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TRAILER SPRING BRAKE CONTROL SYSTEMS

Provide a Choice of

SPRING BRAKE PRIORITY
or
SERVICE RESERVOIR PRIORITY

Changes in the requirements of “DOT 121” as they relate to the supply and control of trailer spring brakes have resulted in the evolution of two distinct spring brake control system logics.

The first system gives priority to the release of the spring brakes - regardless of the condition of the reservoir - and is known as “**Spring Brake Priority**”

The second system gives priority to the filling of the service reservoir prior to releasing the spring brakes - and is therefor referred to as “**Service Reservoir Priority**” logic.

Tramec Sloan provides both systems.

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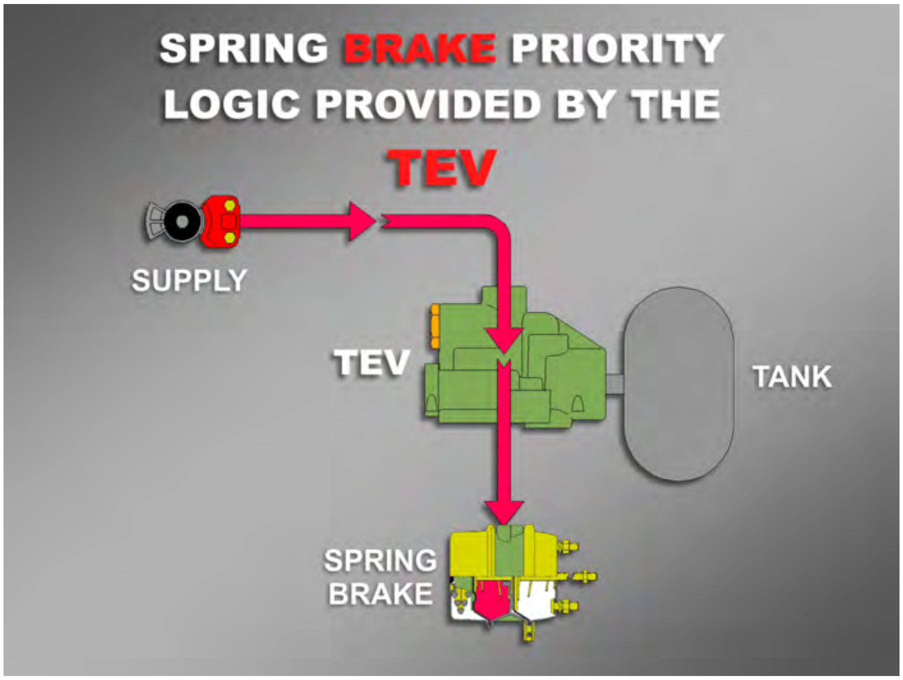
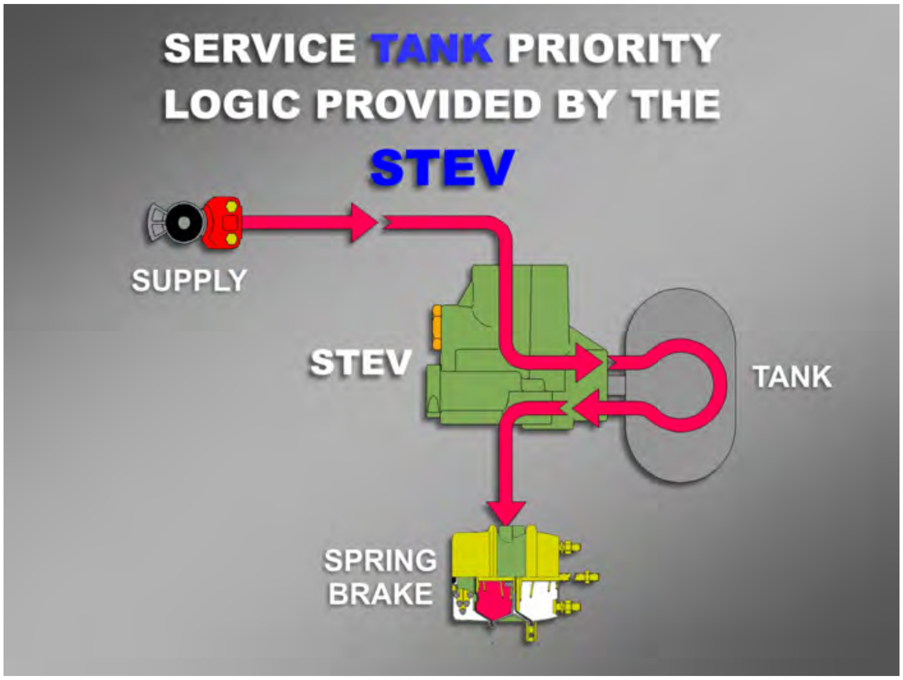


With "**Spring Brake Priority**", air pressure is routed directly from the supply gladhand (also referred to as the "emergency" gladhand), to the spring brakes. This is accomplished in the **Tramec Sloan** system by a valve known as the **TEV**, or **T**railer **E**mergency **V**alve.

"**Spring Brake Priority**" provides the ability to quickly move a vehicle without waiting for the reservoir to fill. This can be advantageous in operations that require a lot of re-spotting of vehicles. This logic also allows the quick removal of a disabled vehicle in which the tank cannot be pressurized. This also requires that the tractor be able to provide a reliable supply - otherwise it may be possible to drive away a trailer without adequate service tank pressure.



With "**Service Reservoir Priority**", air pressure is routed from the supply gladhand so that pressure must be built in the service reservoir before the parking brakes are released. This is accomplished in the **Tramec Sloan** system by a valve known as the **STEV**, or **S**ensing **T**railer **E**mergency **V**alve.

"**Service Reservoir Priority**" insures that the reservoir receives significant air pressure before the spring chambers are sufficiently pressurized to release the brakes. This system has the advantage that it requires that the tractor be able to provide an adequate supply before the trailer can be driven away. This can also be a disadvantage if the trailer is disabled in traffic by the failure of a tank. The spring brakes must be caged or disconnected before the vehicle can be moved. A dangerous process that leaves the trailer completely without brakes.

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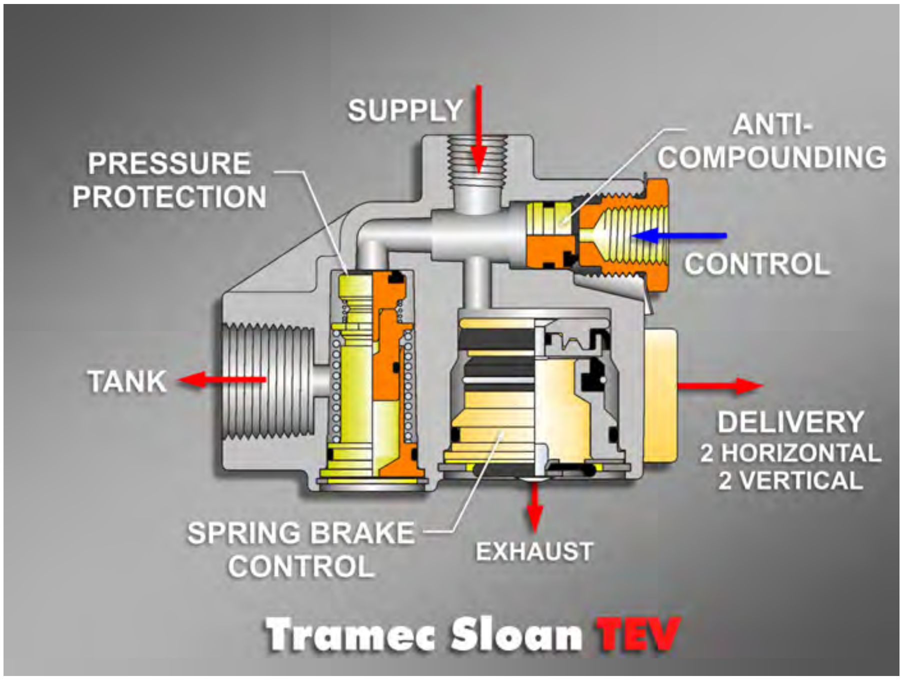
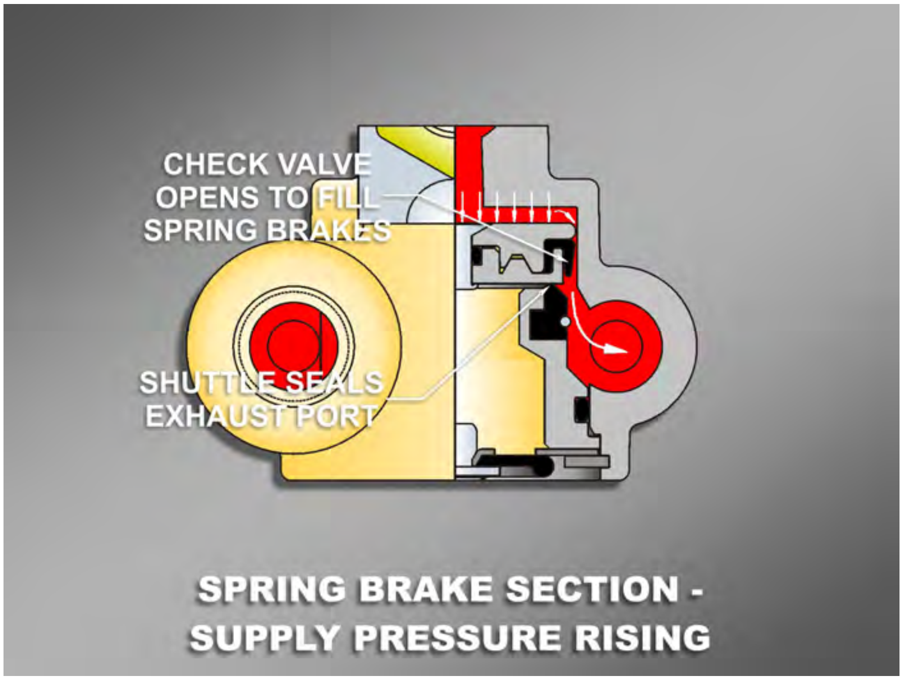


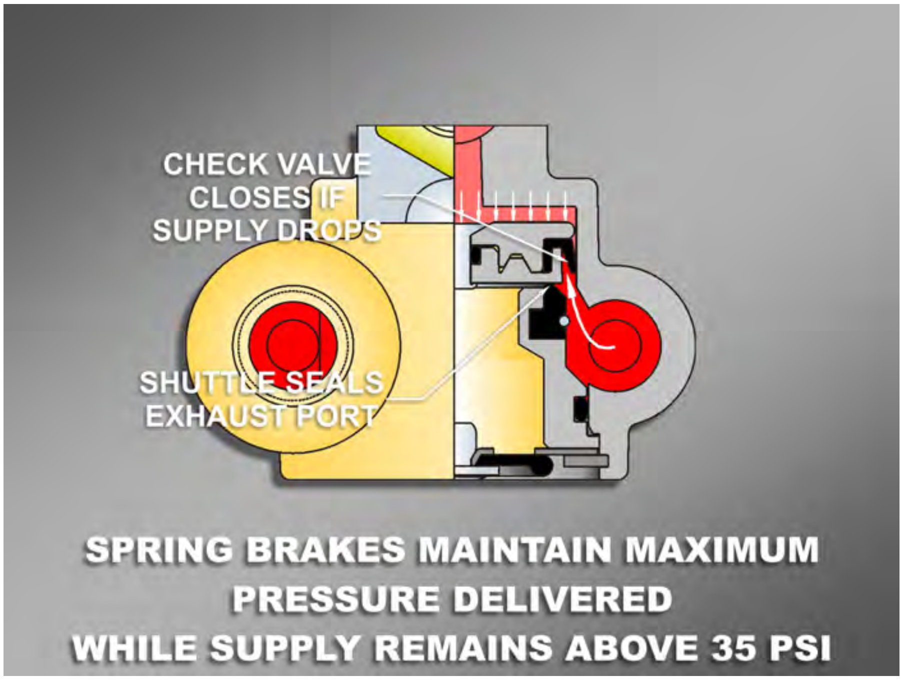
This cross section of the **TEV** shows the simplicity of the valve. The valve is nipple mounted on the tank at the reservoir port. The supply line is connected at the top port, the service line is connected at the control port, and four delivery ports are provided to allow the valve to easily control three axles.

The valve has three functional sections:

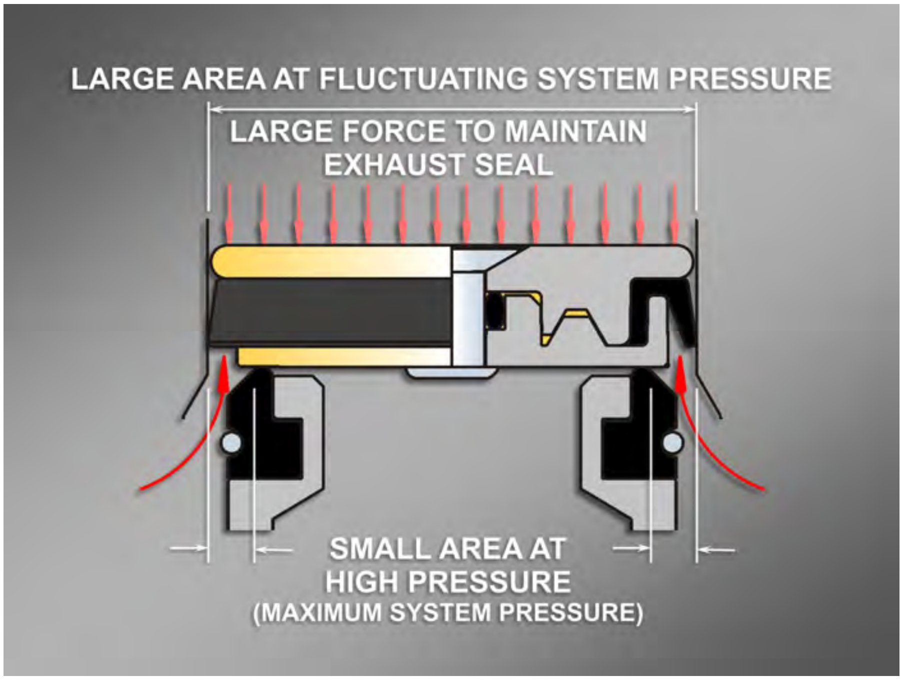
1) The **Pressure Protection** section,
2) The **Anti-Compounding** section, and
3) The **Spring Brake Control** section.



The **Spring Brake Control** section is seen in this view as pressure is first being delivered to the supply (emergency) gladhand. Air flows into the Supply port and directly into the top of the spring brake control section. This forces the "shuttle" to press against the seal to close off the exhaust port. The "check valve flapper" allows air to flow around the shuttle and out to the spring brakes through the delivery ports.

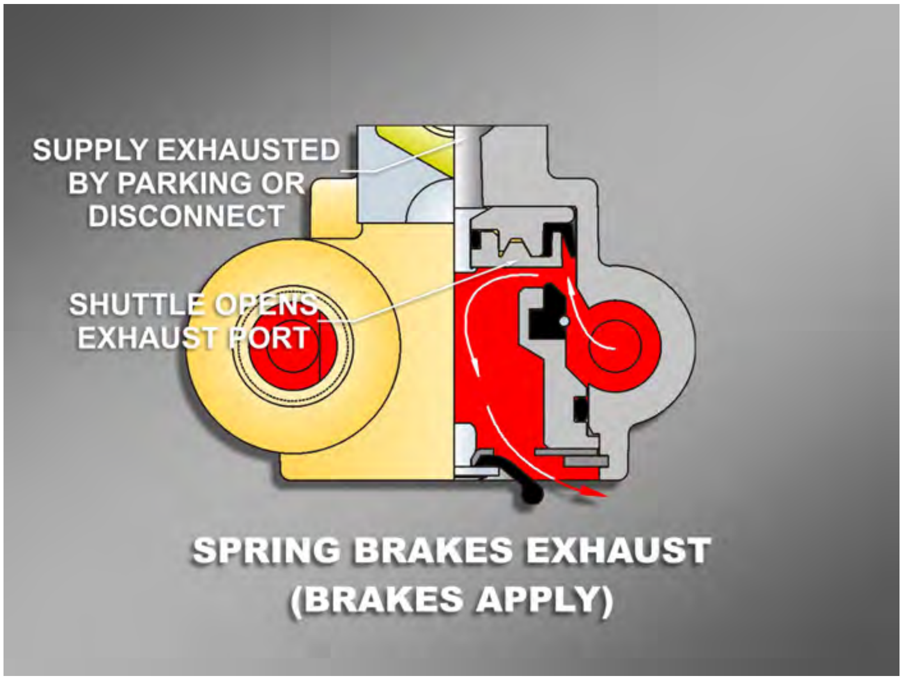


If the air pressure delivered to the supply port should drop (such as when tractor air is being consumed), the pressure will also drop at the top side of the "shuttle". The check valve "flapper" will prevent the air from flowing backward, out of the spring brakes.



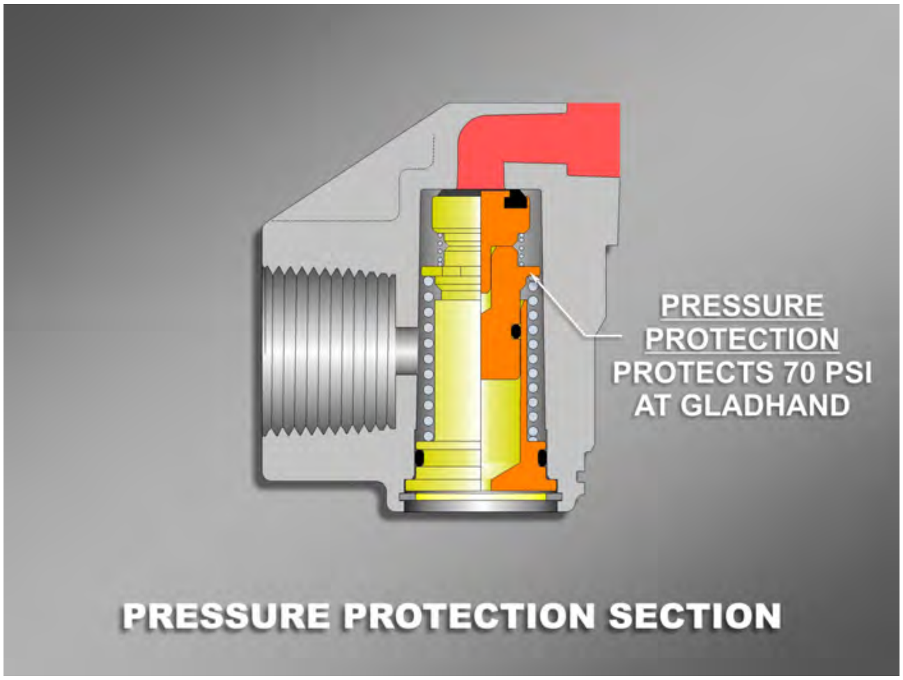
Force (lbs) = **Air Pressure** (lbs / sq. in.) X **Area** (sq. in.)

The force applied to the top of the shuttle is equal to the air pressure at the supply port (psi) multiplied by the large area of the top of the shuttle. The area exposed to the high pressure in the spring brakes is exerted against only a very small area on the bottom of the shuttle, producing a much smaller force trying to lift the shuttle. The maximum pressure delivered by the tractor may therefor be trapped in the spring brakes to **Prevent Brake Drag.**

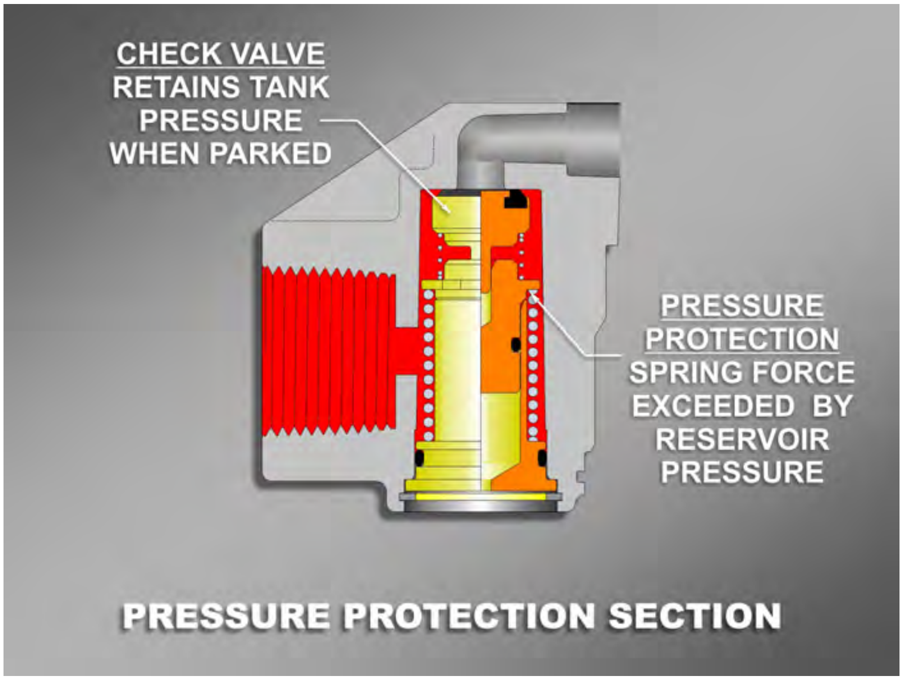


When the pressure at the gladhand falls to zero because the driver applies the parking brake, or the gladhand is disconnected, the pressure at the top of the shuttle will also fall to zero.

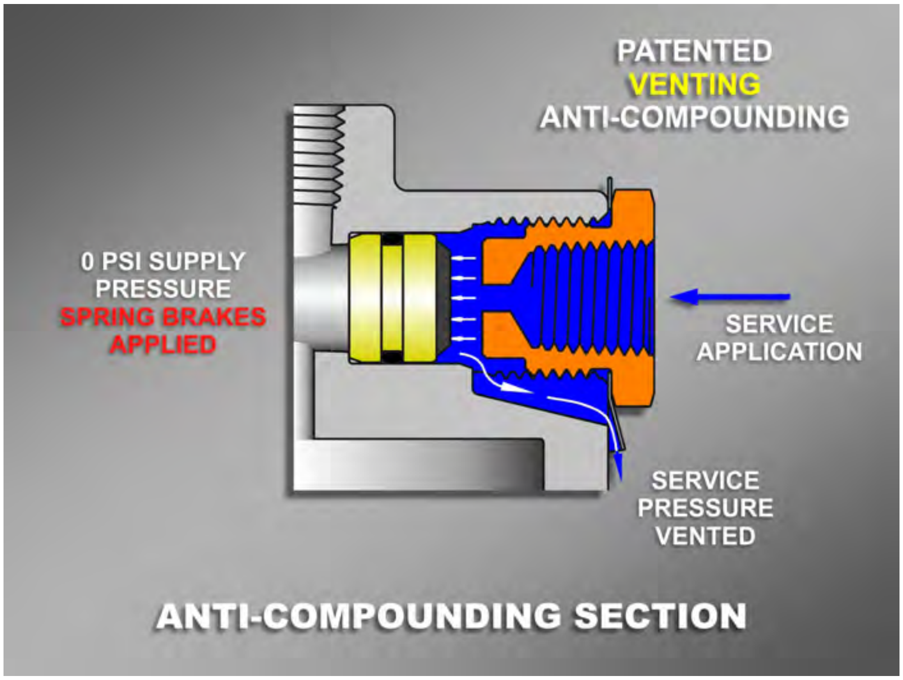
The force developed against the bottom of the shuttle by the high pressure in the spring brakes can now lift the shuttle to open the **Exhaust Port**, and vent (apply) the spring brakes.



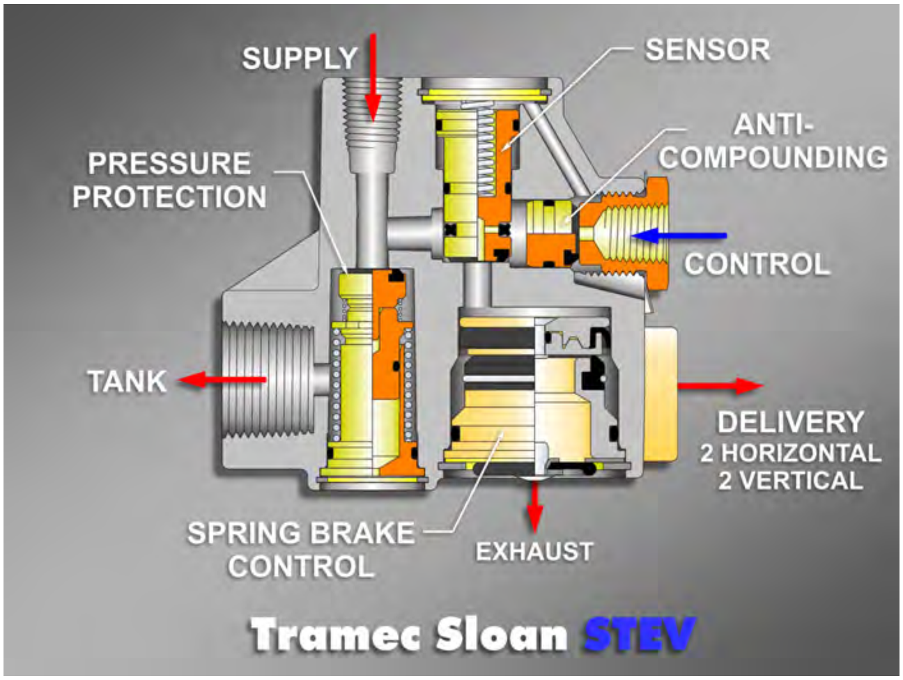
The protection of gladhand pressure to 70 psi as required by DOT 121, is provided by the **Pressure Protection Section** of the **TEV**. The law requires that the supply line pressure not be allowed to fall below 70 psi as the result of any service system failure, including the failure of a tank. The pressure in the supply must over come the spring force to open flow to the tank. This view shows the valve when supply pressure is below the pressure required to allow flow to the reservoir.



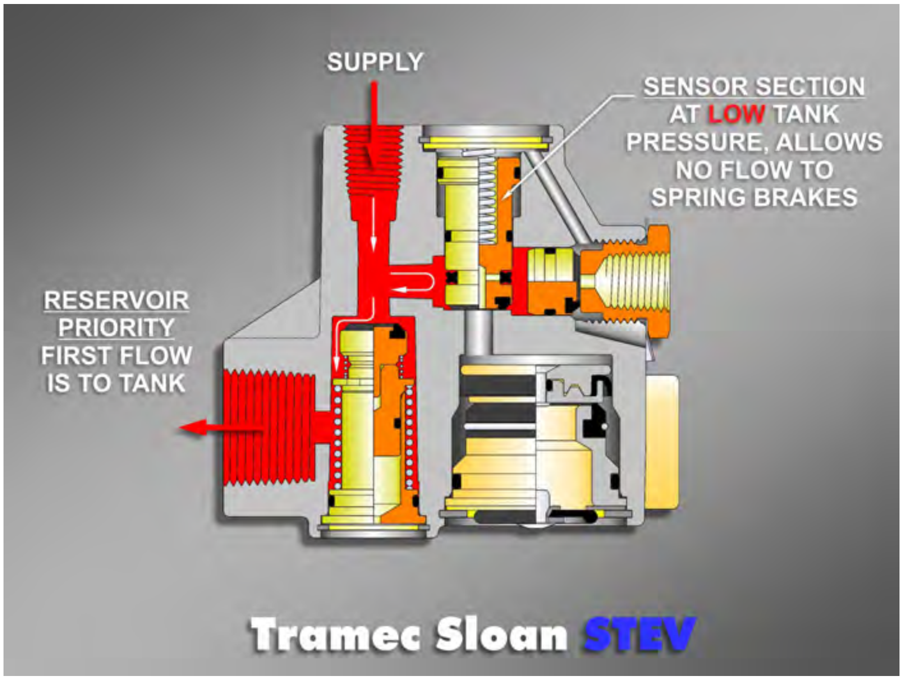
The **Check Valve** maintains tank pressure when the trailer is parked. Once the reservoir pressure exceeds that required to over come the calibrated spring, only the very weak check valve spring must be compressed to open the check valve. Above this point, the reservoir pressure will be about 4 psi below the supply pressure.



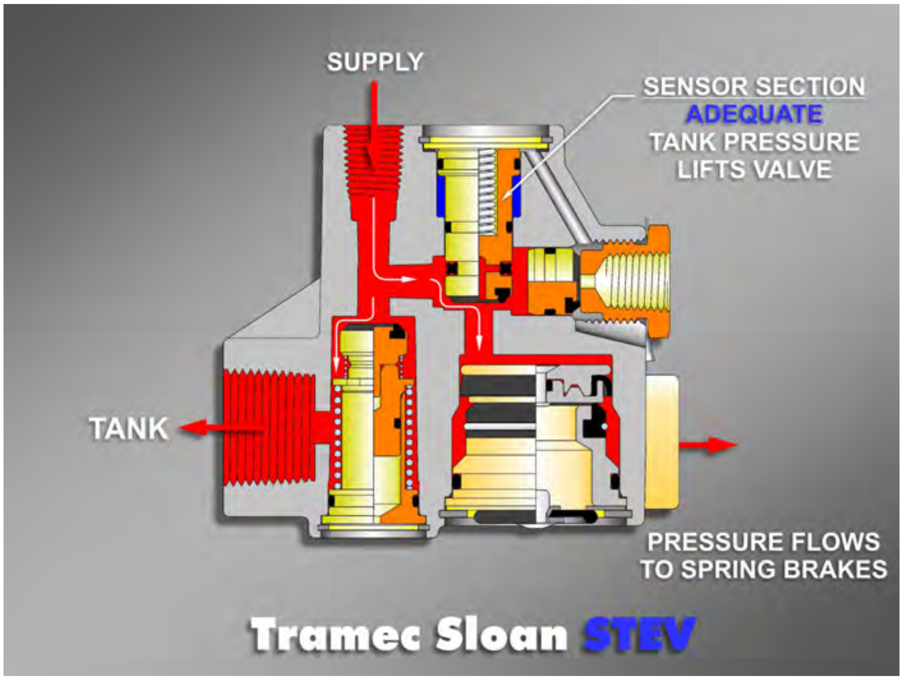
The **Anti-Compounding Section** 1) Prevents the simultaneous application of Service Brakes and Spring Brakes; 2) Prevents "false release" of the spring brakes; and 3) Provides for ejection of control line fluid contaminants. Air pressure at the supply port will force the piston to seal the control port during normal driving. With 0 psi at the supply port (spring brakes applied) any pressure in the control (service) line will shift the piston, open the orifice, and vent the line to atmosphere - eliminating service brake pressure and contaminants.



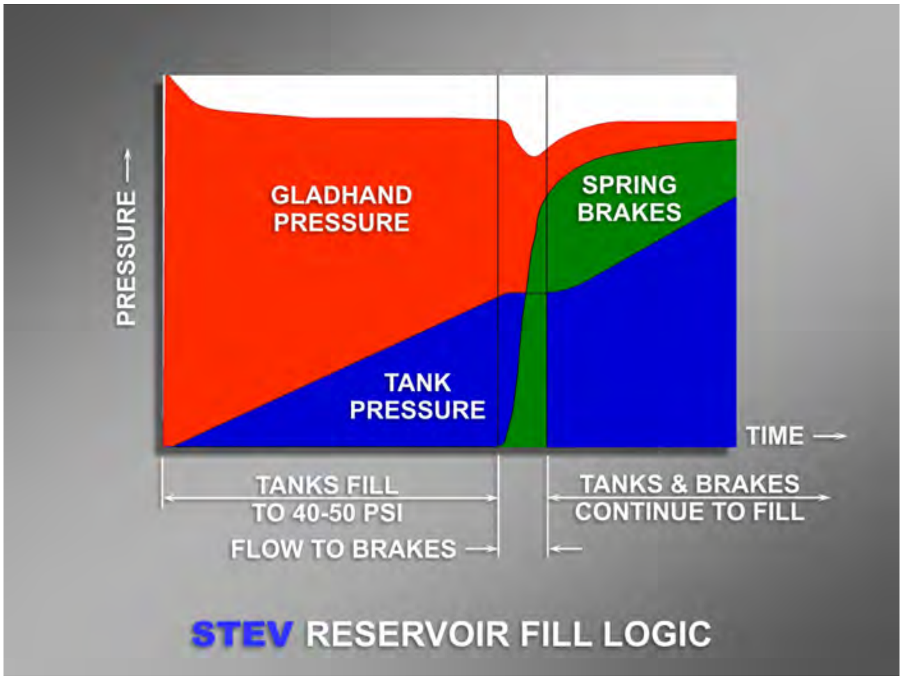
This is a cross sectional view of the **STEV** (service reservoir priority valve) illustrates the presence of the same ports that were seen in the **TEV**. The Anti-Compounding, Spring Brake Control, and Pressure Protection sections are identical in the **STEV** and **TEV**. The **STEV** has one additional functional area - the **Reservoir Sensor** section.



The **Sensor Section** of the valve is internally connected to the reservoir so that the chamber between the o-rings on the sensor piston is at reservoir pressure. If the reservoir is empty (or below the pressure required to over come the sensor spring) when air is applied to the supply port of the **STEV,** the sensor piston prevents air from flowing into the spring brakes. Allowing all pressure available to be applied to opening the "pressure protection" section in order to fill the tank.



When the pressure in the tank reaches the trigger point of about 50 psi, the **Sensor Section** of the valve will open the flow to the spring brakes, and then continue to fill the tank after the brakes are released.



This chart provides a Time vs Pressure illustration of the **STEV** "service priority" logic. The pressure rise in the spring brakes (GREEN) is delayed until the pressure in the tank (BLUE) rises to the preset trigger pressure.

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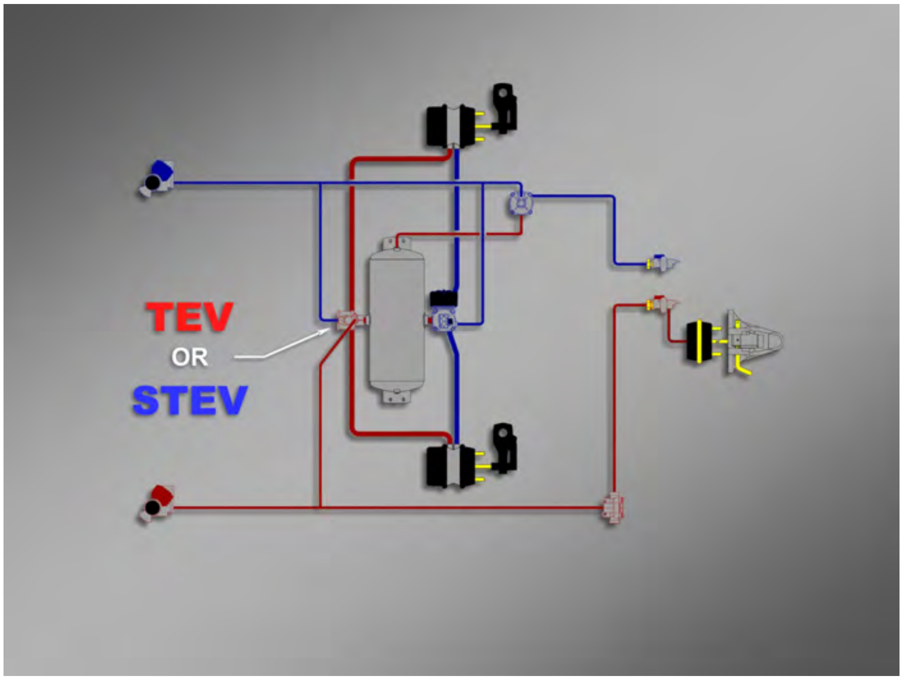
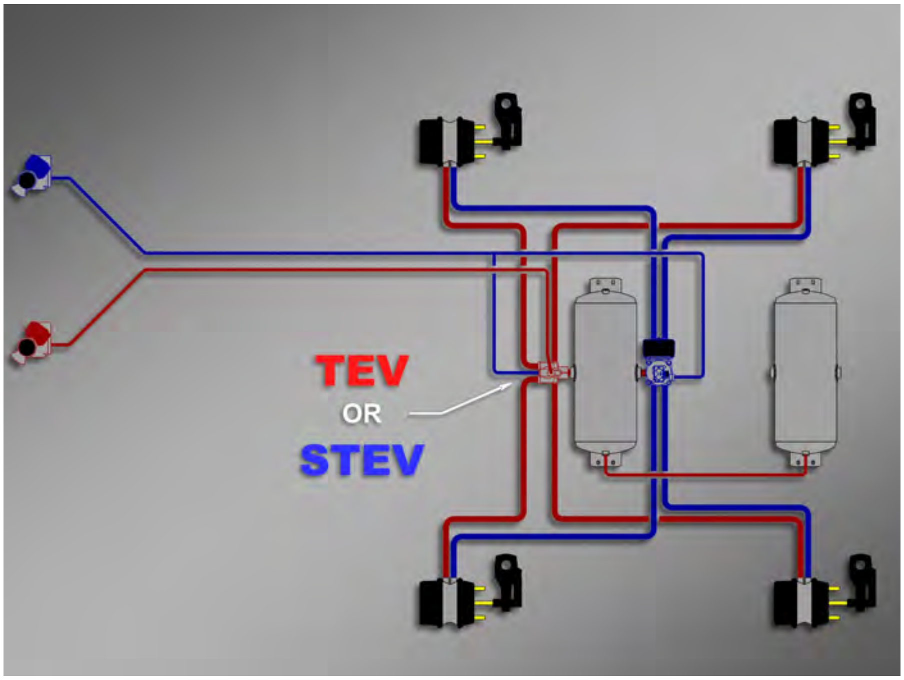


The mounting of the **TEV** and **STEV** are completely interchangeable,
as illustrated by this schematic of a single axle trailer, and ...



... this schematic of a tandem axle trailer. No changes other than the type valve selected are required to switch from one priority to the other. This provides the flexibility to allow the fleet to chose the spring brake control logic that best fits their particular operation.

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TRAILER SPRING BRAKE CONTROL SYSTEMS

“VENTED” ANTI-COMPOUNDING
VERSUS
SPRING BRAKE “FALSE CHARGE”

A Closer Look at the **Tramec Sloan**
Patented Venting Anti-Compounding

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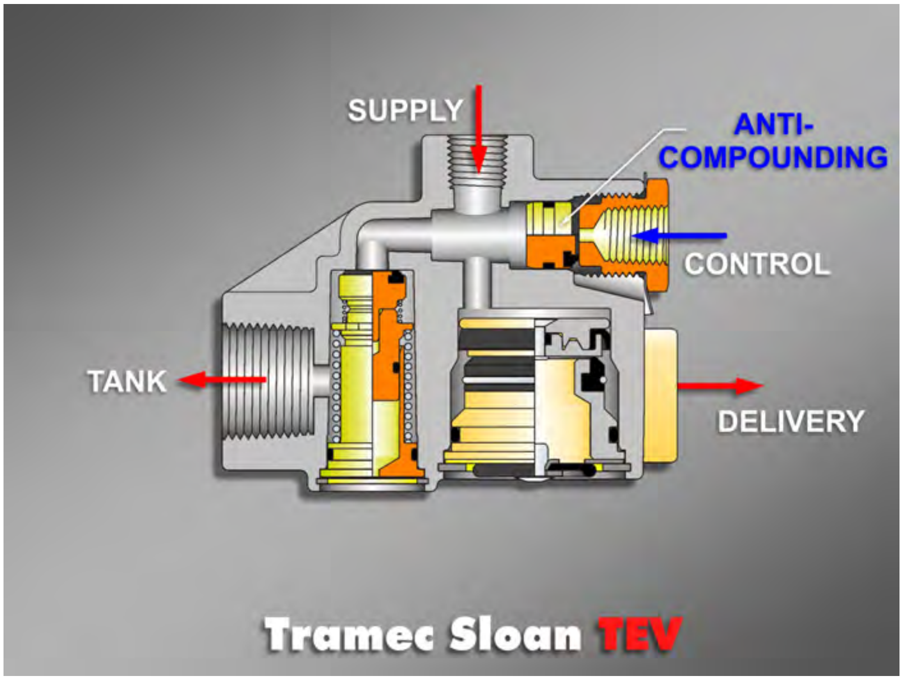
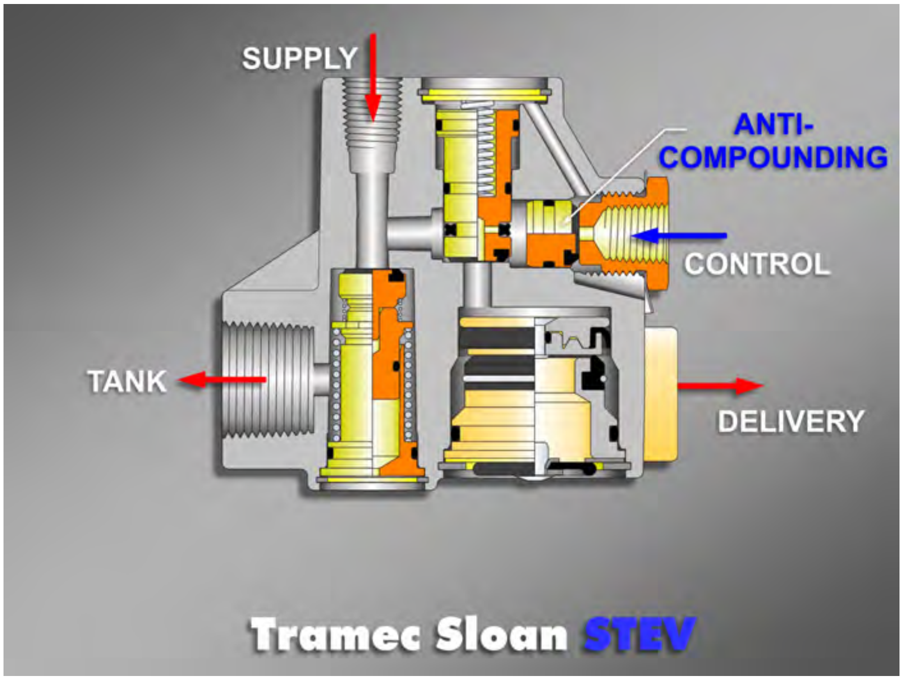
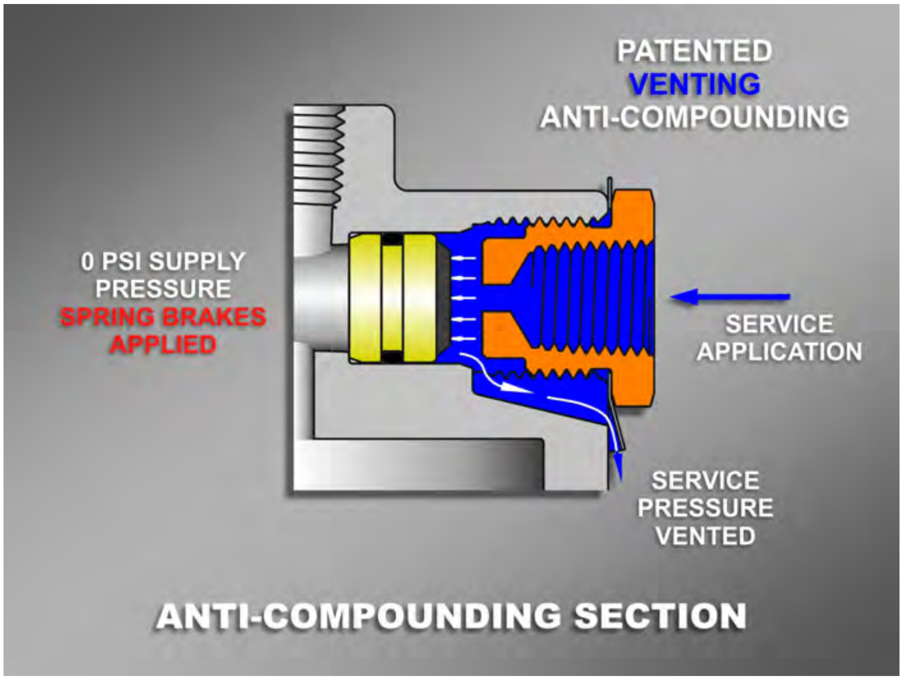


The **TEV** ...



and **STEV** spring brake control valves both have the patented venting anti-compounding feature located at the "Control" port. This feature is unique, because it vents any control line pressure when the supply line pressure is at zero psi to avoid compounding of spring and service brake pressures.



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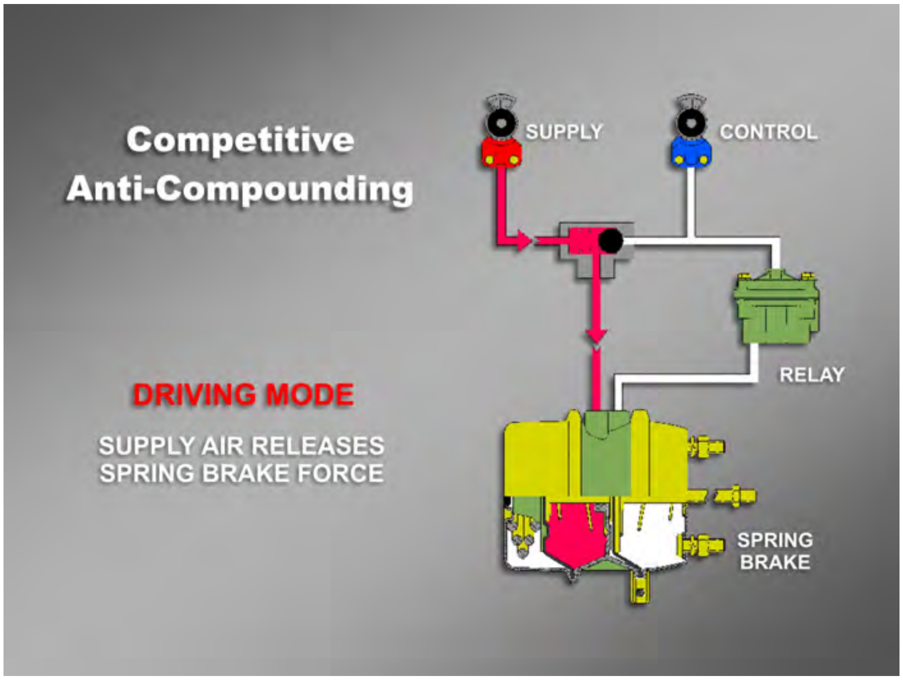
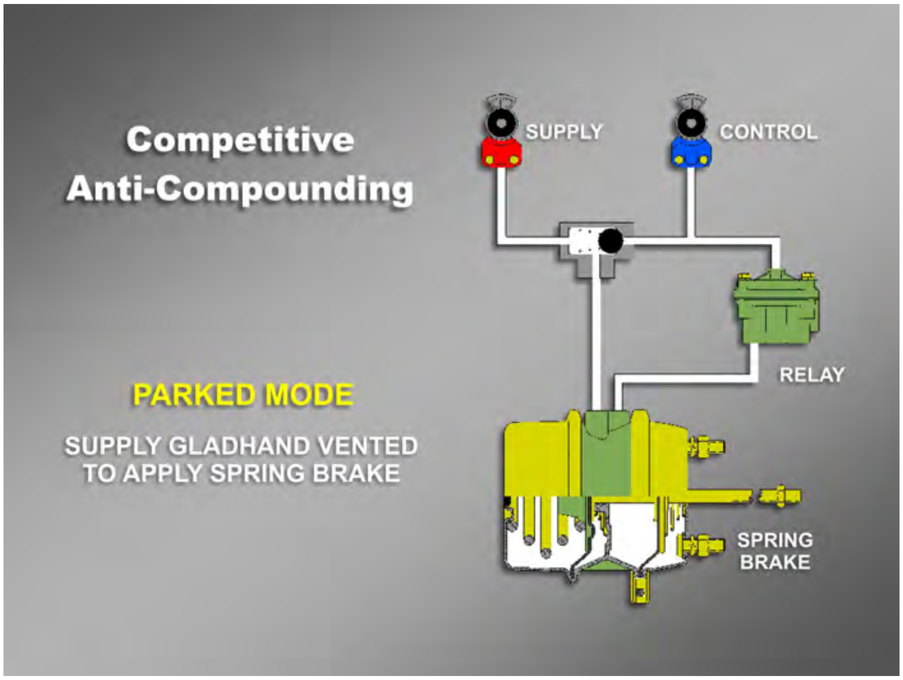
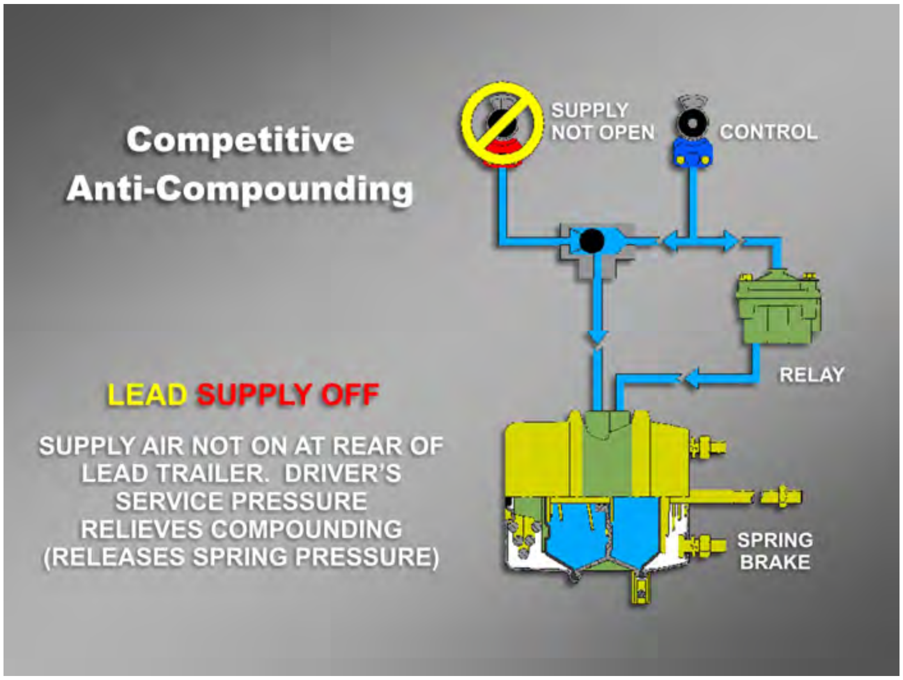


The Competition

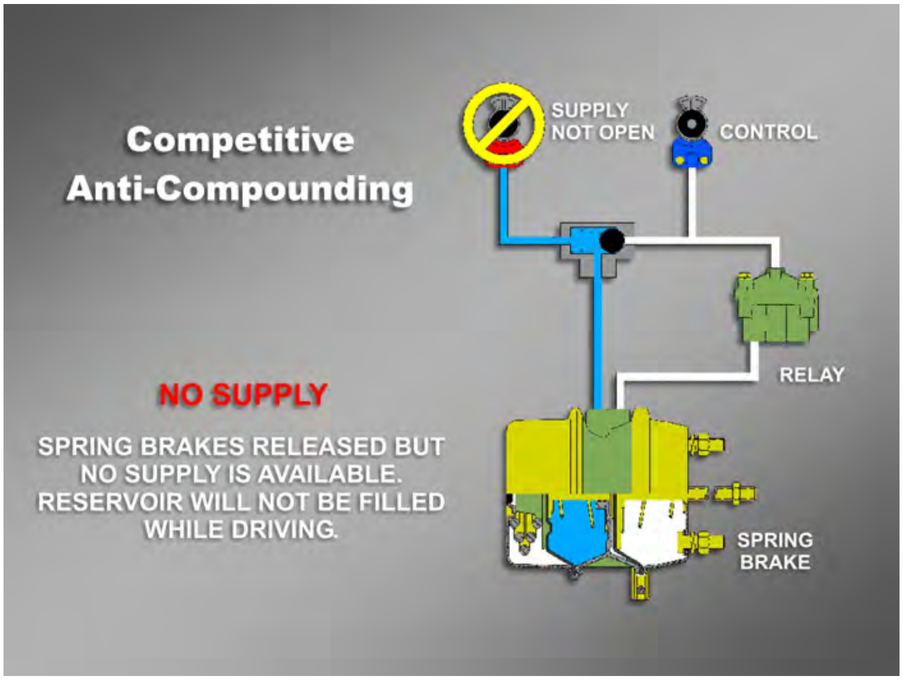
This plate shows the competitive anti-compounding logic in normal driving mode. The supply (emergency) gladhand is providing air (shown in red) to release the spring brake. A check valve inside the parking brake control valve prevents supply air from venting out through the control (service) system, and vice versa.



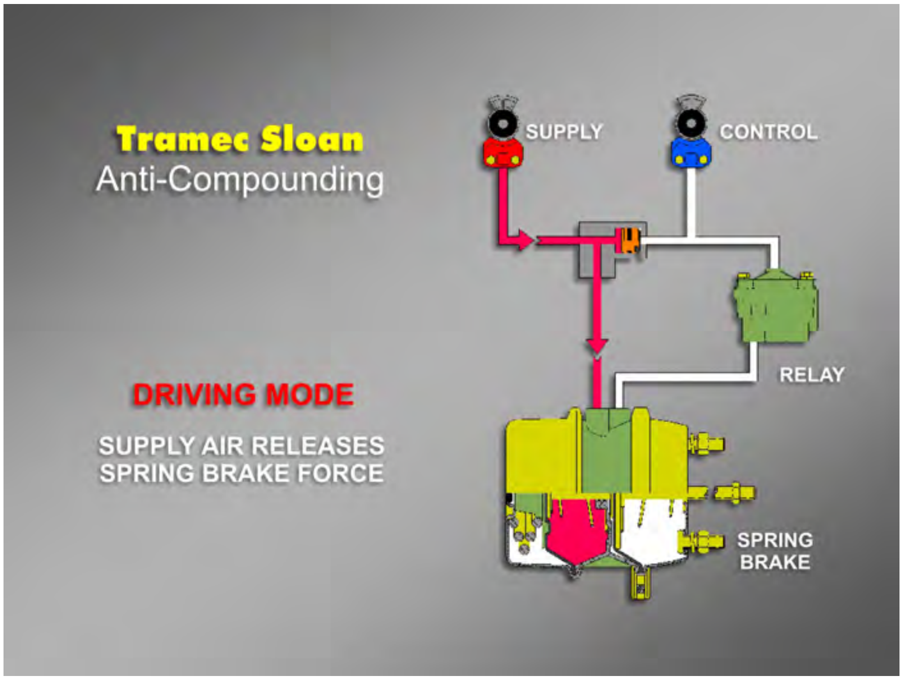
Here, the system is shown in the parked mode. The supply line is vented, allowing the emergency spring to expand and force the brake pushrod to extend. With no supply line pressure competitive valves prevent "compounding" of spring forces and service brake forces by sending control line pressure to the spring brake chamber to back off the spring pressure by the same amount of pressure being applied to the service chamber.



The view in this plate shows the special case which can lead to a ***"false release"*** of the parking brakes. It shows the condition that results on a second (or third) trailer if the following sequence of events occurs: 1) The lead trailer has shutoffs on the rear gladhands; 2) The second trailer is connected; and 3) The control line is turned on, but the supply line was left closed (it happens). The driver now gets in the tractor, applies his service brakes, turns on the trailer supply, and waits for the trailer tanks to fill. The lead trailer works fine, the drivers service brake application (shown in blue) is sent down the control line to the second trailer through the gladhand. But since there is no supply line pressure at the second trailer, the check valve shifts, and service pressure releases the spring brake.

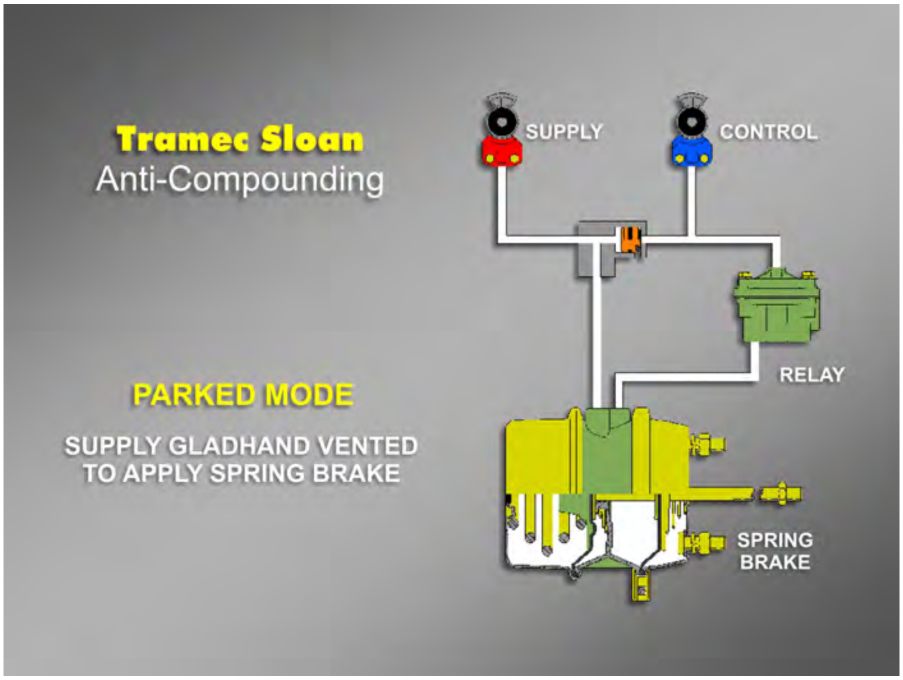


This view shows what happens when he takes his foot off of the brakes. The air pressure is exhausted from the service chamber by the relay valve. But, the air in the emergency side is trapped by the check valve closing in the anti-compounding and the closed shutoff on the lead trailer. As a result, the brakes don't re-park. **When the existing tank air is gone, the trailer has no brakes. If there is a small leak in the supply system, the spring brakes will start to drag and cause a fire.**

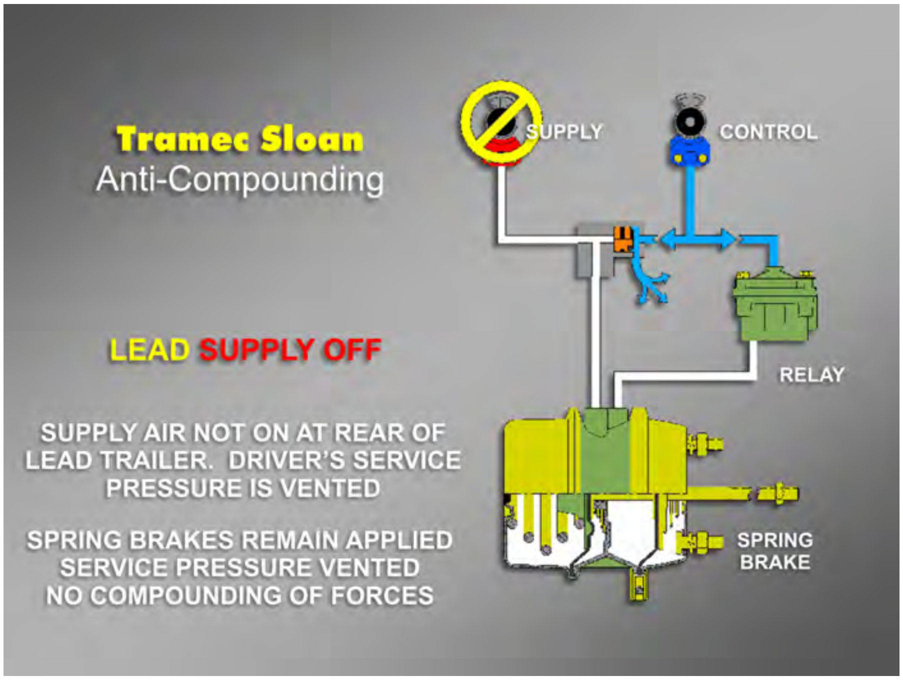


Tramec Sloan's Venting Anti-Compounding

Here the system is shown in the normal driving mode. The supply (emergency) gladhand is providing air (shown in red) to release the spring brake. The anti-compounding check valve inside the **TEV** or **STEV** prevents air from venting out from the control (service) system while there is pressure in the supply line.



Here, the system is shown in the parked mode. The supply line is vented, allowing the emergency spring to expand and force the brake pushrod to extend.



The "venting anti-compounding" logic is shown here in the condition described before, with the lead trailer's supply connected but shut off. The lack of supply pressure allows the anti-compounding check valve piston to shift and thereby vent the driver's service application (shown in blue). No compounding occurs because no service pressure builds at the relay valve or in the service brake chamber, and the parking brakes remain set.

The driver is alerted that something is wrong because the brakes did not release.