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# WABCO



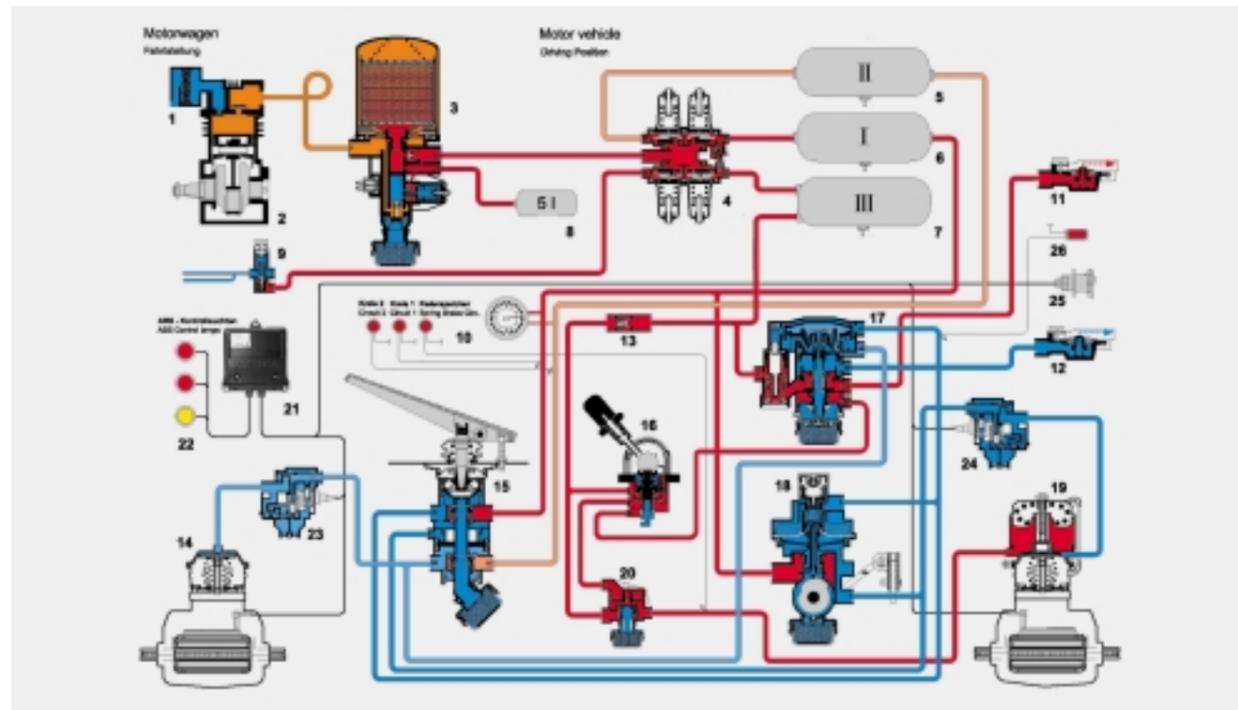
## The Compressed Air Braking System

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**WABCO**

**Vehicle Control Systems**  
An American Standard Company

## The Compressed Air Braking System for Trucks



### Air Supply

The compressed air delivered by the compressor (2) reaches the air dryer (3) where any water vapour is extracted from the air and emitted to atmosphere through the dryer's vent. The unloader valve integrated in the air dryer automatically controls the pressure within a range of between 7.2 and 8.1 bar, for instance.

The dried air then flows to the quadruple circuit protection valve (4) which, in the event of any defect in one or several circuits, protects the intact circuits against a fall in pressure. In service braking circuits I and II, the air from the air reservoirs (5 and 6) flows to the brake valve (15).

In circuit III the air from the air reservoir (7) passes through the 2/2-way valve integrated in the trailer control valve (17) and on to the automatic hose coupling (11), and through the check valve (13), hand brake valve (16) and the relay valve (20) into the spring-loaded portion of the Tristop® spring-brake actuators (19). Circuit IV is used to supply compressed air to any ancillary consumers which are represented by the engine brake in this case.

When the supply hose is connected, the braking system of the semitrailer receives its compressed air through the hose coupling (11). The air flows through the line filter (31) to the relay emergency valve

(34) and on into the air reservoir (36). From that reservoir it reaches the supply ports of the ABS relay valves (38 and 40) and the spring-loaded portions of the Tristop® spring brake actuators (42 and 43).

### Operation: Service Braking System

When the brake valve in the motor vehicle (15) is actuated, compressed air flows via the ABS solenoid control valve (23) into the brake chambers (14) on the front axle and to the load-sensing valve (18).

The load-sensing valve reverses and the air now flows through the ABS solenoid control valve (24) into the service braking portion (brake cylinders) of the Tristop® spring brake actuators (19). The pressure level in the brake cylinders generating the force required for the foundation brake is dependent on the foot force applied to the brake valve and on the vehicle's load.

This pressure is controlled by the load-sensing valve (18) which is connected to the rear axle by means of a linkage. The continuous change in the distance between the vehicle's frame and its axle while the vehicle is being loaded or unloaded causes the control pressure to be adjusted continuously. At the same time, the empty-load valve integrated in the brake valve receives information on the change in the load through a pilot line.

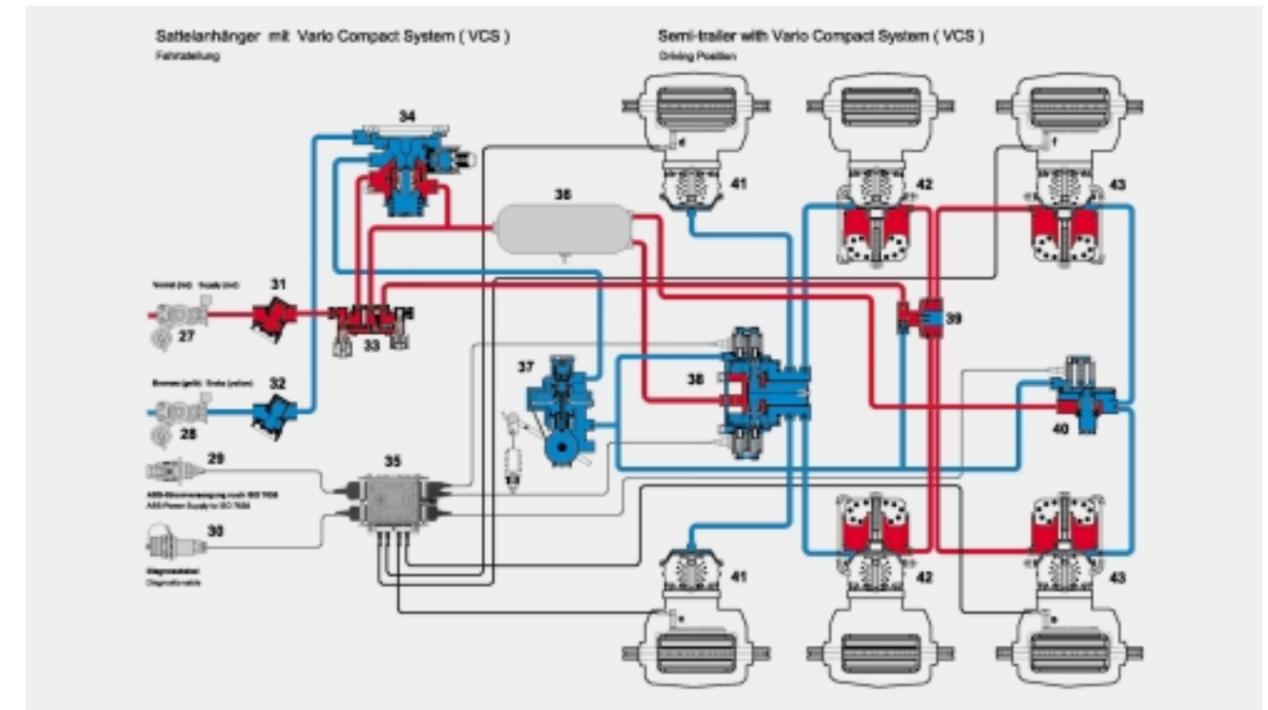
Thus the control pressure on the front axle is adjusted to the load carried on the vehicle (mainly on lorries). The trailer control valve (17) actuated by both service braking circuits pressurizes the control port of the relay emergency valve (34) from the hose coupling (12) and through "control" connecting hose. Thus the air supply from the air reservoir (36) is allowed to pass to the load-sensing valve (37).

The ABS relay valves (38 and 40) are actuated by the load-sensing valve, and the compressed air is allowed to pass to the brake chambers (41) and the service braking portions (brake chambers) of the Tristop® spring-brake actuators (42 and 43).

The control pressure on the semitrailer which corresponds to the output pressure from the motor vehicle is adjusted by the load-sensing valve (37) to the load carried on the semitrailer. The ABS relay valves (on the semitrailer) and the ABS solenoid control valves (on the motor vehicle) are used for controlling (pressure increase, pressure hold or pressure reduce) the brake cylinders.

If the valves are activated by the electronic control unit for ABS (21 or 35), this control is achieved regardless of the pressure which is allowed to pass by the brake valve or the relay emergency valve. When not required (solenoids are currentless)

## The Compressed Air Braking System for Trailers



the valves operate as relay valves and are used to rapidly increase or decrease the pressure in the brake cylinders.

### Parking Braking System

When the hand brake valve (16) is actuated and moved to its lock-in position, the spring-loaded portions of the Tristop® spring-brake actuators (19) are evacuated completely. The force required for the foundation brake is now generated by the heavily prestressed springs of the Tristop® spring-brake actuators.

At the same time, the line leading from the hand brake valve (16) to the trailer control valve (17) is also evacuated. The braking process for the semitrailer is commenced by the pressure being increased in the "control" connection hose.

As the Guideline of the Council of the European Communities (GCEC) requires that the motor vehicle must be able to hold the whole of the tractor-trailer combination, the braking system of the semitrailer can subsequently be evacuated by moving the hand brake lever into the "control position".

This can be done to ascertain whether the parking braking system of the motor vehicle meets the requirements of the GCEC. The parking brake of the detached semitrailer is actuated by pulling out the

red actuating button on the double release valve (33) which causes the spring chambers of the Tristop® spring-brake actuators (42 and 43) to be evacuated through the quick-release valve.

### Emergency Brake

Due to the sensitive gradability of the hand brake valve (16) the semitrailer-tractor combination can, in the event of service braking circuits I and II failing, be braked by the spring-loaded portions of the Tristop® spring-brake actuators (19).

As described for the parking braking system, the brake force required for the foundation brake is generated by the prestressed springs of the Tristop® spring-brake actuators (19) although the spring-loaded portions are not evacuated fully but only to the extent required for the performance of the brakes.

### Automatic Braking of the Semitrailer

In the event of the "supply" line rupturing, the pressure falls abruptly and the relay emergency valve (34) causes full braking of the semitrailer.

In the event of the "control" line rupturing and the service brake being actuated, the 2/2-way valve integrated in the trailer control valve (17) throttles the passage to

the hose coupling (11) to the point where the rupture of the control line causes a rapid fall in pressure in the supply line and the relay emergency valve (34) induces the trailer to be braked automatically within the maximum period of 2 seconds as required by law.

The check valve (13) safeguards the parking brake against unintentional actuation if the pressure within the supply line leading to the trailer falls.

### ABS Components

The motor vehicle usually has three telltale lamps (if ASR is installed there will be more) showing which functions are active, and for consistent monitoring of the system. It also has a relay, an information module and an ABS socket (25).

When the driving switch is actuated, the yellow telltale will be on if the trailer has no ABS or if that connection has been severed.

The red telltale goes off as soon as the vehicle is moving at a speed in excess of approx. 7 k.p.h. and no error or defect has been detected by the safety circuit of the electronic control unit for ABS.