

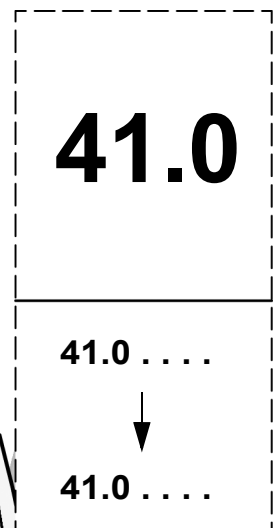
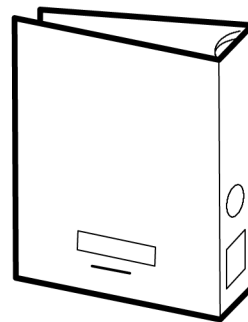
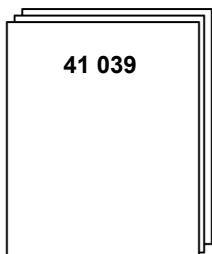
# 41 039 - GB - 06/2003

## STEERING

RANGE	FAMILY	VARIANT
KERAX	33DD P 8X4	51403/51405
	33CC P 8X4	
	33BB P 8X4	
	33AA P 8X4	
	33D P 8X4	51403/51405/12905
	33C P 8X4	
	33B P 8X4	
	33A P 8X4	51403/51405/12905/12910



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



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**GENERALITIES**

## Warnings

In this document, safety instructions are symbolized as follows:



**DANGER!** NON-OBSERVANCE OF THE PROCEDURE DESCRIBED OR LACK OF CARE OR ATTENTION, RISK CAUSING SERIOUS INJURY OR EVEN DEATH.



**WARNING!** Any different or inappropriate working method risks causing damage to the product.








**NOTE!** Draws attention to particular or important points of the method.













**Comply without fail with the regulations in force relative to the recovery and treatment of used parts and waste.**

## Conventional symbols









### Fitting

	Tighten to torque (Nm) (left-hand thread)		Tighten by indicated value
	Tighten to torque (Nm) (right-hand thread)		Loosen by indicated value
	Tightening torque with lubricated threaded hardware		










### Dimensioning

	Tightening		... Greater than or equal to ...
	Equal to		Wear limit
	... Less than ...		Machining limit or dimension
	... Greater than ...		Maximum out-of-true
	... Less than or equal to ...		Maximum parallelism error



















### Repair

	Force to be exerted in the direction shown (hammer - press)		Smear or coat (see "Consumables" table)
	Heat or cool: Temperature in degrees Celsius (e.g. + 80 °C)		Fill to level (see "Technical Data" and "Consumables" table)
	Weld bead		Grease or oil (see "Consumables" table)
	Repair time - Heating time		Mark - Assemble according to marking

**Adjustment**

	Rotating friction torque		Turn anti-clockwise
	Turn in alternate directions		Turn anti-clockwise (the figure shows the number of turns)
	Turn clockwise		Turn clockwise (the figure shows the number of turns)
	Place in contact		Move in the direction shown
	Dimension to be assured (mm)		

**Various information**

	Exhaust - Outlet		Operation with a sequence
	Intake - Inlet		Involves
	Weight in kg (example: 275 kg)		Return to numbered operation - Connected with numbered operation
	Depending on versions or options		Withdraw - Delete
	Wrong		Direction of disassembly (the arrow shows the direction)
	Correct		Direction of assembly (the arrow shows the direction)
	Injection		... to ...
	Repair dimension		Inspect - Check condition of part
	Part to be replaced		Danger for persons, vehicle or equipment

**TECHNICAL DATA**

## Tightening torques

There are several types of tightening:

- Tightening to torque (in **Nm**)
- Tightening to angle (en °)
- Tightening to torque-angle (en **Nm + °**)

Torques given in **Nm**. are nominal torques (average value calculated on the basis of the minimum torque and the maximum torque).

The tightening precision class defines the tolerance of this torque in percent as a function of the nominal torque applied.

### Tightening precision classes:

- **Class I:** Special threaded hardware (tolerances  $\pm 10\%$  of the final torque).
- **Class II:** Reserved for precise tightening (tolerance  $\pm 10\%$  of the nominal torque).
- **Class III: Reserved for normal standard tightening** (tolerance  $\pm 20\%$  of the nominal torque)

For standard threaded hardware indicated in the table below, use tightening **class III**.

For other torques, see the following page(s).



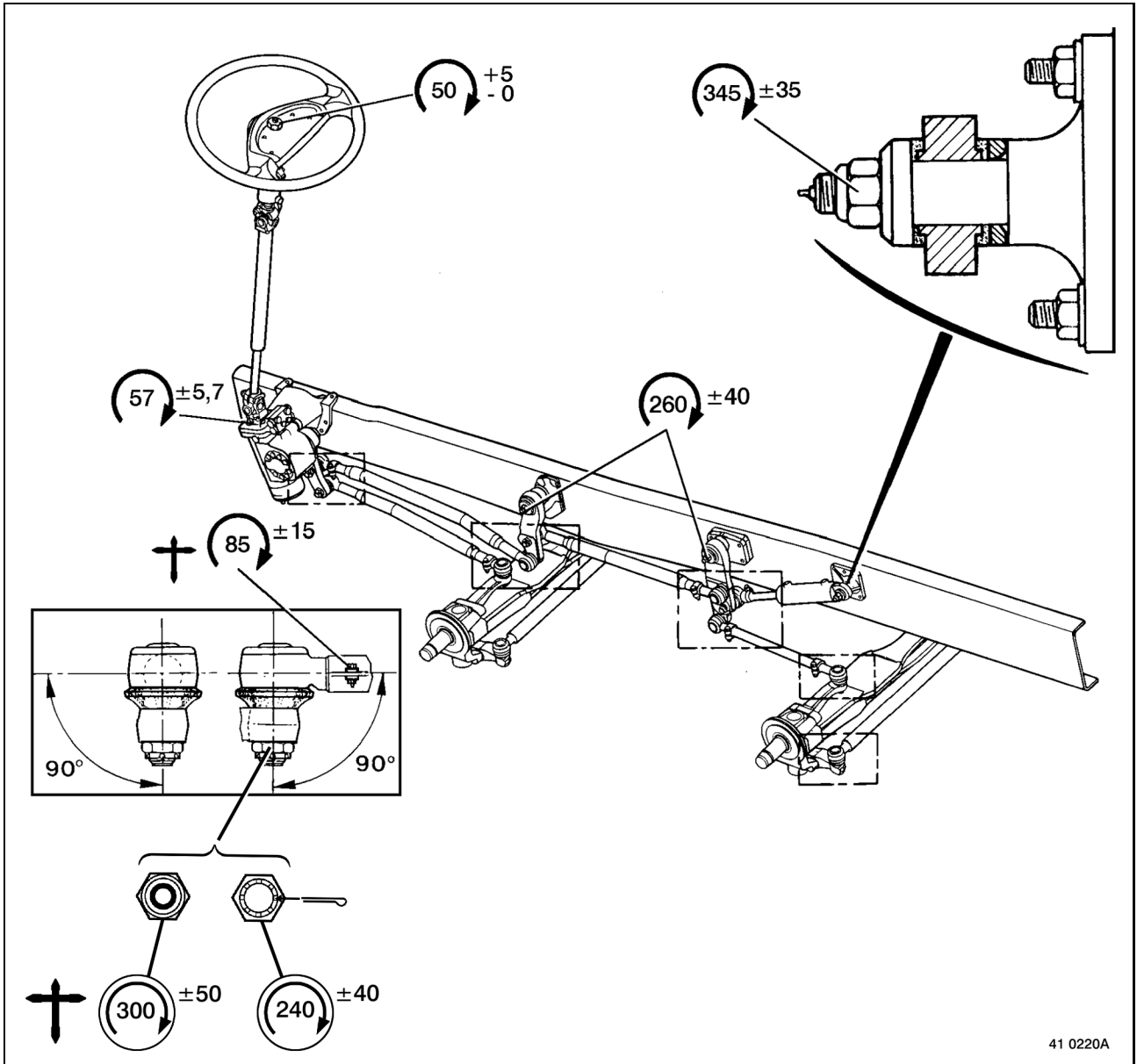
*The tightening torque values given in the table are based on standard 01.50.4002 and apply to new nuts and bolts fitted dry and re-used nuts and bolts with oil applied to the screw-threads. If any nuts and bolts are replaced, it is absolutely essential to use nuts and bolts recommended by the RENAULT TRUCKS Spare Parts Department (coefficient of friction in compliance with standard 01.50.4002).*

Tightening torque values in Nm for conventional "metric system" threaded hardware based on standard 01.50.4002 (H: normal and HE: with flange)		
dia. and pitch of nuts and bolts	Quality class 8.8	Quality class 10.9
	Tightening class III ( $\pm 20\%$ )	Tightening class III ( $\pm 20\%$ )
6 x 1.00	10	10
7 x 1.00	15	20
8 x 1.00	20	30
8 x 1.25	20	25
10 x 1.00	40	60
10 x 1.25	35	60
10 x 1.50	40	50
12 x 1.25	65	105
12 x 1.50	65	95
12 x 1.75	60	90
14 x 1.50	105	165
14 x 2.00	100	145
16 x 1.50	160	230
16 x 2.00	150	220
18 x 1.50	235	340
18 x 2.50	210	310
20 x 1.50	330	450
20 x 2.50	295	435
22 x 1.50	445	650
22 x 2.50	405	595



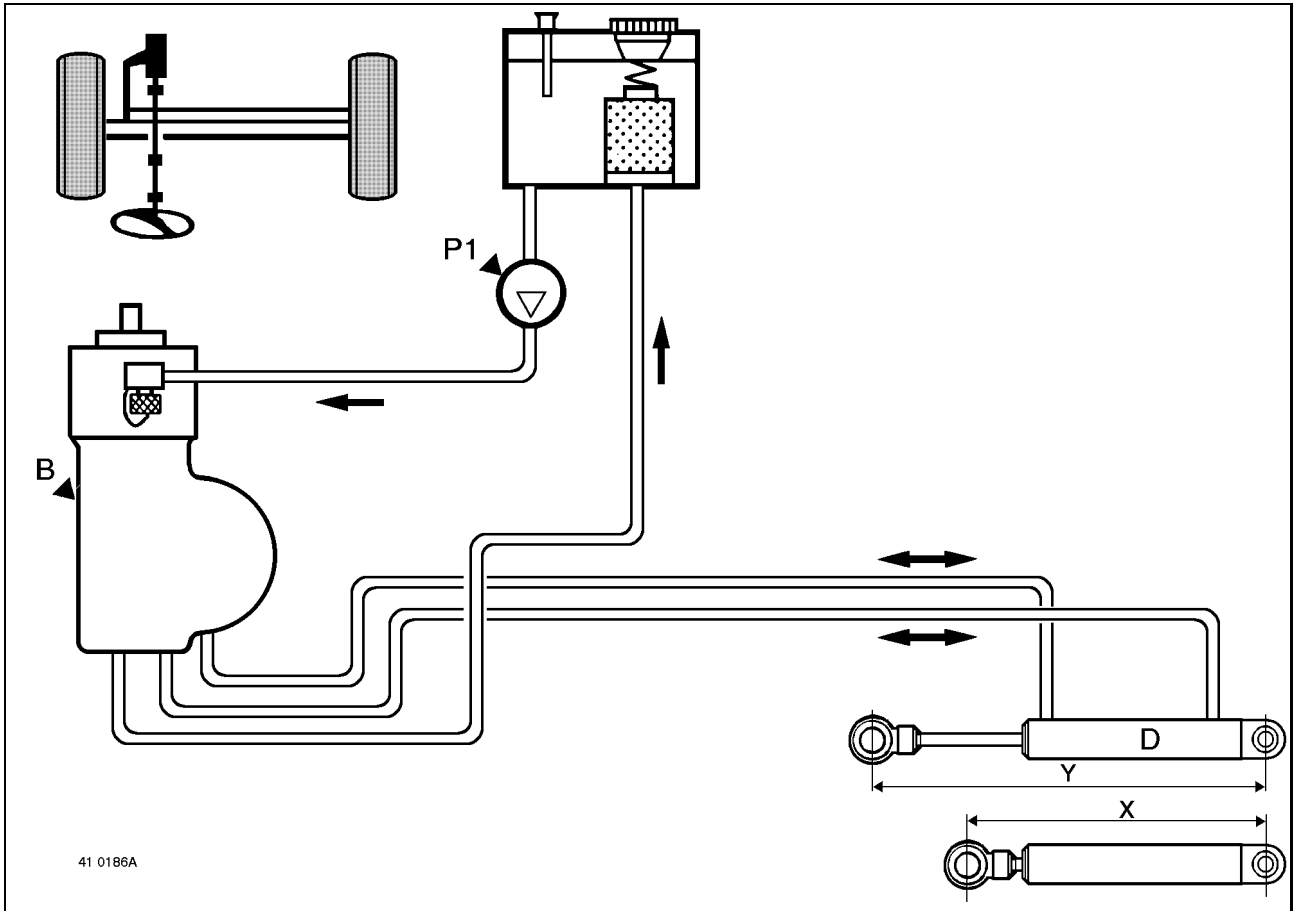
***"FIH" type (Nylstop) locknuts must be replaced whenever removed. "DRH" type (oval) locknuts can be re-used. If locknuts (DRH, FIH or other) are re-used, make absolutely certain that the screw-thread of the bolt protrudes least two threads above the top edge of the nut.***

Detail views





Left-hand drive hydraulic circuit (one pump)



## Main circuit engine-driven pump (P1)

ENERFLUX HYDRAULIC PUMP			
Reference N°		Check at 50°C at 50 bars	
Supplier	RENAULT TRUCKS	Engine speed in rpm	Flowrate in l/min +3/-1
2901	5010239654	650	16
		1800	20

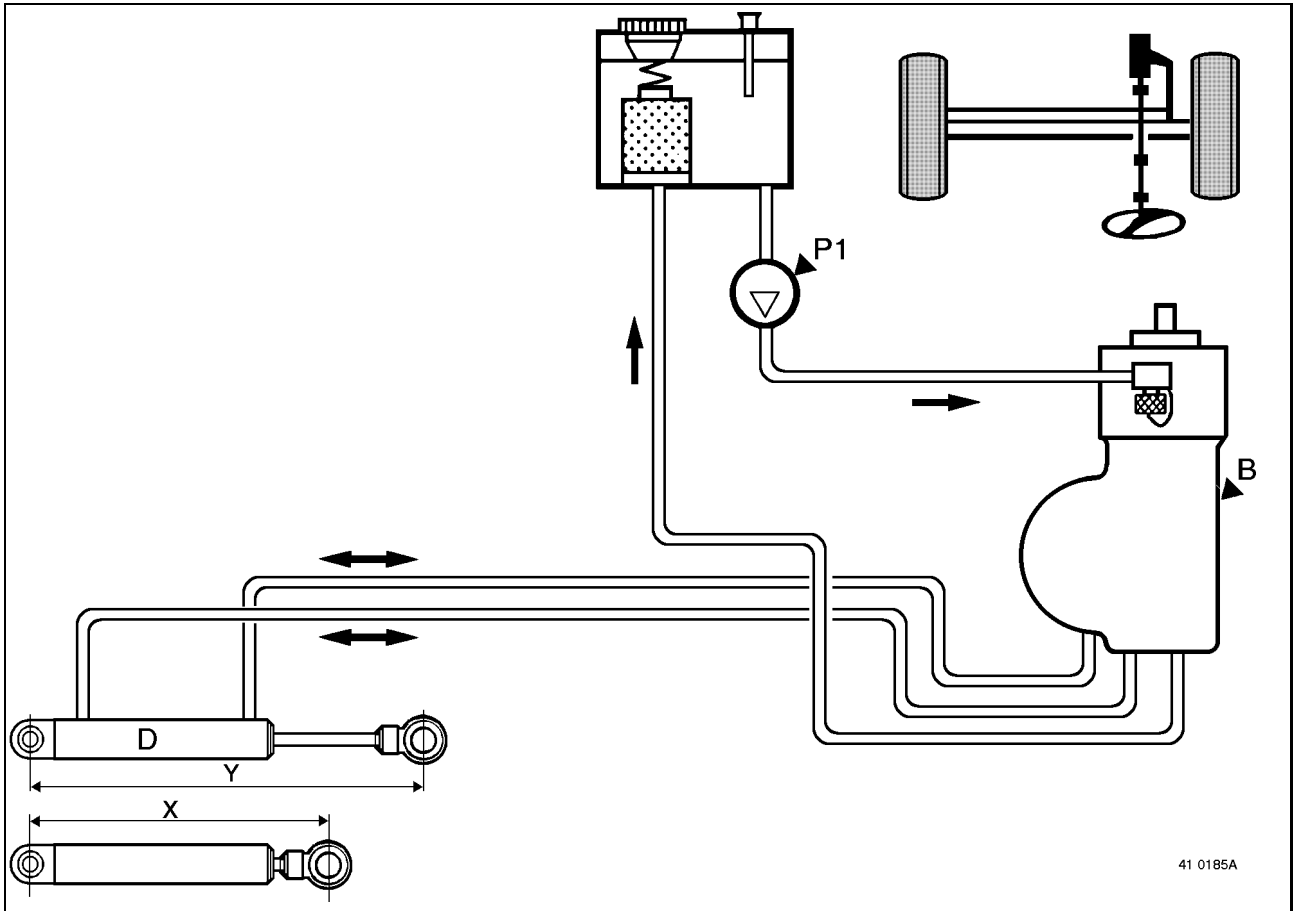
HPI HYDRAULIC PUMP			
Reference N°		Check at 50°C at 50 bars	
Supplier	RENAULT TRUCKS	Engine speed in rpm	Flowrate in l/min +3/-1
XA 5090300	5010488130	750	18
		1800	20

## Steering box (B)

<b>Steering type</b>	ZF 8098 955 323
Number of steering wheel turns	3.1
Step-down ratio	22.2 → 26.2/1
Maximum torque at a pressure of <b>150 bar</b>	6 726 Nm
Maximum permissible temperature	150 °C
Normal operating flowrate	16→20 l/min
Maximum permissible pressure	150→165 bars

Ram (D)				
Reference N°		Technical data		
Supplier	RENAULT TRUCKS	Length X mm	Length Y mm	Max. pressure Bars
ZF 8346 974 277	5010383182	484	734	180

Right-hand drive hydraulic circuit (one pump)



**Main circuit engine-driven pump (P1)**

ENERFLUX HYDRAULIC PUMP			
Reference N°		Check at 50°C at 50 bars	
Supplier	RENAULT TRUCKS	Engine speed in rpm	Flowrate in l/min +3/-1
2901	5010239654	650	16
		1800	20

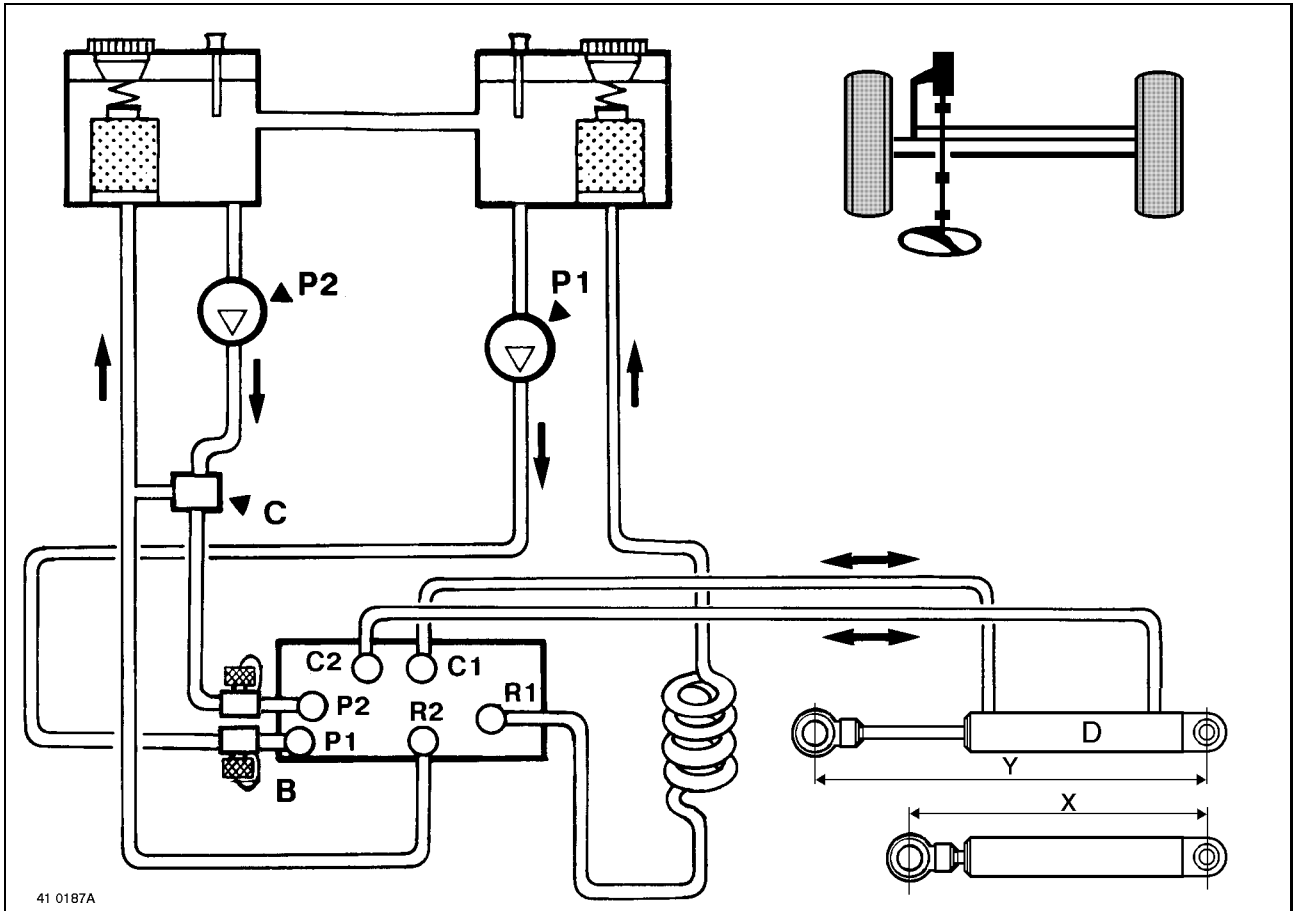
HPI HYDRAULIC PUMP			
Reference N°		Check at 50°C at 50 bars	
Supplier	RENAULT TRUCKS	Engine speed in rpm	Flowrate in l/min +3/-1
XA 5090300	5010488130	750	18
		1800	20

**Steering box (B)**

<b>Steering type</b>	ZF 8098 955 330
Number of steering wheel turns	3.1
Step-down ratio	22.2 → 26.2/1
Maximum torque at a pressure of <b>130</b> bar	5 829 Nm
Maximum permissible temperature	150 °C
Normal operating flowrate	16→20 l/min
Maximum permissible pressure	130→143 bars
<b>Steering type</b>	ZF 8098 955 424
Number of steering wheel turns	3.1
Step-down ratio	22.2 → 26.2/1
Maximum torque at a pressure of <b>150</b> bar	6 726 Nm
Maximum permissible temperature	150 °C
Normal operating flowrate	16→25 l/min
Maximum permissible pressure	150→165 bar

Ram (D)				
Reference N°		Technical data		
Supplier	RENAULT TRUCKS	Length X mm	Length Y mm	Max. pressure Bars
ZF 8345 974 114	5010294783	481	731	180
ZF 8345 974 277	5010383182	484	734	180

Left-hand drive hydraulic circuit (two pumps)



**Main circuit engine-driven pump (P1)**

LUK HYDRAULIC PUMP			
Reference N°		Check at 50°C at 50 bars	
Supplier	RENAULT TRUCKS	Engine speed in rpm	Flowrate in l/min +3/-1
2107541	5010294846	650	20
		1800	25
2107542	5010383033	650	20
		1800	25
2107542	5010557101	750	20
		1800	25

**Emergency circuit gearbox-driven hydraulic pump (P2)**

ZF HYDRAULIC PUMP			
Reference N°		Check at 50° C	
Supplier	RENAULT TRUCKS	Engine speed in rpm	Flowrate in l/min
ZF 8605 955 145	5001843477	-	16
ZF 8605 955 126	5001850761	-	16
ZF 8605 955 111	5001857431	-	16
ZF 8605 955 115	5001857544	-	25

**Steering box (B)**

<b>Steering type</b>	TRW TAS 87609
Number of steering wheel turns	5.5
Step-down ratio	21/1
Maximum torque at a pressure of <b>150</b> bar	6 650 Nm
Maximum permissible temperature	150 °C
Normal operating flowrate	21 l/min
Maximum permissible pressure	150→160 bar


**Pressure limiter (C)**

Operating pressure	170→180 bar
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Ram (D)				
Reference N°		Technical data		
Supplier	RENAULT TRUCKS	Length X mm	Length Ymm	Max. pressure-Bars
ZF 8345 974 277	5010383182	484	734	180

## Consumables

### Grease

Symbols	Renault Trucks Oils	Standards
	RAM	NLGI 2 Lithium soap grease NLGI 2 with molybdenum bisulphide

### Oils

Circuit	Renault Trucks Oils	Standard
Steering hydraulic system	STARMATIC 3	ATF DEXRON ATF III





**TOOLS**

## Generalities

RENAULT TRUCKS divide tools into three categories:

- **General-purpose tools:** proprietary tools.
  - **50 00 26 .... reference number** (possibility of purchasing through the RENAULT TRUCKS Spare Parts department).
  - **4-figure reference number** (tools classified by RENAULT TRUCKS but available from the supplier).
- **Special tools:** specifically created tools distributed by the RENAULT TRUCKS Spare Parts Department.
- **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 TRUCKS Spare Parts department): a certain amount of skill is needed to make these tools.

**Three levels (or echelons)** determine their assignment:

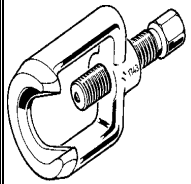
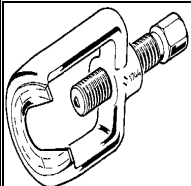
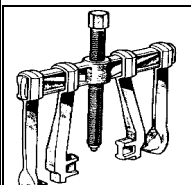
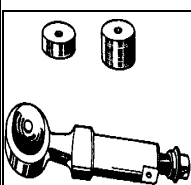
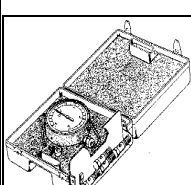
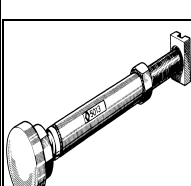
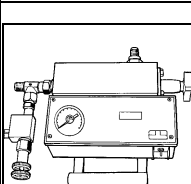
- **Level 1:** tools for servicing, maintenance and minor tasks.
- **Level 2:** tools for major repairs.
- **Level 3:** tools for refurbishment.





*Proprietary tools mentioned in this manual do not appear in the tools list.  
These tools are identified in the standard tools manual (MO) by a 4-figure number.*

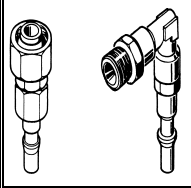
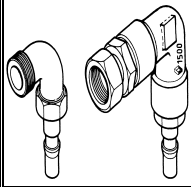
## LIST OF TOOLS

## General-purpose tools

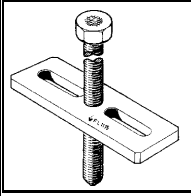
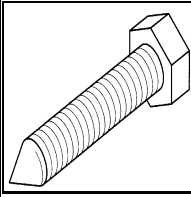
Illustration	RENAULT TRUCKS Ref.	Designation	Manufacturer reference	Manufacturer code	Level	Qty
	5000261743	BALL-JOINT PULLER			1	1
	5000261744	BALL-JOINT PULLER			1	1
	5000260833	PULLER			1	1
	5000260816	RAM			1	1
	5000269850	PRESSURE GAUGE	CH 801	AE	1	1
	5000265013	RAM			1	1
	5000268149	CONTROL BOX			1	1

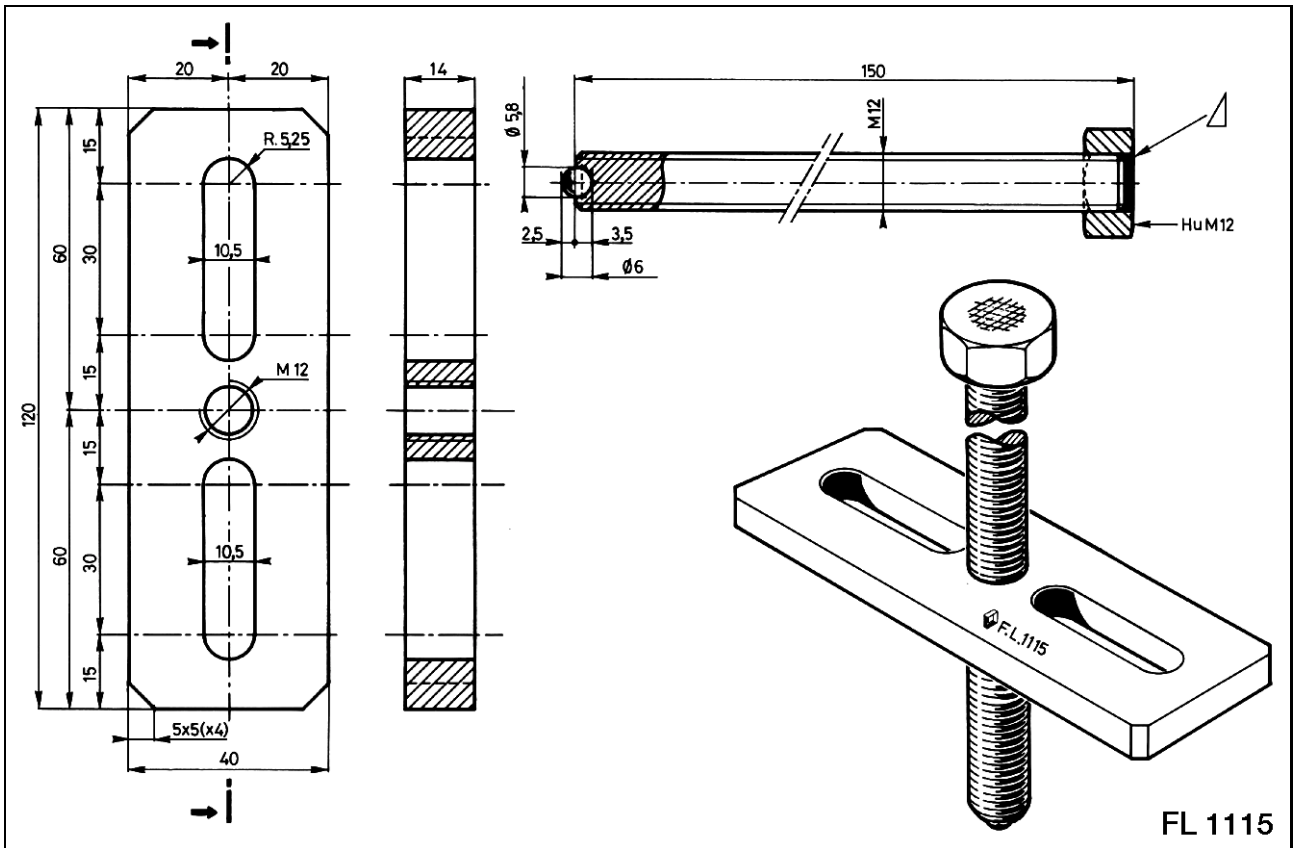
AE	<b>CERGYDIS</b>		
	Parc d'affaire Silic - Bât. B BP 8256		
	95801 CERGY PONTOISE CEDEX		FRANCE
	 01 34 20 13 40	 01 34 20 13 42	

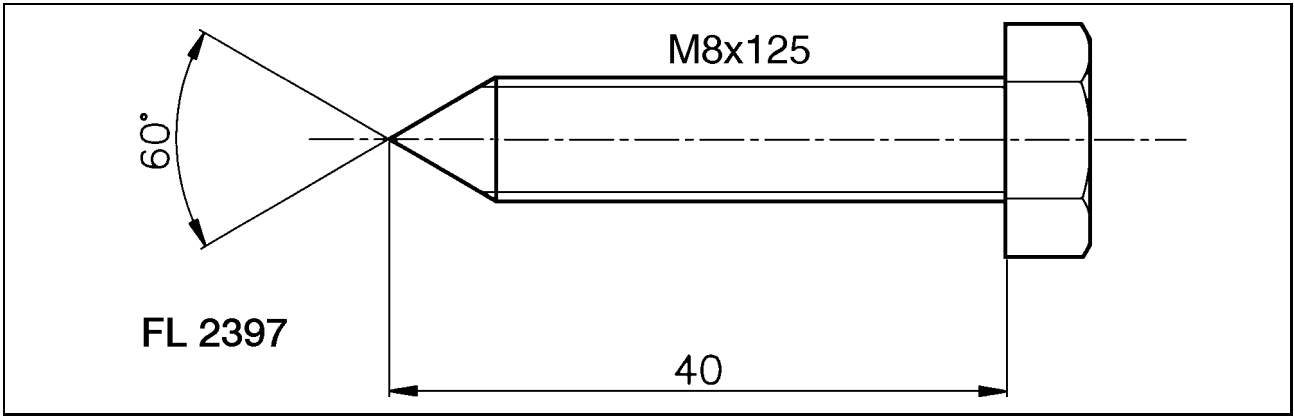
## Special Tools

Illustration	RENAULT TRUCKS Ref.	Designation	Manufacturer reference	Manufacturer code	Level	Qty
	5000261515	UNION			1	1
	5000261500	UNION			1	1

Locally manufactured tools

Illustration	RENAULT TRUCKS Ref.	Designation	Manufacturer Reference	Manufacturer code	Level	Qty
	1115	FLANGE			1	1
	2397	RETAINER			1	1







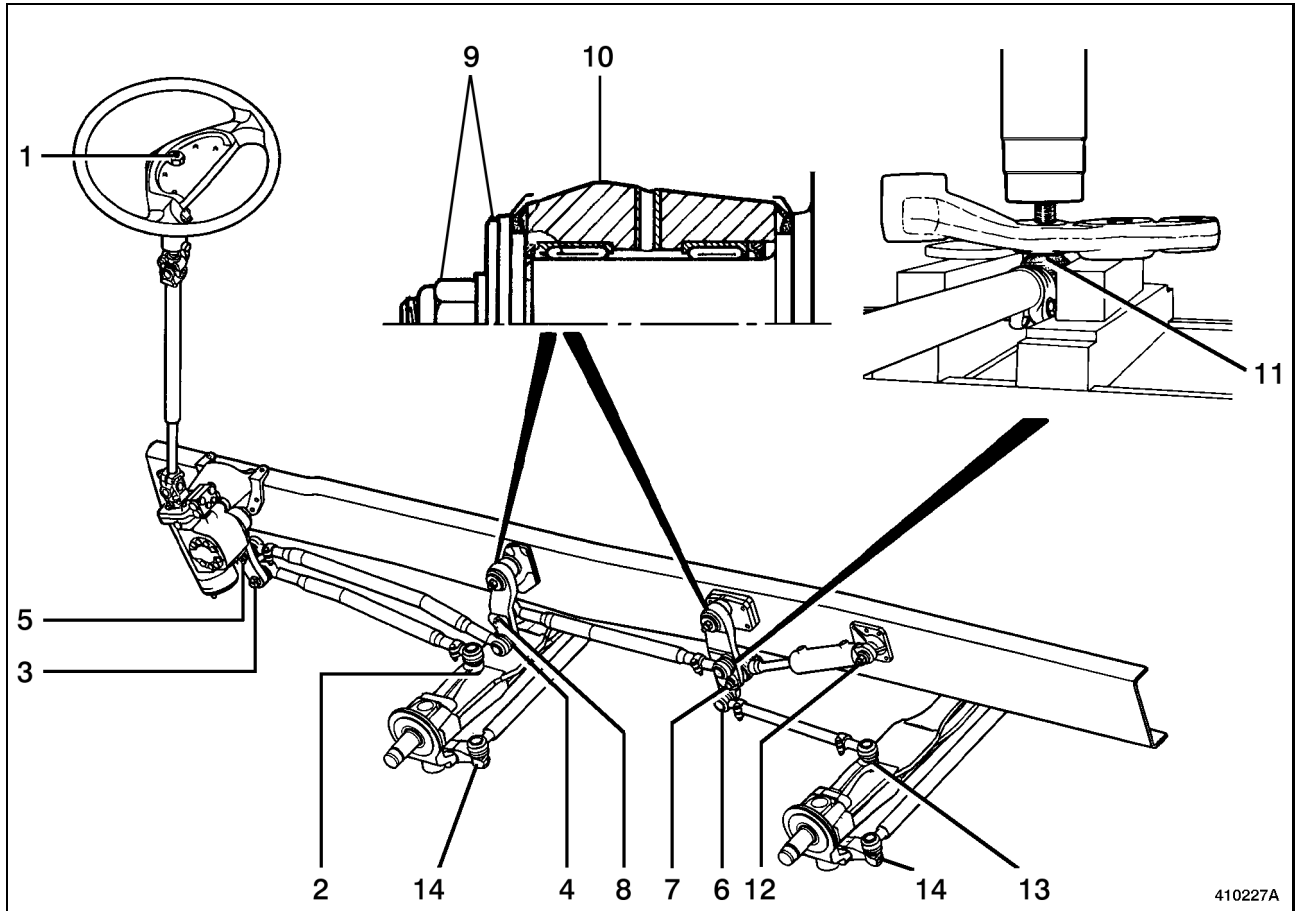


**STEERING LINKAGE**

## Disassembly

Remove the roadwheels if necessary.

The item numbers indicated in the drawings correspond to a **sequence of disassembly**.

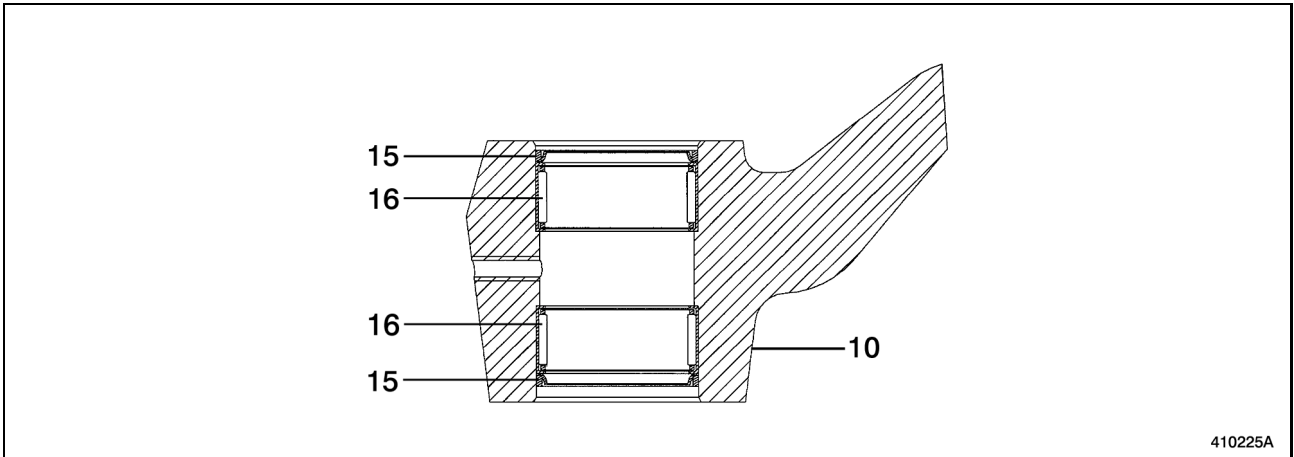


The table indicates the designation and reference number of the tools required for assembly/disassembly of the itemized parts.



*To put the tool into place, disengage the pipes but do not disconnect them.*

Item	Tool designation	Reference N°	Assembly	Disassembly
1	Puller	1115		X
2-4-6-13-14	Puller	1743		X
3-5	Puller	1744		X
7-8-12	Puller	0833		X
7	Ram	0816		X
11	Press			X



Remove gaskets **(15)**.  
Remove bearings **(16)**.

## Assembly

### Preparation prior to assembly:

Carefully clean and check all the parts. Wash the bearings in clean solvent. Let them drip dry naturally. Immediately prior to assembly, lubricate them very lightly with thin oil.

Do not unpack a new bearing until you are ready to install it. Do not clean off the protective grease on new bearings.

Old seals and lock-plates must always be discarded and new ones fitted.

Never force fit parts with copper or brass punches or drifts. Always use a specially adapted driver to prevent ingress of metal particles into the casings and bearings. Always oil parts prior to force fitting.

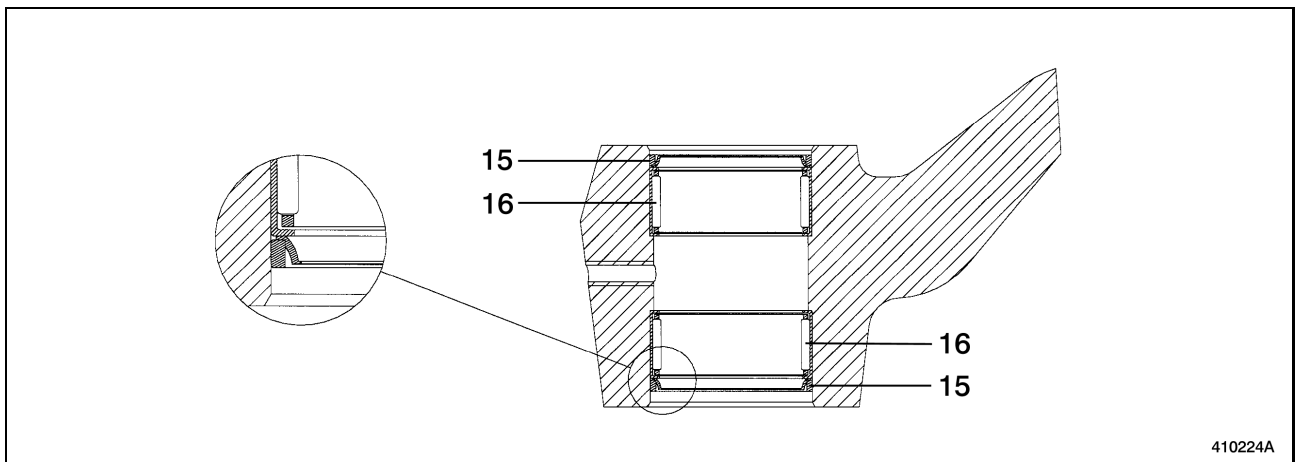
Always apply grease on the inside of seal ring lips.

Shrink fitted parts are to be heated with a hot air blower or in an oven, etc... Flame heating is strictly forbidden.



*When using a torque multiplier, calibrate the torque wrench/multiplier unit at the required torque loading.*

### Relay bearing bracket



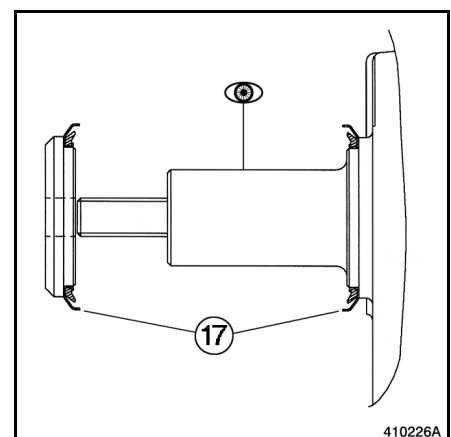
Install ball-bearing (16).

Install seals (15).

Match the direction of assembly (lip outside).

Check the bearing for wear.

Replace the seals (17).



The table indicates the designation and reference number of the tools required for assembly/disassembly of the itemized parts.

Item	Tool designation	Reference N°	Assembly	Disassembly
15-16	Press		X	
15-16-17	Tube		X	

Fit the lever to its bearing bracket.

Tighten to torque.

Apply grease.

### Coupling of drag links



The input shaft should not be turned by more than 1 1/4 turns from the mid-point position when the drag link is not connected to the axle with the lockover angles correctly adjusted to avoid maladjustment of the hydraulic pressure limitation stops.

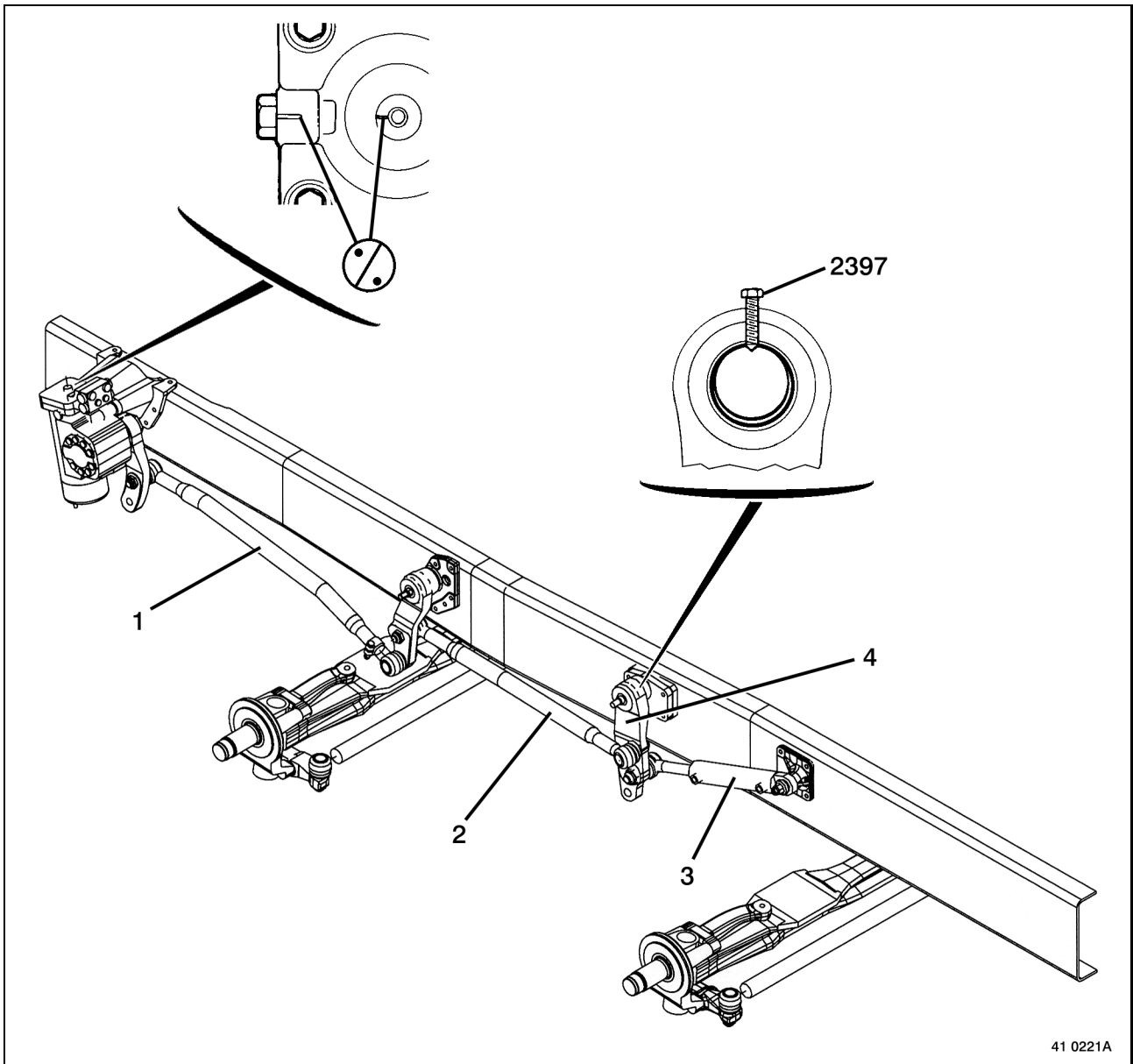
### Adjustment conditions

- a) : Park the vehicle **unladen** and **in running order** on flat ground. Place the steering axle wheels on pivoting plates.
- b) : Set the steering box to the mid-point position (marks aligned).
- c) : With wheel alignment already adjusted, set the front axle wheels to the straight-ahead position. Use a front axle geometry checking device.



Follow the sequence of assembly.

### Assembly of swing levers (1-2) and ram (3)

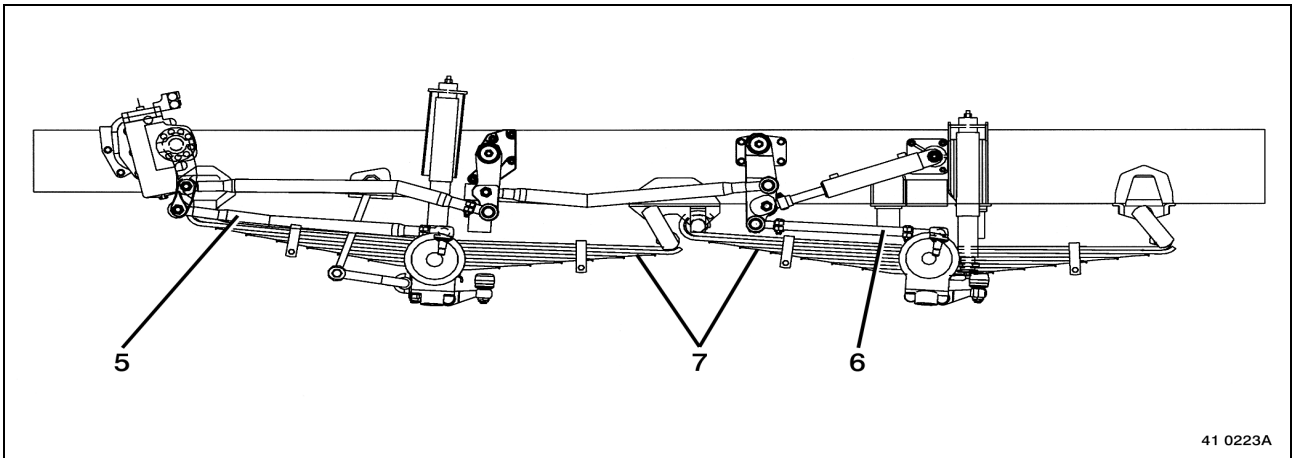


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- 1° Comply with adjustment conditions **(b)**.
  - 2° Install tool **2397** to keep the relay bearing bracket in position **(4)**.
  - 3° Fit swing lever **(2)** length **961±2 mm**. Do not alter the length of the swing lever, even if it is possible according to the assembly (works pre-set).
  - 4° Position the drag link **(2)** by tightening the ball-joint nuts.
  - 5° Adjust the length of the drag link **(1)** while complying with the adjustment conditions **(b)**.
  - 6° Install ram **(3)**. Do not alter the length of the ram (works pre-set)
  - 7° Tighten the ball-joint clamp perpendicular to the track rod **(1)**.
  - 8° Tighten the ball-joint nuts and lock them if the assembly comprises castle nuts.
  - 9° Remove tool **2397**.
- Retighten to allow locking. **Never loosen.**

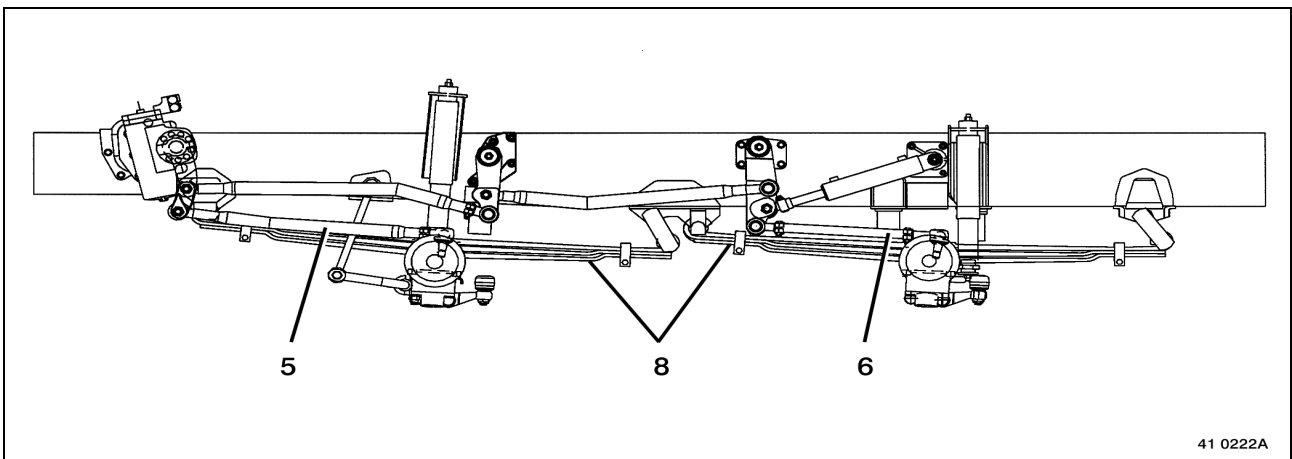
### Assembly of track rods (5-6)

#### Vehicles equipped with semi-elliptic leaf spring suspension (7)



- 1° Adjust the length of the track rods (5-6) complying with adjustment conditions (a-b-c). Fit track rods (5-6), offer up the nuts of the ball-joints for the track rods, then check that the adjustment conditions (b-c) are complied with.
  - 2° Shorten the length of the track rod (6) by rotating the rod through 0.4 of a turn. The steering box mid-point is modified.
  - 3° Tighten the ball-joint clamps perpendicular to the track rods (5-6).
  - 4° Tighten the ball-joint nuts and lock them if the assembly comprises castle nuts.
- Retighten to allow locking. **Never loosen.**

#### Vehicles equipped with parabolic leaf spring suspension (8)



- 1° Adjust the length of the track rods (5-6) while complying with adjustment conditions (a-b-c). Fit track rods (5-6), offer up the nuts of the ball-joints for the track rods, then check that the adjustment conditions (b-c) are complied with.
  - 2° Extend the length of the track rod (5) by rotating the rod through 3 turns of the ball-joint. The steering box mid-point is modified..
  - 3° Tighten the ball-joint clamp perpendicular to the track rods (5-6).
  - 4° Tighten the ball-joint nuts and lock them if the assembly comprises castle nuts.
- Retighten to allow locking. **Never loosen.**





**HYDRAULIC SYSTEM**

## Operating principle

### Assembly with one steering pump

The item numbers indicated in the text refer to the drawing on page B-5.

One engine-driven pump (**P1**) provides the output necessary for operation of the steering (**B**) and of the assistance ram (**D**).

### Assembly with two steering pumps

The item numbers indicated in the text refer to the drawing on page B-9.

One engine-driven pump (**P1**) and one gearbox-driven pump (**P2**) provide the output necessary for operation of the steering.

#### **Vehicle stationary, engine running:**

The output of the main pump (**P1**) feeds the steering box (**P1-R1**) and the power assistance ram (**C1-C2**).

The output of the emergency pump (**P2**) is nil. The power steering alert pictogram is not displayed.

#### **Vehicle moving**

The output of the main pump (**P1**) feeds the steering box (**P1-R1**) and the power assistance ram (**C1-C2**). The emergency pump (**P2**)

Two distributors inside the steering box are piloted when the output of the main circuit falls to zero. In this way, the main circuit (**P1-R1-C1-C2**) is isolated. It is the output coming from the emergency pump (**P2**) that feeds the steering box (**P2-R2**). The power steering alert pictogram is displayed if the vehicle is travelling at a speed above **6 km/h**.

## Filling and bleeding the hydraulic circuit

### Method

Raise the front end of the vehicle.

Fill the two reservoirs through the filler ports to the maximum with oil. When the level is steady, actuate the starter a few times so as to rotate the main pump. Top up the level accordingly.

Run the engine at idling speed. Turn the steering wheel from one lock to the other several times so as to bleed air from the system. Observe the oil level during this operation and top up if necessary. Repeat the operation until the oil level remains stable. Stop the engine and top up.

Return the roadwheels to the ground.

Continue the lockover manoeuvres with the roadwheels on the ground until no flowing fluid noise is to be heard and until the oil in the reservoirs becomes clear and is no longer emulsified.

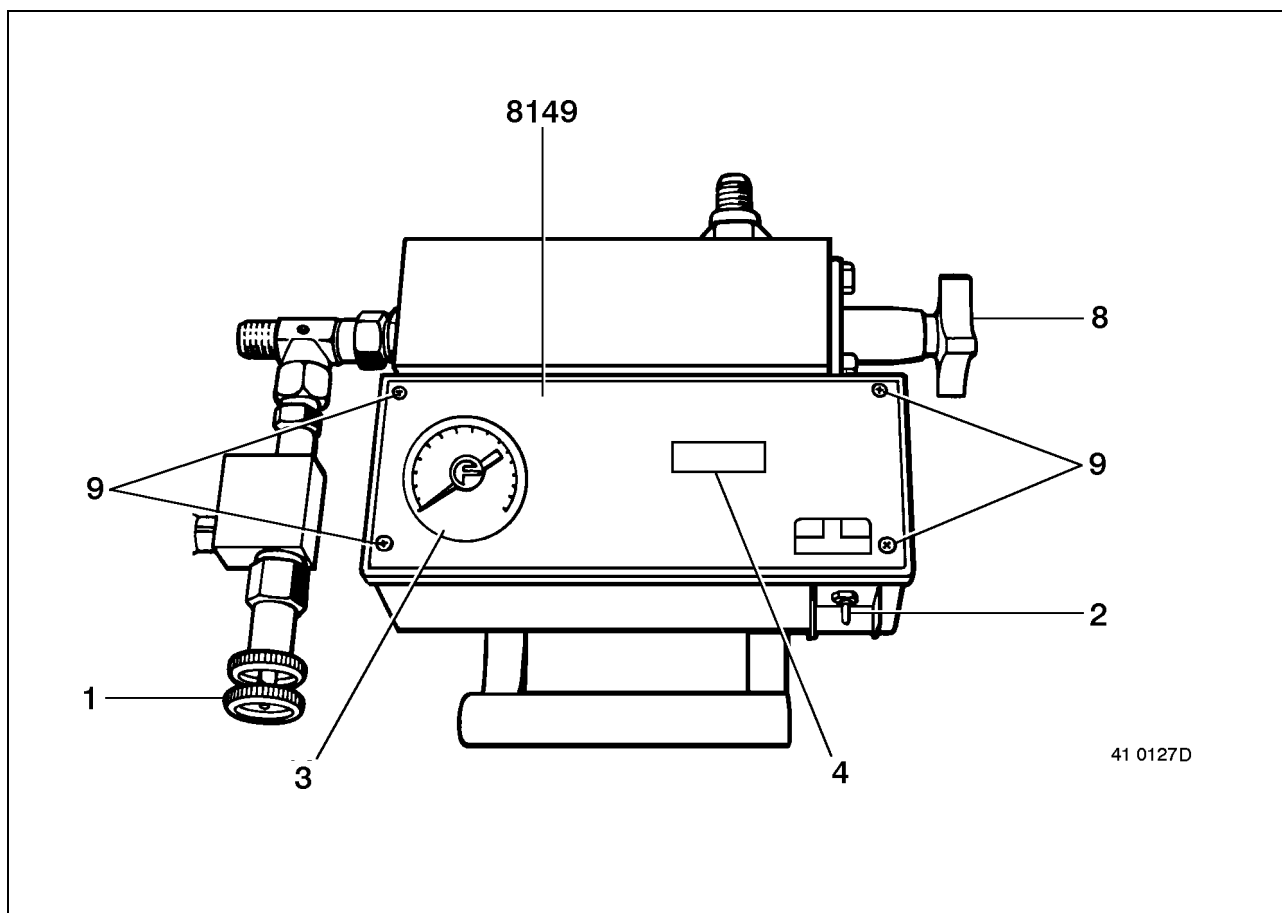
Carry out a few manoeuvres at low engine speed and low road speed on vehicles equipped with an emergency pump. Check the oil level and top up, if necessary.



**Whenever working on the flexible pipes or power steering ram, in order to bleed air from the hydraulic system, loosen the flexible pipes and repeat the above operations while letting the oil flow into a receptacle.**

**Tighten up the flexible pipes before manoeuvring the vehicle.**



**"FLO-TECH 8149" testing apparatus (new generation apparatus)****Technical data**

This serves to monitor the output, pressure and temperature of hydraulic systems.

**Pressure reducing valve (1):** Serves to test the steering box pressure limiter and guarantees safety of the apparatus for other checks.

**Switch (2):** Flowmeter and pressure gauge on/off (to be used only at the moment of read-out).

**Pressure gauge (3):** Pressure from 0 to 400 bar.

**Flowmeter (4):** Output from 4 to 60 l/min.

**Temperature gauge (4):** Temperature display from 0 to 150 °C or 0 to 300 °F.

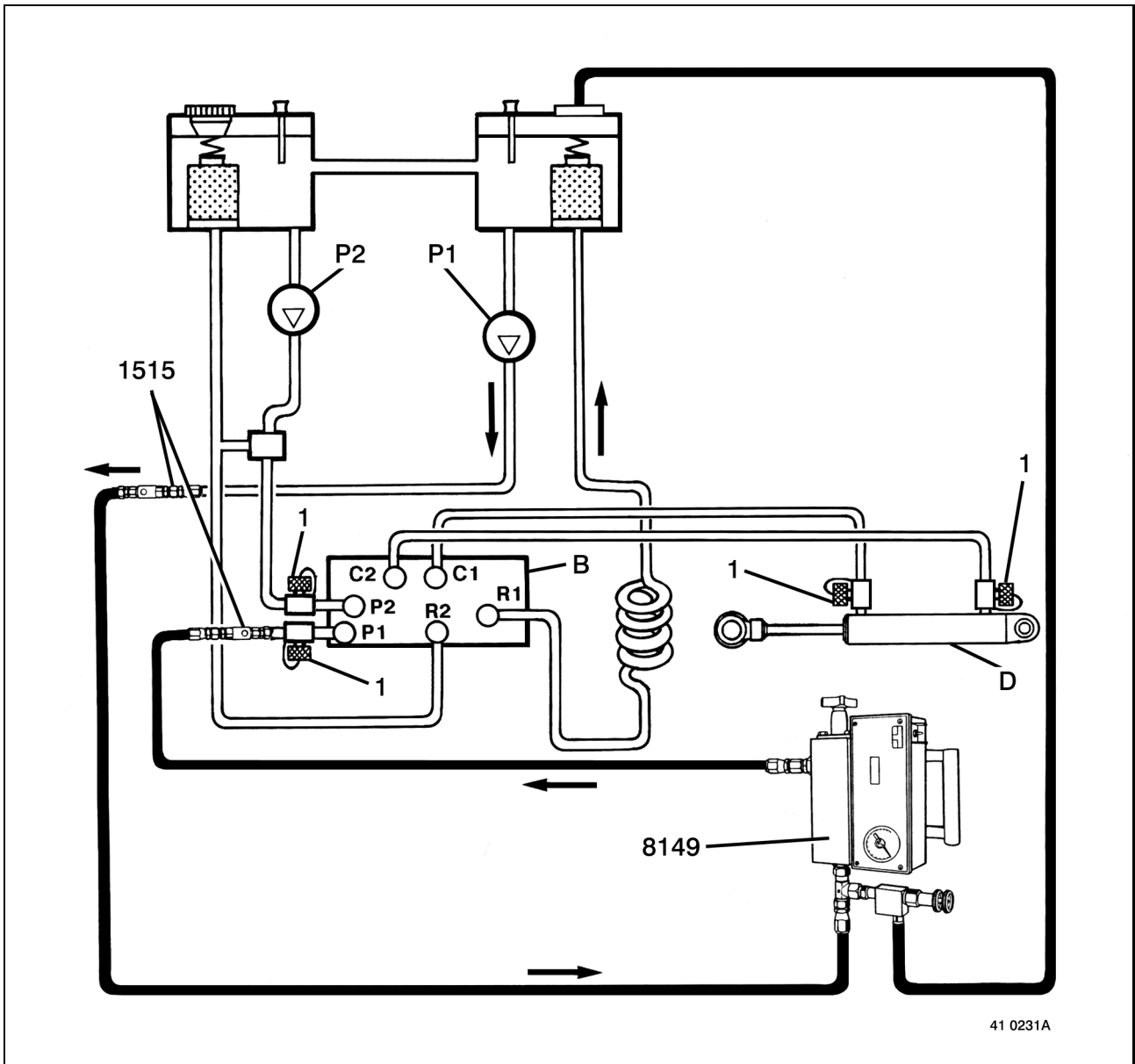
**Valve (8):** Alters hydraulic circuit flow.

**Cover screw (9).**



*The apparatus is equipped with an overpressure safety device.*

## How to connect up and use the apparatus



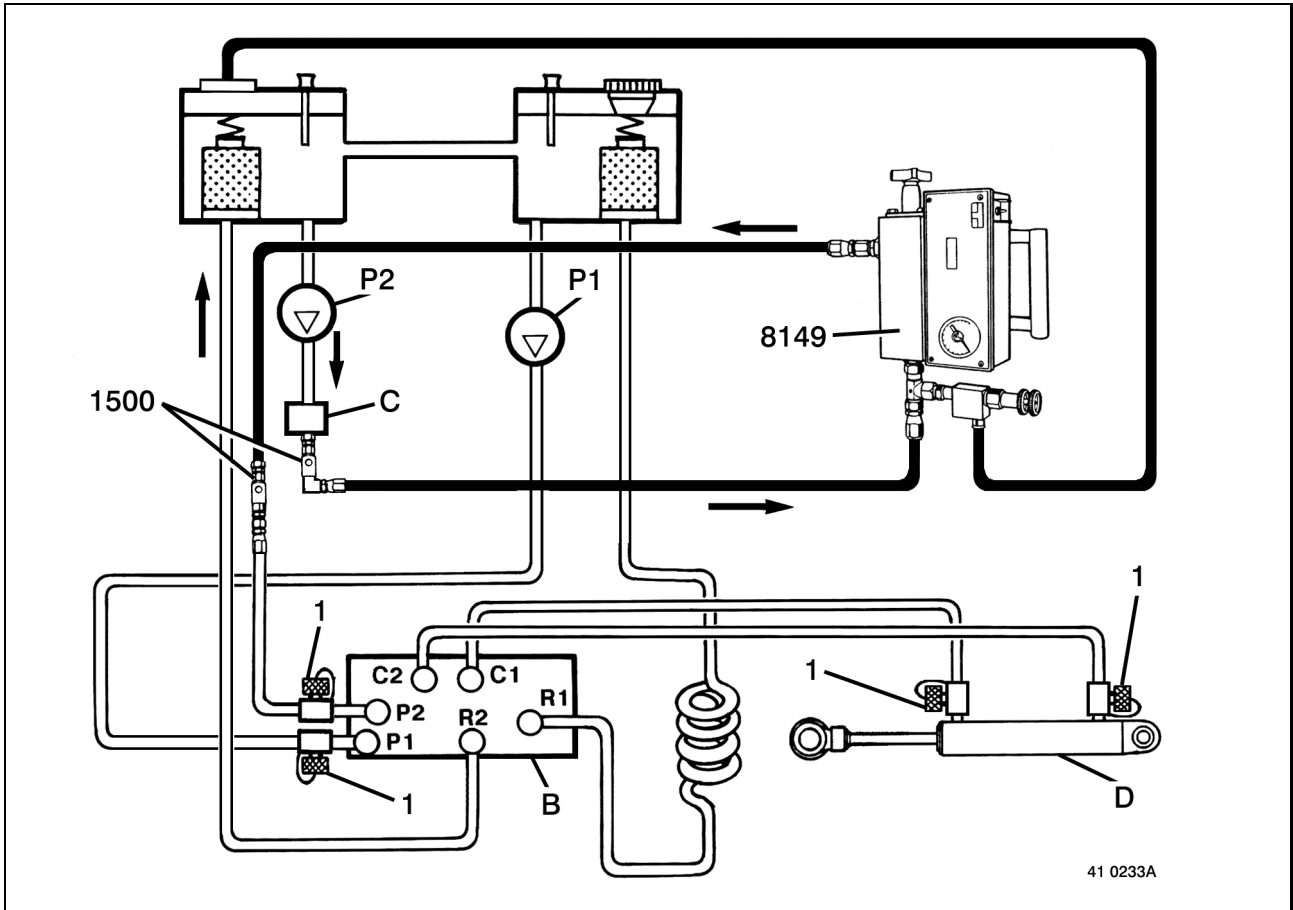
### Connection for an assembly with 2 pump(s) on the main circuit P1.

Connect the apparatus in series between main pump P1 and steering box B.

Ensure the direction of connection of the testing apparatus.

Use the set of couplings 1515.

To make a circuit pressure reading only, connect pressure gauge 9850 to pressure take-offs (1).



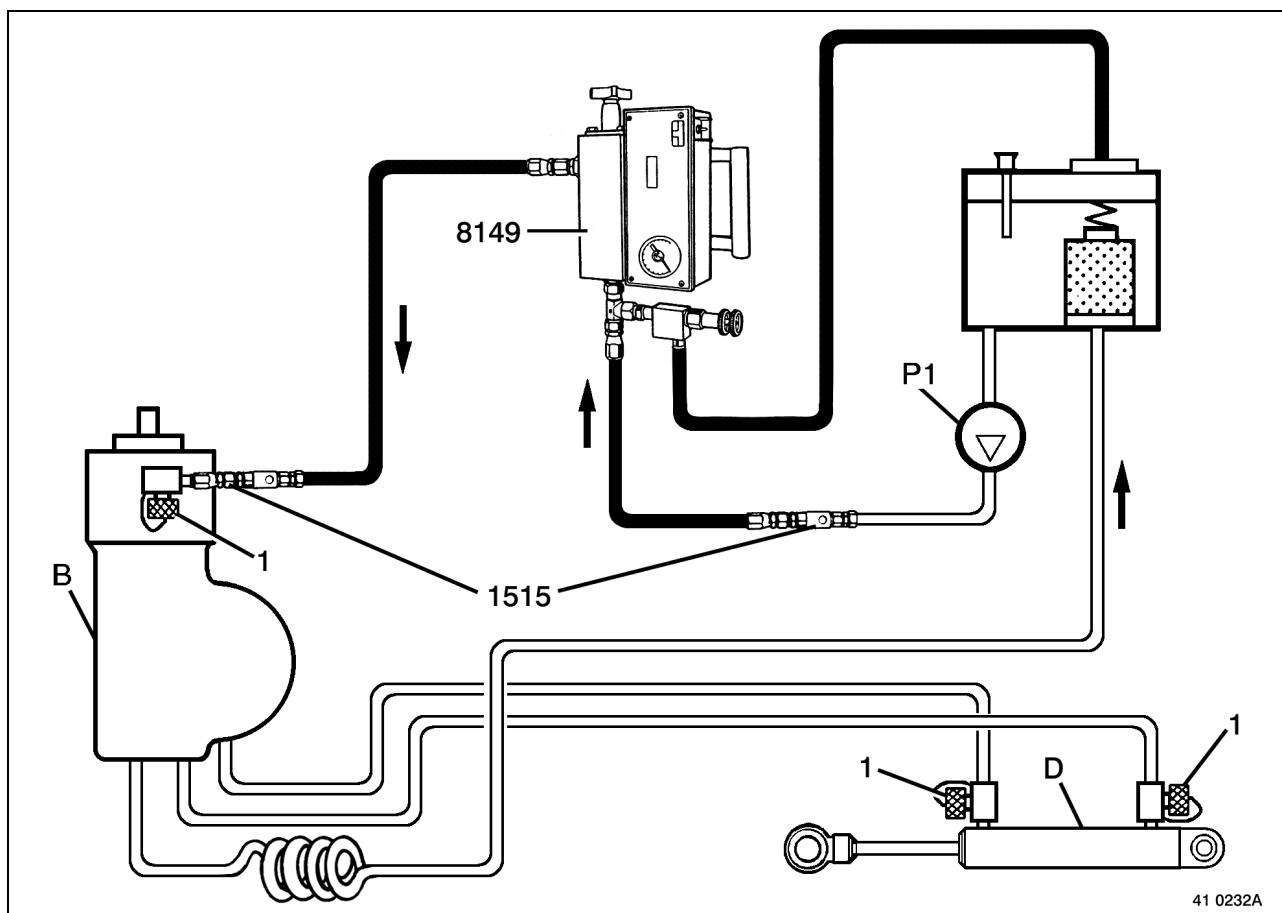
**Connection for an assembly with 2 pump(s) on the emergency circuit P2.**

Connect the apparatus in series between pressure limiter C and steering box B.

Ensure the direction of connection of the testing apparatus.

Use the set of couplings 1500.

To make a circuit pressure reading only, connect pressure gauge 9850 to pressure take-offs (1).



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### Connection for an assembly with 1 pump(s) on the main circuit P1.

Connect the apparatus in series between main pump **P1** and steering box **B**.

Ensure the direction of connection of the testing apparatus.

Use the set of couplings **1515**.

To make a circuit pressure reading only, connect pressure gauge **9850** to pressure take-offs **(1)**.

The item numbers indicated in the text refer to the figure on page E-3-1 .

Raise the front end of the vehicle.

Fill the hydraulic steering reservoir.

Open valve **(8)**.

Run the engine at idling speed and top up with oil to the correct level.

Bleed the air from the circuit (see page E-2-1).

Close the valve **(8)** so as to heat the fluid to its normal operating temperature (about 50 °C) in order to throttle the oil.

Open valve **(8)** as soon as the operating temperature is reached.

To check the temperature

- Move switch **(2)** to the TEMP position.



*The voltage of the batteries may be affected by changes in temperature. A light signal (:) flashes meaning that it is necessary to replace the batteries. To gain access to the batteries, remove the screws (9) and take off the cover.*

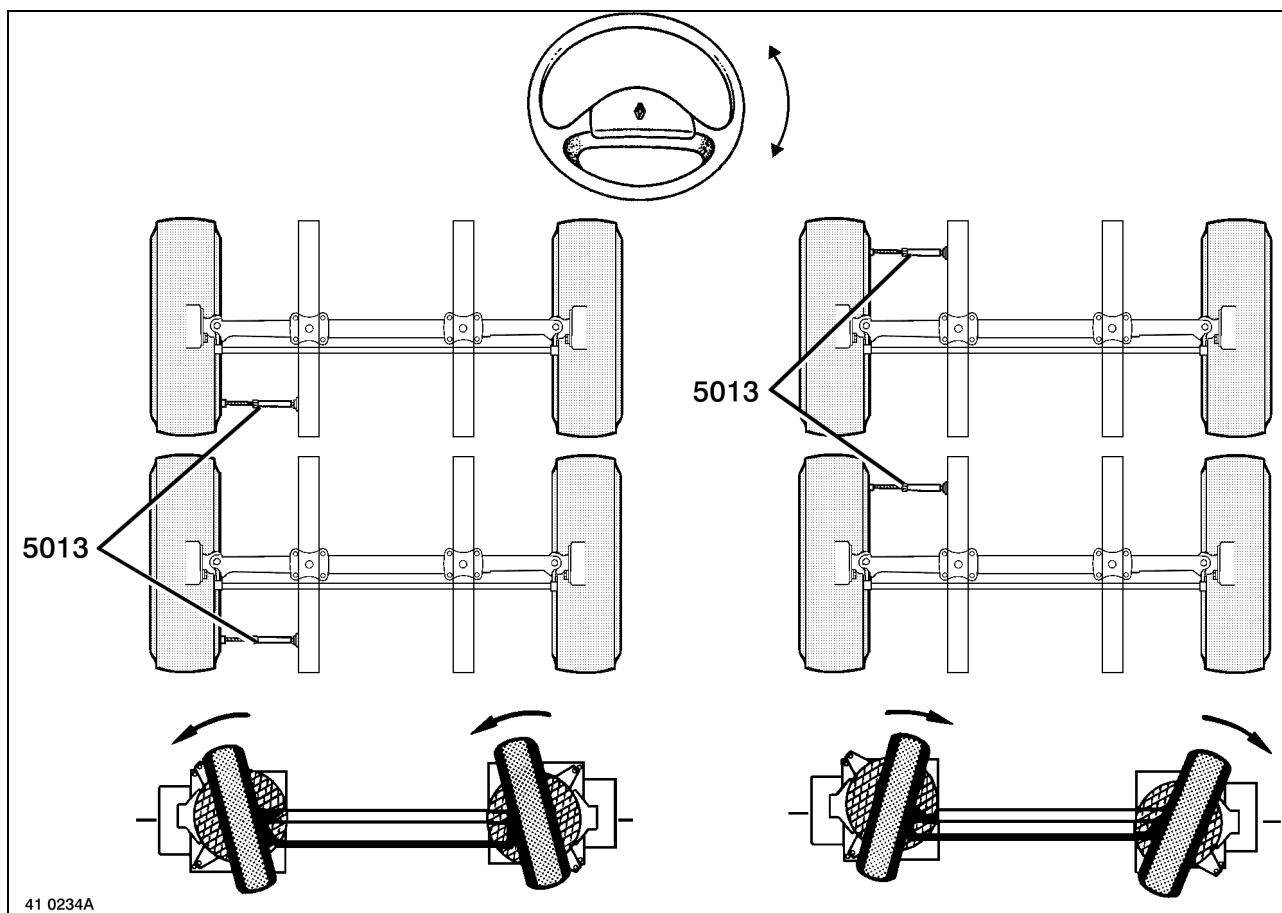
### Adjusting the pressure reducing valve (1)

- With the engine idling.
- Fully open pressure reducing valve **(1)**.
- Close valve **(8)**.
- Adjust pressure reducing valve **(1)** until the required pressure is obtained.
- Open valve **(8)**.



## Testing the steering box

### Testing the steering box hydraulic pressure limiter



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**All pressure checks must be carried out while the engine is idling**

The item numbers indicated in the text correspond to the figure on page E-3-1.

The test time is about **5 seconds**, without exceeding a temperature of **50°C**.

- Adjust pressure reducing valve **(1)** (see page E-3-4) to a pressure **5 bar(s)** higher than maximum operating pressure (see "Technical data" chapter)
- Immobilize the steering in the mid-point position using tool **5013**.
- With the engine idling, valve **(8)** open, exert a force of **50 Nm** in one direction on the steering wheel.
- The maximum operating pressure should be within the tolerances.
- Repeat the check, but turning the steering wheel in the other direction.
- Check the operating temperature.
- If necessary, replace the pressure limiter
  - For a steering box **ZF 8098**, see **MR 41623**.
  - For a steering box **TRW TAS87**, see **MR 41628**.

## Checking the hydraulic lockover limitation pressure



All pressure checks must be carried out while the engine is idling

The item numbers indicated in the text correspond to the figure on page E-3-1.

The test time is about **5** seconds, without exceeding a temperature of **50°C**.

- Set pressure reducing valve **(1)** to maximum operating pressure.
- With the roadwheels on pivoting plates.
- With the engine idling, valve **(8)** open.
- Lock the steering wheel over on one side as far as mechanical abutment of the axle.
- Exert a torque of **75 Nm** on the steering wheel.
- The pressure should not exceed **55 bars**.
- Repeat the test in the other direction.
- Check the operating temperature.
- Adjust the hydraulic pressure limitation stops
  - For a steering box type **TRW TAS/87**, see **CMR 41628**.
- Replace the hydraulic pressure limitation stops
  - For a steering box type **ZF 8098**, see **CMR 41623**.

## Testing the steering hydraulic pump

### Main circuit engine-driven pump (P1)

The item numbers indicated in the text correspond to the figure on page E-3-1.

The test time is about **5** seconds, without exceeding a temperature of **50°C**.

For values, see "Technical data" chapter".

#### Checking the output

- Set the pressure reducing valve **(1)** (see page E-3-4) at a pressure higher than **50 bars**.
- Raise the oil temperature to **50°C**.
- Set the steering to the mid-point position.
- Move switch **(2)** to the "output" position.
- With the engine running at the recommended speed.
- Adjust the circuit pressure to **50 bars** by means of **(8)**.
- Read out the output.

#### Checking the pressure

- Set pressure reducing valve **(1)** to a pressure **5 bar(s)** higher than the pressure of the pressure limiter integrated in the steering box (see "Technical data" chapter).
- With the engine idling, progressively close valve **(8)**. The pressure should hold steady at the value of the pressure limiter integrated in the steering box.
- After making this check, open valve **(8)**.



- *To find the correlation of the steering pump to the steering box, see the "Technical data" chapter*

## Emergency circuit gearbox-driven hydraulic pump (P2)

### General conditions for making checks

Raise the vehicle so that the left-hand wheel of the middle drive axle is about 2 cm from the ground.

Place an axle stand (1) under the drive axle.

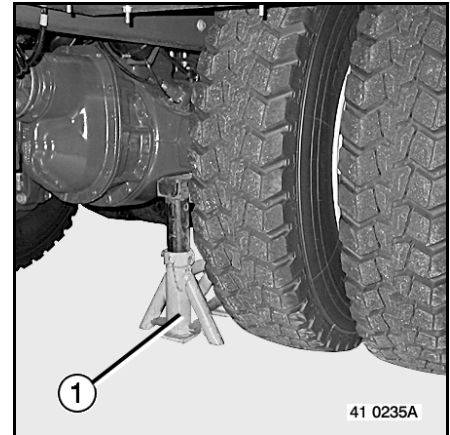
Take out fuse 25.

Apply the parking brake.

Check that the inter-axle and inter-wheel diff. locks are not engaged.



**ONE PERSON MUST STAY INSIDE THE CAB, WHICH MUST BE IN THE "ROAD" POSITION, DURING THE CHECKS. IN CASE OF PROBLEM, THIS PERSON CAN RELEASE THE CLUTCH OR STOP THE ENGINE WITH THE IGNITION KEY. ESTABLISH A SAFE AREA AROUND THE VEHICLE.**



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### Checking the output

For values, see "Technical data" chapter".

Start the engine.

Engage 6<sup>th</sup> gear to drive the prop shaft.

Raise the oil temperature to 50°C.

Set the steering to the mid-point position.

Move switch (2) on tool 8149 to the "output" position.

Increase the engine speed until the output becomes stable.

Note down the value.

### Checking the operation of the emergency circuit pilot distributors

Connect tool 9850 to pressure take-off (1) of the ram D corresponding to the direction of lockover being checked.

See page(s) E-3-3.

Start the engine.

Engage 6<sup>th</sup> gear to drive the prop shaft.

Increase the engine speed until the output becomes stable.

Release the clutch.

The inertia of the roadwheel serves to drive the prop shaft and therefore the emergency pump P2.

Turn the steering wheel to the left through 1 turn: the force on the steering wheel should not be greater when the engine is running.

The pressure at the ram D should be zero.

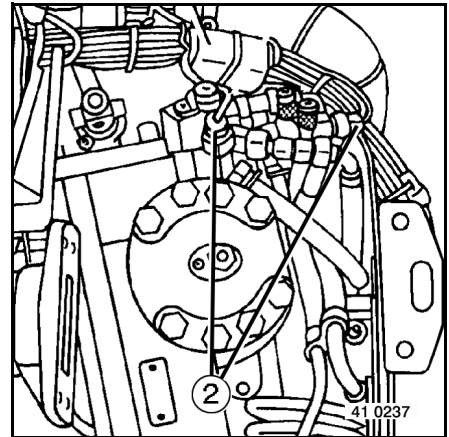
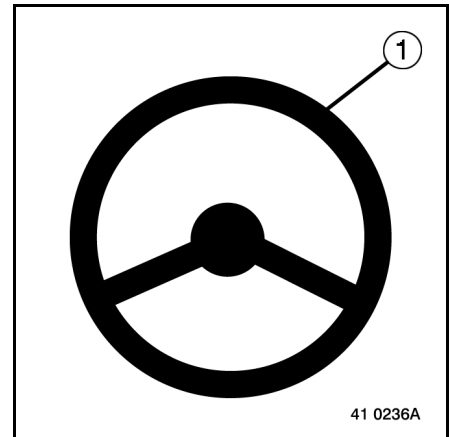
Repeat the above operations, but turning the steering wheel in the other direction.

The steering is hard or there is a pressure reading at the ram D replace the steering box.

**Checking the position indicators**

When the vehicle is travelling at a speed above **6 km/h**, pictogram **(1)** is displayed whereas the checks made on the pump **P2** are correct.

Disconnect the position indicators **(2)** one after the other. As soon as the pictogram **(1)** disappears, replace the corresponding position indicator.





## Diagnostics

### Troubleshooting

Incident	Probable cause	Remedy
Pump noisy	Fluid too cold Maximum lockover  Air in circuit Insufficient fluid	Let fluid heat up Release steering wheel (limit max. lock-over) Bleed Top up with fluid
Steering heavy on both sides	Insufficient fluid Oil filter clogged Air in circuit Distributor jammed Pump damaged Internal leaks	Top up with fluid Replace filter Bleed circuit Replace steering box Repair - replace pump Replace steering box
Steering heavy on one side only	Distributor jammed Hydraulic pressure limitation valves defective Internal leaks Air in steering box	Replace steering box Adjust - repair - replace  Replace steering box Bleed
Steering does not return properly	Stub axle or axle  Pump output	Grease stub axle. Check out axle and caster angle Check - repair - replace
Vehicle pulls to one side	Distributor worn or maladjusted Distributor internal leaks Wheel alignment defect	Replace steering box Replace steering box Check - adjust
Abnormally long response time upon lockover	Pump output Air in circuit	Check - repair Bleed- replace
Momentary steering heaviness	Air in circuit Valve seized	Bleed Repair
Fluid emulsified	Poor seal / Ingress of air	Retighten pipes or replace pump inlet gasket
Steering locks itself over	Incorrectly centred distributor	Replace steering box
Vehicle wanders	Steering system / roadwheels mid-point incorrect Joints - axle worn Distributor worn	Check - repair  Check - repair Replace steering box

