Workshop Manual

TSR30
CSR 12,5/16/20

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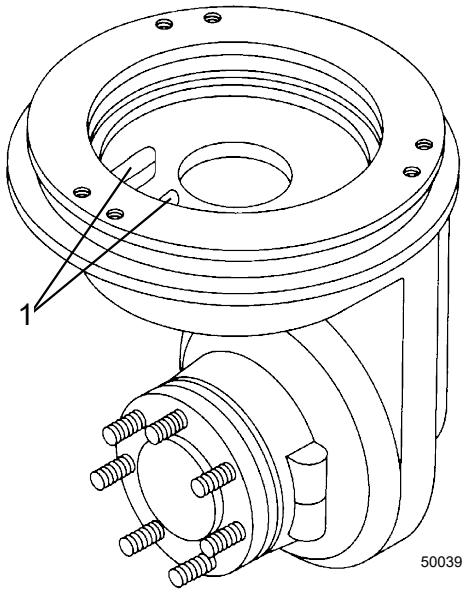
Maintenance

Visual inspection, replacing damaged parts

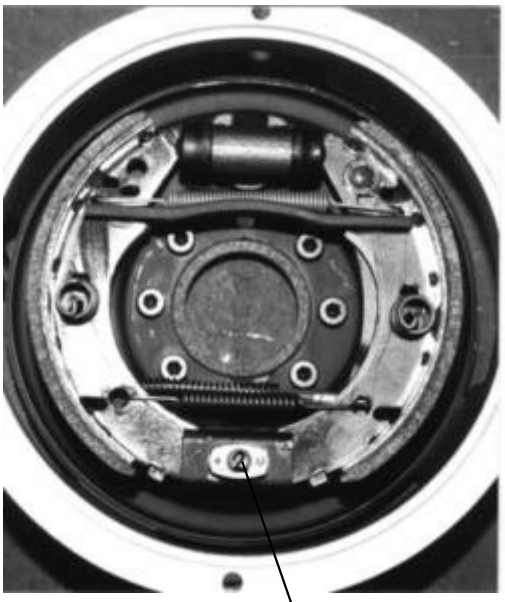
- Straighten or replace dented sealing tapes.
- Check fan impellers for damage. Damaged fans (imbalance, reduced output) must be replaced.
- Clean the gear ventilation channels (1). To do so, remove the drive motor and clean the channels with a vacuum cleaner (do not blow them out with compressed air). Soiling impairs the air circulation, which leads to increased temperatures in the motor and possibly to irreparable damage.
- Check field and armature coils for signs of over-loading (overheating): dark coloration, brittle or burned insulation, unsoldered commutators.
  Motors with this kind of damage must be replaced without delay.
- If you discover oil or grease in the motor (usually a paste made up of oil, oil vapour mixed with dust and carbon abrasions), investigate the cause immediately and remedy it. The motor must be cleaned extremely thoroughly.



Remark: Rapid carbon brush or commutator wear is generally due to the effect of oil.
The oil/grease burns in the brush sparks, leaving behind a sharp-edged oil ash which has an abrasive effect.
This can lead to inadmissibly high levels of carbon brush wear before the scheduled maintenance date is reached.

Adjusting the brake clearance

Note: The brake deceleration values must be checked in accordance with the guidelines (see brake deceleration) once a year and after all adjustments/ repairs made to the brake system.



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Checking the brake lining thickness

There are holes (1) integrated in the brake plate which are designed for visual inspection of the brake linings. If there is only a residual thickness of approx. 2mm visible, the brake shoes must be replaced.

Adjusting the brakes

The inner shoe brake has a central adjustment feature for the clearance and enveloping circle. In this adjusting process, a wedge (2) is drawn between the contact points of the brake shoes, which causes the enveloping circle to change. As a result, ideal utilisation of the brake linings is achieved, while at the same time, the leverage for transfer of the brake force to the brake drum is improved. After every new adjustment of this brake wedge, the brake shoes must be re-centred by braking several times.

Turning the adjusting wedge (2) to the right pulls the wedge upward, in other words expands the enveloping circle and results in re-adjustment of the brake linings. Turning the wedge to the left makes the enveloping circle smaller. Brake clearance setting 0.3-0.5mm.

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Steering sensor

General

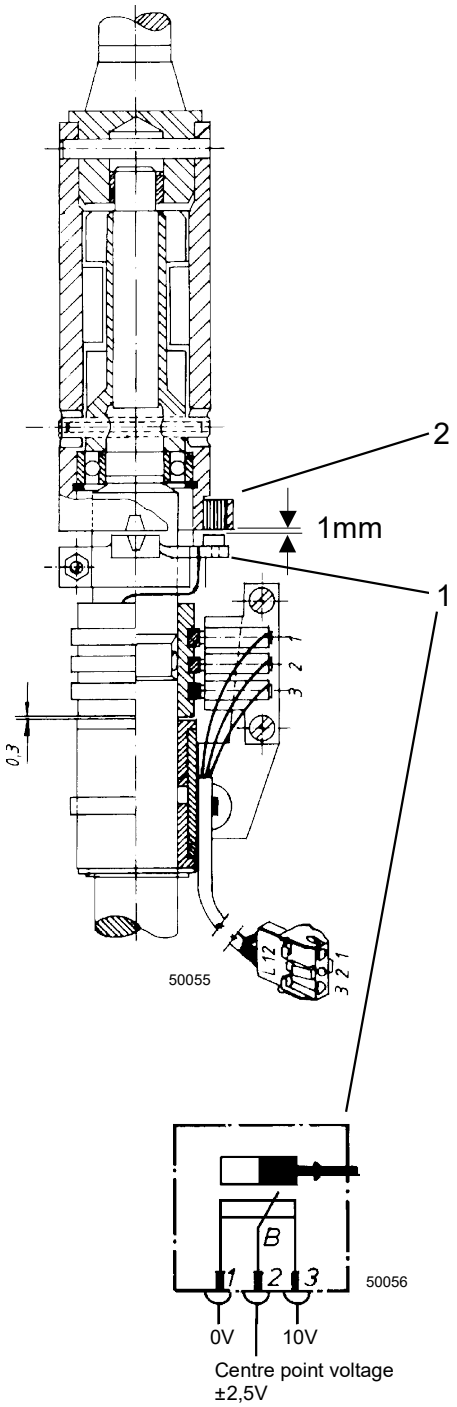
For measurement of the setpoint, which is proportional to the steering force, the system uses a differential magnetoresistive sensor (1), which is influenced by a permanent magnet (2)

The steering column is divided into 2 sections. The upper section with the steering wheel can be turned against the lower section with the cardan joint by ±7° out of the centre position against two torsion elements made of foam rubber.

The differential magnetoresistive sensor can be seen as a resistor that is dependent on a magnetic field. It is fitted on the lower section of the steering column, and the magnet on the upper section. When the two sections are turned in opposite directions, the magnetic field changes in dependence on the angle of the magnetic field, which also causes the output signal to change.

When not actuated, the centre point voltage of the differential magnetoresistive sensor is half the supply voltage and is the reference potential for the steering controller.
The change in voltage in comparison to the reference potential is approx. ±2.5V, depending on the turning direction and force.

This change in voltage is also dependent on the distance between the magnetoresistor and the magnet. For this reason, the distance between the magnetoresistor and the magnet should be 1mm at the most.



Curtis Combi-Controller 803

General

The Curtis Combi-Controller 803 works on the principle of continuously comparing the battery voltage with an internally set reference voltage series.

This 36 stage reference voltage is the same as the course of the discharge voltage that has been set.

If the mean value of the battery voltage drops below the reference voltage within a space of 46 seconds, the Combi-Controller 803 automatically makes a comparison with the next reference voltage down.
This process is repeated from one voltage stage to the next.

As the voltage stages decrease, the LED display moves from the right to the left. When the cut-off wave (final discharge voltage) is reached, the two LEDs on the left flash (in red).

The discharge characteristic curve can be set on the back of the appliance, to suit the relevant operating conditions.
The battery charging status is stored with a lithium battery (10 years), and the counter status is stored in an EEPROM.

Adjusting accumeter EL-AC

The table below shows the various different basic settings for different battery types.
When the vehicle is used in cold storage areas there may be variations, depending on the operating conditions.
In cases of this kind, please contact the battery manufacturer.

Battery type	Basic setting
Lead acid wet-cell battery (PZS)	G
Lead acid wet-cell battery Capacity-increased (CSM)	I
Sonnenschein Dryfit	K
Varta Carat (gel battery)	K
Deta Dryflex	K
Gel batteries in general	K

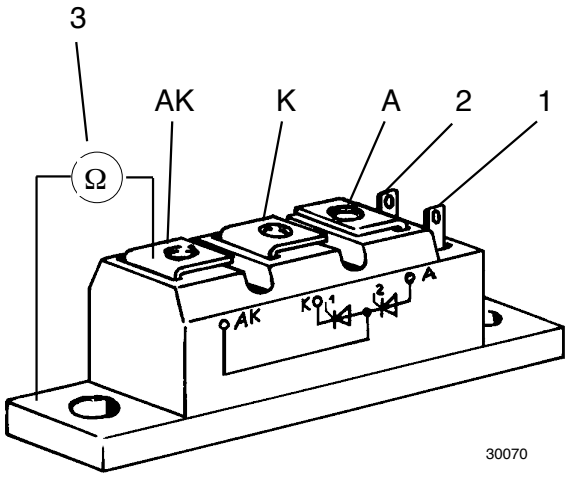
Remark: Identification letter I is between G and J.
Identification letter K is between J and M.

Thyristor power block

General

The thyristor power block is used on the control panel A1 with adapter card A8, and incorporates the gate turn-off and transcharge thyristor (n22 and n36).

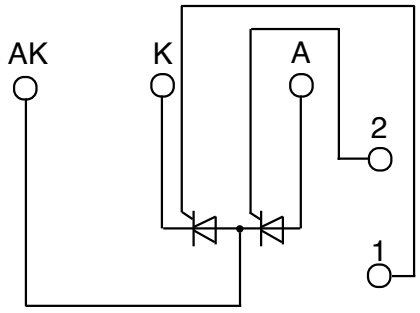
The thyristor can be tested when it is installed (see Travel control/ Testing the primary current).



Remark: No conducting connection should exist between the individual terminal and the cooling surface (resistance measurement, 3).

Terminals

AK - K:	Transcharge thyristor n36
AK - A:	Turn-off thyristor n22
1:	Gate transcharge thyristor
2:	Gate turn-off thyristor



Control circuit board u200

Reversing current RS
If the travel direction switch is switched over while the accelerator is pressed, the truck is electrically braked and accelerated in the opposite direction. This process must be set in such a way that the drive wheel does not block and a "gentle" acceleration is carried out.
Potentiometer setting at the furthest right-hand poistion (full reversing current).

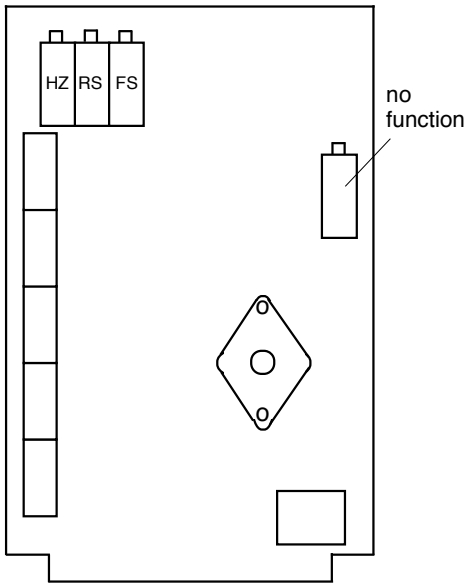
Drive current FS
By correct setting of the drive current, the optimum power output of the vehicle is achieved without the possibility of overloading occurring in the drive system.

Maximum values for drive current:

24V truck: 280A
48V truck: 220A

Remark: As these are maximum values, they must not be exceeded. Before precise setting of the drive current, it is necessary to set the reversing current!
(see travel control/ Measurement and adjustment of drive current)

up to 11/90



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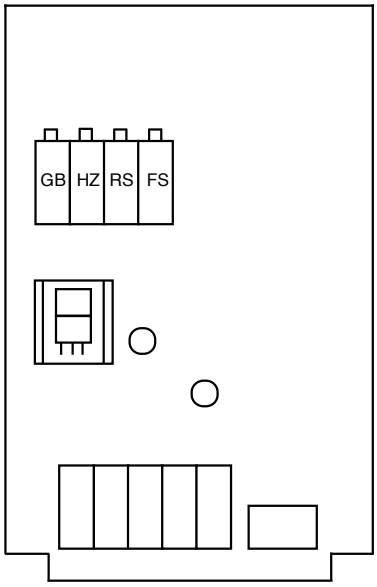
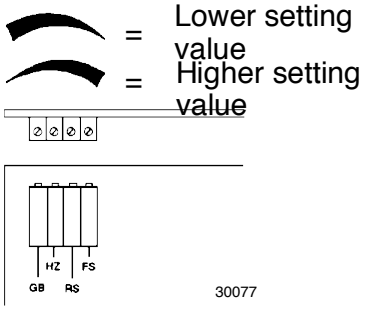


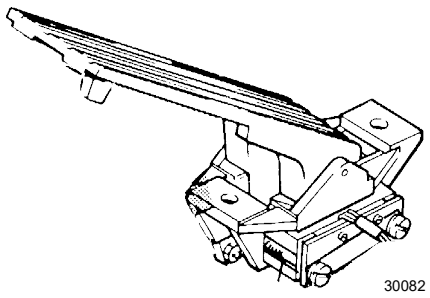


General

The accelerator pedal with electronic sensor is a closed unit and operates on a contact-free and therefore wear-free basis.

The lower part of the plastic pedal accommodates a permanent magnet, the exterior of which is moved past the closed sensor.

Depending on the position of the manget, a control signal (appr. 4-8V) is given off to the control circuit board via the sensor. Adjustment is not possible.



Magnet with colour coding positioned towards the outside.

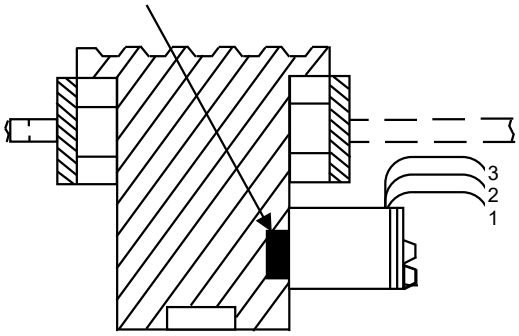
Functional characteristics of the magnetoresistor

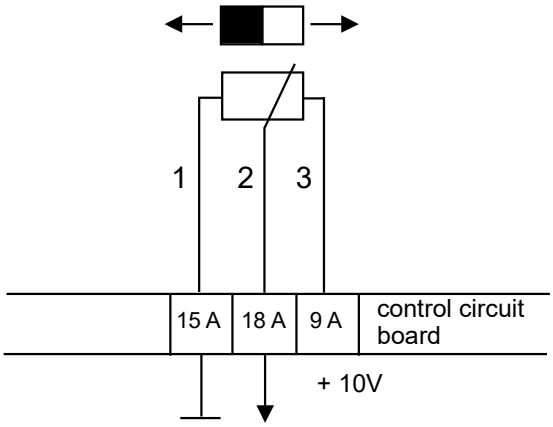
The resistor can be seen as a magnetic field-dependent resistor.

The magnetoresistors used in the sensor and current transformer are differential resistors. They consist of two series-connected resistors in one housing with central tapping.

Depending on the position and influence of the magnetic field, the resistance ratio of the two resistors in relation to each other changes and so, when voltage is applied (appr. 10V) at the outside terminals (1 and 3), also the potential at the central tap (2).

The alteration in potential of the central tap is transmitted to the control circuit board as a control signal.





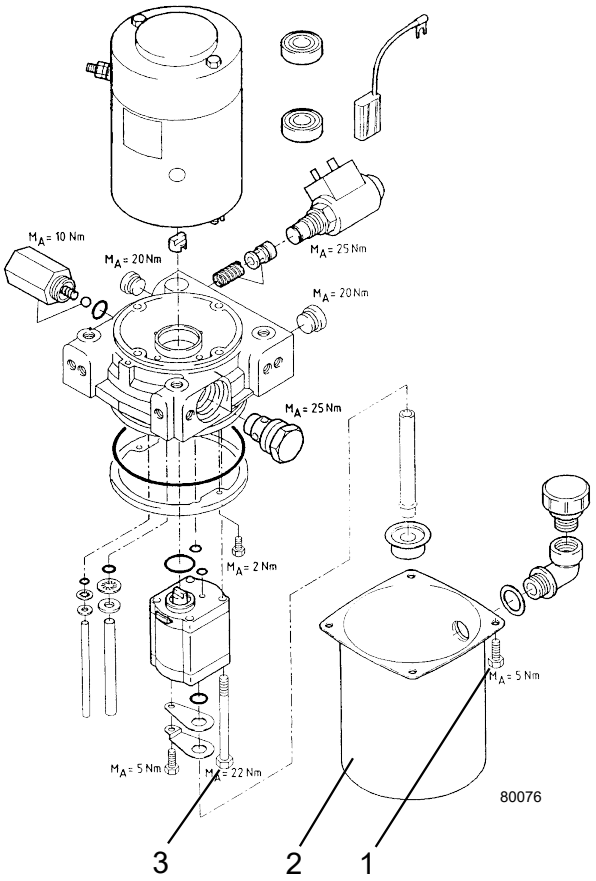
Measured values:		
1 against	3	=10 V
1 against	2	=ca. 4V (0-position)
1 against	2	=4-8 V (actuated)

Pump assembly

Removing the hydraulic pump

1. Pull out the battery plug
2. Remove the pump assembly
3. Remove the pump motor
4. Unscrew the 4 hexagon screws (1).
5. Remove the tank (2).
6. Unscrew the 4 hexagon screws (3).
7. Remove the hydraulic pump.

Remark: After re-assembling again, check the oil level (oil volume approx. 1.5 litres).



Adjustment

Angled lever - pressure rods

(depends on vehicle type)
The length of the pressure rods cannot be adjusted. If adjustment is necessary, spacer plates can be added at the fastening of the angled lever hinge point (1).

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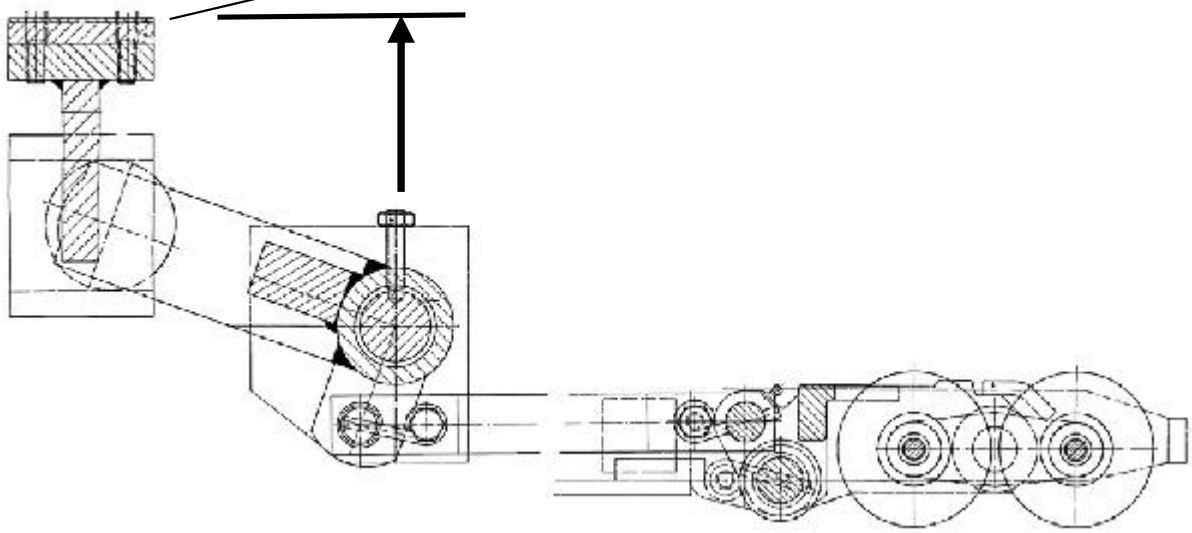

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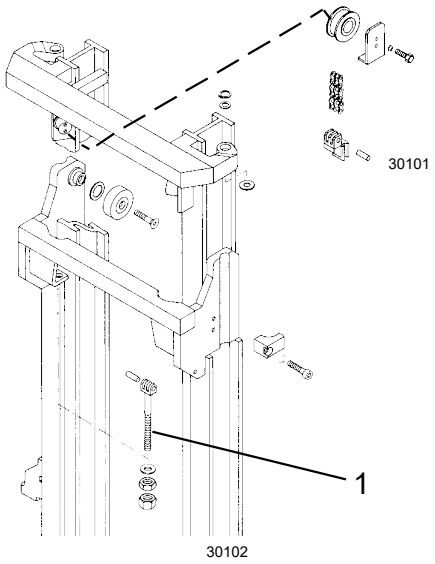
Chains

General

Chains increase in length with time. Once a determined tolerance is exceeded, the chain must be exchanged. In order to keep wear to a minimum, carry out the following work once every 6 months:

1. Regular cleaning with compressed air (in special cases using a steam jet without cleaning additives) followed by spraying the chain using a chain spray.
2. Check correct setting (tension) of the chains.
3. Avoid one-sided strain due to incorrect chain tension or a mechanical fault.

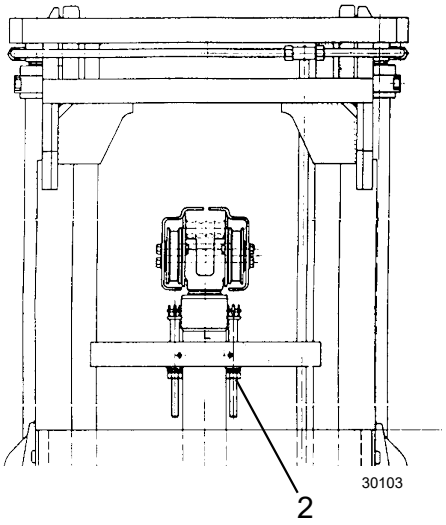


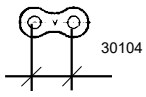
The control chains are tensioned using the two chain tensioners (1).

The chain tensioner (2) for the clearance lift is located directly behind the clearance lift cylinder.

Two types of chains are used

- 3/4inch chains (19.05mm) Control chain
- 1inch chains (25.4mm) clearance lift chains





1" / 3/4"

Steering

Ease of movement

It should be possible to turn the steering wheel with a moderate amount of force.
On vehicles with electrical power assisted steering (1), the function of the steering controller and steering sensor must be checked (please see Steering).

Note: During work on the steering controller or steering sensor the steering wheel can turn. If this is a problem, dismantle the chain to the steering motor.

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Cut-out in the event of error

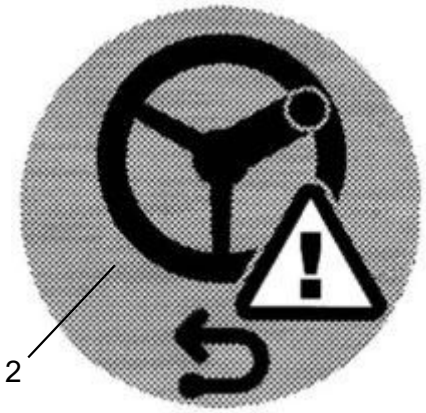
If there is an internal or external error in the steering controller, the vehicle can be steered in emergencies with the mechanical steering column.

Steering chain

The steering chain and pinion must be lubricated.

Reverse steering

If the vehicle is fitted with reverse steering, the appropriate information sign (2) must be mounted on the vehicle.



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