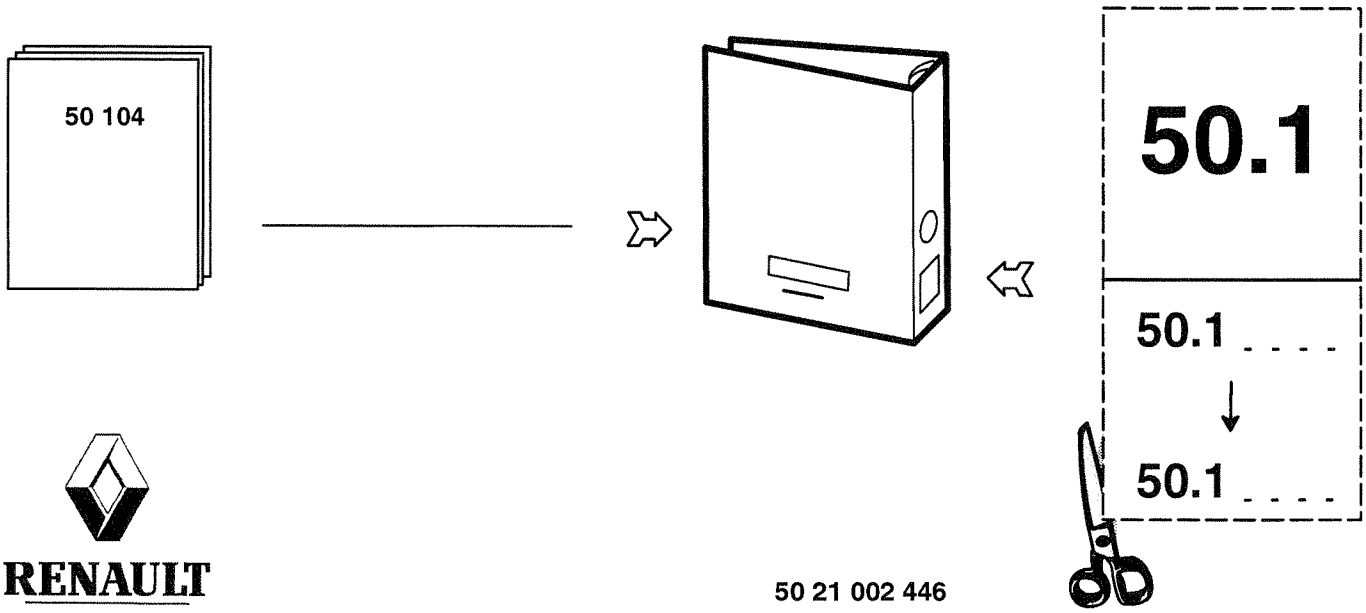
50 104 – AN – 11.2001

BRAKES

BRAKING	VEHICLE
BRAKING SYSTEM EBS	RENAULT PREMIUM 22CC071

NOTE
The above information may change in the course of time.
Only the "Consult" section of the workshop manuals repertory in standard N° 10320 serves as reference.



RENAULT

CONTENTS

Tighten at indicated torque (Nm) (left–hand thread)

Tighten at indicated torque (Nm) (right–hand thread)

Tighten by the indicated value

Loosen by the indicated value


Interference fit


Force to be exerted in direction of arrow (hammer–press)


Rotational load

Heat or cool. Temperature in degrees Centigrade (e.g.: 80 ° C)


Weld bead


Repair time


Exhaust – Outlet


Intake – Inlet

Weight in kg (e.g.: 275 kg)


Smear (see “Consumables” table)


Grease or oil (see “Consumables” table)


Fill to level (see “Specifications” and “Consumables” table)


Depending on versions or options


Mark – Assemble as per marking


Adjust – Place in contact


Clearance – Dimension to be assured or noted down (mm)


Axial – Vertical


Radial – Horizontal


Maximum out–of–true


Maximum static toe–in error


Machining tolerance


... to ...


Equal – One or the other


... Smaller than ...


... Greater than ...


... Less than or equal to ...


... Greater than or equal to ...


Repair dimension


Part to be replaced


Wear limit


Inspect – Check the condition of parts

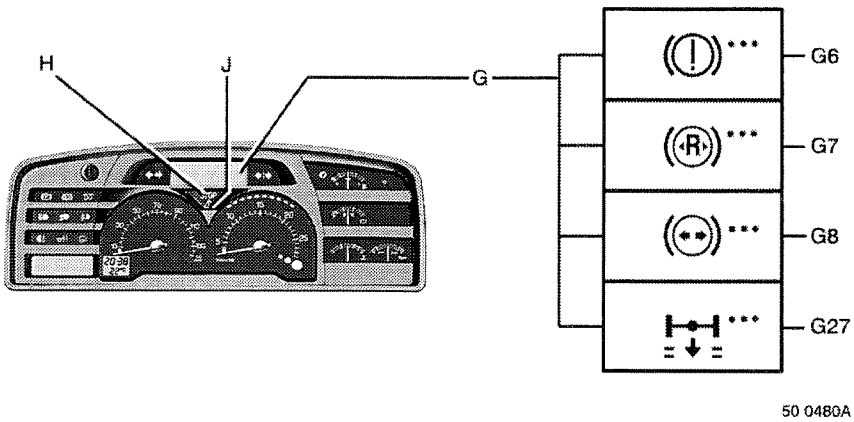

Danger for persons, the vehicle or the equipment

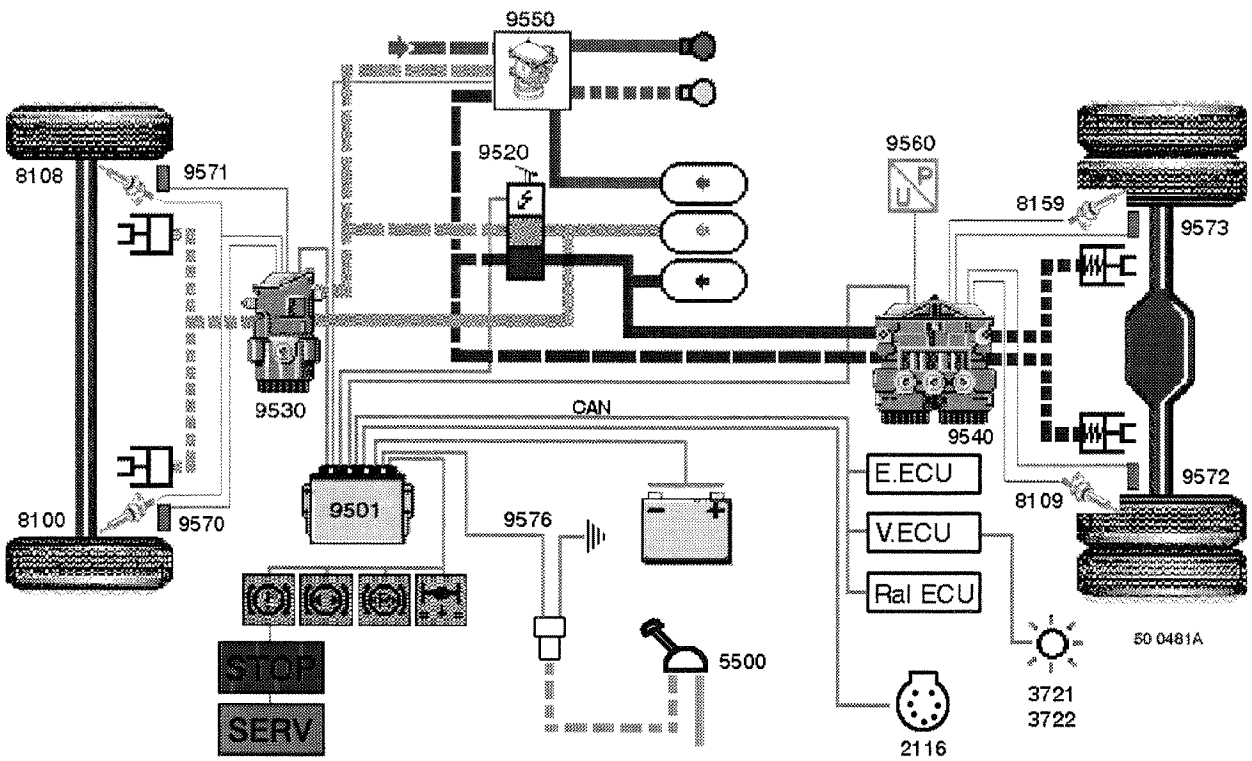
PRESENTING THE EBS BRAKING SYSTEM

DEFINITION:

EBS braking system: electronically controlled braking system. The system electronically pilot–controls pneumatic energy to control the mechanical foundation brakes.

As supplement, it comprises the following systems:
– WCS (Wear Control System): System controlling and optimizing brake pad wear between front axle and rear axle.
– CFCS (Coupling Force Control System): Automatic harmonization of braking between tractor and trailer. It serves to commence application of the brakes on all the roadwheels (tractor + trailer) at the same time.





REMINDER OF WARNING LIGHTS:

– Warning light G6:
Minimum air pressure alert or "Tractor EBS" major defect warning light
This light is coupled to the vehicle STOP warning light. If one of these two lights comes on, it means you must: **immediately stop the vehicle**.

– Warning light G7:
This light indicates a defect in the trailer braking system. If this light comes on, you can carefully drive to your nearest dealer or approved agent. It is coupled to the "Service" warning light.

– Warning light G8:
This light indicates a minor defect in the tractor EBS braking system. If this light comes on, you can carefully drive to your nearest dealer or approved agent. It is coupled to the "Service" warning light.

– Warning light G27:
This light is utilized for the ASR function.

OPERATION OF THE SYSTEM:

The system comprises 5 independent supply circuits (front brake circuit, rear brake circuit, trailer brake circuit, parking brake circuit, electrical circuit).

The brake valve (9520) includes 2 pneumatic stages and 1 electrical stage.

Service braking:

1 – The electrical stage of the brake valve informs the electronic control unit (ECU) (9501) of the braking demand from the driver and its power level.
Coherence between the electrical and pneumatic signals of the brake valve is assured by calibration of the latter.

2 – The ECU sends information on pressure having to be delivered to the brake cylinders to the front module (9530) and to the rear module (9513).
The pressure level sent to the brake cylinders is determined by using the calculation rules defined by the parameters contained in the ECU.
Each module controls the brake cylinders of the axle that it monitors in relation to the information received by the ECU.
Distribution of braking forces between the front and rear axles depends on the braking demand from the driver and the vehicle load pilot–controlled by the rear axle suspension air spring pressure sensor connected to the rear module.
Automatic front/rear correction (WCS) is carried out to balance wear. Each brake is equipped with a disc + pad thickness measuring sensor. The EBS modules calculate an average LH/RH wear value to give the ECU a value for the axle. When the wear deviation between the front and rear axles is more than 3%, the ECU determines a predominance value for braking of the axle having the lowest wear. The correction is limited to 0.15 bar per axle.

Example:
For a vehicle presenting higher wear and for a braking demand of 2.5 bars, at least the following will be obtained:
– at the front: 2 – 0.15 = 1.85 bar
– at the rear: 2 + 0.15 = 2.15 bar

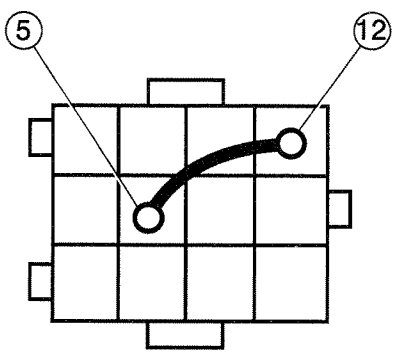
The WCS function is inhibited if:
– Defect on one of the wear sensors, or
– Front/rear wear deviation > 40%.

3 – The link between the tractor and the trailer is assured by the electronic trailer control valve, pilot–controlled by the EBS ECU which assures harmonization of braking between the tractor and the trailer (CFCS).

4 – The **ABS** function:
Each module detects the roadwheel speeds of its axle through the speed sensors installed on the hubs. This speed information is sent by the modules to the ECU. On the basis of this information, the ECU can manage ABS regulation of one or other of the roadwheels.
A single module is installed on the front axle for regulating the "high grip type axle. Upon operation of the ABS, the pilot–control of the pressures on this axle also uses information obtained on the rear axle.
A double module is installed on the rear axle for regulating the roadwheel. Upon operation of the ABS, the pilot–control of the pressures on this axle also uses information obtained on the front axle.

5 – The **ASR** function:
ASR operation is assured by the EBS system by means of differential braking on the rear axle (by the rear module) and by monitoring the engine via the vehicle CAN link).

IMPORTANT
Roller bench mode.
This mode allows a vehicle equipped with EBS to be able to pass onto a power bench without the ASR function being activated and thus limiting the engine power.
This mode is activated as follows, the vehicle being on the bench:
– Earthing of vehicle DIAG socket pin 12 for at least 5 seconds.
– The roller bench mode is indicated to the driver by the message "ROLLER BENCH" on the display.
To quit this mode:
– Either switch the ignition ON/OFF to rest;
– Or if the roadwheel speed is > 7 km/h.



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6 – Illumination of the stop lights is managed by the vehicle ECU on the basis of the braking demand transmitted by the EBS system to the vehicle CAN bus.

Parking brake

The function is identical to that of the system without EBS from the control to the rear brake cylinders, except for the fact that the ECU receives "start of application of parking brake" information. This information enables the trailer control valve to distinguish between a service brake braking demand and a parking brake braking demand.

BRAKING IN THE EVENT OF FAILURE:

1 – Compressed air burst (pipe, union...): **Consequence identical to that of a vehicle not equipped with EBS.**
An air tank empties and the STOP warning light comes on: **Stop the vehicle immediately.**

2 – Total electrical failure: **The system changes over to safeguard mode**
The STOP warning light comes on: **Stop the vehicle immediately.**

The electrical stage of the brake valve no longer pilot–controls braking.
Brake valve pneumatic stage N°1 pilot–controls the front axle through the front module relay valve.
Brake valve pneumatic stage N°2 pilot–controls the rear axle through the rear module relay valves.

Consequence on a **laden** vehicle: full braking power is available.
Consequence on an **unladen** vehicle: **overbraking on the rear axle.**

IMPORTANT
Precautions must be taken during application of the brakes as there is the risk of the roadwheels slipping or locking (no more ABS function, nor load sensing correction).

3 – Intermediate fall–back modes:
Problems less serious than total electrical failure are managed (see aid–to–diagnostics). They illuminate warning lights G7 or G8 and the "Service" warning light. In such case, you can carefully drive to your nearest dealer or approved agent.

If warning light G7 comes on, it involves a trailer defect in 75% of the cases.

Examples:

A – Significant air leak at front air tank:

Consequences on the vehicle:

– Warning light G6 and the STOP warning light come on.
– The driver sends the EBS ECU an electrical demand for braking via the brake valve electrical stage.
– The EBS ECU controls the front and rear modules.
– The rear module delivers the air pressure to the rear brake cylinders.
– The front module cannot deliver air pressure to the front brake cylinders.

Consequence on braking:

The vehicle no longer sustains its service brake performance (no brake on front axle).

Immediately stop the vehicle.

B – Significant air leak at rear air tank:

Consequences identical to those of the front air tank:

Immediately stop the vehicle.

C – Electrical failure on ECU / front module wiring harness:

Consequences on the vehicle:

- Warning light G8 and the STOP warning light come on.
- The driver sends the EBS ECU an electrical demand for braking via the brake valve electrical stage.
- The EBS ECU controls the rear module.
- The air pressure delivered to the rear brake cylinders is determined by the EBS ECU.
- The front module is in safeguard mode and the EBS ECU no longer controls the front module (no more air pressure regulation, no more ABS function).
- The air pressure delivered to the front brake cylinders is determined by the progressiveness of the brake valve front pneumatic stage.

Consequence on braking:

The vehicle no longer sustains its service brake performance:

Warning: the vehicle no longer sustains the abs function.

D – Electrical failure on ECU / rear module wiring harness:

Consequences on the vehicle:

- Warning light G6 and the STOP warning light come on.
- The driver sends the EBS ECU an electrical demand for braking via the brake valve electrical stage.
- The EBS ECU controls the front module.
- The air pressure delivered to the front brake cylinders is determined by the EBS ECU.
- The rear module is in safeguard mode and the EBS ECU no longer controls the rear module (no more air pressure regulation, no more ABS function).
- The air pressure delivered to the rear brake cylinders is determined by the progressiveness of the brake valve rear pneumatic stage.

IMPORTANT
*When the "EBS" ECU/ rear module wiring harness is defective, the "EBS" ECU considers that the vehicle is **100%** laden (information given to front module).*
*If the load sensor is inoperative, the "EBS" ECU considers that the vehicle is **50%** laden (information given to front and rear modules).*

Consequence on braking:

The vehicle no longer sustains its service brake performance:

Immediately stop the vehicle taking all necessary precautions.
No more load sensing correction or ABS regulation on the rear axle

E – Electrical failure on "EBS" ECU / brake valve wiring harness:

Consequences on the vehicle:

- Warning light G6 and the STOP warning light come on.
- The driver sends the EBS ECU an electrical demand for braking via the brake valve electrical stage.
- The EBS ECU no longer controls the front and rear modules.
- The front and rear modules are in safeguard mode.
- The air pressure delivered to the front and rear brake cylinders is determined by the progressiveness of the brake valve front and rear pneumatic stages.

Consequence on braking:

The vehicle no longer sustains its service brake performance:

Immediately stop the vehicle taking all necessary precautions
No more load sensing correction or ABS regulation on the front and rear axles

F – General electrical failure (battery voltage < 18.6 Volts):

Consequences identical as previously:

– Warning light G6 and the STOP warning light come on.
– The front and rear modules are in safeguard mode.

Consequence on braking:

The vehicle no longer sustains its service brake performance:

Immediately stop the vehicle taking all necessary precautions.

No more load sensing correction or ABS regulation on the front and rear axles

G – Trailer control valve electrical failure:

Consequences on the vehicle:

– Warning light G8 and the "Service" warning light come on.
– The brake valve electrical stage is inoperative – the electrovalves are in the "rest" position.
– The brake valve operates like a conventional brake valve.

Consequence on braking:

No more tractor / trailer harmonization but the vehicle sustains its service brake performance.

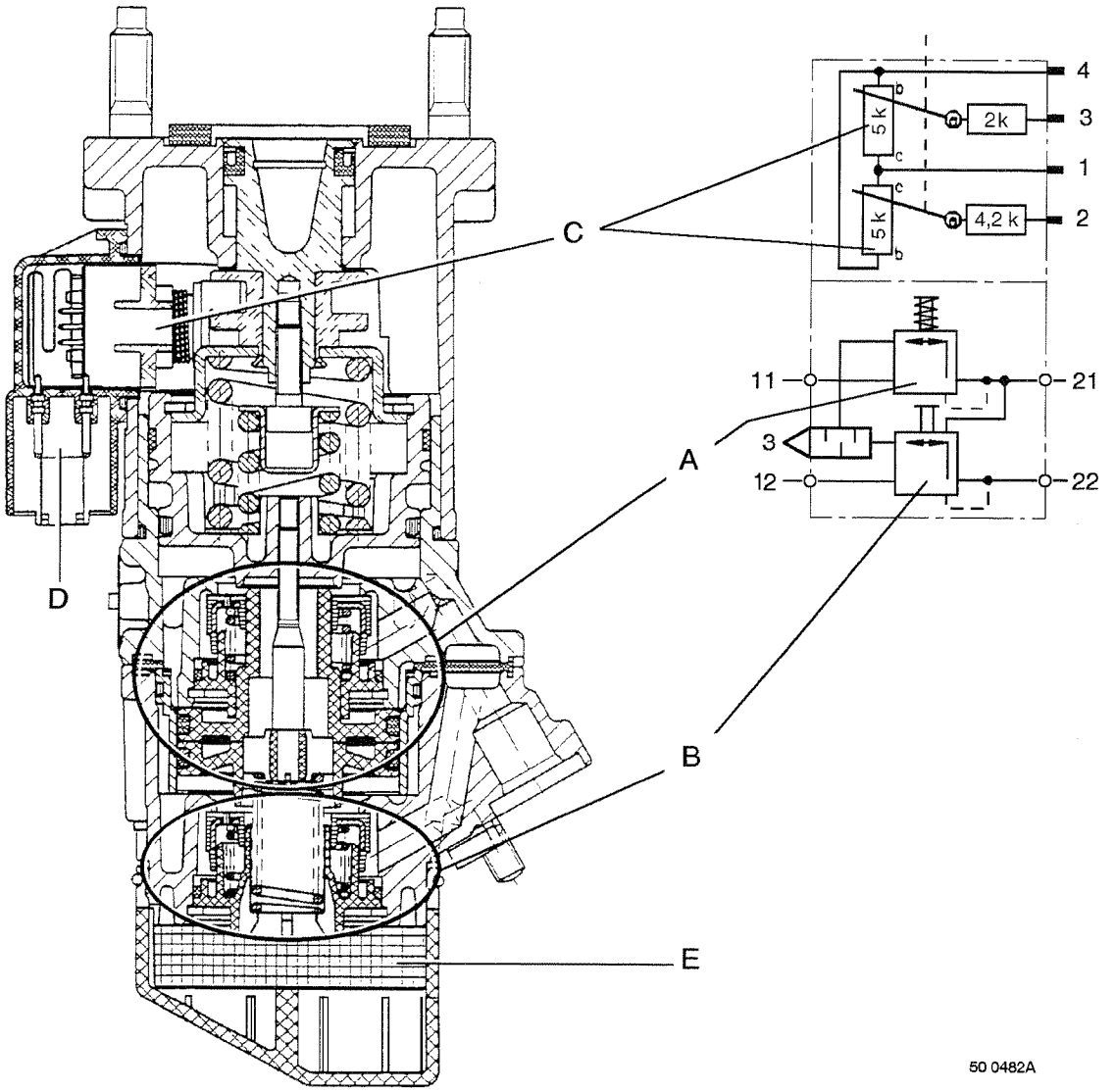
H – WCS failure:

Consequences on the vehicle:

– Warning light G8 and the "Service" warning light come on.
– The WCS mode is inhibited.

Consequence on braking:

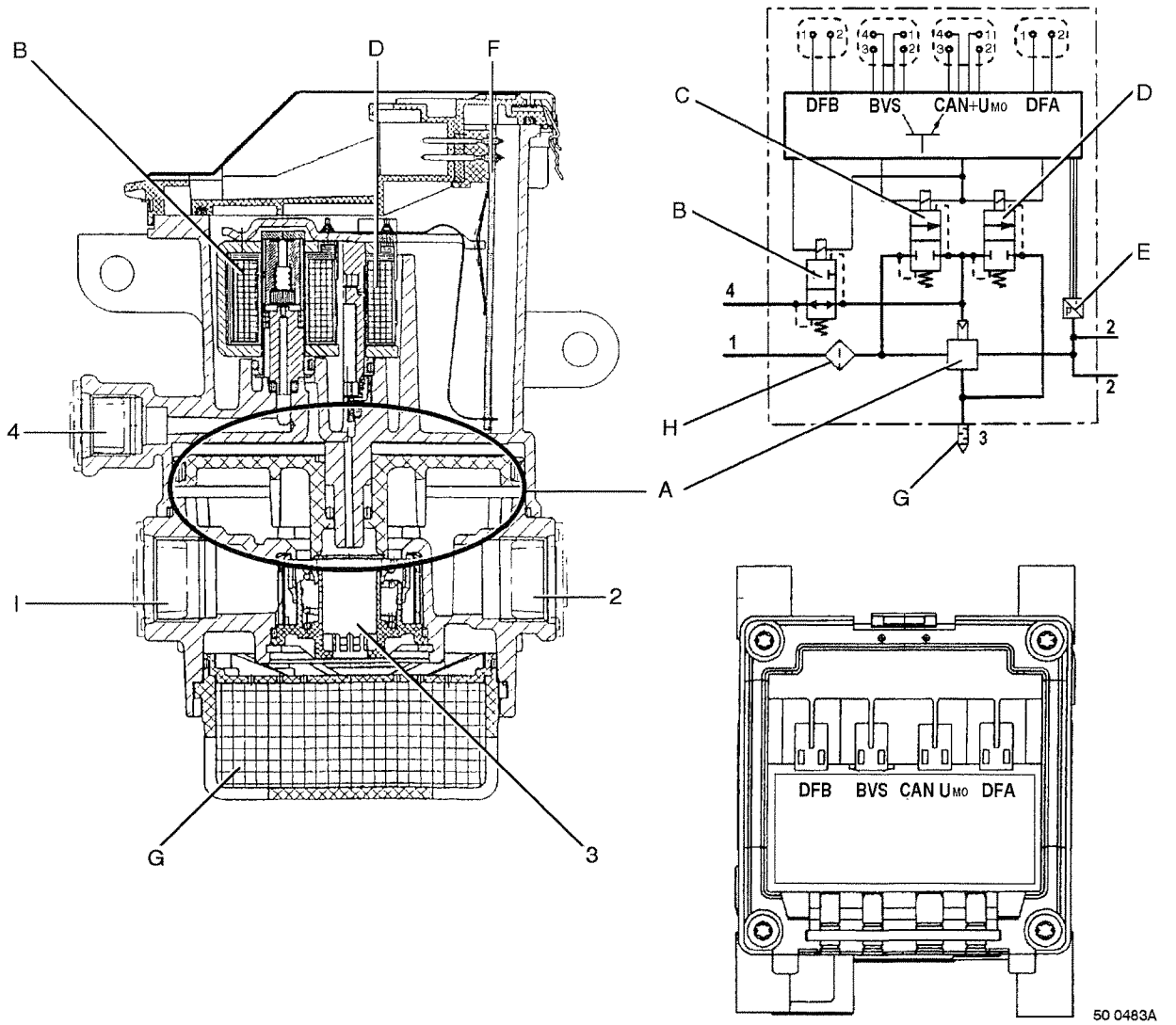
The vehicle sustains its service brake performance.



Cross–section through service brake valve (9520)

IMPORTANT
The different elements of the EBS braking system (brake valve, module, trailer control valve) cannot be repaired.
Replacement of the service brake valve must without fail be followed by calibration. If calibration is not performed, the system will operate but the braking forces between tractor and trailer risk being incorrectly distributed.

A – Front brake circuit pneumatic stage
B – Rear brake circuit pneumatic stage
C – Potentiometers
D – Connector
E – Silencer



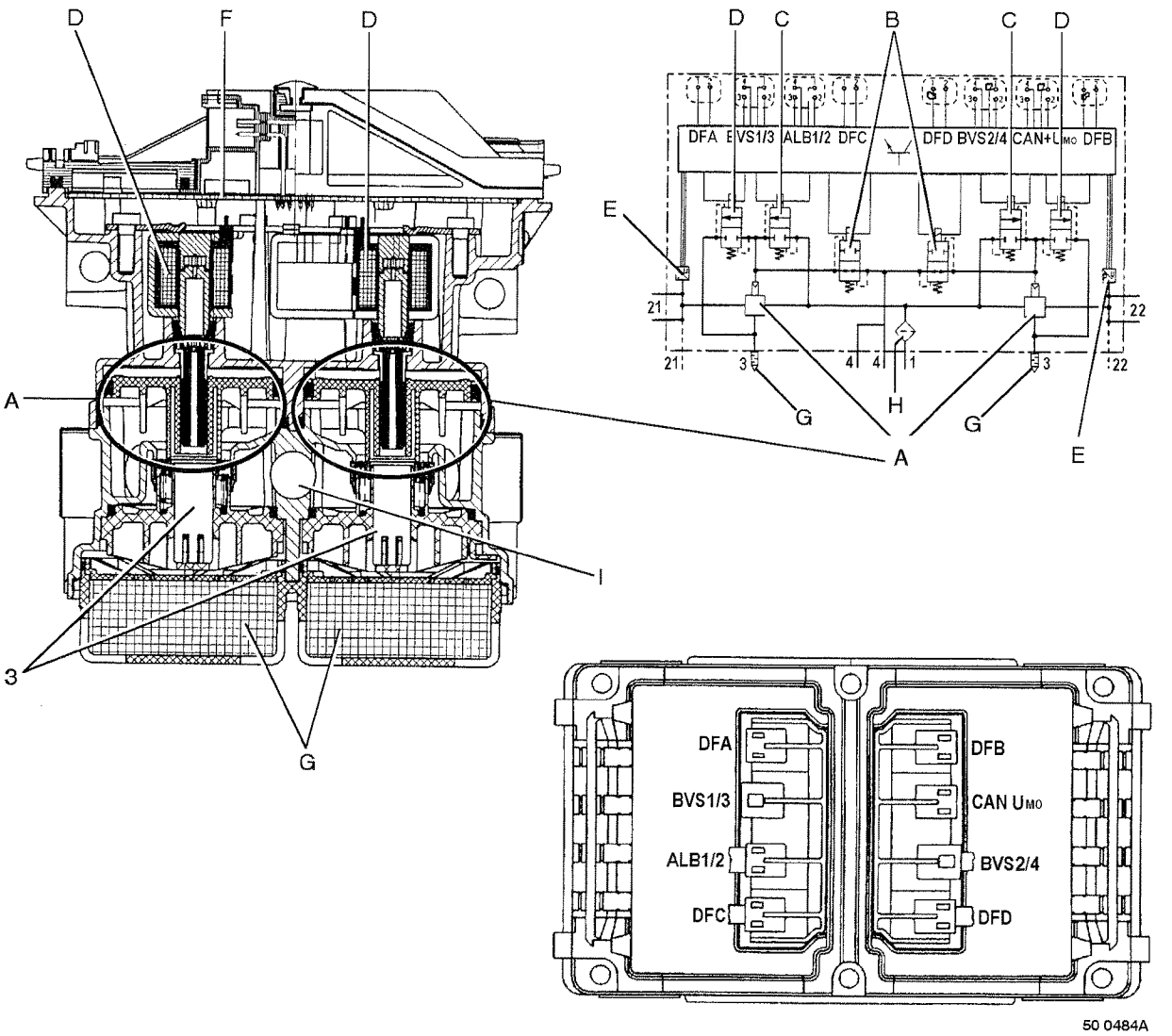
Cross–section through front module (9530)

IMPORTANT
The different elements of the EBS braking system (brake valve, module, trailer control valve) cannot be repaired.

A – Relay valve
B – Safeguard electrovalve
C – Intake electrovalve
D – Exhaust electrovalve
E – Pressure sensor
F – Electronic card
G – Silencer
H – Internal filter

1 – Air tank supply
2 – To brake cylinders
3 – Exhaust
4 – Brake valve pilot–control

DFB – RH speed sensor
BVS – Wear sensors signal input
CAN+Umo – Communication with EBS ECU + Module power supply
DFA – LH speed sensor



Cross–section through rear module (9530)

IMPORTANT
The different elements of the EBS braking system (brake valve, module, trailer control valve) cannot be repaired.

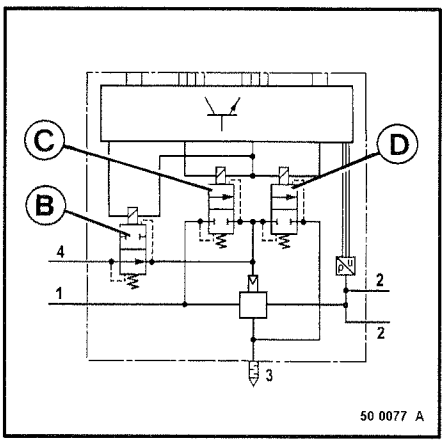
A – Relay valve
B – Safeguard electrovalve
C – Intake electrovalve
D – Exhaust electrovalve
E – Pressure sensor
F – Electronic card
G – Silencer
H – Internal filter

1 – Air tank supply
2 – To brake cylinders
3 – Exhaust
4 – Brake valve pilot–control

DFA – LH speed sensor signal
BVS1/3 – LH wear sensor signal
ABL1/2 – Load sensor signal
DFC – Not used

DFB – RH speed sensor signal
CAN+Umo – Communication with EBS ECU + Module power supply
BVS2/4 – RH wear sensor signal
DFD – Not used

Operation of a module in EBS mode:

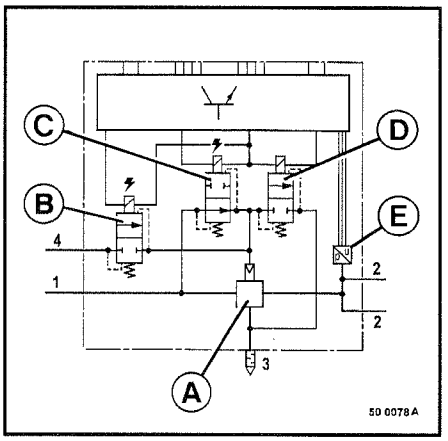


1 – The module is supplied with electricity and pneumatic pressure (port 1) and the brake pedal is in the "rest" position (absence of electrical and pneumatic pilot–control).
- The safeguard electrovalve (**B**) is in the normally–open position.
- The intake electrovalve (**C**) and exhaust electrovalve (**D**) are in the normally–closed position.

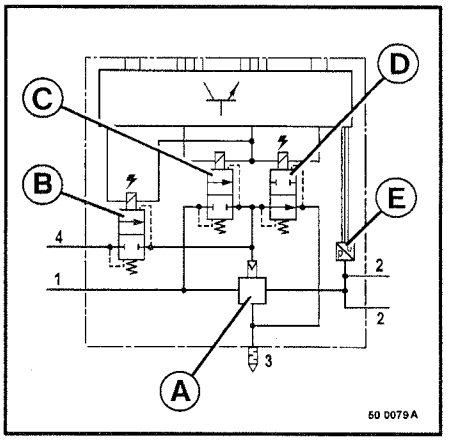
2 – Action on the brake pedal and holding:

1st stage:
- The safeguard electrovalve (**B**) is pilot–controlled and moves to the closed position.

2nd stage:
- The intake electrovalve (**C**) is pilot–controlled and moves to the open position.
- The exhaust electrovalve (**D**) stays in the normally–closed position.
- The relay valve (**A**) is pneumatically pilot–controlled and delivers a control pressure to ports **2**.
- The delivered pressure is permanently measured by the pressure sensor (**E**).
- When the delivered pressure value corresponds to the value demanded by the brake pedal position information, the intake electrovalve (**C**) is no longer pilot–controlled and interrupts the control of the relay valve (**A**). The exhaust electrovalve (**D**) stays closed.



3 – Partial release of the brake pedal (without return to the "rest" position):
- The safeguard electrovalve (**B**), still pilot–controlled, stays in the closed position.
- The intake electrovalve (**C**) and exhaust electrovalve (**D**) are in the closed position.
- The ECU integrated in the module permanently compares the pressure demand value supplied by the brake pedal with the delivered pressure informed by the pressure sensor (**E**).
- Upon release of the brake pedal, the module ECU takes into account the pressure reduction information. It controls the exhaust electrovalve (**D**) to make the output pressure identical to the information received.
- When the output pressure becomes identical to the demand pressure, the module ECU interrupts the pilot–control of the exhaust electrovalve (**D**) which closes automatically.
- The delivered pressure has reached the demand level originating from the brake valve.



4 – Total release of the brake pedal:
- During continuous release of the brake pedal, the module ECU pilot–controls the exhaust electrovalve (**D**) to the open position.
- When the brake pedal reaches the zero position, the EBS ECU givers the order to the module ECU to no longer pilot–control the safeguard electrovalve (**B**) (it returns automatically to the open position); at the same time, the exhaust electrovalve (**D**) is no longer pilot–controlled.

Operation of a module in ABS regulation mode:

1 – Operation of the front module in ABS regulation mode for the front axle:
- On the front axle, ABS regulation is done on the axle.
- At the time of strong deceleration or when the LH front wheel locks.
- The ECU detects locking of the roadwheel by means of the speed sensor.
- The ECU closes the intake electrovalve and opens the exhaust electrovalve (the brakes on the complete axle are partially released).
- The ECU closes the exhaust electrovalve again and opens the intake electrovalve so as to bring the speed of the LH wheel identical to the speed of the RH wheel before release of the brakes (before getting the roadwheel speed identical, the exhaust and inlet electrovalves may open and close several times)

NOTE:
During the ABS regulation phase, the roadwheels may lock.

2 – Operation of the rear module in ABS regulation mode for the drive axle:
- On the rear drive axle, ABS regulation is done wheel–by–wheel.
- When a roadwheel locks, the ECU partially releases the brakes on the wheel so as to reduce its speed to that of the other wheel.

NOTE:
During the ABS regulation phase, the roadwheels may lock.

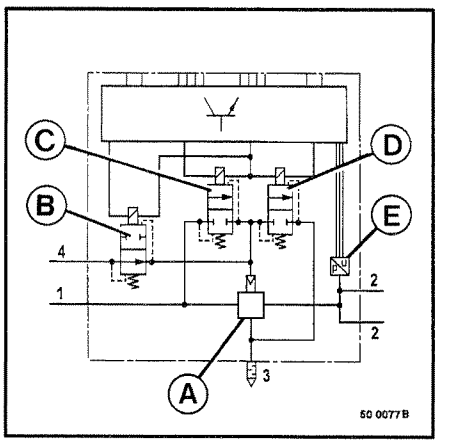
Operation of a module in ASR regulation mode:

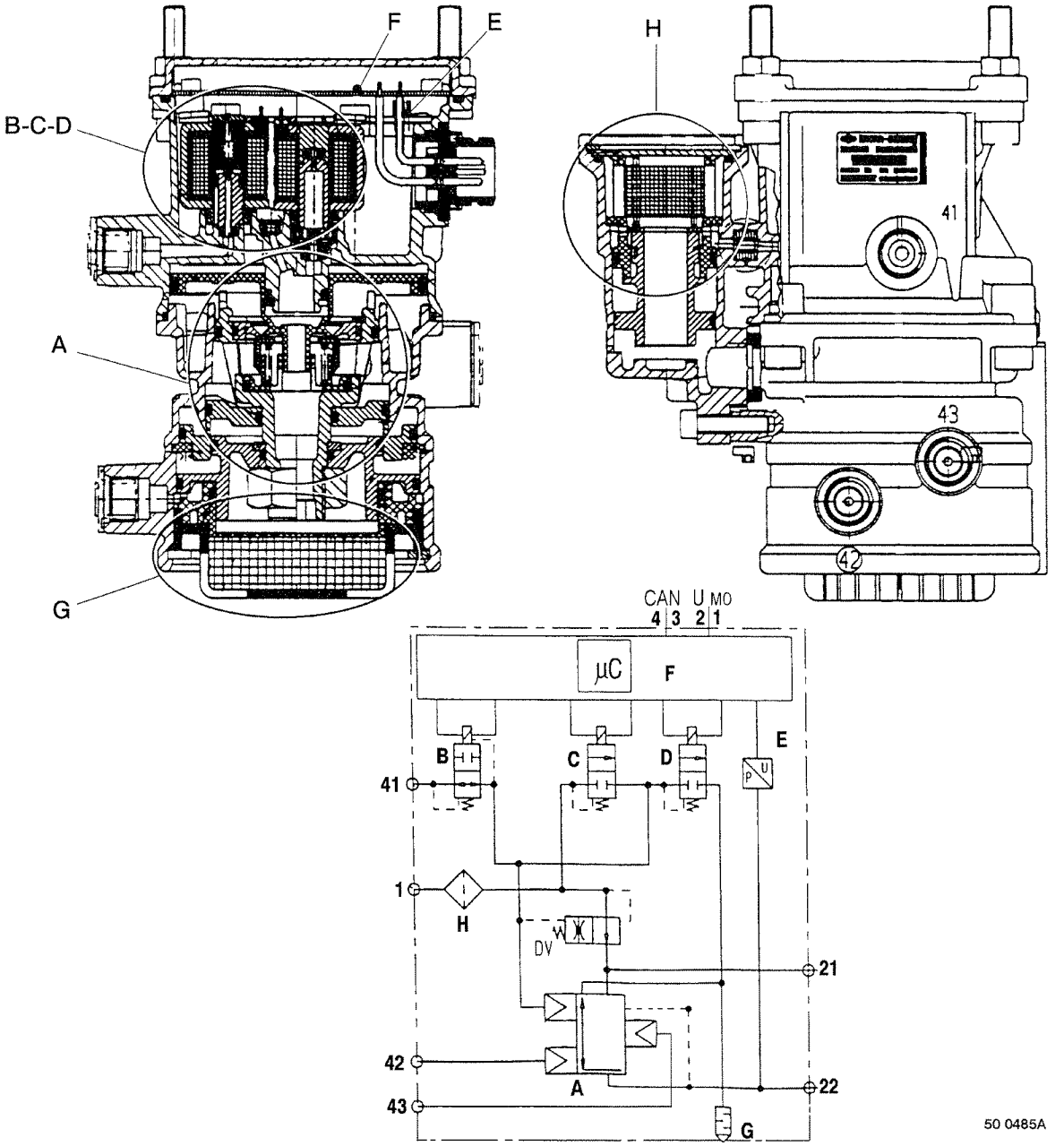
The operating logic of a module in ASR regulation mode is the opposite to the logic in ABS regulation mode.
- If the LH rear wheel slips, the ECU opens the intake electrovalve of the LH channel of the axle module (braking of LH roadwheel) so as to raise the speed of the LH wheel to the same speed as the RH wheel.

Operation of a module in safeguard mode:

If an important system defect is detected by the ECU, it disconnects the input(s) electrical control:
- pressure sensor
- brake valve
- front module
- rear drive axle module.

If the brake pedal is depressed:
- The safeguard electrovalve (**B**) is in the normally–open position.
- The intake electrovalve (**C**) and exhaust electrovalve (**D**) are in the normally–closed position.
- The pressure delivered by the brake valve crosses the safeguard electrovalve (**B**) and directly pilot–controls the relay valve (**A**). The pressure delivered to ports 2 (brake cylinders) is proportional to the pneumatic control pressure.
- Upon release of the brake pedal, the pressure is discharged through the relay valve exhaust. The module operates like a single relay valve.
- The sensor (**E**) is no longer active. The delivered pressure is no longer monitored electronically.





Cross–section through trailer control valve (9550)

IMPORTANT
The different elements of the EBS braking system (brake valve, modules, trailer control valve) cannot be repaired.

A – Relay valve
B – Safeguard electrovalve
C – Intake electrovalve
D – Exhaust electrovalve
E – Pressure sensor
F – Electronic card
G – Silencer
H – Internal filter
DV– Breakaway valve

1 – Air tank supply43 – Parking brake pilot–control
21 – To red coupling head
22 – To yellow coupling head
41 – Front brake circuit pilot–control
42 – Rear brake circuit pilot–control

Operation of trailer control valve:

Rest mode
- The valve is supplied with electricity and pneumatic pressure through port 1).
- The electrovalves are at rest.
  - The safeguard electrovalve (**B**) is in the normally–open position.
  - The intake electrovalve (**C**) and exhaust electrovalve (**D**) are in the normally–closed position.
  - Pneumatic pressure is present at output 21 (to red coupling head).
  - No Pneumatic pressure delivered at output 22 (to yellow coupling head).
  - No pressure control at 41 and 42 (from service brake valve).
  - Constant pressure at 43 (from parking brake valve).

Service braking mode
The valve receives one electrical information and two pneumatic information items:
- Brake application
  The electrical information (the fastest) controls closing of the safeguard electrovalve (**B**) and opening of the intake electrovalve (**C**). The control pressure arrives at the relay valve (**A**) which in turn delivers a pneumatic pressure to output 22 (yellow coupling head).
  A sensor (**E**) permanently monitors this pressure.
- Brake release
  Opening of the exhaust electrovalve (**D**) to drop the pressure at output 22.

The electronics system permanently compares the pressure at output 22 with the set–point value and corrects any deviation by modulating with electrovalves (**C**) and (**D**).

Failure at electronically managed trailer control valve
When there is a defect present in the electronic function of the trailer control valve, the electrical stage is cut out. The electrovalves are put into their "rest" position and it is the pneumatic pilot–control information through ports 41 and 42 that control the relay valve (**A**).

Parking brake mode
Action of the parking brake control makes the pressure drop at 43 which delivers this pressure to output 22 via the relay valve (**A**) (to the yellow coupling head). The parking brake mode is not managed by the electronic system.

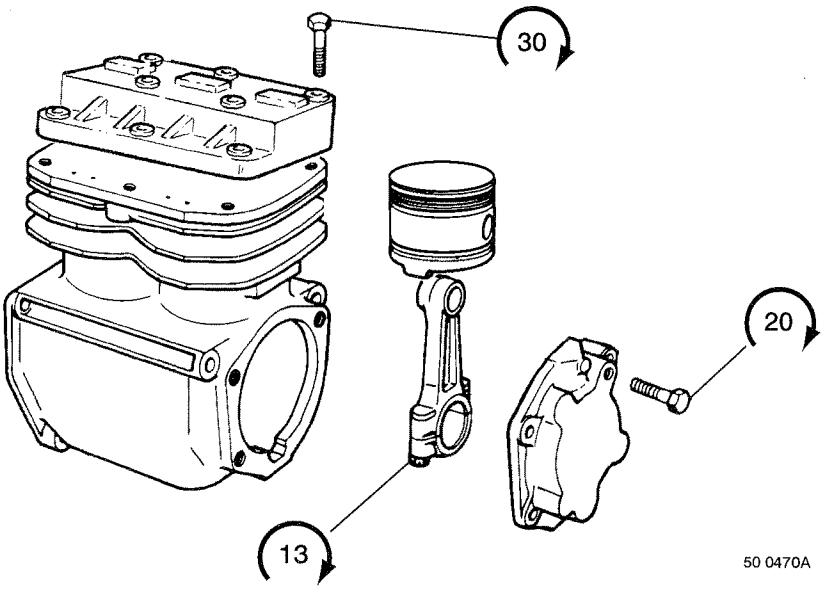
TECHNICAL FEATURES

IMPORTANT
These values serve for vehicle testing or diagnostics purposes and cannot be used to check conformity of the vehicle with the legislation in force.
These values are given for on–bench appliances.

0100 COMPRESSOR

TWIN–CYLINDER COMPRESSOR

Make: ..... **KNORR–BREMSE**
Reference: ..... **LP 4851**
Displacement: ..... **500 cm^3**
Port screw–threads:
– Air ..... **M 26x150**
– Refrigerant ..... **M 18x150**



0500 AIR DRYER

SINGLE–CANISTER AIR DRYER

Make: ..... **KNORR–BREMSE**
Reference: ..... **LA 8061**
Cut–out pressure: ..... **12.5 $^{+0/-0.4}$ bar**
Cut–in pressure: ..... **1 $^{+0.4/0}$ bar**
below the cut–out pressure
Regeneration capacity: ..... **140 L**
Safety pressure: ..... **15.5 bar**
Port screw–threads: ..... **M 22x150**

0800 PROTECTION VALVE

PROTECTION VALVE ⇒ 08/12/01

Make: ..... **KNORR–BREMSE**
Reference: ..... **AE 4605**
Opening pressure:
– circuits **21 – 22** (avec by–pass) ..... **7 $^{0/-0.3}$ bar**
– circuit **23** ..... **7.3 $^{0/-0.3}$ bar**
– circuit **24** ..... **7 $^{0/-0.3}$ bar**
Static closing pressure: ..... **4.5 $^{+0.5/0}$ bar**
Port **1** screw–threads: ..... **M 22x150**
Ports **21 – 22 – 23 – 24** screw–threads: ..... **flanged**

PROTECTION VALVE 10/12/2001 ⇒

Make: ..... **KNORR–BREMSE**
Reference: ..... **AE 4625**
Opening pressure:
– circuits **21 – 22** (with by–pass) ..... **7** $^{0/-0.3}$ **bar**
– circuit **23** ..... **7.3** $^{0/-0.3}$ **bar**
– circuit **24** ..... **7** $^{0/-0.3}$ **bar**
Static closing pressure: ..... **4.5** $^{+0.5/0}$ **bar**
Port **1** screw–threads: ..... **M 22x150**
Ports **21 – 22 – 23 – 24** screw–threads: ..... **flanged**

AIR TANKS

1001 FRONT BRAKES AIR TANK

Validity period: ..... **15 years**
Diameter: ..... **250 m**
Capacity: ..... **30 L**
Port screw–threads: ..... **M 22x150**

1010 REAR BRAKES AIR TANK

Validity period: ..... **15 years**
Diameter: ..... **250 mm**
Capacity: ..... **30 L**
Port screw–threads: ..... **M 22x150**

1020 TRAILER BRAKES AIR TANK

Validity period: ..... **15 years**
Diameter: ..... **250 mm**
Capacity: ..... **30 L**
Port screw–threads: ..... **M 22x150**

3600 SINGLE DIAPHRAGM CHAMBER

SINGLE DIAPHRAGM Type 20

Make: ..... **MERITOR**
LH reference: **68 323 556**
RH reference: **68 323 557**
Port 1 screw–threads: ..... **M 16x150**

3741 AIR–OPERATED SINGLE–PLATE BRAKE CALIPER

On front axle

MERITOR type D–ELSA

LH reference: ..... **68 032 911 NZP**
RH reference: ..... **68 032 912 NZP**

Brake pads

Asbestos–free quality: ..... **TEXTAR T3016**
Original thickness: ..... **30 mm**
Minimum permissible thickness: ..... **11 mm**

Brake disc

Ventilated disc
Diameter: ..... **434 mm**
Original thickness: ..... **45 mm**
Minimum grinding thickness: ..... **42 mm**
Minimum permissible thickness: ..... **39 mm**
Parallelism of faces: ..... **< 0.05 mm**
Support face/ inner track buckle: ..... **< 0.2 mm**

On rear axle

MERITOR type D–ELSA

LH reference: ..... **68 032 913 NZP**
RH reference: ..... **68 032 914 NZP**

Brake pads

Asbestos–free quality: ..... **TEXTAR T3016**
Original thickness: ..... **30 mm**
Minimum permissible thickness: ..... **11 mm**

Brake disc

Ventilated disc
Diameter: ..... **434 mm**
Original thickness: ..... **45 mm**
Minimum grinding thickness: ..... **42 mm**
Minimum permissible thickness: ..... **39 mm**
Parallelism of faces: ..... **< 0.05 mm**
Support face/ inner track buckle: ..... **< 0.2 mm**

4100 DOUBLE RELAY GOVERNOR VALVE

DOUBLE RELAY VALVE

Make: ..... **WABCO**
Reference: **973 011 206 0**
Maximum working pressure:
Connection **1** ..... **13 bar**
Connections **41 – 42** ..... **10 bar**
Ports **1 – 21** screw–threads: ..... **M 22x150**
Ports **22 – 41 – 42** screw–threads: ..... **M 16x150**

4500 PRESSURE REDUCING VALVE

PRESSURE REDUCING VALVE

Make: ..... **KNORR–BREMSE**
Reference: ..... **AC 157C**
Limited pressure: ..... **8 $^{+0.4/0}$ bar**
for a service pressure of **12.5 bar**
Port screw–threads: ..... **M 22x150**

5000 DOUBLE SPRING CYLINDER

DOUBLE CYLINDER type 20/30

Make: ..... **MERITOR**
Reference: **68 323 037**
RH reference: **68 323 038**
Neutralizing pressure: ..... **5 $^{+/- 0.3}$ bar**
Port screw–threads: ..... **M 16x150**

5500 PARKING BRAKE VALVE

HAND CONTROL VALVE

Make: ..... **KNORR–BREMSE**
Reference: ..... **DPM 28A**
Service pressure: ..... **10 bar**
Port screw–threads: ..... **M 16x150**

5700 PARKING BRAKE SAFETY VALVE (VARIANT 45203)

PUSH VALVE

Make: ..... **WABCO**
Reference: **434 205 033 0**
Service pressure: ..... **10 bar**
Safety or tripping pressure: ..... **4 $^{0/-0.6}$ bar**
Port screw–threads: ..... **M 16x150**

6400 DOUBLE CHECK VALVE

DOUBLE CHECK VALVE

Make: ..... **WABCO**
Reference: **434 208 021 0**
Service pressure: ..... **10 bar**
Port screw–threads: ..... **M 22x150**

6700 OVERFLOW VALVE

OVERFLOW VALVE

Make: ..... **WABCO**
Reference: **434 100 253 0**
Opening pressure: ..... **6.1 $^{+0.5/-0.2}$ bar**
Overflow pressure: ..... **5.5 $^{+/-\ 0.2}$ bar**
Port screw–threads: ..... **M 22x150**

8105 REAR AIR PRESSURE TRANSMITTER

Make: ..... **JEAGER**
Maximum working pressure: ..... **16 bar**
Screw–threads: ..... **M 16x150**

8165 REAR BRAKE AIR PRESSURE SWITCH

Make: ..... **JEAGER**
Contact: ..... **6$^{+/-0.6}$ bar**

8166 FRONT BRAKE AIR PRESSURE SWITCH

Make: ..... **JEAGER**
Contact: ..... **6$^{+/-0.6}$ bar**

8174 PARKING AND TRAILER BRAKES AIR PRESSURE SWITCH

Make: ..... **JEAGER**
Contact: ..... **6$^{+/-0.6}$ bar**

8178 PARKING BRAKE INDICATOR AIR PRESSURE SWITCH

Make: ..... **JEAGER**
Contact: ..... **0.7 $^{+/-\ 0.07}$ bar**

NOTE:
All these pressure switches operate upon fall in pressure.

81.. WEAR SENSOR

Make: ..... **MERITOR**
LH front reference: **68 323 955**
RH front reference: **68 323 956**
LH rear reference: **68 323 496**
RH rear reference: **68 323 497**
Power supply by EBS modules: ..... **5 Volt**

9501 "EBS ELECTRONIC CONTROL UNIT

Make: ..... **KNORR–BREMSE**
Reference: **0 486 106 024**
Power supply: ..... **24 Volt**
Stand–by switchover for a voltage: ..... **≤ 18.6 Volt**

9513 DOUBLE REAR MODULE ⇒ 13/10/2001

Make: ..... **KNORR-BREMSE**
Reference: **0 486 204 002**
Power supply by ECU: ..... **24 Volt**
Power supply to wear sensors and load sensor: ..... **5 Volt**
Supply pressure: ..... **≤ 12.5 bar**
Service pressure: ..... **≤ 10 bar**
Ports **1 – 21 – 22** screw–threads: ..... **M 22x150**
Port **4** screw–threads: ..... **M 16x150**

9513 DOUBLE REAR MODULE 15/10/2001 ⇒

Make: ..... **KNORR-BREMSE**
Reference: **0 486 204 026**
Power supply by ECU: ..... **24 Volt**
Power supply to wear sensors and load sensor: ..... **5 Volt**
Supply pressure: ..... **≤ 12.5 bar**
Service pressure: ..... **≤ 10 bar**
Ports **1 – 21 – 22** screw–threads: ..... **M 22x150**
Port **4** screw–threads: ..... **M 16x150**

WARNING
The rear module has one direction of assembly (link with the ECU to the right in the direction of running).

9520 SERVICE BRAKE VALVE

Make: ..... **KNORR-BREMSE**
Reference: **0 486 200 104**
Electrical stage:
- Power supply by ECU ..... **5 Volt**
- Resistance between pins **1** and **2** ..... **4200 < R < 9200 Ω**
- Resistance between pins **3** and **4** ..... **2000 < R < 7000 Ω**

Pneumatic stage:
- Deviation between two elements ..... **0.6 $^{+/-0.2}$ bar**
- Plunger clearance ..... **0.5 mm**
- Minimum plunger travel ..... **10.5 mm**
- Maximum supply pressure ..... **13 bar**
- Maximum delivery pressure ..... **8 $^{+/-0.4}$ bar**

9530 SINGLE FRONT MODULE ⇒ 13/10/2001

Make: ..... **KNORR-BREMSE**
Reference: **0 486 203 017**
Power supply by ECU: ..... **24 Volt**
Power supply to wear sensors: ..... **5 Volt**
Supply pressure: ..... **≤ 12.5 bar**
Service pressure: ..... **≤ 10 bar**
Ports **1** & **2** screw–threads: ..... **M 22x150**
Port **4** screw–thread: ..... **M 16x150**

9530 SINGLE FRONT MODULE 15/10/01 15/10/2001 ⇒

Make: ..... **KNORR-BREMSE**
Reference: **0 486 203 017**
Power supply by ECU: ..... **24 Volt**
Power supply to wear sensors: ..... **5 Volt**
Supply pressure: ..... **≤ 12.5 bar**
Service pressure: ..... **≤ 10 bar**
Ports **1** & **2** screw–threads: ..... **M 22x150**
Port**4** screw–thread: ..... **M 16x150**

WARNING: Modules mounted after 15/10/01 can replace modules assembled earlier, but not vice versa.

9550 TRAILER CONTROL VALVE

Make: ..... **KNORR–BREMSE**
Reference: **0 489 205 006**
Power supply by ECU: ..... **24 Volt**
Supply and service pressure: ..... **≤ 8.5 bar**
Ports **1 – 21 – 22** screw–threads: ..... **M 22x150**
Ports **41 – 42 – 43** screw–thread: ..... **M 16x150**

9560 REAR AXLE LOAD SENSOR

Make: ..... **KNORR–BREMSE**
Reference: **0 484 205 004**
Power supply by rear module: ..... **5 Volt**
Screw–threads: ..... **M 16x150**

957.SPEED SENSOR

Make: ..... **KNORR–BREMSE**
LH front reference: **0 486 000 114**
RH front reference: **0 486 000 115**
LH rear reference: **0 486 000 072**
RH rear reference: **0 486 000 071**
Electrical resistance: ..... **950 < R < 1930 Ω**

9576 PARKING BRAKE COMMENCEMENT OF APPLICATION PRESSURE SWITCH

Make: ..... **JEAGER**
Contact: ..... **6 $^{+/-\ 0.6}$ bar**
Pressure switch operating upon fall in pressure

BATTERIES ..... **190/230 AH**

ALTERNATOR ..... **BOSCH N1 80A**

IMPORTANT
It is formally forbidden to reduce the capacity of the batteries or the power of the alternator (appliances type approved with the braking system).
It is formally forbidden to alter the braking circuit (by adding or deleting non type approved appliances).

PNEUMATIC DIAGRAMS

COLOUR KEY TO BRAKING DIAGRAMS

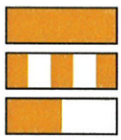
Compressed air supply .....

Front service brake:

Constant pressure .....

Delivered pressure .....

Pilot–control information .....



Rear service brake:

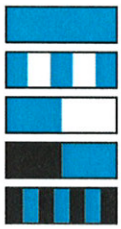
Constant pressure .....

Delivered pressure .....

Pilot–control information .....

2nd rear axle constant pressure .....

2nd rear axle delivered pressure .....

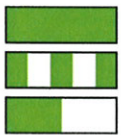


Parking brake:

Constant pressure .....

Delivered pressure .....

Pilot–control information .....



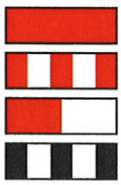
Trailer brake:

Constant pressure .....

Delivered pressure .....

Pilot–control information .....

Supply by towing vehicle .....

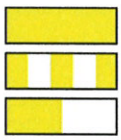


Emergency, auxiliary or extra brake:

Constant pressure .....

Delivered pressure .....

Pilot–control information .....



Hydraulic circuit:

Front .....

Rear .....

Auxiliary equipment:

Constant pressure .....

Delivered pressure .....

IDENTIFICATION OF BRAKING PIPES

RENAULT V.I. standards

Polyamide braking circuit pipes are identified according to a code using rings of different colours. A colour range indicates the function of the circuit. Two extra colours specify the sub–function of the circuit.

Function code:

ORANGE: . . . . . Front service brake
BLUE: . . . . . Rear service brake
GREEN: . . . . . Parking brake
RED: . . . . . Trailer brake
BROWN: . . . . . Auxiliary equipment
Without identification: . . . . . Feed or supply circuit

Sub–function code:

Function colour only: . . . . . Constant pressure
YELLOW: . . . . . Signalling pressure
WHITE: . . . . . Delivered pressure

CODIFICATION OF EQUIPMENT PORTS

DIN – ISO 6786 standards

The numbering of ports, used by the majority of braking equipment manufacturers, conforms to DIN and ISO standards.
The ports are coded according to their function.

0 . . . . . Air intake
1 . . . . . Energy input or inlet
2 . . . . . Energy output or outlet
3 . . . . . Air vent
4 . . . . . Control pressure
5 . . . . . Available
6 . . . . . Available
7 . . . . . Antifreezer
8 . . . . . Lubrication
9 . . . . . Water cooling

Case where 2 figures are used:

1st figure: Indicates the function.
2nd figure: Indicates a sequence number.

Example of use:
41: Control port N° 1
42: Control port N° 2

COLOUR KEY TO BRAKING DIAGRAMS

IMPORTANT
It is formally forbidden to alter the braking circuit (by adding or deleting one or several appliances).

Key to braking appliances

0100 – Compressor
0500 – Air dryer
0800 – Protection valve
0960 – Connection block
0962 – Manual bleed valve
0965 – Inflation valve
1001 – Front brakes air tank
1010 – Rear brakes air tank
1020 – Trailer brake air tank
1075 – Expansion air tank
3600 – Single diaphragm chamber
3741 – Single air disc brake caliper
4100 – Double relay valve
4500 – Pressure reducing valve
4860 – Pressure take–off
5000 – Double spring diaphragm cylinder
5500 – Parking brake valve
5700 – Parking brake safety valve
6400 – Double check valve
6700 – Overflow valve
7601 – Automatic coupling head
7610 – Service brake coupling head
8105 – Rear air pressure transmitter
8115 – Parking brake indicator warning light
8123 – Air pressure indicator warning light
8138 – Air pressure indicator
8165 – Rear brake minimum air pressure switch
8166 – Front brake minimum air pressure switch
8174 – Parking brake and trailer brake air pressure switch
8178 – Parking brake indicator air pressure switch
9513 – "EBS" rear module (double)
9520 – Service brake valve
9530 – Front module
9550 – Trailer control valve
9560 – "EBS" rear axle load sensor
9576 – Parking brake commencement of application pressure switch

Key to cross–references

21 – To air suspension

22 – To air springs

23 – To gearbox auxiliary equipment and key STOP switch

24 – To other auxiliary equipment

70 – To ECU

71 – To LH front speed sensor

72 – To RH front speed sensor

73 – To front wear sensor

74 – To LH rear speed sensor

75 – To RH rear speed sensor

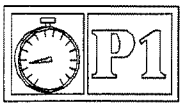
76 – To LH rear wear sensor

77 – To RH rear wear sensor

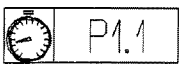
78 – To load sensor

79 – To rear module

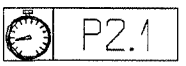
AIR BRAKES TEST POINTS:



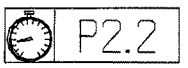
Braking reference point
Brake valve output (priority circuit) / EBS front module input.



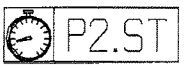
Brake valve output (secondary circuit) / EBS rear module input point



Pressure delivered to N° **1** axle cylinders
(first axle starting from front of vehicle)



Pressure delivered to N° **2** axle cylinders



Pressure delivered to parking brake spring cylinders

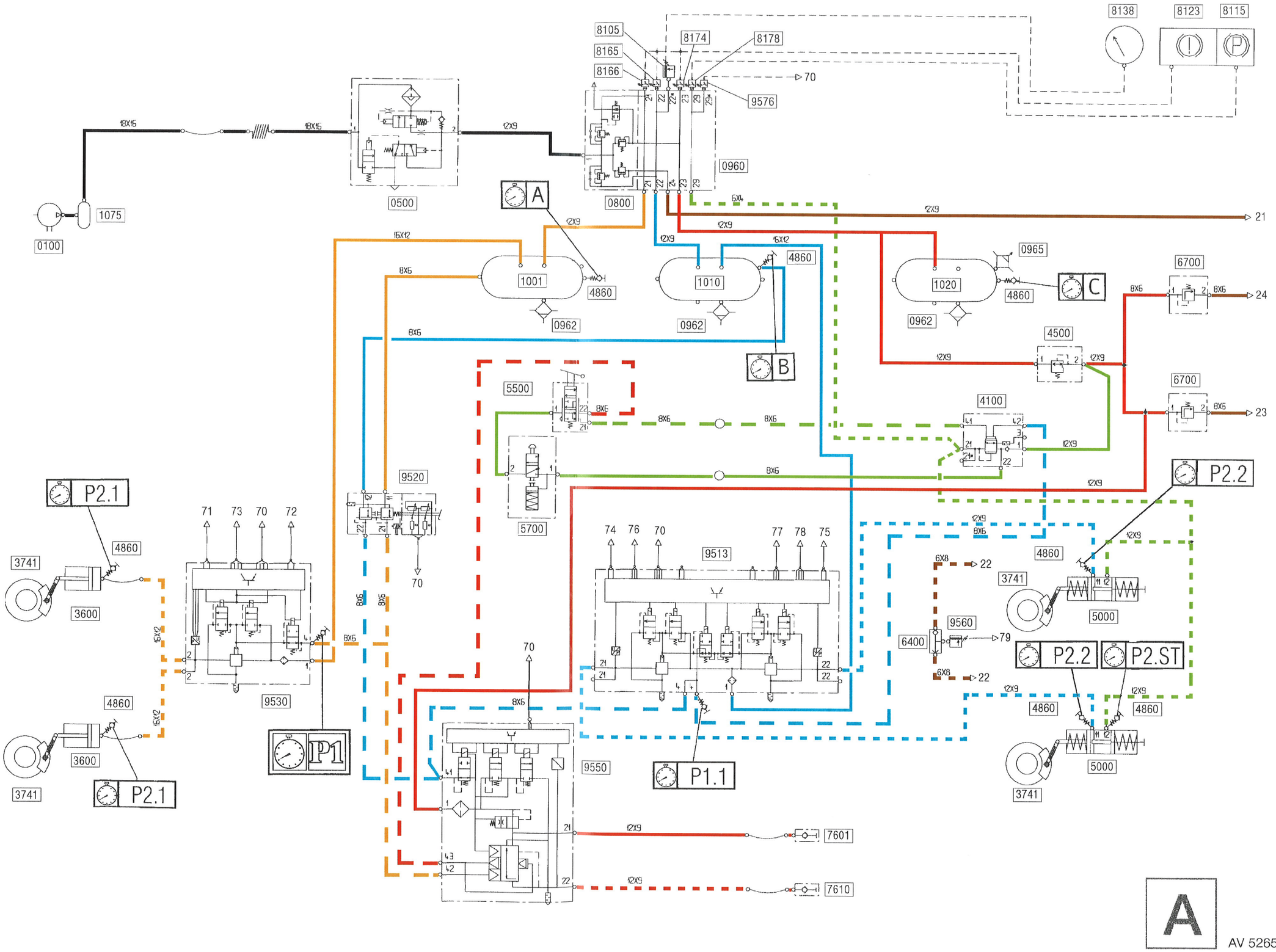
Front service brake air tank pressure

Rear service brake air tank pressure

Parking brake and trailer brake air tank pressure

Automatic coupling head pressure (red head)

Service brake coupling head pressure (yellow head)


8138
8123
8115
8105
8165
8166
8174
8178
70
9576
0960
0800
0500
18X15
18X15
12X9
1075
0100
A
12X9
16X12
8X6
1001
4860
0962
12X9
16X12
1010
4860
0962
5X4
12X9
12X9
21
0965
1020
4860
0962
C
6700
8X6
8X6
24
4500
12X9
12X9
6700
8X6
8X6
23
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5500
8X6
8X6
8X6
4100
12X9
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5700
9520
70
8X6
8X6
8X6
P2.2
71
73
70
72
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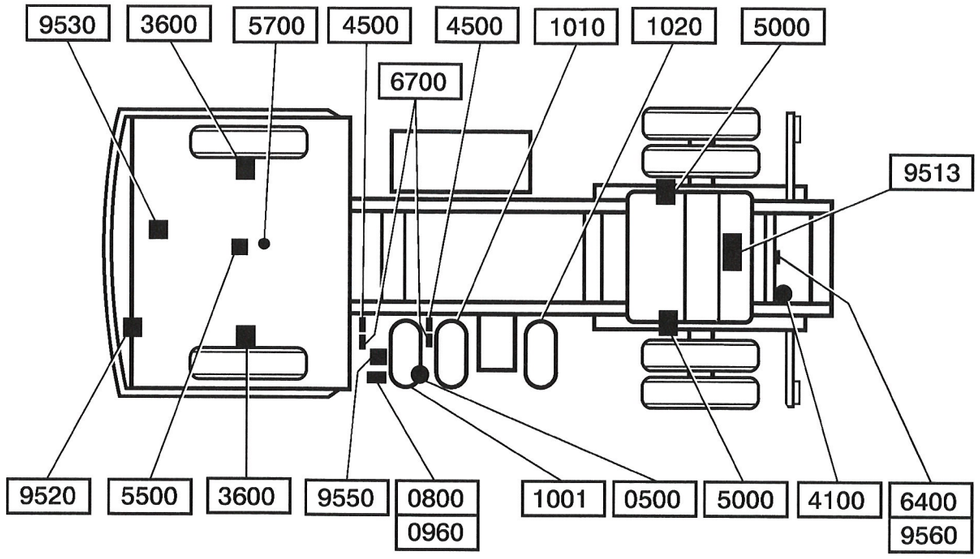
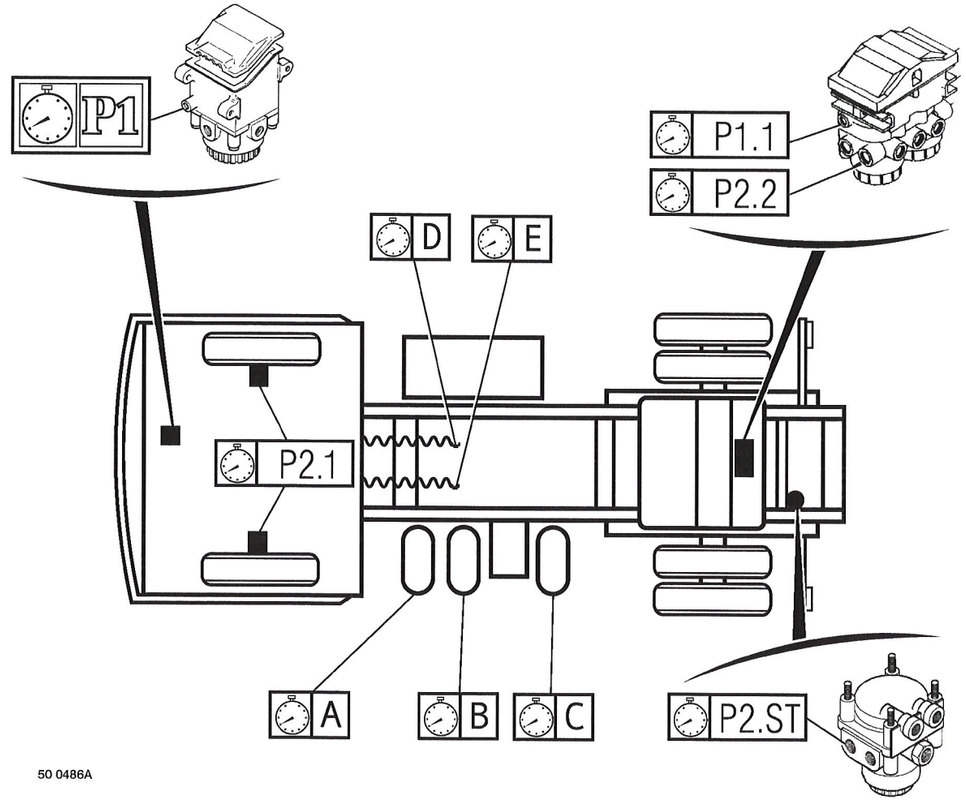
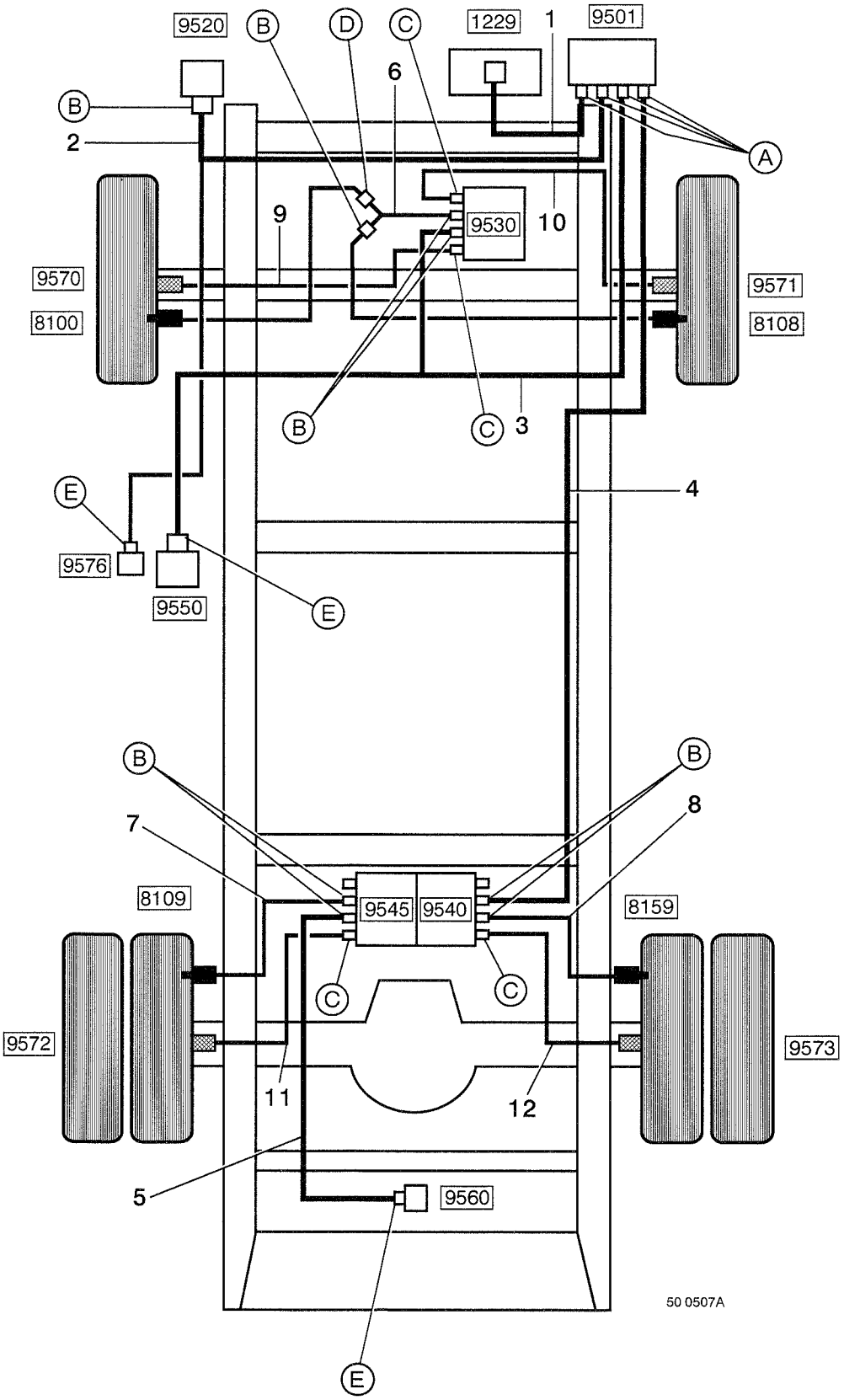
76
70
77
78
75
9513
12X9
8X6
6X8
22
9560
6400
79
6X8
22
4860
3741
5000
P2.2
P2.ST
12X9
12X9
4860
4860
5000
3741
P2.1
4860
3741
3600
15X2
9530
4860
15X2
3600
3741
P2.1
P1
8X6
9550
P1.1
12X9
7601
12X9
7610
A
AV 526583C

LAYOUT OF BRAKING APPLIANCES





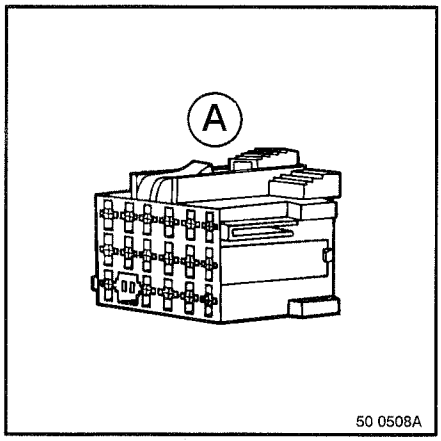
ELECTRICAL DIAGRAMS


9520
B
D
C
1229
1
9501
6
B
2
A
9
9530
10
9570
9571
8100
8108
B
C
3
E
4
9576
9550
E
B
B
7
8
8109
9545
9540
8159
C
C
9572
9573
11
12
5
9560
50 0507A
E

on

Legend:

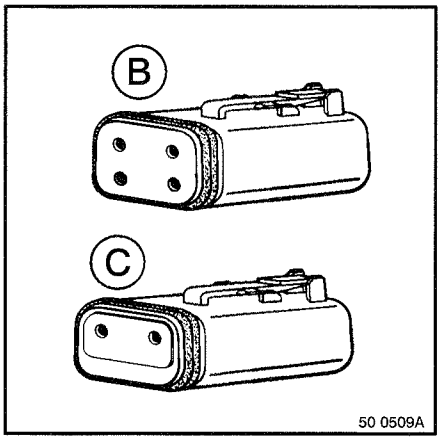
1229 – Chassis–cab connection unit
8100 – LH front brake pad wear sensor
8108 – RH front brake pad wear sensor
8109 – LH rear brake pad wear sensor
8159 – RH rear brake pad wear sensor
9501 – "EBS" ECU
9520 – Service brake valve
9530 – Front module
9540 – Rear module RH channel
9545 – Rear module LH channel
9550 – Trailer control valve
9560 – Rear axle load sensor
9570 – LH front roadwheel speed sensor
9571 – RH front roadwheel speed sensor
9572 – LH rear roadwheel speed sensor
9573 – RH rear roadwheel speed sensor
9576 – Parking brake pressure switch (beginning of air supply)



Wiring harness architecture:

The EBS system features several interdependent electrical wiring harnesses:

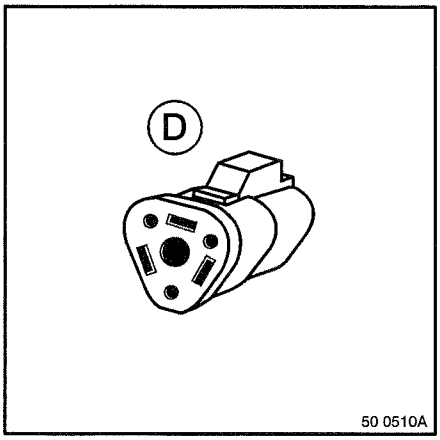
1 – Cab wiring harness (to connection unit)
2 – Brake valve + parking brake commencement of application pressure switch wiring harness
3 – Front module + trailer control valve wiring harness
4 – Rear module wiring harness
5 – Load sensor wiring harness
6 – Front wear sensor wiring harness
7 – LH rear wear sensor wiring harness
8 – RH rear wear sensor wiring harness
9 – LH front speed sensor wiring harness
10 – RH front speed sensor wiring harness
11 – LH rear speed sensor wiring harness
12 – RH rear speed sensor wiring harness

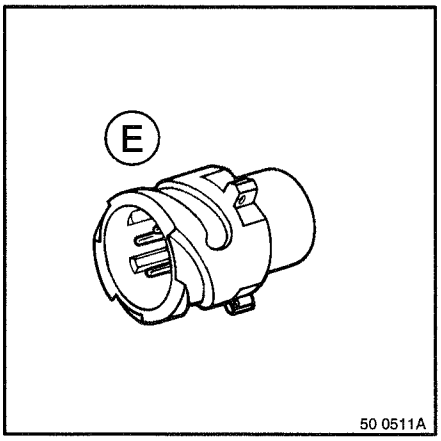


Connecting arrangement type:

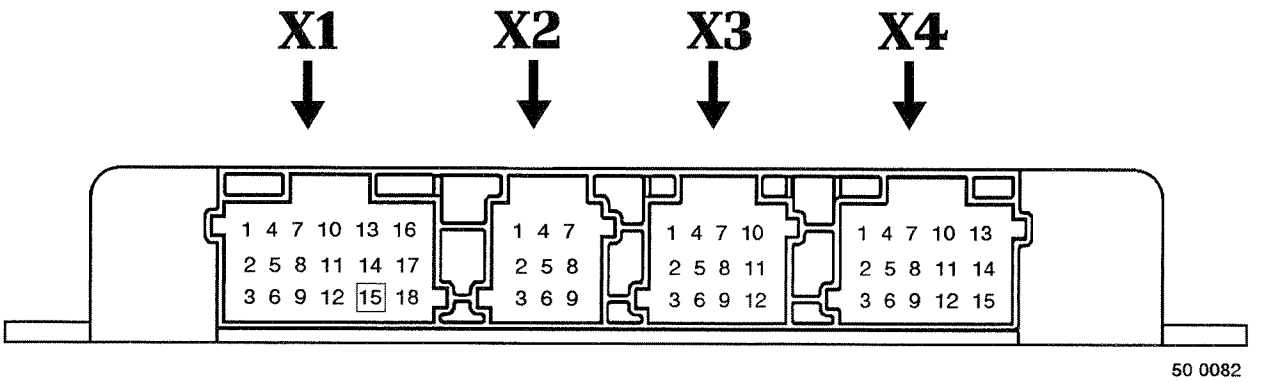
The EBS system wiring harnesses feature several types of connector:

A – JPT connector (9, 12, 15, 17 ways), on the EBS ECU.
B – DEUTSCH 4–way connector, on the valve and on the front and rear modules.
C – DEUTSCH 2–way connector, on the front and rear modules.
D – DEUTSCH 3–way connector, on the front wear sensors wiring. harness
E – DIN 2.5 connector:
2 way on parking brake commencement of application pressure switch.
3 way on load sensor.
4 way on trailer control valve.





NOTE:
For the electrical schematic diagram, see **MR 70.099.**



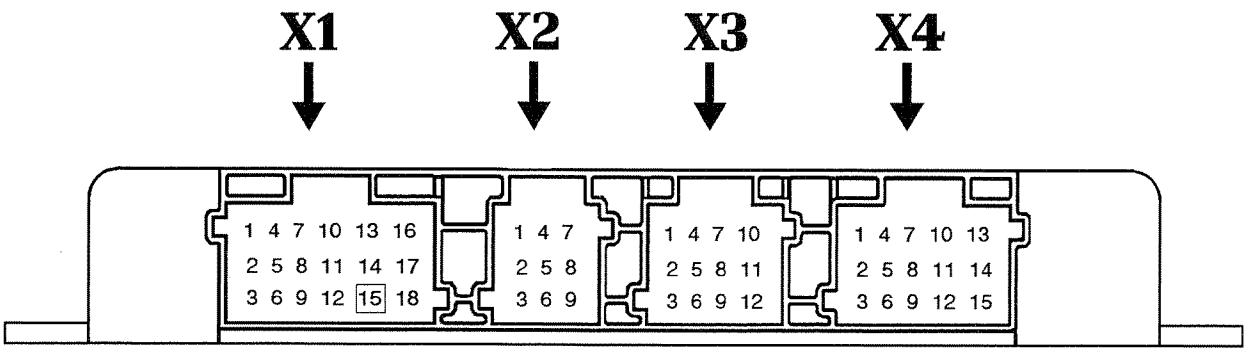
Identification of EBS electronic control unit pin arrangement:

Connector X1:

1 – Communication with vehicle CAN (low)
2 – Communication with vehicle CAN earth
3 – Communication with vehicle CAN (high)
4 – Not used
5 – Not used
6 – All terrain "ASR" control information
7 – After–ignition positive
8 – Battery power supply
9 – Stop lights relay
10 – ECU earth
11 – "ASR" in operation warning light
12 – Modulator inputs earth
13 – Diagnostics line K
14 – Diagnostics line L
15 – Disconnection detection system
16 – Not used
17 – Not used
18 – Not used

Connector X2 (brake valve management):

1 – Not used
2 – Potentiometers power supply
3 – Potentiometers earth
4 – Potentiometer N° 2 information
5 – Not used
6 – Parking brake commencement of application information
7 – Potentiometer N° 1 information
8 – Not used
9 – Not used



Connector X3 (front module + trailer control valve management):

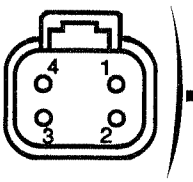
1 – Not used
2 – Front module earth
3 – Trailer control valve earth
4 – Not used
5 – Communication with front module (low)
6 – Communication with trailer control valve (low)
7 – Not used
8 – Communication with front module (high)
9 – Communication with trailer control valve (high)
10 – Not used
11 – Front module power supply
12 – Trailer control valve power supply

Connector X4 (rear module management):

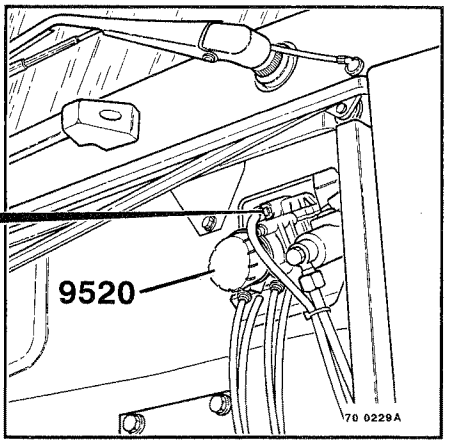
1 – Communication to trailer (low)
2 – Not used
3 – Communication to trailer (high)
4 – Rear module earth
5 – Not used
6 – Not used
7 – Communication with rear module (low)
8 – Not used
9 – Not used
10 – Communication with rear module (high)
11 – Not used
12 – Not used
13 – Rear module power supply
14 – Not used
15 – Not used

Identification of brake valve pin arrangement:

1 – Earth
2 – Potentiometer N° 1 signal
3 – Potentiometer N° 2 signal
4 – Power supply 5 Volts

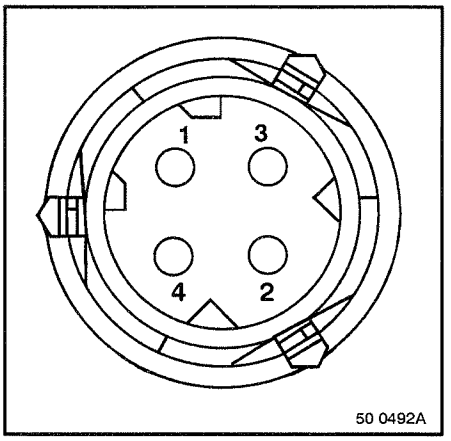


50 0487A



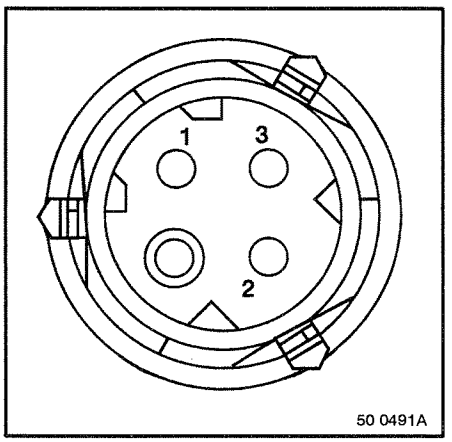
Identification of trailer control module pin arrangement:

1 – Power supply 24 Volts
2 – Earth
3 – CAN High signal
4 – CAN Low signal



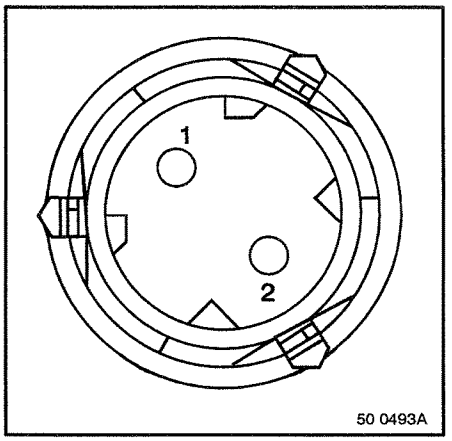
Identification of load sensor pin arrangement:

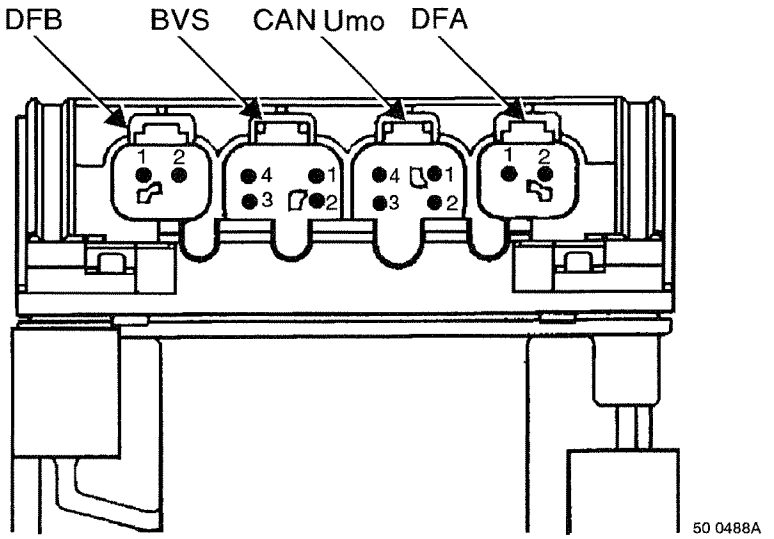
1 – Power supply 5 Volts
2 – Earth
3 – Sensor signal



Identification of parking brake commencement of application pressure switch pin arrangement:

1 – Power supply
2 – Signal





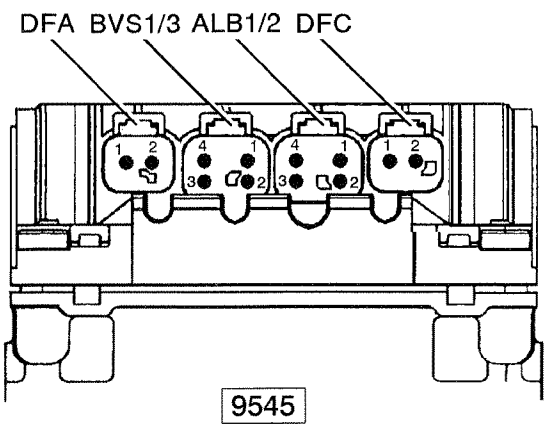
Identification of front module pin arrangement:

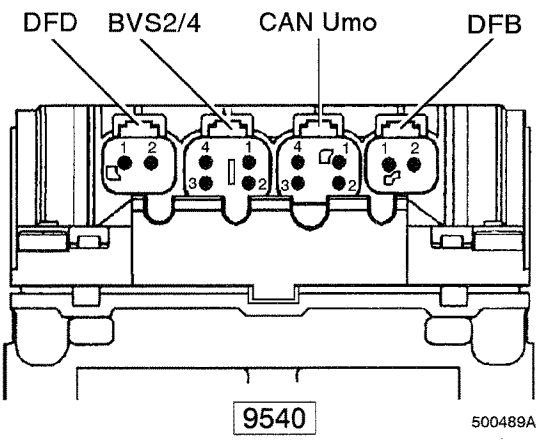
Connector DFB: RH speed sensor
- 1 – RH speed sensor signal
- 2 – RH speed sensor signal

Connector BVS: LH/RH front wear sensors
- 1 – Earth
- 2 – RH sensor signal
- 3 – LH sensor signal
- 4 – Power supply 5 Volts

Connector CAN + Umo: Communication with ECU + module power supply
- 1 – Earth
- 2 – Power supply 24 Volts
- 3 – AN High signal
- 4 – CAN Low signal

Connector DFA: LH speed sensor
- 1 – LH speed sensor signal
- 2 – LH speed sensor signal





Identification of rear module pin arrangement:

Connector DFA: LH speed sensor
- 1 – LH speed sensor signal
- 2 – LH speed sensor signal

Connector BVS1/3: LH rear wear sensor
- 1 – Earth
- 2 – Not used
- 3 – LH sensor signal
- 4 – Power supply 5 Volts

Connector ALB1/2: Rear axle load sensor
- 1 – Earth
- 2 – Load sensor signal
- 3 – Not used
- 4 – Power supply 5 Volts

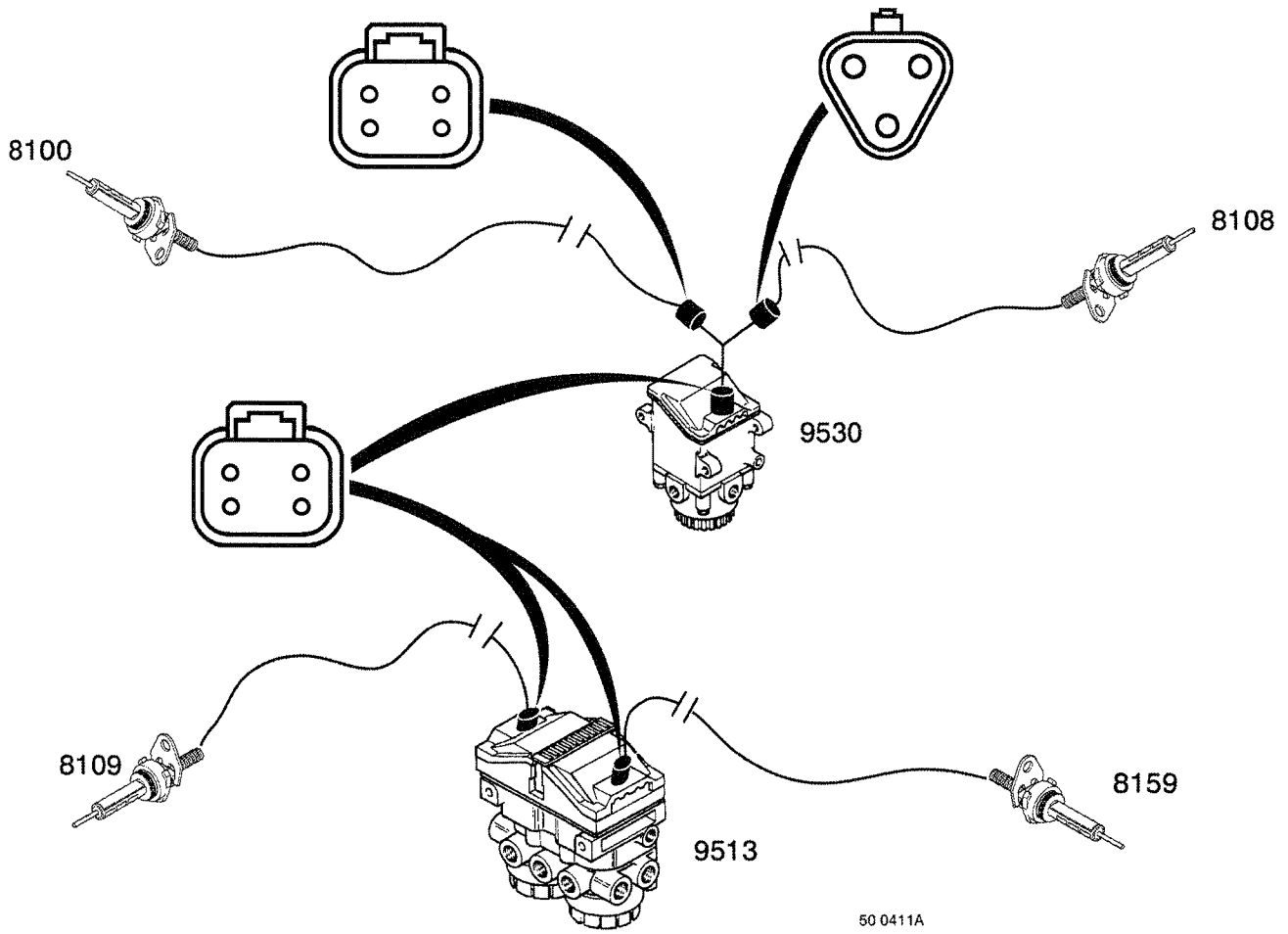
Connector DFC: Not used

Connector DFD: Not used

Connector BVS2/4: RH rear wear sensor
- 1 – Earth
- 2 – Not used
- 3 – RH sensor signal
- 4 – Power supply 5 Volts

Connector CAN + Umo: Communication with ECU + module power supply
- 1 – Earth
- 2 – Power supply 24 Volts
- 3 – CAN High signal
- 4 – CAN Low signal

Connector DFB: RH speed sensor
- 1 – RH speed sensor signal
- 2 – RH speed sensor signal



Wear sensors wiring:

8100 – LH front brake pad wear sensor
8108 – RH front brake pad wear sensor
8109 – LH rear brake pad wear sensor
8159 – RH rear brake pad wear sensor
9513 – Rear module
9530 – Front module

AID–TO–DIAGNOSTICS

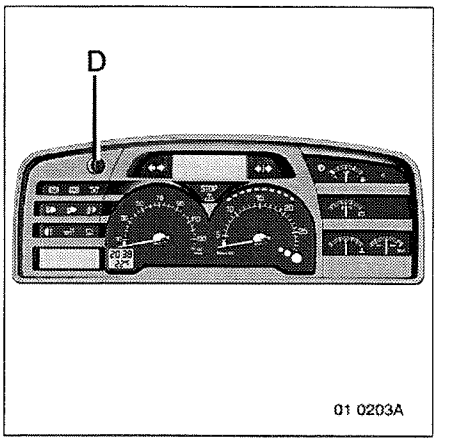
Diagnostics of EBS system defects using the instrument panel display

IMPORTANT
Any work on the vehicle's compressed air systems (brakes, suspension) may lead to bodily injury to the operative.
Prior to carrying out any work:
– Disengage the master switch to switch off the current.
– Apply the parking brake.
– Drain the braking and suspension systems.

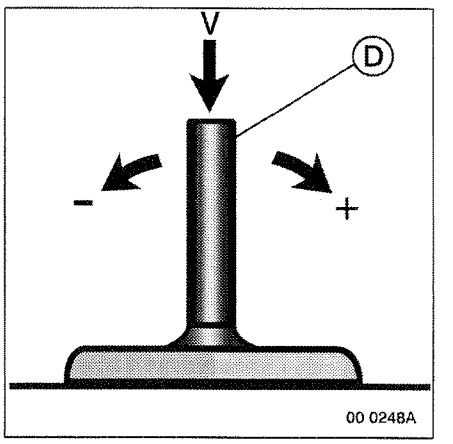
In the event of incident on the EBS braking system, warning light G6, G7 or G8 comes on, together with display of a message, while the STOP or Service warning light comes on to indicate seriousness of the incident.

To find out the system defect, use instrument panel button (**D**).

NOTE:
You are advised to use this button when the vehicle is stationary and parked correctly.



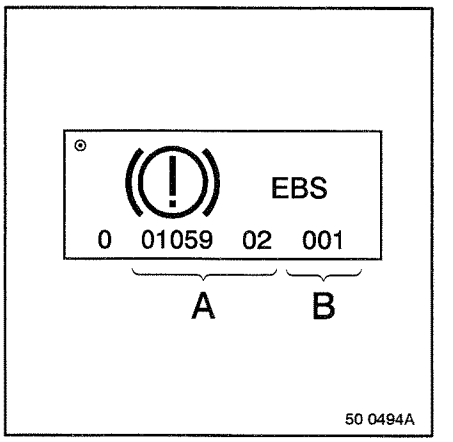
Push towards (+) or (–) to gain access to the different menus and sub–menus:
– Choose the menu "DIAGNOSTIC".
– Then the menu "PRESENT DEFECT".
– Press the button (**V**) briefly to validate.



Warning light G6 comes on, the defective function and a series of figures are displayed:

A : Defect number
B : Number of appearances of defect

List of defect code numbers (on following pages)



LIST OF DEFECT CODE NUMBERS

DEFECT CODE N°	DEFECT TYPE	REPAIR RECOMMENDATION	INDICATION	TEST LIGHT
00070 07	Parking brake circuit defect.	Check parking brake. Erase defect. If defect persists, change trailer control module.	TRAILER DEFECT	Service
00084 09	CAN bus link with VECU problem.	Check continuity and insulation of CAN bus arriving at EBS ECU. Check VECU for proper connection and correct operation.	ABS DEFECT	Service
00084 10	CAN bus link with VECU problem.	Check continuity and insulation of CAN bus arriving at EBS ECU. Check VECU for proper connection and correct operation.	ABS DEFECT	Service
00084 31	CAN bus link with VECU problem. **Defect not memorized**	Check continuity and insulation of CAN bus arriving at EBS ECU. Check VECU for proper connection and correct operation.	ABS DEFECT	Service
00122 09	CAN bus link with EECU problem.	Check continuity and insulation of CAN bus arriving at EBS ECU. Check EECU for proper connection and correct operation.	RISK OF LOCKING	Service
00512 09	CAN bus link with EECU problem.	Check continuity and insulation of CAN bus arriving at EBS ECU. Check EECU for proper connection and correct operation.	RISK OF LOCKING	Service
00514 09	CAN bus link with EECU problem.	Check continuity and insulation of CAN bus arriving at EBS ECU. Check EECU for proper connection and correct operation.	TRAILER DEFECT	Service
00520 09	CAN bus link with retarder ECU problem.	Check continuity and insulation of CAN bus arriving at EBS ECU. Check retarder ECU for proper connection and correct operation.	RISK OF LOCKING	Service
00627 07	EBS ECU overvoltage or undervoltage. **Defect not memorized**	Check EBS ECU power supply (Z1/7, X1/8, X1,12) and vehicle EBS fuses.	DANGER OF LOCKING	STOP
00628 02	EBS ECU parameters not defined. Inconsistency in parameter definition curves.	Write parameter definitions. If defect persists, change EBS ECU.	DANGER OF LOCKING	STOP

DEFECT CODE N°	DEFECT TYPE	REPAIR RECOMMENDATION	INDICATION	TEST LIGHT
00628 13	EBS ECU internal defect.	Write parameter definitions. If defect persists, change EBS ECU.	DANGER OF LOCKING	STOP
00629 02	EBS ECU internal defect.	Erase defect. If defect persists, change EBS ECU.	DANGER OF LOCKING	STOP
00629 09	EBS ECU internal defect.	Erase defect. If defect persists, change EBS ECU.	DANGER OF LOCKING	STOP
00629 11	EBS ECU internal defect.	Erase defect. If defect persists, change EBS ECU.	DANGER OF LOCKING	STOP
00629 12	EBS ECU internal defect.	Erase defect. If defect persists, change EBS ECU.	DANGER OF LOCKING	STOP
00630 13	Service brake valve calibration problem	Calibrate. If defect persists, change EBS ECU.	WORKSHOP HALT	Service
00639 02	Open–circuit or short–circuit on CAN communication bus.	Check continuity and insulation of CAN bus arriving at EBS ECU. Check EECU for proper connection and correct operation.	RISK OF LOCKING	Service
00639 09	Open–circuit or short–circuit on CAN communication bus.	Check continuity and insulation of CAN bus arriving at EBS ECU.	ABS DEFECT	Service
00789 01	LH front speed sensor air gap defect.	Check sensor air gap = 0.2 mm.	ABS DEFECT	Service
00789 02	Open–circuit or short–circuit on LH front speed sensor.	Check sensor resistance: 950 Ω < R < 1930 Ω	ABS DEFECT	Service
00789 07	Sensor air gap defect or LH front roadwheel toothed wheel defect.	Check sensor air gap = 0.2 mm Check toothed wheel (buckle, state of teeth). Buckle < 0.3 mm.	ABS DEFECT	Service
00789 08	LH front speed sensor signal loss while moving or ABS regulation defect.	Check sensor resistance: 950 Ω < R < 1930 Ω Check toothed wheel (buckle, state of teeth). Check for absence of residual pressure and mechanical seizing in cylinders.	ABS DEFECT	Service
00789 10	ABS regulation defect on LH front roadwheel.	Check sensor resistance: 950 Ω < R < 1930 Ω Check toothed wheel (buckle, state of teeth). Buckle < 0.3 mm.	ABS DEFECT	Service
00789 13	Wheel size incompatible (deviation > 30%).	Check tyre fitment. Run vehicle for a few kilometres. If defect persists, change tyre size.	ABS DEFECT	Service
00790 01	RH front speed sensor air gap defect.	Check sensor air gap = 0.2 mm.	ABS DEFECT	Service
00790 02	Open–circuit or short–circuit on RH front speed sensor.	Check sensor resistance: 950 Ω < R < 1930 Ω	ABS DEFECT	Service

DEFECT CODE N°	DEFECT TYPE	REPAIR RECOMMENDATION	INDICATION	TEST LIGHT
00790 07	Sensor air gap defect or RH front roadwheel toothed wheel defect.	Check sensor air gap = 0.2 mm Check toothed wheel (buckle, state of teeth). Buckle < 0.3 mm.	ABS DEFECT	Service
00790 08	RH front speed sensor signal loss while moving or ABS regulation defect.	Check sensor resistance: 950 Ω < R < 1930 Ω Check toothed wheel (buckle, state of teeth). Check for absence of residual pressure and mechanical seizing in cylinders .	ABS DEFECT	Service
00790 10	ABS regulation defect on RH front roadwheel.	Check sensor resistance: 950 Ω < R < 1930 Ω Check toothed wheel (buckle, state of teeth). Buckle < 0.3 mm.	ABS DEFECT	Service
00790 13	Wheel size incompatible (deviation > 30%).	Check tyre fitment. Run vehicle for a few kilometres. If defect persists, change tyre size.	ABS DEFECT	Service
00791 01	LH rear speed sensor air gap defect.	Check sensor air gap = 0.2 mm	ABS DEFECT	Service
00791 02	Open–circuit or short–circuit on LH rear speed sensor.	Check sensor resistance: 950 Ω < R < 1930 Ω	ABS DEFECT	Service
00791 07	Sensor air gap defect or LH rear roadwheel toothed wheel defect.	Check sensor air gap = 0.2 mm. Check toothed wheel (buckle, state of teeth). Buckle < 0.3 mm.	ABS DEFECT	Service
00791 08	LH rear speed sensor signal loss while moving or ABS regulation defect.	Check sensor resistance: 950 Ω < R < 1930 Ω Check toothed wheel (buckle, state of teeth). Buckle < 0.3 mm.	ABS DEFECT	Service
00791 10	ABS regulation defect on LH rear roadwheel.	Check sensor resistance: 950 Ω < R < 1930 Ω Check toothed wheel (buckle, state of teeth). Buckle < 0.3 mm.	ABS DEFECT	Service
00791 13	Wheel size incompatible (deviation > 30%).	Check tyre fitment. Run vehicle for a few kilometres. If defect persists, change tyre size.	ABS DEFECT	Service
00792 01	RH rear speed sensor air gap defect.	Check sensor air gap = 0.2 mm.	ABS DEFECT	Service
00792 02	Open–circuit or short–circuit on RH rear speed sensor.	Check sensor resistance: 950 Ω < R < 1930 Ω	ABS DEFECT	Service

DEFECT CODE N°	DEFECT TYPE	REPAIR RECOMMENDATION	INDICATION	TEST LIGHT
00792 07	Sensor air gap defect or RH rear roadwheel toothed wheel defect.	Check sensor air gap = 0.2 mm. Check toothed wheel (buckle, state of teeth). Buckle < 0.3 mm.	ABS DEFECT	Service
00792 08	RH rear speed sensor signal loss while moving or ABS regulation defect.	Check sensor resistance: 950 Ω < R < 1930 Ω Check toothed wheel (buckle, state of teeth). Check for absence of residual pressure and mechanical seizing in cylinders.	ABS DEFECT	Service
00792 10	ABS regulation defect on RH rear roadwheel.	Check sensor resistance: 950 Ω < R < 1930 Ω Check toothed wheel (buckle, state of teeth). Buckle < 0.3 mm.	ABS DEFECT	Service
00792 13	Wheel size incompatible (deviation > 30%).	Check tyre fitment. Run vehicle for a few kilometres. If defect persists, change tyre size.	ABS DEFECT	Service
00793 01	LH seed sensor air gap defect on extra axle. RH/LH speed sensors inconsistency.	Check sensor air gap = 0.2 mm.	ABS DEFECT	Service
00793 02	Open–circuit or short–circuit on extra axle LH speed sensor.	Check sensor resistance: 950 Ω < R < 1930 Ω	ABS DEFECT	Service
00793 07	Sensor air gap defect or extra axle LH toothed wheel defect.	Check sensor air gap = 0.2 mm Check toothed wheel (buckle, state of teeth). Buckle < 0.3 mm.	ABS DEFECT	Service
00793 08	Extra axle LH speed sensor signal loss while moving or ABS regulation defect.	Check sensor resistance: 950 Ω < R < 1930 Ω Check toothed wheel (buckle, state of teeth). Check for absence of residual pressure and mechanical seizing in cylinders.	ABS DEFECT	Service
00793 10	Extra axle ABS regulation defect on LH roadwheel.	Check sensor resistance: 950 Ω < R < 1930 Ω Check toothed wheel (buckle, state of teeth). Buckle < 0.3 mm.	ABS DEFECT	Service
00793 13	Wheel size incompatible (deviation > 30%).	Check tyre fitment. Run vehicle for a few kilometres. If defect persists, change tyre size.	ABS DEFECT	Service
00794 01	RH speed sensor air gap defect on extra axle. RH/LH speed sensors inconsistency.	Check sensor air gap = 0.2 mm	ABS DEFECT	Service

DEFECT CODE N°	DEFECT TYPE	REPAIR RECOMMENDATION	INDICATION	TEST LIGHT
00794 02	Open–circuit or short–circuit on extra axle RH speed sensor.	Check sensor resistance: 950 Ω < R < 1930 Ω	ABS DEFECT	Service
00794 07	Sensor air gap defect or extra axle RH toothed wheel defect.	Check sensor air gap = 0.2 mm. Check toothed wheel (buckle, state of teeth). Buckle < 0.3 mm.	ABS DEFECT	Service
00794 08	Extra axle RH speed sensor signal loss while moving or ABS regulation defect.	Check sensor resistance: 950 Ω < R < 1930 Ω Check toothed wheel (buckle, state of teeth). Check for absence of residual pressure and mechanical seizing in cylinders.	ABS DEFECT	Service
00794 10	Extra axle ABS regulation defect on RH roadwheel.	Check sensor resistance: 950 Ω < R < 1930 Ω Check toothed wheel (buckle, state of teeth). Buckle < 0.3 mm.	ABS DEFECT	Service
00794 13	Wheel size incompatible (deviation > 30%).	Check tyre fitment. Run vehicle for a few kilometres. If defect persists, change tyre size.	ABS DEFECT	Service
00795 12	Front circuit pneumatic defect or EBS front module internal defect.	Check for leaks at module inputs and outputs. Check pipes for absence of obstruction and crushing. Check valve and module exhaust using DIAGNOSTICA. Check min. air pressure switches.	ABS DEFECT	Service
00796 12	Front circuit pneumatic defect or EBS front module internal defect.	Check for leaks at module inputs and outputs. Check pipes for absence of obstruction and crushing. Check valve and module exhaust using DIAGNOSTICA. Check min. air pressure switches.	ABS DEFECT	Service
00797 12	Front circuit pneumatic defect or EBS rear module internal defect.	Check for leaks at module inputs and outputs. Check pipes for absence of obstruction and crushing. Check valve and module exhaust using DIAGNOSTICA. Check min. air pressure switches.	DANGER OF LOCKING	STOP
00798 12	Front circuit pneumatic defect or EBS rear module internal defect.	Check for leaks at module inputs and outputs. Check pipes for absence of obstruction and crushing. Check valve and module exhaust using DIAGNOSTICA. Check min. air pressure switches.	DANGER OF LOCKING	STOP

DEFECT CODE N°	DEFECT TYPE	REPAIR RECOMMENDATION	INDICATION	TEST LIGHT
00799 12	Extra axle circuit pneumatic defect or extra axle EBS internal defect.	Check for module input and output leaks. Check pipes for absence of obstruction and crushing. Check valve and module exhaust using DIAGNOSTICA. Check min. air pressure switches.	ABS DEFECT	Service
00800 12	Extra axle circuit pneumatic defect or extra axle EBS internal defect.	Check for module input and output leaks. Check pipes for absence of obstruction and crushing. Check valve and module exhaust using DIAGNOSTICA. Check min. air pressure switches.	ABS DEFECT	Service
00802 02	Short–circuit on one or several EBS ECU power outputs.	Check wiring harnesses between ECU and modules. If defect persists, change EBS ECU.	DANGER OF LOCKING	STOP
00810 07	Present speed sensor defect when ignition last switched on. **Defect not memorized**	Need to run at more than 20 km/h. The defect disappears if the speed sensor problem has been resolved.	TEST RUN!	Service
01042 07	Defect on 7–pin trailer socket. **Defect not memorized**	Check 7–pin trailer socket and wiring.	TRAILER DEFECT	Service
01043 02	5V power supply defect on service brake valve. Short–circuit on sensor power supply.	Check that voltage between ECU terminals X2/2 and X2/3 is: 4.5V < U < 5.5V. Disconnect valve and check its resistance: 3,2 kΩ < R < 7,5 kΩ between terminals 1 and 2; 2,1 kΩ < R < 5,4 kΩ between terminals 1 and 3. Check wiring harnesses and connectors.	DANGER OF LOCKING	STOP
01047 02	Front circuit pneumatic defect or module internal defect.	Check for leaks at module inputs and outputs. Check pipes for absence of obstruction and crushing. Check valve and module exhaust using DIAGNOSTICA. Check min. air pressure switches.	ABS DEFECT	Service
01047 07	Front circuit pneumatic defect or front module internal defect.	Check for leaks at module inputs and outputs. Check pipes for absence of obstruction and crushing. Check valve and module exhaust using DIAGNOSTICA. Check min. air pressure switches.	ABS DEFECT	Service

DEFECT CODE N°	DEFECT TYPE	REPAIR RECOMMENDATION	INDICATION	TEST LIGHT
01047 09	Communication defect between front module and EBS ECU (internal CAN bus).	Check continuity and insulation of the 4 wires between ECU and front module. Check EBS ECU power supply (X1/7, X1/8, X1/12) and module power supply by ECU (X3/2, X3/11) and fuses relative to EBS.	ABS DEFECT	Service
01047 12	Front module internal defect.	Erase the defect. If the defect persists, change the front module.	ABS DEFECT	Service
01047 13	Incompatibility between front module and EBS ECU.	Check ECU and module reference numbers. Change, if necessary.	ABS DEFECT	Service
01048 07	Front circuit pneumatic defect or front module internal defect.	Check for leaks at module inputs and outputs. Check pipes for absence of obstruction and crushing. Check valve and module exhaust using DIAGNOSTICA. Check min. air pressure switches.	IMMEDIATE HALT	STOP
01050 02	Rear circuit pneumatic defect or rear module internal defect.	Check for leaks at module inputs and outputs. Check pipes for absence of obstruction and crushing. Check valve and module exhaust using DIAGNOSTICA. Check min. air pressure switches.	DANGER OF LOCKING	STOP
01050 07	Rear circuit pneumatic defect or rear module internal defect.	Check for leaks at module inputs and outputs. Check pipes for absence of obstruction and crushing. Check valve and module exhaust using DIAGNOSTICA. Check min. air pressure switches.	DANGER OF LOCKING	STOP
01050 09	Communication defect between rear module and EBS ECU (internal CAN bus).	Check continuity and insulation of the 4 wires between ECU and front module. Check EBS ECU power supply (X1/7, X1/8, X1/12) and module power supply by ECU (X3/2, X3/11) and fuses relative to EBS.	DANGER OF LOCKING	STOP
01050 12	Rear module internal defect.	Erase the defect. If the defect persists, change the rear module.	DANGER OF LOCKING	STOP
01050 13	Incompatibility between rear module and EBS ECU.	Check ECU and module reference numbers.Change, if necessary.	DANGER OF LOCKING	STOP

DEFECT CODE N°	DEFECT TYPE	REPAIR RECOMMENDATION	INDICATION	TEST LIGHT
01051 07	Front circuit pneumatic defect or EBS rear module internal defect.	Check for leaks at module inputs and outputs. Check pipes for absence of obstruction and crushing. Check valve and module exhaust using DIAGNOSTICA. Check min. air pressure switches.	IMMEDIATE HALT	STOP
01053 02	Extra axle circuit pneumatic defect or extra axle EBS internal defect.	Check for module input and output leaks. Check pipes for absence of obstruction and crushing. Check valve and module exhaust using DIAGNOSTICA. Check min. air pressure switches.	ABS DEFECT	Service
01053 07	Extra axle circuit pneumatic defect or extra axle EBS internal defect.	Check for module input and output leaks. Check pipes for absence of obstruction and crushing. Check valve and module exhaust using DIAGNOSTICA. Check min. air pressure switches.	ABS DEFECT	Service
01053 09	Communication defect between extra axle module and EBS ECU (internal CAN bus).	Check continuity and insulation of the 4 wires between ECU and front module. Check EBS ECU power supply (X1/7, X1/8, X1/12) and module power supply by ECU (X4/2, X4/14) and fuses relative to EBS.	ABS DEFECT	Service
01053 12	Extra axle module internal defect.	Erase the defect. If the defect persists, change the rear module.	ABS DEFECT	Service
01053 13	Incompatibility between extra axle module and EBS ECU.	Check ECU and module reference numbers. Change, if necessary.	ABS DEFECT	Service
01054 07	Extra axle circuit pneumatic defect or EBS rear module internal defect.	Check for module input and output leaks. Check pipes for absence of obstruction and crushing. Check valve and module exhaust using DIAGNOSTICA. Check min. air pressure switches.	IMMEDIATE HALT	STOP
01056 07	Trailer control valve pneumatic defect or parking brake circuit defect.	Check air supply pressure, min. pressure switches and trailer control valve compressed air circuit. Check parking brake. Erase the defect. If the defect persists, change the trailer control module.	TRAILER DEFECT	Service

DEFECT CODE N°	DEFECT TYPE	REPAIR RECOMMENDATION	INDICATION	TEST LIGHT
01056 09	Trailer control module internal defect or com–munication defect between trailer control valve and EBS ECU.	Check continuity and insulation of the 4 wires between ECU and front module. Check EBS ECU power supply (X1/7, X1/8, X1/12) and trailer control valve power supply by ECU (X3/3, X3/2) and fuses relative to EBS.	TRAILER DEFECT	Service
01056 11	Incompatibility between trailer control valve and EBS ECU.	Erase the defect. If the defect persists, change the trailer control valve.	TRAILER DEFECT	Service
01056 12	Trailer control valve internal defect.	Write parameter definitions. Erase the defect. If the defect persists, replace the ECU.	TRAILER DEFECT	Service
01056 13	Trailer control valve internal defect.	Erase the defect. If the defect persists, replace the ECU.	TRAILER DEFECT	Service
01056 16	Trailer control valve internal defect.	Erase the defect. If the defect persists, change the rear module.	TRAILER DEFECT	Service
01057 07	Trailer compressed air supply problem. **Defect not memorized**	Check trailer air supply circuit.	TRAILER DANGER	STOP
01058 07	Trailer control valve pneumatic defect.	Check air supply pressure, min. pressure switches and trailer control valve pneumatic circuit. Erase the defect. If the defect persists, change the trailer control valve.	TRAILER DEFECT	Service
01059 02	Open–circuit or short–circuit on load sensor signal. Short–circuit to load sensor power supply earth.	Check continuity and insulation of the load sensor wiring harness. Check load sensor characteristics: 4,0 kΩ < R < 6,0 kΩ between terminals 1. 2,2 kΩ < R < 8,4 kΩ between terminals 2 and 3	RISK OF LOCKING	Service
01060 02	LH front wear sensor signal defect or RH/LH wear deviation too great.	Check continuity and insulation of front wear sensors wiring harness. Check sensor characteristics: see check page F9. Check brakes assembly.	WORKSHOP HALT	Service
01060 12	Short–circuit to earth on RH or LH front axle wear sensors power supply.	Check continuity and insulation of front wear sensors wiring harness. Check sensor characteristics: see check page F9.	WORKSHOP HALT	Service
01061 02	RH front wear sensor signal defect.	Check continuity and insulation of front wear sensors wiring harness. Check sensor characteristics: see check page F9.	WORKSHOP HALT	Service

DEFECT CODE N°	DEFECT TYPE	REPAIR RECOMMENDATION	INDICATION	TEST LIGHT
01062 02	LH rear wear sensor signal defect or RH/LH wear deviation too great.	Check continuity and insulation of wear sensor wiring harness. Check sensor characteristics: see check page F9. Check brakes assembly.	WORKSHOP HALT	Service
01062 12	Short–circuit to earth on LH rear wear sensors power supply.	Check continuity and insulation of wear sensors wiring harness. Check sensor characteristics: see check page F9.	WORKSHOP HALT	Service
01063 02	RH rear wear sensor signal defect.	Check continuity and insulation of wear sensors wiring harness. Check sensor characteristics: see check page F9.	WORKSHOP HALT	Service
01063 12	Short–circuit to earth on RH rear wear sensors power supply.	Check continuity and insulation of wear sensors wiring harness. Check sensor characteristics: see check page F9.	WORKSHOP HALT	Service
01064 02	3rd axle LH wear signal defect or 3rd axle RH/LH wear deviation too great.	Check continuity and insulation of wear sensor wiring harness. Check sensor characteristics: see check page F9. Check brakes assembly.	WORKSHOP HALT	Service
01064 12	Short–circuit to earth on 3rd axle RH or LH wear sensors power supply.	Check continuity and insulation of wear sensors wiring harness. Check sensor characteristics: see check page F9.	WORKSHOP HALT	Service
01065 02	3rd axle RH wear sensor signal defect.	Check continuity and insulation of wear sensor wiring harness. Check sensor characteristics: see check page F9.	WORKSHOP HALT	Service
01066 02	Open–circuit or short–circuit on one of the two brake valve signals.	Check continuity and insulation of wiring harness. Check valve characteristics between pins 1 and 4: R = 2,5 kΩ	DANGER OF LOCKING	STOP
01069 13	EBS ECU internal defect.	Erase the defect. If the defect persists, replace the EBS ECU.	ABS DEFECT	Service
01624 09	CAN bus link with tachograph problem.	Check continuity and insulation of CAN bus arriving at EBS ECU. Check tachograph ECU for proper connection and correct operation.	ABS DEFECT	Service

NOTE:
To erase memorized defects, the "DIAGNOSTICA" tool is essential.

TESTING – DIAGNOSTICS

Use of the RENAULT V.I. diagnostics tool "DIAGNOSTICA"

The use of this tool makes for very easy diagnostic testing and its use is strongly advised.
Besides this, it is indispensable for erasing memorized defect.

Possible functions:

1) Present defects
   - component
   - defect
   - remedies
2) Memorized defects
   - component
   - defect
   - remedies
   - erasure.

The logic of the EBS braking system diagnostics is identical to that of the diagnostics of other electronic systems:
- Read–out of memorized defects (see "aid–to–diagnostics" volume).
- Testing inputs (warning lights, relays, min. pressure switches, speed sensors, load sensor and brake valve).
- Testing modules.

Testing the min. pressure switches:

Aim : To check correct operation of min. pressure switches, warning light A1 and check that the electronic control unit (ECU) correctly receives minimum pressure information.

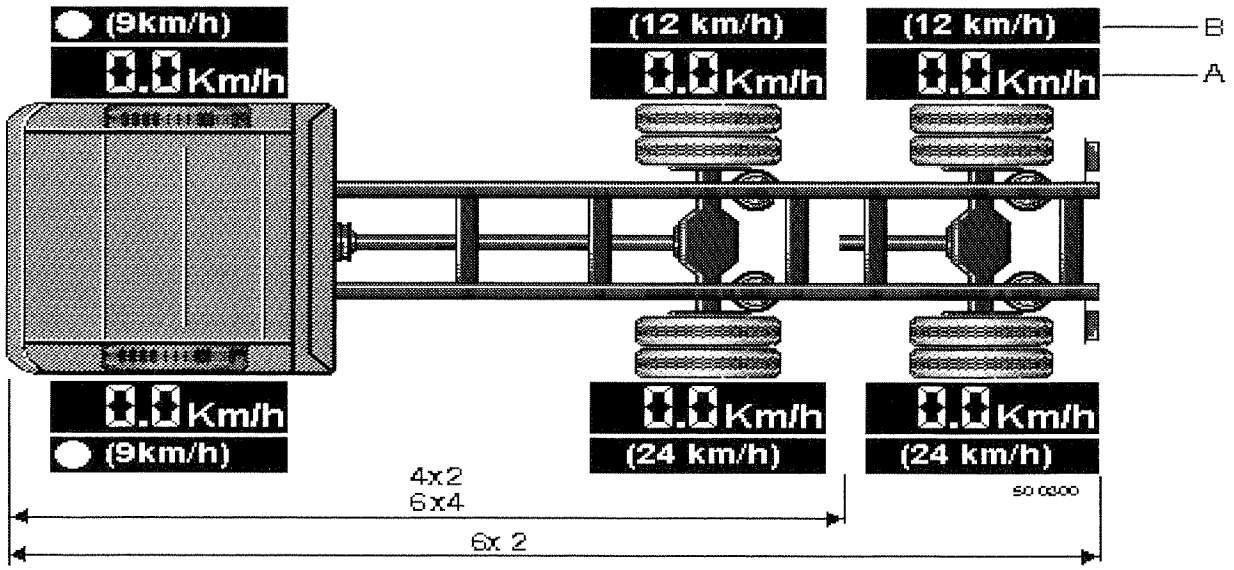
Conditions prior to diagnostics:
Ignition switched on.
Compressed air system at cut–in pressure.
Parking brake applied.
Batteries charged.

Diagnostics using DIAGNOSTICA:
Install yourself together with Diagnostica in the cab.
Check that:
– Warning lights G6 and STOP are illuminated on the instrument panel and on DIAGNOSTICA.
– The min. pressure contacts are in the "open" position on the diagnostics tool.
Drain the trailer air tank by means of the inflation valve.
Check that:
– Warning lights G6 and STOP are extinguished on the instrument panel and on DIAGNOSTICA.
– The min. pressure switch contacts are in the "closed" position on the diagnostics tool.

Testing the speed sensors:

Aim: To check speed information, correct connection of sensors (inversion) and the air gap.

The DIAGNOSTICA screen gives two types of information:
A – The actual roadwheels speed.
B – An estimated air gap value.
This value is updated whenever the program is accessed.
It is accompanied by a green dot (value strictly below 11 km/h) which means that the air gap is all right. A red dot means that the air gap is incorrect (value greater than or equal to 11 km/h).



Conditions prior to diagnostics:
Ignition switched on.
Vehicle immobilized (wheel chocks in position).
Compressed air system at cut–in pressure.
Batteries charged.

Diagnostics on the air gaps:
Check that all the dots are green.

Diagnostics on the speed information:
There are two ways of testing the speed sensors:
- Diagnostics using DIAGNOSTICA and a jack.
- Diagnostics using DIAGNOSTICA and a brake–testing bench.

Diagnostics using DIAGNOSTICA and a jack:
Raise a roadwheel using a jack.
Rotate the wheel by hand.
Check that the speed displayed by DIAGNOSTICA corresponds to the wheel you are turning (if you are turning the LH front roadwheel, DIAGNOSTICA should display the LH front wheel speed).
Repeat the same operation on the diagonally opposed roadwheel.

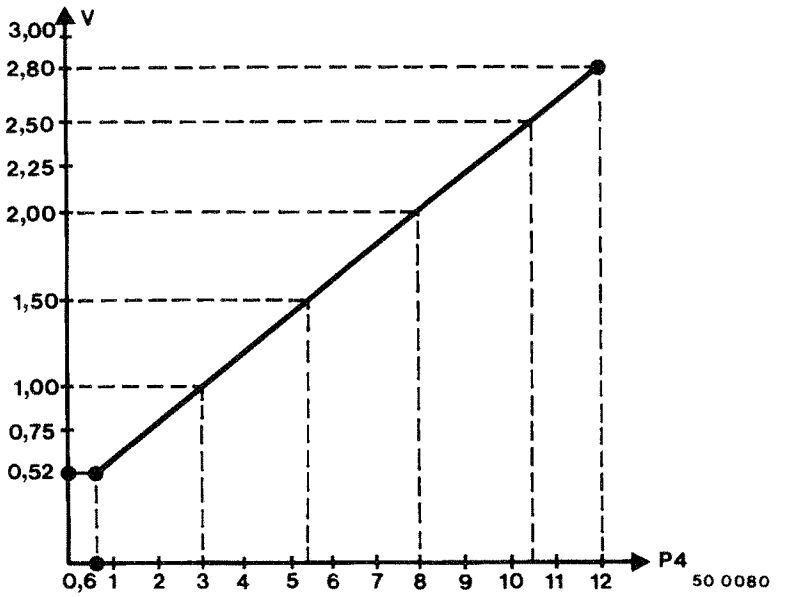
Diagnostics using DIAGNOSTICA and a brake–testing bench:
Place the wheels of the front axle of the vehicle on the brake–testing bench rollers.
Stop one of the two rollers and check that the speed read–out on DIAGNOSTICA corresponds precisely to the wheel that is rotating.
Repeat the same operation on the diagonally opposed roadwheel.

Testing the "EBS" rear drive axle load sensor:

Aim: To check the state of loading of the vehicle and correct connection of the sensor.

Conditions prior to diagnostics:
Vehicle laden.
Ignition switched on.
Compressed air system at cut–in pressure.
Batteries charged.

Diagnostics using DIAGNOSTICA and pressure gauges:
Connect a pressure gauge to each pressure take–off (located on the suspension ECAS electrovalve) giving the pressure to the rear axle air springs.
Compare the information given by DIAGNOSTICA with that on the pressure gauges, using the voltage / pressure equivalence table supplied below.



IMPORTANT
To determine the voltage / pressure equivalence, it is essential to take the highest pressure shown on the two pressure gauges (cause: double check valve at sensor).

To eliminate electrical inversions, check that when the pressure drops in the air springs the voltage drops on the DIAGNOSTICA unit.
Method:
Raise the vehicle suspension to the "up" position with the suspension remote control. Read the sensor voltage value given by DIAGNOSTICA. Lower the suspension with the remote control and check that the voltage drops on DIAGNOSTICA.

Testing the brake valve:

Aim: To check correct operation of the brake valve (electrical information, pneumatic offset and self–regulation).

Conditions prior to diagnostics:
Ignition switched on.
Compressed air system at cut–in pressure.
Batteries charged.

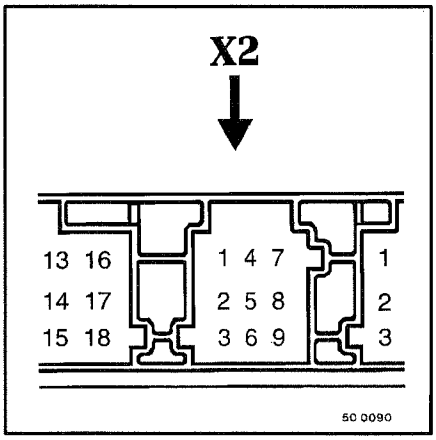
Diagnostics using DIAGNOSTICA, pressure gauges and a voltmeter:
Connect a pressure gauge to each pressure take–off P1 (brake valve output / front module input) and P1.1 (brake valve output / rear axle module input).

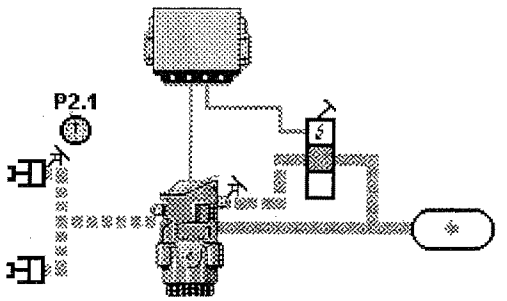
Open the DIAGNOSTICA "**Check pressures**" menu:

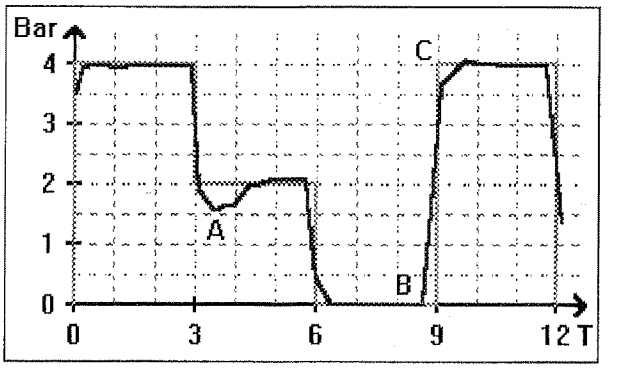
1 – Check the pneumatic offset of the valve:
Select the safeguard circuit mode on DIAGNOSTICA.
Progressively depress the brake pedal so as to obtain at P1: **2 bars** (on DIAGNOSTICA and on the pressure gauge).
Check that the pressure is in the region of **1.4 bars** at P1.1 (on DIAGNOSTICA and on the pressure gauge).

2 – Check self–regulation of the valve (compressed air system at cut–in pressure):
Select the safeguard circuit mode on DIAGNOSTICA.
Progressively depress the brake pedal as far as maximum braking.
Check that the pressure at points P1 and P1.1 is higher than **8 bars** (on DIAGNOSTICA and on the pressure gauge).

3 – Check the electrical information of the valve:
Connect a voltmeter to pins 3 and 7 of connector X2 of the ECU (be careful not to disconnect the ECU connector).
Switch on the ignition.
Progressively depress the brake pedal.
Check during this action that the change in voltage is roughly identical between DIAGNOSTICA and the voltmeter.
Progressively release the brake pedal and check the drop in voltage on the two tools.







50 0091

Testing the front module:

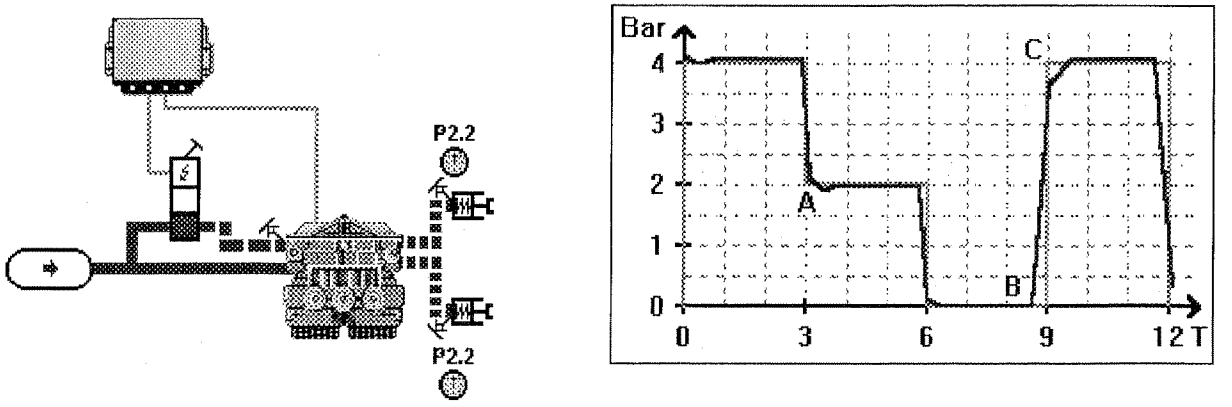
Aim: To test the different functions of the front module (EBS mode and safeguard mode).

Conditions prior to diagnostics:
Ignition switched on.
Compressed air system at cut–in pressure.
Batteries charged.
Vehicle immobilized (wheel chocks).
Parking brake in the "road" position.

Diagnostics on the EBS mode using DIAGNOSTICA and pressure gauges:
Connect a pressure gauge to pressure take–off P2.1 (front brake chamber).
Run the DIAGNOSTICA cycle on the front module.
Check that the cycle achieved by DIAGNOSTICA (blue curve) and by the pressure gauge is identical to the set–point demanded (green curve on the screen).

The DIAGNOSTICA and pressure gauge cycles may differ a little from the set–point demanded (hysterisis of the valves).
Explanation of points A, B, C:
A – Module relay valve closing time.
B – Information on pressure build–up to 4 bars is given before 9 seconds have elapsed.
C – Data acquisition time needed by DIAGNOSTICA.

Diagnostics on the safeguard mode using DIAGNOSTICA and pressure gauges
Connect a pressure gauge to each pressure take–off P1 (brake valve output / front axle module input) and P2.1 (front cylinder).
Progressively depress the brake pedal.
Check that the change in pressures is roughly identical on the pressure gauges and on the DIAGNOSTICA screen.



50 0092

Testing the rear module:

Aim : To test the different functions of the rear module (EBS mode and safeguard mode) and correct pneumatic connection.

Conditions prior to diagnostics:
Ignition switched on.
Compressed air system at cut–in pressure.
Batteries charged.

Diagnostics of EBS mode using DIAGNOSTICA and pressure gauges:
Connect the pressure gauges to the LH and RH pressure take–offs P2.2.
Launch DIAGNOSTICA cycle 1 on the LH rear module.
Check that the cycle run by DIAGNOSTICA (blue curve) and by the pressure gauge (connected to LH pressure take–off P.2.2) is identical to the demanded set–points (green curve on screen).
During the entire cycle, the pressure gauge connected to P2.2 should not move.
Repeat the similar operation in cycle 2.
Cycle 1: Rear module LH channel
Cycle 2: Rear module RH channel

The DIAGNOSTICA and pressure gauge cycle may differ a little from the demanded set–points (valves hysterisis).
Explanation of points A, B, C:
A – Module relay valve closing time.
B – Information on pressure build–up to 4 bars is given before 9 seconds have elapsed.
C – Data acquisition time needed by DIAGNOSTICA.

Diagnostics on the safeguard mode using DIAGNOSTICA and pressure gauges:
The DIAGNOSTICA and pressure gauge cycles may differ a little from the set–point demanded (hysterisis of the valves).
Connect a pressure gauge to each pressure take–off P1 (brake valve output / rear axle module input) P2.2 left and P2.2 right.
Progressively depress the brake pedal.
Check that the change in pressures is roughly identical on the pressure gauges and on the DIAGNOSTICA screen.

NOTE :
The diagnostics safeguard mode is different from the actual safeguard mode: the pressure sensor integrated in the module remains in operation.

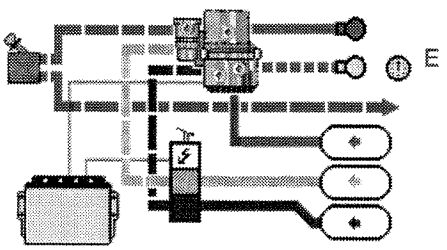
Testing the trailer control valve:

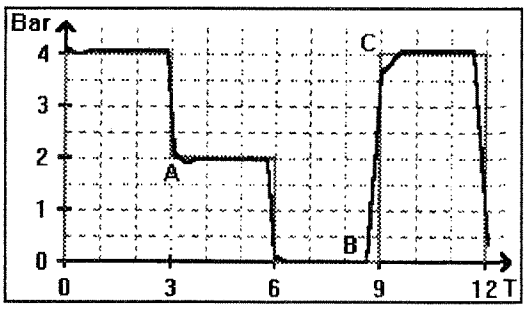
Aim : To check the different trailer control module functions (**EBS** mode and safeguard mode and correct pneumatic connection.

After a teach–in phase, the system determines the correction to be made to optimize harmonization of tractor / trailer braking.

The max. correction value is **1.5 bars**.

NOTE:
The CFCS system is inactive for speeds < 15 km/h.
The result obtained upon check–out on a brake–testing bench is without effective correction.





Conditions prior to diagnostics:
Ignition switched on.
Compressed air system at cut–in pressure.
Batteries charged.
Vehicle immobilized (wheel chocks in position).
Parking brake in the "road" position.

Diagnostics on the EBS mode using DIAGNOSTICA and pressure gauges:
Connect a pressure gauge to each pressure take–off **E**.
Run the DIAGNOSTICA cycle on the trailer control valve.
Progressively depress the brake pedal.
Check that the cycle achieved by DIAGNOSTICA (blue curve) and by the pressure gauge is identical to the set–point demanded (green curve on the screen).
The DIAGNOSTICA and pressure gauge cycles may differ a little from the set–point demanded (hysterisis of the valves).

Explanation of points A, B, C:
A – Module relay valve closing time.
B – Information on pressure build–up to 4 bars is given before 9 seconds have elapsed.
C – Data acquisition time needed by DIAGNOSTICA.

Diagnostics on the safeguard mode using DIAGNOSTICA and pressure gauges
Connect a pressure gauge to pressure take–offs **P1** and **E**.
Progressively depress the brake pedal.
Check that the change in pressures is roughly identical on the pressure gauges and on the DIAGNOSTICA screen.

Check that the parking brake is in the "PARK" position.

Testing the parking brake start of application pressure switch:

Aim: To test correct operation of the parking brake 'start of application' pressure switch and to check that the ECU receives the information correctly.

Conditions prior to diagnostics:
Ignition switched on.
Compressed air system at cut–in pressure.
Batteries charged.
Vehicle immobilized (wheel chocks).
Parking brake in the "road" position.

Diagnostics using DIAGNOSTICA and pressure gauges:
Connect a pressure gauge to pressure take–off **P2.ST**.
Actuate the parking brake valve.
Check that the pressure switch closes at a pressure of 6 bars on DIAGNOSTICA and on the pressure gauge.

Checking the wear sensor (CWS):

Aim: To check correct operation of the sensors and that the EBS front and rear modules receive the correct information.

Conditions prior to diagnostics:
Ignition switched on.
Compressed air system at cut–in pressure.
Batteries charged.

Procedure:
Dismantle the CWS from the brake (securing screws ∅ 8)
Leave the end opposite the connector free so as not to drive the rod into the sensor.
Measure the resistances between the different connector terminals connected to wires of yellow, red and green colour and compare them with the values below.

Terminal pairs measured	Acceptable resistance intervals
White and Red	5 MΩ < R < 8,5 MΩ
Red and Yellow	5 MΩ < R < 8,5 MΩ
White and Yellow	600 Ω < R < 1000 Ω

IMPORTANT
When taking measurements, use a **digital multimeter** and not a multimeter with analogue display.
An analogue multimeter falsifies the readings.

If the resistance readings made lie within the above intervals, the CWS system is in good condition.
If not, it must be replaced. If the sensor is in good condition, put it back into place in its housing in the brake.
Tighten the ∅ 8 mm securing setscrews at a torque of between 20 and 30 Nm.

The DIAGNOSTICA screen indicates for each roadwheel the percentage of wear of the disc / pad assembly with an accuracy of ± 10%.

PARAMETER DEFINITION – CALIBRATION

Defining the ECU parameters:

Defining parameters allows the ECU to memorize the parameters defined for correct operation of the "EBS" braking system.

This operation must be performed without fail after:

- replacement of the "EBS" ECU
- modifying the vehicle make–up (change of type of retarder. change of final driveÉ)
- modification to after–sales settings
- change of tyre characteristics (changeover to a different "SET"):

Definition of a tyre set:

Set n° **1** = 0.448 m < Tyre radius < 0.485 m
Set n° **2** = 0.484 m < Tyre radius < 0.522 m
Set n° **3** = 0.521 m < Tyre radius < 0.546 m

Size = front / rear:

Set n° **1** : 275/70 R22.5 or 295/60 R22.5 or 305/60 R22.5 or 315/60 R22.5
Set n° **2** : 275/80 R22.5 or 295/80 R22.5 or 305/70 R22.5 or 315/70 R22.5
Set n° **3** : 315/80 R22.5 or 12 R22.5

Size – front / rear:

Set n° **1** : 315–295/60 R22.5
Set n° **3** : 315–295/80 R22.5

Management of parameters:

One of the jobs of the VECU box is to store information for the EBS function.

After–sales parameter definition:

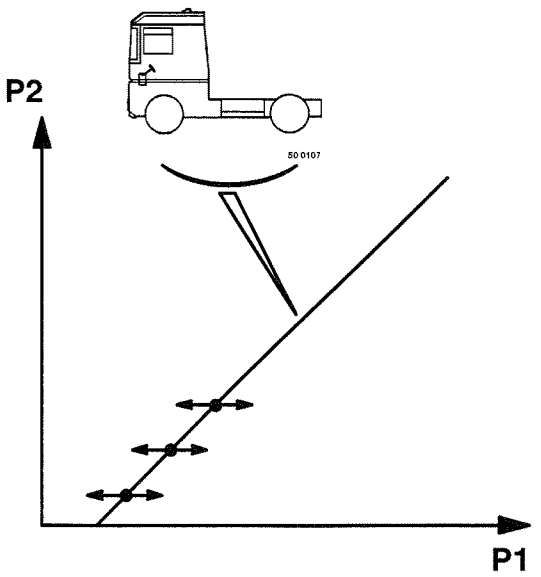
There are two kinds of parameters:

- Works parameters:
  - Vehicle definition.
  - Braking strategy definition.

- After–sales parameters:
  - Capability of adjusting the **tractor / trailer** braking.

Braking distribution

Tractor / Trailer



3 adjusting points

IMPORTANT

Prior to any modification to parameters, a full diagnostics must be conducted on the road combination:

Preliminary visual checks

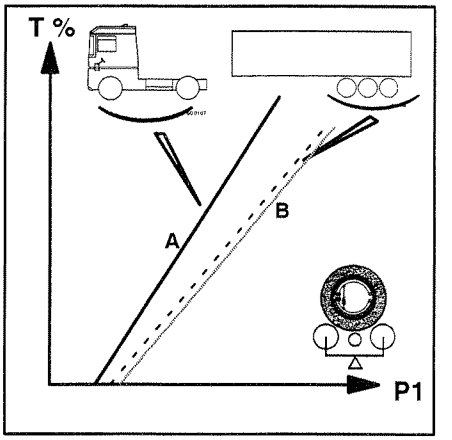
▼

Energy reserve checks

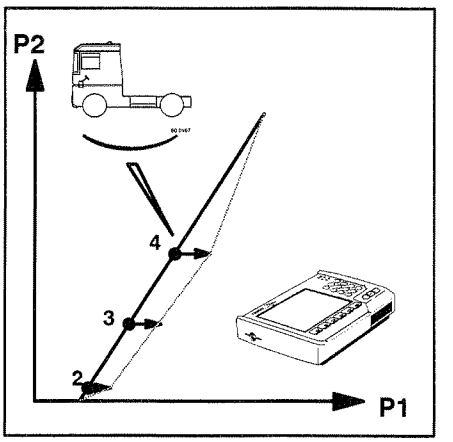
Pressure gauges method — *Brake–testing bench*

All parameter modifications are memorized in the ECU as well as the DIAGNOSTICA number used for this operation.

Modification to tractor / trailer braking distribution:

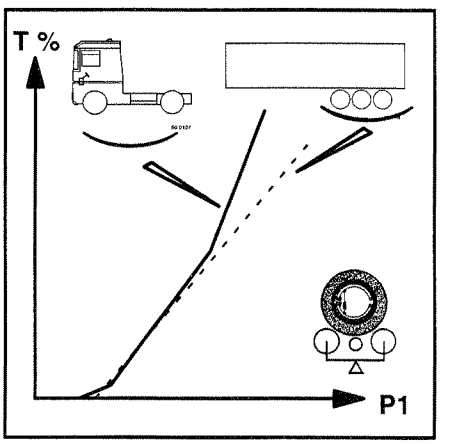


1 – Result obtained on brake–testing bench or by using the pressure gauges method prior to intervention:
Analysis:
– The tractor / trailer braking distribution is incorrect. The tractor has more braking than the trailer.
Action :
–The tractor curve must be placed behind that of the trailer (move the tractor curve **A** to curve **B**). For a same value of **P2**, the value of **P1** must be increased.



2 – The DIAGNOSTICA tool allows 3 points (2, 3, 4) to be modified on the tractor P1 / P2 pressure change curve:
P1 : Braking reference pressure (brake valve output / front module input).
P2 : Average of the pressures delivered to the tractor front and rear brake cylinders.

To modify the points:
– Open the parameter definition, after–sales adjustment and tractor / trailer braking distribution menu.
– Modify points (**2**, **3**, **4**) to offset the tractor **P2** pressure curve.



3 – Measure the vehicle again on the brake–testing bench or again employ the pressure gauges method to check the result of the after–sales parameters modification.
If the modification is not suitable, recommence as from phase 2.

After a teach–in phase, the system determines the correction to be made to optimize harmonization of tractor / trailer braking.

NOTE :
The CFCS system is inactive for speeds < 15 km/h.

Calibrating the brake valve:

Aim:
The brake valve is calibrated in order to achieve consistency between the signals of the electrical stage and the information from the first pneumatic stage of the brake valve.
Reminder: – The electrical stage informs the "EBS" ECU the braking demand from the driver.
The ECU applies the brakes of the vehicle equipped with EBS braking system (tractor, rigid).
– The first pneumatic stage sends information on braking demand from the driver for vehicles equipped with conventional braking system (trailer or semi–trailer).

When should calibration be carried out ?
– Whenever the brake valve is replaced.
– When the defect code N° 00630 13 appears on the instrument panel display.
– Whenever the "EBS" ECU is replaced.

Méthod :
Follow the instructions given by DIAGNOSTICA.

Risk if calibration is not performed
The signals from the electrical stage and from the pneumatic stage are no longer consistent.
There are two possible cases:
1 – The electrical stage anticipates in relation to the pneumatic stage:
Problem: The tractor anticipates over the trailer.
Consequence: Premature tractor brakes wear.
2 – The pneumatic stage anticipates over the electrical stage:.
Problem: The trailer anticipates over the tractor.
Consequence: Premature trailer brakes wear.

TOOLS

RENAULT V.I. divide tools into 3 categories :

- **General–purpose tools :** Commercially available tools.
  . **50 00 26 .... reference number** (possibility of purchasing through the Renault V.I. Spare Parts department).
  . **4–figure reference number** (tools with Renault V.I. reference number, but available from the supplier).

- **Special tools :** Specially created tools, distributed by the RENAULT V.I. spare parts division.

- **Locally manufactured tools :** these tools are classified differently according to their degree of sophistication :

  . **4–figure reference number** (represented by a drawing) : tools that are simple to make without need for special qualification.

  . **50 00 26 .... reference number** (possibility of purchasing through the Renault V.I. Spare Parts department) : a certain skill is needed to make these tools.

Three levels (or echelons) determine their assignment :

- **LEVEL1 :** Tools for servicing and minor tasks.

- **LEVEL 2 :** Tools for major repairs.

- **LEVEL 3 :** Tools for refurbishment.

General–purpose tools				
Ref. Renault V.I.	**Description**	**Category**	**Quantity**	**Page**
5000262423	Test case	1	1	C1 → C9 F1 → F9 G1 → G5
5000262464	Box RILLAX 2000	2	1	C1 → C9
5000262599	Box RILLAX 2000 or 135° endpieces	2	1	C1 → C9
5000267200	Diagnostica	1	1	F1 → F9 G1 → G5
5000267096	Flexible pipe	1	4	C1 → C9 F1 → F9 G1 → G5