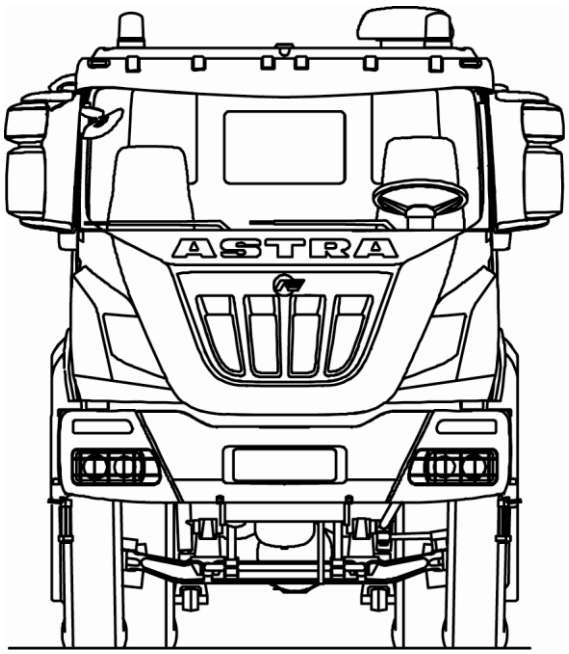
USE AND MAINTENANCE HANDBOOK



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ASTRA

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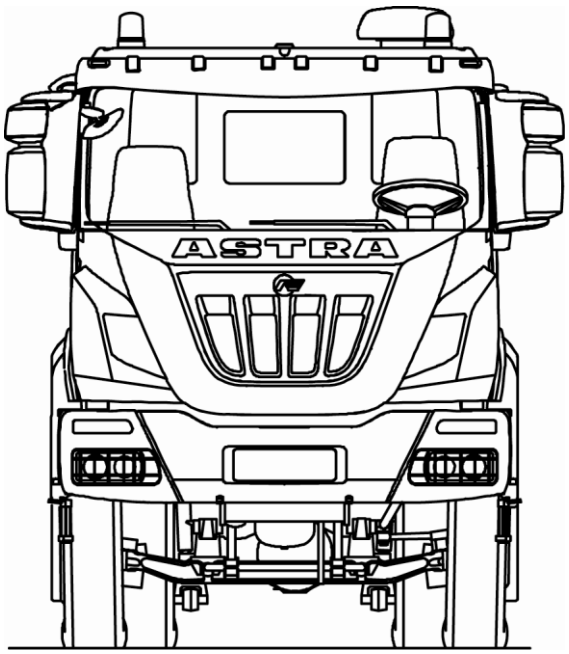
USE AND MAINTENANCE HANDBOOK



HD9 Euro 3

ASTRA

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The company ASTRA VEICOLI INDUSTRIALI reserves the right to make any modifications to vehicles for technical or commercial reasons at any time; the information, descriptions and illustrations contained in this publication are therefore correct at the time going to press.
This Use and Maintenance Handbook deals with optional equipment which cannot be present on your vehicle, and alternative equipment as well (e.g. mechanical and automatic gearbox).
Moreover, the regulations in force in certain countries affect the standard equipment of the vehicle.
This publication could therefore contain information and illustrations not corresponding to the vehicle version provided on a particular market.

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INTRODUCTION

This Use and Maintenance Handbook is divided into 4 parts, each of which systematically subdivided according to subject, for quick and easy consulting.

1) Technical specifications: this contains all the characteristic data which should be read through at least once to acquire a working knowledge of the vehicle.
2) Use of the vehicle and practical hints: this contains information relevant to the main controls and instruments, and the main rules to be followed especially for new vehicles.
3) Maintenance instructions: this section contains the functional instructions for checking and maintaining the vehicle which must be implemented to ensure satisfying operation, cost-effective running and long life of the vehicle.
4) Tables and diagrams: contains vehicle scheduled maintenance tables and diagrams.

In this Use and Maintenance Handbook there are texts that are highlighted in a particular manner:

Failure to heed and/or correctly carry out procedures, technical information and precautions given may cause injury.

Failure to heed and/or correctly carry out procedures, technical information and precautions given may cause damage to the vehicle.

Procedures, technical information and precautions which must be highlighted.

Failure to heed and/or correctly carry out procedures, technical information and precautions given may cause environmental damages.

AFTER SALES SERVICE

Warranty

To comply to the warranty conditions, all the instructions for correct use and maintenance described in this manual are to be followed.

After-sales service

For any type of servicing the ASTRA V.I. Dealership is at the complete disposal of the Customer. Equipment and skilled staff are available for maintenance or repair jobs. The ASTRA V.I. Dealership is always willing to offer you hints and advice to ensure you get best performance from your vehicle.

Spare parts

Any spare parts used for replacements are to be “GENUINE ASTRA SPARES” which can be obtained from the dealer warehouses and authorised workshops. Remember that a correct order for spare parts must always include the following details:

– type of vehicle;
– chassis number;
– reference and category numbers, to be found in the **Spare Parts Catalogue**.

If the items are parts of a main group (engine, cab, axles, power steering, gearbox etc.) indicate also the group version and serial number.

WARNING

The handbook contains use and maintenance instructions for all systems foreseen on the vehicle by the Manufacturer.
Some systems described in the handbook may not be present on Your vehicle, according to the chosen version and market the vehicle is destined for.

Assembly of accessories, additions and modifications on the vehicle are to be carried out in conformity with ASTRA directives. The specific document “Directive for conversion and outfittings” can be obtained as a guideline from the After Sales Service workshops.

It is reminded that, especially regarding the electrical system. there are several electrical sockets available (standard or optionals) to simplify electrical operations carried out by the outfitters.

For any exemption from the directives for the conversion it is necessary to have authorisation from ASTRA.

It is strictly forbidden to make modifications or connections to the wiring of electronic control units. In particular the interconnection lines between control units (CAN lines) are never to be interfered with.

Diagnostics and maintenance operations are to be carried out by skilled personnel using approved diagnostics equipment.

Ignoring these afore-mentioned prescriptions will annul the contractual warranty .

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Technical data

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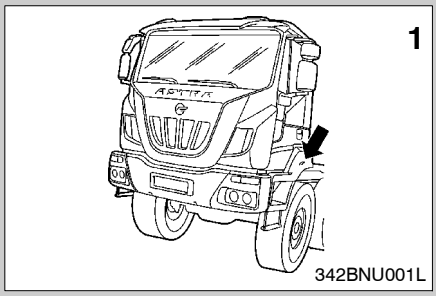
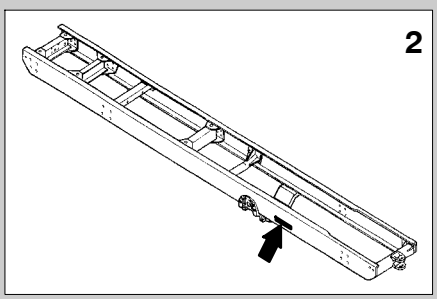
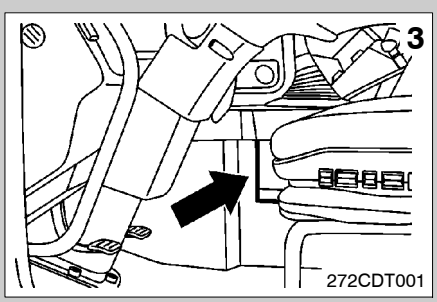






POSITION OF VEHICLE IDENTIFICATION DATA PLATES

Model identification plate

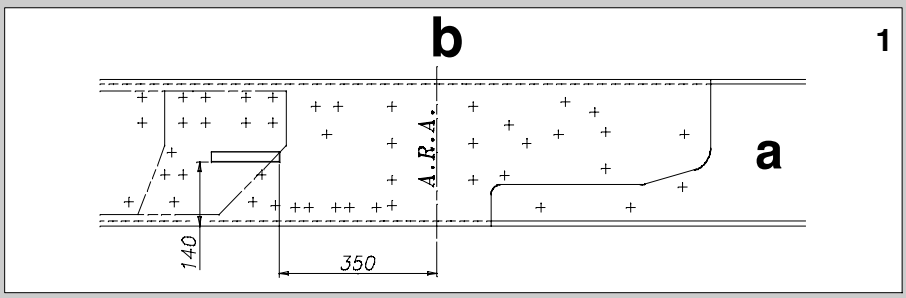
Located on the side walls of the cab (Fig. 1, see arrow).

Imprinting of the vehicle chassis

Punch marked at the front end of the right-hand side member (Fig. 2, see arrow).
(see following page).

Vehicle identification plate

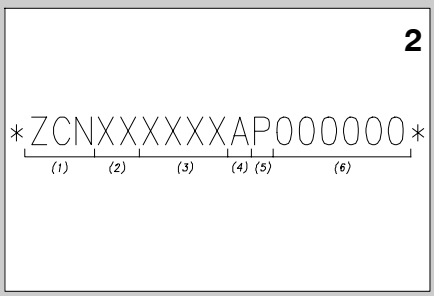
On bonnet left side in cabin for vehicle identification as per EU standards (Fig. 3, see arrow).



1

Chassis punching (Fig. 1)

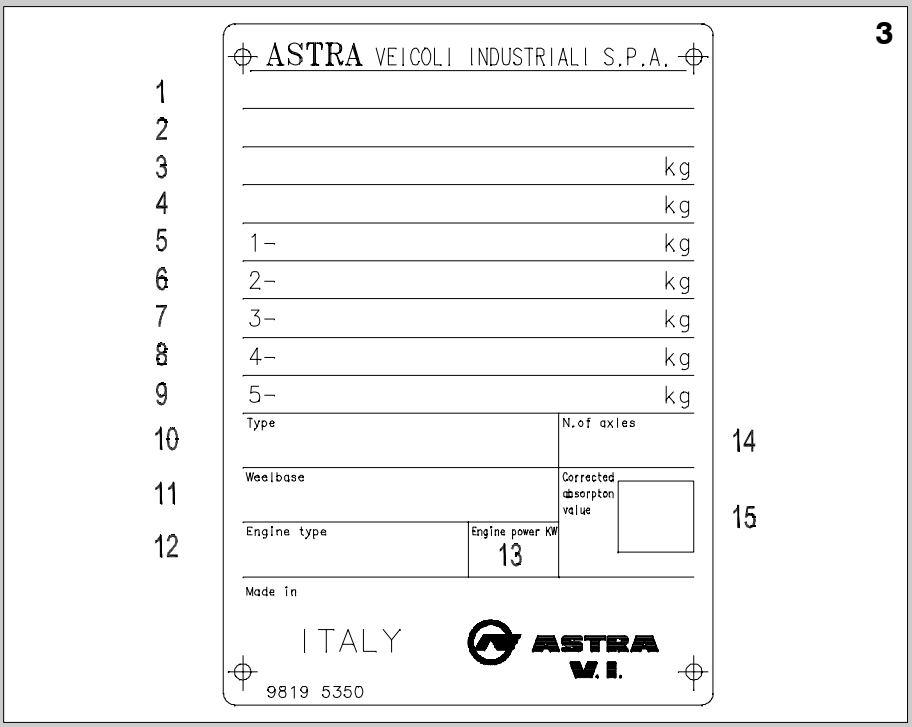
a. right side member
b. rear axle front leaf spring



2

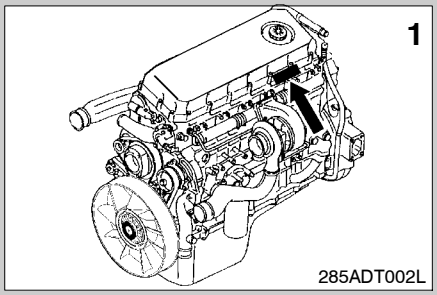
Vehicle registration number (Fig. 2)

1) World–wide identification of manufacturers (Astra Veicoli Industriali S.p.A.)
2) Type of vehicle
3) Vehicle features
4) Year of construction
5) Production facility (P=Piacenza)
6) Chassis number



Vehicle identification plate (Fig. 3)

1) Type approval number markings
2) Vehicle chassis punch markings
3) Overall vehicle weight
4) Overall tractor + trailer/semitrailer weight
5) Maximum admissible weight 1st axle
6) Maximum admissible weight 2nd axle
7) Maximum admissible weight 3rd axle
8) Maximum admissible weight 4th axle
9) Maximum admissible weight on fifth wheel (tractor versions only)
10) Vehicle commercial denomination
11) Axle spacing
12) Engine type
13) Engine power
14) Number of axles
15) Grade of smoke



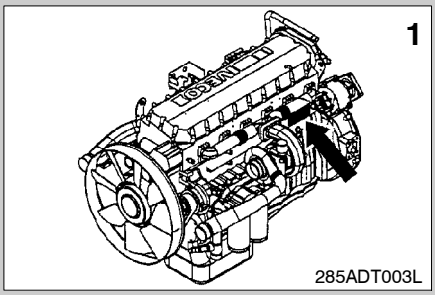
ENGINE

Engine

IVECO F2B (Cursor 8) (Fig. 1)
4-stroke Diesel, liquid cooled, variable geometry exhaust gas turbocharger.

Main specifications

Number of cylinders		6
Bore	mm	115
Stroke	mm	125
Total displacement	cm^3	7790
Compression ratio		16.5
Injection order		1-4-2-6-3-5



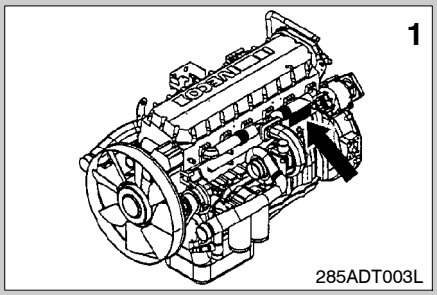
ENGINE

Engine

IVECO F3B WG (Cursor 13) (Fig. 1)
4-stroke Diesel, liquid cooled, turbocharger with Wastegate pressure limiter.

Main specifications

Number of cylinders		6
Bore	mm	135
Stroke	mm	150
Total displacement	cm^3	12882
Compression ratio		16.5
Injection order		1-4-2-6-3-5



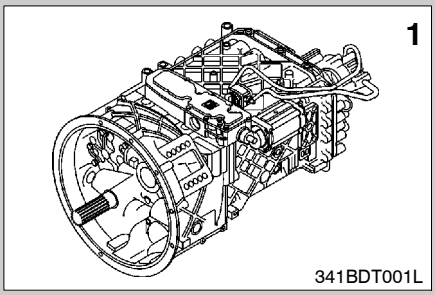
ENGINE

Engine

IVECO F3B VGT (Cursor 13) (Fig. 1)
4-stroke Diesel, liquid cooled, variable geometry exhaust gas turbocharger.

Main specifications

Number of cylinders		6
Bore	mm	135
Stroke	mm	150
Total displacement	cm^3	12882
Compression ratio		16.5
Injection order		1-4-2-6-3-5



MANUAL TRANSMISSION

Clutch

Dry single disk. Diameter 17".
Hydraulic control.

Gear shift (Fig. 1)

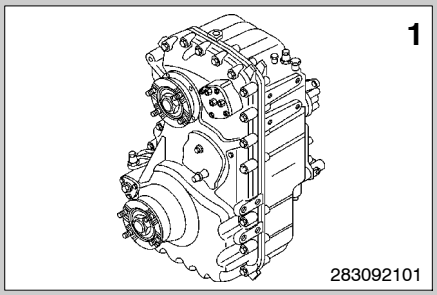
ZF 16 S 1620 TD, ZF 16 S 1820 TO,
ZF 16 S 1920 TD, ZF 16 S 2220 TO,
ZF 16 S 2220 TD, ZF 16 S 2320 TD,
ZF 16 S 2520 TO, ZF 16 S 2720 TO

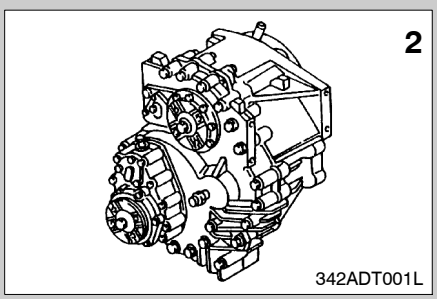
Syncromesh manual with 8 forward gears, split into a low range group (1- 4) and a high range group (5 - 8), and 1 R.G, normal and low.
Pneumatic servoshift device.
Neutral switch for preventing starting the motor with gear engaged.
Hydrodynamic retarder (intarder) mounted on gearbox output (optional).

Ratios

	Direct Drive		Over Drive	
	Normal	Low	Normal	Low
1st	13.80	16.41	11.54	13.80
2nd	9.49	11.28	7.93	9.49
3rd	6.53	7.76	5.46	6.53
4th	4.57	5.43	3.82	4.57
5th	3.02	3.59	2.53	3.02
6th	2.08	2.47	1.74	2.08
7th	1.43	1.70	1.20	1.43
8th	1.00	1.19	0.84	1.00
R.G.	12.92	15.36	10.80	12.92

R.G. = Reverse Gear





TRANSFER DISTRIBUTOR

STEYR VG 2700/400 (Fig. 1)

Transmission ratios:

Normal (on road): 0.913
Low (off road): 1.407

Maximum torque at input:

30.000 Nm

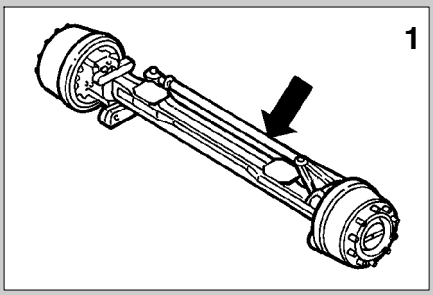
IVECO ZF TC 2200 (Fig. 2)

Transmission ratios:

Normal (on road): 1.0
Low (off road): 1.6

Maximum torque on input:

22.000 Nm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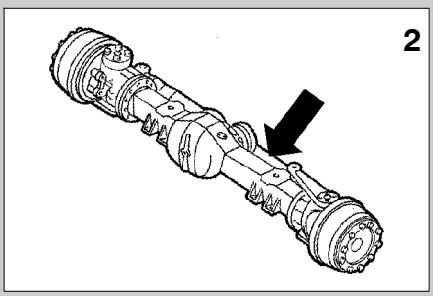
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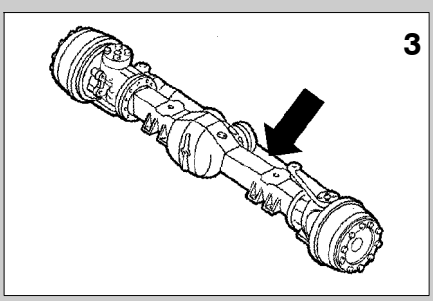
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AXLES

Front steering axle (Fig. 1)

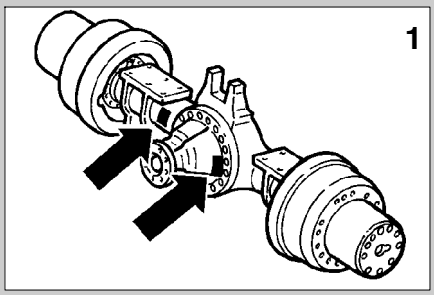
In high strength drop-forged steel, steering type, not drive.

Front steering drive axle 9 ton (Fig. 2)

With double reduction (central and final) in wheel hubs by means of epicyclical gear set. Drive shafts controlling front wheels equipped with Cardan joints.

Front steering drive axle 10 ton (Fig. 3)

With double reduction (central and final) in wheel hubs by means of epicyclical gear set. Drive shafts controlling front wheels equipped with Cardan joints.



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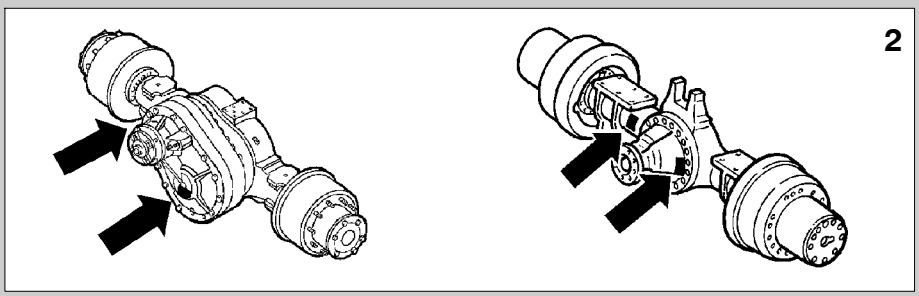


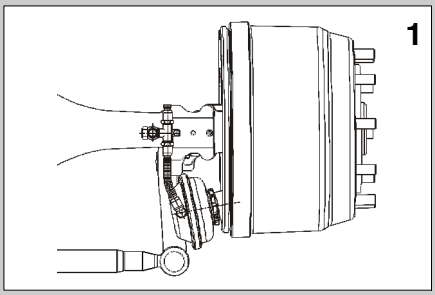
2

Single rear drive axle (Fig. 1)

With double reduction, central by pinion set and final in wheel hubs with epycicloid gear. Differential between wheels with pneumatic lock.

Tandem rear drive axles (Fig. 2)

Two drive axles in tandem with double reduction, central with bevel gear and final in wheel hubs with epicyclical gear set.
The tandem is provided with splitter between axles and pneumatic lock.
Differential between wheels with pneumatic lock.


1

BRAKES (simplex without ABS)

Simplex wedge drum brakes (Fig. 1) on all axles. Brake adjustment is automatic and therefore maintenance free until total brake lining wear.

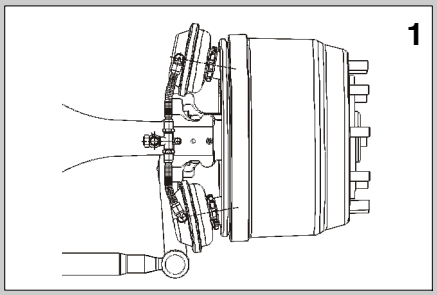
Service brake: pneumatic operation with two independent sections for vehicles without tow bar, three independent sections for vehicles with tow bar.

Parking and emergency brake: pneumatic operation acting on rear wheel brake drums through spring cylinder.

Engine brake: built into engine.

Retarder brake: hydraulic, installed on transmission.

Auxiliary parking brake: pneumatic operation: must be engaged with engine running.



1

BRAKES (duplex with ABS)

Duplex wedge drum brakes (Fig. 1) on all axles. Brake adjustment is automatic and therefore maintenance free until total brake lining wear.

Service brake: pneumatic operation with two independent sections for vehicles without tow bar, three independent sections for vehicles with tow bar.

Parking and emergency brake: pneumatic operation acting on rear wheel brake drums through spring cylinder.

Engine brake: built into engine.

Retarder brake: hydraulic, installed on transmission.

Auxiliary parking brake: pneumatic operation: must be engaged with engine running.

ABS

Wheel anti-lock system (ABS) with four channel electronic system and four solenoid valves that exercise the ABS function during the braking phase.

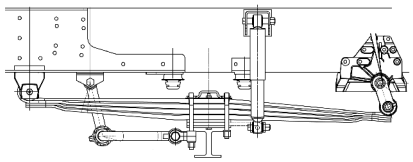
Pulse generators and sensors on 1st and 2nd axles (2-axle vehicles).
Pulse generators and sensors on 1st and 3rd axles (3-axle vehicles).
Pulse generators and sensors on 2nd and 4th axles (2-axle vehicles).

TYRES

Front: single (*)
Rear: double (**) or single (*)

DIMENSION	TYPE	(*) bar	(**) bar	DIMENSION	TYPE	(*) bar	(**) bar
13R22.5	MICHELIN XZY2	8	8	**12.00R20**	MICHELIN XDY	8.5	8.5
	MICHELIN XDY3	8	8		MICHELIN XZY2	8.5	8.5
	MICHELIN XZH	8	8		MICHELIN XZL	8.5	8.5
	PIRELLI AP05	9	-		MICHELIN XZY	8.5	8.5
	PIRELLI AT75	-	9		PIRELLI AP05	9	-
	PIRELLI AT99	8.5	8.5		PIRELLI AT75	-	8.5
	PIRELLI FG85	9	9		PIRELLI FG85	9	9
	PIRELLI TG85	9	9		PIRELLI TG85	9	9
	PIRELLI FG88	9	9	**315/70R22.5**	MICHELIN XZE2TL	9	9
	PIRELLI TG88	9	9		MICHELIN XDE2TL	9	9
	CONTINENTAL HSC	-	-	**325/95R24**	PIRELLI FG88	9	9
	CONTINENTAL HDC	-	-		PIRELLI TG88	9	9
315/80R22.5	MICHELIN XZY2	8.5	8	**20.00R20**	CONTINENTAL	-	-
	MICHELIN XDY3	8.5	8	**385/68R22.5**	MICHELIN XZY3	9	-
	MICHELIN XZE2	8.5	8		MICHELIN XFA1+	8.5	-
	MICHELIN XDE2	8.5	8	**365/85R20**	MICHELIN XZL	7.5	-
	MICHELIN XDE2+	8.5	8	**365/80R20**	MICHELIN XZL	6	-
	PIRELLI AP05	8	8	**16.00R20**	MICHELIN XZL	7.6	7.6
	PIRELLI AT75	8	8	**14.00R20**	MICHELIN XZL	7.6	7.6
	PIRELLI FG85	8	8		PIRELLI PS22 PISTA	7	7
	PIRELLI TG85	8	8	**24.00R20.5**	MICHELIN XS	6	-
	PIRELLI FG88	8.5	8.5	**385/95R24**	MICHELIN X	9	-
	PIRELLI TG88	8.5	8.5	**385/55R22.5**	MICHELIN XFA2	9	9
	CONTINENTAL HSR1	-	-	**525/65R20.5**	MICHELIN XS	8	-
	CONTINENTAL HDR	-	-	**395/85R20**	MICHELIN XZL	8.5	.
495/45R22.5	MICHELIN XDA2	9	-	**525/80R25**	MICHELIN XL	7	.
445/65R22.5	MICHELIN XZL	8	-	**24R21**	MICHELIN XZL	6	.

1



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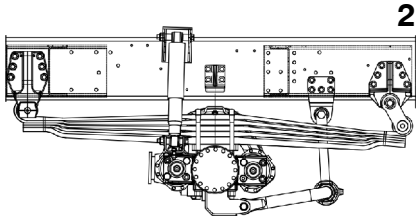

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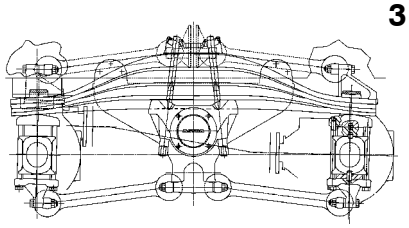

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SUSPENSION

Front (Fig. 1):

Longitudinal single leaf springs. Telescopic duplex hydraulic shock absorbers and roll bar.

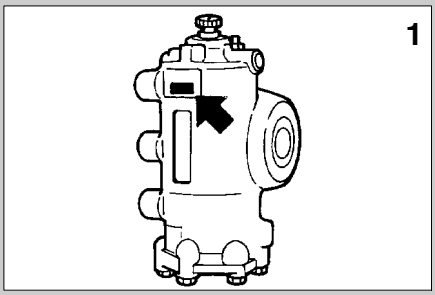
Rear:

2-axle vehicles (Fig. 2):

Longitudinal double leaf springs.
Telescopic duplex hydraulic shock absorbers and roll bar.

3 and 4 axle vehicles (Fig. 3):

Single leaf springs, individual for the two rocking axles with rocker system.
The torque bars between axle and central support counteract the axial thrust on acceleration and braking.
Anti-roll bar on intermediate axle and on rear axle (upon request).
Leaf spring: parabolic or semi-elliptic (upon request).



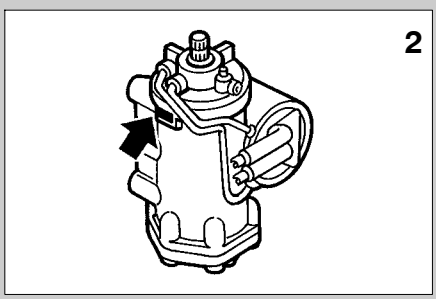
1

STEERING

ZF hydraulic ball bearing mounted power steering.

Vehicles without auxiliary cylinder

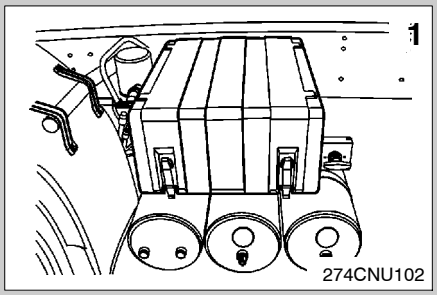
Type: 8098 (Fig. 1)
Oil pump driven by engine.
Front wheel steering with quadrilateral kinetic motion assembly.



2

Vehicles with auxiliary cylinder

Type: 8099 (Fig. 2)
Oil pump driven by engine.
Emergency pump driven by transmission.
Front wheel steering with quadrilateral kinematic motion assembly.
Auxiliary cylinder.

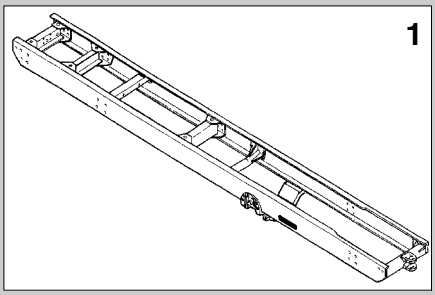


ELECTRICAL SYSTEM

Nominal voltage: 24 V
Accumulators (Fig. 1) (n° 2):
12 V – 170 Ah or
12 V – 220 Ah
Alternator: 28 V – 90 A

Accumulator and alternator features may change according to the outfitting and market of destination.

Starter motor
24V – 4.5 kW (engine F2B)
24V – 5 kW (engine F3B)
Ground reference: negative pole.



CHASSIS (Fig. 1)

Built with rectilinear side members in high strength “C” section steel, connected by riveted or bolted cross-members.

Standard fuel tank

Steel, capacity 300 liters with level and reserve indicator.

Oversize fuel tank

Steel, capacity 600 liters with level and reserve indicator.

TIGHTENING TORQUES

Assembly	Element	Type	Torque (Nm)
Engine	F2B engine oil magnetic drain plug		
	F3B engine oil magnetic drain plug		
Multipower power take-off	Magnetic oil drain plug		
	Oil filler cap		25 ÷ 30
ZF manual transmission	Oil drainage, level and filler caps		80
	Oil magnetic drain plug on clutch bell	M 38 x 1.5	140
ZF iIntarder	Oil filter cover fastening screw		
	Oil drain plug	M25x1.5	60
ZF As-Tronic automated transmission	Side oil drain plugs		
	Bottom oil drain plug		
	Filler and level cap		
	Oil filter cover fastening screw		20 ÷ 25
Allison automatic transmission	Oil drain plug		25 ÷ 32
	Filler and level cap		
IVECO splitter	Oil drain plug	M14x1.5	54 ÷ 66
	Magnetic oil drain plug	M27x2	90 ÷ 110
	Oil filler and level cap	M22x1.5	63 ÷ 77
ZF splitter	Oil drain plug	M22x1.5	60
	Oil filler and level cap	M22x1.5	60
Wheels	Fasteners (nut and washer)		580 ÷ 650
	Fasteners (countersunk nut)		380 ÷ 450
Front axle (Iveco)	Magnetic oil drain plug		
	Oil filler and level plug		
	Oil drain plug on transfer case		
	Oil level plug on transfer case		

Assembly	Element	Type	Torque (Nm)
Front intermediate axle (Iveco)	Magnetic oil drain plug		
	Oil filler and level plug		72 ÷ 88
	Oil drain plug on transfer case		
	Oil level plug on transfer case		
Rear intermediate axle (Iveco)	Magnetic oil drain plug		
	Oil filler and level plug		100 ÷ 120
	Oil drain plug on transfer case		
	Oil level plug on transfer case		
Rear axle (Iveco)	Magnetic oil drain plug		
	Oil filler and level plug		36 ÷ 44
	Oil drain plug on transfer case		
	Oil level plug on transfer case		
Front axle (Kessler)	Magnetic oil drain plug	M16x1.5	60
	Oil filler and level plug	M30x1.5	160
	Oil drain plug on transfer case	M16x1.5	60
	Oil level plug on transfer case	M24x1.5	120
Intermediate axle (Kessler)	Magnetic oil drain plug	M16x1.5	60
	Oil filler and level plug	M30x1.5	160
	Transfer case oil drainage cap	M24x1.5	120
	Transfer case oil filler and level plug	M24x1.5	120
	Oil drain plug on transfer case	M16x1.5	60
	Oil level plug on transfer case	M24x1.5	120
Rear axle (Kessler)	Magnetic oil drain plug	M16x1.5	60
	Oil filler and level plug	M30x1.5	160
	Oil drain plug on transfer case	M16x1.5	60
	Oil level plug on transfer case	M24x1.5	120

VEHICLE OUTFITTING

Each vehicle is equipped with a set of tools and wrenches so that the Customer can carry out the normal maintenance operations.

- Lifting jack.
- Cab tilting jack/rod and wheel wrench.
- n° 2 chocks.
- Instructions for USE AND MAINTENANCE HANDBOOK.
- Log-book holder.

Keys

Each vehicle is supplied with:

- Ignition/door/fuel filler cap keys (3).
- Door lock remote control (optional).

Instructions for use

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GENERAL INSTRUCTIONS FOR CORRECT USE OF THE VEHICLE

Before driving

Adjust the seat, steering wheel and rear-view mirrors to obtain a correct driving position.
Check that there are no obstructions to pedal excursion, in particular the brake pedal.
Check that the horn works correctly.
Check that all external lights function correctly, and if necessary clean the lighting groups.
Check, especially when travelling by night, that headlights are correctly aligned.
Check that no oil or fluids are leaking from under the vehicle.
Check that any cargo is correctly stowed.
Check that the handbrake is on and that no dashboard warning light indicates a fault.
To prevent accidental vehicle movements, disengage the handbrake with the brake pedal pressed.
Do not apply transfers or stickers to the windscreen: these could distract or impair vision.

When driving

Long journeys should only be undertaken in ideal physical conditions.
Light, easily digestible meals help in keeping reflexes ready as well as maintaining the concentration required for safe driving.
Never drive for too many consecutive hours, but make frequent stops, taking the opportunity to stretch and generally refresh.
Make use of the wide range of adjustments offered by the heating, ventilation or air-conditioning system to maintain constant cabin air change.
The abuse of alcohol, drugs and or certain medicines is extremely dangerous. Never undertake a journey under the influence of alcohol, pharmaceuticals or drugs.
Careful driving also means being in a condition to foresee the mistakes or carelessness of other drivers.
Always observe speed limits and always drive in the slow lane on motorways.
Always use indicators when changing direction or lane.
Keep a safe distance from the vehicle in front. This distance varies according to speed, weather, traffic and road conditions.
Never drive with the gearbox in neutral.
Never freewheel downhill: With the engine off there is no engine braking, requiring greater force on the brake pedal.
Use engine braking by engaging a low gear to avoid overheating the brakes.
In case of breakdown, park the vehicle off the carriageway, switch on the hazard warning lights and set up the red reflecting triangle sign to warn other drivers. Always follow the Highway Code.

Night driving
Take special care, reducing speed if necessary, especially on unlit roads.
Keep a greater safety distance than when driving by day: in effect it is more difficult to estimate the speed of an approaching vehicle when only its lights are visible.
Stop and rest as soon as you feel tired. To continue would only be a hazard to yourself and others.
Use high beams only outside built-up areas an only when you are sure they do not other drivers.
Always dip headlights with oncoming traffic.

Driving in rain, fog and snow
If the road is wet the grip between the tyres and the road surface is significantly reduced, so braking distance is greater and grip when turning is reduced. Reduce speed and keep a greater distance from the vehicles in front.
Heavy rain and fog reduce visibility. In compliance with the Highway Code, switch on dipped headlights even by day to render your vehicle more visible.
Do not drive through puddles or flooded sections of road at high speed. Aquaplaning may cause loss of control. Use engine braking and in all cases avoid braking sharply.
Set ventilation controls to ensure efficient windscreen demisting.
Before starting out, check the condition of windscreen wipers. If temperature is below 0°, or if it is snowing, check that the wiper blades and not frozen against the windscreen-
Proceed with extreme caution in case of fog. Moderate speed and avoid overtaking if possible.
Check that windscreen/headlight washer fluid contains antifreeze and anti-scale products.
In winter, even apparently dry roads may have icy patches, especially sections in the shade or lined by trees or rocks.

Parking
Switch off the engine.
Engage the parking brake.
Engage 1st gear if the vehicle is parked on a slope or reverse gear if the vehicle is facing downwards (manual gearshift vehicles only).
Never leave the key turned to MAR with the engine off to avoid flattening the batteries.

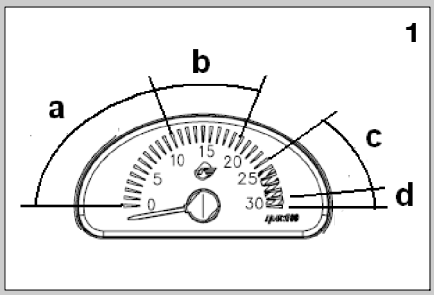
Tyres
Always reduce speed before taking on a tight bend, even if vehicle performance permits.
Avoid sharp acceleration of heavy braking.
Do not drive at constant high speeds for long periods, especially on uneven road surfaces.
Make certain that wheels are correctly balanced and adjusted.
Avoid violent impacts to tyre walls (for example when parking).
Never tamper with tyre inflation valves.

Do not insert any kind of tool between tyre and wheel rim.
If the rim is damaged, replace it.
If a tyre loses pressure for no apparent reason, replace the wheel and check the faulty tyre.
Tyre pressures, including the spare, must always be as specified.
Tyres that are old (over 6 years) or used should only be used in case of emergency and with due caution.
Do not leave the vehicle parked for long periods on the edge of the kerb or similar irregularities on the road surface.
Regularly check tyre tread depth, changing tyres when depth is less than the legal minimum.
The vehicle mounts 'tubeless' tyres, meaning without inner tube. Inner tubes must not be fitted to tubeless tyres.
Certain types of tyres are fitted with wear indicators. They must be changed as soon as the indicators become visible on the tread.
Aquaplaning is more likely with worn tyre treads.

Snow chains
The use of snow chains is governed by local law in each country.
Chains should only be fitted to drive wheels.
To prevent tyre damage, do not drive on clear roads with chains fitted. In extreme cases (tunnels, etc....) proceed at low speed and in any case remove the chains as soon as conditions permit.
Maintain moderate speed with chains mounted, avoiding potholes and driving onto the kerb.
Certain tyres of snow chain require tension adjustment after travelling a short distance.

Economic, ecological driving
Road conditions and driving style have a direct influence on fuel consumption and environmental impact.
Carry out the maintenance operations described below at regular intervals and with care.
Do not demand maximum power from the vehicle with the engine cold.
Do not rev the engine when parked.
Always avoid sharp acceleration and repeated braking/acceleration. Engage a higher gear as soon as conditions permit.
If possible, avoid driving with side windows lowered. Use the air-conditioner/ventilation system to obtain the desired conditions in the cab.

Engage a high gear whenever traffic and road conditions permit.
Limit the use of high power absorption utilities (air-conditioner on full, for example) when driving in city traffic or behind slow moving vehicles.
Revving the engine between gears or before stopping the engine serves absolutely no purpose.
Avoid accelerating on full throttle. Fuel consumption will be significantly lower with gradual acceleration.



Range of use of the engine

The following table shows indications for correct engine use.

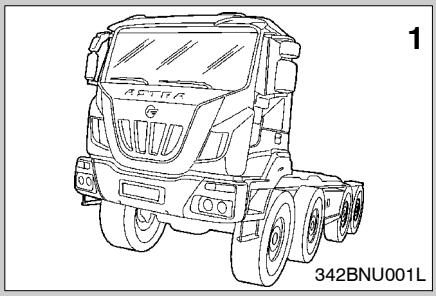
a white sector: minimum, low use
b green sector: economic running

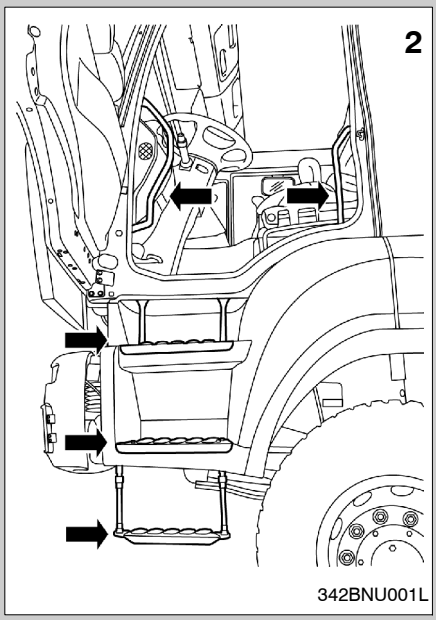
The best performance/consumption ratio is obtained when the engine rate is in the green sector.

c yellow sector: maximum engine speed range
d red sector: runaway rate

NEVER USE RED SECTOR.

Engine	Tachometer sector (RPM)			
	White	Green	Yellow	Red
F2B/F3B	0 - 1200	1200 - 1900	2400 - 3000	3000 - 3200





LEFT HAND DRIVE VEHICLES

CAB-EXTERNAL

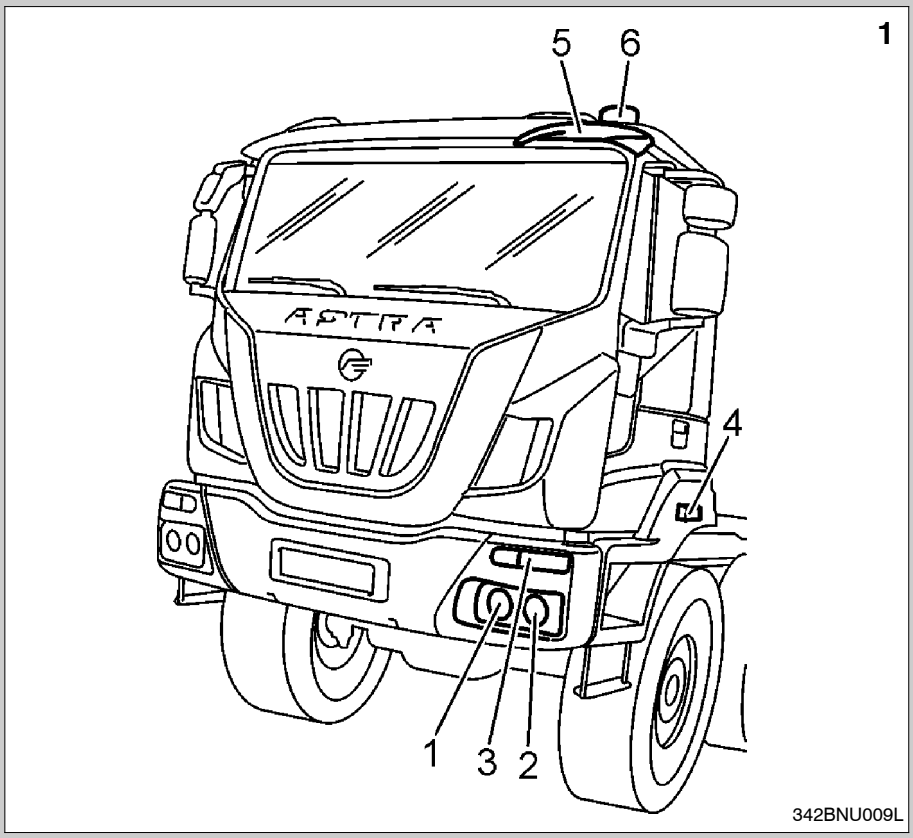
The cab (Fig. 1) is hinged at the front and suspended both to front and rear on the chassis:

- to the front by two longitudinal arms with springs, shock absorbers and buffers.
- to the rear by two control arms with springs, shock absorbers and buffers.

The cabin can be tipped forward by means of a manually controlled hydraulic cylinder.

Always use the grips and steps (Fig. 2, see arrow) specifically designed to permit easy accessibility to get on and off the vehicle.

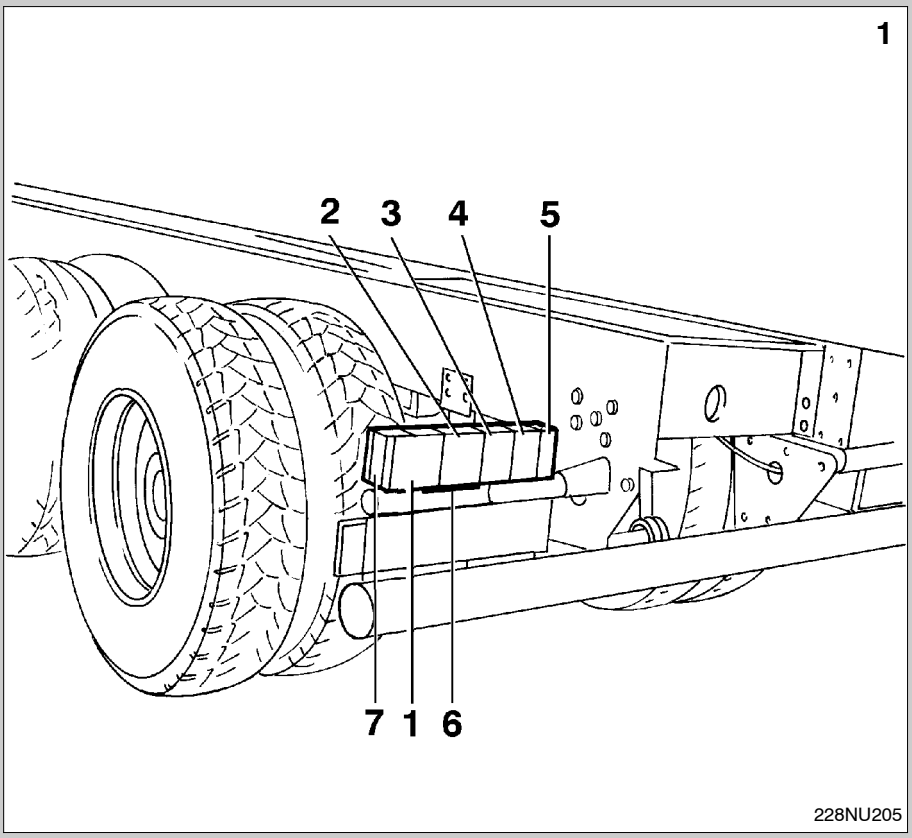
Always keep handles and foot-boards clean to avoid slipping.



EXTERNAL LIGHTING

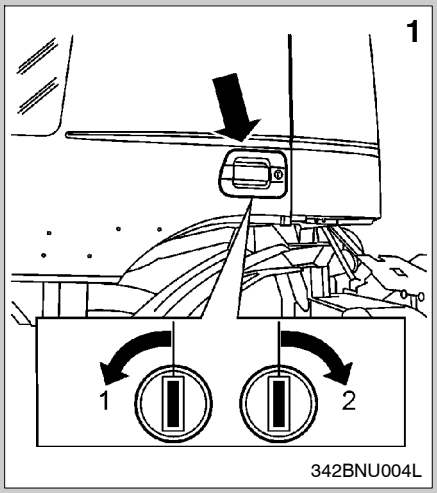
Front lights (Fig. 1)

1. High beam
2. Parking light and headlight
3. Front direction indicator
4. Side direction indicator
5. Front clearance light
6. Rotary warning lights (if fitted)



Rear lights (Fig. 1)

1. Direction indicator
2. Stop light
3. Side light
4. Fog warning light
5. Reversing light
6. License plate light (one side only)
7. Side clearance

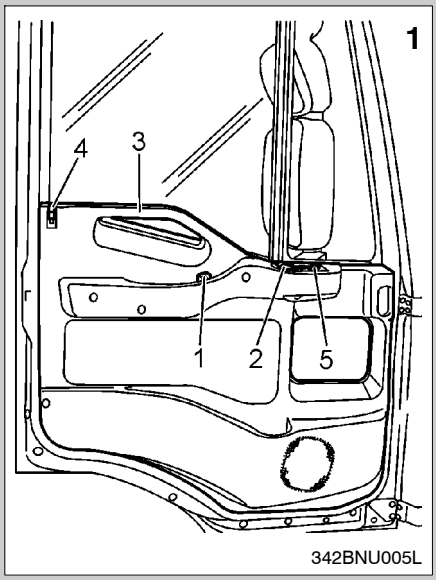


DOORS

The vehicle has two doors symetrically placed at each side.
The external door handle (Fig. 1, see arrow) can be locked from the outside with a key.
To open the door pull down the external handle.

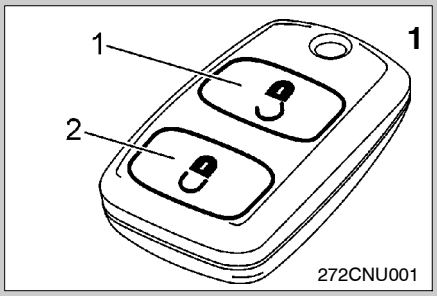
- to block the lock, turn the key anticlockwise (Fig. 1, ref. 1);
- to block the lock, turn the key clockwise (Fig. 1, ref. 2);
- to open the door, pull handle downward.

When the door is opened the cabin interior light comes on automatically, along with the cabin step lights.



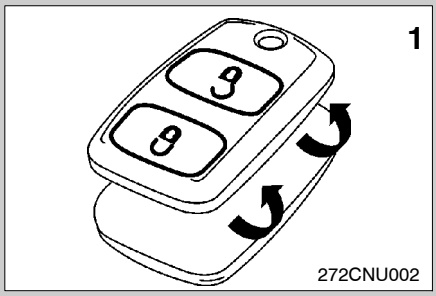
The inner side of the door has the following controls (Fig. 1):

1. Door opening handle
2. Electric window control
3. Door closing handle
4. Knob for locking doors from the inside
5. Electric mirrors adjustment control (only driver's door)



Central locking remote control

Briefly press the button (Fig. 1, ref. 1) on the remote control, while pointing the control in the direction of the vehicle, the direction indicators will flash simultaneously indicating that all doors are unlocked.
To lock the doors press the button (Fig. 1 ref. 2) still while pointing the control in the direction of the vehicle, the direction indicators will flash simultaneously indicating that all doors are locked.



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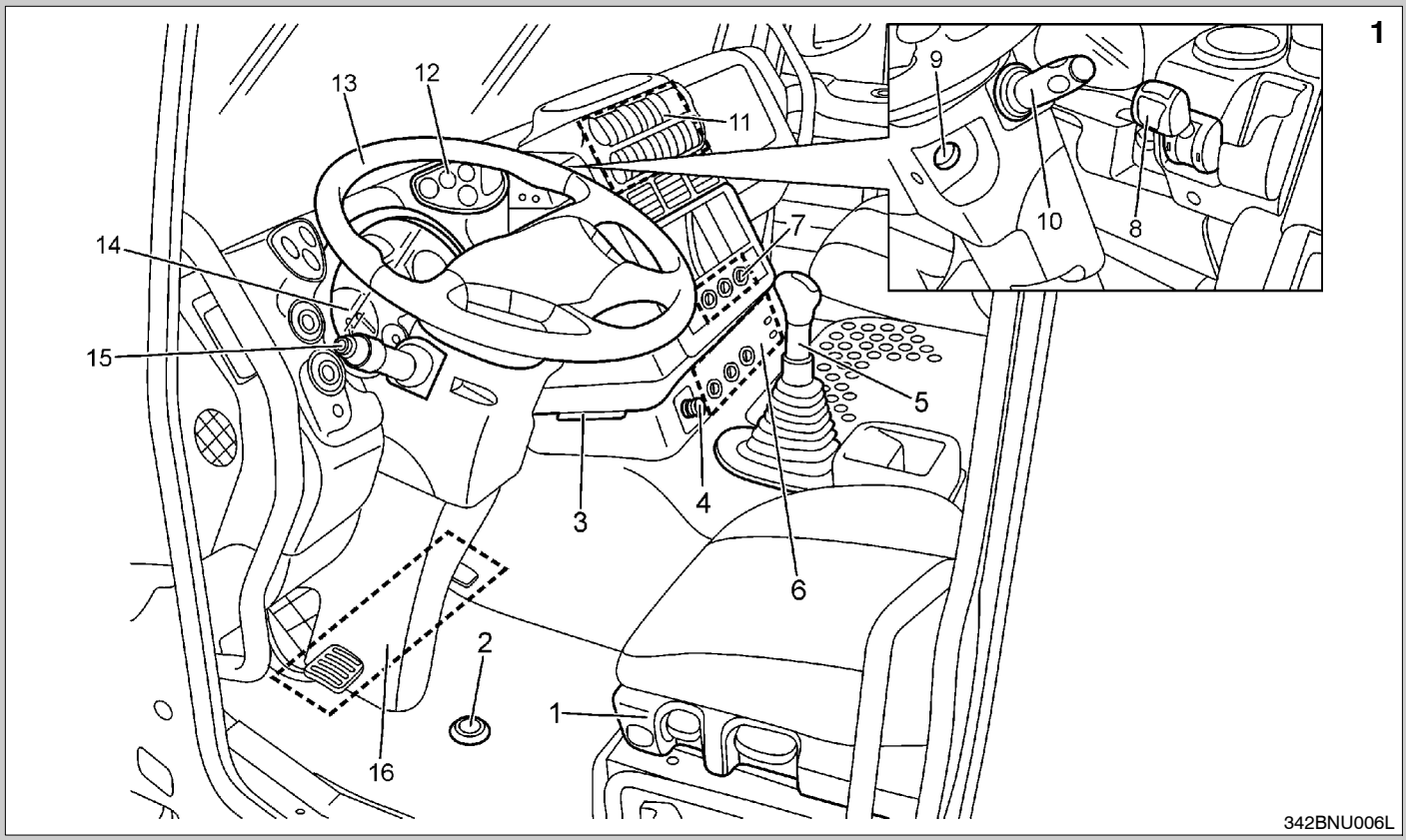
Replacing remote control battery

- Insert a small coin or screwdriver into the slot on the side of the remote control and open it (Fig. 2).
- Replace the battery, paying attention to the polarity.
- The remote control has a lithium battery. CR 2032 3V
- Close the two halves of the remote control checking that they are correctly coupled.

A reduction in range of the remote control is an indicator that the battery is almost exhausted.

Exhausted batteries are harmful to the environment. Exhausted batteries must be disposed of as required by law. Or it can be handed over to the Service Network that will provide for correct disposal.

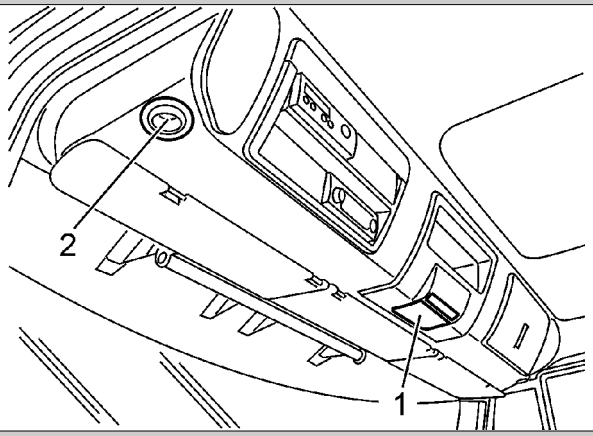
DRIVERS SEAT



DRIVER'S SEAT (Fig. 1 previous page)

1. Driver's seat adjustment controls
2. Steering wheel position control
3. Ashtray
4. Cigar lighter - 12 V power socket - Diagnostic socket
5. Gear lever
6. Differential lock / splitter / supplementary parking brake
7. Climate control system controls
8. Parking brake
9. Document holder
10. Controls lever Cruise control / retarder
11. Ignition switch
12. Dashboard
13. Steering wheel
14. Instrument panel
15. Controls lever lights / headlights / direction indicators / windscreen wiper controls
16. Pedal controls

1



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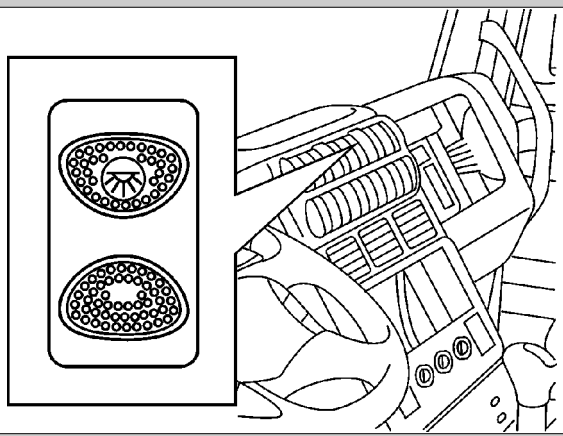

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INTERNAL LIGHTING DEVICE

Upper dashboard (Fig. 1)

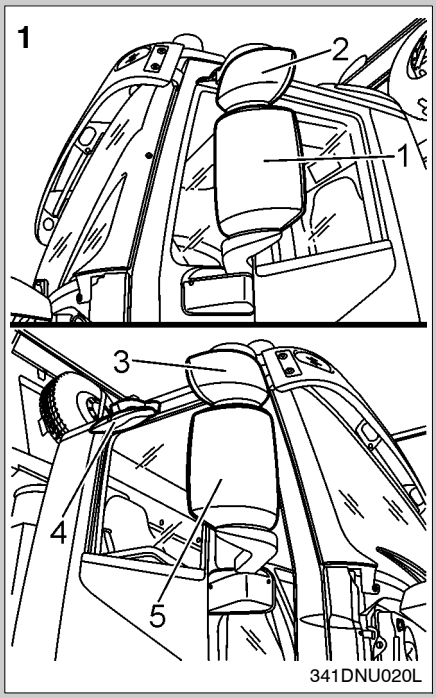
1. Ceiling light

Press button (Fig. 2) to switch on the ceiling light.
Press again to switch off the ceiling light.

2. Access step lighting

The light switches on when the door is opened.

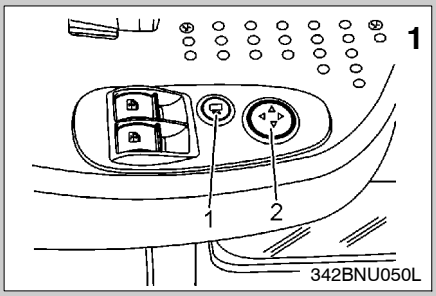
1

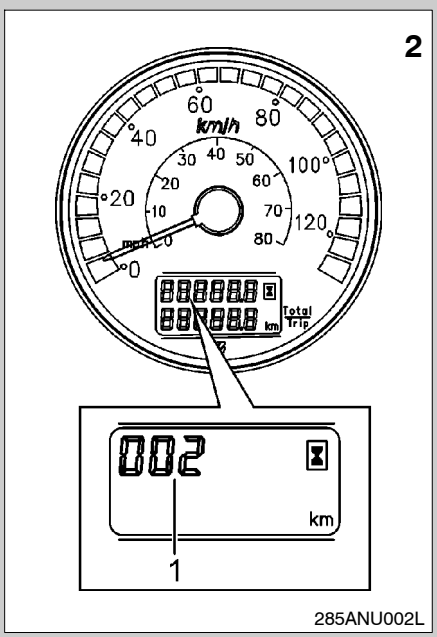


EXTERNAL REAR VIEW MIRRORS

The vehicle is fitted with the following external rear view mirrors (Fig. 1, 2 and Fig. 3):

1 Left side wide-angle mirror
2 Main left side mirror
3 Right side wide-angle mirror
4 Main right side mirror
5 Right pull-in mirror





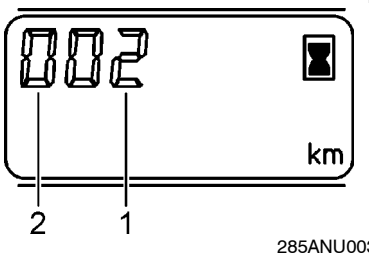
Mirror selection and handling

This adjustment must be made with vehicle stationary.

Using the mirror selection control (Fig. 1, ref. 1) brings up a specific page on the techometer LCD (Fig. 2, ref. 1).
Use the mirror adjustment control (Fig. 1, ref. 2) to adjust the selected mirror.

Without remote control the driver has to adjust the mirrors manually.

1



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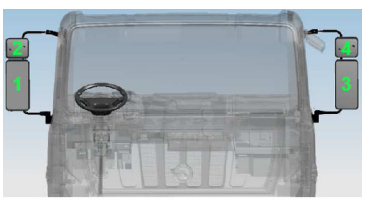

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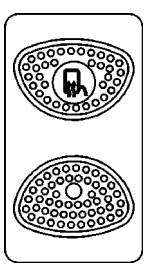

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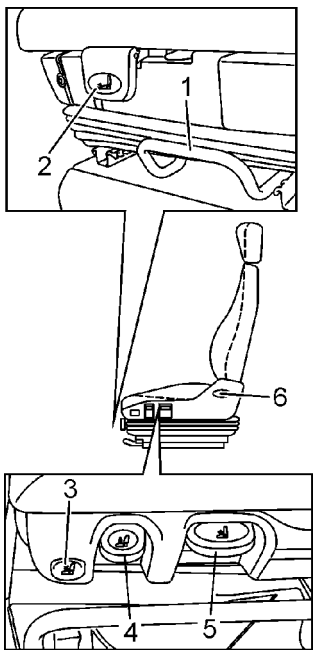
The selected mirror is identified by the number on the LCD (Fig. 1, ref. 1)
The selected mirror is graphically highlighted on the LCD (Fig. 1, ref. 2).

The mirrors controlled by the system are (Fig. 2):

1. Main driver's mirror
2. Driver's wide-angle mirror
3. Main passenger side mirror
4. Passenger side wide-angle mirror

Press the mirror heater button (Fig. 1, ref. 3) to rapidly demist the mirrors. Press the button to turn the mirror heating system on. Press the button again to turn the mirror heating system off.

1



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SEATS

Fore and aft adjustment

Lift lever (Fig. 1, ref. 1) to have the seat free to move backwards or forward.

Release the lever and ensure the mechanism is fully.

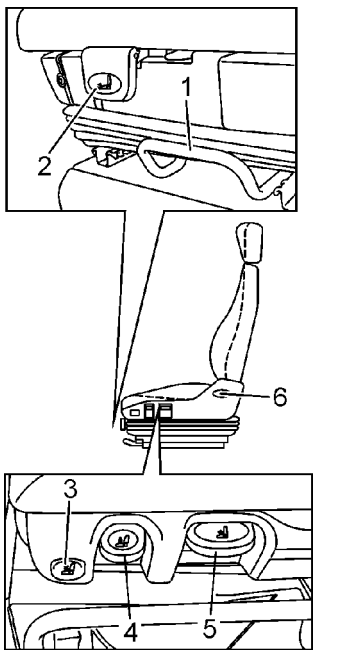
Cushion angle adjustment

The cushion angle may be adjusted by lifting lever (Fig. 1, ref. 2) and pulling and pushing the backrest (12° max.). Release the lever after adjustment.

Seat suspension adjustment

Lift lever (Fig. 1, ref. 3) to lower and lock the seat; lower the lever to raise the seat (set beforehand with lever 5).

1



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Springing system adjustment

Springing system adjustment is obtained by lifting or lowering lever (Fig. 1, ref. 4):

- Lever up = Maximum suspension effect.
- Lever down = Minimum suspensions effect.

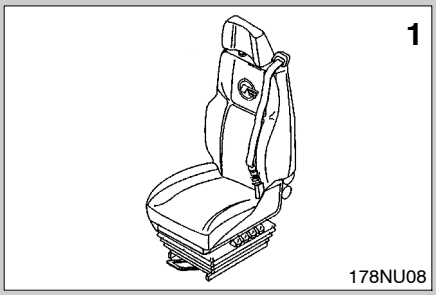
With this device seat suspension is according to road surface and weight of the driver. The shock absorber has to be adjusted rigidly, to avoid that on rough surfaces the seat hits the end of stroke, jeopardising the spring system.

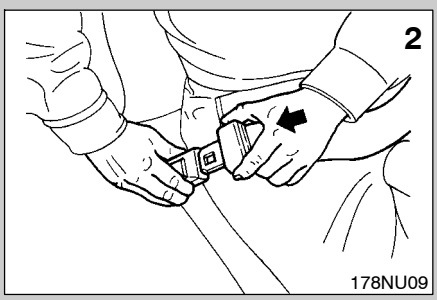
Height adjustment

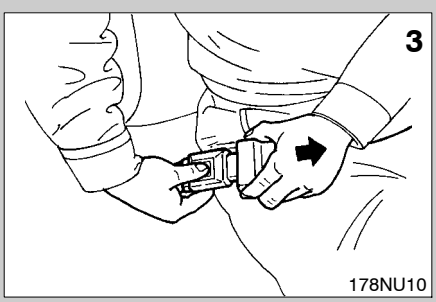
Lift lever (Fig. 1, ref. 4) to raise the seat; release the lever after adjustment. Seat height is memorised automatically.
Lower lever to lower the seat (100 mm max.)

Backrest angle adjustment

Lift lever (Fig.1, ref. 5) and set the backrest to the desired angle with your back. Release the lever to block the backrest.





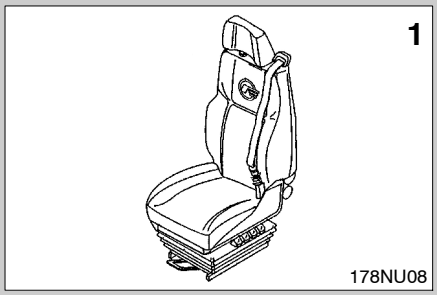


SEAT BELTS

The vehicle is equipped with three-point seat belts and automatic reel (Fig. 1).

- To fasten the belt grip the tab and insert it into the buckle until it clicks (Fig. 2).
- To release the belt, press the button on the top of the buckle (Fig. 3).

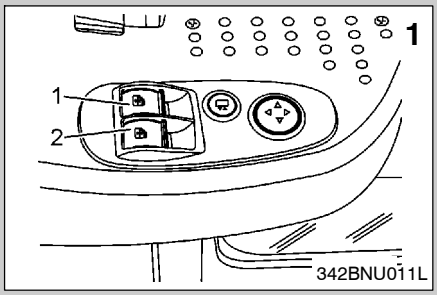
Do not adjust the mirrors while driving.

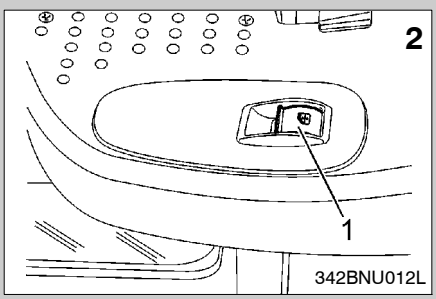


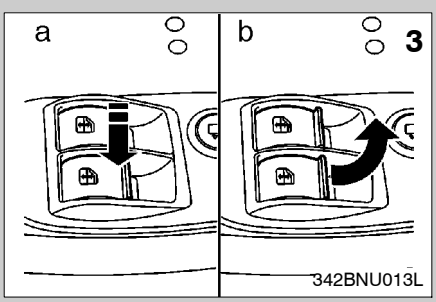
The belt does not need to be adjusted by hand: the webbing adjusts itself automatically to the length most suited to the driver allowing him freedom of movement provided that his movements are not abrupt.
The belt mechanism is affected by changes in vehicle attitude and as a consequence the belt may lock in the following cases:

- sudden braking or acceleration;
- vehicle driving on a slope;
- when cornering.

The belt must not twist and must adhere to the hips, not the abdomen, to prevent the risk of slipping forwards.
Occasionally check that the anchor bolts are fully tightened and that the belt itself is not cut or frayed.
In case of accident of a certain gravity, replace the belt involved, even if it does not appear damaged.
Do not make alterations likely to reduce seat belt efficiency







ELECTRIC WINDOW CONTROL

Electric window risers control

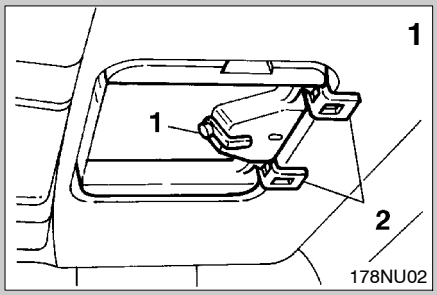
Left side (Fig. 1)

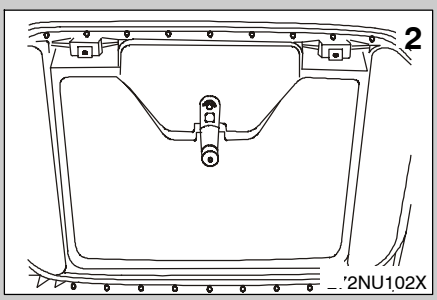
1. Left side window control
2. Right side window control

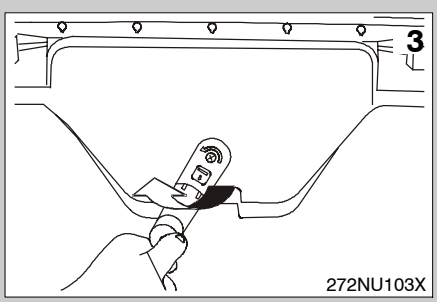
Right side (Fig. 2)

1. Right side window control.

Press (Fig. 3, ref a) the switch to lower the glass.
Pull the switch upward (Fig. 3, ref b) to raise the glass.
The glass stops when the switch is released.







HATCH

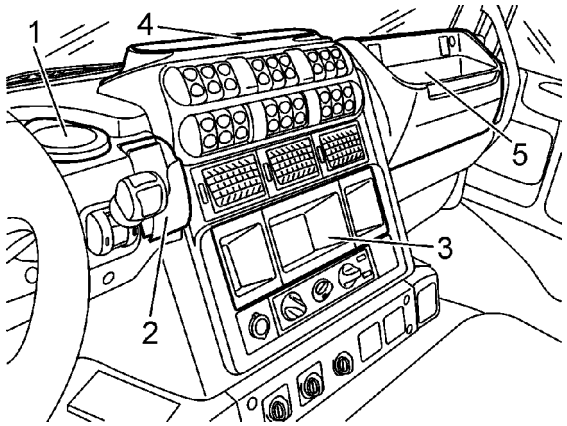
To open the hatch turn the handle (Fig. 1, ref. 1) anti-clockwise.

To close the hatch proceed as follows:

- Turn the handle clockwise until closing the hatch.
- Return the handle to its original position (Fig. 2).
- Turn the handle at most by a quarter turn until reaching the stop (Fig. 3, arrow).
- Return the handle to closed position and lock it by tipping the knob.

To escape from the cabin in an emergency turn the full release handles downward (Fig. 1, ref. 2) and push the hatch outwards.

1



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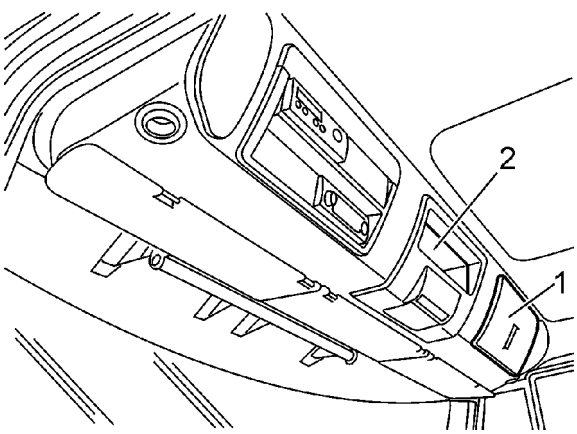

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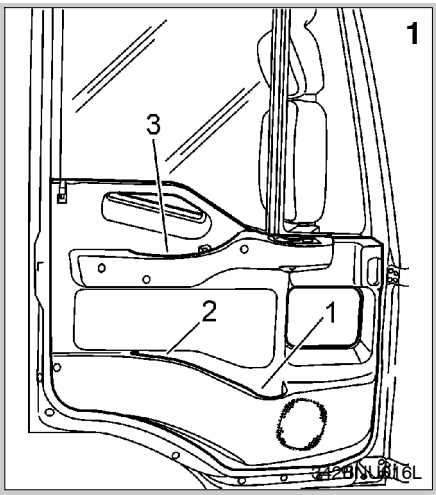
COMPARTMENTS

Dashboard (Fig. 1)

1. Bottle/can holder
2. Mobile phone holder
3. Items tray (according to outfitting)
4. Gloves compartment
5. Compartment in front of passenger

Upper dashboard (Fig. 2)

1. Compartment in front of passenger (closed with lid).
   Act on button and raise lid to open.
   Lower lid and press until it clicks into place.
2. Loose items tray (according to outfitting)



Door (Fig. 1)

1. bottle holder
2. pocket
3. pocket

Tunnel (Fig. 2)

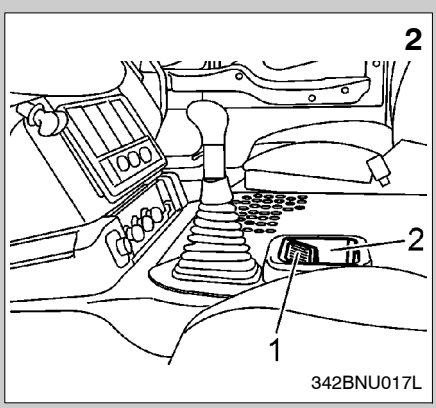
1. coin holder
2. loose items tray

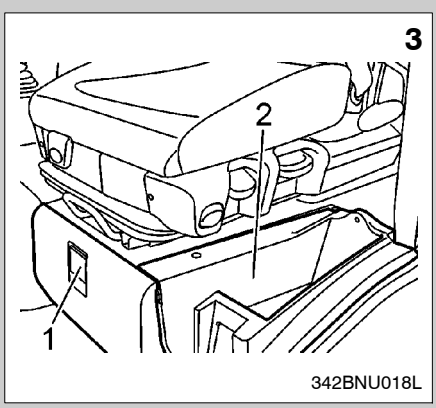
Seat (Fig. 3)

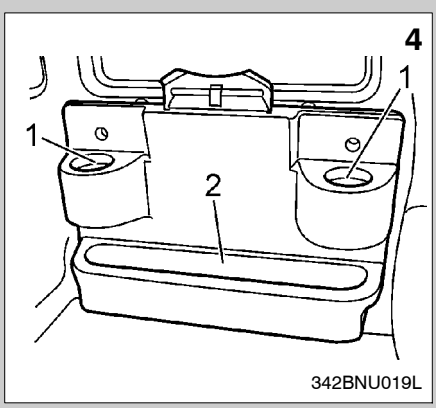
1. Compartment (closed with lid)
   Act on button and lower lid to open.
   Raise lid and press until it clicks to close.
2. items holder

Rear wall (Fig. 4)

1. bottle holder
2. items compartment







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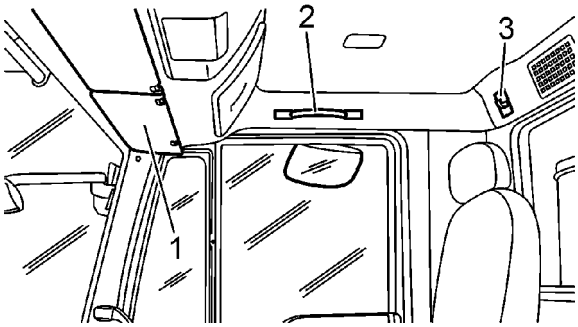

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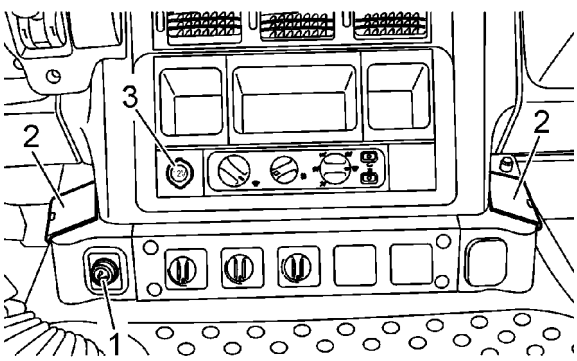

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ACCESSORIES - DEVICES

Sun blind tabs (Fig. 1, ref. 1)

Grip the front edge of the tab and turn downward.
Bring to position by hand.

Grip handle (Fig. 1, ref. 2)

On passenger side.

Coat hook (Fig. 1, ref. 2)

On both sides of cab.

Cigar lighter (Fig. 2, ref. 1)

Press to activate cigar lighter: a click indicates it is ready for use.
After use return to its seat without pressing.

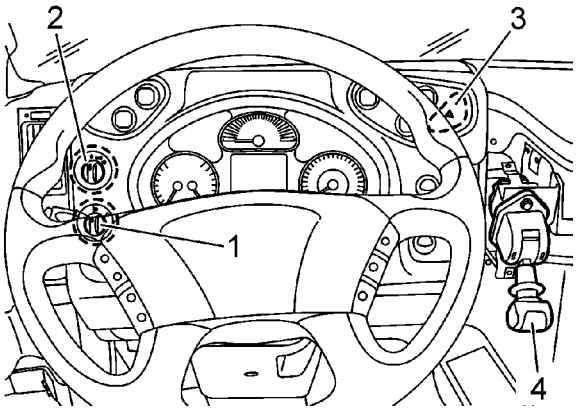
Ashtray (Fig. 2, ref. 2)

On both sides of cab.
Raise lid to open.
Lower lid to close.

12Volt current socket (Fig. 2, ref. 3)

Open cap and insert facility .
After use close cap.

1



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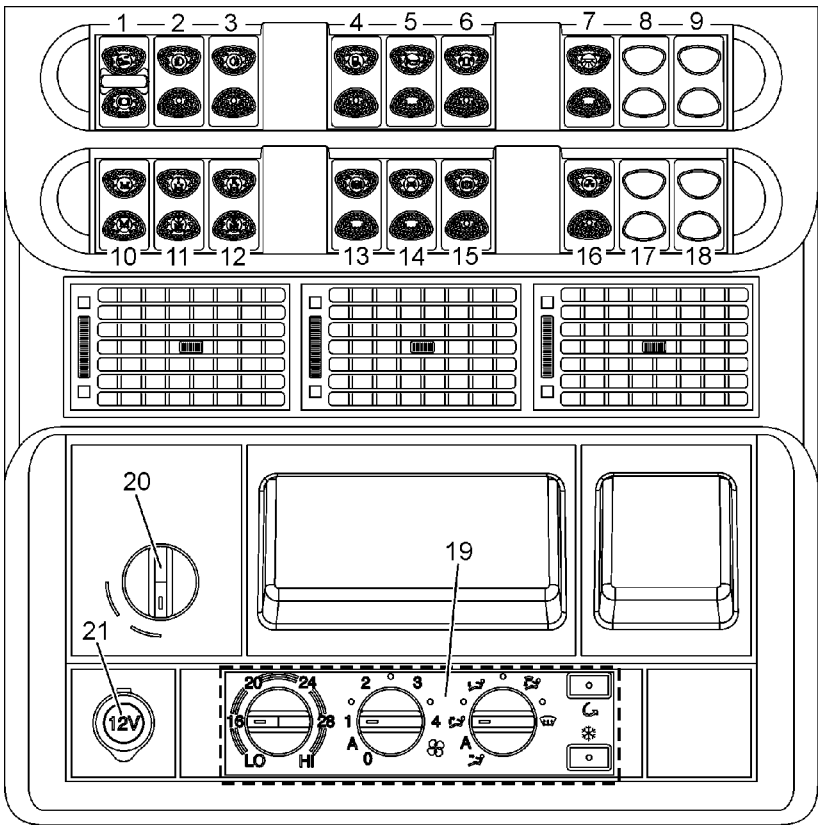
CONTROLS

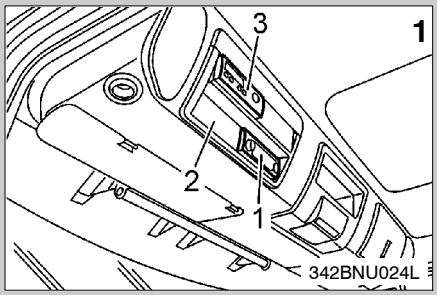
Controls on dashboard (Fig. 1)

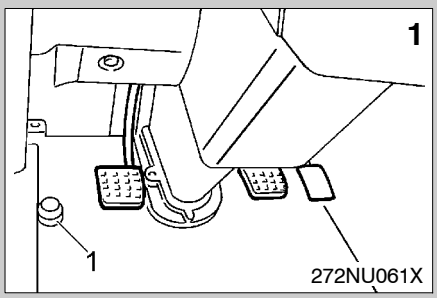
1. Headlamps geometry adjustment
2. External lights switch
3. Hazard lights
4. Parking brake control



Module holder dashboard controls (Fig. 1)

1. Engine brake switch
2. Fog light switch
3. Rear fog light
4. Mirrors heating switch
5. Horn selector switch
6. Pivoting headlamps switch
7. Ceiling light switch
8. Not used
9. Not used
10. PTO activation switch
11. PTO 1 activation switch
12. PTO 2 activation switch
13. ABS switch (OFF-ROAD)
14. ASR switch
15. Additional parking brake switch
16. Work light switch
17. Electric battery master switch
18. Not used
19. Climate controls
20. Not used
21. 12 V current socket





Controls on roof (Fig. 1)

1. Radio CD equipment housing
2. CB housing
3. Tachograph housing

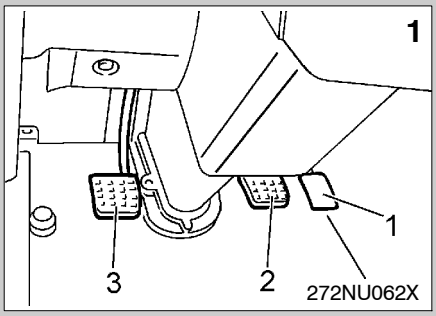
Controls on floor

Steering wheel position control

Steering wheel position adjustment is pneumatic, and can be regulated by means of the button on the floor at the base of the steering column, driver's side.
Proceed as follows:

- With the button pressed (Fig. 2, ref. 1) take the wheel in your hands and bring it to the required position.
- Once in position, release the button.

This operation can only be done with:
- **sufficient air pressure;**
- **parking brake engaged.**



Accelerator

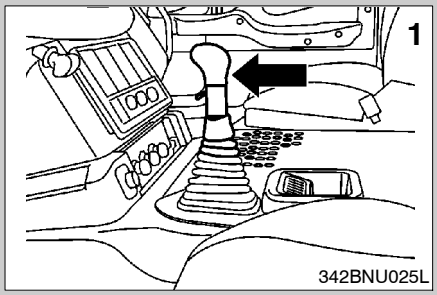
The accelerator is controlled by means of a pedal on the floor to be operated by the driver's right foot (Fig. 1, ref. 1).
Press the pedal to increase the torque output by the engine proportionally to the position of the pedal.

Service brake

The service brake is controlled by means of a pedal on the floor to be operated by the driver's right foot (Fig. 1, ref. 2).
Press the pedal to obtain a braking effect in proportion to the exerted pressure.

Clutch

The clutch is controlled by a pedal to be operated with the driver's left foot (Fig. 1, ref. 3).
Press the pedal to release the clutch. Only for manual trasmission vehicles.



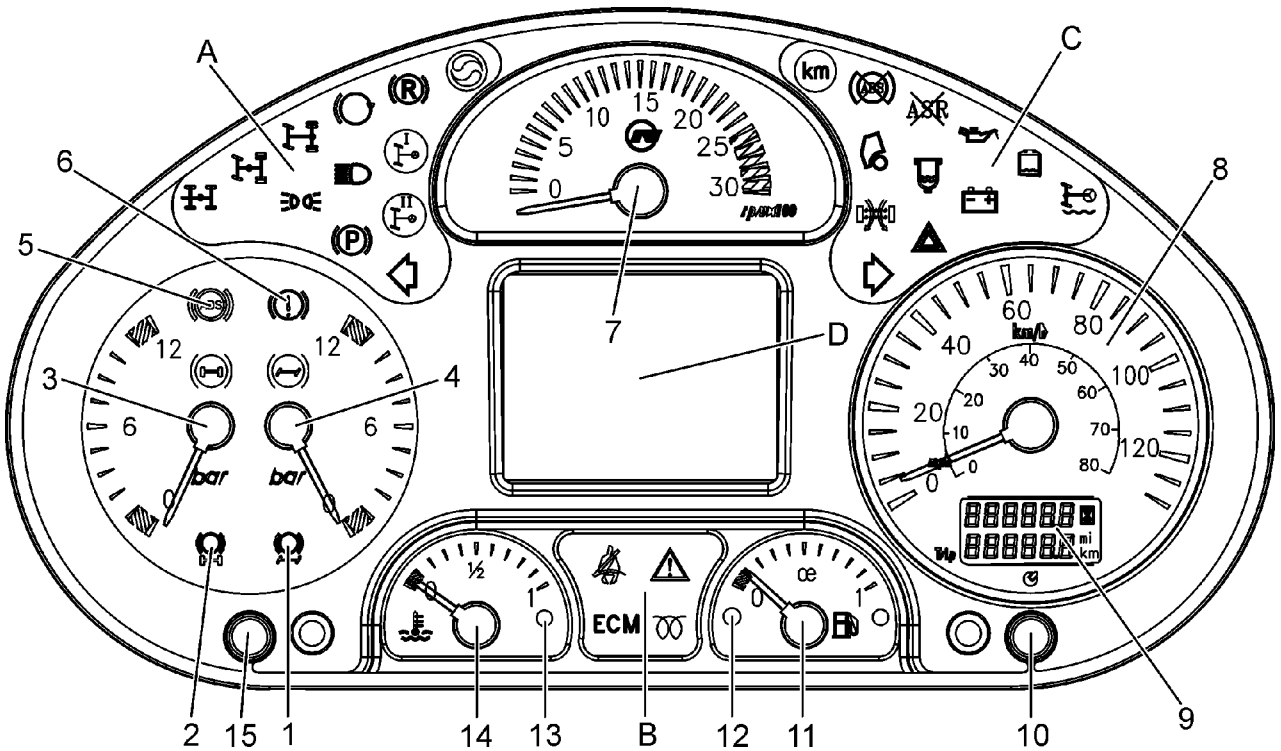
Manual transmission control

Transmission is controlled by a manually operated lever. (Fig. 1, see arrow).
By shifting the lever, the different gears are engaged.
The lever also has a splitter pre-selection lever. Acting on this lever pre-selects the engagement of reduced gears range, actuated through the clutch pedal.

ALL VEHICLES
INSTRUMENTS

Instrument panel (Fig. 1)

1



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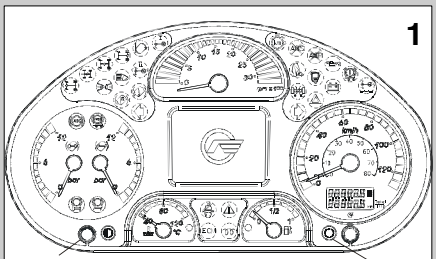
Instrument panel (Fig. 1)

1) Front axles brake wear warning light
   Red light indicates front brakes have reached the wear limit
2) Rear axles brake wear warning light
   Red light indicates rear brakes have reached the wear limit
3) Rear axle brakes air pressure indicator.
4) Front axle brakes air pressure indicator.
5) ABS failure warning light
   Yellow light indicates ABS system is not functioning
6) Braking system failure warning light
   Red light indicates there is a failure in the braking system
7) Rev counter
8) Digital speedometer
9) LCD screen with hour-counter and partial trip display
10) Partial trip reset button
11) Fuel level indicator
12) Fuel reserve warning light
    Red light indicates fuel tank level is in reserve
13) Engine water overheating
    Red light indicates the engine water is overheated
14) Engine water temperature indicator
15) Instruments illumination adjustment button

A) Warning lights panel A
B) Warning lights panel B
C) Warning lights panel C

See the below for further information regarding instrument panel.

1



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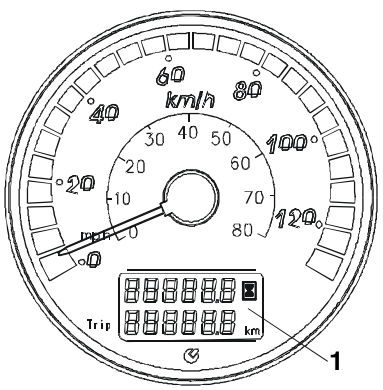

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Functions of instrument panel keys

Key 1 (Fig. 1, ref. 1):

Instrument illumination adjustment.
or
Error memory display.

Refer to the DIAGNOSTIC chapter for more information

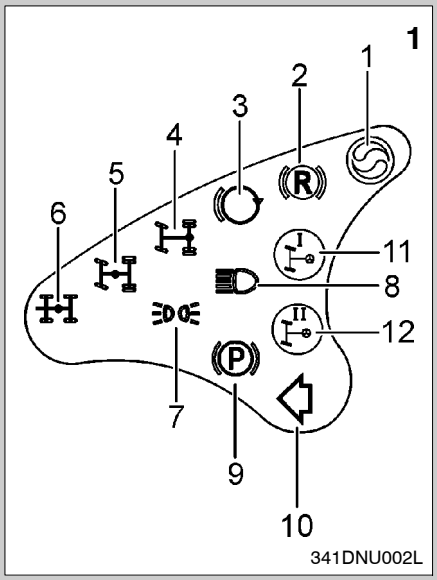
Key 2 (Fig. 1, ref. 2):

Press key 2 for less than three seconds to display trip km or total km
Trip odometer reset
With trip odometer displayed on LCD (Fig. 2, ref. 1), press key 2 for more than three seconds to zero the indicated distance.

Units of measure conversion (Km - miles)

To convert the units of measure displayed on the LCD, proceed as follows:

- With ignition key out, press both buttons (Fig. 1, ref 1 and 2).
- Holding the buttons down, turn the key to MAR and wait 10 seconds.



Warning lights panel A details

1 Automatic gear converter functioning warning light.
Yellow light indicates lock-up clutch is not engaged.

2 Retarder on warning light.
Yellow. Indicates that hydraulic retarder is active.

3 Engine brake engaged warning light.
Yellow. Indicates that the engine brake is engaged.

4 Rear traverse differential locked warning light.
Yellow. Indicates that the rear differential clamp is engaged.

5 Transfer box longitudinal differential locked warning light.
Yellow. Indicates that the transfer box differential clamp is engaged.

6 Tandem longitudinal differential locked warning light.
Yellow. Indicates that the tandem longitudinal differential is engaged.

7 External lights on warning light.
Green. Indicates that the side lights (and dip headlights) are on.

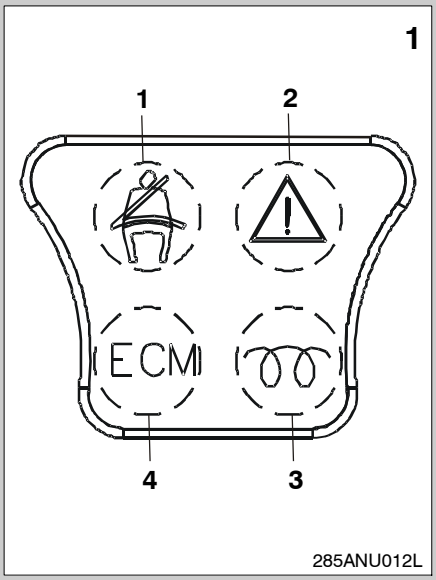
8 Main beam on warning light.
Blue. Indicates that main beam headlights are on.

9 Parking brake engaged warning light.
Red. Indicates that the parking brake is engaged.

10 Left direction indicator warning light.
Green. Indicates that the left direction indicator has been activated.

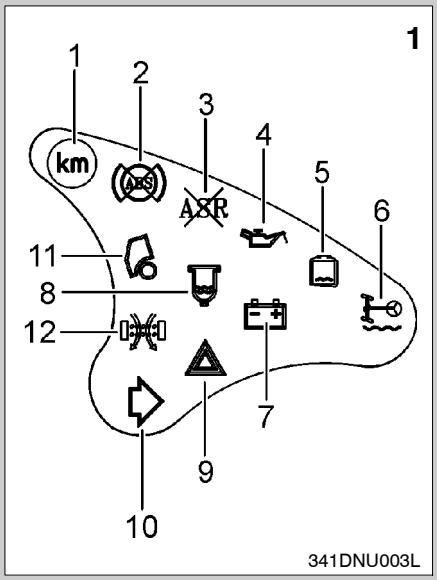
11 Power steering main circuit failure warning light.
Red. Indicates there is a failure on the power steering main circuit.

12 Power steering emergency circuit failure warning light.
Red. Indicates there is a failure on the power steering emergency circuit.



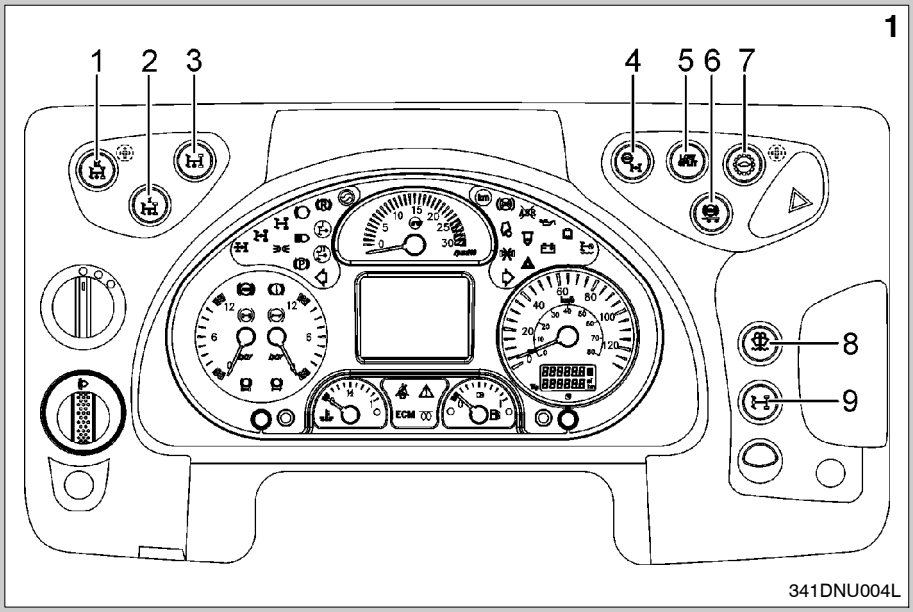
Warning lights panel B details

1. Seat belt not fastened warning light
   Red. Indicates that the driver's seat belt is not fastened.
2. Warning light
   Yellow. Indicates a general vehicle fault.
3. Preheating on warning light
   Yellow. Indicates that the engine preheating system is active.
4. ECM warning light
   Yellow. Indicates an ECM malfunction.



Warning lights panel C details

1. Second speed limit engaged warning light.
   Yellow. This indicates that the second speed limiter is engaged.
2. ABS off warning light.
   Yellow. Indicates ABS off.
3. ASR off warning light
   Yellow. Indicates ASR off.
4. Engine oil temperature high warning light.
   Red. Indicates that the engine oil temperature is high.
5. Low trailer brake air pressure warning light.
   Red. Indicates trailer air brake malfunction.
6. Power steering oil level low warning light.
   Red. Indicates that the power steering oil level is insufficient.
7. Alternator warning light.
   Red. Indicates that the current delivered to the alternator is insufficient.
8. Water in fuel pre-filter warning light.
   Yellow. Indicates the presence of water in the fuel pre-filter.
9. Hazard lights on warning light.
   Red. Indicates that the hazard warning lights are on.
10. Right direction indicator warning light.
    Green. Indicates that the right direction indicator has been activated.
11. Cab unhooked warning light
    Red. Indicates that the cab has not been secured correctly.
12. Air filter clogged warning light
    Yellow. Indicates that the engine air filter is clogged.



Warning lights on dashboard

1. PTO 1 on gearbox engaged warning light.
   Yellow light indicates that PTO 1 on gearbox is engaged.
2. PTO 2 on gearbox engaged warning ligh.
   Yellow light indicates that PTO 2 on gearbox is engaged.
3. PTO on flywheel engaged warning light.
   Yellow light indicates that PTO on flywheel is engaged.
4. Splitter unit reduced gear ratio engaged warning light.
   Green light indicates that splitter unit reduced gear ratio is engaged.
5. Low range engaged warning light.
   Green light indicates that the gear low range is engaged.
6. Reduced gears engaged warning light.
   Green light indicates that the gearbox reduced gears are engaged.
7. Trailer ABS failure warning light.
   Yellow light indicates that the trailer ABS system is not functioning.
8. Windshield washer liquid level warning light.
   Red light indicates that windshield washer liquid level is low.
9. Front transverse differential locked warning light.
   Yellow light indicates that front differential lock is engaged.

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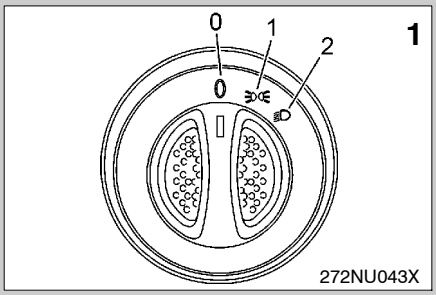

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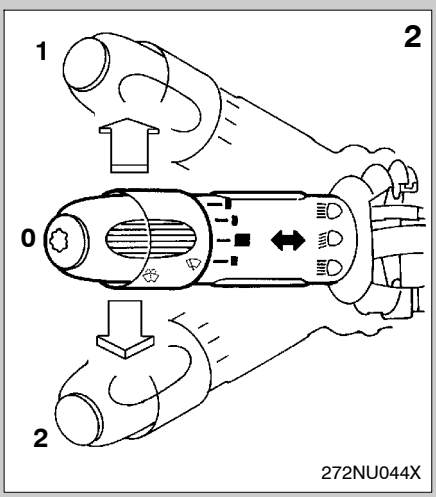


2

CONTROL OPERATION

Position and headlight controls (Fig. 1)

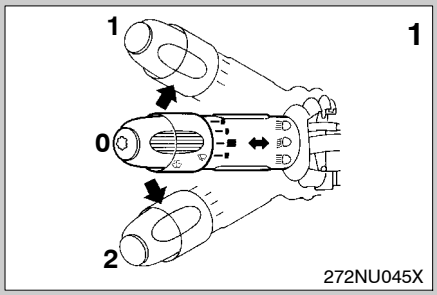
The control has three positions:

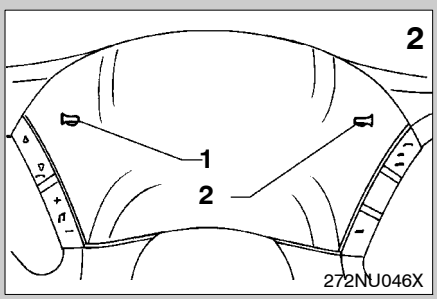
- position 0: off;
- position 1: first click: position lights on;
- position 2: second click: headlights on.

Headlight control (Fig. 2)

The control has three positions.

- position 0: normal headlights;
- position 1 (light push forward): high beams;
- position 2 (pull lever back): Beam flasher.





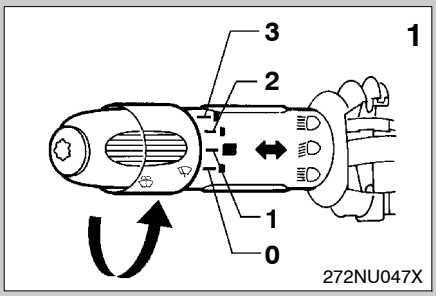
Direction indicator control (Fig. 1)

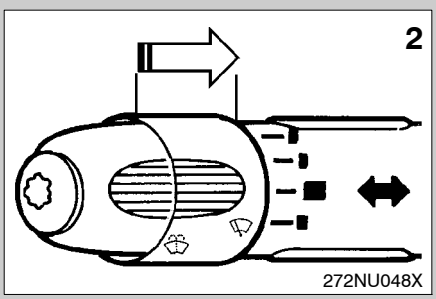
The control has three positions:

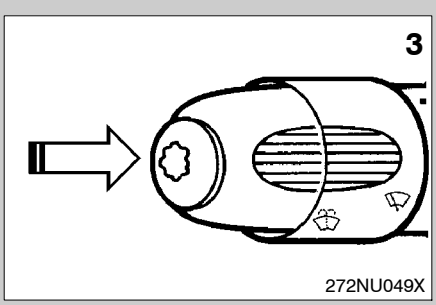
- position 0 off;
- position 1 (up) right direction indicators;
- position 2 (down) left direction indicators.

Horn (Fig. 2)

The horn can be sounded by pressing the indicated points (Fig. 2, ref. 1, 2).





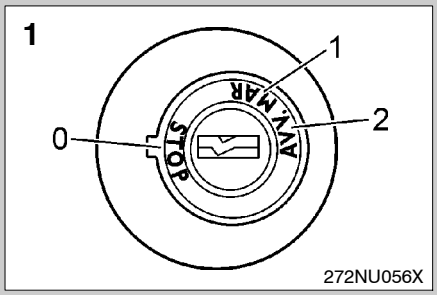


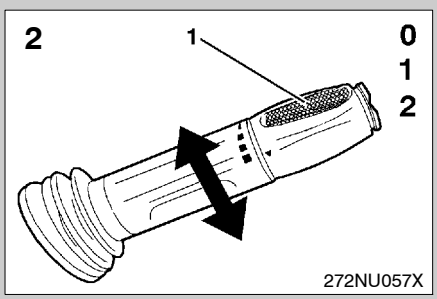
Windscreen washer/wiper control

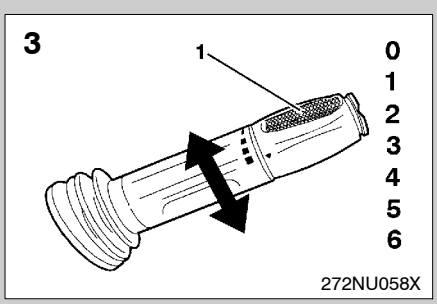
The control (Fig. 1) has four positions:

- position 0 = disengaged;
- position 1 = intermittent;
- position 2 = slow;
- position 3 = fast.

Pushing the end of the ring (Fig. 2, see arrow), the windscreen wiper makes one sweep.
The windscreen washer is the button (Fig. 3, see arrow) on the control stick.
Pressing the windscreen washer button also activates slow windscreen wiper operation.
Releasing the washer button, the wiper makes three more cleaning strokes before stopping.







Ignition switch (Fig. 1)

The ignition switch has three positions:

- position 0 (STOP): all off, key may be removed;
- position 1 (MAR): ready to start, electrical power on, key locked in;
- position 2 (AVV): starting engine.

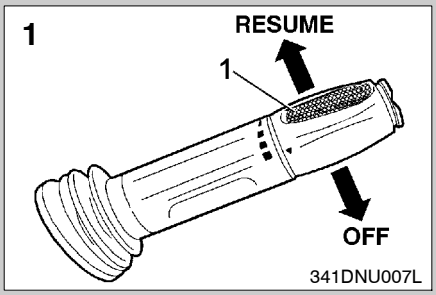
Engine braking control - Vehicles without intarder

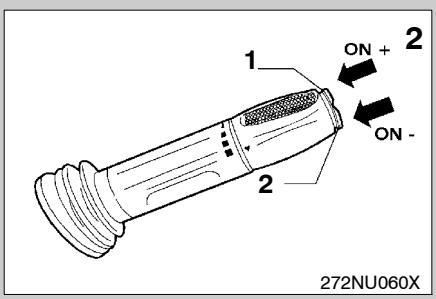
The device is controlled by turning the end part of the lever (Fig. 2) and which has three positions (from 0 to 2), corresponding to one only braking level.

Positions 1 and 2 are equivalent.

Engine braking control - Vehicles with intarder

The device is controlled by turning the end part of the lever (Fig. 3) and which has seven position lever (from 0 to 6), corresponding to progressively higher levels of braking.





Cruise control

The vehicle is fitted with an engine speed / vehicle speed control.

Memory control (Fig. 1, ref. 1).

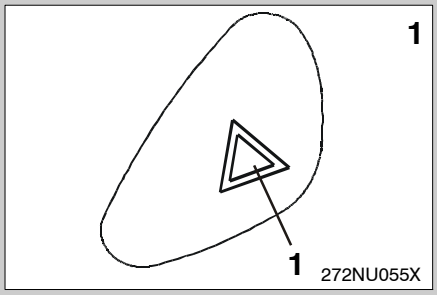
RESUME: Pulling the lever memorises the current regulator setting / recalls memorised setting.

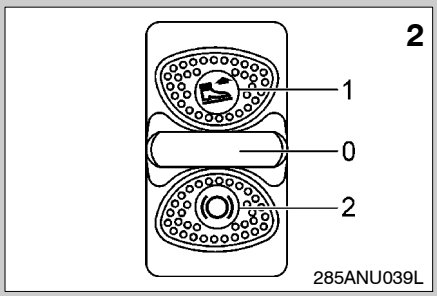
OFF: Operate the lever to deactivate the clutch.

Speed setting control

ON button (+): pressing the button (Fig. 2, ref. 1) increases the rpm / vehicle speed value.

ON button (-): pressing the button (Fig. 2, ref. 2) decreases the rpm / vehicle speed value.





Hazard light control

Press the control (Fig. 1, ref. 1) to turn the hazard lights on.

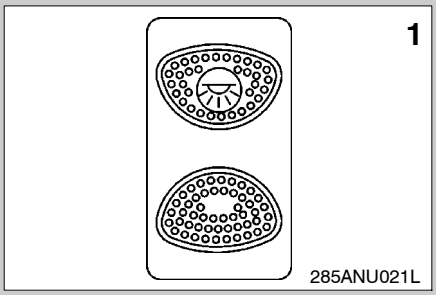
Press again to switch the hazard lights off.

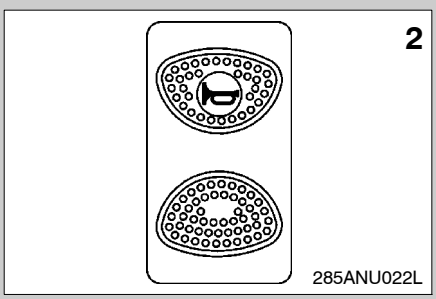
Exhaust brake pre-selection

The control (Fig. 2) has three positions:

- position 0: the exhaust brake is applied when the command is actuated;
- position 1: the exhaust brake is applied when the accelerator pedal is released;
- position 2: exhaust brake applied each time the brake pedal is pressed;

All Cruise Control operations are deactivated when the exhaust brake is applied.



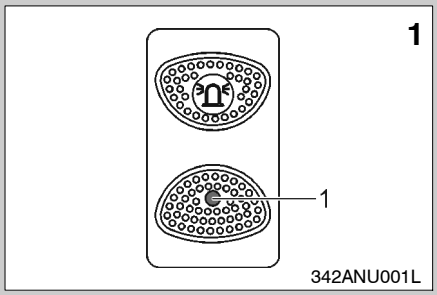


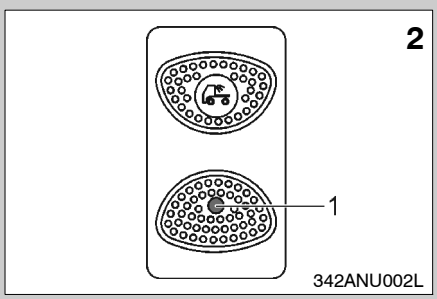
Courtesy light switch

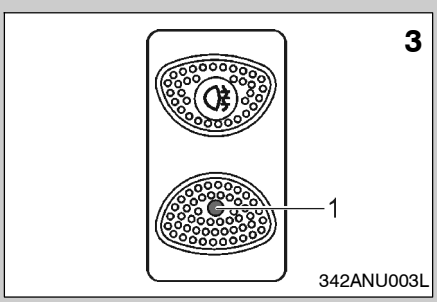
Press the button (Fig. 1) to turn the courtesy light on.
Press the button again to turn the courtesy light off.

Electro-pneumatic horn pre-selection

Press the control (Fig. 2) to operate the electro-pneumatic horn by means of the horn control on the left steering stalk.
Press the control again to operate the electric horn by means of the horn control on the left steering stalk.







Swivelling light control

Press the button (Fig. 1) to turn the swivelling light on.
The warning light (Fig. 1, ref. 1) indicates that the swivelling light is on.
Press the button again to switch the swivelling light off.

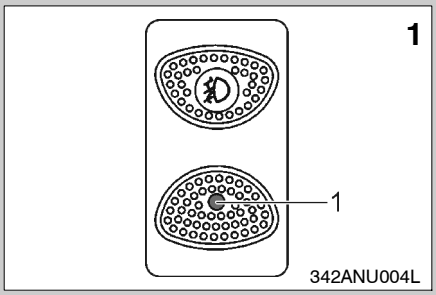
Work light

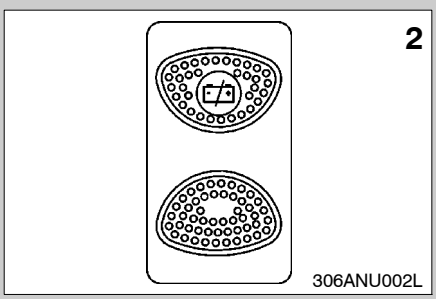
Press the button (Fig. 2) to switch the work light on.
The warning light (Fig. 1, ref. 1) indicates that the work light is on.
Press the button again to switch the work light off.

Rear fog light

The rear fog light will only come on when the dipped beam headlights are switched on (light and headlight control in second position).

Press the button (Fig. 3) to switch the rear fog light on.
The warning light (Fig. 3, ref. 1) indicates that the rear fog light is on.
Press the button again to switch the rear fog light off.





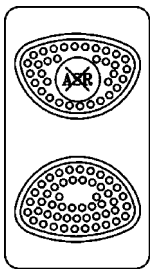
Fog light control

Press the button (Fig. 1) to turn the fog lights on.
The warning light (Fig. 1, ref. 1) indicates that the fog lights are on.
Press the button again to switch the fog lights off.

Electric battery isolator control

Press the pushbutton (Fig. 2) to switch on the main power supply.

This switch replaces the manual switch located near the battery case.
After a certain time from activation or after the engine has been switched off, the batteries disconnect automatically.



1

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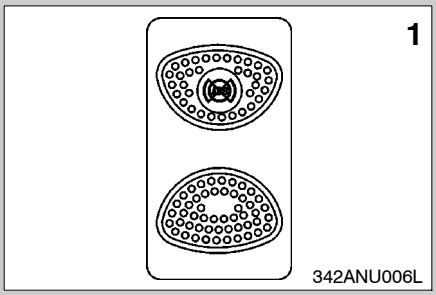
ASR off command

Press the button (Fig. 1) to turn the ASR system off.
Press the button again to switch the ASR system off.

Vehicle traction can be improved by pressing the ASR button in particular terrain conditions (deep snow, mud, etc.).
Press this button to change the ASR system intervention and obtain more start-off force.
The corresponding warning light will come on.



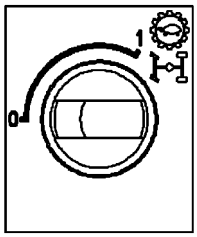
ABS off command

Press the button (Fig. 1) to switch the wheel anti-locking system (ABS) off.
Press the button to switch the wheel anti-locking system (ABS) back on.

Vehicle braking can be improved by pressing the ASR button in particular terrain conditions (deep snow, mud, etc.).
Press this button to change the internal parameters of the function stored in the control unit. The corresponding warning light will come on.
The ABS will be automatically turned back on when the engine is started again.

The ABS is turned off when this button is pressed and therefore the wheels could lock while braking.

1



Distributor-reducer (transfer)

Position knob (Fig. 1):

- Position 0:travelling on road (normal ratios).
- Position 1, “tortoise” symbol:off-road use (step-up ratios).

Shift from one range to the other must take place with the vehicle stopped and gearbox in neutral.

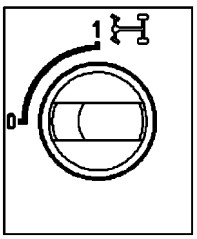
To shift from normal to reduced:

- turn knob (Fig. 1) to position 1.

To pass from the step-up ratio to the normal ratio:

- turn knob (Fig. 1) to position 0.

1



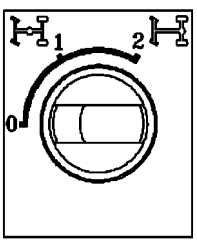
Differential lock control (2 axle vehicles)

Front transverse differential lock (4x4 vehicles only) (Fig. 1)

0) Lock disengaged.
1) Lock engaged.

We recommend engaging the front transverse differential lock once the rear longitudinal and transverse differential locks are engaged.

2

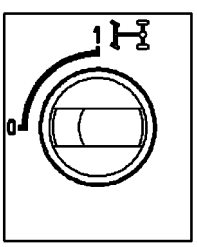


Reat longitudinal distributor and transverse differential lock (4x4 vehicles only) (Fig. 2)

0) Lock disengaged.
1) Longitudinal differential distributor lock engaged.
2) Rear transverse differential lock engaged.

The rear transverse differential only engages when the longitudinal lock is already engaged.

3



Rear transverse differential lock (4x2 vehicles only) (Fig. 3)

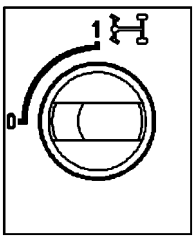
0) Lock disengaged.
1) Lock engaged.

Differential lock engagement

- To engage the lock, turn the knob to engage position.
- Lock engagement is indicated by activation of the corresponding warning light.
- To disengage the lock turn the knob to disengage position.
- Lock disengagement is indicated by deactivation of the corresponding warning light.

The differentials must be engaged with the vehicle stopped and with the wheels straight.
If the lock does not disengaged immediately, change direction in order to eliminate any tension present.
Proceed with caution when lock is engaged. Do not engage the lock on roads that do not require its use.
In muddy or slippery conditions do not allow the wheels to slip when the differential lock is not engaged, as this will lead to serious damage to the gearing (a few seconds are enough).
Do not engage the differential while a wheel is slipping as this will also cause serious damage to gearing.
After use, always check that the locks are disengaged checking both the warning lights and the position of the control button.

1



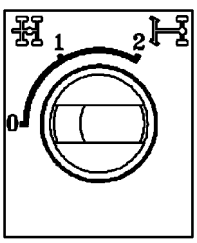
Differential lock control (3-4 axle vehicles)

Front transverse differential lock 6x6, 8x6 and 8x8 vehicles only) (Fig. 1)

0) Lock disengaged.
1) Lock engaged.

We recommend engaging the front transverse differential lock once the rear longitudinal and transverse differential locks are engaged.

2

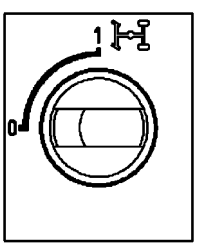


Interaxle longitudinal differential lock and rear transverse differential lock (Fig. 2)

0) Lock disengaged.
1) Interaxle longitudinal differential lock engaged.
2) Rear transverse differential lock engaged.

We recommend engaging the interaxle longitudinal lock after the longitudinal distributoir lock has already been engaged.
The rear transverse differential lock only engages once the longitudinal lock has been engaged.

3



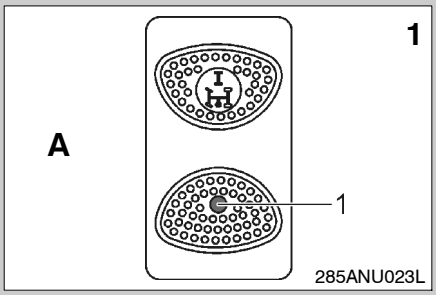
Longitudinal distributor differenital lock (6x6, 8x6 and 8x8 vehicles only) (Fig. 3)

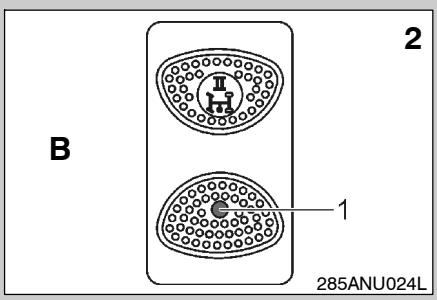
0) Lock disengaged.
1) Lock engaged.

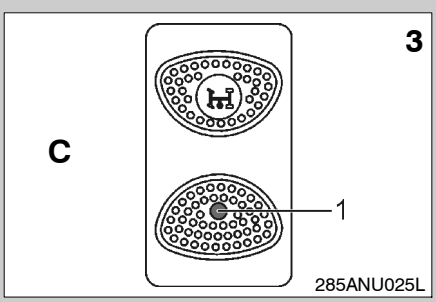
Differential lock engagement

- To engage the lock turn the know to engage position.
- Engagement is indicated by the activation of the corresponding warning light on the cluster.
- To disengage the lock turn the knob to disengage position.
- Lock disengagement is indicated by deactivation of the corresponding warning light on the cluster.

The differentials must be engaged with the vehicle stopped and with the wheels straight.
If the lock does not disengaged immediately, change direction in order to eliminate any tension present.
Proceed with caution when lock is engaged. Do not engage the lock on roads that do not require its use.
In muddy or slippery conditions do not allow the wheels to slip when the differential lock is not engaged, as this will lead to serious damage to the gearing (a few seconds are enough).
Do not engage the differential while a wheel is slipping as this will also cause serious damage to gearing.
After use, always check that the locks are disengaged checking both the warning lights and the position of the control button.







Power take off control

The vehicle has the following power take offs:

- P.T.O on flywheel (Multipower or NMV 221).
- PTO on transmission.

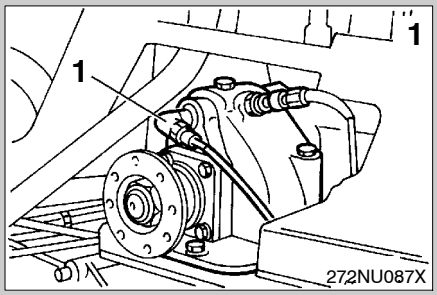
The power take offs are controlled by a switch on the dashboard.

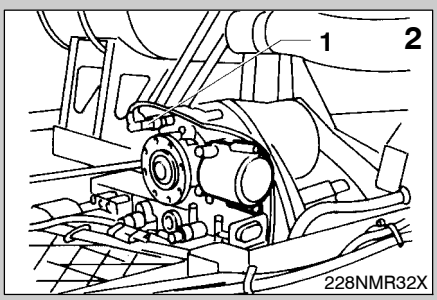
A. P.T.O I control on gearbox
Power take-off activated is indicated by the warning light on the pushbutton (Fig. 1, ref. 1).

B. P.T.O II control on gearbox
Power take-off activated is indicated by the warning light on the pushbutton (Fig. 1, ref. 1).

C. P.T.O control on flywheel
Power take-off activated is indicated by the warning light on the pushbutton (Fig. 1, ref. 1).

A maximum of 3 power take offs can be controlled simultaneously.





Multipower PTO on flywheel

Engage procedure:

- Gearbox in neutral, vehicle stationary, engine off.
- Turn ignition switch to MAR.

Make sure that braking system low pressure warning light is off. If it is not, start the engine, wait until the warning light switches off then switch off the engine.

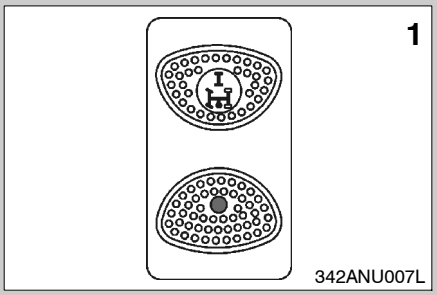
- Press the corresponding PTO button.
- Wait for the yellow light on cluster.
- Start the engine.

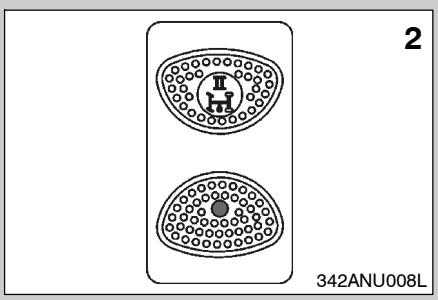
In case of electrical or pneumatic command fault, the PTO can be engaged manually as follows:

- **Remove the Multipower connector ring (Fig. 1, ref. 1) or (Fig. 2, ref. 1) NMV 221;**
- **Fully insert an M12x1.5 bolt.**

Disengage procedure:

- Switch off the engine
- Press the corresponding button.
- Check that corresponding light goes out on cluster.





P.T.O. manual transmission

Engage procedure:

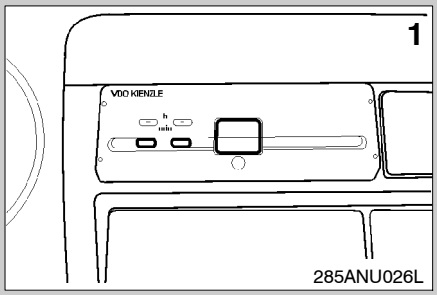
- Gear idling, vehicle stationary, engine at minimum.

Make sure that the braking system low pressure warning light is off. Otherwise wait until it switches off.

- Gearbox in neutral, vehicle stationary, engine idling.
- Press the clutch pedal full down.
- Press the corresponding PTO button (Fig. 1; Fig. 2).
- Wait for the light to light up on cluster.
- Release the clutch pedal.

Disengage procedure:

- Press the clutch pedal full down.
- Press the corresponding PTO button (Fig. 1; Fig. 2).
- Check on cluster that corresponding light goes out .
- Release the clutch pedal.



TACHOMETRIC SIMULATOR

The tachometric simulator (Fig. 1) permits correct electronic management of the cluster.

For more information, refer to the corresponding publications.

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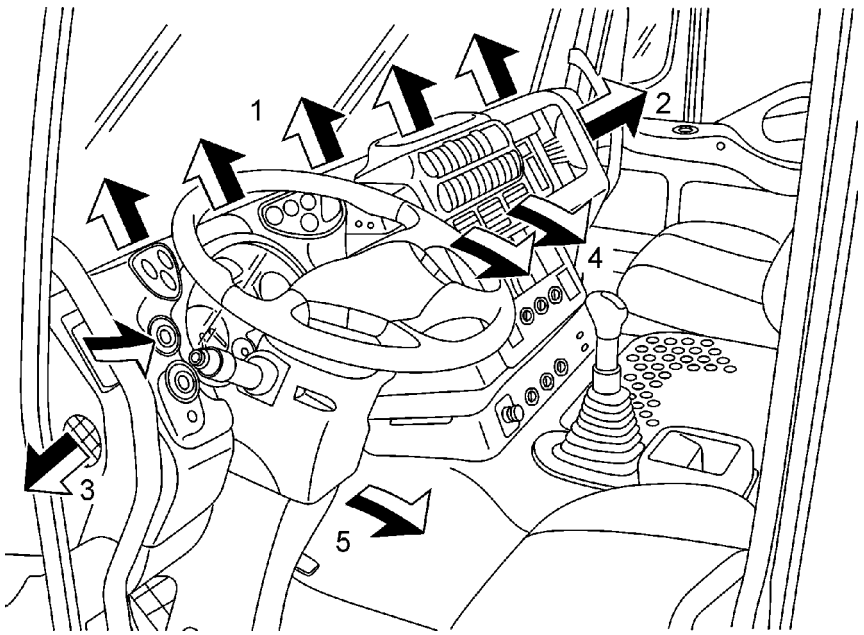

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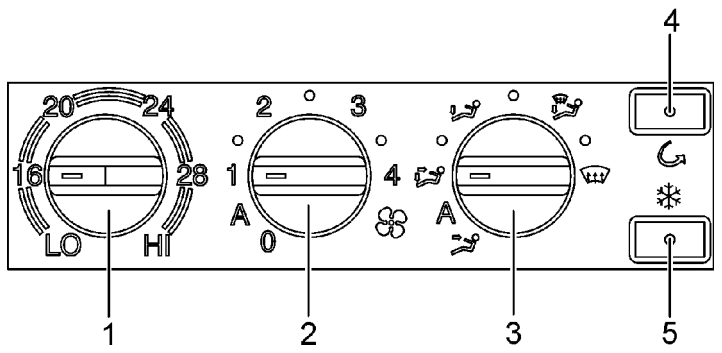
HEATING AND VENTILATION

Climate control system air vents (Fig. 1)

1. Windshield defrosting air outlets
2. Side ventilation air outlets
3. Door windows de-frosting air outlets
4. Central ventilation air outlets
5. Foot ventilation air outlets

□ cool air
■ warm air

1



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Climate controls (Fig. 1)

1. Temperature adjustment control:
2. Four-speed electric fan control
3. Air distribution control knob (see symbols)
4. Internal recirculation control:
   - not pressed: external air inlet
   - pressed: internal recirculation
5. Conditioner control with incorporated warning light (only climate control version)
   - not pressed: off
   - pressed: engaged

Symbols

Ventilation outlets

Foot cooling/outlets

Foot cooling

Foot cooling/windshield

Windshield de-misting and side vent windows

Climate control

Recirculation

Proceed as follows (figure on previous page):

For all versions:

- start engine;
- turn the knob (Fig. 1, ref. 1) of fan control, to set the required ventilation level;
- turn the knob (Fig. 1, ref. 2) to set the required temperature inside the passenger compartment;
- turn the knob (Fig. 1, ref. 3) to the required position according to the climate control requirements (feet-outlets-windshield, see also next page).
- if there is heavy environment pollution press pushbutton (Fig.1, ref. 4) to activate internal recirculation.

Only for versions with climate control:

- press the switch (Fig. 1,ref. 5) to start the air conditioner;
- to disengage the air conditioner, press the switch again.

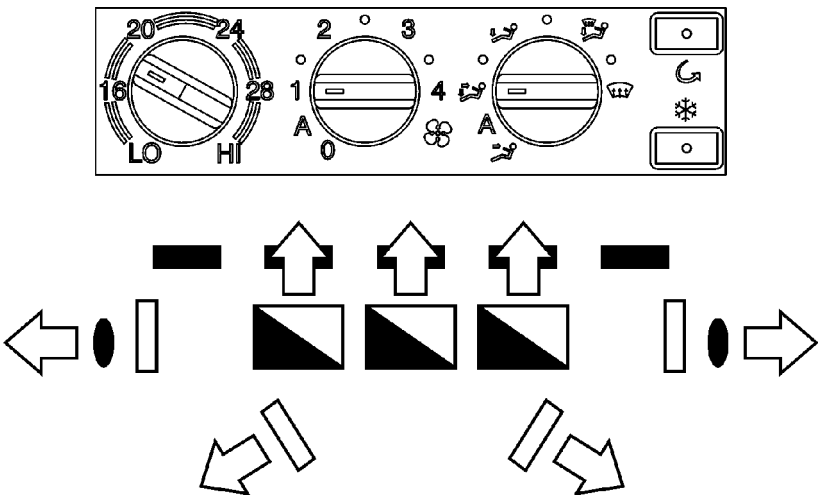
With the knob (Fig. 1, ref. 1) in position 0 (off) there is no electrical enable to the conditioner control.

Hints for use:

- keeping permanently in recirculation position can cause misting of the windows. Periodically press button (Fig 1, ref. 4) to ensure a change of air.
- Do not keep the conditioner on for long times with the fan (Fig. 1, ref. 1) at minimum to avoid ice forming on the evaporator.
- If the cab is overheated (vehicle has remained parked for a long time under the sun) turn the knob (Fig. 1, ref. 1) anticlockwise , and the knob (Fig. 1, ref. 2) clockwise, switch on the conditioner and keep the windows open for a few minutes.
- In the case of a very humid environment switch on the conditioner and fully turn the knob (Fig. 1, ref. 3) clockwise; if necessary adjust the temperature with the knob (Fig. 1, ref. 2), using the conditioner as a dryer.
- Run the system for a few minutes to ensure full efficiency at least once a week, regardless of the temperature.

Any water dripping from under the vehicle with the air-conditioner on is due to normal condensation discharge.

1



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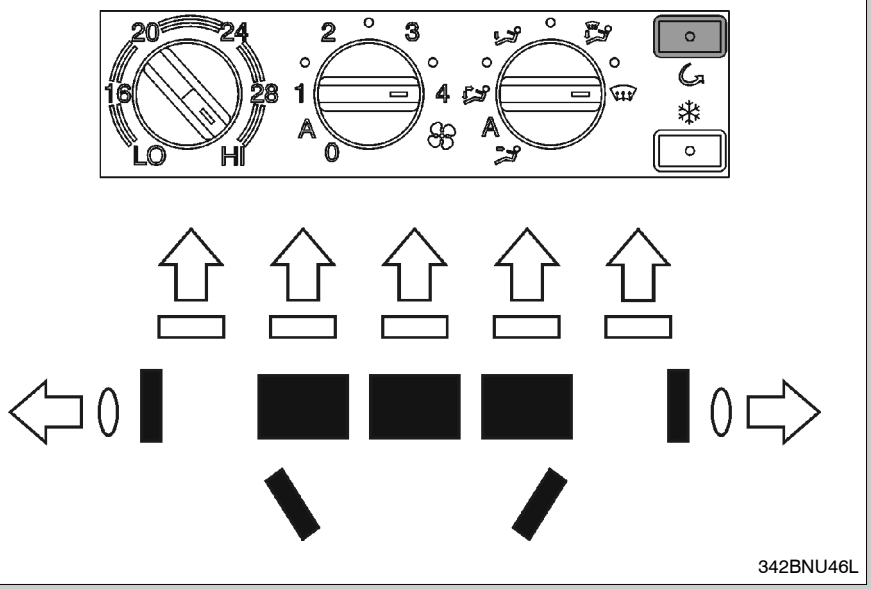
Most common control positions

Normal temperature position

1



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De-misting -de-frosting position

To obtain a rapid increase in air temperature, press the recirculation start button: however, it is not advisable to keep this position for a long time.

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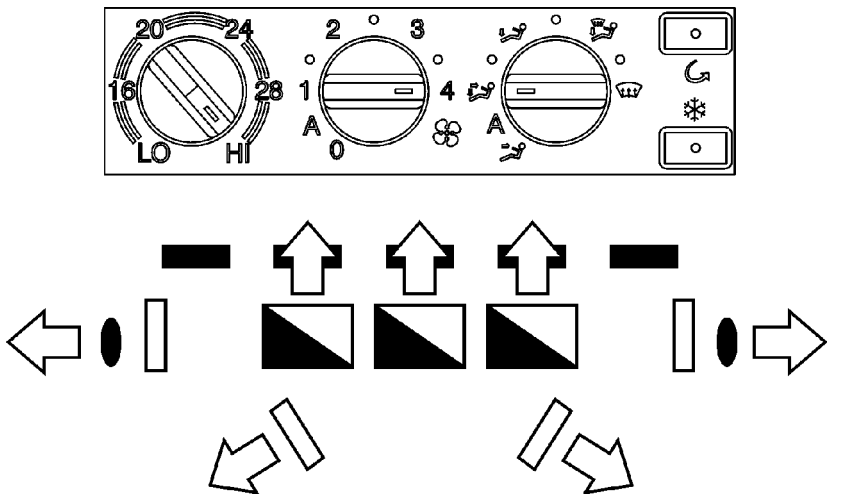

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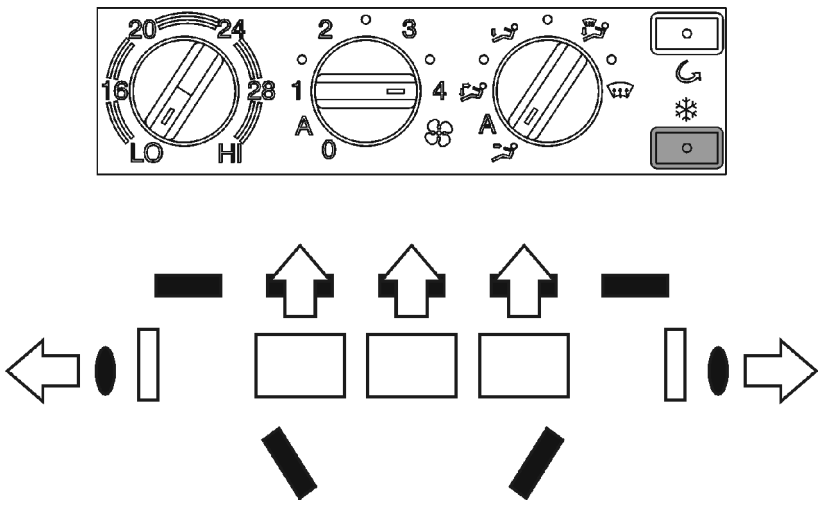
Maximum heating position

1



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Maximum cooling position

For versions with air conditioner press the start button.

1

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AUXILIARY HEATER (WEBASTO)

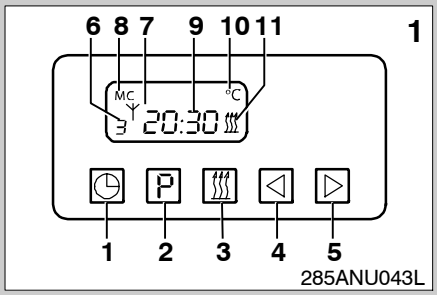
The vehicle is provided with a hot air generator for heating the cabin. Turn the knob (Fig. 1) to activate the hot air generator and modulate the temperature of the air introduced into the cabin.

Proceed as follows to activate the cabin hot air generator:

- Start the auxiliary heater rotating the knob from the position 0.
- Turn the knob gradually clockwise to proportionally increase the air temperature.
- Turn the knob gradually anticlockwise to proportionally decrease the air temperature.

Proceed as follows to turn the hot air generator off:

- Turn the knob to “0” to turn the cabin hot air generator off.

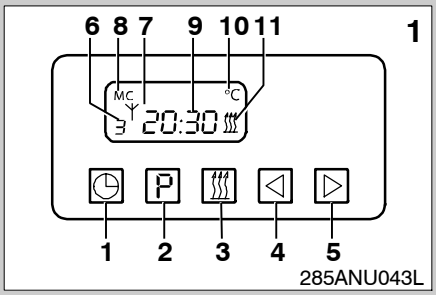


AUXILIARY HEATER (WEBASTO)

The vehicle is provided with an auxiliary heater for heating the engine coolant when the engine is off. Ignition of the heater can be programmed by means of a display for setting the required parameters (Fig. 1).

Auxiliary heater control panel (Fig. 1)

1. Time
2. Programming
3. Heating
4. Back
5. Forward
6. Stored
7. Remote control symbol
8. Day of the week or programmed day
9. Current time or programmed time
10. External temperature
11. Operation indicator

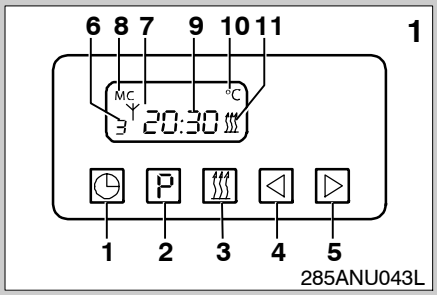


Before setting the time and day of the week

Briefly press the button (Fig. 1, ref. 1). 12:00 will blink on the display. Set the current time during the buttons (Fig. 1, ref. 4 and 5). The digits will stop blinking when the time is stored. The day of the week will blink on the display. Set the day using the buttons (Fig. 1, ref. 4 and 5). The day will be stored when the indication stops blinking. The indication will light up when the key is inserted. It will go out 10 seconds after removing the key.

How to set the time and day of the week

Hold the button (Fig. 1, ref. 1) pressed until the time starts blinking. Adjust as described for the first setting. To set the time only, press the button twice (Fig. 1, ref. 1) after setting the time to skip setting the day. After changing the day of the week, press the button (Fig. 1, ref. 1) to make the day blink for less time.



Operation of the heater with key-off without programming

Symbol (Fig. 1, ref. 11) heater working.

Turning the heater on

Briefly press the button (Fig. 1, ref. 3). Symbol (Fig. 1, ref. 11) and the heating time will appear. The default setting is 120 minutes. It may be modified temporarily or permanently.

Temporarily changing the heating time

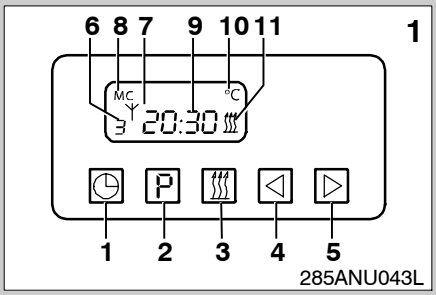
Press button (Fig. 1, ref. 4) after turning on to shorten the operation time (down to 1 minute). Press the button (Fig. 1, ref. 5) to extend the heating time (up to 120 minutes).

Permanently changing the heating time

Do not turn the heater on. Press the button (Fig. 1, ref. 4) and hold it pressed for approximately 3 seconds until the indication blinks on the display. Release briefly. Set the heating time (from 10 to 120 minutes) using the buttons (Fig. 1, ref. 4 and 5). The new setting will be stored when the indication disappears from the display.

Turning the heating off

Briefly press the button (Fig. 1, ref. 3). The symbol (Fig. 1, ref. 11) disappears from the display. The heater will continue to operate for a few minutes to allow the device to cool down correctly (wash-out step).



Operation of the heater with key-on without programming

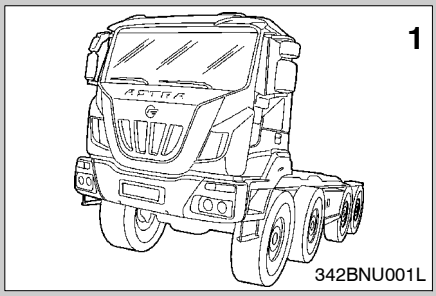
Symbol (Fig. 1, ref. 11) heater working.

Turning the heater on

Briefly press the button (Fig. 1, ref. 3). The symbol (Fig. 1, ref. 11), the time and day of the week will appear. The heater will work until the key is on. At key off, the remaining heating time (15 minutes) may be extended (up to 120 minutes) by pressing the button (Fig. 1, ref. 5) or shortened (down to 1 minute) by pressing the button (Fig. 1, ref. 4).

Turning the heater off

Briefly press the button (Fig. 1, ref. 3). The symbol (Fig. 1, ref. 11) disappears from the display. The heater will continue to operate for a few minutes to allow the device to cool down correctly (wash-out step).



USE OF THE VEHICLE

Precautions for the initial period of use

When the vehicle is new a brief running-in period of at least 150/200 hours is required: Observe the following precautions during this time:

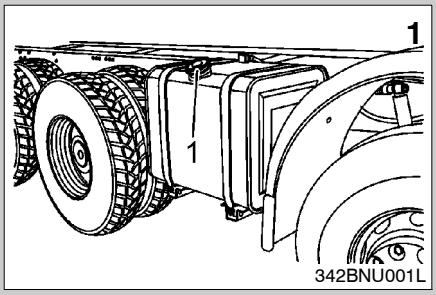
- do not demand maximum engine power;
- after starting, warm the engine slowly; avoid driving at high revs too soon;
- frequently check the oil level;
- check the tightening of the wheel bolts.

General checks

Before starting to use the vehicle, check:

- tyre conditions;
- correct functioning of all lights, headlights and windshield wiper;
- fuel level in tank;
- any faults or low levels indicated on the instrument board;
- check service brake and parking brake efficiency.

Visually inspect the vehicle, checking working conditions and for damage/problems which may cause damage to the vehicle or injury to operators.



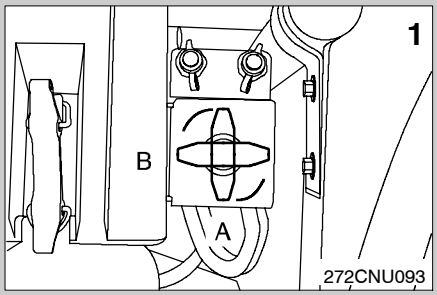
Refuelling

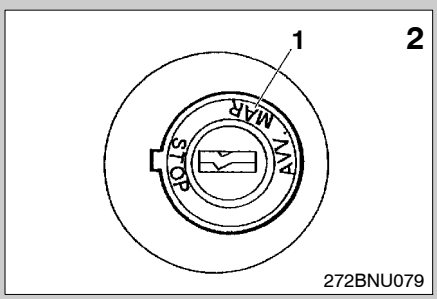
Put out naked flames while refuelling. Do not smoke.

Proceed as follows:

- clean the filler area, open the filler cap (Fig. 1, ref. 1) with the key and refuel with the specified fuel type;
- close the filler cap carefully.

Keep the fuel tank as full as possible.
Use fuels of the specified types supplied by petroleum companies.
Do not use other than specified fuels. Use of other than specified fuels can cause severe engine damage.





STARTING ENGINE

Exhaust gases are poisonous.
Check for adequate ventilation before starting the engine in a confined space.
Always engage the handbrake before starting the engine.

Checks before starting

Check that the main switch (Fig. 1) is on.
A: power off
B: power on

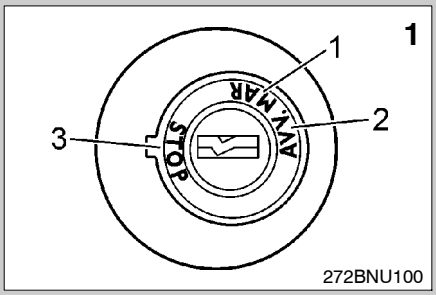
Make all the required daily checks (for more information see MAINTENANCE INSTRUCTIONS).

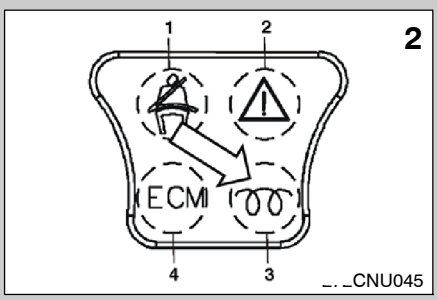
Especially check:

- engine oil level;
- engine coolant level;
- tyre condition;
- tow-hook /semi-trailer fifth wheel condition.

Power up the vehicle electrical system turning the ignition switch to MAR (Fig. 2, ref. 1) and check:

- fuel level;
- lights, warning light, horn and windscreen wiper function;





Starting from drivers cabin

Proceed as follows:

- Check that the parking brake is engaged;
- turn the ignition key to MAR (Fig. 1, ref. 1);
- wait until the engine pre-heating light (Fig. 2) goes out.

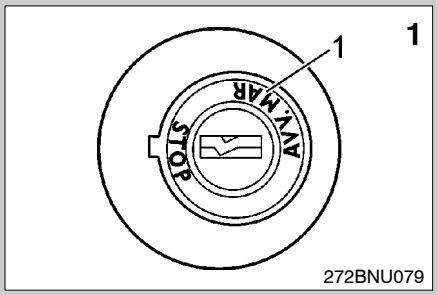
If the key is not turned to start the engine within a few econd, the key must be turned to STOP (Fig. 1, ref. 3) and the procedure repeated.

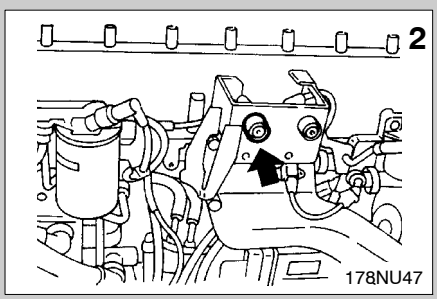
- turn the ignition key to AVV (Fig. 1, ref. 2) and release it as soon as the engine starts.

Do not press the accelerator pedal while starting the engine.

If the engine does not fire immediately, do not insist on the starter motor for more than 15 seconds.

Do not leave the engine idling for a prolonged period of time, whether cold or hot.
After starting the engine, drive the vehicle gently for a certain period, with medium to low engine revs, to allow it to warm up.





Starting from engine bay

The engine can be started with the cabin tipped in the following way:

- Turn the ignition switch (Fig. 1, ref. 1) to MAR position;
- tip the cabin and press the starter button (Fig. 2, see arrow).

Engine starting is only possible if:
- **gearbox is in neutral;**
- **parking brake is engaged.**

Tow starting

The engine cannot be started in any case in presence of a battery fault, because the control units are not powered.

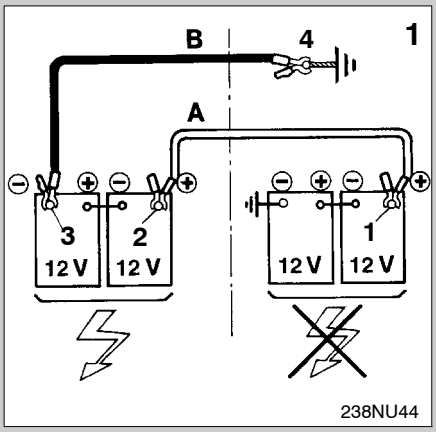
Manual transmission vehicles

Proceed as follows:

- turn the ignition switch (Fig. 1) to MAR;
- engage a medium-low gear according to working conditions.

Vehicles with hydro-mechanical/automatic/automated transmission

The engine cannot be started by towing.



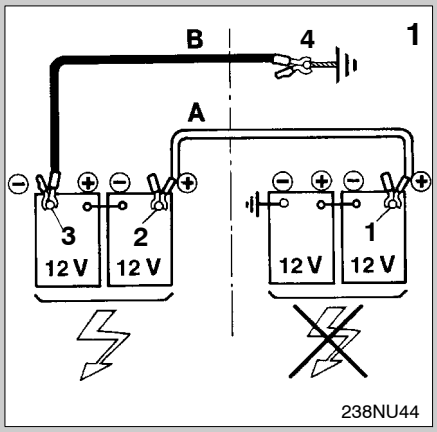
Emergency electrical power

When the batteries are discharged, connect the vehicle to external batteries to restart it.

The vehicle is equipped with a 24 volt electrical system with negative and earth. Only use 24 volt batteries to jump start the engine.

Proceed as follows:

- lay the cables on the ground ensuring that the terminals do not touch metal parts or each other; connect one end of the red cable (A) to the POSITIVE terminal (Fig. 1, ref. 1) of the flat battery;
- connect the other end of the red cable (A) to the POSITIVE terminal (Fig. 1, ref. 2) of the external battery;
- connect one end of the black cable (B) to the NEGATIVE terminal (Fig. 1, ref. 3) of the external battery;
- connect the other end of the black terminal (B) to any point of the chassis of the vehicle (Fig. 1, ref. 4) to be started which is certainly connected to earth.



Select a connection point as distant as possible from the vehicle batteries.
Make sure that the two vehicles do not come into contact.
Respect the sequence of the operation.
Do not reverse the polarity when making the connection.
Use cables with a suitable cross-section area.
Never use a battery charger to start the engine.
Do not disconnect the accumulators even if they are discharged.

The use of a booster is permitted following the use instructions of the said instrument.

Always start the engine a previously described.

After starting the engine, disconnect the cables by reversing the connection sequence.

The vehicle electrical system must work in presence of battery, even if flat.

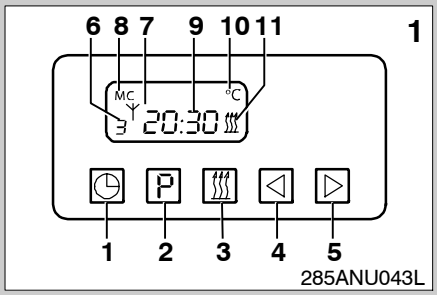
In any case verify the causes of the batteries discharge.

COLD START

The following table shows the precautions to be adopted for starting the engine at temperatures lower than 0 °C.

For more information on fluids, refer to the MAINTENANCE INSTRUCTIONS chapter.

Operations	Temperature [°C]		
	From 0 to -19	**From -19 to -25**	**Lower than -25**
Starting procedure	normal	with heater	with heater
Fuel	replace with Artic diesel fuel		replace with suitable fuel
	add suitable percentage of additive		wash out the engine and auxiliary heater feeding circuit
Engine oil	no replacement needed	replace with suitable type	
Engine coolant	appropriate percentage of antifreeze		
Transmission oil	no replacement needed		
Power steering steering fluid	no replacement needed		
Windscreen washer fluid	appropriate percentage of antifreeze		
Batteries	check maximum charge by measuring electrolyte density		



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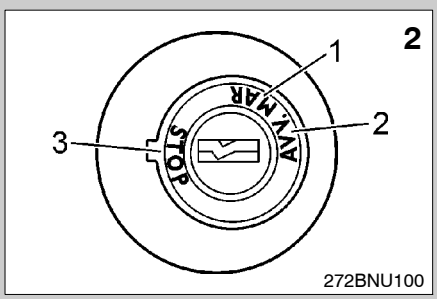

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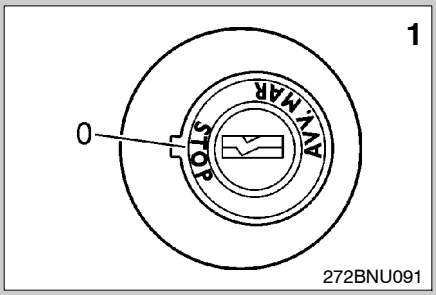
Starting with heater

Proceed as follows:

- Start the supplementary heater (Fig. 1) as described above.
- Let the heater run for at least 60 minutes.
- Start the engine (Fig. 2) as described above.
- Check that the oil pressure reaches the maximum value within thirty seconds: otherwise stop the engine, start the auxiliary heater for at least 10 minutes and start the engine again.
- After starting the engine, keep the heater running to warm up the engine faster.

The vehicle can be used at maximum power only after the liquid temperature.



STOPPING ENGINE

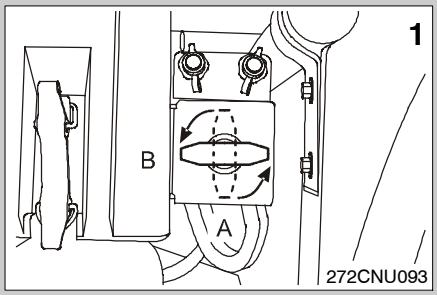
Stopping from drivers cabin

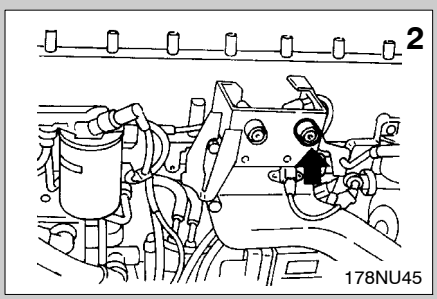
To stop the engine, proceed as follows:

- bring the engine to idle speed for a few minutes to reached steady state temperature and ensure turbocompressor lubrication;
- turn the ignition switch to STOP (Fig. 1, ref. 0) and remove the key.

DO NOT switch off the engine with the vehicle in motion to prevent loss of power steering.
DO NOT remove the key from the ignition switch with vehicle in motion to prevent locking the steering.

Vehicles with automated transmission: if the gearbox is not in neutral when the engine is stopped, the system automatically sets this position when the key is removed from the switch.
In this condition there is no mechanical connection between engine and wheels, and the vehicle may roll forward if the parking brake is not applied.





After switching off the engine the engine control unit has to carry out a series of diagnostic procedures that require electrical power for a few seconds.
For this reason, before cutting out the batteries wait at least 10 seconds.
Premature deactivation of the electric power through the circuit breaker (Fig. 1, position A) can cause considerable operating problems on the engine control system. Therefore this manoeuvre is only to be performed in cases of extreme necessity.
After five (5) consecutive engine emergency switch-off operations, on the next start the engine starts normally but is unable to provide power and remains at idle speed.
To restore complete function, contact the Service Network.

Stopping from engine bay

To stop the engine, proceed as follows:

- press the button (Fig. 2, see arrow) until the engine stops.

Always disconnect batteries by means of the cut-off provided after stopping the engine

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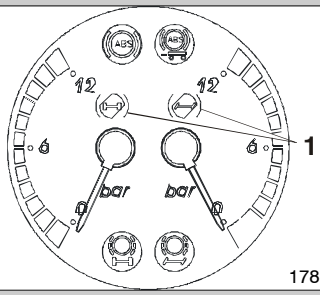

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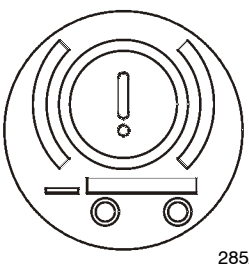

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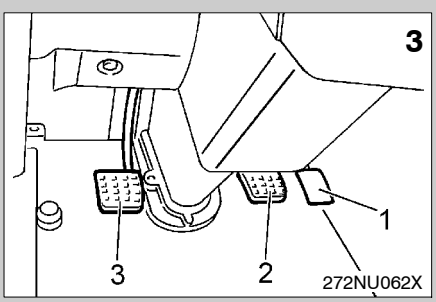


MANUAL TRANSMISSION VEHICLES

STARTING THE VEHICLE

Before starting the vehicle, make sure that the tractor brake low pressure warning lights and trailer brake low pressure warning lights (if fitted) are off, and that brake air pressure has reached 6 bar (Fig. 1). If necessary wait a few minutes for the compressor to charge the air tanks.

To start the vehicle proceed as follows:

- press the clutch pedal (Fig. 2, ref. 3);

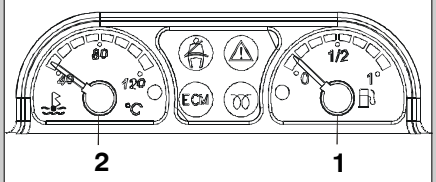
Press the pedal full down to fully disengage the clutch to prevent premature wear to synchronisers.

- engage a low gear (1st to 3rd according to gradient);
- release the parking brake, then release the clutch while pressing the accelerator pedal (Fig. 2, ref. 1).

The vehicle must be started in the right gear, especially if loaded and/or on a hill to prevent premature clutch wear.

Proceed to engage the next gear pressing the clutch down before selecting the gear.

1



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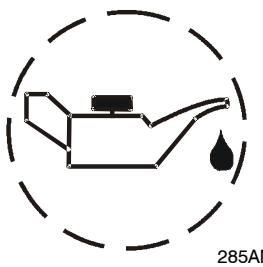

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DRIVING THE VEHICLE

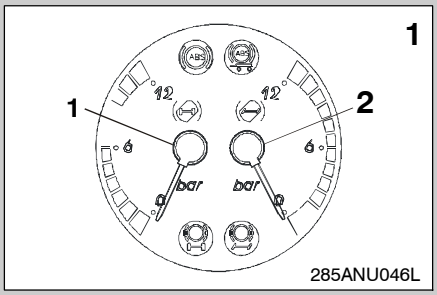
In normal driving conditions the danger warning lights (RED) must be off.
If one or more warning lights come on, stop the vehicle and ascertain the cause.

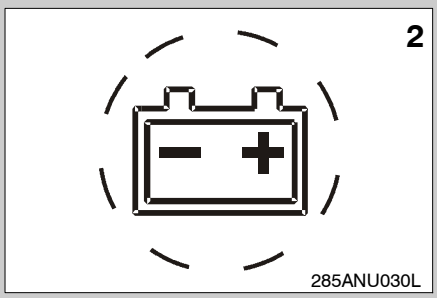
When driving, check that:

- fuel level(Fig. 1, ref. 1) is not at minimum;

Never totally empty the fuel tank to prevent any deposits or condensation water from the tank reaching the injectors.

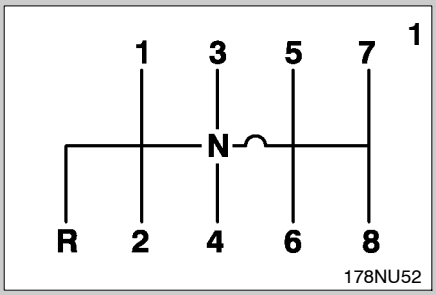
- engine coolant temperature light (Fig. 1, ref. 2) remains at around 90° C;
- the engine oil pressure (Fig. 2) is suitable; the warning light will go out after the engine has started;

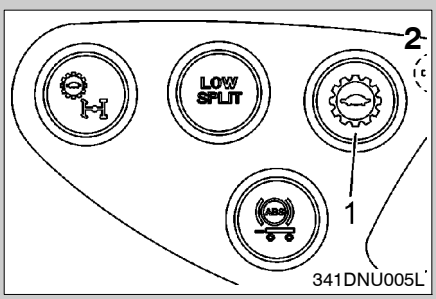




- the rear (Fig. 1, ref. 1) and front (Fig. 1, ref. 2) brake air pressure is suitable (max. 12 bars, min. 5.5 bars).
- the alternator warning light (Fig. 2) is off.

Do not exceed maximum engine speed, especially on downhill stretches.
Never run down hill in neutral or with clutch disengaged.
Use auxiliary brakes for long downhill stretches (engine brake, intarder) to prevent service brakes from overheating.
Do not for any reason use the parking brake when travelling (except in emergency).





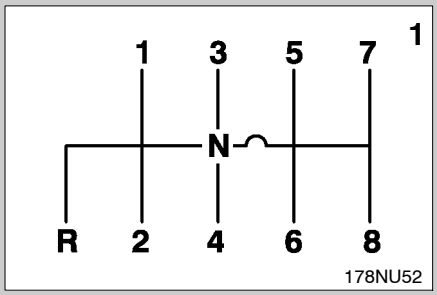
GEARBOX

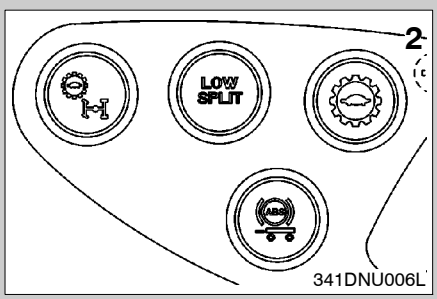
The operations to control the gearbox are the same as those on traditional type synchronised gearboxes, i.e. without requiring doubling of the clutch when changing up and without intermediate acceleration when changing down.
The individual gears can be engaged only when the parts to be mated reach the same speed. It is therefore important to press the gear lever evenly until the gear is engaged.

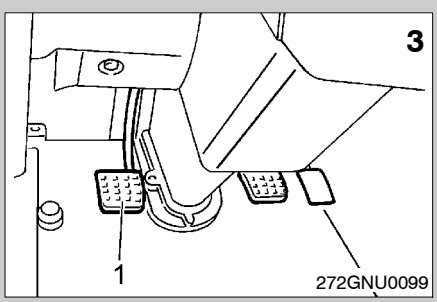
To avoid damaging the toothing of the gear, reverse should only be engaged when the vehicle is stationary.

Gearbox control (Fig. 1)

When the low range group is selected ("Tortoise" on warning light, Fig. 2, ref. 1) and the gearbox is in neutral, the gear lever is positioned between 3rd and 4th gear whereas when the high range group is selected ("Tortoise" off warning light, Fig. 2, ref. 1) and the gearbox is in neutral, the lever is positioned between 5th and 6th.
To engage 1st and 2nd and 7th and 8th, the gear lever must be moved towards the left or right to overcome the slight resistance of the positioning springs.
The selections 3rd/4th and 5th/6th are separated by a harder spring click.







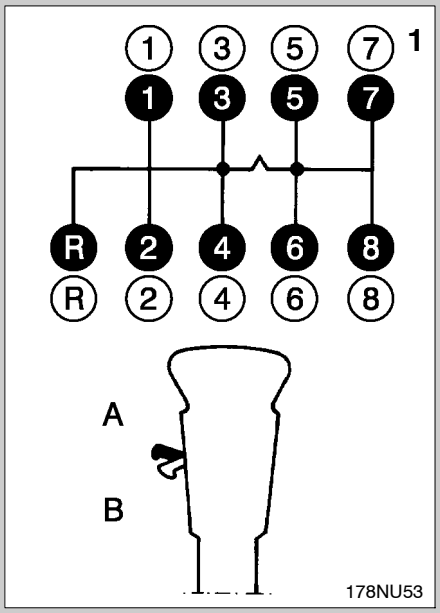
Strike rapidly with the palm of your hand to overcome elastic resistance to shift range. The lever will position itself automatically for the desired selection of 3rd/4th and 5th/6th (Fig. 1).
During change-over the gear shift automatically activates, indicated by the relevant LOW SPLIT warning light (fig. 2).that switches on or off.
To protect the clutch, the engine and the gearbox against run-away speed rates, SPECIAL CARE MUST BE TAKEN TO AVOID ERRONEOUS OPERATIONS when a lower gear is engaged.
In particular:

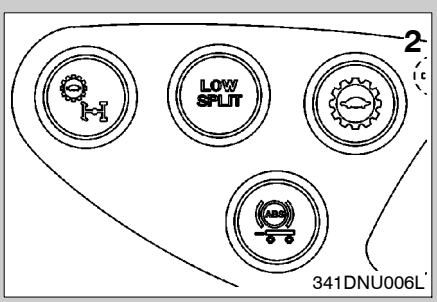
- A lower gear must be engaged only when the vehicle speed is lower than the maximum speed of the gear .
- Shift from range 5/6 to range 3/4 only if the vehicle speed is slower than approximately 30 km/h.
- Do not shift up or down more than two ratios (four half ratios) at a time.

Any passage from the high range to the low range other than the passage 5th and 4th used for normal driving conditions must be avoided. The lever should not be used to set the low range even when the vehicle is momentarily in neutral.

Operating the clutch

The clutch pedal (Fig. 3, ref. 1) must be fully depressed each time a gear is changed. Changed gear effected only if the clutch is completely disengaged.





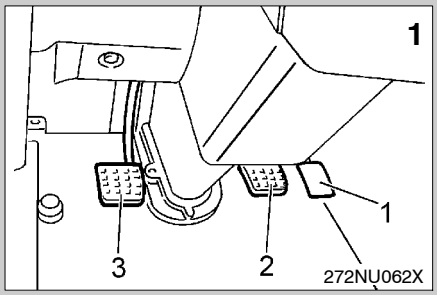
Splitter control

The splitter control which makes it possible to divide each of the eight gears (and reverse) occurs via the pre-selection valve located in the control lever and operated by the pre-selection lever (Fig. 1):

- lever upwards (position A) = > normal gears
- lever downwards (position B) = > step-up gears

To control the splitter the lever should be worked and the clutch pedal fully depressed.
A valve activated by the clutch pedal commands the splitter control cylinder, so that switching is obtained. To obtain correct splitter operation, engagement and disengagement movements must not be abrupt.
Engagement of reduced gears is indicated by the relevant LOW SPLIT warning light (Fig. 2) that switches on.
The use of the splitter is particularly useful in certain cases, for example:

- to exploit the maximum power of the engine when difficulty is experienced when driving off, overtaking or travelling uphill;
- when travelling in urban areas or when travelling in a queue when you wish to maintain the engine at an economical rpm.



STOPPING THE VEHICLE

To stop the vehicle proceed as follows:

- release the accelerator pedal (Fig. 1, ref. 1) and gradually press the brake pedal (Fig. 1, ref. 2);
- when the vehicle is drawing to a halt, depress the clutch pedal (Fig. 1, ref. 3) and move the gear lever to neutral;
- when the vehicle has come to a halt, engage the parking brake.

DO NOT switch off the engine with the vehicle in motion to prevent loss of power steering.
DO NOT remove the key from the ignition switch with vehicle in motion to prevent locking the steering.

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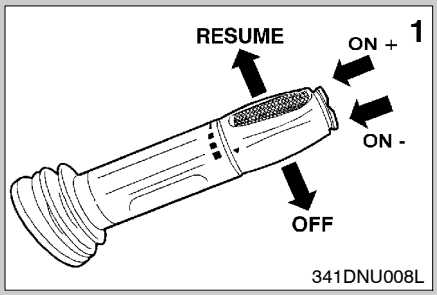


ALL VEHICLES

SPEED PROGRAMMER

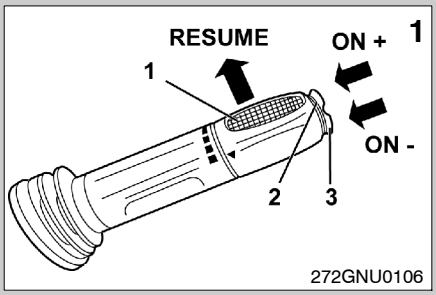
Engine idle speed adjustment / memorising

The speed programmer is a device that acts on the engine power supply management system, controlling rotation speed both with vehicle stationary and in motion, so that certain conditions are met.

Keep the brake pedal pressed throughout the operation.

Conditions:

- engine at idle speed;
- engine at temperature over 30 °C.



Proceed as follows:

- Action the Cruise Control lever (Fig. 1, ref. 1) toward the steering wheel (RESUME) until engine speed reaches the basic stabilised rate (approx 550 rpm);
- Adjust speed as required using ON + (Fig. 1, ref. 2) or ON – (Fig. 1, ref. 3) (pivoting head key).

Each touch of the ON key increases or decreases engine speed by circa 20 rpm. Engine idle speed must be between the following values:

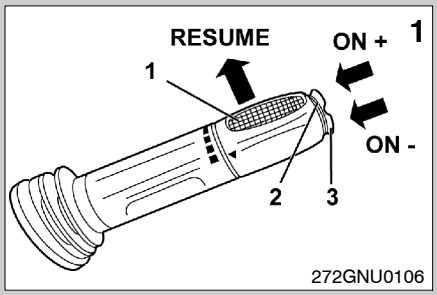
- **minimum value: 550 rpm**
- **maximum value: 750 rpm**

Adjust idle speed according to needs (noise, vibration, etc.).

- When required speed is reached, move the Cruise Control lever again toward the steering wheel (RESUME) for about 5 seconds.
- Release the brake pedal.

This will memorise the new speed even after stopping the engine, and the new setting will be valid for all subsequent restarts.

If the procedure is not carried out correctly and/or problems are encountered during it, the previously memorised speed is maintained.



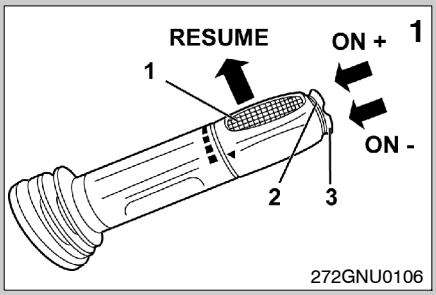
Vehicle speed (cruise control) adjustment / memorising

The system controls and maintains vehicle speed.

The Cruise Control must not be used in heavy traffic conditions or on roads where constant speed adjustment is necessary.

If the set speed is no longer achievable the device cuts-out automatically.

If vehicle speed increases by more than 2 kph over the set value (e.g. on descending road) to slow the vehicle and maintain set speed, engine braking is automatically engaged.
If vehicle speed increases more than 4 km/h also the retarder (if present) engages.

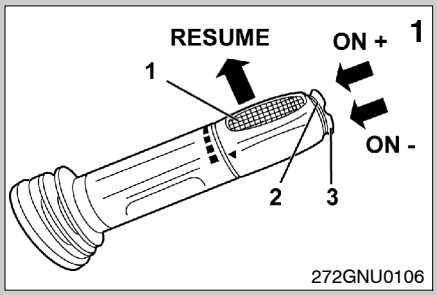


Vehicles with automated transmission: if the vehicle speed exceeds 6 km/h, the transmission will shift down (automatic mode only). The automated transmission, in automatic mode, will shift down whenever necessary (increase coolant flow rate).

Vehicles with automated transmission without retarder: if the vehicle speed increases to over 4 km/h despite the intervention of the exhaust brake, the transmission with automatically shift down (in automatic mode only).

Conditions:
- engine brake lever/retarder not engaged;
- vehicle moving with gear engaged;
- vehicle speed greater than 20 kph;
- brake pedal not pressed;
- clutch pedal not pressed.

Control	Vehicle speed regulation
ON +	Increases speed
ON -	Decreases speed
RESUME	Selects last set speed
OFF	Cancels speed regulation

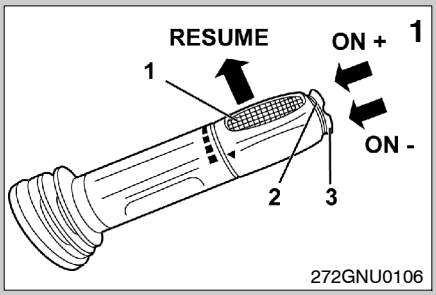


Enable

Proceed as follows:

The function can be enabled only if the brake pedal has been pressed at least once after starting the vehicle.

- Bring the vehicle to the steady speed to maintain with the accelerator pedal;
- Press the ON button (+) (Fig. 1, ref. 2) once: the speed value is automatically memorised;
- Release the accelerator pedal.



Changing setting

Proceed as follows:

- after activating the function press ON (+) (Fig. 1, ref. 2) to increase vehicle speed;

or

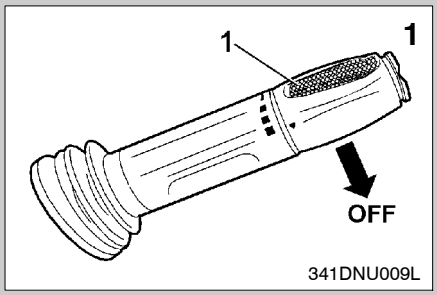
- after activating the function press ON (-) (Fig. 1, ref. 3) to decrease vehicle speed.

Tip Function

Briefly press the pivoting ON button (+) (Fig. 1, ref. 2) or ON (–) (Fig. 1, ref. 3) to change speed in 1 kph steps.

Ramp Function

Holding the pivoting ON button (+) pressed (Fig. 1, ref. 2) or (–) (Fig. 1, ref. 3) increases speed continuously.



Permanent disable

Proceed as follows:

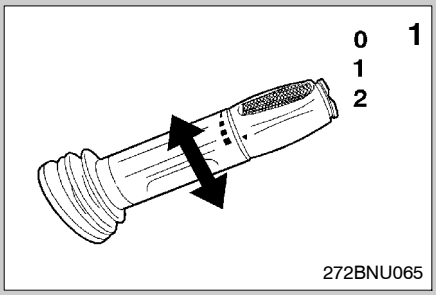
- Pulling (OFF) the Cruise Control lever (Fig. 1, ref. 1);
  or
- Operate the brake or engine brake pedal;
  or
- Press/turn the accelerator pedal (demanding a higher speed than set) for more than 60 seconds.

After disabling it is possible to return to the previous setting by pulling the Cruise Control lever toward the steering wheel (RESUME).
If the set speed is no longer achievable the device cuts-out automatically.
To prevent disabling the engine brake or intarder on downhill stretches, the Cruise Control remains active if the brake pedal is pressed at speed over 4 kph.

Temporary disable

Proceed as follows:

- Operate the clutch pedal (if present) the system shifts to stand-by. After disengaging the clutch the vehicle returns to the cruising speed set previously.
- Press/turn the accelerator pedal for more than 60 seconds. As soon as the accelerator is released the function automatically resumes at the last set value.

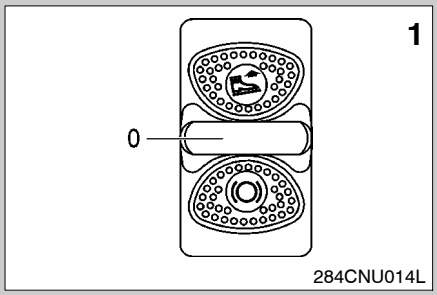


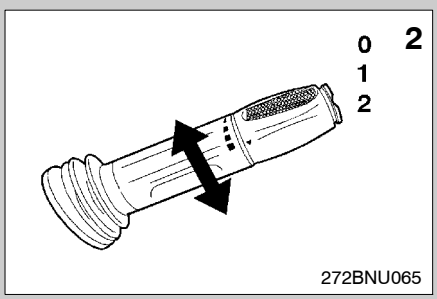
ENGINE BRAKE CONTROL SELECTION (vehicles without intarder)

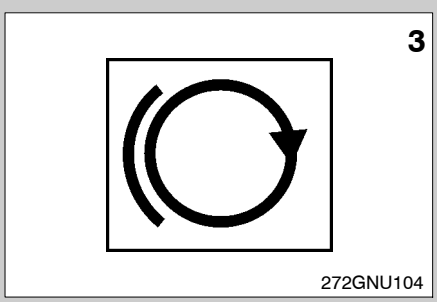
The device is controlled by turning the end part of the lever (Fig. 1) and (Fig. 1), which has three positions (from 0 to 2):

- position 0: disabled
- position 1: 50% engine braking
- position 2: 100% engine braking

For the same lever positions, maximum engine braking effect is achieved by engaging lower gears, since braking is proportional to engine revs.
Engine brake engagement disables all cruise control operations
Whatever the setting, the function is disabled as soon as the accelerator pedal is pressed.







To enable the device:

- not press the switch (Fig. 1 item 0);
- rotate the terminal part of the lever (Fig. 2) to the required braking position.

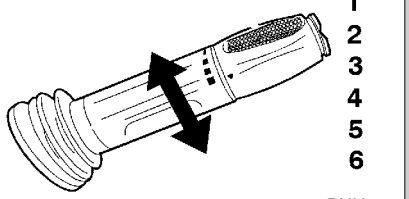
To disable the device:

- return the end part of the lever to position 0.

Use the retarder to reduce vehicle speed on turns or downhill, to prevent overheating the brakes.

Function warning light (Fig. 3) switches on:

- bringing the ignition switch to MAR (RUN) for three seconds (test);
- in fixed mode until the retarder performs its braking action;
- flashing if there is a system fault.



1

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Position lever	Engine brake	Intarder
0	OFF	deactivated
1	ON (100%)	deactivated
2	ON	step 1
3	ON	step 2
4	ON	step 3
5	ON	step 4
6	ON	step 5

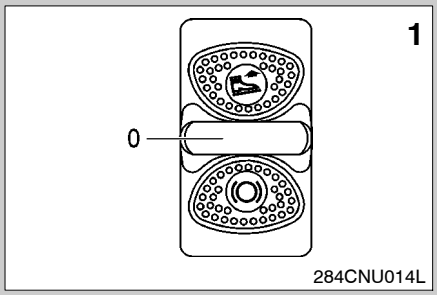
2

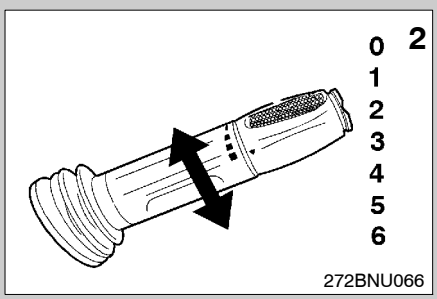
228NUR53

ENGINE BRAKE AND INTARDER CONTROL SELECTION (vehicles fitted with intarder)

The device is controlled by turning the end part of the lever (Fig. 1) and (Fig. 1), which has seven positions (from 0 to 7), corresponding to progressively higher levels of braking (as shown in table, Fig. 2).

For the same lever positions, maximum engine braking effect is achieved by engaging lower gears, since braking is proportional to engine revs.
Engine brake engagement disables all cruise control operations
Whatever the setting, the function is automatically disabled as soon as the accelerator pedal is pressed.





To enable the device:

- not press the switch (Fig. 1, item 0);
- rotate the terminal part of the lever (Fig. 2) to the required braking position.

To disable the device:

- return the end part of the lever to position 0.

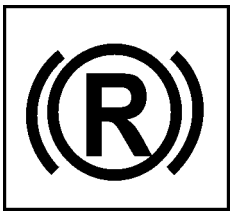
Vehicles with automated gearbox (in automatic mode): with the lever in position 6, the transmission automatically shifts to the lower gear whenever this is needed to ensure maximum efficiency of the exhaust brake.

Continuous use of the retarder increases the temperature of the oil and the coolant.

Proceed as follows to avoid overheating:

- position 1-2-3: undetermined intarder on time;
- position 4-5-6: maximum intarder on time 2 minutes.

The braking effect is gradually reduced so as to prevent exceeding the maximum allowed temperature of the coolant.



1

272GNU105

Function warning light (Fig. 1) switches on:

- bringing the ignition switch to MAR (RUN) for three seconds (test);
- in fixed mode until the retarder performs its braking action;
- flashing if there is a system fault.

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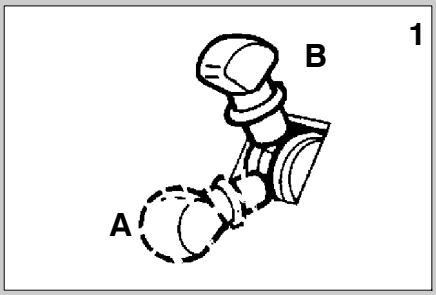


1

VEHICLE PARKING

Parking brake – vehicles without trailer

The parking brake (Fig. 1) has two positions:

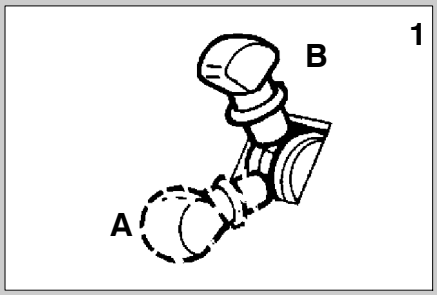
- position A: engaged, vehicle braked;
- position B: disengaged, vehicle NOT braked.

To engage the parking brake bring the lever to position A.
To disengage the parking brake raise the collar and bring the control lever to position B.

Never use the parking brake (unless in an emergency) when the vehicle is running.

The parking brake must be engaged in the following situations:

- **temporary or prolonged parking of the vehicle;**
- **when loaading/unloading the vehicle.**



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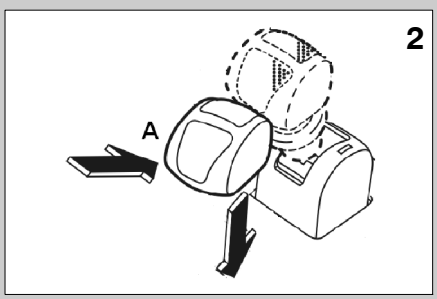


2

Parking brake – vehicle with trailer

The parking brake (Fig. 1) has two positions:

- position A: engaged, vehicle braked;
- position B: disengaged, vehicle NOT braked.

To engage the parking brake bring the lever to position A.
To disengage the parking brake raise the collar and bring the control lever to position B.

Never use the parking brake (unless in an emergency) when the vehicle is running. The parking brake must be engaged in the following situations:

- **temporary or prolonged parking of the vehicle;**
- **when loaading/unloading the vehicle.**

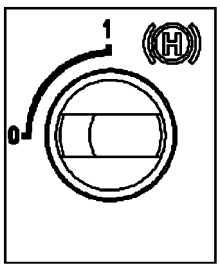
Parking brake efficiency check

Proceed as follows:

- bring the vehicle (tractor + trailer) on an appropriate slope;
- set the lever in position A (Fig. 1);
- press and push (Fig. 2) the lever keeping it in position: the vehicle must not move.

In this position the trailer parking brake is excluded.
Any movement of the vehicle indicates an insufficiency of the TRACTOR parking brake.

When released, the lever returns to position A.



1

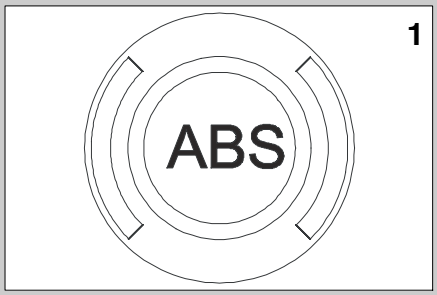
Additional parking brake

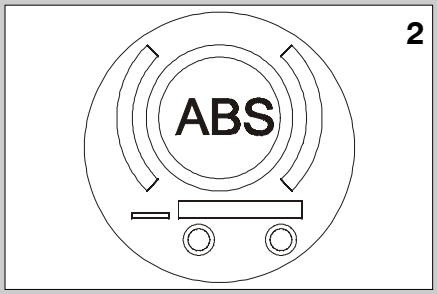
The additional parking brake (Fig. 1) has two positions:

- position 0: off;
- position 1: on.

To engage the additional parking brake, turn the knob to position 1 and wait for 5 to 6 seconds.

The additional parking brake is of the non-proportional type and can be engaged only after engaging the parking brake.
Since it is pneumatically operated, it must be used only with running engine and for short periods of time.





A.B.S. ANTI-LOCK BRAKING SYSTEM

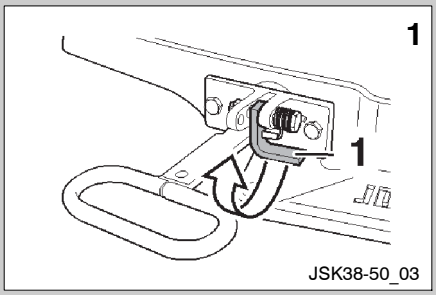
The A.B.S. system provides optimal braking and perfect vehicle control in all conditions. in particular:

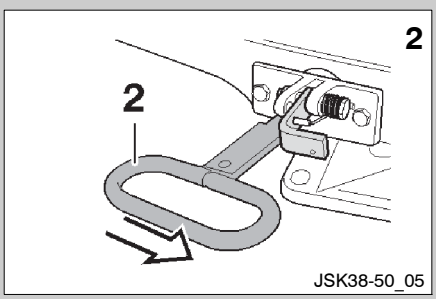
- it prevents wheel locking while braking in any road conditions;
- it reduces stopping distance;
- increases safety for the driver who can maintain vehicle stability and direction.

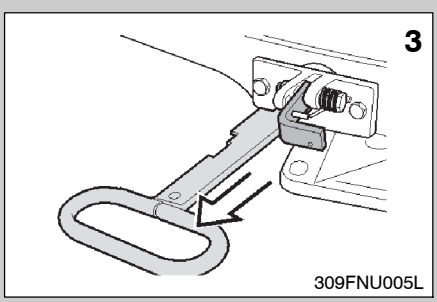
Functioning check or any faults on the ABS system are indicated with the ignition key on “MAR”.

1. Tractor ABS (yellow) (Fig. 1); also the generic warning light switches on. This indicates a fault on the tractor ABS system.
2. Trailer ABS (yellow) (Fig. 2); also the generic warning light switches on. This indicates a fault on the trailer ABS system.

When there is an A.B.S. circuit fault. the vehicle braking related to that circuit takes place in normal mode. In any case it is necessary to go as soon as possible to the nearest After Sales dealership .







SEMI-TRAILER COUPLING

Coupling

Proceed as follows to open the fifth wheel:

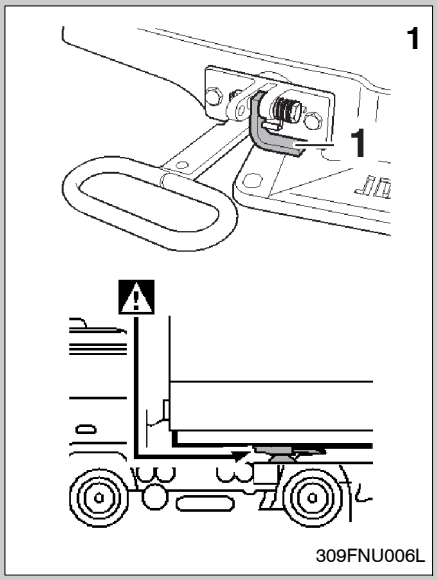
- raise the safety lever (Fig. 1, ref. 1);
- move the bolt (Fig. 2, ref. 2) forwards to release the first stop notch (Fig. 3, see arrow);
- pull the bolt fully to the second stop notch (see arrow).

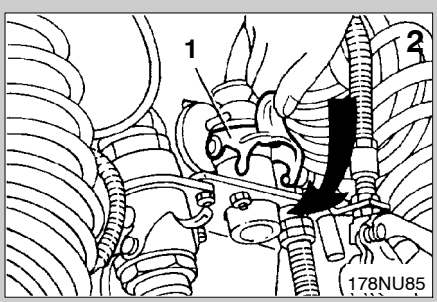
Proceed as follows to couple the semi-trailer:

- immobilise the semi-trailer;

The semi-trailer skid plate should be approx. 5 cm lower than the top of the fifth wheel.

- reverse the tractor so that it is in line with the semi-trailer, the locking mechanism functions automatically;
- drive the tractor forwards to check that the semi-trailer is hooked-up correctly;
- check the closure as shown below;
- lift the supporting legs;
- connect the electric and pneumatic connections.





Check closure

- check that the safety lever (Fig. 1, ref. 1) is in the lower position;
- the back plate must uniformly rest on the fifth wheel (see arrow).

Uncoupling

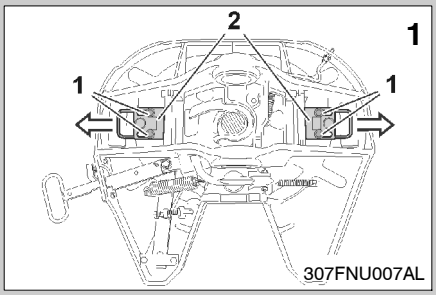
Proceed as follows:

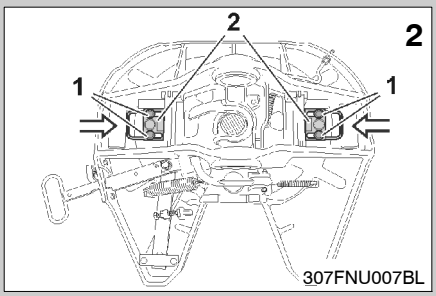
- immobilise the vehicle;
- lower the supporting legs;
- disconnect the pneumatic and electric connections;
- open the fifth wheel as described above;
- move the tractor forwards.

When the coupling pin is released the locking mechanism will automatically rearmed and the fifth wheel will be in coupling position.

ABS coupling (if foreseen)

When using a tractor without a semi-trailer, particular attention should be paid to reconnecting the ABS coupling in its seating. After inserting it, press hard on the bracket (Fig. 2) until it locks into position. If this is not carried out water may get into the system causing corrosion and malfunctioning of the device.





Pivoting fifth wheel

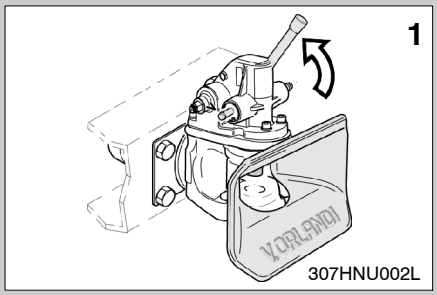
Crosswise pivoting movements may be enabled for off-road use only.
Crosswise pivoting must be blocked for safety reasons when travelling at high speed on roads.

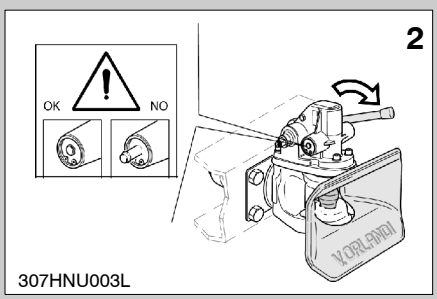
How to enable crosswise pivoting

- Loosen the hexagonal head screws (Fig. 1, ref. 1) on each side.
- Extract the two lock teeth (Fig. 1, ref. 2) to reach end of travel in the slot (see arrow).
- Fasten the hexagonal head screws again (Fig. 1, ref. 1) at a tightening torque of 80 Nm.

How to lock crosswise pivoting

- Loosen the hexagonal head screws (Fig. 2, ref. 1) on each side.
- Insert the two lock teeth (Fig. 2, ref. 2) to reach end of travel in the slot (see arrow).
- Fasten the hexagonal head screws again (Fig. 2, ref. 1) at a tightening torque of 80 Nm.

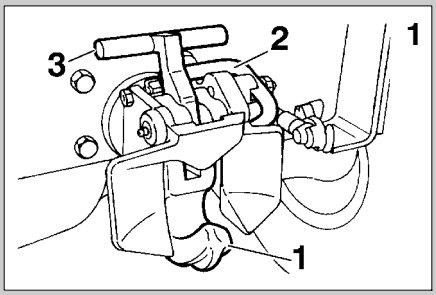


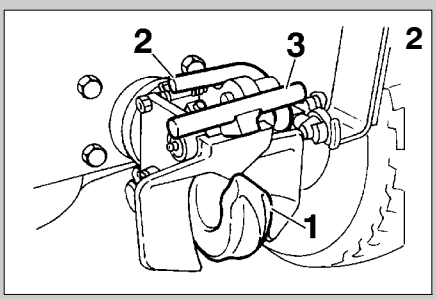


TRAILER HOOKING – I type

Proceed as follows:

- ensure that the chocks are positioned under the rear wheels;
- the front axle can still be moved;
- adjust the height of the trailer draw bar to that of the pintle hook;
- lift the lever (Fig. 1, see arrow);
- hook the trailer to hook (Fig. 1, ref. 1);
- reverse the tractor and insert the trailer eyebolt in the bell-shaped head: the lever will snap down;
- check coupling by checking that the lever is down (Fig. 2, see arrow) and the safety pins are retracted (detail).

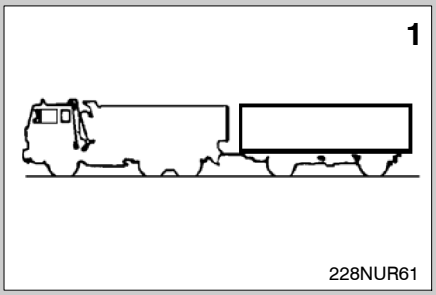




TRAILER HOOKING – II type

Proceed as follows:

- secure the trailer with chocks under the rear wheels, so that the front axle can be manoeuvred;
- adjust the height of the trailer draw bar to that of the pintle hook;
- pull the lever outwards (Fig. 1, ref. 2) and at the same time raise the lever (Fig. 1, ref. 3) so as to lower the hook (Fig. 1, ref. 1);
- connect the trailer to the hook (Fig. 2, ref. 1) checking that the safety lever (Fig. 2, ref. 2) has entered into its housing.



NORMS FOR TOWING TRAILER / SEMI-TRAILER

Before hitching-up

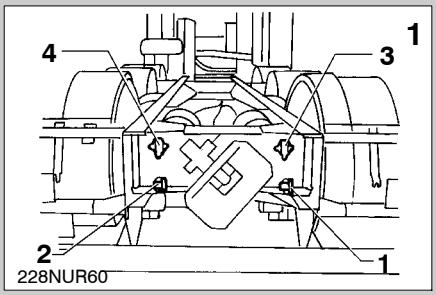
Before reversing with the tractor, make sure no people are standing in the immediate area

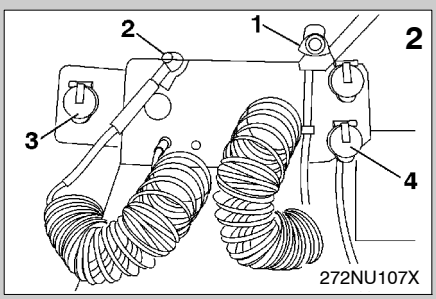
After hitching-up

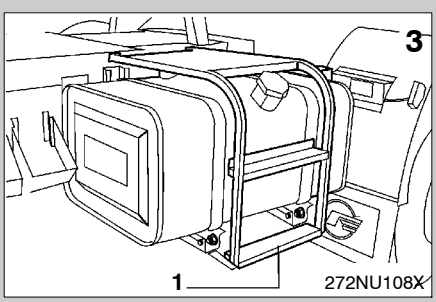
Engage the parking brake.
Check that the coupling has been made correctly.
Connect the air lines and electrical cables.
Check the brakes and lights.
Check correct function of the safety device.

When driving

Proceed with care while towing a trailer/ semi-trailer. Never exceed the maximum admissible weight.
In case of stops on hill, check that the parking brake functions correctly. It must be capable of holding the vehicle stopped.







TRAILER COUPLING

Pneumatic coupling (Fig. 1)

1. Automatic (red)
2. Adjustable (yellow)

Electric coupling (Fig. 1)

3. 15 pin coupling (ISO 12098)
4. ABS

SEMI-TRAILER COUPLING

Pneumatic coupling (Fig. 2)

1. Automatic (red)
2. Adjustable (yellow)

Electric coupling (Fig. 2)

3. 15 pin coupling (ISO 12098)
4. ABS

LADDER

Use the specific ladder (Fig. 3, ref. 1) to access the electric and pneumatic connections of the tractor.

Keep the steps clean at all times to avoid slipping.

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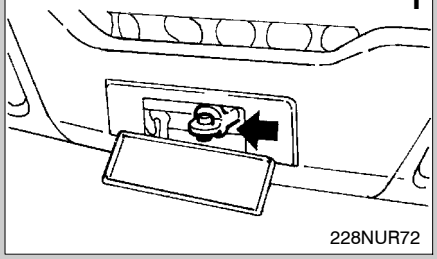

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TOWING THE VEHICLE

The towing of the vehicle is to be carried out using the specific hook for this purpose (see arrow).

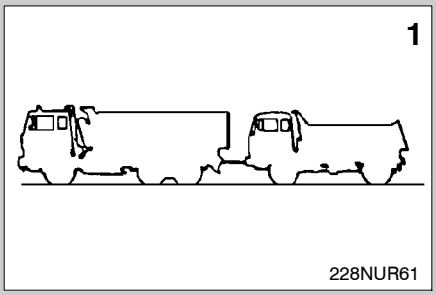
Proceed as follows:

- free the split pin and withdraw the locking pin;
- insert the end of the towbar into the seat;
- insert the locking pin and fasten it with the cotter pin.

If present, remove the protection hood before starting towing operations.

Always use a suitably anchored rigid bar.
Do not use cables or chains.
Insert the key into the ignition switch to release the steering lock.
The towing vehicle must have:

- **a total weight comparable to that of the vehicle being towed;**
- **traction power sufficient to tow the convoy up the hills along the way;**
- **braking power sufficient to slow the convoy down the hills along the way.**



Vehicles with 2 and 3 axles

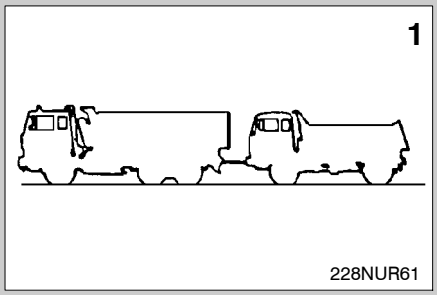
The towing vehicle (Fig. 1):

- must be of a similar weight to the one being towed;
- must have sufficient engine power to tow the vehicle up any gradients present on the route;
- must have sufficient braking power to slow the vehicle down any gradients present on the route.

Vehicles without auxiliary cylinder

- disconnect the transmission shaft between gearbox and axle from the axle (4x2 and 6x4 vehicles;
- disconnect the transmission shaft between transfer box and axle from the transfer box (4x4 and 6x6 vehicles).

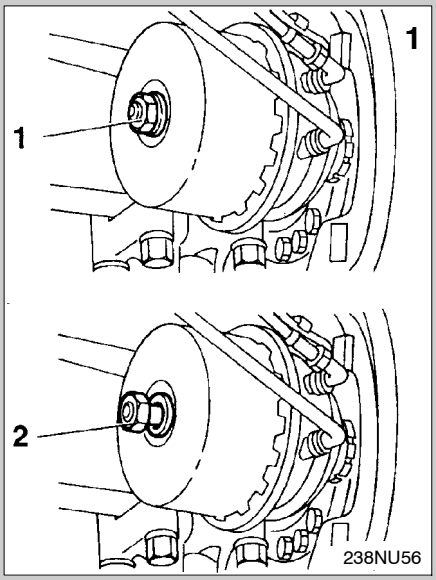
If hydraulic servo power to steering is absent, remember that although the connection between the steering wheel and the wheels themselves always functions, the amount of effort necessary to steer the vehicle increases greatly.
A towing speed limit is not necessary.



Vehicles with 4 axles

The vehicle is fitted with an emergency steering pump driven by the transmission.
Without the hydraulic steering servo (engine off), although the mechanical connection between steering wheel and wheels still functions, steering is practically impossible.
For this reason, DO NOT disconnect the propeller shaft to allow the transmission to drive the emergency steering pump and ensure a certain amount of steering assistance.

To prevent damage to the gearbox, towing speed must be limited.
Maximum towing speed in this condition is 40 kph.
Check that the gear shift lever is in high range (5th – 8th gear).



Spring cylinder emergency braking device

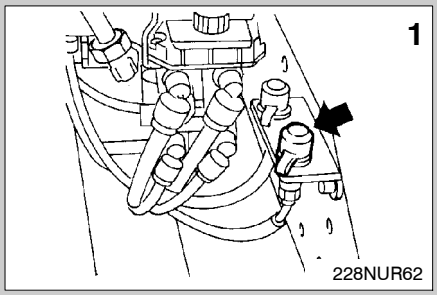
In the event that compressed air does not reach the parking brake circuit, the vehicle is automatically braked by the spring cylinders.
To enable the vehicle to be towed, the brake must be released with the mechanical release device.

Mechanical disengagement

To do this, proceed as follows OPERATING ON BOTH CYLINDERS:

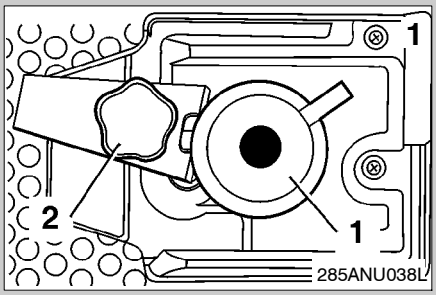
- place chocks under the wheels;
- engage the hand brake;
- turn the central screw located on the rear part of the cylinder (Fig. 1) anticlockwise from position 1 to position 2.

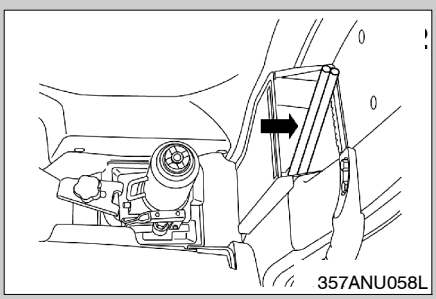
After intervention of the emergency release device, the vehicle must only be towed and must under no circumstances circulate autonomously.
Before using the vehicle normally again, return both the spring cylinders to position 1.

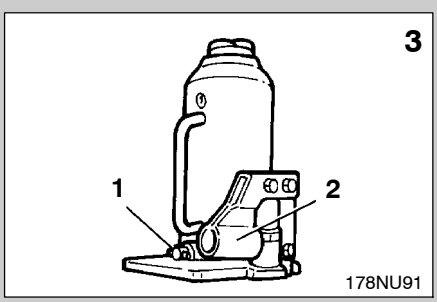


Compressed air discharged

If the vehicle has not been used for a long period and the comprssed air system is discharged, it can be re-charged from an external source through the connector (Fig. 1, see arrow).
This operation also releases the spring cylinders.







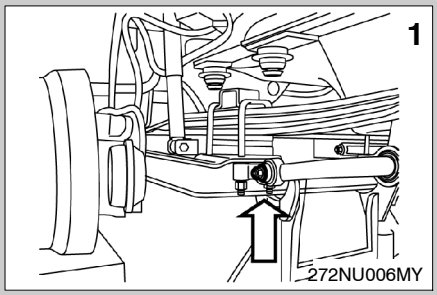
WHEEL CHANGE

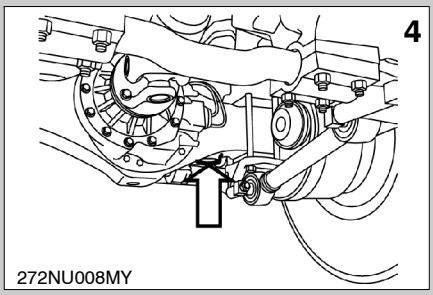
Jacking up the vehicle

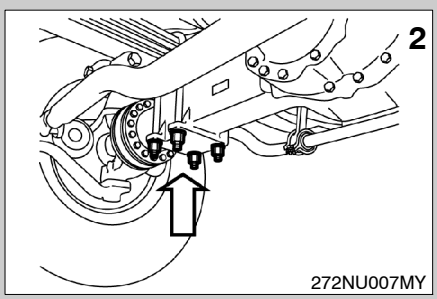
To use the jack:

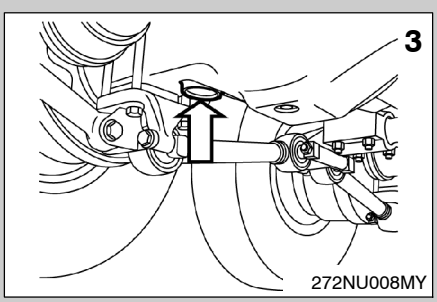
- remove the cab jack (Fig. 1, ref. 1) from its housing behind the passenger seat by loosening the retainer screw (Fig. 1, ref. 2) from the bracket;
- take the rod supplied (Fig. 2, see arrow) located in the cab at the side of the jack;
- check, that the hydraulic valve (Fig. 3, ref. 1) of the jack is rotated clockwise (hydraulic circuit under pressure);
- position the jack at the raising points specified in the following page;
- insert the rod into the bush (Fig. 3, ref. 2) and work the pump until lifting the wheel;
- after changing the wheel, turn the jack hydraulic valve anti-clockwise (Fig. 1, ref. 1);
- remove the jack and press the top part of jack cylinder with your foot to fit it back into seat.

Strictly comply with instructions indicated on the label attached to the jack to use it correctly.
The wheels should be changed when the vehicle is on level ground and unloaded with the hand brake engaged and chocks placed against the wheels which remain on the ground.





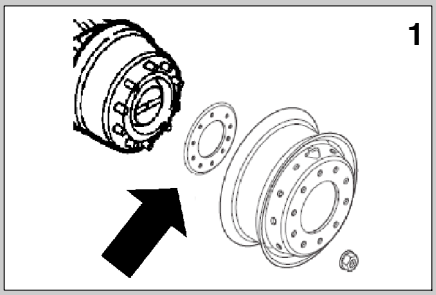


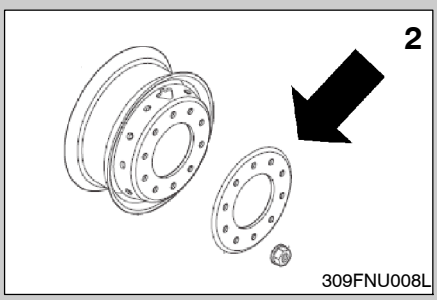


Changing a wheel

To change a wheel:

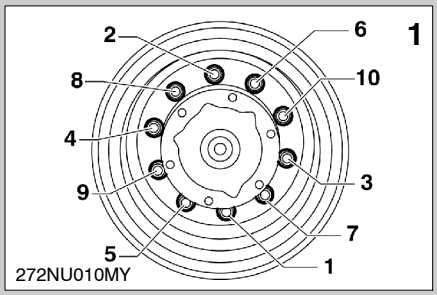
- use the wheel brace provided to loosen the wheel bolts on the wheel to be changed;
- raise the vehicle until the wheel is off the ground and set the jack at the following points:
  Figure 1: axle;
  Figure 2: front axle;
  Figure 3: intermediate axle;
  Figure 4: rear axle.





The vehicle may be provided with spacers in some cases:
- **between rim and hub (Fig. 1);**
- **between rim and fastening nuts (Fig. 2).**

Take note of the position if the spacer is removed to refit it correctly.
Do not eliminate the spacer.



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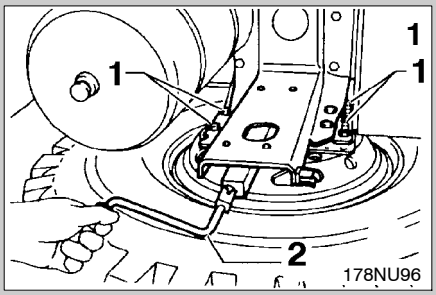
- unlock the fastening nuts completely and remove them, then withdraw the wheel, taking care not to damage the stud bolt threads;
- clean the threads of the screws and the nuts and the rim and hub strikers;
- fit the spare wheel or the repaired wheel;
- slightly tighten the nuts so that the wheel remains correctly coupled to the hub;
- tighten the nuts in the indicted order (Fig. 1);
- lower the vehicle and tighten the wheel fastening nuts to a torque of 60 ~ daNm.

Putting the weight of the body (approx 70 daN) on the end of the lever supplied, obtain a torque that is approximately equal to the specified value.

Check the torque of the wheel fastening nuts after travelling about 20-40 km and then again after travelling 100 km.
Do NOT lubricate the contact zones between nut and rim.
A torque that is too tight could cause damage: therefore do not use pipes or extensions that have not been specifically supplied
Do not use wheels and fastening devices different to the originals.



Handling the spare wheel

Replacing a front or rear wheel with a spare does not create problems even if the profile of the thread is different.
A tyre with the same profile should however be reintegrated as soon as possible.

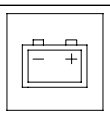
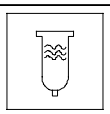
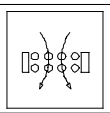
To remove the wheel proceed as follows:

- unscrew the nuts (Fig. 1, ref. 1) fastening the wheel to the support bracket;
- free the handle (Fig. 1, ref. 2) and take it in job position;
- turn the crank until sufficiently lowered to remove the wheel.

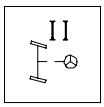
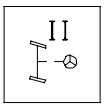
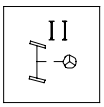
To replace the wheel, reverse the above procedure.

DIAGNOSTICS – VEHICLE

Quick guide to the most common problem

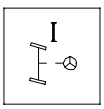
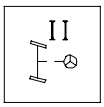
Light on	Problem	Remedy
	Braking system malfunction	**WARNING: braking efficiency reduced or absent.** Stop the vehicle and contact your Dealer as soon as possible
	ABS system malfunction	Proceed with aution and contact your Dealer as soon as possible
	Low battery	Proceed with caution and contact your Dealer as soon as possible
	Water in fuel pre-filter	Purge water from pre-filter or replace pre-filter proceeding as described in the MAINTENANCE chapter
	Clogged air cleaner	Replace the air filter proceeding as described in the MAINTENANCE chapter

Quick guide to most common problems – Vehicles steering system with steering emergency circuit without auxiliary cylinder

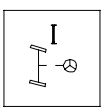
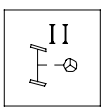
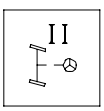
 Engine off, ignition key inserted	 Vehicle speed < 10 km/h	 Vehicle speed > 10 km/h	**Beeper**	**Meaning / behaviour**
off	off	off	off	Normal
off	off	on	on	**WARNING: power steering efficiency degraded or absent.** Stop the vehicle and contact the Dealer as soon as possible.

Quick guide to most common problems – Vehicles steering system with steering emergency circuit with auxiliary cylinder

(a) engine off, ignition key inserted

		**Beeper**	**Meaning / behaviour**
off	off	off	Normal
off	off	on	**WARNING: power steering efficiency degraded or absent.** Stop the vehicle and contact the Dealer as soon as possible.

(b) engine running

	 Vehicle speed < 10 km/h	 Vehicle speed > 10 km/h	**Beeper**	**Meaning / behaviour**
off	off	off	off	Normal
on	off	off	on	**WARNING: power steering efficiency degraded or absent.** Stop the vehicle and contact the Dealer as soon as possible.
off	off	on	on	Power steering normal, but secondary circuit no longer available in case of primary circuit failure.

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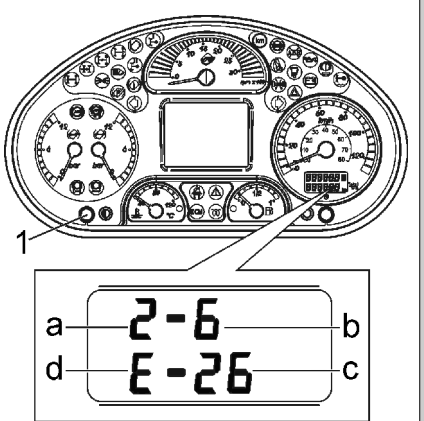
ECU type		W. light	Sign
IBC	Body computer		I
ABS	Anti-lock brake		A
ECM	Engine control		E
TCO	Tachograph		d

2



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DIAGNOSTICS – CONTROL SYSTEMS

The odometer display shows errors present in the vehicle control system memory.

The warning light related to the concerned system will appear to indicate that errors are present. The control systems are indicated by four letters (Fig. 1, see table).

Proceed as follows if one or more warning lights come on (see table, Fig. 1):

- Turn the ignition switch to MAR;
- Hold the button pressed for at least 5 seconds (Fig. 2, ref. 1). The error situation when the request was made will appear on the display (Fig. 2, detail).
  a error sequential number
  b total number of errors present
  c error code
  d ECU type (Fig. 1, see table).

The errors present at the time of the request are displayed. The displayed error list is not refreshed. Each error is displayed for 5 seconds: the display goes back to the basic function after the last error.

Maintenance Instructions

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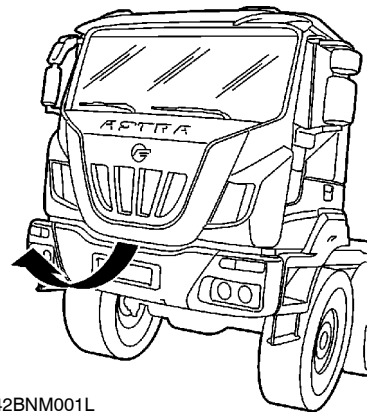
INTRODUCTION

Properly dispose of replaced material (brake pads, filters, etc.) and materials resulting from maintenance operations and repairs (material soaked in fuel, oil, powder, etc.) according to the laws in force, diversified from normal waste.
Collect and dispose of used lubricants and fluids, according to the laws in force.
Collect and dispose of used batteries according to the laws in force.
Drain and recharge the air conditioning system using the specific devices, according to the laws in force.
All level checks must be carried out with vehicle parked on flat and handbrake engaged.
Wait a few minutes for the level to stabilise before checking.
Observe scrupulous cleanness of oil and fluid containers when refilling.
Before injecting grease, or checking levels, carefully clean the pressure fittings and the areas around the level and filling caps.
Use oil and fluid of the same type used before in the various assemblies when topping up.
Never tamper with valves, regulators or other devices, unless specified in the handbook, to prevent damage to vehicle components and consequent hazards for persons.

Technical information on maintenance (intervals, type and number) is given in TABLES AND DIAGRAMS.



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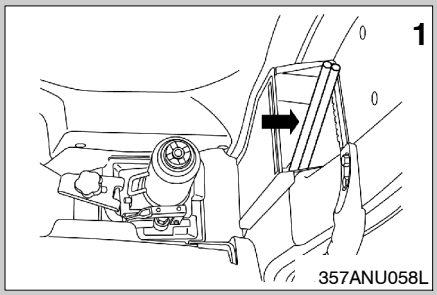
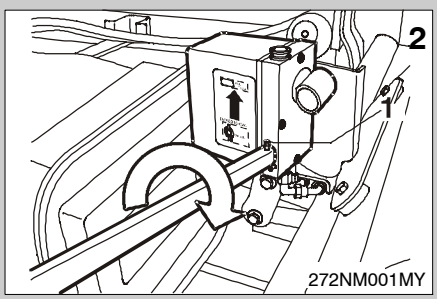
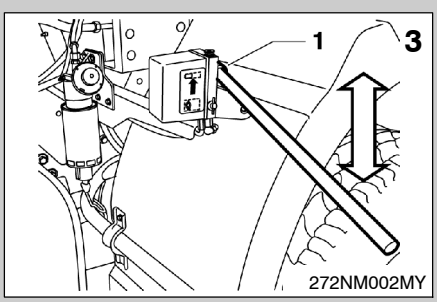
OPENING RADIATOR GRILL

To open the radiator grill, lift it (Fig. 1, see arrow): two gas springs hold it open.
To close the radiator grill, lower it until flush.







TILTING THE CAB

The vehicle's cab can be tilted forward via a hydraulic cylinder driven by the oil pressure supplied by a manually operated pump.

Always apply the parking brake and set the shift lever to neutral before starting any job.

Before tipping open the front grill to prevent damage.

Lifting the cab

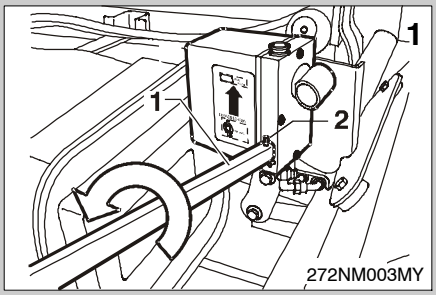
Proceed as follows:

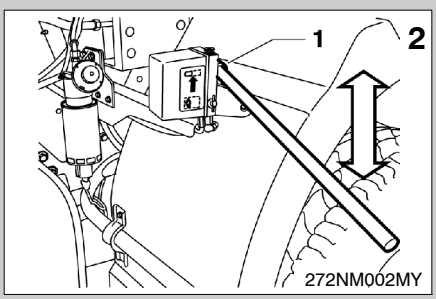
- take the rod supplied (Fig. 2, see arrow) located in the cab at the side of the jack;
- using the lever (Fig. 2, ref. 1) turn the pawl to the circuit pressure position (to right);
- insert the lever into the seat provided (Fig. 3, ref. 1) and pump until the cabin is fully tipped.

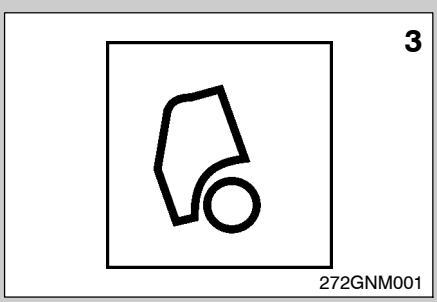
Never leave the cab in a partially tilted position. Never work under a partially tilted cab. Do not stand in front or behind the cab when it is being tilted.

Keep the front grill fully open throughout the operations.

If there is an anomaly affecting the hydraulic system, the cab can be tilted with mechanical means (e.g. with a crane).







Lowering the cab

Proceed as follows:

- using lever (Fig. 1, ref. 1) turn the pawl (Fig. 1, ref. 2) to the circuit decompression position (to the left);
- insert the lever provided into the appropriate seating (Fig. 2, ref.1) and down until the cab has been tilted;
- check that the cab is fully lowered and warning light and cluster (Fig. 3) is off.

Tipping can be interrupted by turning the pawl (Fig. 1 ref. 2).
Leave the pawl (Fig. 1, ref. 2) in decompression position until the next tipping operation.

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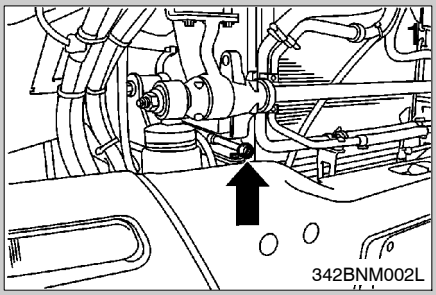
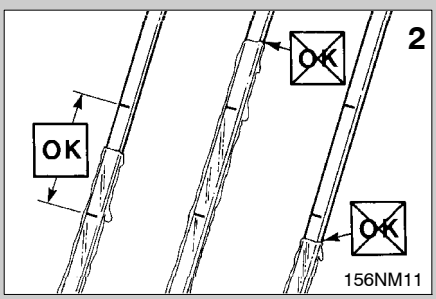




MAIN LEVELS CHECK

All the fluids indicated have a level sensor.
However it is a good rule to periodically check the levels visually, also to ensure the correct functioning of the sensor.

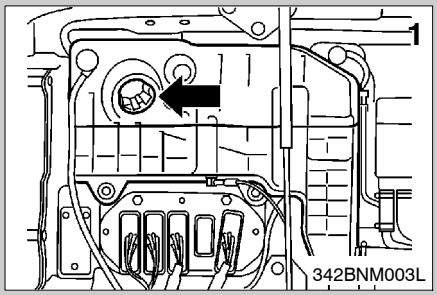
Check engine oil level

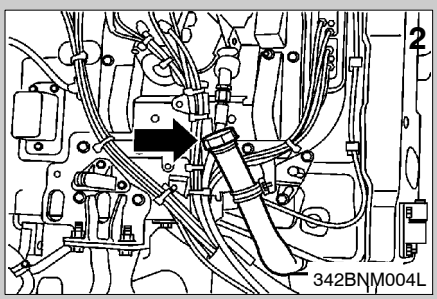
Proceed as follows:

- open the cowl;
- with the engine off and cold, remove the oil dipstick (Fig. 1, see arrow) and check that the level is included between the references on the dipstick (Fig. 2). Reposition the dipstick;

If the engine is warm, stop the engine and wait for 10 minutes for the oil to drain into the sump.
Do not use the vehicle if the oil level is either under or over the limits. Lack of lubricant or excessive lubricant can damage the engine.

- if required, top up using oil of the same type contained in the oil sump.





Check engine coolant level

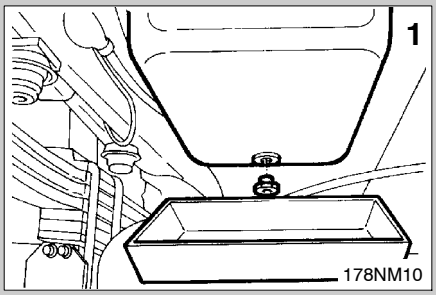
Proceed as follows:

- open the cowl;
- with engine cold check that the liquid level is at a distance of 1-2 (cm) from the cap (Fig. 1, see arrow);
- top up using fluid of the same type contained in the reservoir, if required;

Check windshield washer level

Proceed as follows:

- open the cowl;
- check that the liquid level is at a distance of 2-3 (cm) from the cap (Fig. 2, see arrow);
- if necessary top up the level, using an appropriate mixture of water and detergent.

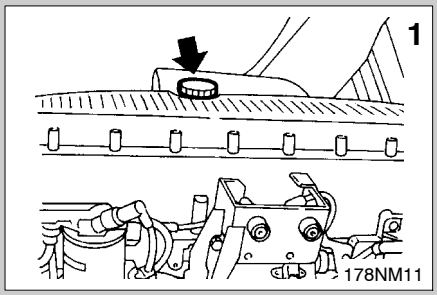


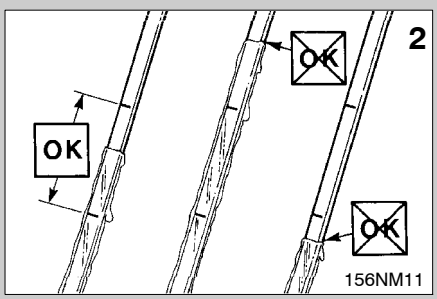
ENGINE

Changing engine oil

Proceed as follows:

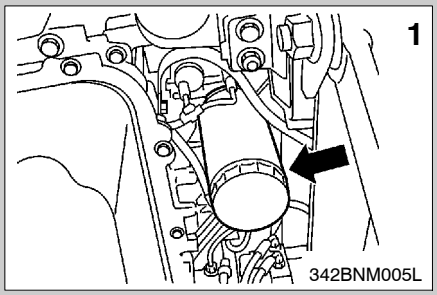
- stop the warm engine and wait for the coolant temperature to drop to 60 °C;
- tilt the cab;
- arrange a suitable sized container and remove the dipstick;
- clean the cap area, loosen the drain cap (Fig. 1) and drain all the oil for the time required;
- clean the drain plug, check that the thread is in good condition, replace the O-ring and close it;

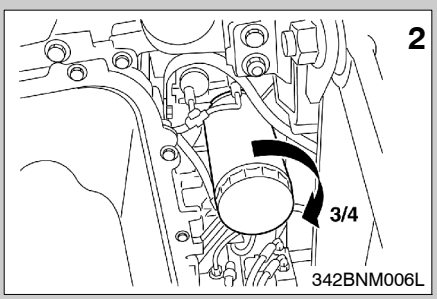




- clean the filler area and pour in the specific amount of lubricant through the filler (Fig. 1, see arrow);
- close the filler and arrange the dipstick in the housing;
- start the engine and warm it up. Stop the engine and wait for a few minutes;
- remove the oil dipstick and check that the level is included between references on the dipstick (Fig. 2);
- top-up the level if necessary.

Do not use the vehicle if the oil level is either under or over the limits.
Lack of lubricant or excessive lubricant can damage the engine.





Replacing engine oil filter F2B

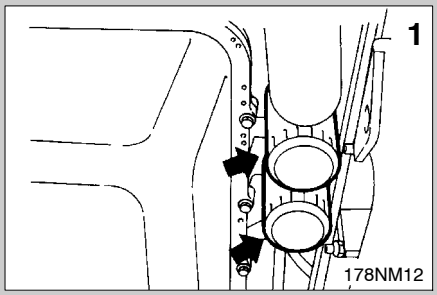
Replace the oil filter at the frequency shown. If the filter is clogged up, the bypass valve will permit lubrication of the engine, but the circulating lubricant will not be filtered.

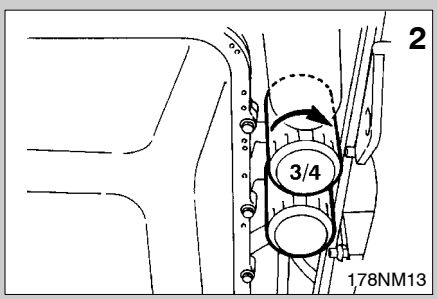
Proceed as follows:

- stop the warm engine and wait for the coolant temperature to drop to 60 °C;
- loosen the filtering cartridge (Fig. 1, see arrow) using the specific tool and accurately clean the housing;
- fasten the cartridge by hand until the seal comes into contact with the housing, then turn by another 3/4 of a turn (Fig. 2).

Do not fasten the cartridge excessively. This could damage the seal. Observe the specifications provided by the supplier.

- start the engine for a few minutes and check for leakage of lubricant;
- check engine oil level and top up, if required.





Replacing engine oil filter F3B

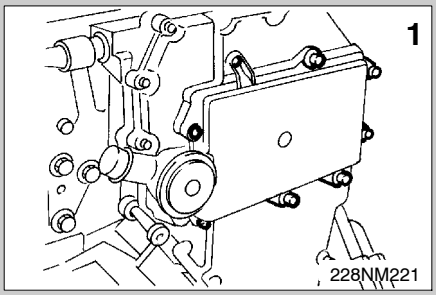
Replace the oil filter at the frequency shown. If the filter is clogged up, the bypass valve will permit lubrication of the engine, but the circulating lubricant will not be filtered.

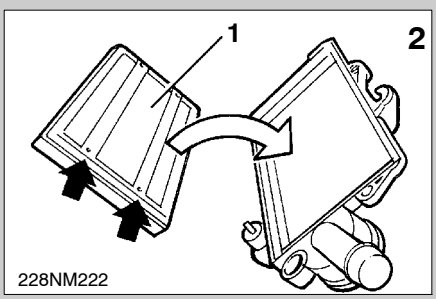
Proceed as follows:

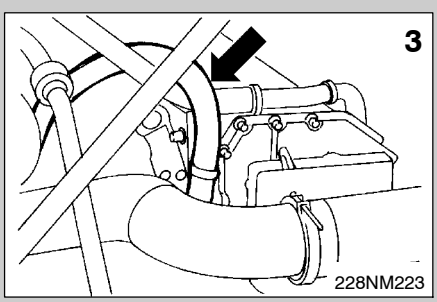
- stop the warm engine and wait for the coolant temperature to drop to 60 °C;
- loosen the filtering cartridge (Fig. 1, see arrow) using the specific tool and accurately clean the housing;
- fasten the cartridge by hand until the seal comes into contact with the housing, then turn by another 3/4 of a turn (Fig. 2).

Do not fasten the cartridge excessively. This could damage the seal. Observe the specifications provided by the supplier.

- start the engine for a few minutes and check for leakage of lubricant;
- check engine oil level and top up, if required.







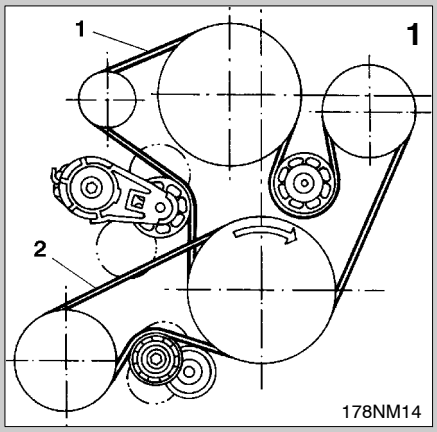
Engine oil vapour filter change

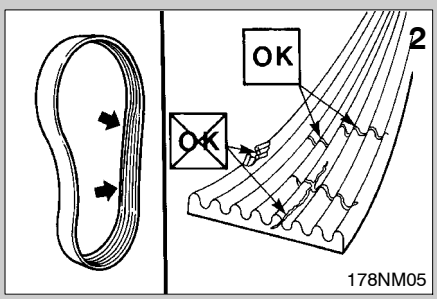
Proceed as follows:

- loosen the screws of the cover (Fig. 1) and remove it;
- remove the filter (Fig. 2, ref. 1);

When refitting, position the filter with the support brackets (Fig. 2, see arrow) pointing toward the cover.

- replace the cover;
- check that the breather pipe (Fig. 3, see arrow) is not kinked or bent.





Accessory drive belts check

The engine has two accessory drive belts (Fig. 1):

1. alternator/fan/water pump drive belt
2. climate control compressor drive belt (only clima-version).

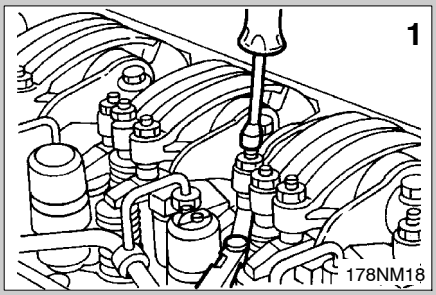
Each belt has an automatic take-up device and does not require adjustment.

Proceed as follows:

- tilt the cab;
- when the engine is cold, check that the belt (Fig. 2) is not frayed or cracked (small crosswise cracks are allowed);
- otherwise replace the belt;

This operation must be carried out by adequately trained personnel. For further information contact your Dealer.

- press with the hand on the longer branch to check the take-up device is functioning properly.

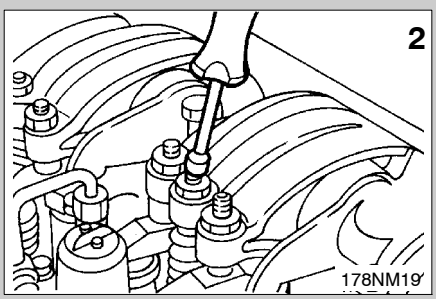


Intake-exhaust valve play adjustment (Fig. 1)

This operation must be carried out by adequately trained personnel. For further information contact your Dealer.

Play is adjusted by means of the screw with lock nut, at the head of each rocker.

Injector-pump pre-load adjustment (Fig. 2)



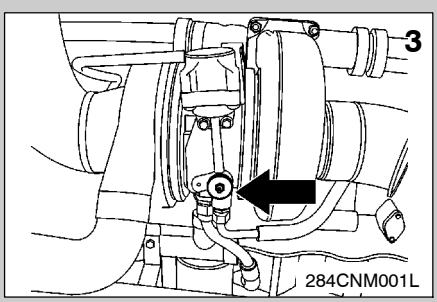
This operation must be carried out by adequately trained personnel. For further information contact your Dealer.

Adjust the pre-load by means of the screw with lock nut on the head of each rocker arm (contact the dealership for further information).

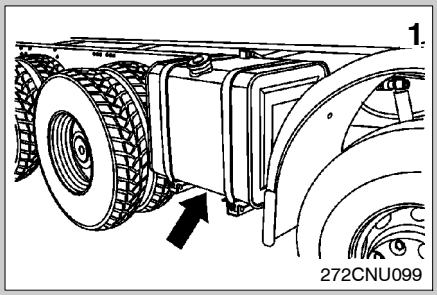
VGT actuator grease application procedure

Proceed as follows:

- tilt the cab;
- clean the concerned fitting (Fig. 3, see arrow);
- inject grease of the specified type in the fitting.



Inject lubricant until it pours out of the lubricated points to ensure efficient lubrication.
Use a manual grease dispenser only. Never use a high pressure grease dispenser.



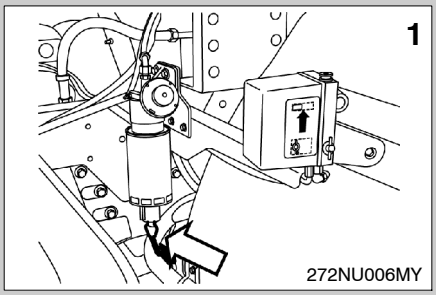
FUEL FEED SYSTEM

Bleed fuel tank condensation water

Proceed as follows:

- loosen the drain cap (Fig. 1, see arrow) and let a little fuel out to drain the residues and condense which normally is formed in the tank.

Keep the fuel tank as full as possible. Use fuels of the specified types supplied by petroleum companies. Do not use other than specified fuels.
Use of other than specified fuels can cause severe engine damage.

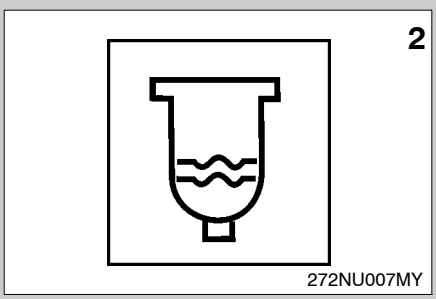


Fuel tank water drain

Proceed as follows:

- with the engine stopped, loosen the ring (Fig. 1, see arrow) and drain the fuel;
- tighten the ring nut without excessive torque when water-free fuel flows out.

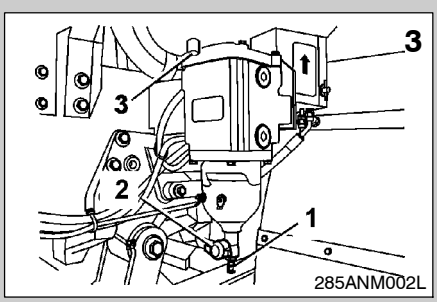
This operation must be carried out if the fuel filter water warning light comes on (Fig. 2).

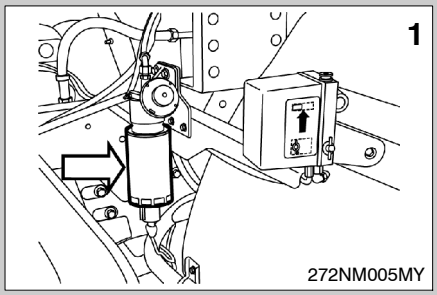


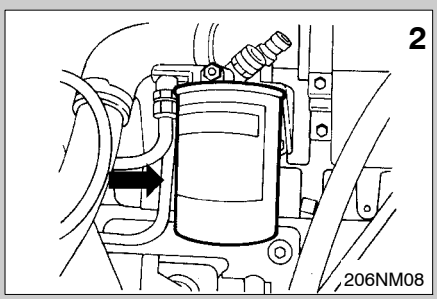
Purging water from fuel decanter

Proceed as follows:

- fasten on end of a rubber pipe to the connector (Fig. 3, ref. 1);
- insert the other end of the pipe into a container;
- loosen the vent screw (Fig. 3, ref. 3);
- open the valve (Fig. 3, ref. 2) and drain off the water and any impurities trapped in the decanter;
- close the valve and remove the pipe.







Replacing fuel filters

The vehicle has two groups of fuel filtration:

- fuel prefilter (on chassis; Fig. 1, see arrow);
- fuel filter (on engine; Fig. 2, see arrow).

Proceed as follows:

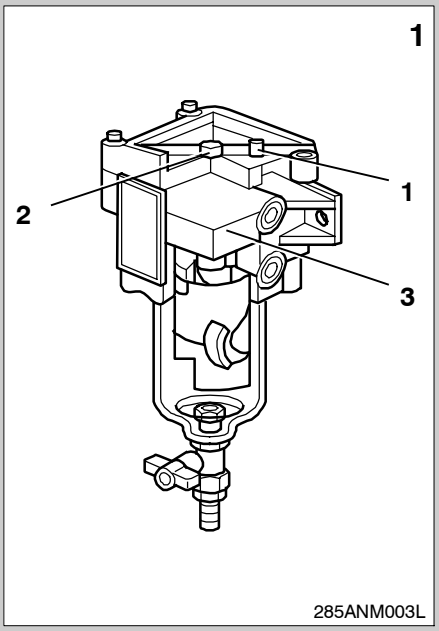
- with the engine stopped, loosen the filtering cartridge using the specific tool and carefully clean housing and engine;

Do not fill the new filter with fuel to prevent foreign matter entering the injection system.

- hand-tighten the cartridge until the seal comes into contact with the support, then tighten it by ¾ of a turn;

Do not fasten the cartridge excessively. This could damage the seal. Observe the specifications provided by the supplier.

- start the engine for a few minutes and check for leakage of lubricant.

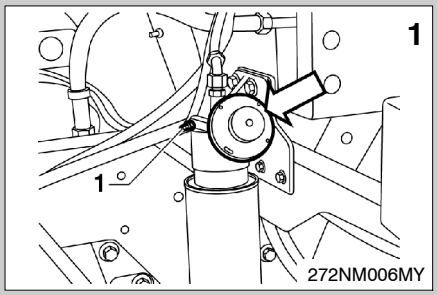


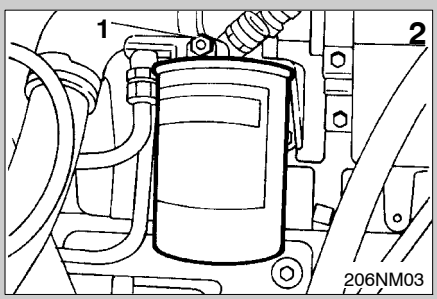
Replacing fuel decanter filter

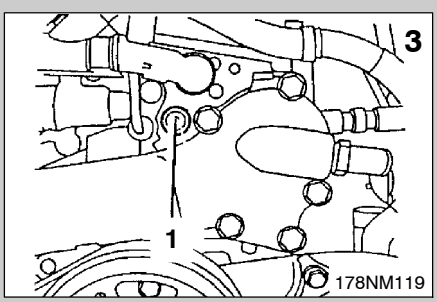
Proceed as follows to replace the fuel separator filter cartridge:

- Stop the engine.
- Close the on-off valve (if present).
- Loosen the securing screws and remove the cover (Fig. 1, ref. 1).
- Remove the spring (Fig. 1, ref. 2).
- Remove the cartridge (Fig. 1, ref. 3) and replace it.
- Refit the spring.
- Refit the lid and check that the seal is intact and correctly positioned: replace it required.
- Open the on-off valve (if present).
- Start the engine and check for leakage.

Bleed the feed system, if required.







Fuel circuit bleeding

Proceed as follows:

- tip the cabin;
- fit suitable pipes to the bleed nipples and lead them to a container;
- loosen the bleed nipples by a few turns.

Prefilter

- Pump the priming pump (Fig. 1, see arrow) until fuel flows out from the nipple (Fig. 1, ref. 1) without air bubbles, then tighten the nipple.

Filter

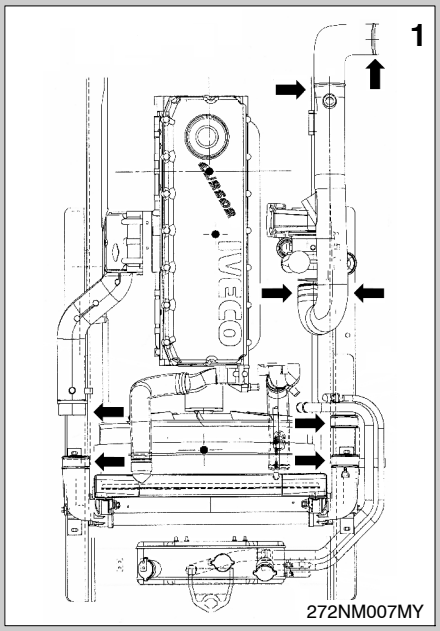
- Repeat the operation for this nipple (Fig. 2, ref. 1);

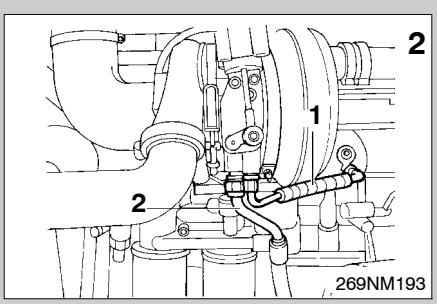
Cylinder head bleed nipple

- Remove the soundproofed cover;
- Repeat the operation for this nipple (Fig. 3, ref. 1).

Absolutely avoid smearing fuel on the accessory drive belts to prevent damage.

Use suitable receptacles to prevent fuel leakage into the environment.





INTAKE SYSTEM

Intake system seal check

Proceed as follows:

- tip the cabin;
- check the intake system seals and connectors (Fig. 1, see arrow).

Turbocompressor lubrication check

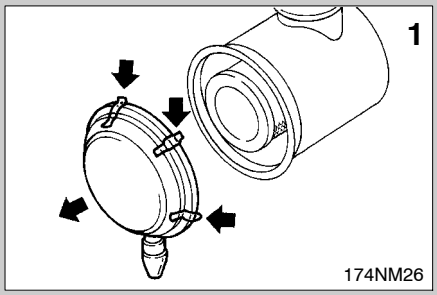
Proceed as follows:

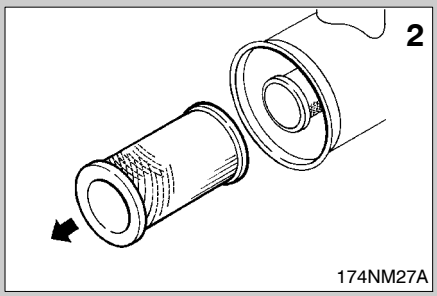
- tip the cabin;
- inspect the delivery pipes (Fig. 2, ref. 1) and return pipes (Fig. 2, ref. 2) to check absence of leaks or faults that could cause decreased oil flow to the turbo.

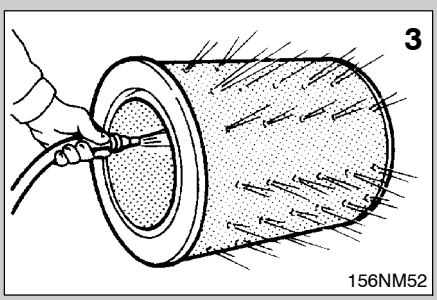
Given the high turbocompressor operating speed, any reduction in oil supply will result in damage.

Intercooler external cleaning

Clean the radiator using compressed air to remove accumulated debris (leaves, insects).
To remove hardened debris, brush the radiator with a water/detergent solution then use steam to remove any residue.







Main filter element cleaning/change

Clean the main filter element at most 6 times, after which it must be changed.

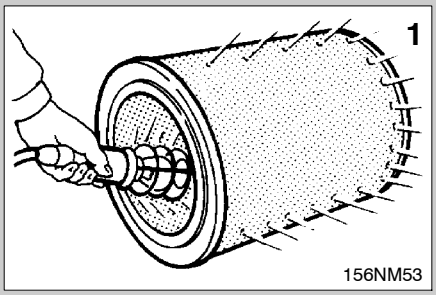
Proceed as follows:

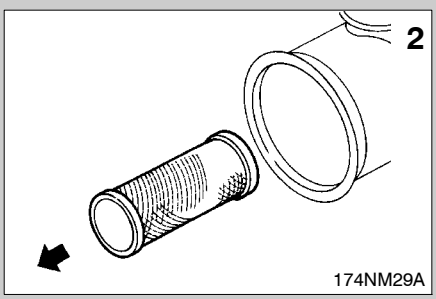
- release the retainer springs (Fig. 1, see arrow) and remove and thoroughly clean the cover;
- extract the primary cartridge (Fig. 2, see arrow);
- dust removal using compressed air at maximum 3 bar pressure, blowing air from inside filter element outwards (Fig. 3);

Keep the air jet at a few centimeters from the filter pack to prevent damage.
Never clean the filter by beating on a hard surface.

- thoroughly clean the inside of the filter box with a vacuum cleaner.

Take care not to allow the dust enter the intake hose.
Do not start the engine without the air filter.





Carry out the following checks before refitting the filtering element:

- check conditions of O-rings and plastic tabs. Replace the filtering element, if required;
- check integrity of filtering element by placing a source of light inside (Fig. 1); light will filter from even the smallest cracks, indicating that the filter must be replaced;

Make sure the temperature does not exceed 60°C if a light source outputting heat (e.g. a lamp bulb) is used.

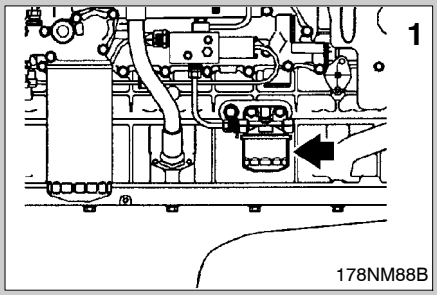
- clean the rubber drain valve, check integrity and replace it if required.

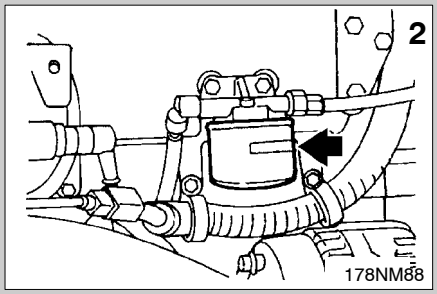
Safety secondary filter element replacement

Proceed as follows:

- remove the main filter;
- remove the element (Fig. 2, see arrow).

The secondary element cannot be cleaned. It can only be replaced.





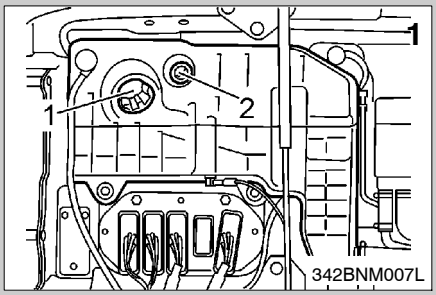
Replacing the VGT piloting hoses filtering element

Engine F2B (Fig. 1)
Engine F3B (Fig. 2)

Proceed as follows:

- with a cold engine, loosen the filtering cartridge (see arrow) using the specific tool and accurately clean housing and engine;
- fasten the cartridge by hand until the seal comes into contact with the housing, then turn by another 3/4th of a turn.

Do not fasten the cartridge excessively. This could damage the seal. Observe the specifications provided by the supplier.

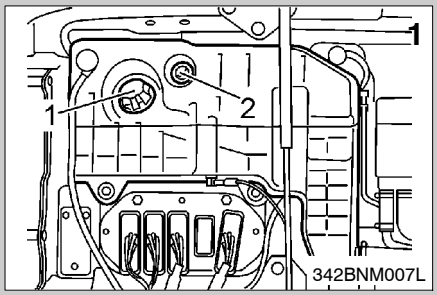


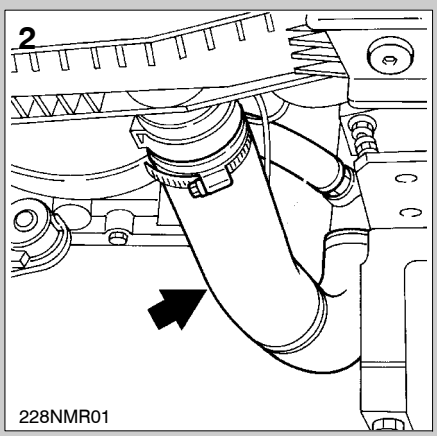
COOLING SYSTEM

Never remove the cap (Fig. 1, ref. 1) when coolant is hot to avoid:

- **scalding;**
- **damage to the engine, in that the system comes under pressure only with coolant heating from engine cold.**

Always top up the system with engine off and cold.



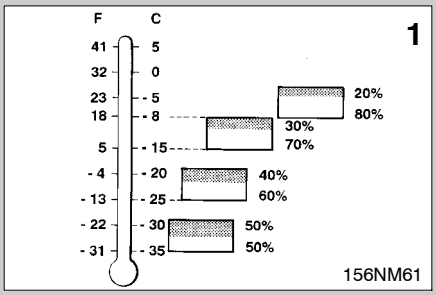


Replacing engine coolant

The system pressure regulator valve (Fig. 1, ref. 2) is sealed and must not be removed for any reason.

Proceed as follows:

- turn the cab heater cock to maximum heat;
- position a container with adequate capacity then remove the cap (Fig. 1, ref. 1) on the expansion chamber (Fig. 1, ref. 2);
- disconnect the radiator hose (Fig. 2, see arrow), then wait for coolant to fully drain off;
- refit the hose;
- pour the coolant very slowly into the expansion tank until full;
- start the engine and run it slightly faster than idle speed for about 5 minutes;
- stop the engine and top-up expansion chamber coolant level;
- start the engine, warm it up and allow it to run until the coolant in the chamber does not produce air bubbles;
- check that the system pressure regulator valve opens at the specified pressure value: otherwise replace it.



1

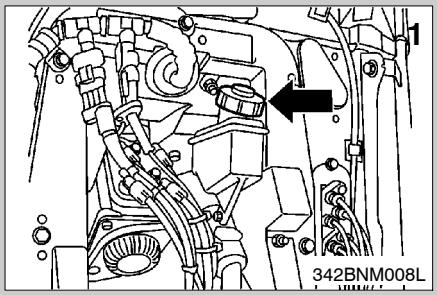
Checking antifreeze concentration

A 50-50 mixture of water and specific antifreeze is required to protect the system from corrosion.
The minimum concentration of antifreeze depends on the temperature where the vehicle is in use (Fig. 1).

antifreeze
water

Check the concentration of antifreeze in the engine coolant.

Always respect the supplier's mixing specifications if particular additives are used.



CLUTCH

Check clutch disengagement

Proceed as follows:

- run the engine at idle and depress the clutch;
- after approx. 10/12 seconds, slowly engage reverse gear. If the toothing “grates” (grating noise of engagement of front teeth) the clutch must be checked and/or bled.

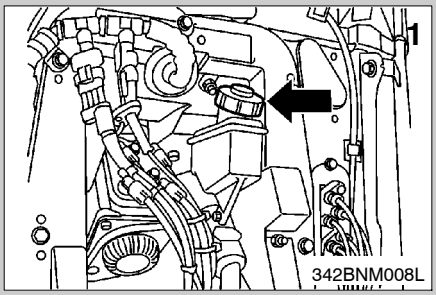
Oil level check

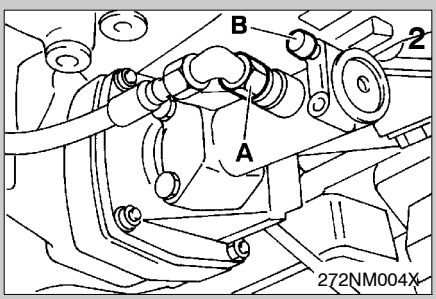
Proceed as follows:

- open the radiator grill;
- visually check that oil level (Fig. 1, see arrow) is not below the minimum level;
- if necessary, top-up the level as shown in the following paragraph.

The fluid is corrosive: always wear protective gloves.

Use only the specified type of fluid for topping up.
The fluid will corrode any paintwork it comes into contact with.





Changing the hydraulic fluid

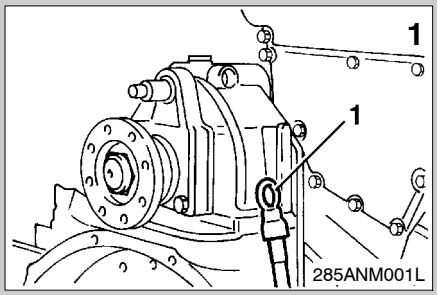
Proceed as follows:

- prepare a suitable container, unscrew tank cap (Fig. 1, see arrow) and unscrew drain pipe (Fig. 2, ref. A), draining off oil completely;
- seal drain pipe and fill tank with oil to the max. level;
- bleed out air from the system.

Air bleeding

Proceed as follows:

- check whether reservoir is full;
- use a transparent tubing and insert one end into the drain valve union (Fig. 2, ref. B) and the other end into a clean container;
- press clutch pedal and keep it in position;
- open the drain valve a little to allow oil and air bubbles to come out and close it after a few seconds;
- release clutch pedal completely;
- repeat operation until oil without air bubbles comes out of the drain valve;

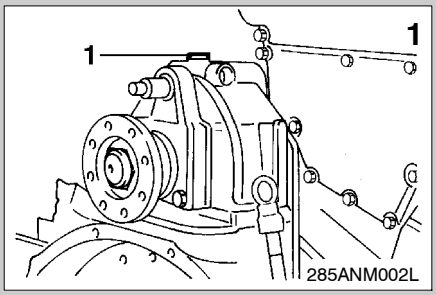


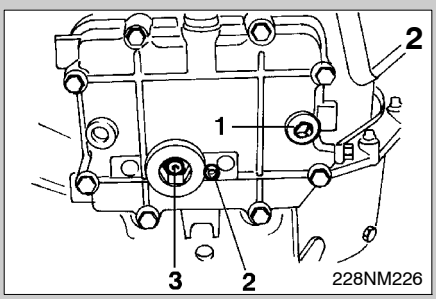
MULTIPOWER PTO

Oil level check

Proceed as follows:

- with the engine off remove the dipstick (Fig. 1, ref. 1) and check that oil level is between the notches on the dipstick, then replace it;
- if necessary, top-up the level as shown in the following paragraph.





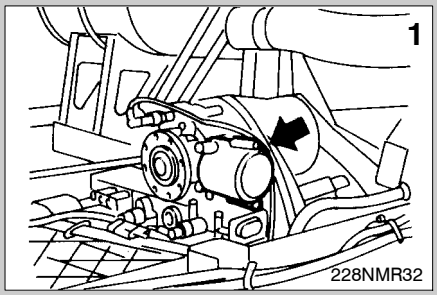
Oil change

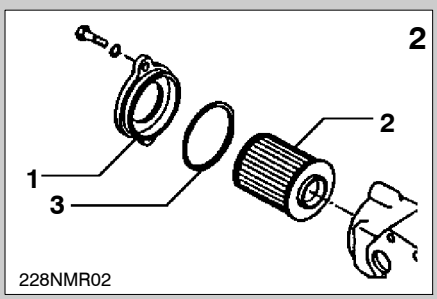
Proceed as follows:

- place a suitable container, clean the area around the level plug and remove it (Fig. 1, ref. 1);
- remove the drain plug (Fig. 2, ref. 1) fully drain off the oil;
- clean the drain plug, check that the thread is in good condition, replace the O-ring and close it;
- fill with the required quantity of fluid as shown on the cap (Fig. 1, ref. 1);
- clean the filler cap, check that the thread is in good condition, replace the O-ring and close it;
- test drive then check level again, removing the screw (Fig. 2, ref. 2) waiting for oil to stop draining then replacing the screw;
- top-up the level if necessary.

Clean the filter on the intake pipe after the first 25 hours of use, proceeding as follows:

- **remove the filter unscrewing the retaining cap (Fig. 2, ref. 3), clean it with diesel oil and dry with compressed air. If exhausted, replace it;**
- **check gaskets and replace them if necessary.**





ZF NMV 221 POWER TAKE OFF

Oil level check/change

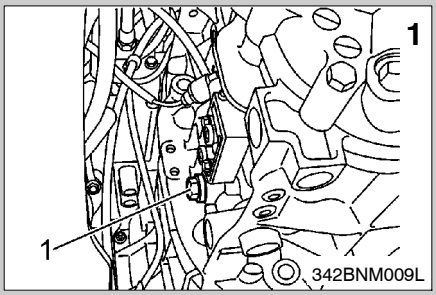
The power take off uses the same oil as the gearbox.
For oil level check/oil change operations refer to the instructions for the gearbox.
The quantity of oil required in addition to that of the gearbox is circa 2 litres.

Oil filter change (Fig. 1)

Change the filter only after having drained off oil.
Oil may leak during these operations.

Proceed as follows:

- position a suitable container then remove the cover (Fig. 2, ref. 1);
- remove the filter (Fig. 2, ref. 2) and recover the seal (Fig. 2, ref. 3);
- refit the filter following above instructions in reverse order.

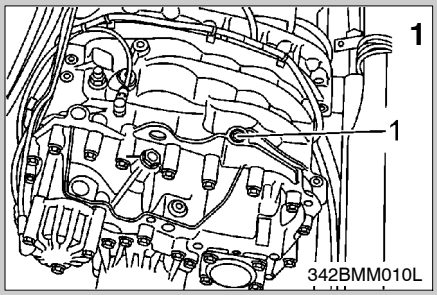


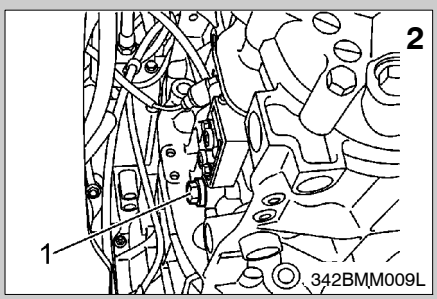
GEARBOX

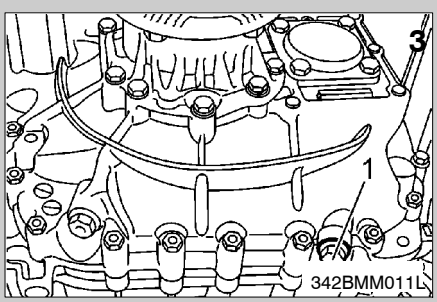
Oil level check

Proceed as follows:

- clean the area around the level plug and remove it (Fig. 1, ref. 1): oil should drip from the hole;
- if necessary, top-up the level as shown in the following paragraph;
- close the level plug.



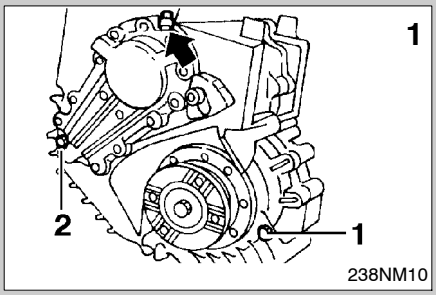




Oil change

Proceed as follows:

- clean the level cap zone (Fig. 1, ref. 1) then remove the cap;
- clean the level cap zone (Fig. 2, ref. 1) then remove the cap;
- prepare a container of adequate capacity, remove the drainage cap (fig.3, ref. 1) emptying out all the lubricant;
- clean the drainage cap, check that the threading is in good condition, replace the O-ring with a new one and close the drain cap;
- fill with prescribed lubricant through the filler cap hole (fig.1, ref. 1) until lubricant flows out from the level cap hole (fig.2, ref. 1);
- clean filler and level caps, check that the threading is in good condition, replace the O-ring with a new one and close;
- run a road test, check the cap level (Fig. 2, ref. 1);
- if necessary, top-up with specified oil until it flows from the hole, repeat the test drive and check the level again.



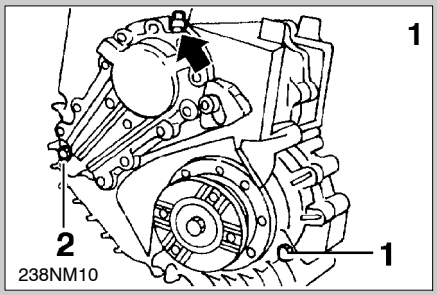
DISTRIBUTOR-TRANSFER (TRANSFER) - TYPE I

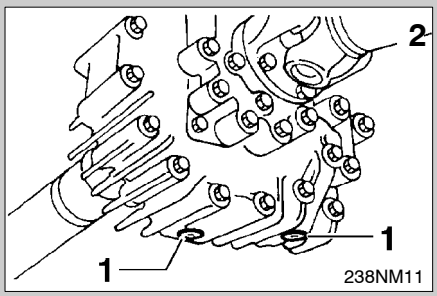
Oil level check

Proceed as follows:

- clean the area around the level plug and remove it (Fig. 1, ref. 1): oil should drip from the hole;
- if necessary, top-up the level as shown in the following paragraph;
- close the level plug.

Check that the breather (Fig. 1, see arrow) is perfectly clean and functioning.

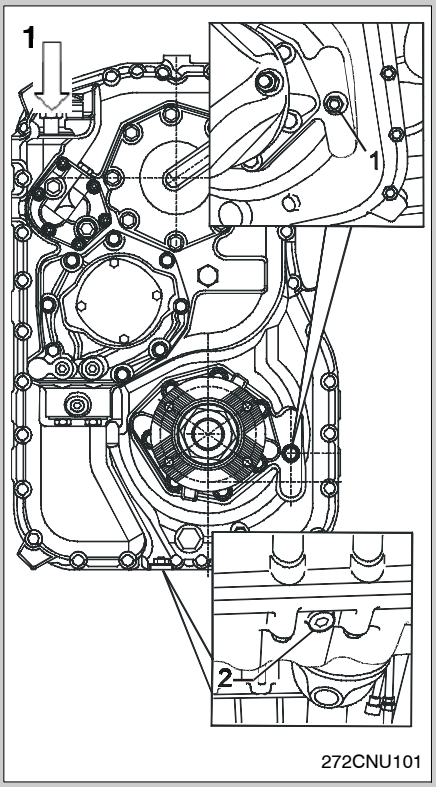




Oil change

Proceed as follows:

- place a suitably sized container, clean the area around the plugs then remove the level plug (Fig. 1, ref. 1); and filler cap (Fig. 1, ref. 2);
- unscrew the plugs (Fig. 2, ref. 1) and fully drain off the oil;
- clean the drain plug, check that the thread is in good condition, replace the O-ring and close it;
- prepare 6.5 litres of fresh oil;
- fill through the filler cap (Fig. 1, ref. 2) until oil flows from the level plug (Fig. 1, ref. 1);
- clean the filler cap and level plug, check that the thread is in good condition, replace the O-rings and close them;
- drive the vehicle for a few minutes to allow oil to reach all transfer components, then stop and wait ten minutes for the oil to settle;
- remove the level plug (Fig. 1, ref. 1): oil should flow from the hole. If not, top up level exclusively through the cap (Fig. 1, ref. 2) until oil flows from the level plug (Fig. 1, ref. 1);
- close both the level plug and filler cap.



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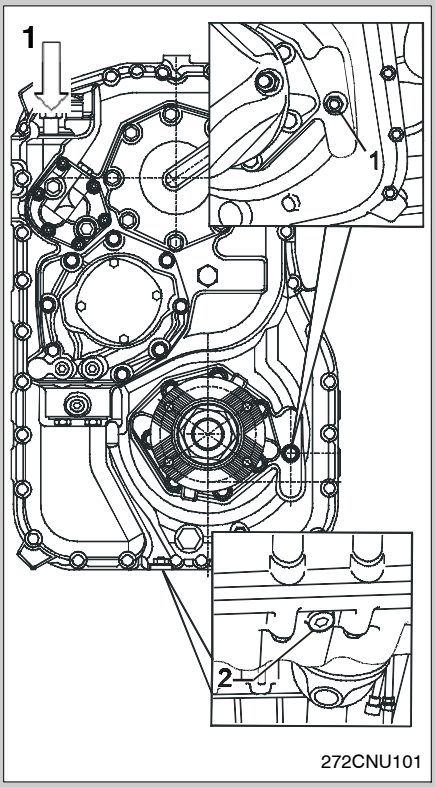
DISTRIBUTOR-TRANSFER (TRANSFER) - TYPE II

Checking oil level

Proceed as follows:

- Clean the area around the filler/level plug then open it (Fig. 1, ref. 1): oil should arrive at the edge of the hole;
- Top up with the specified lubricant, if necessary, through the same hole;
- Close the plug;
- Check that the breather (Fig. 1, see arrow) is perfectly clean and functional.

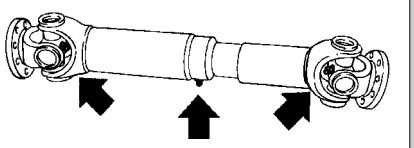


Changing oil

Proceed as follows:

- Place a suitably sized container, clean the area around the plug then remove the level plug (Fig. 1, ref. 1);
- Remove the drain plug (Fig. 1, ref. 2) and fully drain the oil;
- Clean the drain plug, check that the thread is in good condition, replace the o-ring and close it.
- Fill with the specified oil until it flows from the plug hole (Fig. 1, ref. 1);
- Clean the level plug, check that the thread is in good condition, replace the o-ring and close it;
- Carry out a test drive then re-check level at plug (Fig. 1, ref. 1);
- If required, top up with oil of the specified type, repeat the road test and check the level again.

1



178NM46

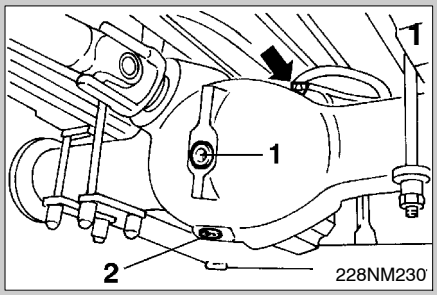
TRANSMISSION SHAFTS

Greasing

Proceed as follows:

- clean the joint concerned;
- Inject grease into the universal joint grease nipples (Fig. 1, see arrow) each transmission shaft has two or three greasing points.

Inject grease until it seeps from the grease nipples to ensure efficient lubrication
A hand pump must be used for greasing, and never a high pressure grease gun.



AXLES

Front axle

Check differential oil level

Proceed as follows:

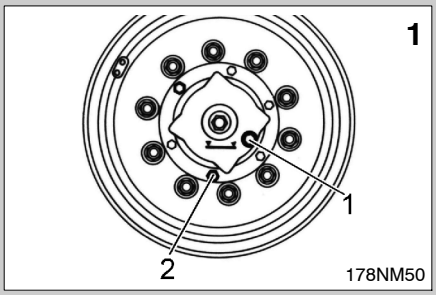
- clean the area around the level plug and remove it (Fig. 1, ref. 1): oil should drip from the hole;
- if necessary, top-up the level as shown in the following paragraph;
- close the level plug.

Check that the breather (Fig. 1, see arrow) is perfectly clean and functioning.

Differential oil change

Proceed as follows:

- place a suitable container, clean the area around the level plug (Fig. 1, ref. 1) and remove it; (Fig. 1, ref. 1);
- remove the drain plug (Fig. 1, ref. 2) fully drain off the oil;
- clean the drain plug, check that the thread is in good condition, replace the O-ring and close it;
- fill with the specified oil until it flows from the plug hole (Fig. 1, ref. 1);
- clean the level plug, check that the thread is in good condition, replace the O-ring and close it;
- carry out a test drive then re-check level at plug (Fig. 1, ref. 1);
- if necessary, top-up with specified oil until it flows from the hole, repeat the test drive and check the level again.

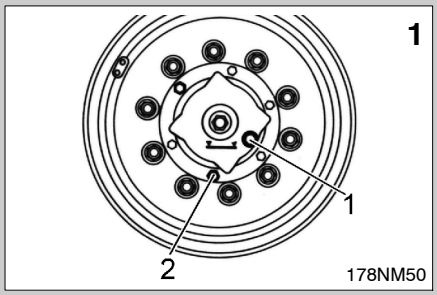


Hub oil level check

This must be checked separately on both hubs.

Proceed as follows:

- turn the plug (Fig. 1, ref. 1) such that the reference mark is horizontal;
- clean the plug zone and open the plug (Fig. 1, ref. 1): oil should drip from the hole;
- if necessary, top-up the level as shown in the following paragraph;
- close the level plug.

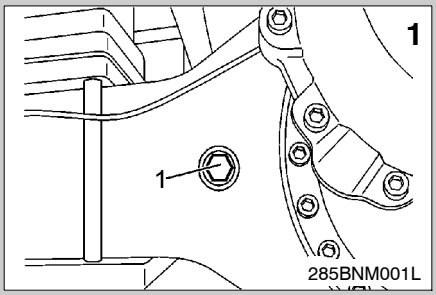


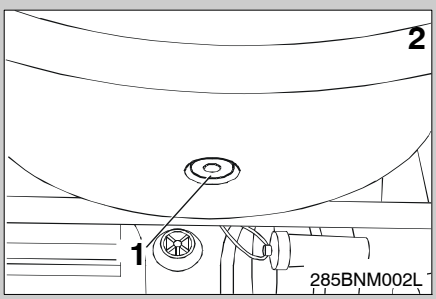
Hub oil change

This must be checked separately on both hubs.

Proceed as follows:

- turn any of the screws (Fig. 1, ref. 2) in the lowest position, until the cap is situated aloft;
- clean the area around the cap, then open it (Fig. 1, ref. 1);
- place a suitably sized container, clean the area around the level plug (Fig. 1, ref. 2) and remove it fully draining off the oil;
- tighten the screw;
- position cap hole (Fig. 1, ref. 1) in horizontal position;
- fill up with new oil until it overflows from hole (Fig. 1, ref. 1);
- clean the drain plug, check that the thread is in good condition, replace the O-ring and close it;
- repeat operation for the other hub;
- carry out a test drive, then re-check the level at plug (Fig. 1, ref. 1);
- if necessary, top-up with specified oil until it flows from the hole, repeat the test drive and check the level again.





Front axle - 10 ton version / K version

Checking differential oil level

Proceed as follows:

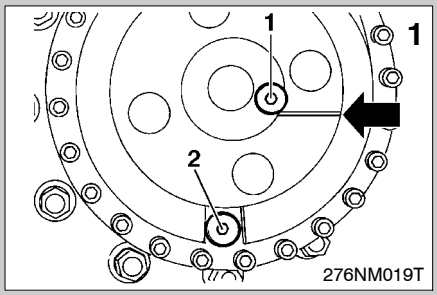
- clean the cap area and open the level cap (Fig. 1, ref. 1): lubricant should drip out of the hole;
- top up the level as shown below, if required;
- close the filler cap.

Check the breather which must be clean and functioning.

Changing differential oil

Proceed as follows:

- arrange a container of appropriately capacity, clean the area around the caps and then remove the filler cap (Fig. 1, ref. 1);
- remove the drain cap (Fig. 2, ref. 1) and drain all the oil;
- clean the drain cap; check that the threading is in good condition, replace the o-ring and close it;
- fill until oil spills out the of the hole on the cap (Fig. 1, ref. 1);
- clean the filler cap; check that the threading is in good condition, replace the o-ring and close it;
- run a road test, check the cap level (Fig. 1, ref. 1);
- if required, top up oil of the specified type until it spills out of the hole. Repeat the road test and check the level again.

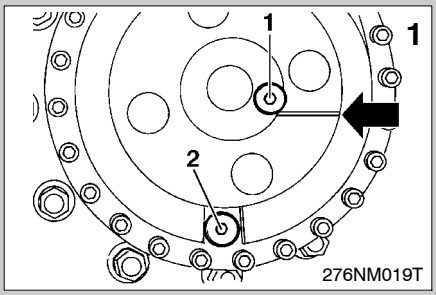


Checking oil hub level

The operation must be carried out separately on both axles.

Proceed as follows:

- adjust the cap (Fig. 1, ref. 1) so that it is arranged in horizontal position;
- clean the cap area and open the level cap (Fig. 1, ref. 1): the lubricant must flow out of the hole;
- top up the level as shown in the following paragraph, if required;
- close the filler cap.

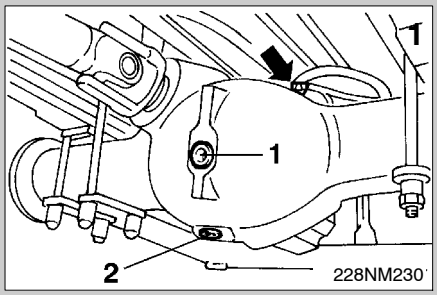


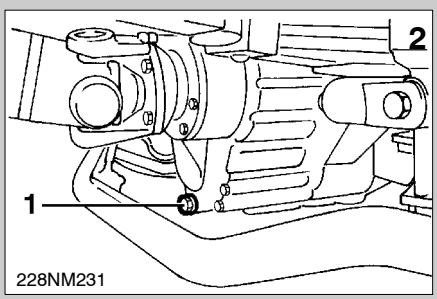
Changing hub oil

The operation must be carried out separately on both axles.

Proceed as follows:

- take any of the screws (Fig. 1, ref. 2) to the lowest position, so that the cap (Fig. 1, ref. 1) is facing upwards;
- clean the cap area and open the cap (Fig. 1, ref. 1);
- arrange a suitably sized container, clean the screw area and remove it (Fig. 1, ref. 2) and drain the lubricant completely;
- tighten the screw;
- adjust the cap (Fig. 1, ref. 1) so that it is arranged in horizontal position;
- fill until oil spills out the of the hole on the cap (Fig. 1, ref. 1);
- clean the cap, check that the threading is in good condition, replace the o-ring and close it;
- repeat the procedure on the other hub;
- run a road test, check the cap level (Fig. 1, ref. 1);
- if required, top up oil of the specified type until it spills out of the hole. Repeat the road test and check the level again.





Front intermediate axle

Check differential oil level

Proceed as follows:

- clean the area around the level plug and remove it (Fig. 1, ref. 1): oil should drip from the hole;
- if necessary, top-up the level as shown in the following paragraph;
- close the level plug.

Check that the breather (Fig. 1, see arrow) is perfectly clean and functioning.

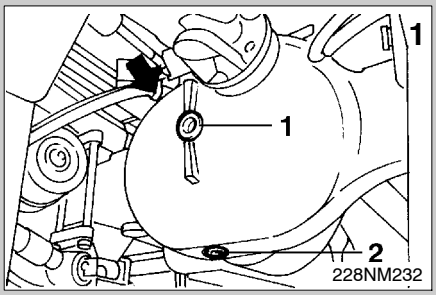
Differential oil change

Proceed as follows:

- place a suitable container, clean the area around the level plug (Fig. 1, ref. 1) and remove it (Fig. 1, ref. 1);
- remove the drain plug (Fig. 2, ref. 1) and fully drain off the oil;
- clean the drain plug, check that the thread is in good condition, replace the O-ring and close it;
- fill with the specified oil until it flows from the plug hole (Fig. 1, ref. 1);
- clean the level plug, check that the thread is in good condition, replace the O-ring and close it;
- carry out a test drive then re-check level at plug (Fig. 1, ref. 1);
- if necessary, top-up with specified oil until it flows from the hole, repeat the test drive and check the level again.

Hub oil level check/change

Proceed as described for the front axle hubs.



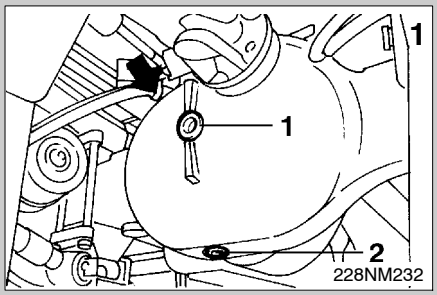
Rear intermediate axle

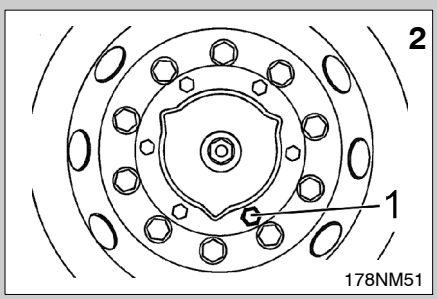
Oil level check

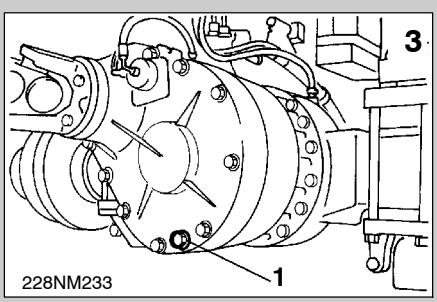
Proceed as follows:

- clean the area around the level plug and remove it (Fig. 1, ref. 1): oil should drip from the hole;
- if necessary, top-up the level as shown in the following paragraph;
- close the level plug.

Check that the breather (Fig. 1, see arrow) is perfectly clean and functioning.







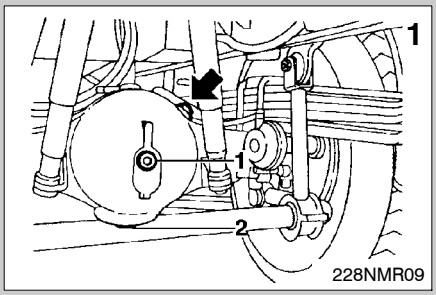
Changing oil

Proceed as follows:

- on either of the hubs, turn any of the screws (Fig. 2, ref. 1) in the lowest position;
- position a container with adequate capacity, clean the zone around the plugs and then remove the level plug (Fig. 1, ref. 1);
- remove the drain plug (Fig. 1, ref. 2) and (Fig. 3, ref. 1) and both the screws (Fig. 2, ref. 1) and completely drain off the oil, then refasten the screws;
- clean the drain plugs, check that the thread is in good condition, replace the o-rings and close them;
- fill with the specified oil until it flows from the plug hole (Fig. 1, ref. 1);

Re-fill gradually to give the oil time to reach the hubs. The operation is finished when the level does not drop for at least five minutes.

- clean the level plug, check that the thread is in good condition, replace the o-ring and replace it;
- carry out a test drive, then re-check the level (Fig. 1, ref. 1);
- if a top-up is necessary, after topping up repeat the test drive and level check.



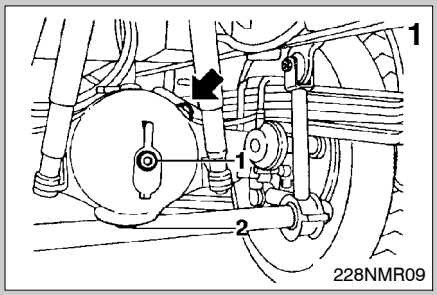
Rear axle

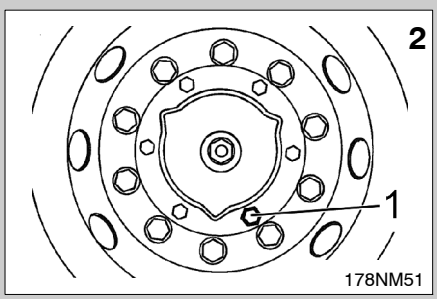
Oil level check

Proceed as follows:

- clean the area around the level plug and remove it (Fig. 1, ref. 1): oil should drip from the hole;
- if necessary, top-up the level as shown in the following paragraph;
- close the level plug.

Check that the breather (Fig. 1, see arrow) is perfectly clean and functioning.





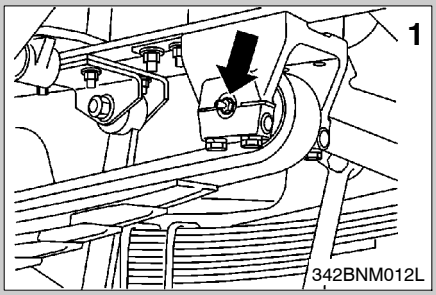
Changing oil

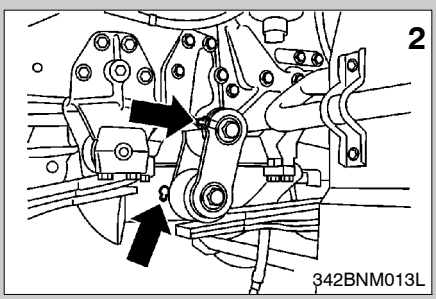
Proceed as follows:

- on either of the hubs, turn any of the screws (Fig. 2, ref. 1) to the lowest position;
- position a container with adequate capacity, clean the zone around the plugs and then remove the level plug (Fig. 1, ref. 1);
- remove the drain plug (Fig. 1, ref. 2) and both the screws (Fig. 2, ref. 1) and fully drain off the oil, then refasten the screws;
- clean the drain plug, check that the thread is in good condition, replace the o-ring and refit the plug.
- fill with the specified oil until it flows from the plug hole (Fig. 1, ref.; 1);

Re-fill gradually to give the oil time to reach the hubs. The operation is finished when the level does not drop for at least five minutes.

- clean the level plug, check that the thread is in good condition, replace the o-ring and replace it;
- carry out a test drive, then re-check the level (Fig. 1, ref. 1);
- if a top-up is necessary, after topping up repeat the test drive and level check.





SUSPENSIONS

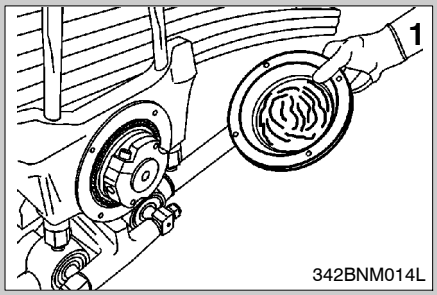
Leaf spring pins greasing

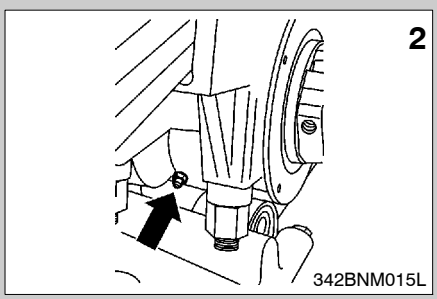
Fig. 1: Support pin
Fig. 2: Support plate

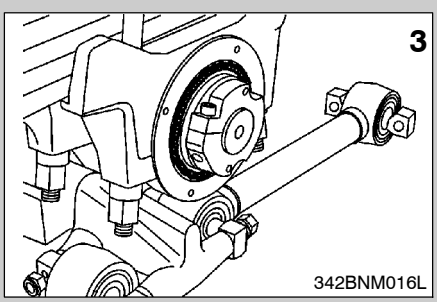
Proceed as follows:

- clean the relevant union;
- inject grease in the pressure unions of leaf spring joints (see arrow).

To ensure efficient lubrication, inject lubricant until it pours out of the lubricated points.
Use a manual grease dispenser only. Never use a high pressure grease dispenser.





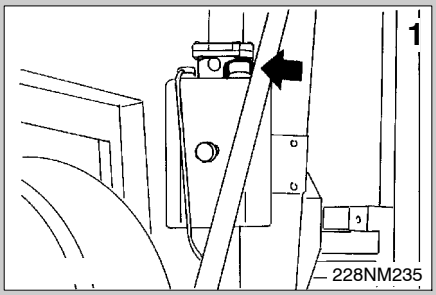


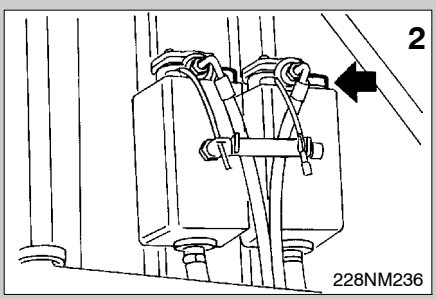
Carriage pin greasing on 3 and 4-axle vehicles

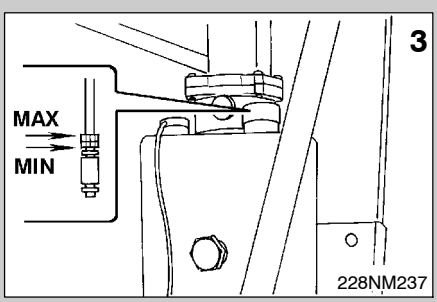
Proceed as follows:

- open the cover (Fig.1) remove grease and fill the cover with prescribed lubricant ;
- clean union (Fig. 2, see arrow);
- inject grease in pressure union until it flows out from the bearing (fig.3);
- close the cover.

To ensure efficient lubrication, inject lubricant until it pours out of the lubricated points.
Use a manual grease dispenser only. Never use a high pressure grease dispenser.







STEERING SYSTEM

Oil level check

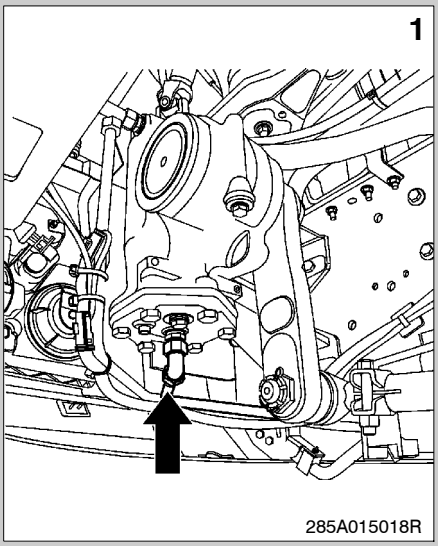
This check is optional, since there is an oil level warning light.

1. vehicles without auxiliary cylinder
2. vehicles with auxiliary cylinder

The system of vehicles fitted with auxiliary cylinder have two inter-connected tanks. The following operations are to be carried out on one tank only.

Proceed as follows:

- park the vehicle with the engine off and wheels straight;
- clean the area around the plug, then unscrew the plug and check that the reservoir oil level is between the two notches (Fig. 3) on the dipstick;
- if necessary top-up the level and close the plug.



Changing the hydraulic oil – Vehicles without auxiliary cylinder

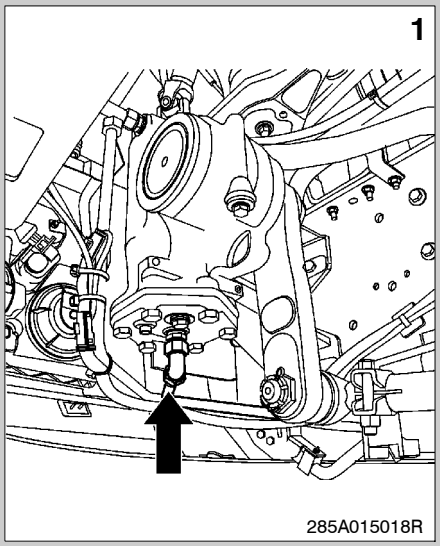
Proceed as follows:

Dumping

- raise the vehicle until the front wheels are off the ground;
- prepare a suitable container, unscrew delivery (Fig. 1, see arrow) pipes from the power steering casing and remove the oil reservoir cap;
- with engine off, turn the steering wheel from lock to lock until the oil stops flowing out;
- reconnect the hoses.

Filling

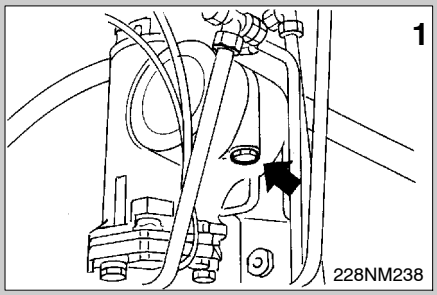
- fill completely reservoir with oil;
- with engine off, turn the steering wheel from lock to lock topping up reservoir with oil, at the same time, until oil level is stabilised;
- start the engine to fill the system with oil: since the level drops rapidly, continue pouring oil into the tank while PREVENTING AIR BEING DRAWN INTO THE SYSTEM;
- proceed until the level is steady.



Bleeding off air

- with the engine running at idle, turn the steering wheel from lock to lock until the residual air bubbles are eliminated.

During this operation the oil level should be constantly checked. If the above indications are followed strictly, oil should not exceed the upper notch on the dipstick by more than 0.5 cm when the engine is stopped, nor suddenly emulsify. This phenomenon would denote a remarkable presence of air in the circuit due to incorrect operations during the filling phase.



Changing the hydraulic oil for – Vehicles with auxiliary cylinder

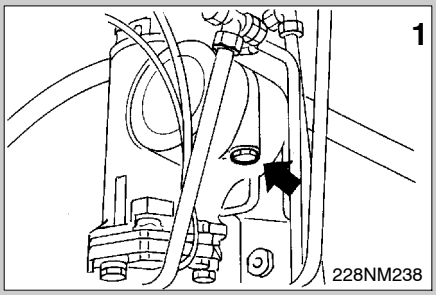
Proceed as follows:

Dumping

- raise the vehicle until the front wheels are off the ground;
- prepare a suitable container, remove drain plug (Fig. 1, see arrow) from the power steering casing and remove the oil reservoir cap;
- with engine off, turn the steering wheel from lock to lock until the oil stops flowing out;
- close the plug.

Filling

- fill completely reservoir with oil;
- with engine off, turn the steering wheel from lock to lock topping up reservoir with oil, at the same time, until oil level is stabilised;
- start the engine to fill the system with oil: since the level drops rapidly, continue pouring oil into the tank while PREVENTING AIR BEING DRAWN INTO THE SYSTEM;
- proceed until the level is steady.

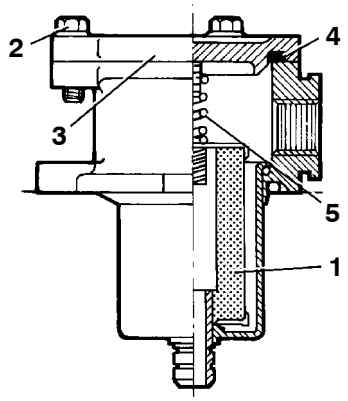


Bleeding off air

- with the engine running at idle, turn the steering wheel from lock to lock until the residual air bubbles are eliminated.

During this operation the oil level should be constantly checked. If the above indications are followed strictly, oil should not exceed the upper notch on the dipstick by more than 0.5 cm when the engine is stopped, nor suddenly emulsify. This phenomenon would denote a remarkable presence of air in the circuit due to incorrect operations during the filling phase.

1



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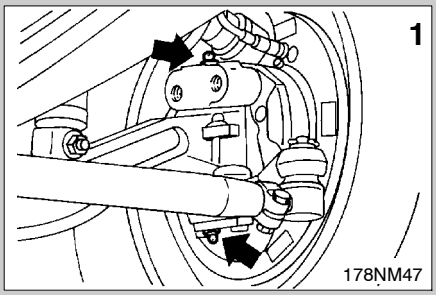
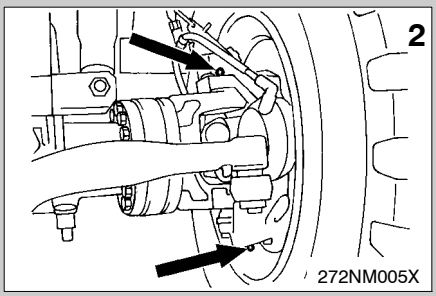
Replacing oil filter

Proceed as follows:

- loosen the retaining screws (Fig. 1, ref. 2);
- remove the cover (Fig. 1, ref. 3), gasket (Fig. 1, ref. 4) and the spring (Fig. 1, ref. 5);
- replace the filter cartridge (Fig. 1, ref. 1);
- check the cover seal. If damaged, replace it;
- replace the cover.





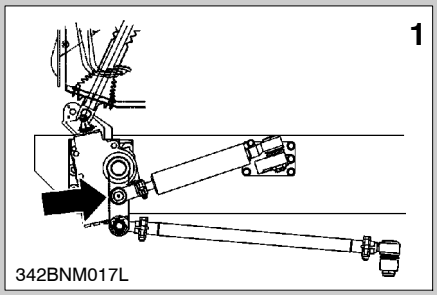
Stub axle greasing

Fig. 1: Axle
Fig. 2: Drive axle

Proceed as follows:

- clean the joint concerned;
- inject grease into the axle stub grease nipples (Fig. 1 - Fig. 2, see arrow).

Inject grease until it seeps from the grease nipples to ensure efficient lubrication.
A hand pump must be used for greasing, and never a high pressure grease gun.



Steering linkage grease application

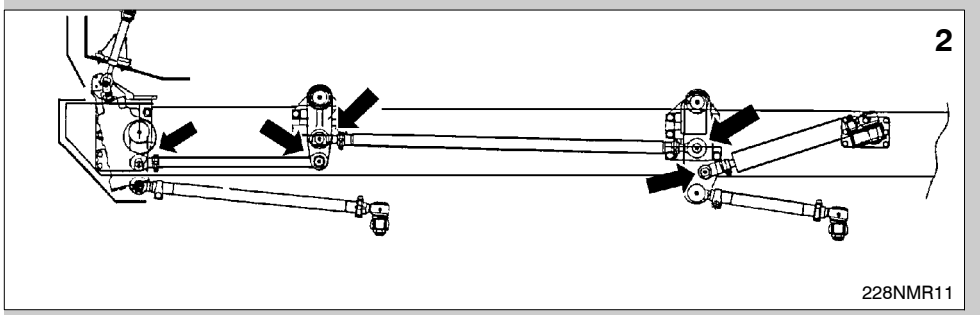
Fig. 1: 3-axle vehicles with auxiliary cylinder

Fig. 2: 4-axle vehicles

Proceed as follows:

- clean the joint concerned;
- inject grease into the joint pressure nipples (see arrow).

Inject grease until it seeps from the grease nipples to ensure efficient lubrication.
A hand pump must be used for greasing, and never a high pressure grease gun.



Front wheel toe-in check

This operation must be carried out by adequately trained personnel. For further information contact your Dealer.

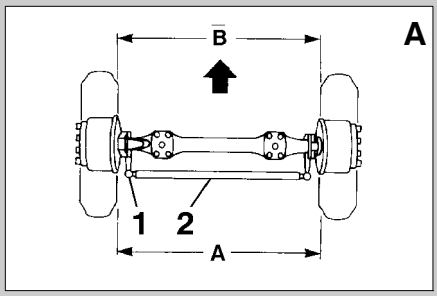
Before starting the check, make sure:
- **the vehicle is on a level surface and empty**
- **the tyres are inflated to the correct pressure.**

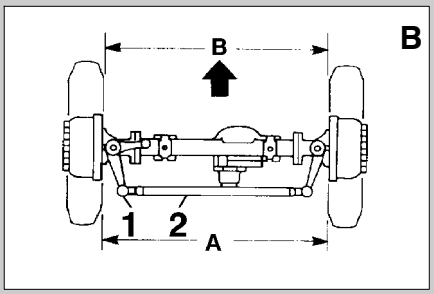
Proceed as follows:
- set the wheels so that they are pointing forwards;
- check that the distances A and B measured along the centreline of the rims at the same height from the ground, correspond to the specified values.

Fore-carriage	Measurement
1st axle	B = A – (1 / 3 mm)
2nd axle	B = A

If this is not the case, adjust as follows:
- loosen the bolts fastening the heads (ref. 1) to the coupling bar (ref. 2);
- rotate the bar itself right and left by enough to obtain the required measurement;
- tighten the head clamp bolts;
- move the vehicle straight forwards or backwards by at least one turn of wheels and check toe-in again.

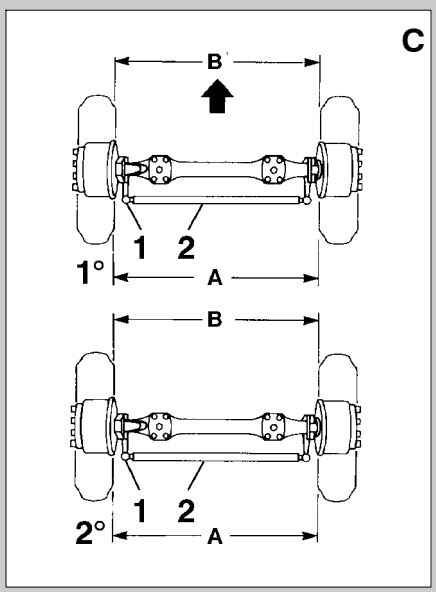
The entire steering mechanism must be checked if adjustments require more than 5 mm from the indicated measurements. For further information contact your Dealer.

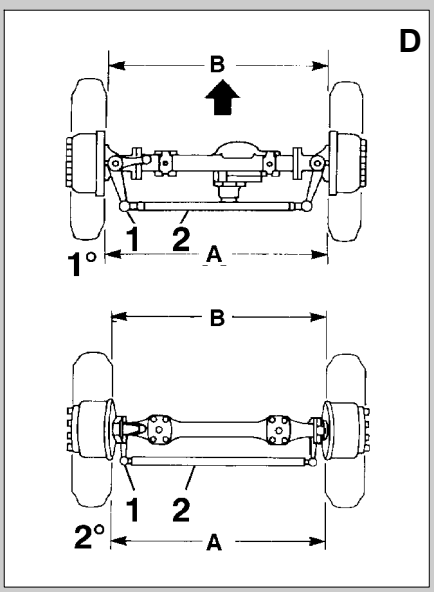


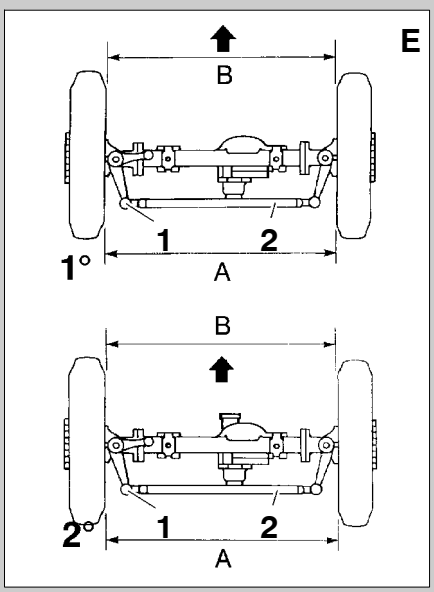


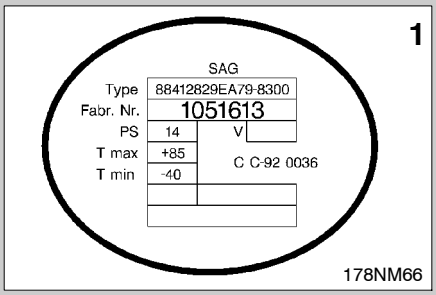
Front wheel toe-in check

A: 4x2 and 6x4 vehicles
B: 4x4 and 6x6 vehicles
C: 8x4 vehicles
D: 8x6 vehicles
E: 8x8 vehicles









COMPRESSED AIR SYSTEM

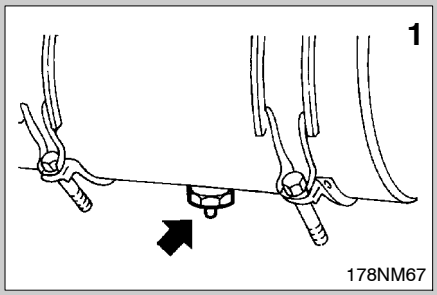
Tank visual inspection

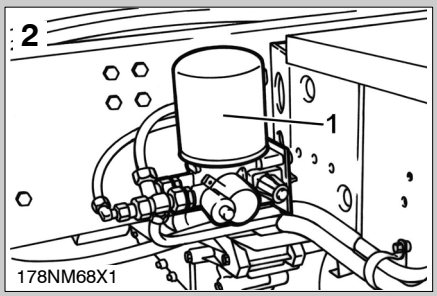
Visually inspect tank external condition.

Under no circumstances should any form of heat treatment or welding be carried out on the outside of the tank.
If the reservoir is dented, have it replaced.
The conditions for use of the compressed air tank (pressure and temperature) are given on the label applied to the tank itself (Fig. 1).
Application should conform to these indications.
During operation the tank must not be subject to stresses in addition to those deriving from the normal conditions of use and by its weight.
The tank is only designed for use with compressed air systems.

The tank is maintenance-free. The following precautions should however be taken:

- any painting should be preceded by a preparatory coat;
- surface treating of the bolts and screws with passivation;
- clean with products which do not contain alcohol.





Air drier functionality check

Proceed as follows:

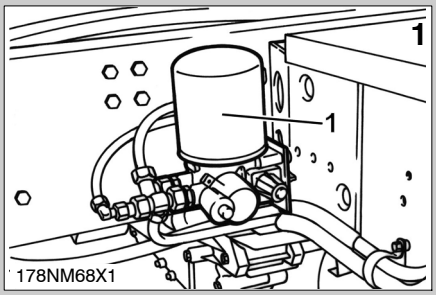
- check that the air drier functions correctly by operating the drain valve (Fig. 1, see arrow), in this case the air should come out of the tank with no traces of condensation.

As soon as a small amount of moisture is noticed, carry out a number of inspections at shorter intervals to check whether this fact is only due to temporary overloading of the drier or (Fig. 2, ref. 1) whether its efficiency is permanently impaired.

In the second case it will be necessary to renew the cartridge as the dampness absorption capacity of the granulate is greatly reduced due to the action of oils, dirt, etc.

If a mixture of oil and water comes out of the tanks during this check, this means that the compressor is not working correctly as it is discharging oil.

In this case in addition to replacing the cartridge, the compressor must also be overhauled.



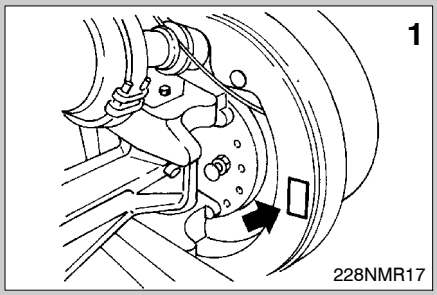
Air dryer filter change

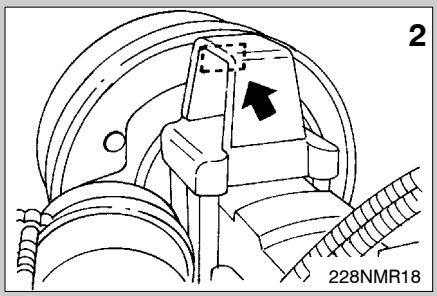
Proceed as follows:

- with the engine off unscrew the cartridge (Fig. 1, ref. 2) with the correct spanner if necessary, then thoroughly clean the support seat;
- hand-tighten the cartridge until the washer comes into contact with the support, then tighten it by ¾ of a turn;

Do not overtighten the cartridge to avoid damaging the washer. Always follow the manufacturer's recommendations.

- run the engine for a few minutes to check for the absence of air leaks.





BRAKING SYSTEM

Shoe-drum play check

This check must be made separately on both the shoes of each wheel.

Front wheels (Fig. 1)
Rear wheels (Fig. 2)

Proceed as follows:

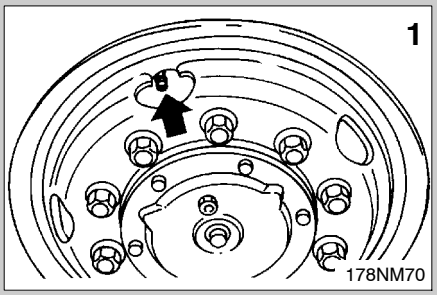
- remove the caps (see arrow) through the inspection slots;
- measure the play between the shoes and drums; this must be between 0.8 and 1.5 mm;
- if not, remove and overhaul the automatic play take-up device;
- check the condition of the brake linings;
- measure brake lining thickness: if less than 8 mm, replace the linings.

After completing the hecks, replace the plugs in the corresponding holes.

Check pedal distributors

Check that there are no leaks from the drain holes of the two distributors.

A leak in the rest position indicates that the air inlet valve is worn while the exhaust valve is worn if the leak occurs during braking.



TYRES AND WHEELS

Checking wheels and tyres

Proceed as follows:

- check the inflation pressure of the tyres (Fig. 1) is within the specified values; otherwise adjust to correct pressure;

Check pressure and inflate the tyres when cold.

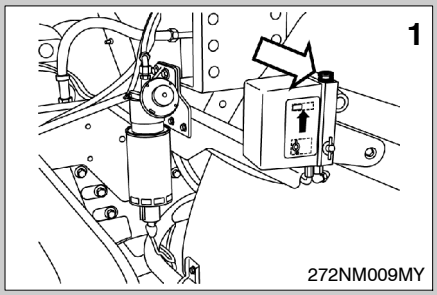
- check the condition of the rims and the wear on the tyres;
- check that bolts are fastened at the specified torque (see TECHNICAL SPECIFICATIONS section);
- check tyres for evident cuts; check whether the tyres touch the vehicle.

If anomalous wear is found on the front tyres, check the front wheel toe-in.
Never exceed the maximum load per axle if the vehicle is fully loaded.

Inflating tyres

Proceed as follows:

- remove the protective cap and connect the inflation device fitting to the valve (Fig. 1, see arrow);
- take to specified pressure;
- disconnect the fitting and close the protective cap.



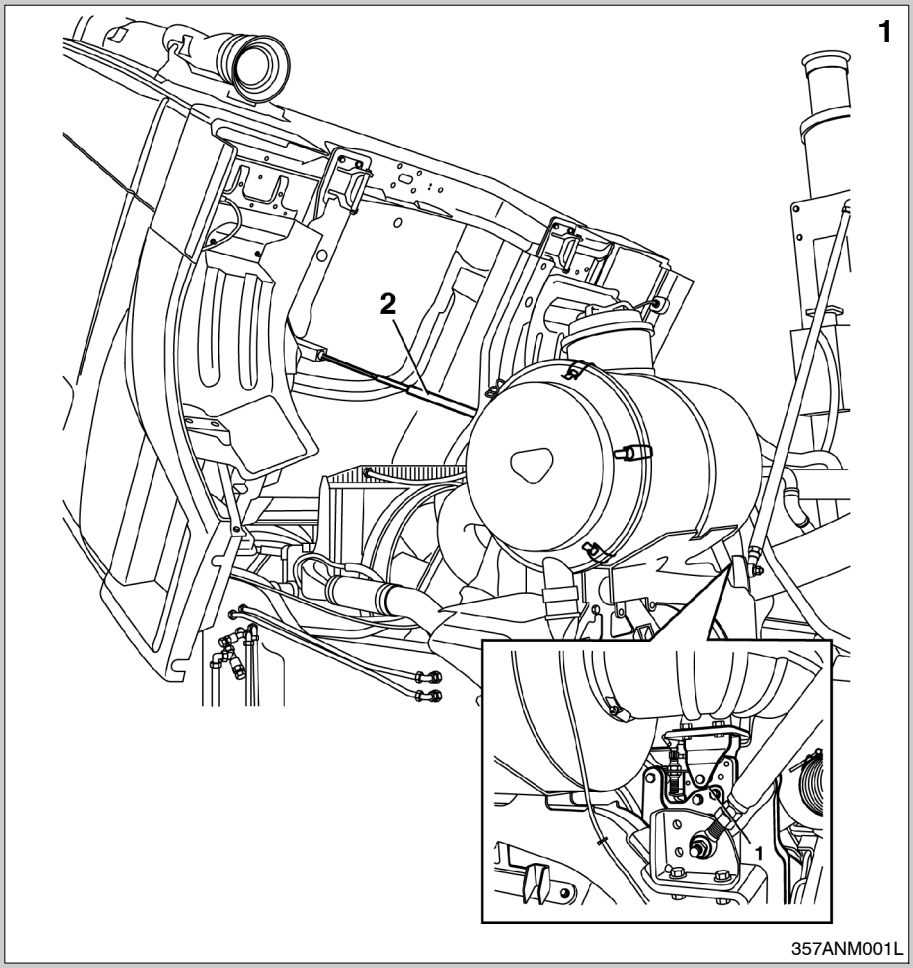
CAB TIPPING SYSTEM

Oil level check / fluid change

To check level, check through the filler cap (Fig. 1, see arrow) that the oil level with cab tilted is 1 - 1.5 cm from the cap. Top-up if necessary.

To change the fluid, proceed as follows:

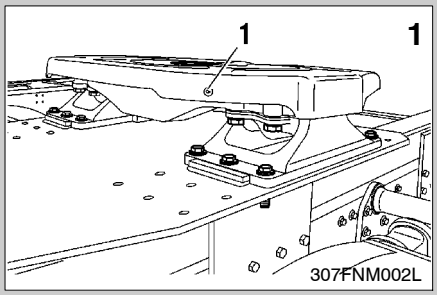
- clean the area around the cap and remove it;
- using a syringe and flexible pipe, draw-out the fluid in the reservoir;
- fill with the required quantity of fluid then close the cap.

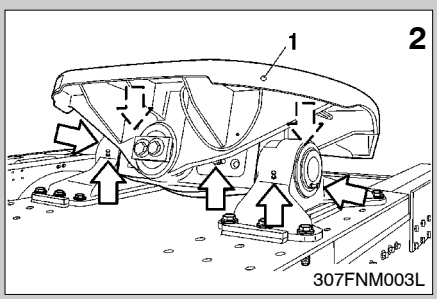


Greasing

Proceed as follows:

- tip the cab;
- grease the mechanism of both cab stop hooks (Fig. 1, ref. 1);
- grease the telescopic manual transmission control rod (Fig. 1, ref. 2).





TOWING SYSTEMS

Greasing the fifth wheel

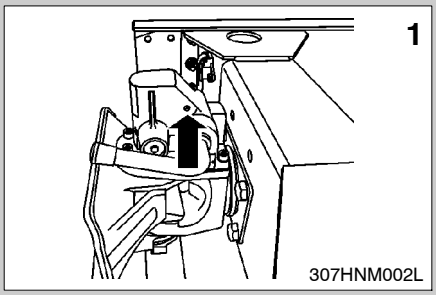
Fig. 1: fixed fifth wheel
Fig. 2: pivoting fifth wheel

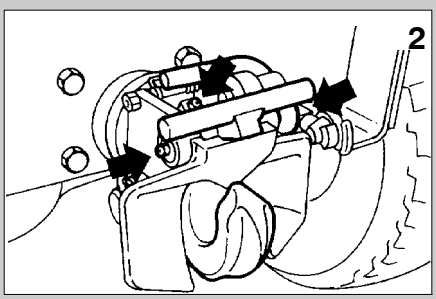
Proceed as follows:

- release the semi-trailer from the tractor;
- clean the surface of the fifth wheel plate and the semi-trailer hitching plate;
- apply plenty of grease the fifth wheel plate, the locking mechanism for the fifth wheel, the coupling pin and semi-trailer attachment plate;
- the rubber buffers require no maintenance;
- clean the concerned fitting;
- inject grease in the pressure fittings of the fifth wheel (see arrow).

Inject lubricant until it pours out of the lubricated points to ensure efficient lubrication.
Use a manual grease dispenser only. Never use a high pressure grease dispenser.

The grease nipple of the fifth wheel plate (ref. 1) is to be used for lubrication between services without needing to uncouple the semi-trailer.





Tow hook greasing – Type I

Proceed as follows:

- release the trailer from the tractor;
- clean the internal surface of the bell head (Fig. 1);
- grease the hooking pin;
- clean the coupling involved;
- inject grease in the hook pressure fittings (Fig. 1, see arrow).

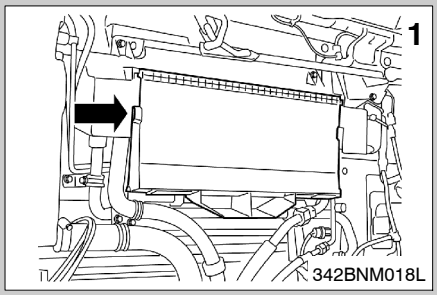
To ensure efficient lubrication, continue to inject lubricant until it flows out from the lubricated points.
To grease, use a hand pump only, never use a high pressure greasing device.
This operation should be carried out with the lever raised.

Tow hook greasing – Type II

Proceed as follows:

- release the trailer from the vehicle and leave the hook in open position;
- carefully clean the hook with a jet of compressed air;
- lubricate the zone in contact with the trailer towing eye;
- clean the coupling involved;
- inject grease in the hook pressure fittings (Fig. 2, see arrow).

To ensure efficient lubrication, continue to inject lubricant until it flows out from the lubricated points.
To grease, use a hand pump only, never use a high pressure greasing device.

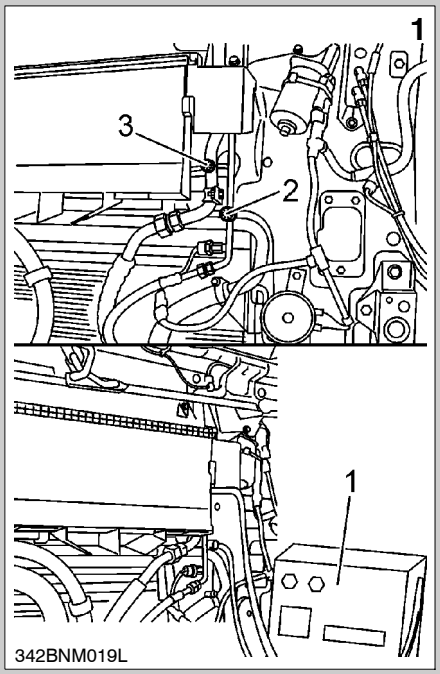


AIR CONDITIONER

Air-conditioner system maintenance

Proceed as follows:

- open the radiator grill;
- remove the cover (Fig. 1, see arrow) and replace dust filter;
- inspect and clean the condenser with compressed air (max 5 bar).



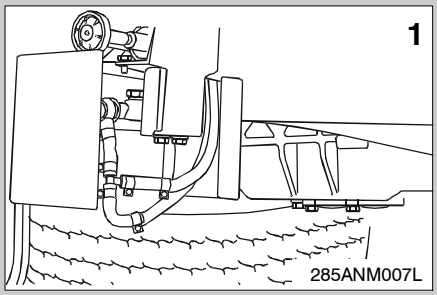
System charge check

Check system charge once a year or when reduced cooling effect is noticed (Fig. 1).

1. system checking and charging equipment
2. high pressure circuit valve
3. low pressure circuit valve

Checking and charging must be carried out by specialist personnel using specific equipment.
R134a (tetrafluoroethane) coolant is used. This coolant is classified as an environmentally-friendly product by law.
Do not use this fluid in systems working with the previous fluid R12 (Freon 12).
For reasons of incompatibility between compressor oil and fluid, do not use R12 in systems designed to use R134a.

Do not discharge R134a into the atmosphere. Although the product has a zero ozone depletion potential it has a global warming potential.
Always use type-approved coolant recovery and recharging devices.
Do not mix different coolants in the same device.



SUPPLEMENTARY HEATER

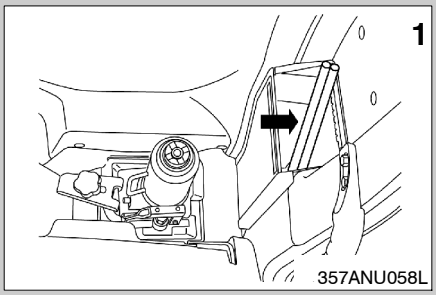
Replacing the supplementary heater fuel filter

Proceed as follows:

- arrange a container of appropriate capacity and clean the filter area;
- loosen the cup using the specific tool if required and remove it from its housing;
- replace the filter cartridge;

Do not fill the new filter with fuel to prevent introducing impurities.

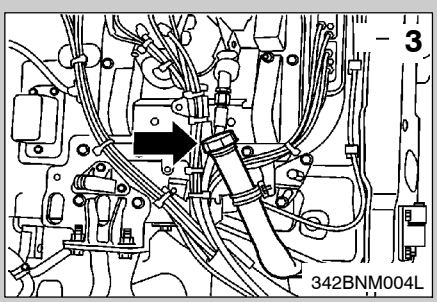
- fasten the cup;
- run the heater for a few minutes and check for leakage of fuel.



2

Temperature	Product	Water
–35 °C	1	0
–20 °C	1	1
–10 °C	1	2
0 °C	1	6
summer	1	10

178NM80



BODYWORK

Replacing front windscreen wiper blade (Fig. 1)

Proceed as follows:

- lift the arm and blade;
- push the blade backwards, disengaging it from the stop and removing it;
- fit the correct adapter on the new blade and approach the blade to the clip to fasten it in the adapter;
- pull the blade fastening the adapter clip.

Observe the specifications provided by the supplier.

Windscreen washer reservoir

You are advised to use a specific antifreeze product mixed with water as shown in the table (Fig. 2).

Proceed as follows:

- open the radiator grill;
- unscrew the plug (Fig. 3, see arrow) and fill until completely full;
- replace the cap and close the grill.

Use the proportion of detergent recommended by the manufacturer.

Bodywork maintenance

Periodically wash the vehicle with neutral detergent and water to remove any corrosive agents (salt, sand, etc.).
Dry accurately with compressed air to fully eliminate any stagnating water.
Do not use products containing aromatic solvents, methanol or hydrocarbons for cleaning paintwork.
Do not wash inside the cab with a jet of water or steam.

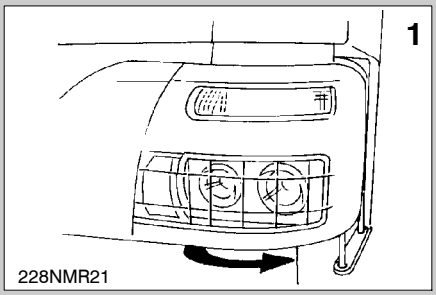
Cleaning plastic parts

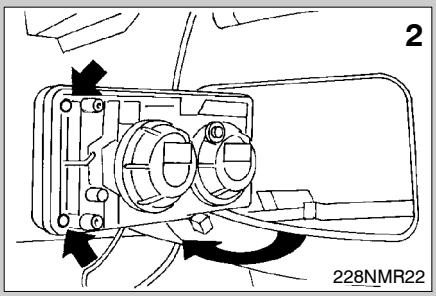
Plastic parts should be cleaned using the same procedure as for normal washing.
For any remaining traces of dirt use specific products, carefully following the manufacturer's recommendations.
Do not use products containing aromatic solvents, methanol or hydrocarbons for ceaning paintwork.

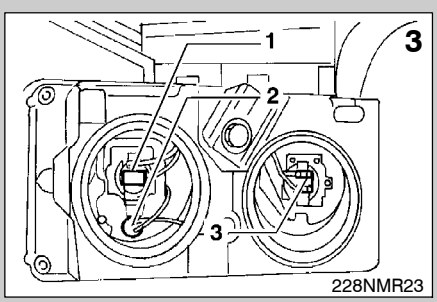
Upholstery may be cleaned with dry foam and general solvents. Exercise caution when using these products as they are flammable and give off fumes.
Ventilate the cabin until they are completely dry. Never use chloride solvents (trichloroethylene, hypochlorite, etc.).

Cleaning seat belts

Seat belts may be washed by hand with hot water and neutral soap, then rinsed and left to dry in the shade. Never use strong detergents, bleach or dyes. Avoid any chemical substance that may weaken the fibres.







LIGHTING SYSTEM

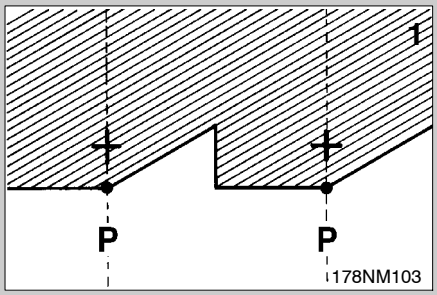
Headlight/front sidelight bulb replacement

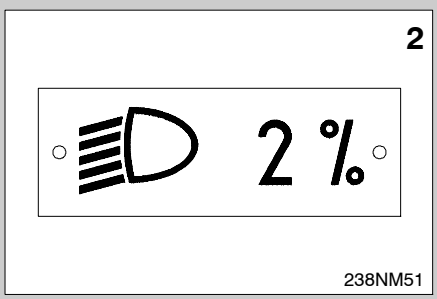
Proceed as follows:

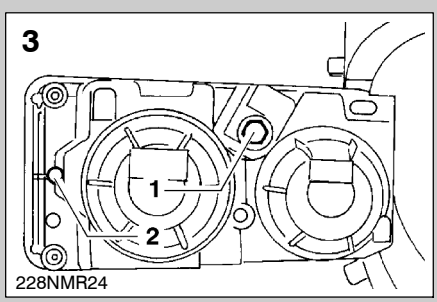
- unhook the guard grill by rotating it toward the outside (Fig. 1, see arrow);
- unscrew the screws (Fig. 2, see arrow) on the inside of the fenders and rotate the complete headlight group toward the outside;
- remove the corresponding cover (Fig. 3):
  1. headlight
  2. side light
  3. high beams
- disconnect the electrical connector;
- release the bulb retaining spring and remove the halogen bulb
  or
- remove the sidelight bulb;

Never touch a halogen bulb with fingers, to avoid damage.

- check that bulb is correctly fitted.
- for replacement, follow the removal instructions in reverse order.





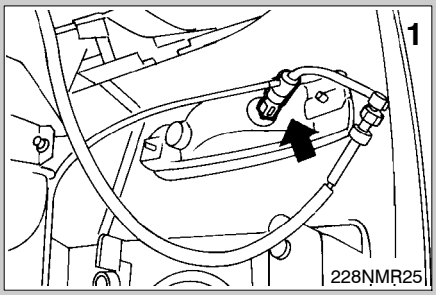


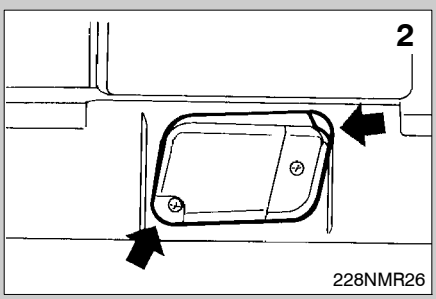
Headlight alignment

After dismantling the headlights or following crash damage, the headlights have to be realigned.
It is advisable to use specific equipment for this operation.
However, a sufficiently correct alignment can be achieved proceeding as follows:

- park the unladen vehicle, with tyres at correct pressure, on flat ground nearly up against a light coloured wall;
- mark two crosses on the wall, corresponding to the two headlights (Fig. 1);
- back the vehicle up 10 m and shine the headlights (Fig. 1) on the wall. The distance between the crosses and reference points P-P must be equal to the percentage of the distance between the vehicle and the wall indicated on the specific plate (Fig. 2);
- if necessary, use the adjuster screws (Fig. 3):
  1. vertical adjustment
  2. horizontal adjustment

For vehicles fitted with adjustable headlights, turn the adjuster knob to position 0.





Front direction indicator light bulb replacement

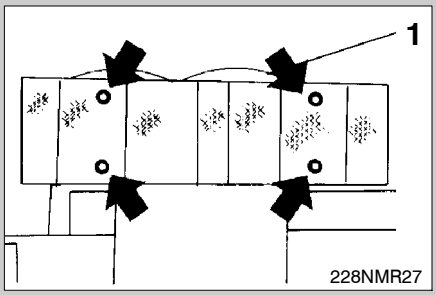
Proceed as follows:

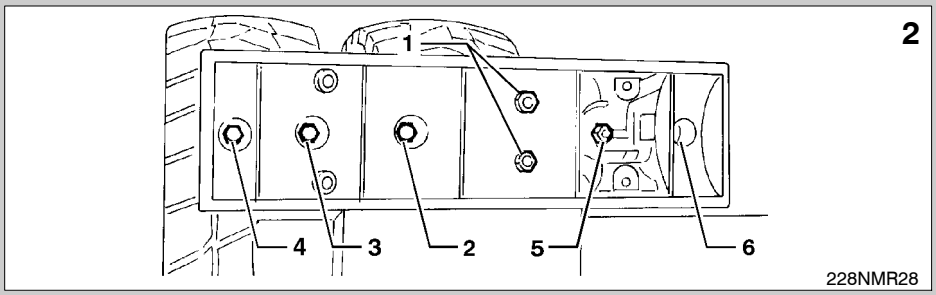
- working from the inside of the fenders, disconnect the connector (Fig. 1, see arrow);
- rotate and extract the fitting with bulb;
- press and turn the bulb anti-clockwise;
- check that bulb is correctly fitted;
- for replacement, follow the removal instructions in reverse order.

Side direction indicator bulb replacement

Proceed as follows:

- remove the cover fastening screws (Fig. 2, see arrow) and remove it;
- press and turn the bulb anti-clockwise;
- check that bulb is correctly fitted;
- for replacement, follow the removal instructions in reverse order.

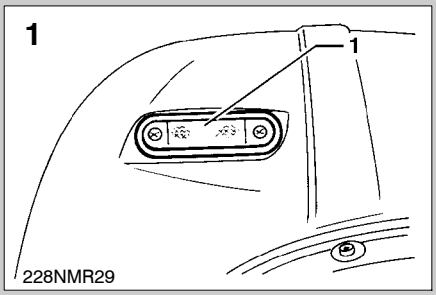


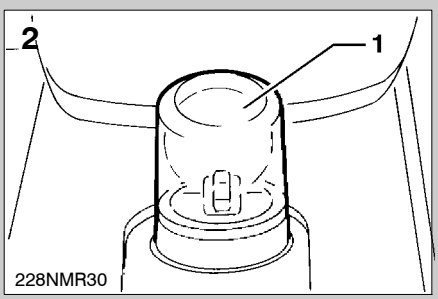


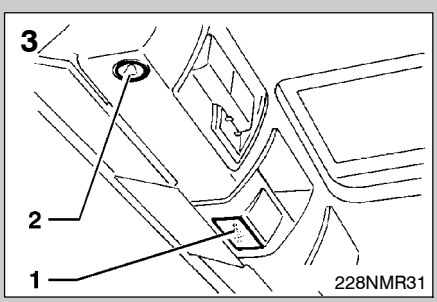
Rear light bulb replacement

Proceed as follows:

- remove the cover fastening screws (Fig. 1) and remove it;
- press and turn the bulb to replace (Fig. 2) anti-clockwise:
  1. position (double)
  2. stop
  3. direction indicator
  4. clearance
  5. rear fog lamp
  6. reversing light
- check that the replaced bulb is correctly fitted.
- for replacement, follow the removal instructions in reverse order.







Front clearance light bulb replacement

Proceed as follows:

- remove the fastening screws and remove the complete light (Fig. 1, ref. 1);
- for replacement, follow the removal instructions in reverse order.

Rotary warning light bulb replacement

Proceed as follows:

- remove the screws and the cover (Fig. 2, ref. 1);
- replace the bulb;
- for replacement, follow the removal instructions in reverse order.

Ceiling light bulb replacement

Proceed as follows:

- insert a screwdriver between the light fitting and cabin interior lining (Fig. 3, ref. 1); lever off the fitting and replace the bulb.
- for replacement, follow the removal instructions in reverse order.

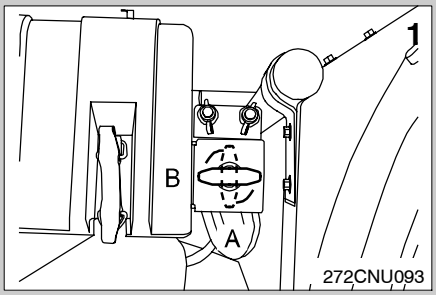
Replacing cab step light

Proceed as follows:

- press and turn the bulb anti-clockwise (Fig. 3, ref. 2).
- For replacement, follow the removal instructions in reverse order.

List of bulbs

Use	Type	Watt
Lights:		
– main beam and dipped beam light	Double filament halogen	75/70
– position	Round	4
Front direction indicator	Round	21
Side direction indicator	Round	21
Rear lights:		
– position/brake (stop)	Round double filament	5/21
– turn	Round	21
– reverse	Round	21
– rear foglight	Round	21
Number plate light	Round	10
Overall light	Round	5
Rotating light	Round	21
Rear light	Round	21
Cabin ceiling light	Round/cylindrical	5/5
Instrument panel/warning lights	All glass	1.2
Warning lights	All glass	1.2



ELECTRICAL SYSTEM

Precautions

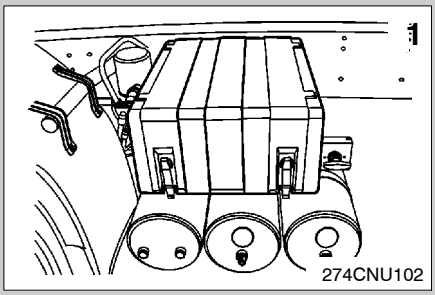
Make absolutely sure that the electrical power is disconnected before working directly or indirectly on electrical system parts by operating the battery disconnect switch (Fig. 1).

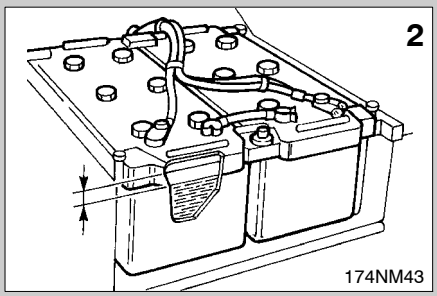
A: power off
B: power on

The vehicle electrical system should work even if the fitted battery is flat.

In order to avoid incorrect interventions which may irreversibly damage the electronic control units installed on board the vehicle the following recommendations should be followed:

- when work on the chassis requires arc welding the connector should be removed from the control units: when welding is to be carried out near the control units, remove the units;
- after a service operation requiring battery disconnection, make sure that the terminals are well connected;
- never use a battery charger to start the engine;
- disconnect the batteries to recharge them;
- do not disconnect or connect the connectors to the electronic control unit when the engine is running or control units are powered;
- do not disconnect the batteries when the engine is running;
- remove the electronic control units in the event of operations at temperatures exceeding 80°C (oven painting, etc.).





3

Temperature		Electrolyte density (100% of charge)	
°C	°F	g/dm^3	
40		1.265	
20		1.285	
0		1.300	
-20		1.365	

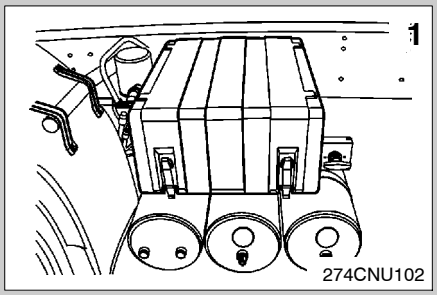
178NM84

Battery maintenance (unsealed batteries)

Sealed batteries (maintenance free) do not require topping up with water in normal working conditions and mild climate. The electrolyte should be checked approximately once a year in tropical climates.

Proceed as follows:

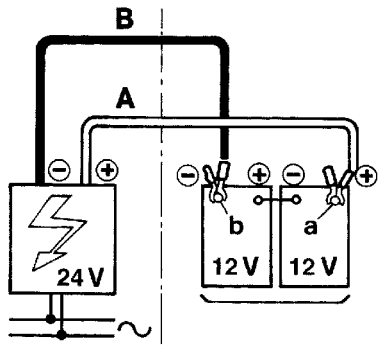
- open the access cover (Fig. 1):
- carefully clean the batteries, the cables and the case, removing rust and dirt which can cause voltage drops;
- check through the caps that the distance between the electrolyte (Fig. 2) and the upper edge of the plate of each element is as specified:
  level-plate distance 10-12 mm (0.4-0.5 in)
- if required, top up with distilled water when the batteries are cold and rested, through the specific filler holes;
- check the battery charge with a densimeter (Fig. 3).



Always take the following precautions when working:

- devices that require current draw from accumulators (Fig. 1) must only be used for the time strictly necessary for the checks to perform on the vehicle.
- carry out function checks requiring current draw from accumulators with the engine running, if possible and in compliance with safety standards.
- do not use the installed batteries to power tools when fitting-out.
- always disconnect the batteries when carrying out any kind of welding operation.

1



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Recharge with external devices

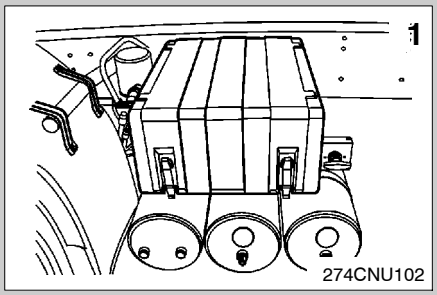
Recharge should usually be performed with batteries disassembled from vehicle.If this is not possible, the batteries can also be recharged using an external source (battery charger) connected directly to the battery terminals.

The vehicle is equipped with a 24 volt electrical system with negative and earth.

Proceed as follows:

- lay the cables on the ground ensuring that the terminals do not touch metal parts or each other. Connect the red cable (Fig. 1, ref. a) to the POSITIVE terminal of the flat battery;
- connect the black cable (Fig. 1, ref. b) to the NEGATIVE terminal of the flat battery;
- set the recharge time and current. Start recharging.

Respect the instructions provided by the battery charger supplier.
Respect the sequence of the operation.
Do not reverse the polarity when making the connection.

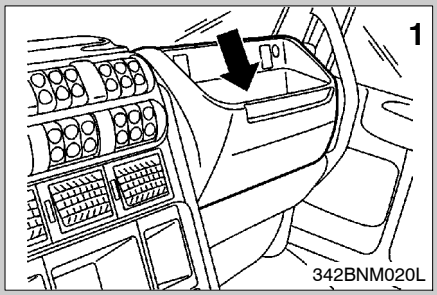


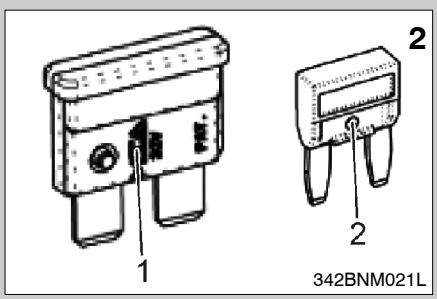
Changing the battery

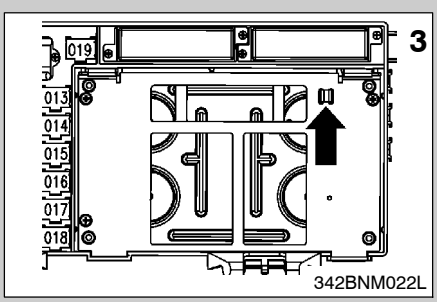
Follow all safety precautions when handling the battery.

- operate the battery cut-off control;
- remove the battery compartment cover (Fig. 1):
- disconnect the battery as follows:
  – disconnect the positive terminal;
  – disconnect the negative terminal.
- remove the flat batteries;
- thoroughly clean the battery compartment, removing oxides and grime;
- install the new batteries;
- connect the battery leads as follows:
  – connect the negative terminal;
  – connect the positive terminal.
- smear pure Vaseline on the terminals;
- replace the battery compartment cover.

Always follow the battery manufacturer's instructions.
Observe the sequence of operations.
When connecting, never invert polarity.







Interconnection control unit (fuses and relays)

Fuses that protect electrical system equipment and relays are arranged in a special compartment (Fig.1, see arrow) inside the cab.

If a fuse valve blows more than once, look for the cause in the electrical system.

The control unit has two types of fuses:

- type A (AMP unival) (Fig.2, ref. 1)
- type A0 (AMP minival) (Fig.2, ref. 2)

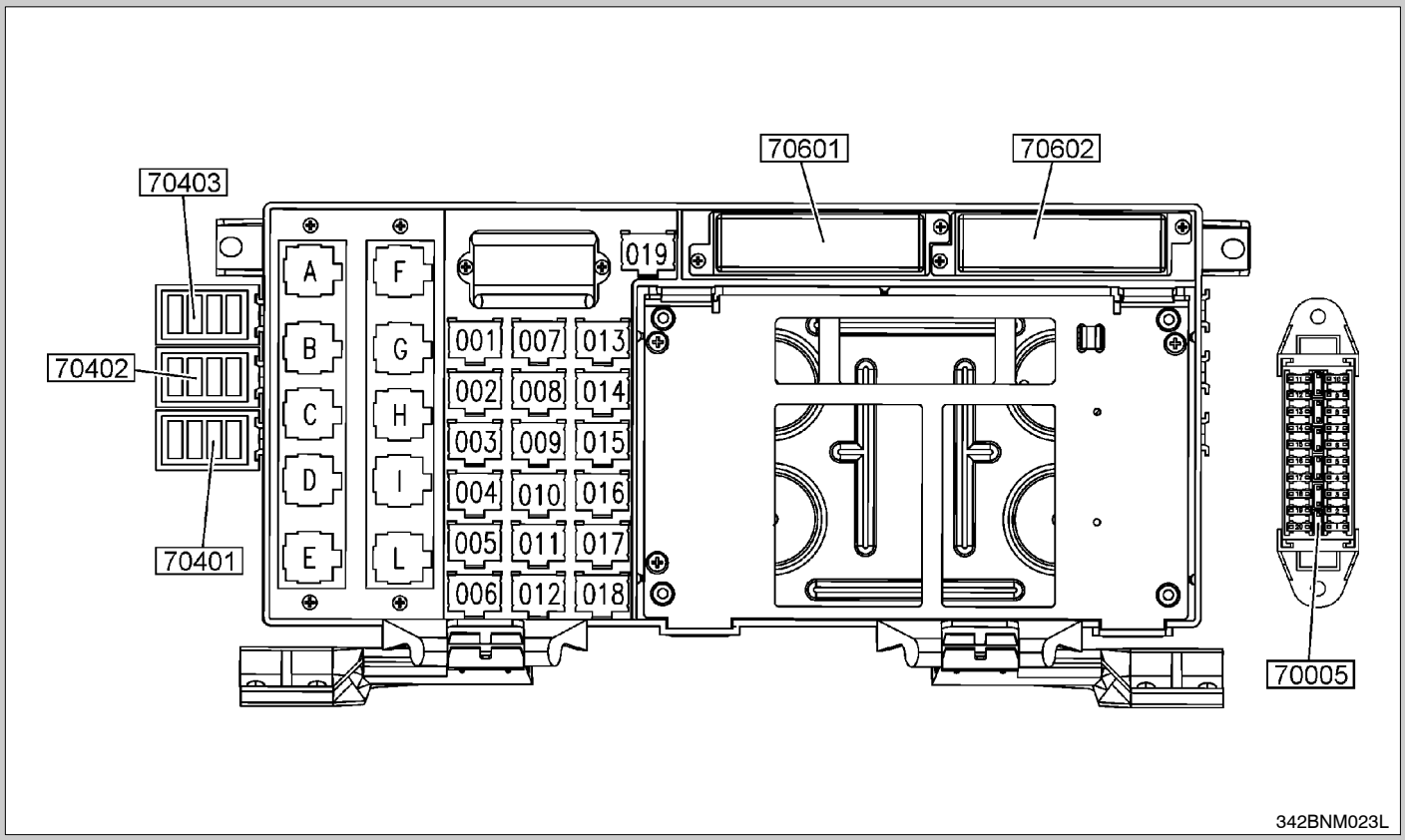
To remove fuses type A0, use the special pliers provided (Fig.3, see arrow).

Fuse replacement

Proceed as follows:

- disconnect the batteries from the battery master switch;
- remove the compartment lid;
- remove the blown fuse from its housing;
- fit a new fuse WITH THE SAME AMPERES as the blown fuse;
- refit the compartment lid;

FUSE / RELAYS HOLDER PLATE



FUSES

Fuse holder (70005)

POSITION	FUNCTION	CAPACITY (A)
1	DTCO – Cluster	3
2	DTCO – Cluster	5
3	IBC2	5
4	Left low beam, right main beam headlights and cab IBC2	10
5	Right low beam, left main beam headlights and symbol panel IBC2	10
6	Right side position lights and rear fog light IBC2	10
7	Left position side lights – braking lights IBC2	10
8	Turn indicators IBC2	10
9	Windshield wiper IBC2	10
10	Fog light – work headlight – day lighting	10
11	Reverse gear	10
12	Pivotable headlights – horn – air horns	15
13	Alternator – Vehicle service equipment	5
14	Solenoid valves VGT – Synchro protection – differential locks – solenoid valves PTO	10
15	Heated fuel pre-filter	15
16	Brakes air drier – fuel filter water detector sensor	5
17	Ignition key – PTO solenoid valve	3
18	Climate control – Heater	20
19	Cigar lighter – 24V/12V voltage reducer – MC net	20
20	Electric window risers	20

Fuse holder (70601)

POSITION	FUNCTION	CAPACITY (A)
1	Trailers ABS	30
2	ABS control unit	15
3	ABS control unit	5
4	OBD socket – refrigerator . 30-pole diagnostics socket	10
5	Centralised closure	10
6	Centralised closure – heated mirrors	10

Fuse holder (70602)

POSITION	FUNCTION	CAPACITY (A)
1	ECM control unit	15
2	ECM control unit	5
3	Heated seats	7,5
4	Heated mirrors	10
5	+ 30 outfitters	15
6	+ 30 outfitters	10

Fuse holder (70401)

POSITION	FUNCTION	CAPACITY (A)
1	AsTronic/Allison control unit	10/15
2	AsTronic/Allison control unit	10/15
3	–	–
4	+ 30 trailer	20

Fuse holder (70402)

POSITION	FUNCTION	CAPACITY (A)
1	Layout	15
2	Intarder	10
3	Intarder	10
4	Layout	15

Fuse holder (70403) not used

RELAYS

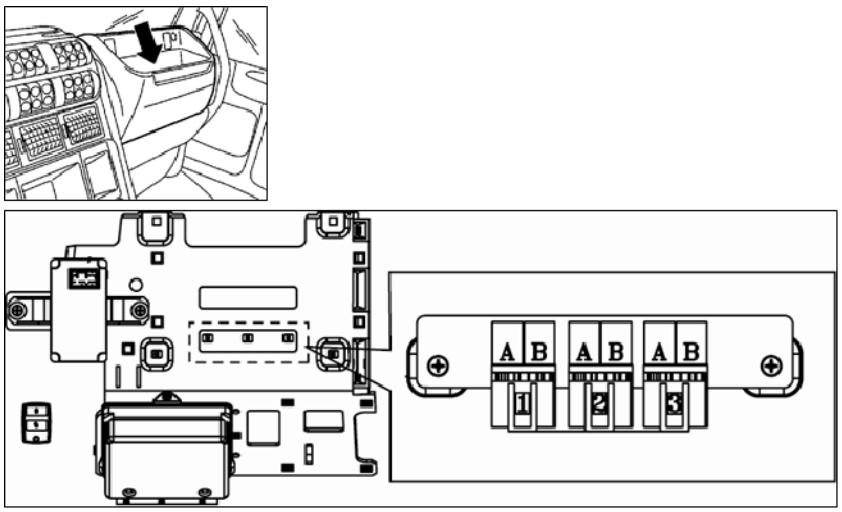
REF.	DESCRIPTION	CODE COMPONENT
001	Relay for climate control	25332
002	Resistor holder for PTO parameter setting	61125
003	Synchro protection engagement relay	25611
004	Power steering failure warning light control relay	25868
005	Horn relay	25805
006	Lights on relay	25806
007	Flywheel PTO engagement enable relay	25701
008	PTO1 engagement relay	25704
009	PTO2 engagement relay	25897
010	PTO3 engagement relay	25898
011	PTO1 parameter setting recall relay	(outfitters)
012	PTO2 parameter setting recall relay	(outfitters)
013	PTO3 parameter setting recall relay	(outfitters)
014	SET adjustment relay + (outfitters)	(outfitters)
015	SET adjustment relay – (outfitters)	(outfitters)
016	PTO engaged confirmation relay	(outfitters)
017	Idle gear confirmation relay	(outfitters)
018	External cruise activation relay	(outfitters)
019	Reverse light relay for vehicle with automatic or automated transmission	25030

RELAYS

REF.	DESCRIPTION	CODE COMPONENT
A	Diodes holder EV PTO outfitter wiring	(outfitters)
B	Vehicle doors open locking relay	25500
C	–	–
D	–	–
E	–	–
F	Terminal 15a/50A relay	25213A
G	Window washer level delay relay	25907
H	40A engeine start relay	25200
I	Fuel pre-filter heating relay	25825
L	Terminal 15b/50A relay	25213B

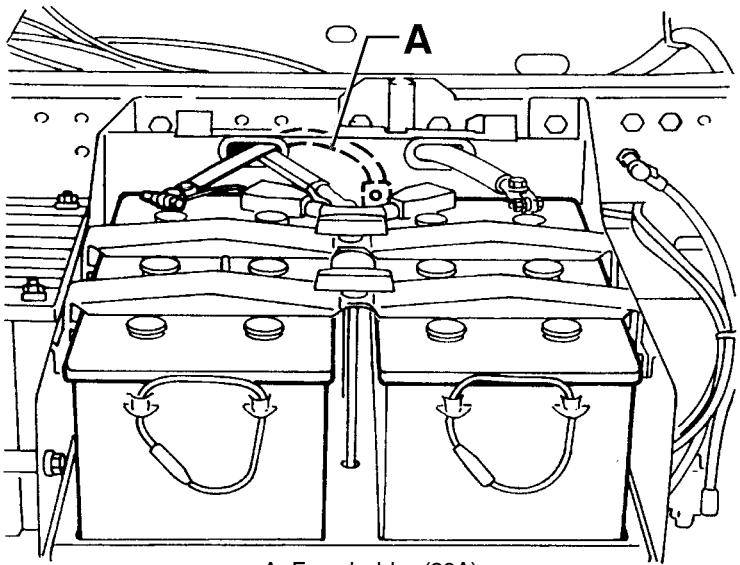
Additional relays board

1



REF.	DESCRIPTION	CODE COMPONENT
1 – A	Emergency stop relay	25205
1 – B	ECM deactivation relay	25903
2 – A	Set + relay	25914 A
2 – B	Set – relay	25914 B
3 – A	Off relay	25914 C
3 – B	Resume relay	25914 D

Supplementary flying fuse



A. Fuse holder (20A)

272NM009X

There is a flying fuse holder near to the batteries, which contains a 20A fuse.

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Table and diagrams

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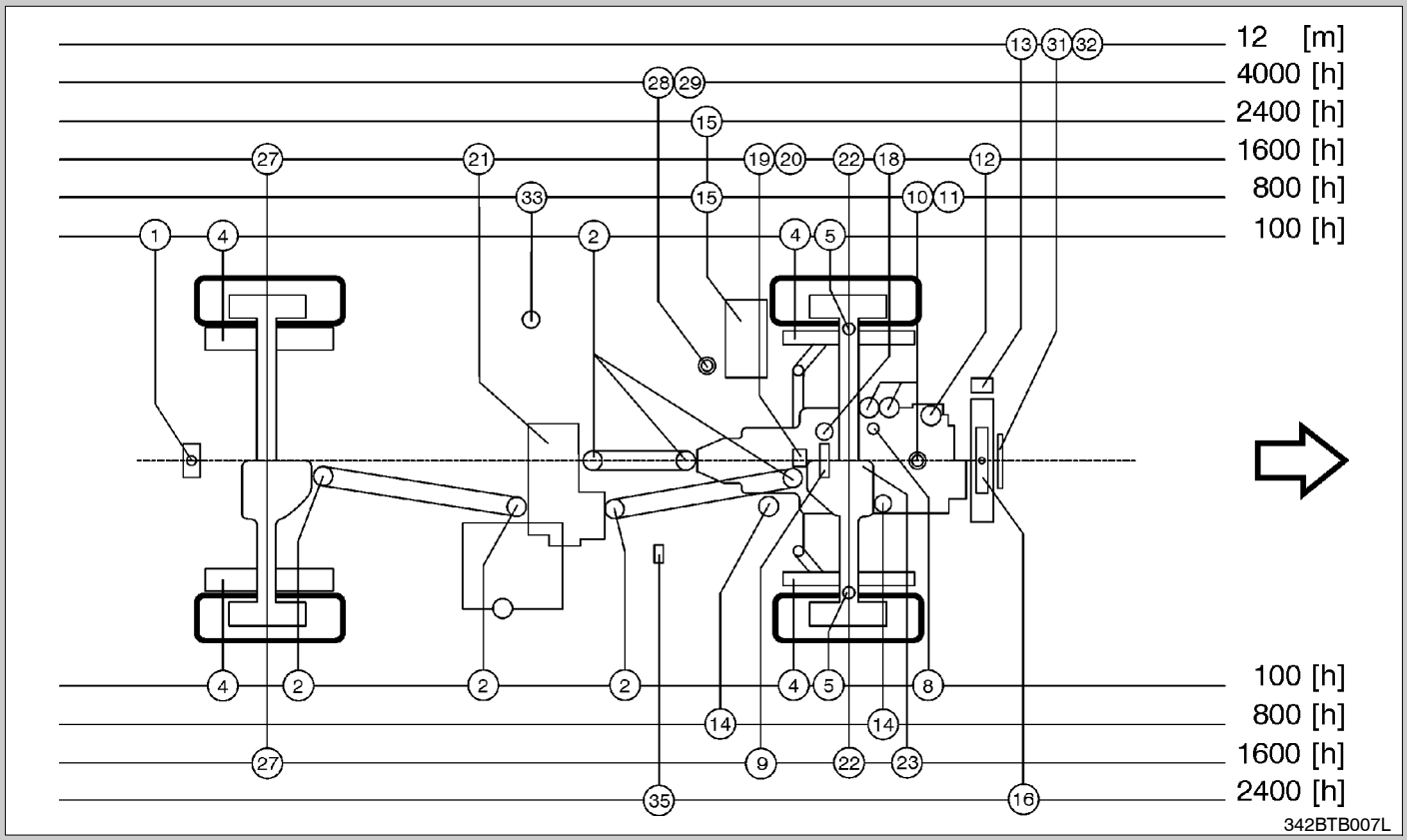
INTRODUCTION

Scheduled maintenance intervals refer to normal operating conditions. They may vary according to the type of use, road and environmental conditions.
If in doubt or faults not possible to correct with normal maintenance, contact the Dealer.

LUBRICANTS, OILS, HYDRAULIC FLUIDS AND FILTER REFILLING/REPLACEMENT DIAGRAM

2-axle vehicles



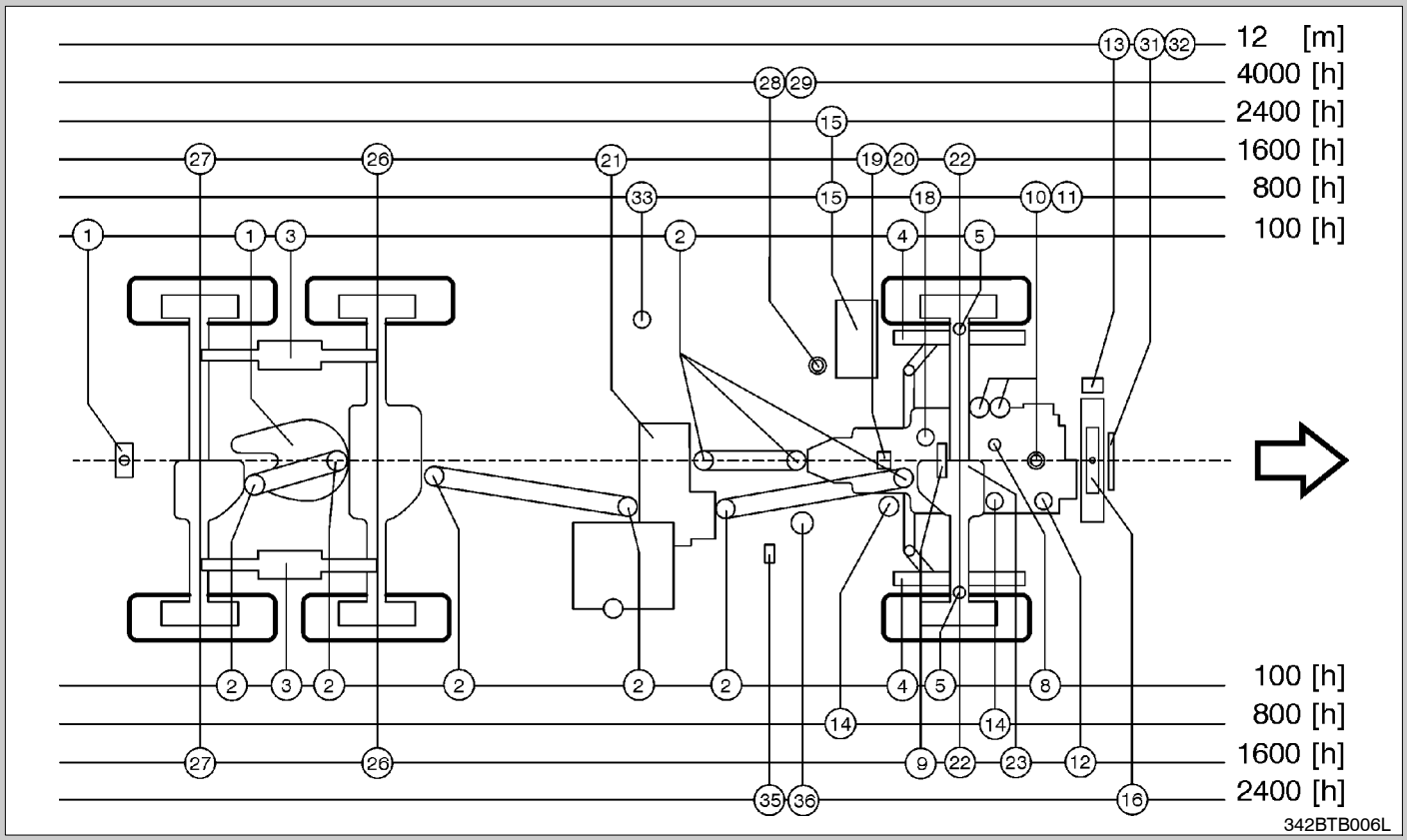
Key (see diagram on previous page)

1. semi-trailer fifth wheel/tow hook greaser
2. cardan joint greaser
3. not used
4. leaf spring articulation greaser
5. stub axle greaser
6. not used
7. not used
8. VGT actuator grease application procedure
9. engine oil vapour filter
10. engine oil
11. engine oil filters
12. VGT filter
13. clutch control system oil
14. fuel filters
15. main/secondary air cleaner
16. engine coolant
17. not used
18. oil/power take off oil filter
19. transmission oil
20. transmission oil filter
21. transfer oil (only 4x4 version)
22. front axle final reductions oil (only 4x4 version)
23. front axle oil (only 4x4 version)
24. not used
25. not used
26. not used
27. rear axle and final reductions oil
28. power steeling oil
29. power steeling filter
30. not used
31. air conditioning fluid
32. air cleaner of air conditioning
33. compressed air drier filter
34. not used
35. cabin tilting oil

Service frequency is expressed in:
[h] vehicle working hours
[m] months

LUBRICANTS, OILS, HYDRAULIC FLUIDS AND FILTER REFILLING/REPLACEMENT DIAGRAM

3-axle vehicles



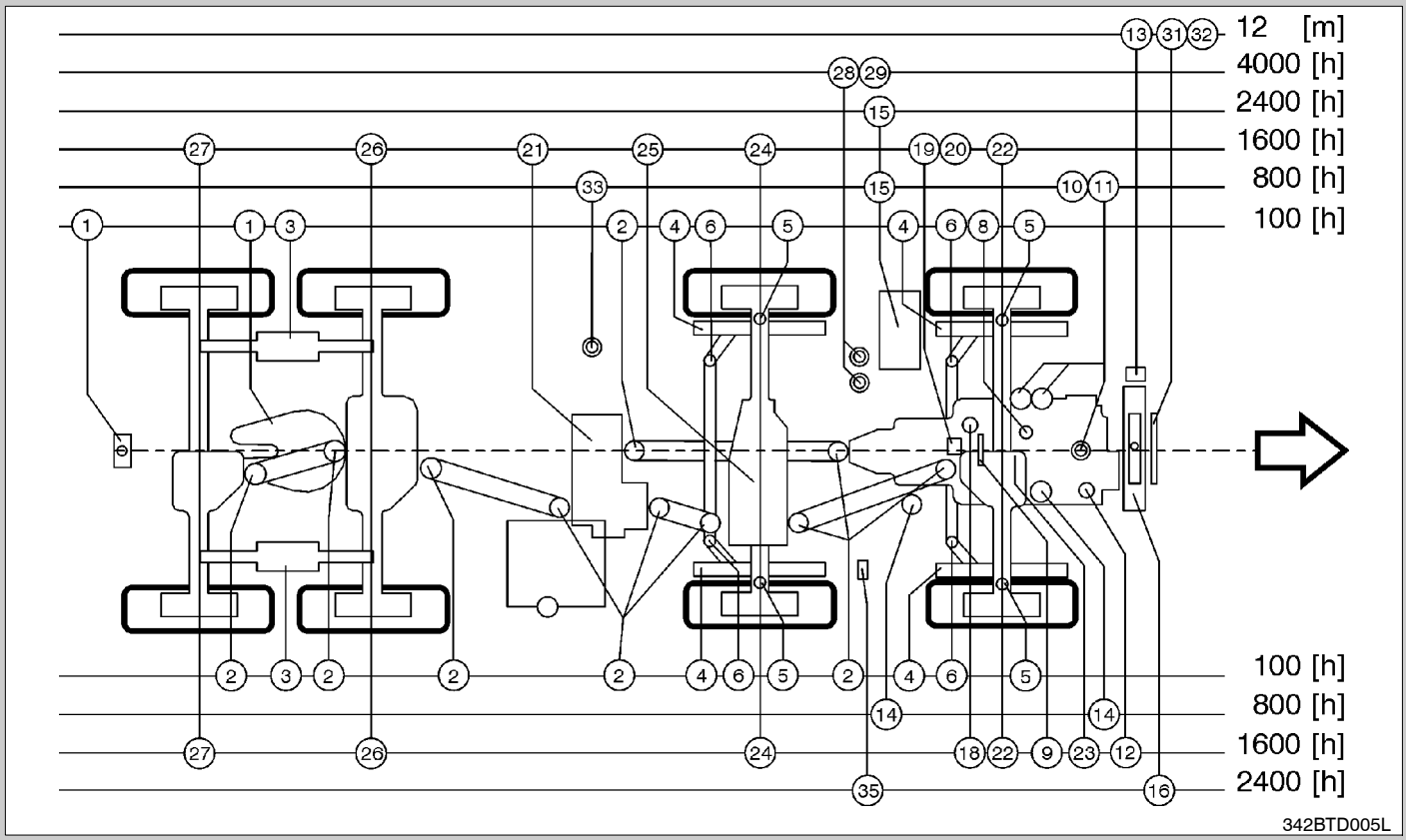
Key (see diagram on previous page)

1. semi-trailer fifth wheel/tow hook greaser
2. cardan joint greaser
3. rear carriage articulation greaser
4. leaf spring articulation greaser
5. stub axle greaser
6. not used
7. not used
8. VGT actuator grease application procedure
9. engine oil vapour filter
10. engine oil
11. engine oil filters
12. VGT filter
13. clutch control system oil
14. fuel filters
15. main/secondary air cleaner
16. engine coolant
17. not used
18. oil/power take off oil filter
19. transmission oil
20. transmission oil filter
21. transfer oil (only 6x6 version)
22. front axle final reductions oil (only 6x6 version)
23. front axle oil (only 6x6 version)
24. not used
25. not used
26. intermediate axle and transfer case oil
27. rear axle and transfer case oil
28. power steeling oil
29. power steeling filter
30. no used
31. air conditioning fluid
32. air cleaner of air conditioning
33. compressed air drier filter
34. not used
35. cabin tilting oil
36. supplementary fan system oil/oil filter

Service frequency is expressed in:
[h] vehicle working hours
[m] months

LUBRICANTS, OILS, HYDRAULIC FLUIDS AND FILTER REFILLING/REPLACEMENT DIAGRAM

4-axle vehicles



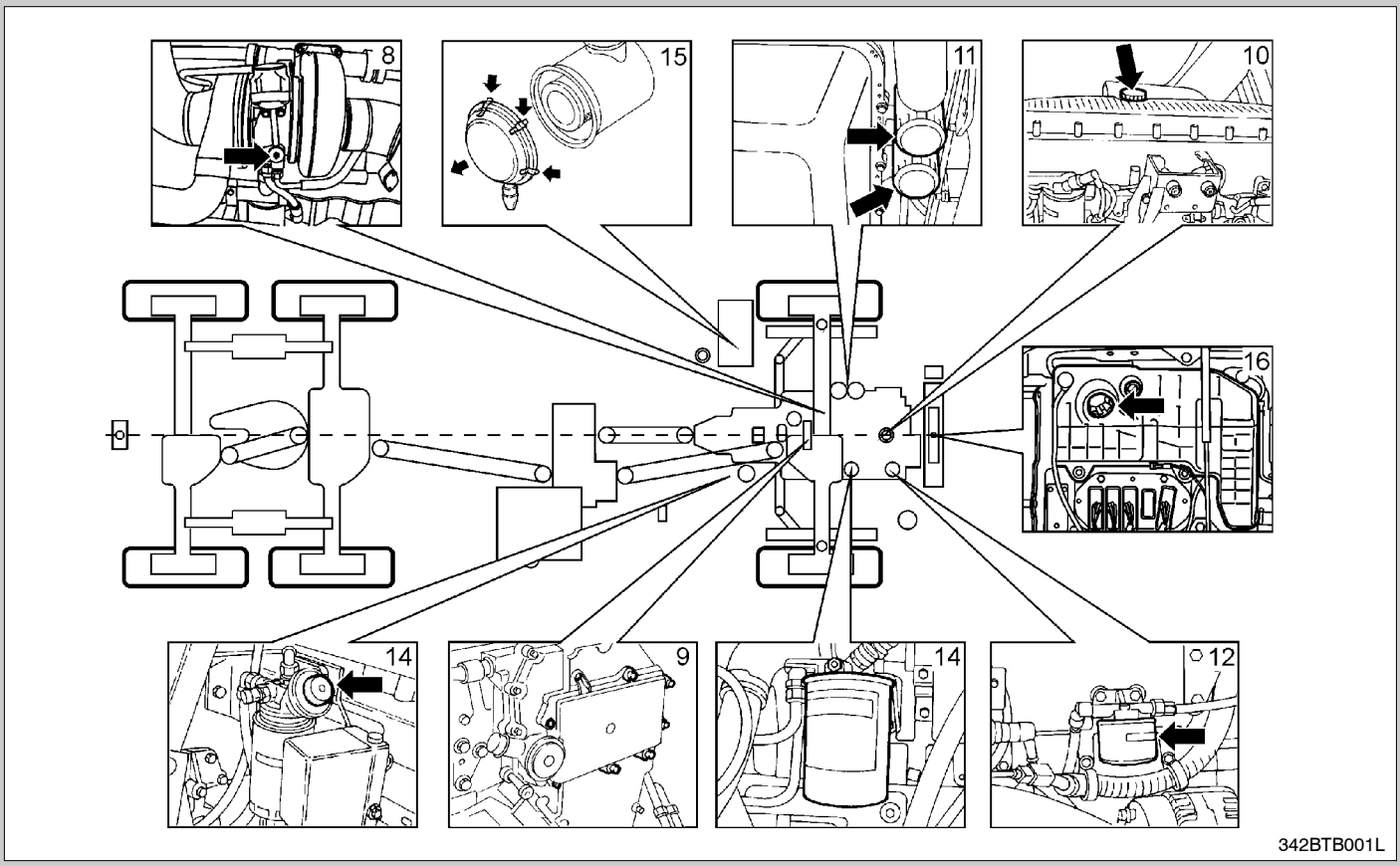
Key (see diagram on previous page)

1. semi-trailer fifth wheel/tow hook greaser
2. cardan joint greaser
3. rear carriage articulation greaser
4. leaf spring articulation greaser
5. stub axle greaser
6. steering linkages greaser (only 4-axle vehicles)
7. not used
8. VGT actuator grease application procedure
9. engine oil vapour filter
10. engine oil
11. engine oil filters
12. VGT filter
13. clutch control system oil
14. fuel filters
15. main/secondary air cleaner
16. engine coolant
17. not used
18. oil/power take off oil filter
19. transmission oil
20. transmission oil filter
21. transfer oil (only 8x6 and 8x8 version)
22. front axle final reductions oil (only 8x6 and 8x8 version)
23. front axle oil (only 8x6 and 8x8 version)
24. second axle final reductions oil (8x8 only)
25. second axle oil (8x8 only)
26. intermediate axle and transfer case oil
27. rear axle and final reductions oil
28. power steeling oil
29. power steeling filter
30. not used
31. air conditioning fluid
32. air cleaner of air conditioning
33. compressed air drier filter
34. not used
35. cabin tilting oil

Service frequency is expressed in:
[h] vehicle working hours
[m] months

LOCATION OF COMPONENTS

Engine F3B



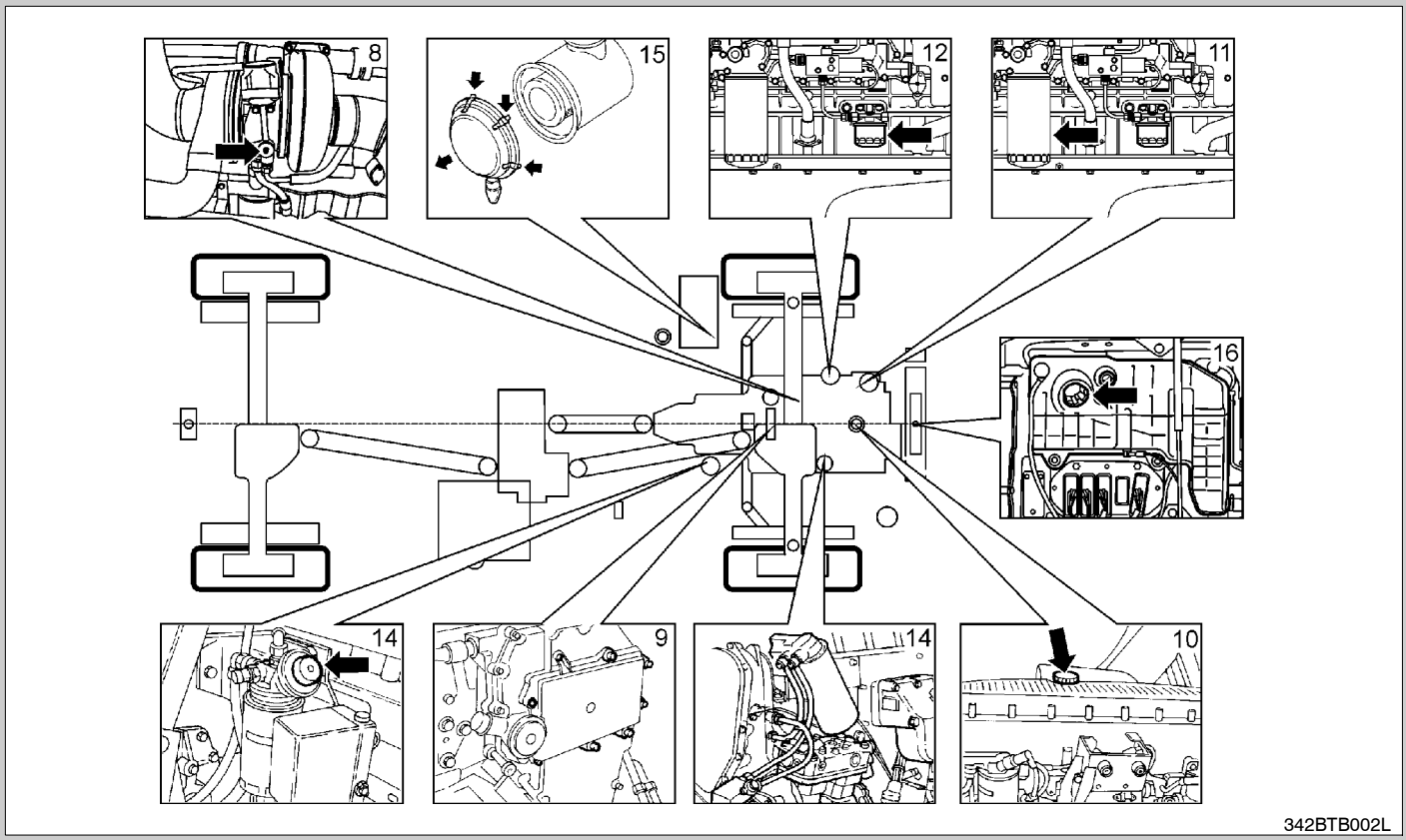
LOCATION OF COMPONENTS

Engine F3B
Key (see diagram on previous page)

8. VGT actuator grease application procedure
9. engine oil vapour recirculation filter
10. engine oil
11. engine oil filter
12. VGT system filter
14. fuel filter
15. main/secondary air filter
16. engine coolant fluid

LOCATION OF COMPONENTS

Engine F2B



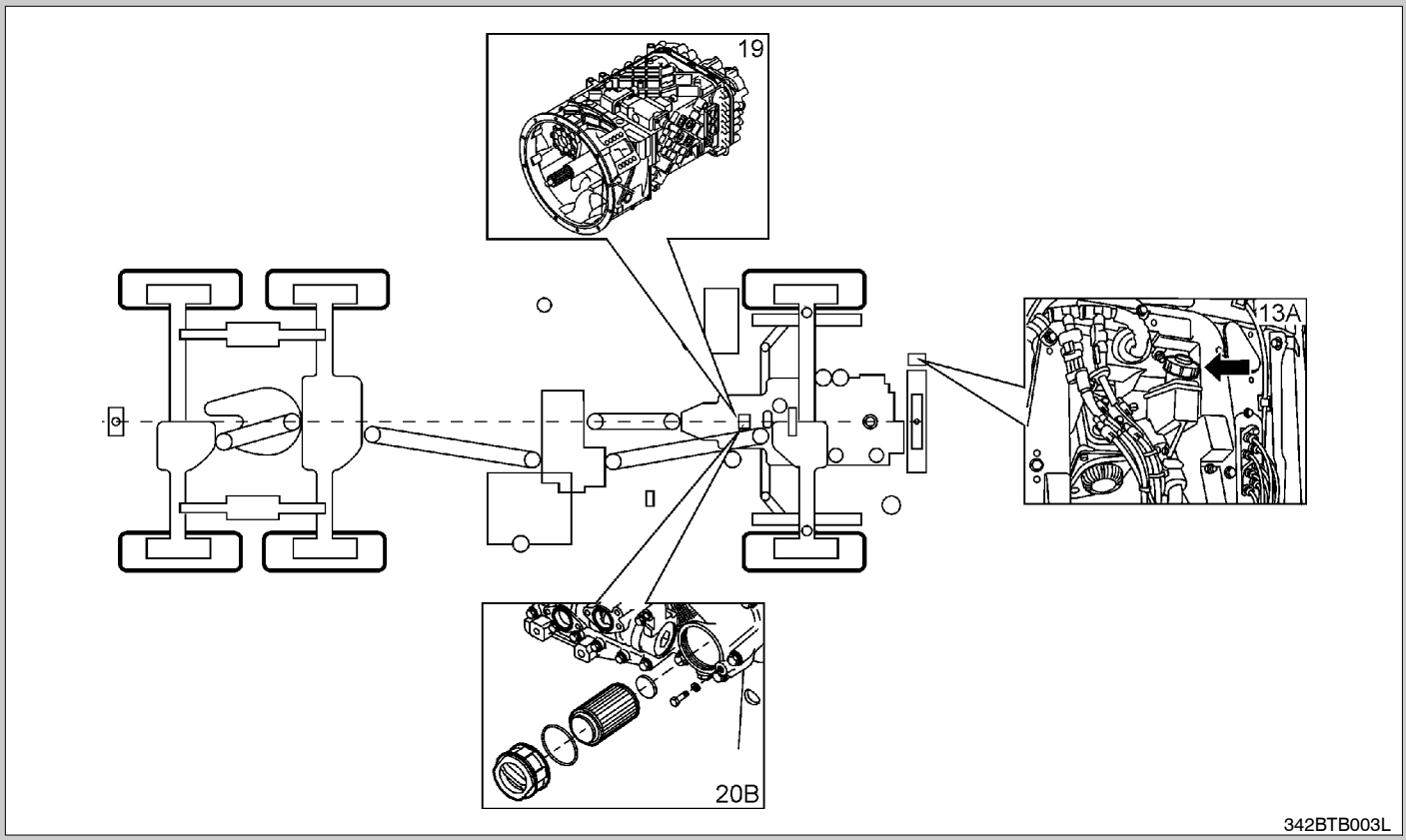
LOCATION OF COMPONENTS

Engine F2B
Key (see diagram on previous page)

8. VGT actuator grease application procedure
9. engine oil vapour recirculation filter
10. engine oil
11. engine oil filter
12. VGT system filter
14. fuel filter
15. main/secondary air filter
16. engine coolant fluid

LOCATION OF COMPONENTS

Manual transmission



LOCATION OF COMPONENTS

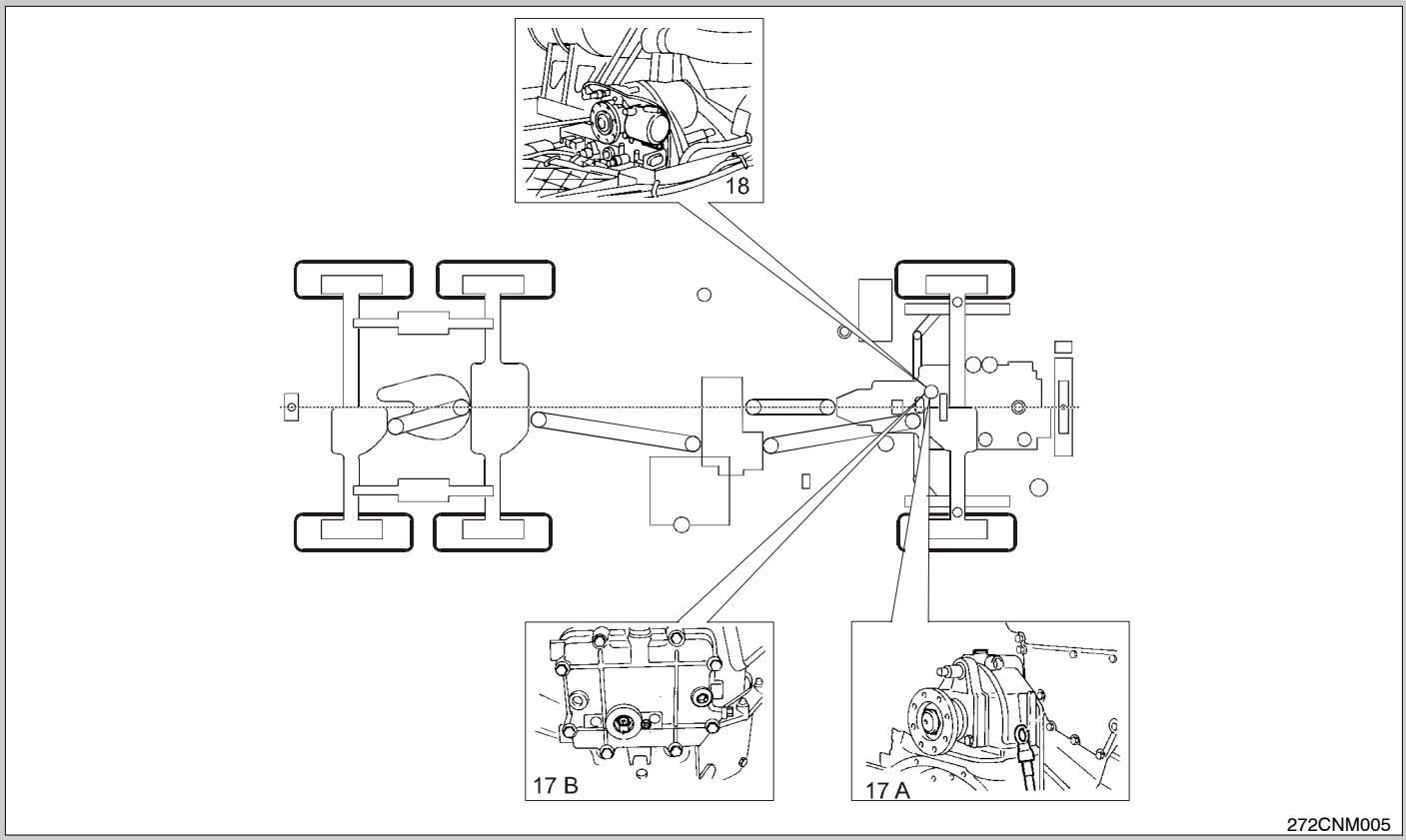
Manual transmission

Key (see diagram on previous page)

13(A). clutch control system oil (left-hand drive)
19. Manual/Hydromechanical transmission
20(B). Manual transmission oil filter (intarder equipped vehicles only)

LOCATION OF COMPONENTS

Multipower/NMV 221 power take off



LOCATION OF COMPONENTS

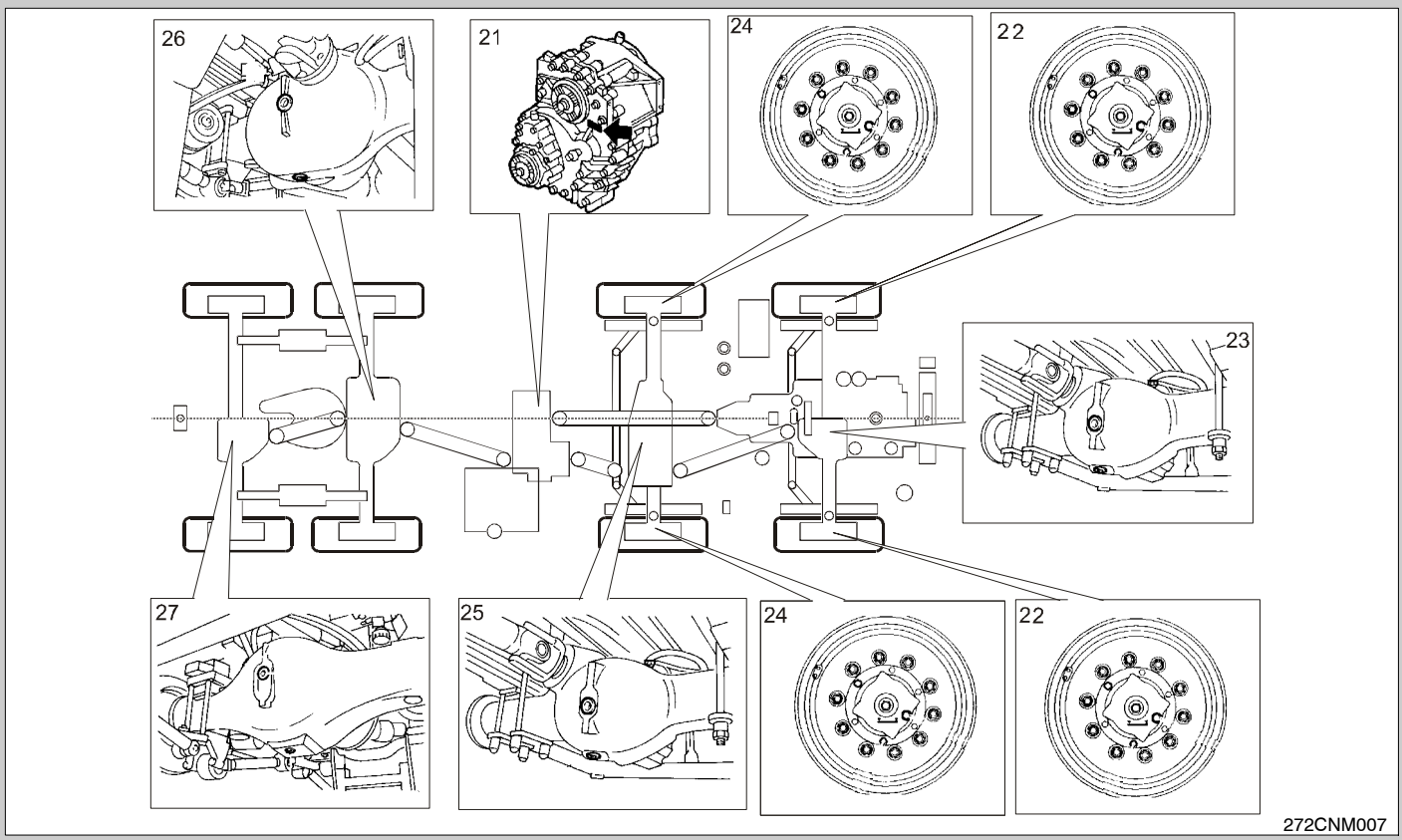
Multipower/NMV 221 power take off

Key (see diagram on previous page)

17(A). Multipower power take off oil
17(B). Multipower power take off oil filter
18. NMV 221 power take off oil filter

LOCATION OF COMPONENTS

Drive-line



LOCATION OF COMPONENTS

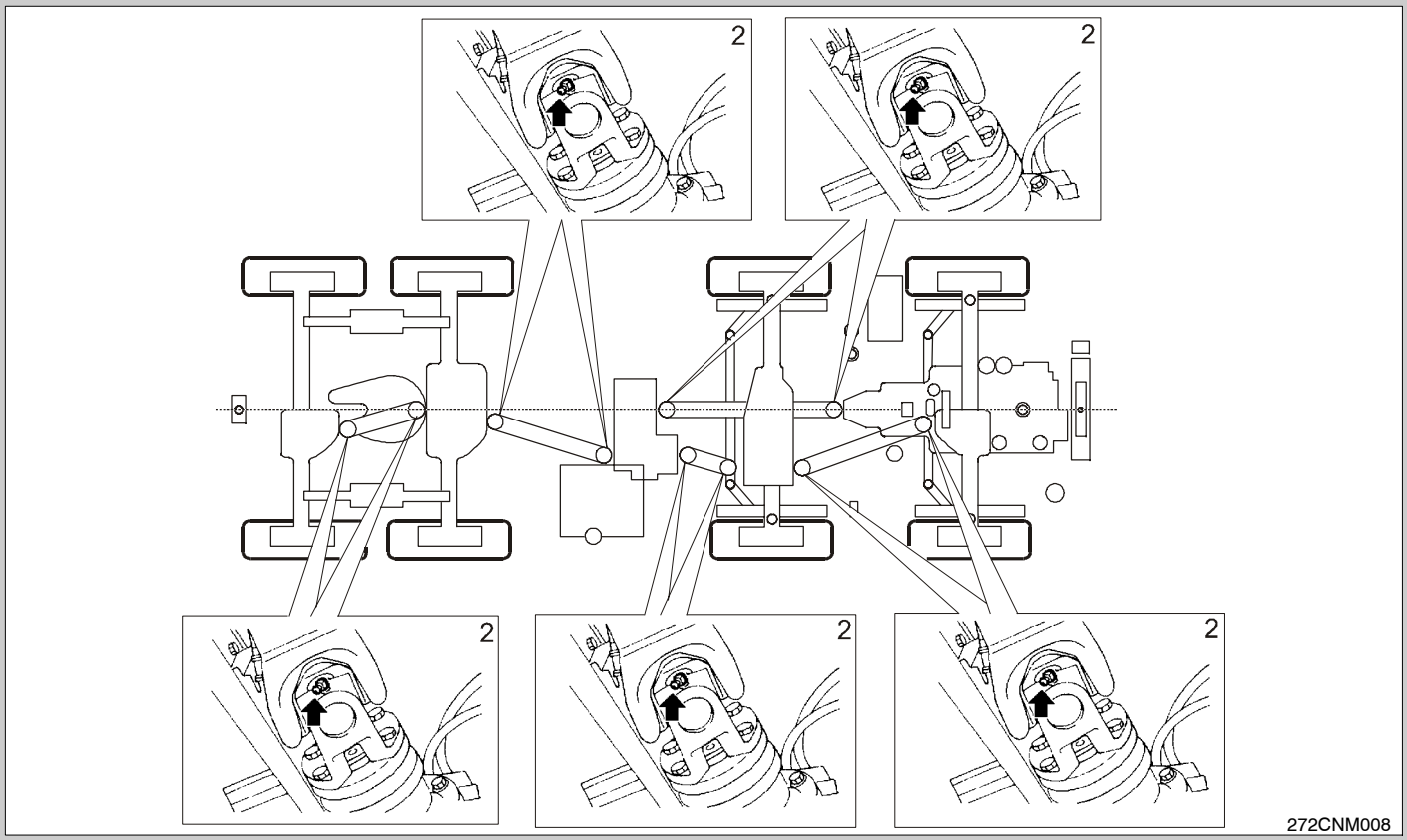
Drive-line

Key (see diagram on previous page)

21. reducer-distributor oil
22. final transfer case oil of 1st front axle
23. 1st front axle oil
24. final transfer case oil of 2nd front axle
25. 2nd front axle oil
26. intermediate axle and final transfer case oil
27. rear axle and final transfer case oil

LOCATION OF COMPONENTS

Greasing transmission shafts



LOCATION OF COMPONENTS

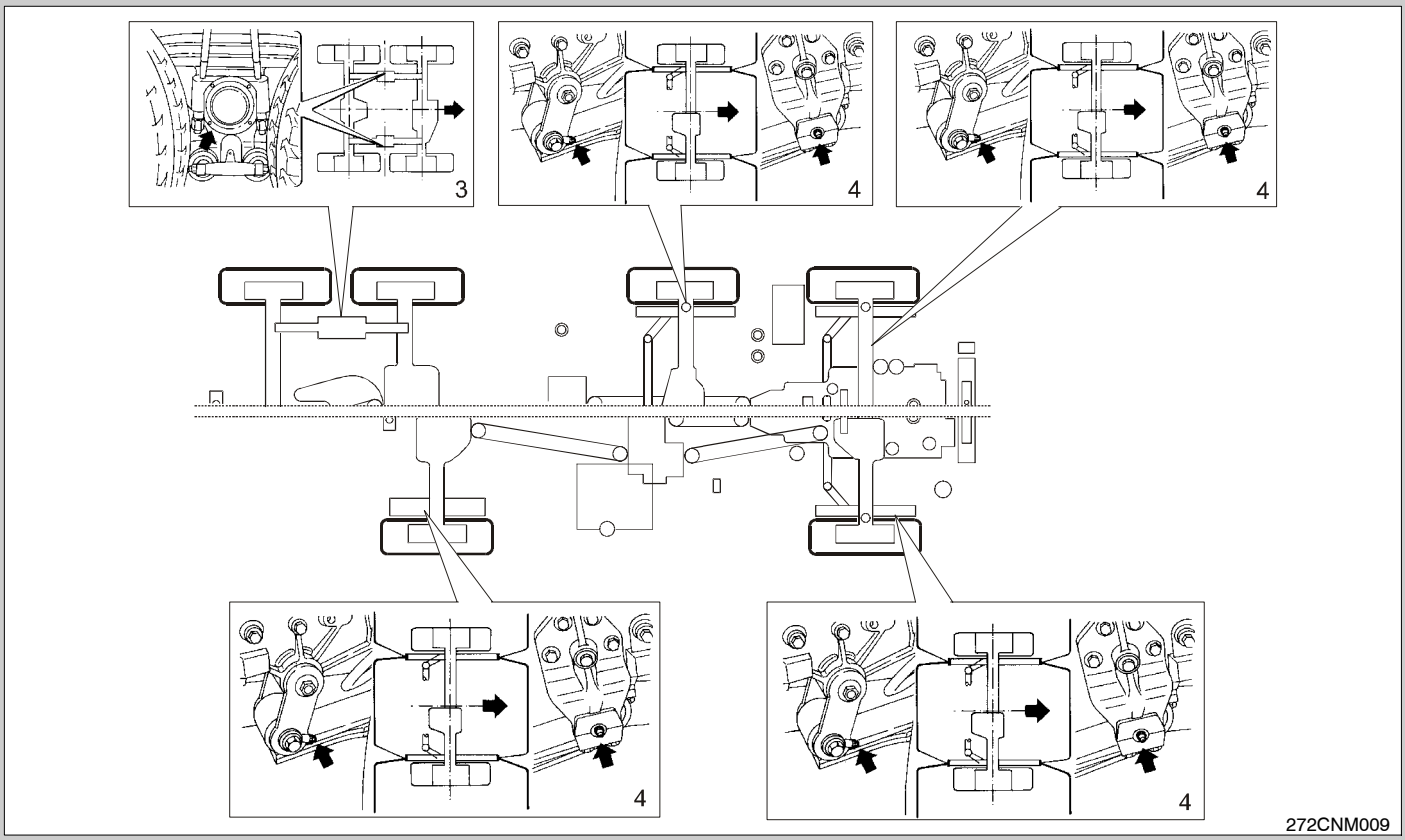
Greasing transmission shafts

Key (see diagram on previous page)

2. universal joint greaser

LOCATION OF COMPONENTS

Suspension geasing



LOCATION OF COMPONENTS

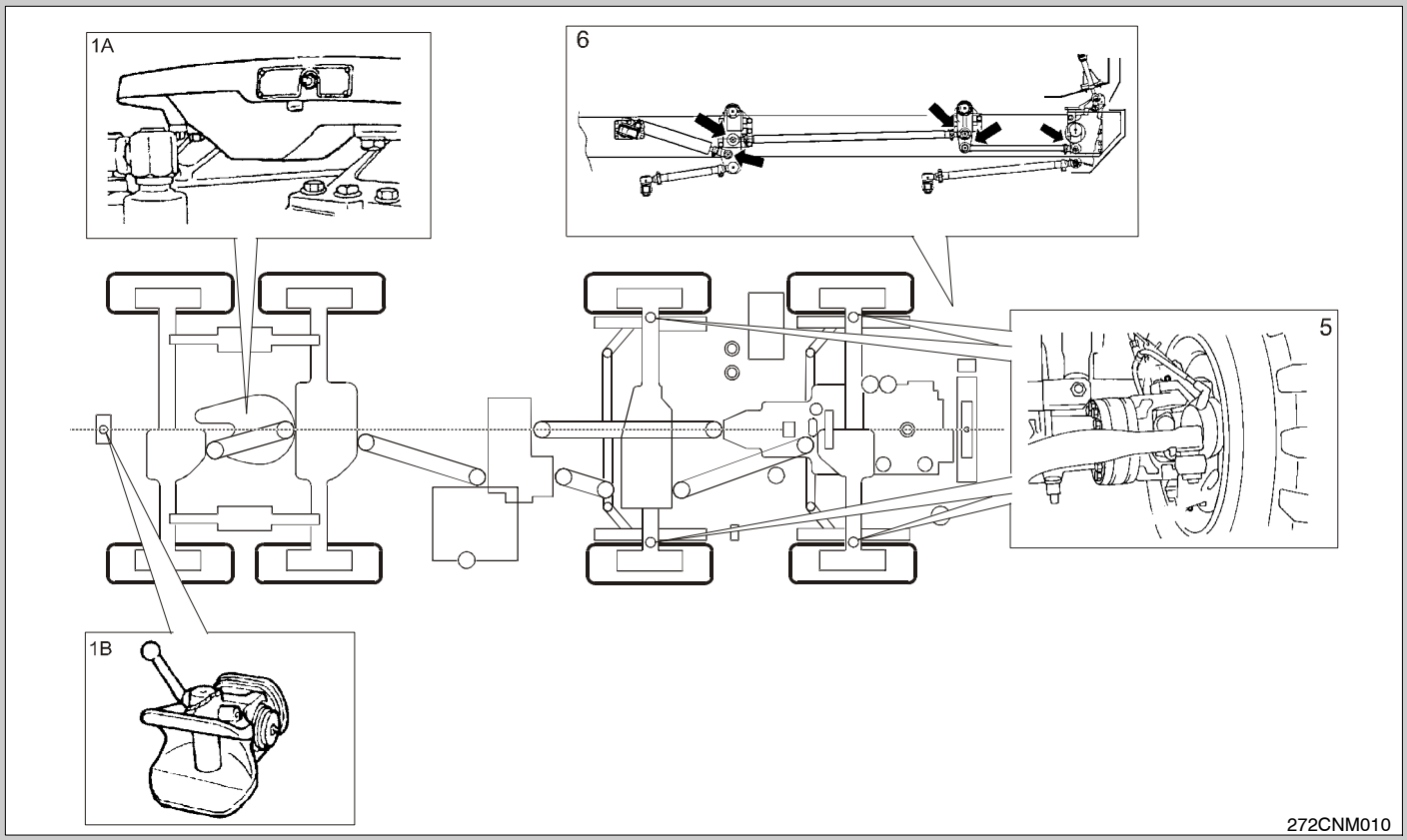
Suspension geasing

Key (see diagram on previous page)

3. rear carriage articulation greaser
4. leaf spring joint greaser

LOCATION OF COMPONENTS

Steering linkages, semi-trailer fifth wheel, tow hook greasing



LOCATION OF COMPONENTS

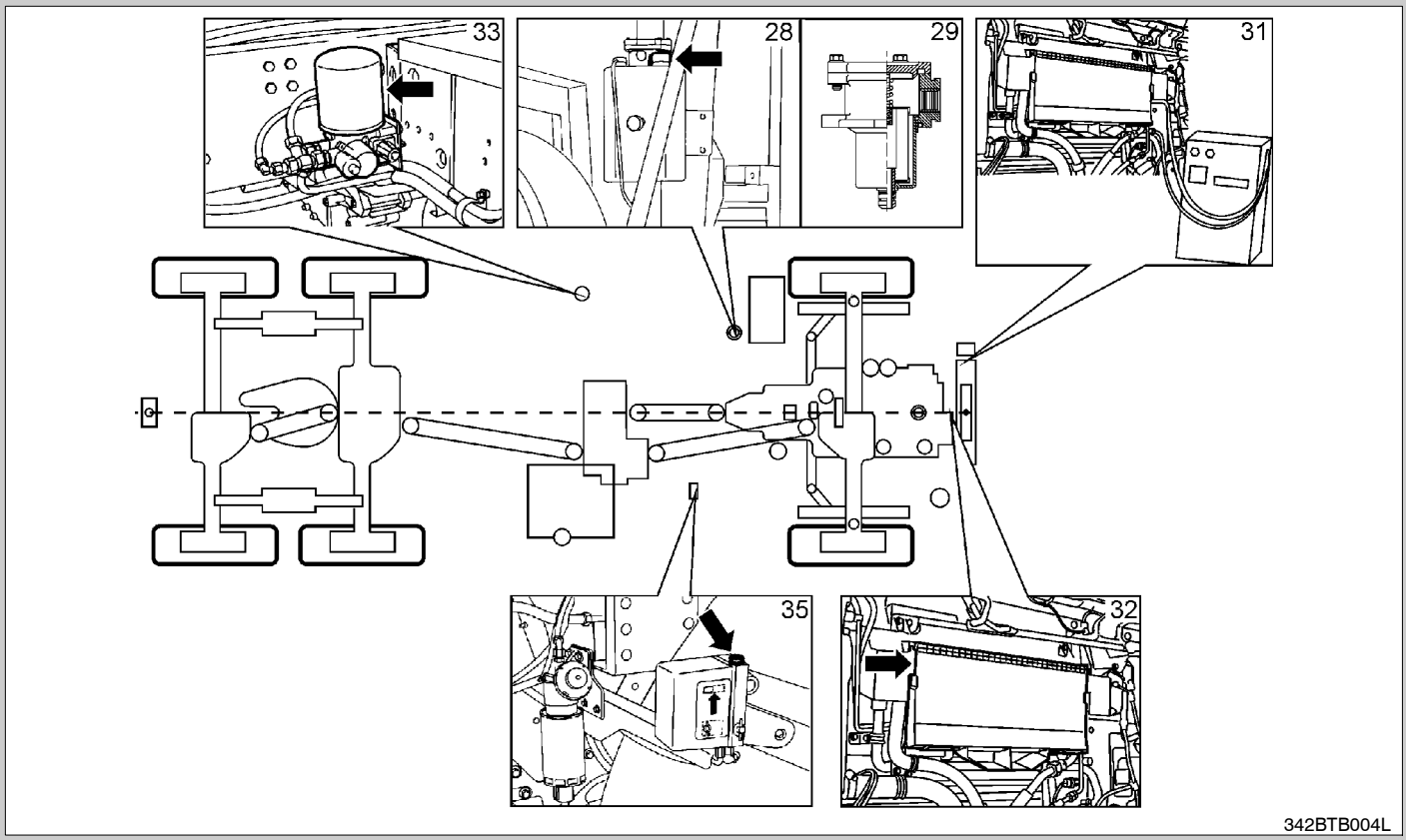
Steering linkages, semi-trailer fifth wheel, tow hook greasing

Key (see diagram on previous page)

1(A). semi-trailer fifth wheel greaser
1(B). trailer pintle greaser
5. stub axle greaser
6. steering linkages greaser

LOCATION OF COMPONENTS

Systems



LOCATION OF COMPONENTS

Systems

Key (see figure on previous page)

28. power steering oil
29. power steering oil filter
31. air conditioner system fluid
32. air conditioner filter
33. compressed air dryer filter
35. cab tipper oil

SERVICE SCHEDULE
Checking, adjusting and cleaning operations

OPERATION	day	hours			year
		400	800	1600	
Check engine oil level	X				
Check engine coolant level	X				
Check service brake and parking brake	X				
Check external lights, dashboard warning lights and windscreen wiper	X				
Windscreen washer fluid level check	X				
Check trailer pintle /semi-trailer fifth wheel condition	X				
Bleed compressed air tank	X				
Check tyre pressure/conditions	X				
Fuel filter check/water drain (1)	X				
Check tightness of wheel fasteners (2)		X			
Turbocompressor intake/lubrication system seal check		X			
Check clutch control oil level		X			
Check gearbox oil level		X			
Check transfer oil level		X			
Check transfer case oil level		X			
Check axle oil level		X			
Pedal distributors check		X			
Tow hook/thrust washer functioning check		X			
Check compressed oil dryer function/if necessary bleed off condensation from tank(s)/visual inspection of tanks		X			
Battery maintenance (unsealed batteries)		X			

(1) or when respective warning light comes
(2) after 20-40 km and again after 100 km when the vehicle is new or after changing the wheel.

The table indicates the time interval between two consecutive operations.

Checking, adjusting and cleaning operations (contd.)

OPERATION	day	hours			year
		400	800	1600	
Check cab tilting system oil			X		
Check accessory belt			X		
Check conditioner compressor belts			X		
Bleed fuel tank condensation water			X		
Check power steering system oil level (^ ^)			X		
Intercooler external cleaning (1)			X		
Front wheel toe-in check (°)			X		
Brake shoe-drum play check			X		
Check EDC engine control system with diagnosis equipment (°)				X	
Adjust tappet /injector-pump play (°)				X	
Clean conditioner condenser					X
Check antifreeze concentration					X
Check headlight alignment					X

(°) For further information contact your Dealer
(^ ^) This check is optional, since there is an oil level warning light.

(1) according to working environment

The table indicates the time interval between two consecutive operations.

Lubrication and replacement operations - engine

OPERATION	hours						year
	100	400	800	1600	2400	3200	
Replace engine oil/filter with ACEA E2 or equivalent (*) (1)		X					
Replace engine oil/filter with ACEA E5/E7 or equivalent (*)			X				
Engine oil vapour recirculation filter replacement				X			
Replace fuel pre-filter/filter			X				
Replace main air cleaner element (2) (*)			X				
Replace air cleaner main element (3)					X		
Replace VGT circuit air filter				X			
Change engine coolant (**)					X		
Replace accessory belt (°)						X	
Replace air conditioner compressor belts (°)						X	
Replace AdBlue filter (°)						X	

(°) for further information contact your Dealer

(*) yearly for shorter periods of use than foreseen
(**) every two years for periods of use less than envisaged interval

(1) with a NEW vehicle, change engine oil the first time after 800 hours of operation
(2) or when respective warning light comes on
(3) or after every three main filter replacements

The table indicates the time interval between two consecutive operations.

Lubrication and replacement operations - vehicle

OPERATION	hours						year
	100	400	800	1600	2400	3200	
Grease lubrication points	X						
Change clutch control oil							X
Change power hitch oil (*)				X			
Transmission oil change (*) (***)				X			
Manual transmission oil filter change with intarder/automatized (*)				X			
Transmission oil filter change (*)				X			
Change transfer oil (*)				X			
Change axle transfer case oil				X			
Change power steering system oil (**)						X	
Replace power steering system oil filter						X	
Replace compressed air dryer filter (*)			X				
Change oil in cab tilting system (**)					X		
Recharge conditioner system fluid (˚)							X
Replace air conditioner filter							X

(˚) for further information contact your Dealer

(*) yearly for shorter periods of use than foreseen
(**) every two years for periods of use less than envisaged interval
(***) every two years or 240,000 km if reached before the foreseen time (automatized transmision only)

The table indicates the time interval between two consecutive operations.

LUBRICANT AND HYDRAULIC FLUID TABLES

ASTRA HD9 — PETRONAS LUBRICANTS

LUBRICANT AND HYDRAULIC FLUID TABLES

ORGAN TO BE LUBRICATED		QUANTITY KG	QUANTITY LT	REPLACE.HRS.	REQUESTED SPECIFICATIONS		RECOMMENDED LUBRICANTS
✻ ENGINE OIL SUMP (+ FILTRES)	ENGINE F2B	20,7 (+2,3)	23 (+2,5)	400	MIL-L-2104E lev. API CF4	ACEA E2	URANIA TURBO
				IN ALTERNANCE WITH BOTH ENGINE			
	ENGINE F3B	25,2 (+2,3)	28 (+2,5)	800 Each year	MIL-L-2104E lev. API CI-4	ACEA E5/E7	URANIA LD7
GEARBOX WITH ZF INTARDER	16 S 2XXX	20,3	22,5	1600 Each year	API GL-4 IVECO Std. 18-1807 CLASSE MG/M ZF TE-ML 01H		TUTELA TRANSMISSION ZCS 160 SAE 80W-90
GEARBOX WITH PTO NMV221		11,7	13				
GEARBOX ZF INTARDER AND PTO ZF NMV221		16,7	18,5				
GEARBOX WITH CONVERTER ZF WSK400	16 S 221		27,5				
AUTOMATED GEARBOX AS-TRONIC 2	16 AS 2301		13	240000 Km Every 2 years			
GEARBOX ALLISON	HD 4700	40,3	48	1000 Each year	ATF DEXRON III		TUTELA TRANSMISSION ATF 90

ORGAN TO BE LUBRICATED			QUANTITY KG	QUANTITY LT	REPLACE.HRS.	REQUESTED SPECIFICATIONS	RECOMMENDED LUBRICANTS
GEARBOX		16 S 1620	11,12	12,5	1600 Each year	API GL-4 IVECO Std. 18-1807 CLASSE MG/M ZF TE-ML 01H	TUTELA TRANSMISSION ZCS 160 SAE 80W-90
		16 S 2XXX	12,92	14,5			
INTEGRAL POWER TAKE-OFF			2,67	3			
TRANSFER	IVECO	TC 2200	5,5	6,2		ATF DEXRON II D (ARTICAL CLIMATE)	TUTELA TRANSMISSION GI/A (ARTICAL CLIMATE)
	STEYR	VG 2000	10,4	11,4	30000 km Each year	MIL-L-2105 D API GL5	TUTELA TRANSMISSION W 140 M-DA SAE 85W-140
		VG 2700	11,8	13			TUTELA TRANSMISSION W 90 M-DA SAE 80W-90 (ARTICAL CLIMATE)
1st FRONT AXLE WITH FINAL REDUCTIONS			5,8	6,5	1600	IVECO Std. 18-1805 CLASSE RAM 2 MIL-L-2105 D API GL5	TUTELA TRANSMISSION W 140 M-DA SAE 85W-140
2nd FRONT AXLE WITH FINAL REDUCTIONS			7,3	8			
INTERMEDIATE AXLE WITH TRANSFER AND FINAL REDUCTIONS			24,6	27			
REAR AXLE WITH FINAL REDUCTIONS			14,6	16			
1st FRONT AXLE KESSLER WITH FINAL REDUCTIONS ■			20,4	22,4	1600	IVECO Std. 18-1805 CLASSE RAM 1 MIL-L-2105 D API GL5	TUTELA TRANSMISSION W 90 M-DA SAE 80W-90
INTERMEDIATE AXLE KESSLER WITH TRANSFER AND FINAL REDUCTIONS ■			19,5	21,4			
REAR EXLE KESSLER WITH FINAL REDUCTIONS ■			20,4	22,4			
▲ IDRAULIC POWER STEERING		2/3 AXLES	7,4	8,5	4000	IVECO Std. 18-1807 CLASSE AG2 ATF DEXRON II D	TUTELA TRANSMISSION GI/A
		4 AXLES	16,1	18			
CAB TILTING CONTROL			0,9	1	2400		
CLUTCH CIRCUIT			0,5	0,5	Each year	DOT4-NHTSA116 SAE J1703	TUTELA TRUCK DOT SPECIAL
GENERAL GREASING			–	–	100	N.L.G.I. 2	TUTELA MR2

✻ For artical climate (until -30°C) use URANIA FE 5W30 - Specification ACEA E4/E7-IVECO Std. 18-1804 CLASSE TFE
▲ For artical climate (until -30°C) use TUTELA LHM-IVECO Std. 18-1823 CLASSE 1
■ For operating temperatures above +30°C use TUTELA W 140/M-DA (SAE 85W-140)
■ For operating temperatures below - 10°C use TUTELA TRANSMISSION FE AXLE (SAE 75W-90)

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