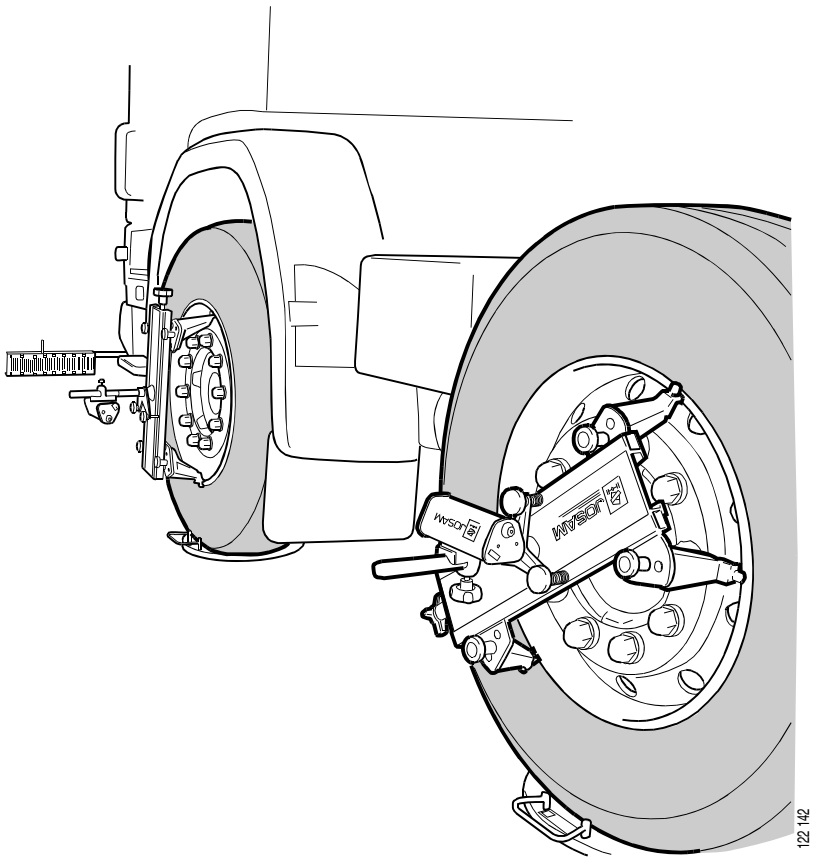
SCANIA

13:00-20

Issue 2 **en**

Axle weight distribution and axle alignment on vehicles with two steered axles in front of a driven axle

Work description



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Contents

General

IMPORTANT! The rolling direction should be adjusted when the vehicle is loaded to its normal service weight.

Use two laser heads if available, otherwise move the laser head from one axle to the other.

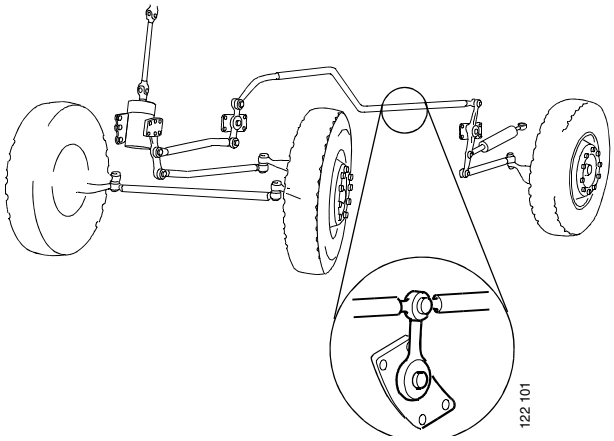
IMPORTANT! Measurements should be taken on the linkage side (always left) with the engine running.

Check the axle weight distribution and adjust as necessary. Refer to Setting the front axle weight.

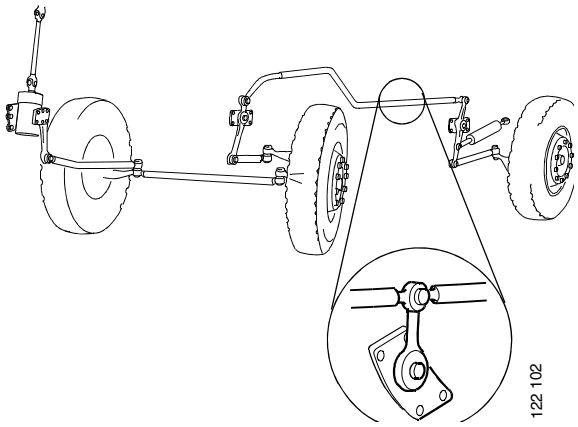
The parking brake should be released and the drive wheels chocked.

The hydraulic cylinder is normally fitted only on vehicles with twin front axles but can also be fitted on vehicles with a steered tag axle.

Vehicles with a tag axle and an axle distance greater than 4,100 mm have an intermediate droparm.



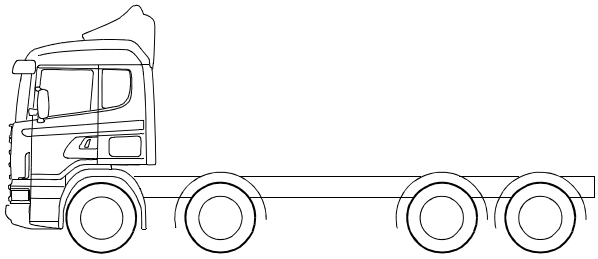
Steering design (LHD vehicles)



Steering design (RHD vehicles)

Setting the front axle weight on vehicles with twin front axles

Weighing



It is essential the weighing is carried out correctly. Tyre pressures and uneven ground can have a great effect on the results. Therefore, always check tyre pressures thoroughly before weighing and measuring.

All axles must be at the same level when weighing. If one pair of axles is at a higher level, the other axles must be raised on blocks so that the vehicle is completely level.

The internal friction of the leaf spring suspension will also affect the results. Make sure the suspension is compressed between each weighing.

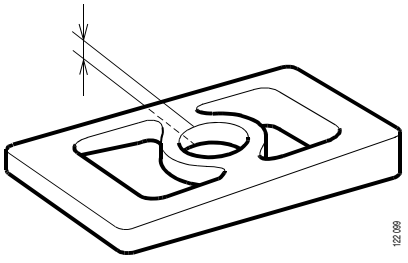
Weighing must be carried out several times, at least three, in order to obtain a reliable result. The average measurement can then be used to select separator inserts.

If the difference between the front axles is **greater than 300 kg** on a laden truck, the axle weight distribution must be adjusted.

Axle weight distribution

Axle weight distribution is adjusted by fitting separator inserts under the second front axle.

The separator inserts are wedge shaped. Measure the height of the separator insert half way along the wedge, close to the guide pin hole; see illustration. The separator insert must be fitted with the thick end towards the rear.



Tables

There is one table for selecting U-bolts for different separator inserts when changing axle weight, and there are six tables for selecting draglink arms.

A condition for using the tables to obtain correct results is that the wheel radius on a laden vehicle must be the same on all wheels.

Use the tables as follows:

1 Identify the type of vehicle and the type of spring on the second axle.

2 When fitting separator inserts, both the U-bolts and draglink arm must be renewed. Determine which separator insert to use based on the difference in axle weight between the front axles.

3 See table 2 when selecting U-bolts.

4 A guide to selecting draglink arms can be found in tables 3-9. The following information is needed to be able to find the right draglink arm:

- type of axle on front axles.
- type of spring on front axles.
- axle distance between front axles.
- ball joint position on draglink arm.
- right-hand drive or left-hand drive vehicle.

The different types of separator inserts that are available are shown in table 1 below.

Table 1: Separator inserts

Type of separator insert	Part No.
17 mm	1 361 952
26 mm	1 361 953
36 mm	1 545 019
44 mm	1 545 020
52 mm	1 545 021
60 mm	1 545 022
68 mm	1 545 023

Select U-bolts in accordance with table 2 below.

Table 2: U-bolts

Type of spring	Thickness of separator insert	U-bolt, part No.
2x30/2x32	17 mm	1 726 129
2x30/2x32	26/36 mm	1 726 130
2x30/2x32	44 mm	1 726 131
2x30/2x32	52/60 mm	1 726 132
2x30/2x32	68 mm	1 726 133
3x29	17/26 mm	1 726 131
3x29	36 mm	1 726 132
3x29	44/52 mm	1 726 133
3x29	60/68 mm	1 726 134
4x28	17/26 mm	1 726 133
4x28	36 mm	1 726 134
4x28	44/52 mm	1 726 135
4x28	60/68 mm	1 726 136
7x15	17 mm	1 726 131
7x15	26 mm	1 726 132
7x15	36/44 mm	1 726 133
7x15	52/60 mm	1 726 134
7x15	68 mm	1 726 135
9x15	17/26 mm	1 726 134
9x15	36/44 mm	1 726 135
9x15	52 mm	1 726 136

Table 3: Parabolic spring LHD axle distance 1795

Configuration			1st axle	2nd axle		
Axle	**Spring**	**Cab**	**Ball joint position**	**Draglink arm part No.**	**Separator insert**	**Ball joint position**
AM740	2x32	All types	down	1355052	44	down
			down	1355052	52	down
			down	1355052	60	down
			down	1355055	68	down
AM900	2x32	All types except CP19F	up	1397976	26	down
			up	1397976	36	down
			up	1397976	44	down
			up	1355056	60	up
			up	1355056	68	up
AM920	2x32	All types except CP19F	up	1355052	26	down
			up	1355055	36	down
			up	1355055	44	down
			up	1355058	52	down
			up	1355058	60	down
			up	1355061	68	down
AM740	2x32	CP19F	down	1355052	26	down
			down	1355055	36	down
			down	1355055	44	down
			down	1355058	52	down
			down	1355058	60	down
			down	1355061	68	down

Table 4: Parabolic spring RHD axle distance 1795

Configuration			1st axle		2nd axle		
Axle	**Spring**	**Cab**	**Ball joint position, right**	**Ball joint position, left**	**Draglink arm part No.**	**Separator insert**	**Ball joint position**
AM740	2x32	All types	down	down	1355052	52	down
			down	down	1355052	60	down
			down	down	1355052	68	down
AM900	2x32	All types	up	up	1397976	26	down
			up	up	1397976	36	down
			up	up	1397976	44	down
			up	up	1355056	60	up
			up	up	1355056	68	up
AM920	2x32	CP19F	up	down	1355052	26	down
			up	down	1355055	36	down
			up	down	1355055	44	down
			up	down	1355058	52	down
			up	down	1355058	60	down
			up	down	1355061	68	down

Table 5: Parabolic spring and air spring LHD axle distance 1940

Configuration			1st axle	2nd axle		
Axle	**Spring**	**Cab**	**Ball joint position**	**Draglink arm part No.**	**Separator insert**	**Ball joint position**
AM900	3x29	All types	up	1397976	0	down
			up	1464558	17	down
			up	1355056	26	up
			up	1475557	36	up
			up	1355059	44	up
			up	1355062	52	up
			up	1355062	60	up
			up	1355062	68	up
AM920	3x29	All types except CP19F	up	1355055	0	down
			up	1355058	17	down
			up	1355061	26	down
			up	1355061	36	up
			up	1355058	44	up
			up	1475555	52	up
			up	1355055	60	up
			up	1355052	68	up
AM920	3x29	CP19F	down	1355055	0	down
			down	1355058	17	down
			down	1355061	26	down
			down	1355061	36	up
			down	1355058	44	up
			down	1475555	52	up
			down	1355055	60	up
			down	1355052	68	up

Configuration			1st axle	2nd axle		
Axle	**Spring**	**Cab**	**Ball joint position**	**Draglink arm part No.**	**Separator insert**	**Ball joint position**
AM740	3x29	All types	down	1355052	17	down
			down	1355055	26	down
			down	1355055	36	down
			down	1355058	44	down
			down	1355061	52	down
			down	1355061	60	down
			down	1475555	68	up
AM950	3x29	All types	down	1355053	26	down
			down	1355053	36	down
			down	1355052	44	down
			down	1355055	52	down
			down	1355055	60	down
			down	1355058	68	down
AM900	2x30	All types	up	1464558	36	down
			up	1355056	44	up
			up	1475557	52	up
			up	1355059	60	up
			up	1355059	68	up
AM620	2x30	All types except CP19F	up	1355058	36	down
			up	1355061	44	down
			up	1355061	52	down
			up	1355061	60	up
			up	1355058	68	up
AM740	2x30	All types	down	1355052	26	down
			down	1355052	36	down
			down	1355055	44	down
			down	1355055	52	down
			down	1475555	60	down
			down	1355058	68	down

Configuration			1st axle	2nd axle		
Axle	**Spring**	**Cab**	**Ball joint position**	**Draglink arm part No.**	**Separator insert**	**Ball joint position**
AM900	2x32	All types	up	1464558	26	down
			up	1464558	36	down
			up	1355056	44	up
			up	1475557	52	up
			up	1355059	60	up
			up	1355062	68	up
AM920	2x32	All types except CP19F	up	1355055	26	down
			up	1355058	36	down
			up	1355061	44	down
			up	1355061	52	down
			up	1355061	60	up
			up	1355058	68	up
AM920	2x32	CP19F	down	1355055	26	down
			down	1355058	36	down
			down	1355061	44	down
			down	1355061	52	down
			down	1355061	60	up
			down	1355058	68	up
AM740	2x32	All types	down	1355052	26	down
			down	1355052	36	down
			down	1355055	44	down
			down	1355055	52	down
			down	1475555	60	down
			down	1355058	68	down
AM900	4x28	All types	up	1355055	0	up
			up	1475557	17	up
			up	1355059	26	up
			up	1355062	36	up
			up	1355062	44	up

Configuration			1st axle	2nd axle		
Axle	**Spring**	**Cab**	**Ball joint position**	**Draglink arm part No.**	**Separator insert**	**Ball joint position**
AM920	4x28	All types except CP19F	up	1355061	0	down
			up	1355058	17	up
			up	1475555	26	up
			up	1355055	36	up
			up	1355052	44	up
			up	1355052	52	up
			up	1355053	60	up
			up	1464558	68	down
AM950	4x28	All types	up	1355053	17	down
			up	1355055	26	down
			up	1475555	36	down
			up	1355058	44	down
			up	1355058	52	down
			up	1355061	60	down
			up	1355061	68	down
AMA860	Normal	All types	down	1355055	0	down
AMA740	Low	All types	down	1355055	0	down
AMA860	Low	All types	down	1355056	0	down

Table 6: Parabolic spring and air spring RHD axle distance 1940

Configuration			1st axle		2nd axle		
Axle	**Spring**	**Cab**	**Ball joint position, right**	**Ball joint position, left**	**Draglink arm part No.**	**Separator insert**	**Ball joint position**
AM900	3x29	All types	up	up	1397976	0	down
			up	up	1464558	17	down
			up	up	1355056	26	up
			up	up	1475557	36	up
			up	up	1355059	44	up
			up	up	1355062	52	up
			up	up	1355062	60	up
			up	up	1355062	68	up
AM920	3x29	All types except CP19F	up	up	1355055	0	down
			up	up	1355058	17	down
			up	up	1355061	26	down
			up	up	1355061	36	up
			up	up	1355061	44	up
			up	up	1355058	52	up
			up	up	1475555	60	up
			up	up	1355055	68	up
AM920	3x29	CP19F	down	up	1355055	0	down
			down	up	1355058	17	down
			down	up	1355061	26	down
			down	up	1355061	36	up
			down	up	1355061	44	up
			down	up	1355058	52	up
			down	up	1475555	60	up
			down	up	1355055	68	up

Configuration			1st axle		2nd axle		
Axle	**Spring**	**Cab**	**Ball joint position, right**	**Ball joint position, left**	**Draglink arm part No.**	**Separator insert**	**Ball joint position**
AM740	3x29	All types	down	down	1355052	17	down
			down	down	1355055	26	down
			down	down	1355055	36	down
			down	down	1475555	44	down
			down	down	1355058	52	down
			down	down	1355061	60	down
			down	down	1355061	68	up
AM950	3x29	All types	down	down	1355053	36	down
			down	down	1355053	44	down
			down	down	1355052	52	down
			down	down	1355055	60	down
			down	down	1475555	68	down
AM900	2x30	All types	up	up	1397976	36	down
			up	up	1464558	44	down
			up	up	1464558	52	down
			up	up	1355056	60	up
			up	up	1475557	68	up
AM620	2x30	All types except CP19F	up	down	1355055	36	down
			up	down	1475555	44	down
			up	down	1355058	52	down
			up	down	1355061	60	down
			up	down	1355061	68	down
AM740	2x30	All types	down	down	1355052	44	down
			down	down	1355052	52	down
			down	down	1355055	60	down
			down	down	1355055	68	down

Configuration			1st axle		2nd axle		
Axle	**Spring**	**Cab**	**Ball joint position, right**	**Ball joint position, left**	**Draglink arm part No.**	**Separator insert**	**Ball joint position**
AM900	2x32	All types	up	up	1397976	26	down
			up	up	1397976	36	down
			up	up	1464558	44	down
			up	up	1355056	52	up
			up	up	1355056	60	up
			up	up	1475557	68	up
AM920	2x32	All types except CP19F	up	down	1355052	26	down
			up	down	1355055	36	down
			up	down	1475555	44	down
			up	down	1355058	52	down
			up	down	1355061	60	down
			up	down	1355061	68	up
AM920	2x32	CP19F	down	down	1355052	26	down
			down	down	1355055	36	down
			down	down	1475555	44	down
			down	down	1355058	52	down
			down	down	1355061	60	down
			down	down	1355061	68	up
AM740	2x32	All types	down	down	1355052	44	down
			down	down	1355052	52	down
			down	down	1355055	60	down
			down	down	1355055	68	up

Configuration			1st axle		2nd axle		
Axle	**Spring**	**Cab**	**Ball joint position, right**	**Ball joint position, left**	**Draglink arm part No.**	**Separator insert**	**Ball joint position**
AM920	4x28	All types except CP19F	up	up	1355061	0	down
			up	up	1355058	17	up
			up	up	1475555	26	up
			up	up	1355055	36	up
			up	up	1355052	44	up
			up	up	1355052	52	up
			up	up	1355053	60	up
			up	up	1464558	68	down
AM950	4x28	All types	up	down	1355052	17	down
			up	down	1355055	26	down
			up	down	1475555	36	down
			up	down	1355058	44	down
			up	down	1355058	52	down
			up	down	1355061	60	down
			up	down	1355061	68	down
AMA860	Normal	All types	down	down	1355058	0	down
AMA740	Low	All types	down	down	1475555	0	down
AMA860	Low	All types	down	down	1355056	0	down

Table 7: Multi-leaf spring LHD

Configuration			1st axle	2nd axle		
Axle	**Spring**	**Cab**	**Ball joint position**	**Draglink arm part No.**	**Separator insert**	**Ball joint position**
AM620	7x15	All types	up	1355058	0	down
			up	1355061	17	down
			up	1355061	26	up
			up	1355058	36	up
			up	1355055	44	up
			up	1355055	52	up
			up	1355052	60	up
			up	1355052	68	up
AM920	9x15	All types	up	1355061	0	up
			up	1355058	17	up
			up	1355055	26	up
			up	1355052	36	up
			up	1355053	44	up
			up	1355053	52	up

Table 8: Multi-leaf spring RHD

Configuration			1st axle		2nd axle		
Axle	**Spring**	**Cab**	**Ball joint position, RH side**	**Ball joint position, LH side**	**Draglink arm part No.**	**Separator insert**	**Ball joint position**
AM620	7x15	All types	up	up	1355058	0	down
					1355061	17	down
			up	up	1355061	26	up
			up	up	1355058	36	up
			up	up	1355055	44	up
			up	up	1355055	52	up
			up	up	1355052	60	up
			up	up	1355052	68	up
AM920	9x15	All types	up	up	1355061	0	up
			up	up	1355058	17	up
			up	up	1355055	26	up
			up	up	1355052	36	up
			up	up	1355053	44	up
			up	up	1355053	52	up

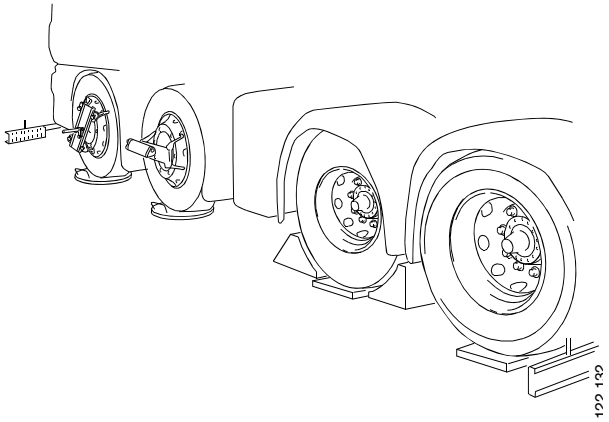
Measuring

Refer to Measuring wheel angles, main group 13, to carry out steps 1 and 2.

1 Check the centre position of the power steering gear.

2 Check toe setting, caster and straight-ahead position of the first axle and adjust as necessary.

IMPORTANT! The toe settings of both axles must be measured and adjusted in order to calculate the deviation in axle alignment of the second steered axle.

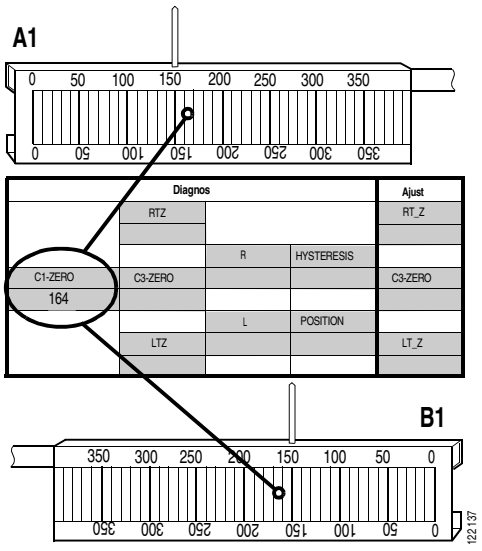


3 Check front axle positions and axle alignment in accordance with the following instructions.

4 Install the measuring equipment and wheel adapter on both left-hand steered wheels with turning discs under all steered wheels and supporting plates of the same thickness as the turning plates under all the other wheels. Refer to Measuring wheel angles in main group 13.

5 Turn the steering wheel to full lock at least once in both directions to settle the turning discs before taking measurements.

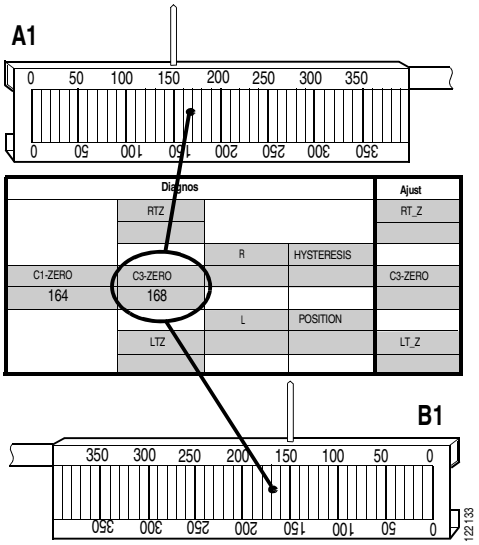
6 Place the left-hand wheel of the first axle in the straight-ahead position. Direct the laser beam alternately on the front A1 and rear B1 measuring scale. Turn the steering wheel until the same value is obtained on both measuring scales. Read and enter the value in the measurement report,
e.g. 164. C1-ZERO=164.



7 Place the left-hand wheel of the second axle in the straight-ahead position. Direct the laser beam alternately on A1 and B1. Turn the steering wheel until the same value is obtained on both measuring scales. Read and enter the value in the measurement report, e.g. 168. C3-ZERO=168.

8 Turn the steering wheel approximately half a turn to the right and then return it to the straight-ahead position for the first axle.

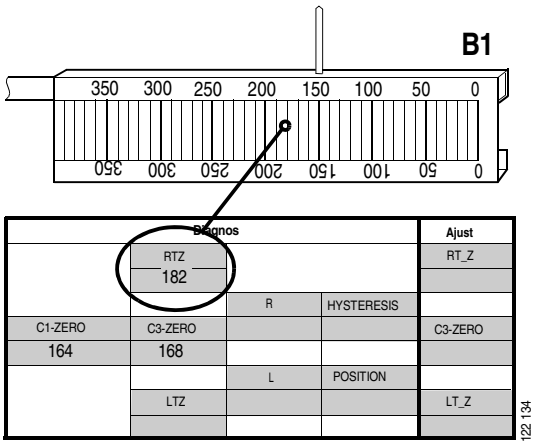
IMPORTANT! Do not turn past C1-ZERO



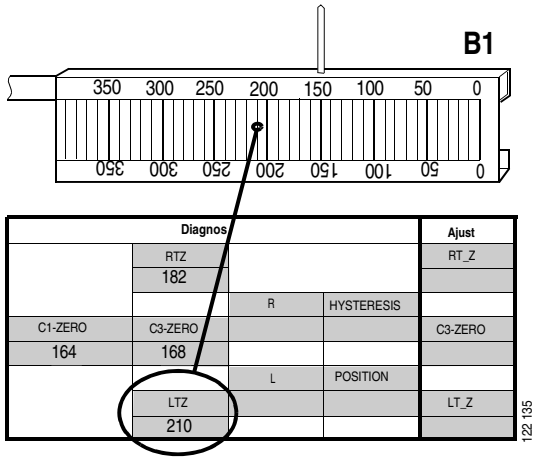
9 Take a reading for the second axle at B1 and enter the value in the measurement report, e.g. 182. RTZ=182.

10 Turn the steering wheel approximately half a turn to the left and then return it to the straight-ahead position for the first axle.

IMPORTANT! Do not turn past C1-ZERO



11 Take a reading for the second axle at B1 and enter the value in the measurement report, e.g. 210. LTZ=210



Calculating axle alignment

Note: In some measuring systems the alignment is calculated by the system.

12 Calculate the value for box R.

R = C3-ZERO – RTZ, 168 – 182 = -14. Enter the value -14 in box R.

Diagnos				Ajust
	RTZ			RT_Z
	182			
		R	HYSTERESIS	
C1-ZERO	C3-ZERO	-14		C3-ZERO
164	168			
		L	POSITION	
	LTZ	42		LT_Z
	210			

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13 Calculate the value for box L.

L = LTZ – C3-ZERO, 210 – 168 = 42. Enter the value 42 in box L.

14 Calculate the value for the HYSTERESIS box.

HYSTERESIS = (R + L)/2, (-14 + 42)/2 = 14. Enter the value 14 in the HYSTERESIS box.

Diagnos				Ajust
	RTZ			RT_Z
	182			
		R	HYSTERESIS	
C1-ZERO	C3-ZERO	-14	14	C3-ZERO
164	168			
		L	POSITION	
	LTZ	42		LT_Z
	210			

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HYSTERESIS represents the play in joints and the elasticity in links and stays, which is distributed in both directions from the straight-ahead position.

15 Calculate the value for the POSITION box.

POSITION = R – L, -14 – 42 = -56. Enter the value -56 in the POSITION box.

POSITION represents the position of the play on the left-hand wheel of the second axle in relation to the left-hand wheel of the first axle. If the value is **zero** it means that the second axle is **correctly adjusted** and the play is evenly distributed to the right and left with the axle in the straight-ahead position.

A **positive** value means that the second axle is pulling to **the right**.

A **negative** value means that the second axle is pulling to **the left**.

Diagnos				Ajust
	RTZ			RT_Z
	182			
		R	HYSTERESIS	
C1-ZERO	C3-ZERO	-14	14	C3-ZERO
164	168			
		L	POSITION	
	LTZ	42	-56	LT_Z
	210			

122 148

Calculating adjustment values

16 Calculate the adjustment values for ADJUST. Transfer the value for C3-ZERO to ADJUST. Enter the value 168 in the C3-ZERO box.

Calculate the adjustment value RT_Z.

RT_Z = C3-ZERO – HYSTERESIS, 168 – 14 = 154. Enter the value 154 in box RT_Z.

Calculate the adjustment value LT_Z.

LT_Z = C3-ZERO + HYSTERESIS, 168 + 14 = 182. Enter the value 182 in the box LT_Z.

Diagnos				Ajust
	RTZ			RT_Z
	182			154
		R	HYSTERESIS	
C1-ZERO	C3-ZERO	-14	14	C3-ZERO
164	168			168
		L	POSITION	
	LTZ	42	-56	LT_Z
	210			182

122 149

Note: Make sure the first axle does not move during adjustment, secure the steering wheel in C1-ZERO position if necessary.

17 When the POSITION value is **positive**, adjust in position RT_Z.

IMPORTANT! Do not adjust any higher.

18 Turn the steering wheel approximately half a turn to the right and then return it to the straight-ahead position for the first axle according to C1-ZERO, 164 on B1.

19 Shorten the draglink until the value for ADJUST RT_Z 154 is obtained.

20 When the POSITION value is **negative**, adjust in position LT_Z.

IMPORTANT! Do not adjust any lower.

21 Turn the steering wheel approximately half a turn to the left and then return it to the straight-ahead position for the first axle according to C1-ZERO, 164 on B1.

22 Lengthen the draglink until the value for ADJUST LT_Z 182 is obtained.

23 Check again according to steps 5-14 and adjust according to steps 15-21 if necessary.

Report

Diagnosis				Adjust
	RTZ			RT_Z
		R	HYSTERESIS	
C1-ZERO	C3-ZERO			C3-ZERO
		L	POSITION	
	LTZ			LT_Z