

River City Products of San Antonio Texas Is The Industry Leader In Developing Heavy Vehicle Directional Stability Technology That Greatly Reduces Driving Fatigue And Related Accidents.

The Howard Precision Steer Wheel Control System™ is presently in service on thousands of heavy over-the-road vehicles that have collectively been driven more than a hundred and fifty million miles. The improvements stated in this document have been verified by the highly trouble-free accumulation of these millions of in-service miles.

It can be reasoned that the lack of heavy vehicle directional stability was not recognized over the many years as a serious problem because it was accepted by conventional wisdom throughout the industry as just the way heavy vehicles were expected to drive. Therefore the lack of directional stability had to be dealt with by an excessive amount of driver steering corrections in order to maintain directional control of the vehicle, resulting in excessive driving fatigue. The Howard Precision Steer Wheel Control System achieves an exceptional level of heavy vehicle directional stability that has never been achieved by any other method, greatly reducing the repetitive Driving Steering Corrections required to maintain directional control.

The Hours of Service Rules Dilemma

It has been well established that heavy vehicle driver fatigue is responsible for the majority of heavy vehicle highway accidents. Therefore, the occurrence was naturally assumed to have been caused by the lack of adequate driver rest and sleep the night before. This obvious assumption placed the burden on the hours of service rule makers to mandate more driver time off for rest and sleep. Considering that the lack of heavy vehicle directional stability was a far greater driver fatigue maker than the extra hours of rest could solve, the time spent behind the steering wheel controlling a directionally unstable heavy vehicle is the big driver fatigue trouble maker, that could not be solved by more time in bed.

Fail Safe Design

The Howard Precision Steer Wheel Control System is designed for a long trouble-free service life that works in harmony with the original equipment power steering components.

Achieving directional stability requires precision return and holding the steer wheels to the on-center driving position except when driver steering input occurs. However, the on-center precision holding force has no adverse effect on the normal service life of the power steering components. In the highly unlikely event of a vehicle power steering failure, the Precision Steer Wheel Control System would automatically shut off and therefore would have no adverse effect on the steering force required to manually steer the vehicle.

In the unlikely event that the Precision Steer Wheel Control System fails to function, it would no longer have a centering effect, however the vehicle power steering system would function normally.

The Fail Safe Automatic Features of the design includes a driver's Steer Wheel Control System On-Off switch, should it be desirable to disengage the system. With the system turned off, the vehicle would drive normally, the way it did before the Howard Precision Steer Wheel Control System was installed.

For additional information please contact

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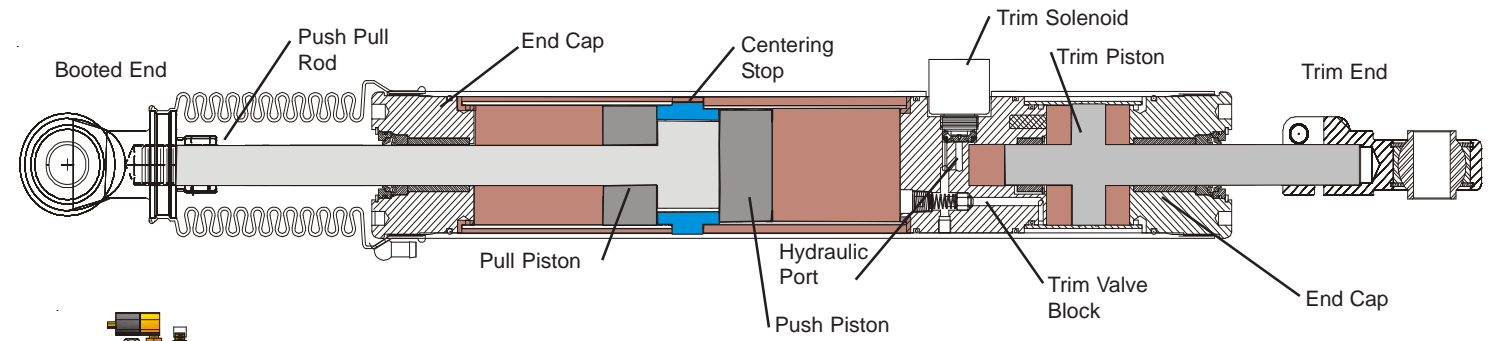
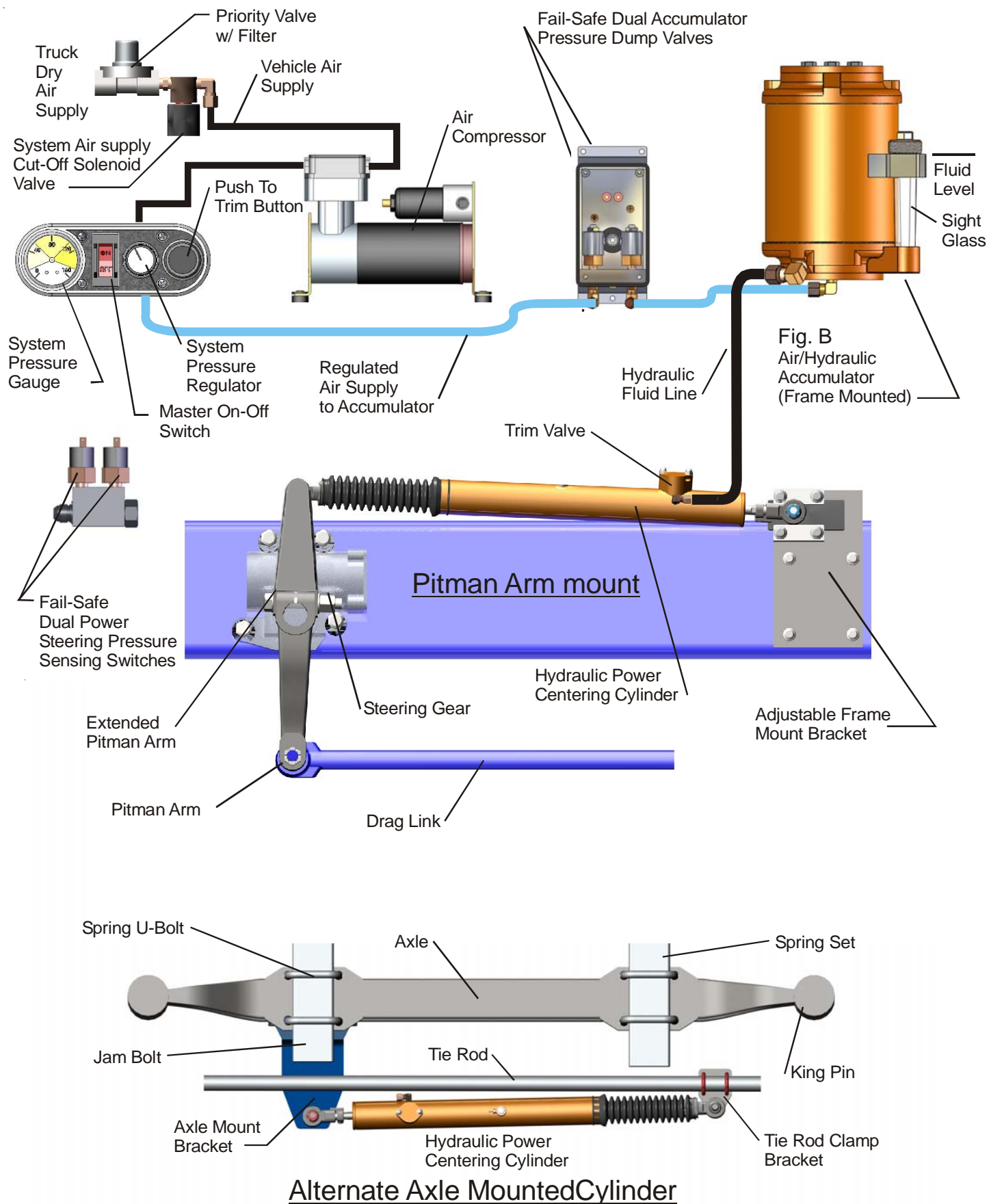


Figure A: System On, Cylinder in the On Center Holding Position

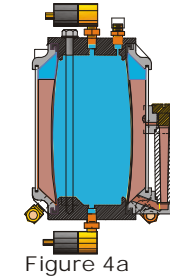


Figure 4a

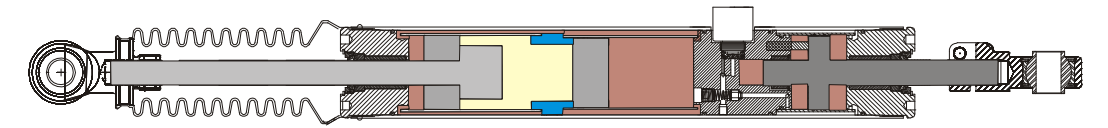


Figure 5: System On, Cylinder in Left Turn Position

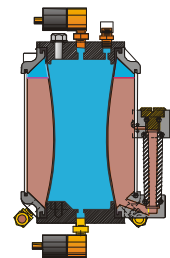


Figure 5a and 6a

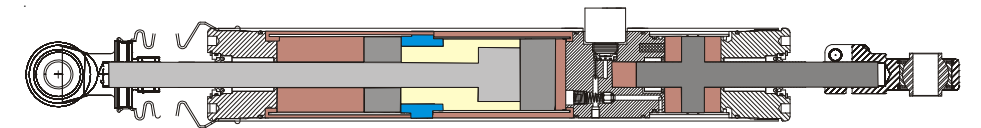


Figure 6: System On, Cylinder in Right Hand Turn Position

The utmost care has been given in the fail-safe design of the Howard Power Center Steering System. For example, in the unlikely event of a failure of the vehicle's power steering system, the Precision Steer Wheel Control System will automatically turn off and therefore will not effect the steering effort to manually steer the vehicle. the system can also be turned off manually by the vehicle driver.

The Power Center Steering System consists of two primary components, the Hydraulic Power Centering Cylinder (figure A), and the Air Activated Hydraulic Pressure Accumulator (figure B). The normal operation of the system is automatic and requires very little attention from the vehicle driver. A Push To Trim Button located conveniently to the vehicle driver allows the driver to trim the Power Centering Cylinder to a perfect on-center straight-ahead driving position.

The source of hydraulic pressure comes from

the Air Activated Hydraulic Accumulator. The air and fluid chambers in the accumulator are separated by a flexible membrane that serves as a diaphragm, whereby the air and fluid pressures are always the same but do not mix. The optimum operating hydraulic pressure is set by an adjustable air pressure regulator. The system is turned off by releasing the air pressure in the accumulator (see figure B).

When the air pressure in the accumulator is exhausted to the atmosphere, the system hydraulic pressure will drop to zero and the system will be turned off and will have no effect on the vehicle's steering. While the vehicle is being driven with the system turned off, the left and right centering pistons will be displaced away from the on-center position by the activity of the centering rod, where they will remain until the system hydraulic pressure is again activated with air pressure in the accumulator.