Brake System Descriptions

Surge Brakes

The surge brake is the least complex of hydraulic trailer brake systems from both an operational and installation perspective. The surge brake system consists of a receiver and master cylinder assembly attached to the frame of the trailer, as well as the hydraulic lines and disc or drum brakes discussed above. The receiver (or hitch) is attached to the trailer through a sliding connection which allows relative motion between the receiver and master cylinder.

In operation, when the driver applies the tow vehicle service brake, the forward momentum of the trailer causes force to be exerted on the master cylinder through the motion of the receiver. The receiver, which is coupled to the tow vehicle, transmits the slowing force of the tow vehicle to the trailer mounted master cylinder producing fluid pressure in proportion to the rate of deceleration and the mass of the trailer.

Typical applications for surge brake systems are boat trailers and two axle utility trailers. The surge brake system is completely independent, allowing one trailer to be used with multiple tow vehicles. No modification to the tow vehicle is required. Surge brakes must be locked out prior to backing the trailer, and can not be applied independently of the tow vehicle service brakes. A safety cable applies the trailer brake in the event the trailer becomes uncoupled from the tow vehicle. ABS is not available for surge brake systems.

Electric over Hydraulic

The electric over hydraulic system is a very adaptable means of supplying robust braking power for a wide range of towing applications. Components of the electric/hydraulic system are mounted on the trailer and consist of an electric/hydraulic power unit, battery, hydraulic lines and hydraulic disc or drum brakes. A 12 volt power supply and electronic signal are supplied from the tow vehicle. The electronic signal is generated by an inertial brake controller of the type typically used with electric trailer brakes.

When the operator applies the tow vehicle service brakes, the tow vehicle controller generates an electronic signal in proportion to the inertia change (slowing) of the tow vehicle. The electric/hydraulic power unit receives this signal and produces hydraulic pressure in proportion to the signal strength. The resulting pressure is distributed throughout the trailer brake system.

Typical applications for electric/hydraulic brake systems range from small single axle utility trailers to large multi-axle recreational vehicles, as well as stock trailers, equipment trailers and flats, receiver, fifth wheel and gooseneck styles. Electric/hydraulic trailer brakes are easily supported by any tow vehicle equipped with an electric brake controller, allowing flexibility in tow vehicle/trailer combinations. Modifications to the tow vehicle are minimal and unobtrusive. Electric/hydraulic brakes are compatible with tow vehicle ABS. The trailer brakes may be applied independently of the tow vehicle brakes. Maximum braking effort is applied to the trailer brakes in the event the trailer becomes uncoupled from the tow vehicle.

Air over Hydraulic

The air over hydraulic system is a common application for trailers being towed by light and medium duty commercial vehicles equipped with air brake systems. Components of the air/hydraulic system are trailer mounted and consist of a compressed air storage tank, a control valve, an air chamber/master cylinder assembly, hydraulic lines and hydraulic disc or drum brakes. The towing vehicle supplies compressed air to the trailer storage tank as well as a modulated control signal through tubing and gladhands or quick connects mounted on the tow vehicle and trailer.

When the operator applies the tow vehicle service brakes, the tow vehicle air brake system provides a signal pressure in proportion to the tow vehicles service brake pressure. The trailer control valve receives this signal and compressed air from the trailer mounted storage tank, modulated by the trailer control valve, is applied to an air chamber/master cylinder assembly producing a corresponding hydraulic pressure in the trailer brake system.

Typical applications for air/hydraulic brake systems are pintle hitch and gooseneck drawn multi-axle equipment and utility trailers towed with air brake equipped vehicles. The trailer brakes may be applied independently of the tow vehicle brakes. ABS and spring actuated emergency braking and parking for FMVSS 571.121 compliance can be incorporated.

Vacuum Hydraulic

The vacuum over hydraulic system is a long time industry standard. Components of the vacuum/hydraulic system are mounted on both the tow vehicle and trailer and consist of a vacuum source, (engine manifold or pump) a control valve and cab mounted display, tubing and connectors. Mounted on the trailer is a vacuum storage tank, a control valve, a vacuum chamber/master cylinder assembly, hydraulic lines and hydraulic disc or drum brakes. The towing vehicle supplies raw vacuum to the trailer storage tank as well as a modulated control signal through tubing and quick connects mounted on the tow vehicle and trailer. The modulated signal is generated by means of a control valve plumbed into the towing vehicles vacuum source and hydraulic brake system.

When the operator applies the tow vehicle service brakes, the control valve produces a vacuum signal in direct proportion to the tow vehicle service brake pressure. The trailer control valve receives this signal and produces a control vacuum signal that is applied to a vacuum chamber/master cylinder assembly producing a corresponding hydraulic pressure in the trailer brake system.

Typical applications for vacuum/hydraulic brake systems are receiver and fifth wheel drawn recreational vehicles, receiver and gooseneck drawn multi-axle utility and stock trailers when pulled with gasoline engine or vacuum pump equipped tow vehicles. Altitude compensation is available for pump driven systems. Vacuum/hydraulic systems are low cost, robust and compatible with tow vehicle ABS.The trailer brakes may be applied independently of the tow vehicle service brakes. Maximum braking effort is applied to the trailer brakes in the event the trailer becomes uncoupled from the tow vehicle.

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