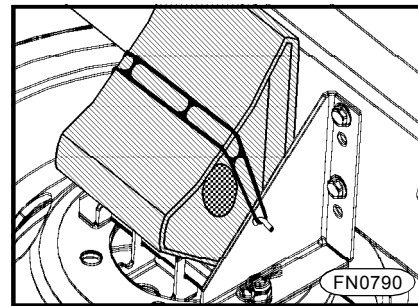
n Swing wheel into horizontal position to you so that it descends to supporting plate of rear bracket and also to supporting plate of front brackets in front of stop protrusions.

n From below, fix supporting plate by means of two nuts and secure by wire lock of one bolt.

### Warning!

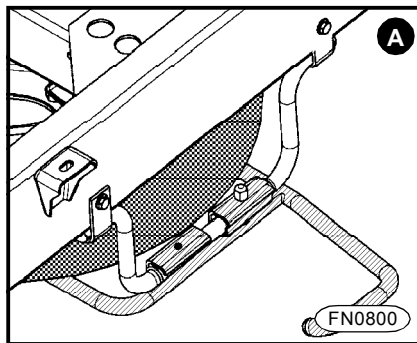
Owing to wheel weight, be careful during manipulation.

## Wheel chock (N, L, E)



## MALFUNCTIONS AND THEIR REMEDY

### Spare wheel carrier (K)



A - left hand side

B - right hand side

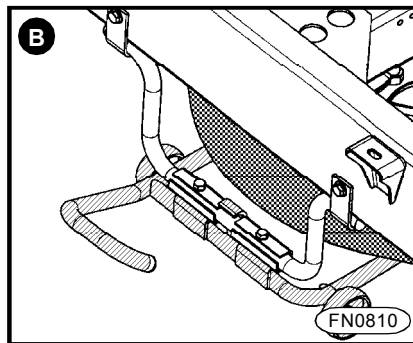
#### Dismantle of spare wheel

n From below, screw out bolt from welded nut on left side of carrier.

n After dismantling of right side bolts, pull handle of wagon in direction to yourself and descend to ground.

n Slightly lift clamp of right side and after hooking out from pin, descend to ground.

n Drive spare wheel out of vehicle.



#### Spare wheel mounting

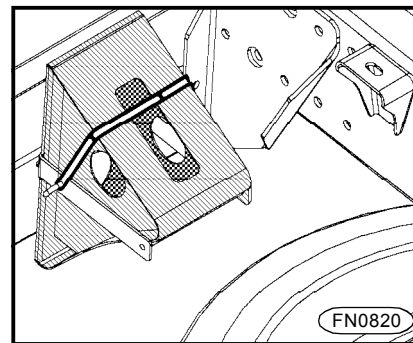
n When mounting spare wheel back, proceed opposite way of work sequence.

n After mounting, depress stops to disc and tighten properly counter-nuts, to prevent knocking of released spare wheel.

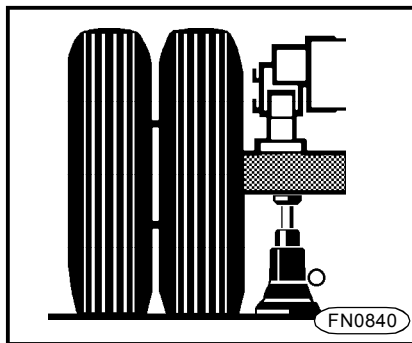
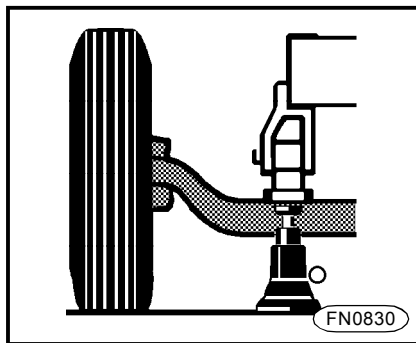
#### Warning!

Owing to wheel weight, be careful during manipulation.

### Wheel chock (K)



## Change of wheel



### Warning!

Never start engine of lifted vehicle.

**n** If it is possible, perform change of wheel on horizontal plain.

**n** Secure vehicle by wheel chocks and brake it.

**n** Remove spare wheel from carrier.

**n** Release wheel nuts by spanner (part of equipment) by one revolution.

**n** Place jack (see figure). Jack must be well placed on hard foundation.

**n** Lift wheel, by lever movement, (with closed valve) by several centimetres above ground.

**n** Screw out wheel nuts, remove wheel and mount spare wheel.

**n** Contact surfaces of disc and hub must be clean.

**n** Partially and uniformly tighten wheel nuts.

**n** After slow opening of jack valve, descend vehicle to ground carefully and slowly.

**n** Tighten completely wheel nuts to torque of **330 ± 25 Nm**.

**n** Retighten nuts after covering **50 - 100 km**.

## MALFUNCTIONS AND THEIR REMEDY

### Change of bulbs

n Before change of bulb, switch off the lamp.

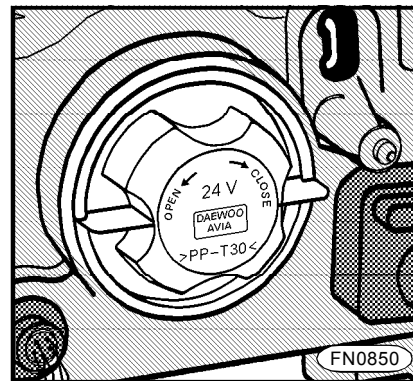
n Replace blown bulbs by bulbs of the same parameters (designation and parameters are marked on bulb).

n Halogen bulbs must not come in contact with fingers - after switching on, bulb loses its efficiency.

#### Warning!

n Perform headlamp adjustment in authorised repair shop.

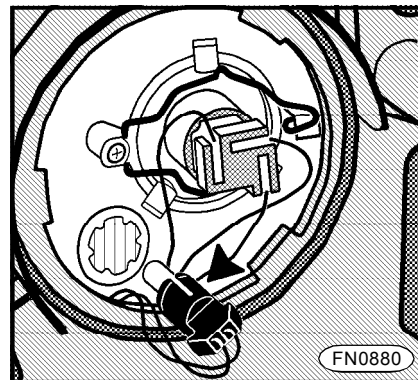
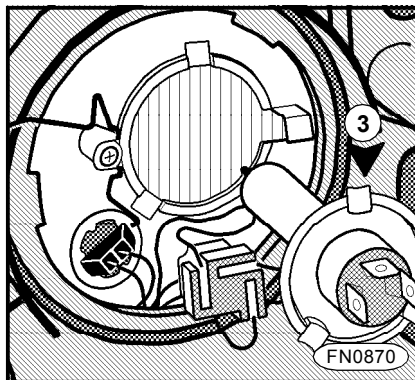
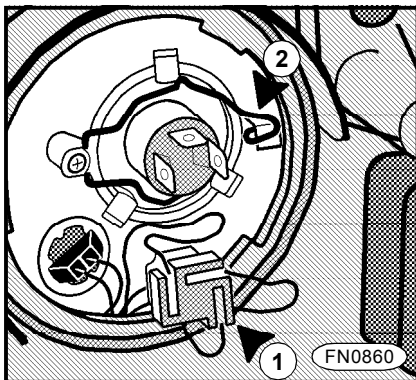
n New bulb type and power must correspond to defined original bulb.



#### Headlamp

n For replacement of blown bulbs, it is necessary to tilt cab.

n Swing plastic cover of headlamp in counter clockwise direction and remove it.



### Low and main beam

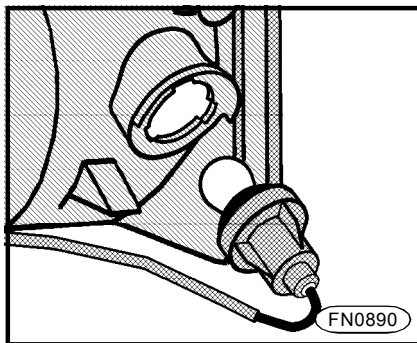
- n** Disconnect terminal board (item 1) from bulb
- n** Hook off wire spring holder (item 2).
- n** Remove blown bulb and insert new one (protrusions of bulb (item 3) base must match with their slots on lamp).
- n** During mounting, proceed opposite way.

### Front position lamps

- n** Remove lamp holder out of lamp.
- n** Pull out bulb out of lamp holder.
- n** Insert new bulb and proceed opposite way.

|            |    |      |         |   |                              |
|------------|----|------|---------|---|------------------------------|
| Front part | H4 | 24 V | 70/75 W | 2 | headlamp - low and main beam |
|            |    | 24 V | 5 W     | 2 | position lamps               |

## MALFUNCTIONS AND THEIR REMEDY



### Front flasher lamps

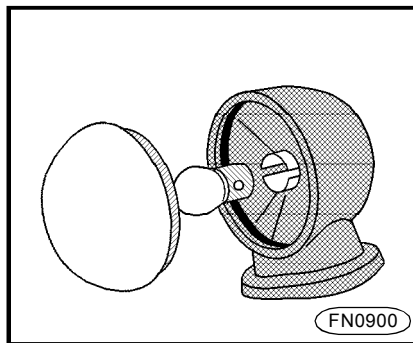
**n** For replacement of blown bulbs, it is necessary to open door for easier access.

**n** Turn plastic bulb socket counter clockwise and pull it out with bulb out of light housing.

**n** Press blown bulb, turn it counter clockwise and remove it.

**n** Insert new bulb, press it and turn it clockwise.

**n** Insert bulb socket into light housing and turn it clockwise up to stop.



### Front auxiliary position lamps

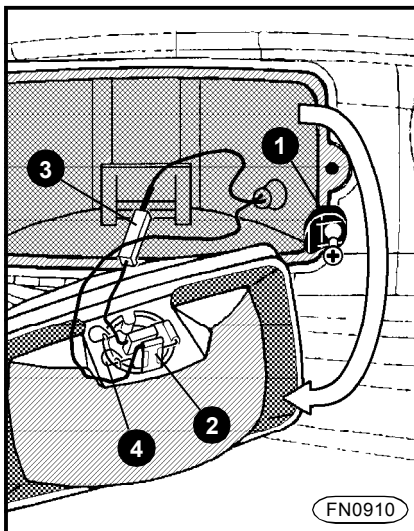
**n** Remove light housing cover by means of bigger screwdriver.

**n** Press blown bulb, turn it counter clockwise and remove it.

**n** Insert new bulb, press it and turn it clockwise.

**n** Mount cover and depress it to its place.

|            |  |      |      |   |                          |
|------------|--|------|------|---|--------------------------|
| Front part |  | 24 V | 21 W | 2 | flasher lamps            |
|            |  | 24 V | 5 W  | 2 | auxiliary position lamps |

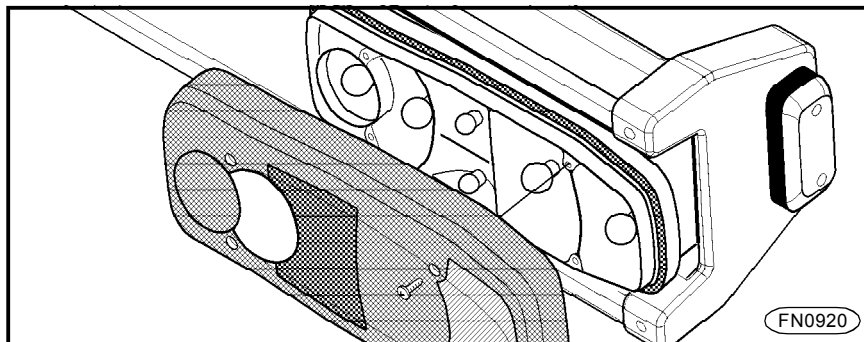


### Front fog lamps

- n Screw out plastic holders (item 1) of fog lamp housing.
- n Remove the housing.
- n Bend ground terminal to perpendicular position (item 2).
- n Disconnect wire (item 3) pulling out.
- n Hook off and bend wire spring holder (item 4).
- n Remove blown bulb and insert new one (protrusions of bulb base must match with their slots on lamp).
- n During mounting, proceed opposite way (do not forget to bend back ground terminal to original position).
- n Designation **TOP** must direct upwards.
- n Let lamp adjustment checked in authorised repair shop.

|            |    |      |      |   |           |
|------------|----|------|------|---|-----------|
| Front part | H3 | 24 V | 70 W | 2 | fog lamps |
|------------|----|------|------|---|-----------|

## MALFUNCTIONS AND THEIR REMEDY



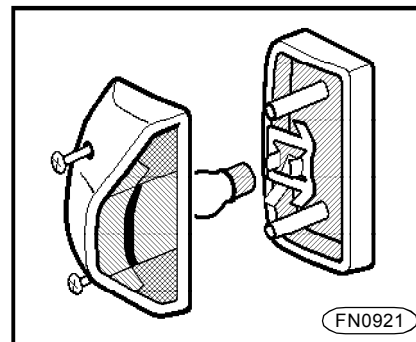
### Rear cluster lamps

**n** Screw out lamp cover.

**n** Press blown bulb, turn it counter clockwise and remove it.

**n** Insert new bulb, press it and turn it clockwise.

**n** Insert and screw up the cover. tighten very slightly - easy to crack.



### Licence plate illumination lamp

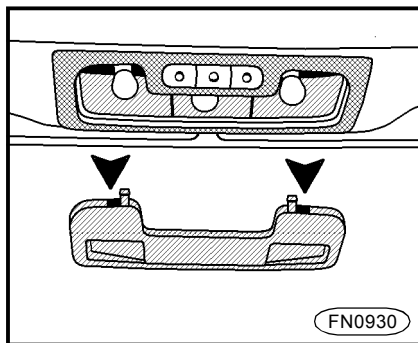
**n** Screw out lamp cover.

**n** Press blown bulb, turn it counter clockwise and remove it.

**n** Insert new bulb, press it and turn it clockwise.

**n** Insert and screw up the cover. tighten very slightly - easy to crack.

|           |  |      |      |   |                                 |
|-----------|--|------|------|---|---------------------------------|
| Rear part |  | 24 V | 10 W | 2 | red tail lamp                   |
|           |  | 24 V | 21 W | 2 | red brake lamp                  |
|           |  | 24 V | 21 W | 2 | orange flasher lamp             |
|           |  | 24 V | 21 W | 2 | red fog lamp                    |
|           |  | 24 V | 21 W | 2 | white reverse lamp              |
|           |  | 24 V | 10 W | 2 | licence plate illumination lamp |



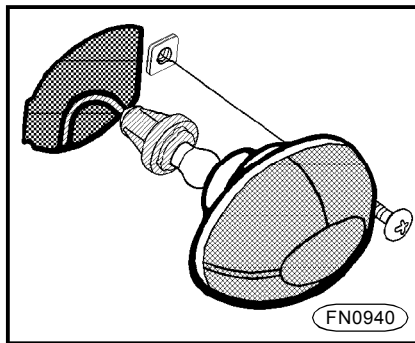
### Ceiling of interior illumination

**n** Remove cover from lamp housing by means of small screwdriver (two slots are visible on cover for screwdriver inserting).

**n** Press blown bulb, turn it counter clockwise and remove it.

**n** Insert new bulb, press it and turn it clockwise.

**n** Carefully insert and depress cover to its place.



### Side flasher lamp

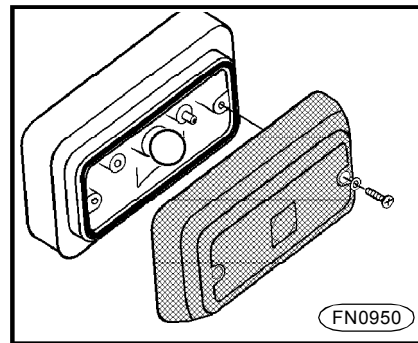
**n** Screw out the lamp.

**n** Press blown bulb, turn it counter clockwise and remove it.

**n** Insert new bulb, press it and turn it clockwise.

**n** Insert light behind fastener in front part and screw it.

**n** Tighten very slightly - easy to crack.



### Side position lamps

**n** Screw out lamp cover.

**n** Press blown bulb, turn it counter clockwise and remove it.

**n** Insert new bulb, press it and turn it clockwise.

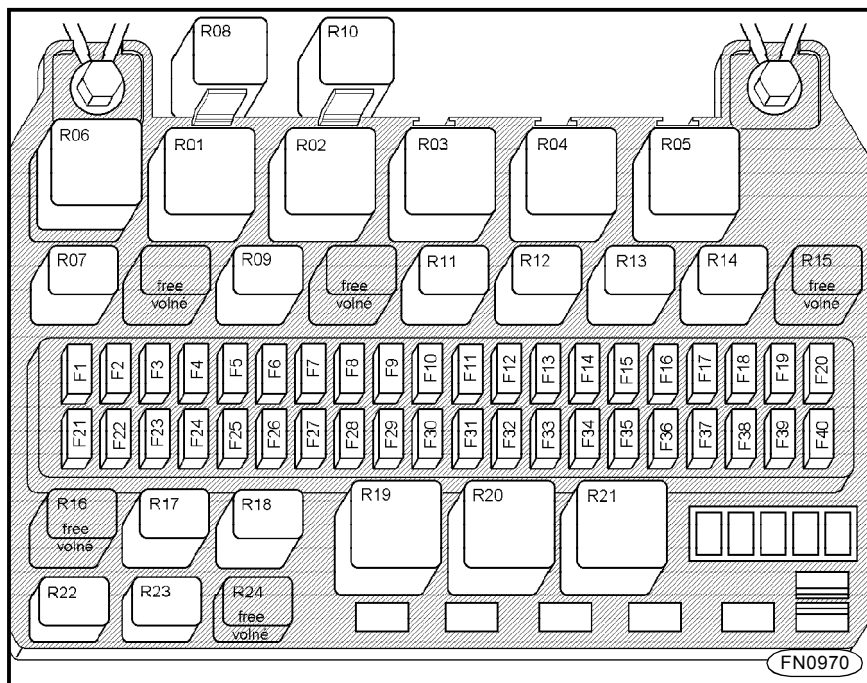
**n** Insert and screw up the cover. tighten very slightly - easy to crack.

|          |  |      |      |   |                     |
|----------|--|------|------|---|---------------------|
| Interior |  | 24 V | 12 W | 3 | ceiling lamp        |
| Side     |  | 24 V | 21 W | 2 | side flasher lamps  |
| part     |  | 24 V | 4 W  | 6 | side position lamps |

## MALFUNCTIONS AND THEIR REMEDY

### Fuse box - cab

| Fuses      |     |                                                                                       |
|------------|-----|---------------------------------------------------------------------------------------|
| <b>F1</b>  | 10A | brake lamp, „+“ onto the instrument panel                                             |
| <b>F2</b>  | 10A | cigarette lighter                                                                     |
| <b>F3</b>  | 10A | acoustic horn                                                                         |
| <b>F4</b>  | 10A | cab interior and superstructure illumination*                                         |
| <b>F5</b>  | 10A | Digital clock*                                                                        |
| <b>F6</b>  | 25A | voltage charger 24V / 12V;<br>pluf of ISBe engine diagnosis                           |
| <b>F7</b>  | 10A | engine speed sensor / exhaust<br>brake relay (D432)                                   |
| <b>F8</b>  | 10A | injection advance device / glowing<br>regulator / fuel stopping (D432)                |
| <b>F9</b>  | 10A | „+“ for differential lock control / auxiliary<br>drive / dashboard clock display      |
| <b>F10</b> | 25A | “+” for towed vehicle                                                                 |
| <b>F11</b> | 10A | warning lamp                                                                          |
| <b>F12</b> | 10A | central lock*                                                                         |
| <b>F13</b> | 10A | IGN relay control via ignition lock /<br>starter relay control                        |
| <b>F14</b> | 10A | “+” for rear fog lamps                                                                |
| <b>F15</b> | 10A | reserve<br>engine brake relay control with running<br>braking and pedal relay (ISBe)  |
| <b>F16</b> | 10A | wipers                                                                                |
| <b>F17</b> | 10A | ventilator engine                                                                     |
| <b>F18</b> | 10A | flasher lamps                                                                         |
| <b>F19</b> | 10A | reverse lamps / “+” pole for instruments                                              |
| <b>F20</b> | 10A | headlamps washer*                                                                     |
| <b>F21</b> | 25A | heating of mirrors                                                                    |
| <b>F22</b> | 10A | air conditioner*                                                                      |
| <b>F23</b> | 25A | control of windows*                                                                   |
| <b>F24</b> |     | free                                                                                  |
| <b>F25</b> | 10A | left main beam + indicator lamp                                                       |
| <b>F26</b> | 10A | right main beam / R04 of rear fog light                                               |
| <b>F27</b> |     | free                                                                                  |
| <b>F28</b> | 10A | left low beam + indicator lamp                                                        |
| <b>F29</b> | 10A | right low beam / + R04 of rear fog light                                              |
| <b>F30</b> | 10A | headlamp corrector                                                                    |
| <b>F31</b> | 10A | left position lamp / right auxiliary position<br>lamp / instrument panel illumination |
| <b>F32</b> | 10A | right position lamp / left auxiliary<br>position lamp                                 |
| <b>F33</b> | 10A | control circ. fog lamps                                                               |
| <b>F34</b> | 10A | illumination of controls                                                              |
| <b>F35</b> | 10A | left front fog lamp*                                                                  |
| <b>F36</b> | 10A | right front lamp*                                                                     |
| <b>F37</b> |     | free                                                                                  |
| <b>F38</b> |     | free                                                                                  |
| <b>F39</b> | 10A | ABS control unit                                                                      |
| <b>F40</b> | 10A | ABS control unit                                                                      |



## Relays

- R01 heating of mirrors
- R02 headlamp washer
- R03 brake lamps - check
- R04 rear fog lamp control
- R05 flash lamps
- R06 switchbox
- R07 window control 1
- R08 window control 2
- R09 window control 3
- R10 window control 4
- R11 position lamps
- R12 low beam
- R13 main beam
- R14 front fog lamps
- R15 free
- R16 free
- R17 wipers
- R18 speed relay of wipers
- R19 wiper-speed switch
- R20 air conditioner
- R21 warning lamps 1
- R22 warning lamps 2
- R23 brake lamps - control
- R24 air-conditioning ventilator

## MALFUNCTIONS AND THEIR REMEDY

### Fuse box - under battery cover

#### Change of fuse

n Fuse box is located under storage compartment in instrument panel.

n Entry is possible after removing bottom of storage compartment that is released by turning of two revolving holders (direction of rotation is visible on cover).

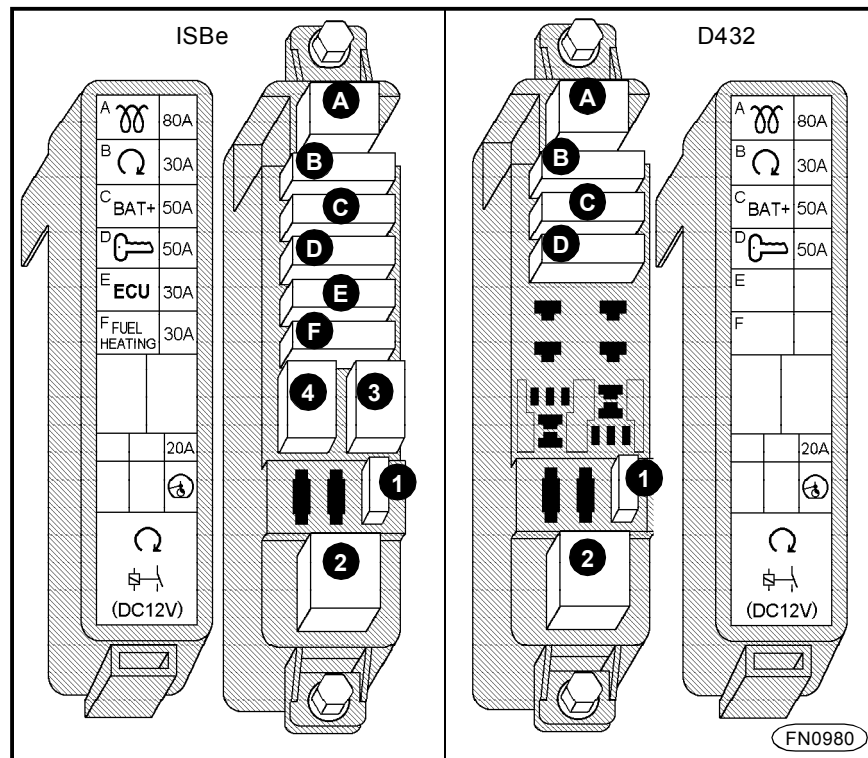
n Individual electric circuits are secured by fuses.

n Blown fuse has melted metal strip.

n During replacement, switch off battery master switch.

n New fuse must have the same current value.

n It is necessary to have spare fuses in vehicle.



### Cummins ISBe

- A 80A air heater
  - B 30A electromagnet for starter motor
  - C 50A "+" before switchbox
  - D 50A "+" after switchbox
  - E 30A "+" permanent for engine control unit
  - F 30A fuel heating
  - 1 20A "+" without battery master switch  
(permanent current for recording  
speedometer, clock, radio)
- 
- 2 relay for starter motor electromagnet (12 V)
  - 3 relay of fuel heating
  - 4 relay

### Dwav D432

- A 80A glowing
  - B 30A electromagnet for starter motor
  - C 50A "+" before switchbox
  - D 50A "+" after switchbox
  - 1 20A "+" without battery master switch  
(permanent current for recording  
speedometer, clock, radio)
- 
- 2 relay for starter motor electromagnet (12 V)

### Warning!

**n Replace blown fuse only with fuse of the same nominal value. Higher value can result in damage of electric wiring and even fire.**

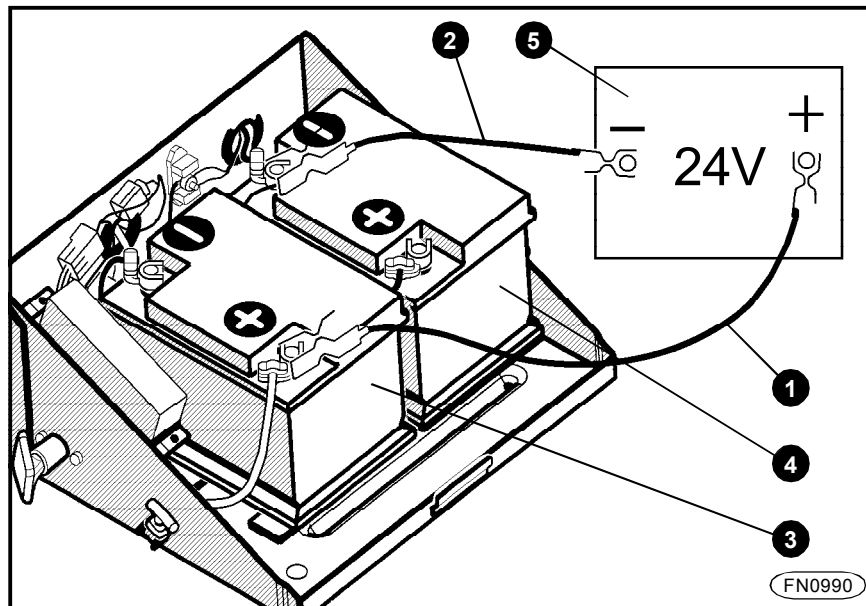
**n When immediately after switching on of appropriate appliance, replaced fuse is blown, it is necessary to inspect electric wiring in authorised repair shop.**

**n Do not repair blown fuses in any case.**

**n It is forbidden to use screwdriver or another metal subject for removing fuses.**

## MALFUNCTIONS AND THEIR REMEDY

### Starting by means of jumper cables



n It is possible to start vehicle with discharged battery only by interconnecting with battery of another vehicle with the same nominal voltage.

#### Warning!

Battery of the second vehicle must have nominal voltage of 24 V.

n Certified jumper cables with sufficient cross section must be used.

n Use only cables with insulated clips.

n During starting, engine of vehicle whose battery is used must run.

### **Procedure of interconnection**

1. Connect one end of ("+") cable (item 1) to positive pole of front discharged battery (item 3).
2. Connect the second end of the same cable to positive terminal of 24 V source (item 5).
3. Connect end of the second ("-") cable (item 2) to negative terminal of 24 V source (item 5).
4. Connect firmly of the same cable to ("-") pole of rear discharged battery (item 4).
5. Engine of vehicle that helps to start must run all the time.

### **Engine starting**

- n** Start engine according to chapter **Engine starting**.
- n** After engine starting, disconnect jumper cables in opposite sequence.

### **Warning!**

**n** During starting by means of jumper cables, radio must be switched off - its damage could occur.

**n** Parts of jumper cable clips that aren't insulated must not come to contact. Jumper cable that is connected to positive pole of battery must not come to contact with vehicle ground due to risk of short circuit.

**TECHNICAL DATA****Engine for D family vehicles**

*n* diesel      *n* turbocharged    *n* with intercooler    *n* four stroke OHV    *n* four cylinder in line    *n* liquid cooled with direct injection

**Engine type designation****CUMMINS****ISBe 150 30****ISBe 170 30**

Number of cylinders

4 / 16

4 / 16

Cylinder bore

102 mm

102 mm

Piston stroke

120 mm

120 mm

Displacement

3 922 cm<sup>3</sup>3 922 cm<sup>3</sup>

Compression ratio

17,2

17,2

Maximum power

110 kW / 2 500 min<sup>-1</sup>125 kW / 2 500 min<sup>-1</sup>

Maximum torque

550 Nm / 1 200-1 600 min<sup>-1</sup>600 Nm / 1 200-1 600 min<sup>-1</sup>

Injection system

CommonRail Bosch;  
Electronic control unitCommonRail Bosch;  
Electronic control unit

**Engine type designation****Daewoo Avia****D432.100**

Number of cylinders

4 / 16

Cylinder bore

102 mm

Piston stroke

120 mm

Displacement

3 922 cm<sup>3</sup>

Compression ratio

17,5

Maximum net power acc. ECE 85

100 kW / 2400 min<sup>-1</sup>

Maximum net torque acc. ECE 85

580 Nm / 1 220 min<sup>-1</sup>Specific fuel consumption at  
maximum torque

225 g / kWh

Injection system

Mechanical rotary  
pump Bosch

## TECHNICAL DATA

### Chassis

#### Engine cooling system

**n** liquid cooling

**n** liquid pressurised-type forced cooling system by means of centrifugal pump

**n** cooling circuit is equipped with twin flap thermostat and coolant expansion tank

#### Air cleaner

dry filter element

DONALDSON P 781039

#### Clutch

**n** dry

**n** single disc

**n** asbestos free lining

**n** with clutch mass damper, axial spring and hydraulic control

#### Gearbox

**n** mechanical

**n** countershaft

**n** constant mesh gears

**n** synchronised

**n** controlled by gear shift stick lever

**n** gearboxes enable mounting of power take-off shaft with pump, shaft or flange

#### Propeller shaft

**n** Versions K have one-shaft with two universal joints - spiders supported by needle bearings, with sliding sleeve yoke.

**n** Versions N, L, E have two-shaft arrangement with three universal joints with shaft bearing and with sliding sleeve yoke.

**n** Versions S have three-shaft arrangement with four universal joints with two shaft bearing and with sliding sleeve yoke.

#### Rear axle

**n** rigid drive banjo axle with cast centre and welded tubes

**n** final gear with single hypoid gear and bevel gear differential

**n** mechanical differential lock

**n** suspension by longitudinal leaf spring or parabolic spring suspension with anti-roll bar

**n** fluid-type dampers with bottom stops

**n** rubber top stop

**n** some versions with leaf springs are without anti-roll bar and dampers

**n** ratio of hypoid transmissions:

Final drive Eaton

4,11 3,70

Final drive Avia

3,55 3.82 4.11

#### Front axle

**n** rigid with forged axle beam

**n** longitudinal leaf spring or parabolic spring suspension with anti-roll bar and fluid-type dampers with bottom stops wheel adjustment

toe in 0 ± 2mm

camber 0°30'

king-pin inclination 8° ± 20'

king-pin castor (horizontal position of frame) 3° ± 30'

Maximum king-pin castor difference of left and right side (horizontal position of frame) 0°30'

internal wheel displacement 48° ± 2°

external wheel displacement 36.5° ± 2°

### Steering

**n** monoblock power assisted steering  
**n** gear ratio 14 - 16.6 - variable during turning of steering wheel between stops  
**n** monoblock power assisted steering with cardan universal joint with longitudinal slots

Total angle of steering gear arm inclination to achieve total angle of front wheels 87°

Number of steering wheel revolutions for maximum inclination of steering gear arm 3.8 rev.

Steering wheel diameter 450 mm

### Frame

**n** ladder type

**n** cold riveted

**n** screwed

**n** brackets and fasteners for fixing of chassis subassemblies and parts are riveted or screwed to frame

**n** holes in chassis beam for superstructure carrying brackets or brackets are prepared

**n** towing hook for vehicle rescue is located on rear bumper bracket

### Cab

Forward control cab, welded of steel pressings, tilted by hydraulic cylinder is equipped with noise and heat insulation. To limit transfer of chassis vibration, cab is supported by two spring blocks in front part and two damping units under rear suspension locks.

All glasses are safety. Laminated-glass windscreen is stuck into body, side windows are divided, rear part is movable by mechanical equipment, electric winder is optional.

For rear view, three windows are in rear wall. Version without rear windows are also available.

Doors are secured in open position by balancer to prevent from spontaneous closing. Doors are locked by locks place in doors that are lockable by key from outside, central lock is optional.

For easier getting in and out of cab, vehicle has steps and handles. Standard equipment of cab is driver's seat and double seat for two co-drivers. Cab with seat for one co-driver and sprung driver's seat is also available.

Driver's seat is adjustable in longitudi-

nal direction and backrest can be tilted in range 14° till 25°.

Cab is equipped with pre-loaded safety belts. Instrument panel with storage compartment in front of front seat passenger is of colourfast shatterproof plastic materials as well as interior equipment of cab, rear wall and doors.

Ceiling rack under windscreen upper edge enables mounting of radio. Mounting places of loudspeakers are in door pockets and in rear wall pocket. Cab is equipped with two sun visors.

heating is hot-water type. Air for heating is aspirated behind bonnet by four-speed fan, it flows through heating element and then it is distributed to adjustable outlets for blowing to windscreen, heads and legs of crew according to selected combination. Air-conditioning is optional.

## TECHNICAL DATA

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### Brake

#### System of driving brake

- n double-circuit
- n air-hydraulic braking system
- n with automatic load-dependence regulator of rear axle wheel braking force (check data of adjusted load-dependence regulator are printed in LDR adjustment label, located in cab).
- n system of brake circuit connection it TT.
- n Vehicles are equipped by default ABS system.

#### Brake equipment

- n front axle features disc brake with fixed calliper
- n rear axle feature drum brake with built in parking brake device and with equipment for automatic adjustment of clearance between brake drum and brake shoe
- n air pressure in brake system is indicated by two pressure gauges in instrument panel
- n air pressure drop under minimum level is indicated by corresponding indicator lamp

- n Drop of brake liquid under minimum acceptable value is signalled by appropriate indicator lamp.

#### Emergency brake

- emergency braking is secured by one unbroken circuit

#### Equipment for parking braking

- n parking braking is secured by spring-actuated brake
- n it is controlled by manual brake valve that is placed beside driver behind gear shift lever
- n air pressure drop in spring-actuated cylinders to the value when brake starts its activity is indicated to driver by corresponding indicator lamp

|                                                    |                                 |
|----------------------------------------------------|---------------------------------|
| Brake fluid                                        | DOT3, DOT4 nebo SAE 1703        |
| Air tank volume                                    | according to type and make 14 l |
| Minimum air pressure for<br>operation of converter | 0.45 MPa (4.5 bar)              |
| Operational air pressure                           | 0.81 ± 0.02 MPa (8.1 bar)       |

**Front brake equipment**

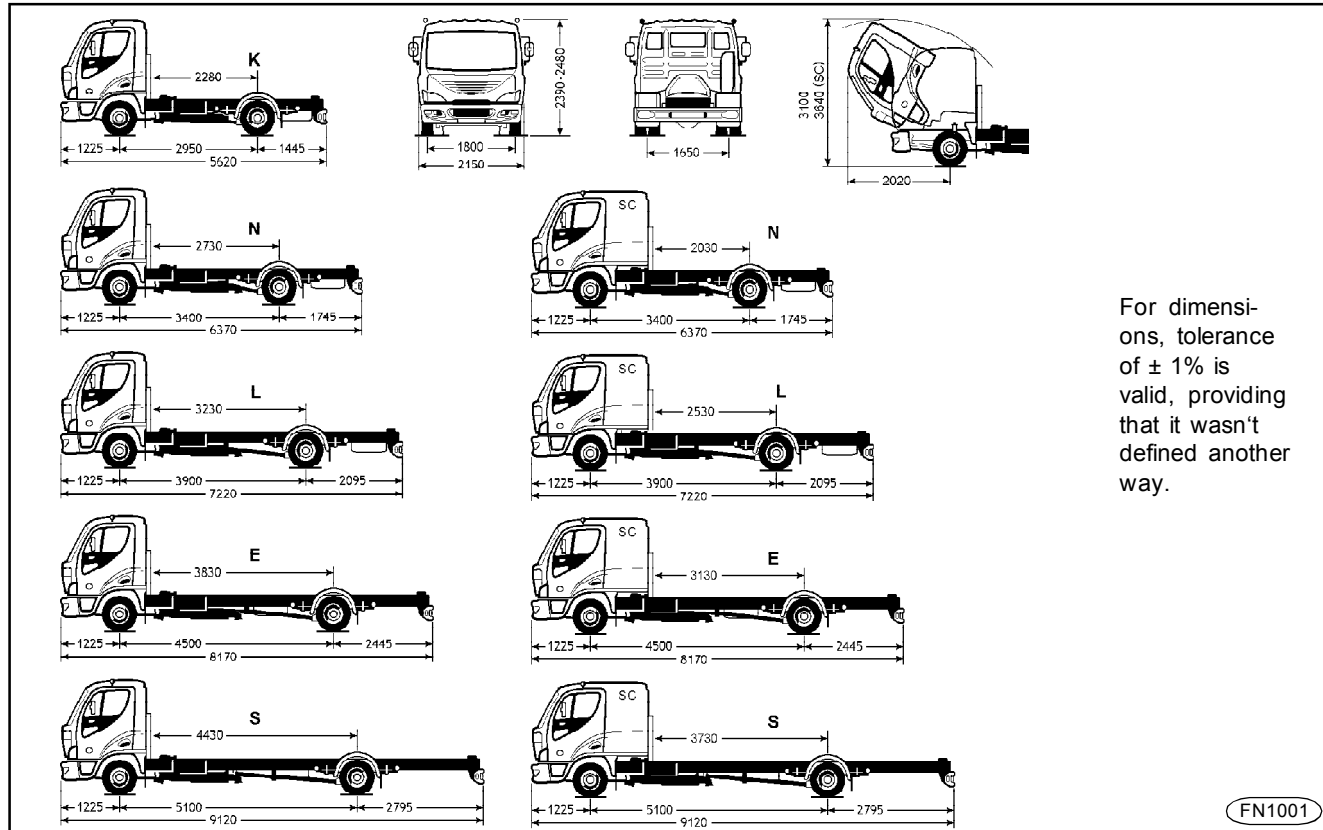
|                        |                                                    |
|------------------------|----------------------------------------------------|
| Disc diameter          | 315 mm                                             |
| Disc thickness         | 26 mm                                              |
| Brake lining thickness | 18 mm                                              |
| Brake lining area      | 243,5 cm <sup>2</sup> (total 487 cm <sup>2</sup> ) |
| Cylinder diameter      | 56 mm                                              |

**Rear brake equipment**

|                        |                                                  |
|------------------------|--------------------------------------------------|
| Drum diameter          | 325 mm                                           |
| Brake lining width     | 100 mm                                           |
| Brake lining thickness | 12 mm                                            |
| Brake lining area      | 448 cm <sup>2</sup> (total 896 cm <sup>2</sup> ) |
| Cylinder diameter      | 38.1 mm                                          |

## TECHNICAL DATA

### Dimensions of chassis-cabs



For dimensions, tolerance of  $\pm 1\%$  is valid, providing that it wasn't defined another way.

FN1001

## Weights and weight on axles

| Vehicle type                                                                                      |                 | D60/65      |      |            |      |      | D70/75      |      |            |      |      | D80/90      |      |            |      |      |
|---------------------------------------------------------------------------------------------------|-----------------|-------------|------|------------|------|------|-------------|------|------------|------|------|-------------|------|------------|------|------|
| Vehicle version                                                                                   |                 | K           | N    | L          | E    | S    | K           | N    | L          | E    | S    | K           | N    | L          | E    | S    |
| Curb weight of serviceable chassis-cab                                                            |                 | 3030        | 3070 | 3080       | 3100 | 3250 | 3030        | 3070 | 3080       | 3100 | 3250 | 3060        | 3100 | 3120       | 3140 | 3300 |
| Weight                                                                                            | - on front axle | 2020        | 2010 | 2040       | 2040 | 2065 | 2020        | 2010 | 2040       | 2040 | 2065 | 2040        | 2030 | 2060       | 2070 | 2125 |
|                                                                                                   | - on rear axle  | 1010        | 1060 | 1040       | 1060 | 1185 | 1010        | 1060 | 1040       | 1060 | 1185 | 1020        | 1070 | 1060       | 1070 | 1175 |
| Carrying capacity of chassis-cab                                                                  |                 | 2960        | 2920 | 2910       | 2890 | 2740 | 3960        | 3920 | 3910       | 3890 | 3740 | 4930        | 4890 | 4870       | 4850 | 4700 |
| Including crew                                                                                    |                 | 3460        | 3420 | 3410       | 3390 | 3240 | 4460        | 4420 | 4410       | 4390 | 4240 | 5940        | 5900 | 5880       | 5860 | 5700 |
| Total vehicle weight                                                                              |                 | 5990 / 6490 |      |            |      |      | 6990 / 7490 |      |            |      |      | 7990 / 9000 |      |            |      |      |
| Axle weight limit                                                                                 | - front         | 2800        |      |            |      |      | 2800        |      |            |      |      | 3200        |      |            |      |      |
|                                                                                                   | - rear          | D60 - 4200  |      | D65 - 4550 |      |      | D70 - 4900  |      | D75 - 5250 |      |      | D80 - 5650  |      | D90 - 6200 |      |      |
| Towed weight                                                                                      | - without brake | 750         |      |            |      |      | 750         |      |            |      |      | 750         |      |            |      |      |
|                                                                                                   | - with brakes   | 3500        |      |            |      |      | 3500        |      |            |      |      | 3500        |      |            |      |      |
| Note: on vehicles having the tank with a capacity of 200 liters - weights are increased by 80 kg. |                 |             |      |            |      |      |             |      |            |      |      |             |      |            |      |      |

For weight values, tolerance of  $\pm 3\%$  is valid.

### Warning!

Distribution of momentary load is permitted to be in ratio minimum 30 - 35 % to front axle and 65 - 70 % to rear axle.

## TECHNICAL DATA

### Tyre inflation

| Vehicle type       | Front axle | Rear axle | Spare wheel | Size tyre   |
|--------------------|------------|-----------|-------------|-------------|
|                    | kPa        |           |             |             |
| <b>D60</b> / K,N,L | 525        | 500       | 525         | 205/75R17,5 |
| <b>D60</b> / E,S   | 550        | 500       | 550         | 205/75R17,5 |
| <b>D75</b> / K,E,S | 600        | 575       | 600         | 205/75R17,5 |
| <b>D75</b> / N,L   | 575        | 575       | 575         | 205/75R17,5 |
| <b>D90</b> / K,N   | 625        | 700       | 700         | 215/75R17,5 |
| <b>D90</b> / L     | 600        | 700       | 700         | 215/75R17,5 |
| <b>D90</b> / E,S   | 675        | 675       | 675         | 215/75R17,5 |

Table of tyre inflation is located in label in door area on driver's side. Values are specified in terms of kPa.

### Truck circle diameter

|                                                | K               | N               | L               | E               | S               |
|------------------------------------------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| <b>Truck circle diameter of external wheel</b> | 10,0 m (+0,5 m) | 12,0 m (+0,5 m) | 13,5 m (+0,5 m) | 16,0 m (+0,5 m) | 17,8 m (+0,5 m) |
| <b>Turning clearance circle diameter</b>       | 11,1 m (+0,5 m) | 13,1 m (+0,5 m) | 14,8 m (+0,5 m) | 17,3 m (+0,5 m) | 19,1 m (+0,5 m) |

## Gearratios

### Ratio of transmission

|     | ZFS5-42 | ZFS6-850 |
|-----|---------|----------|
|     |         |          |
| I   | 5,72    | 6,72     |
| II  | 2,94    | 3,68     |
| III | 1,61    | 2,15     |
| IV  | 1,00    | 1,41     |
| V   | 0,76    | 1,00     |
| VI  |         | 0,79     |
| R   | 5,24    | 6,03     |

### Total power take-off shaft transmission ratio (engine speed / speed of take-off shaft)

| ZFS5-42 | ZFS6-850    |
|---------|-------------|
| 1,15    | 1,88 ; 1,47 |

**TECHNICAL DATA**
**Maximum vehicle speed, climbing performance**

| Engine      | Gearbox   | Rear axle ratio | Theoretical max. speed (km/h) | Min. theoretical gradeability (%) |        |
|-------------|-----------|-----------------|-------------------------------|-----------------------------------|--------|
|             |           |                 |                               | Vehicle type                      |        |
|             |           |                 |                               | D60/75                            | D80/90 |
| ISBe 135 30 | ZF S5-42  | 3,55            | 128                           | 35                                |        |
|             |           | 3,7             | 122                           |                                   | 29,5   |
|             |           | 3,82            | 118                           | 38                                |        |
|             |           | 4,11            | 110                           | 41                                | 33     |
|             | ZF S6-850 | 3,7             | 118                           | 44                                | 35,5   |
|             |           | 4,11            | 106                           | 50                                | 40     |
| ISBe 150 30 | ZF S5-42  | 3,55            | 128                           | 39                                |        |
|             |           | 3,7             | 122                           |                                   | 33     |
|             |           | 3,82            | 118                           | 42                                |        |
|             |           | 4,11            | 110                           | 46                                | 37     |
|             | ZF S6-850 | 3,7             | 118                           | 50                                | 40     |
|             |           | 4,11            | 106                           | 57                                | 45     |
| ISBe 170 30 | ZF S5-42  | 3,7             | 122                           | 44                                | 35     |
|             |           | 4,11            | 110                           | 50                                | 40     |
|             | ZF S6-850 | 3,7             | 118                           | 54                                | 43     |
|             |           | 4,11            | 106                           | 63                                | 49     |
| D432.100    | ZF S5-42  | 3,55            | 122                           | 41,5                              |        |
|             |           | 3,7             | 117                           |                                   | 35     |
|             |           | 3,82            | 114                           | 45                                |        |
|             |           | 4,11            | 106                           | 49,5                              | 39,5   |
|             | ZF S6-850 | 3,7             | 113                           | 53                                | 42     |
|             |           | 4,11            | 102                           | 61                                | 48     |

## Electric equipment

|                       |                                                                                                                                                                                                |
|-----------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Nominal voltage       | 24 V                                                                                                                                                                                           |
| Storage battery       | Varta 562 19, 12 V - 62 Ah (installed by manufacturer)<br>Topla 55 414, 12 V - 60 Ah<br>Banner 56 093, 12 V - 60 Ah<br>Akuma L 61WG, 12 V - 61 Ah<br>Varta 12 V - 88 Ah heavy duty (only ISBe) |
| Way of grounding      | negative pole (-) directly to battery                                                                                                                                                          |
| Alternator            | Magnetron 28 V / 43 A (70 A)<br>Bosh 28 V / 70 A (only ISBe)                                                                                                                                   |
| Glow plugs            | Brisk Tábor 22,5 V                                                                                                                                                                             |
| Electric wiring fuses | 34 fuses 10 A<br>1 fuse 20 A<br>4 fuse 25 A<br>3 fuse 30 A<br>2 fuses 50 A<br>1 fuse 80 A                                                                                                      |
| Horn                  | 24 V electromagnetic                                                                                                                                                                           |

## TECHNICAL DATA

### Bulbs

|                   |       |      |         |   |                                                   |
|-------------------|-------|------|---------|---|---------------------------------------------------|
| <b>Front part</b> | H4    | 24 V | 70/75 W | 2 | headlamp - low and main beam                      |
|                   |       | 24 V | 5 W     | 2 | front position lamp                               |
|                   |       | 24 V | 21 W    | 2 | front flasher lamp                                |
|                   |       | 24 V | 5 W     | 2 | front auxiliary position lamp                     |
|                   | H3    | 24 V | 70 W    | 2 | front fog lamp                                    |
|                   |       |      |         |   |                                                   |
| <b>Rear part</b>  |       | 24 V | 10 W    | 2 | position lamp                                     |
|                   |       | 24 V | 21 W    | 2 | brake lamp                                        |
|                   |       | 24 V | 21 W    | 2 | flasher lamp                                      |
|                   |       | 24 V | 21 W    | 2 | rear fog lamp                                     |
|                   |       | 24 V | 21 W    | 2 | reverse lamp                                      |
|                   |       | 24 V | 10 W    | 2 | licence plate illumination                        |
| <b>Side part</b>  |       | 24 V | 21 W    | 2 | side flasher lamp                                 |
|                   |       | 24 V | 4 W     | 6 | side position lamp                                |
| <b>Interior</b>   |       | 24 V | 12 W    | 3 | ceiling lamp                                      |
|                   | OSRAM | 24 V | 1,2 W   | 3 | instrument panel illumination                     |
|                   | OSRAM | 24 V | 1,2 W   | 1 | main beam indicator lamp (other fixed LED diodes) |

## Fuel consumption

Engine n ISBe 150 30 n ISBe 170 30 n D432.100

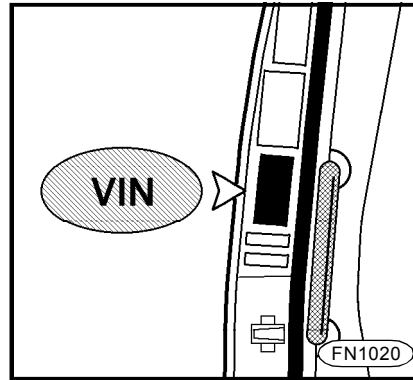
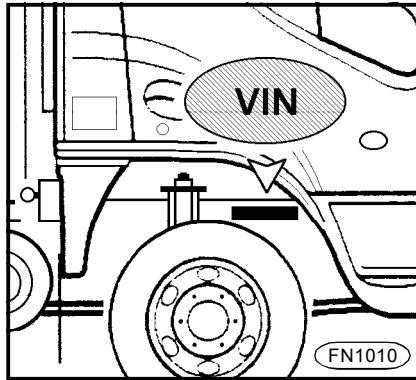
|                          | <b>D 60 / 65 / 70 / 75</b> | <b>D 80 / 90</b>     |
|--------------------------|----------------------------|----------------------|
| at speed 40 km/h         | 7 - 8,5 l / 100 km         | 8 - 9,5 l / 100 km   |
| at speed 60 km/h         | 9,5 - 11 l / 100 km        | 10 - 11,5 l / 100 km |
| at speed 80 km/h         | 13 - 15 l / 100 km         | 13,5 - 17 l / 100 km |
| service consumption      | 14 - 17 l / 100 km         | 15 - 19 l / 100 km   |
| consumption with trailer | +15 %                      | +15%                 |

## Service fluids

|                                           | ISBe                        | D432   |
|-------------------------------------------|-----------------------------|--------|
| Engine oil                                | 13 l                        | 12,5 l |
| Cooling circuit including heating circuit | 19 l                        | 18 l   |
| Gearbox ZF S5-42                          | 3,2 l                       |        |
| Gearbox ZF 6 S 850                        | 7,5 l (auxiliary drive 8 l) |        |
| Fuel tank volume                          | 120 l                       |        |
| Minimum fuel reserve                      | 16 l                        |        |
| Rear axle - final gear                    | 4 l                         |        |
| Monoblock power-assisted steering         | 1,7 l                       |        |
| Windscreen washer tank                    | 7,5 l                       |        |
| Brake fluid circuits                      | 1,6 l                       |        |
| Clutch release hydraulic circuit          | 0,5 l                       |        |
| Cab tilting hydraulic circuit             | 0,65 l                      |        |

## TECHNICAL DATA

### Vehicle Identification Number



#### VIN number

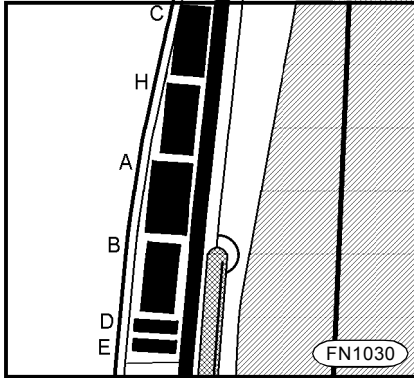
##### (Vehicle Identification Number)

**n** Identification number VIN according to international unified system of vehicle numeration is used for this vehicle. Identification number VIN is stamped in right chassis beam wall in front of damper carrier.

**n** Factory label with VIN number is also on right door jamb above door lock.

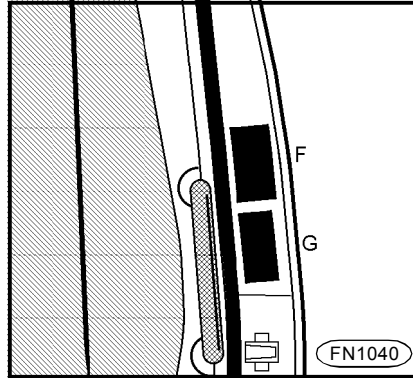
| T N A  |                |                           | A 2          | X 0 0 0                |  |     | X A                | 0 1 2 3 4 5    |                |  |  |  |  |  |
|--------|----------------|---------------------------|--------------|------------------------|--|-----|--------------------|----------------|----------------|--|--|--|--|--|
| Europe | Czech Republic | AVIA ASHOK LEYLAND s.r.o. | vehicle type | wheelbase (K, N, L, E) |  |     | year of production | mounting plant | chassis number |  |  |  |  |  |
| WMI    |                |                           | VDS          |                        |  | VIS |                    |                |                |  |  |  |  |  |

## Labels



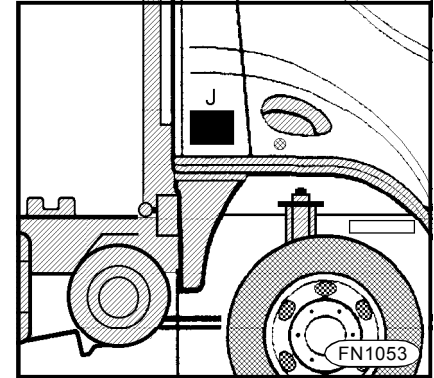
### On right door jamb above door lock

- n ALR (A)
- n VIN number (B)
- n certification (C)
- n certification (H)
- n Headlamp adjustment (D)
- n Cab (E)



### On left door jamb above door lock

- n Tyres inflation (F)
- n Warning - information about alternator (G)



### On right hand side of cab, rearwards

- Information about cab tilting (J)



**AVIA ASHOK LEYLAND MOTORS s.r.o.**

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Czech Republic

Version 3j / Aj / 12/2006

Alternations reserved

