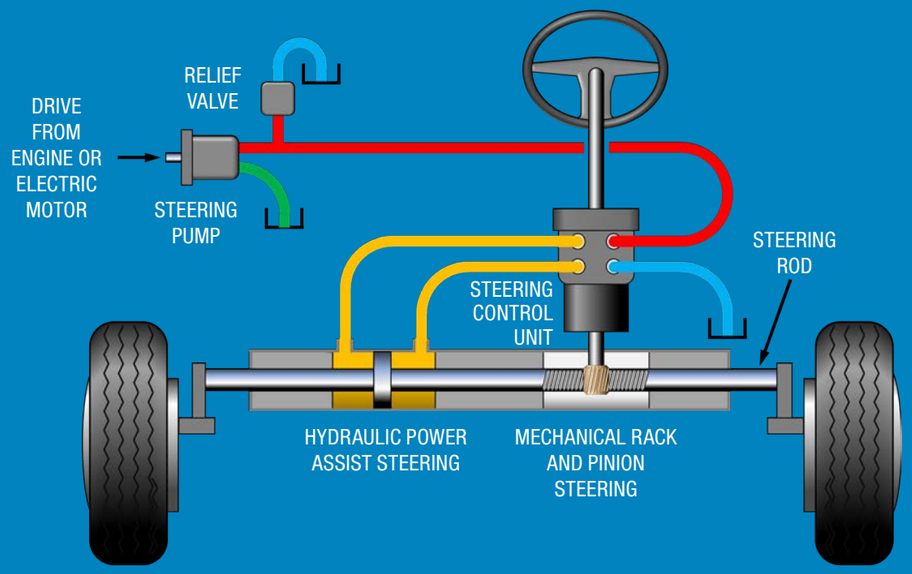
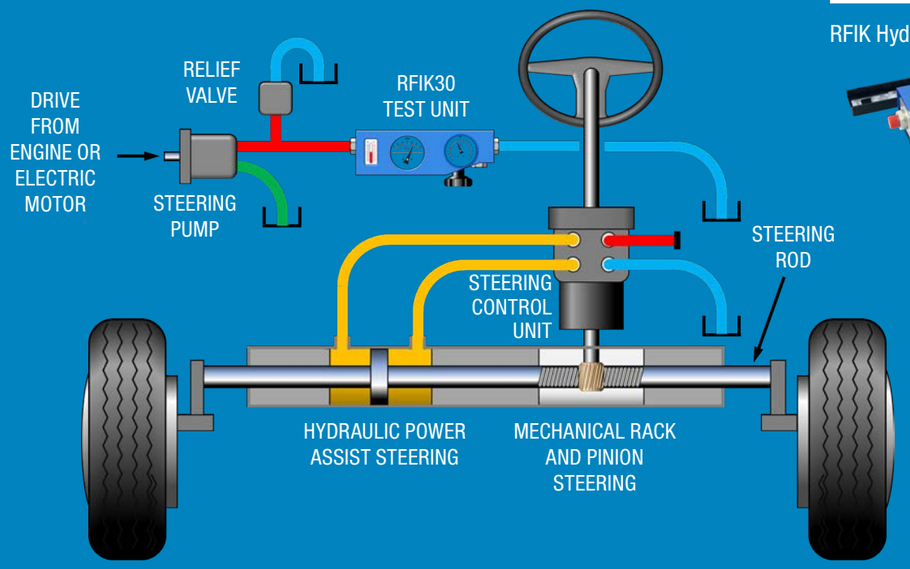
WEBTEC

HYDRAULIC MEASUREMENT AND CONTROL

APPLICATION CASE STUDY

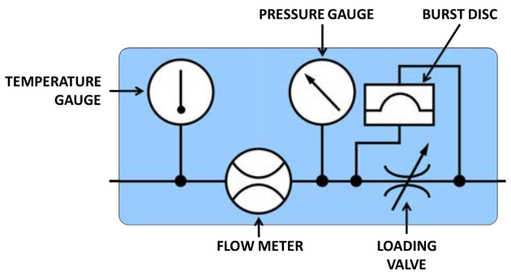
HYDRAULIC TESTING OF ON-HIGHWAY VEHICLE STEERING SYSTEMS





RFIK Hydraulic Tester

HYDRAULIC TESTING OF ON-HIGHWAY VEHICLE STEERING SYSTEMS



Power assisted steering is now very common on all types of on-highway vehicles. While electric steering systems are gradually replacing traditional hydraulic systems on cars and other small vehicles, the steering forces required on larger vehicles (such as trucks and buses) still require the power capability of hydraulic or electro hydraulic systems. Pure hydraulic systems employ an engine driven pump to provide the necessary flow and pressure whereas electro-hydraulic systems use an electric motor driven pump. In either case, the safety of the vehicle and its occupants obviously depends upon a steering system that is operating to specification, particularly the pump and its associated relief valve. Regular, scheduled testing of these components is therefore an important part of the vehicle's maintenance programme. Ideally, testing needs be carried out with the pump in situ but if this is not possible then the pump should be returned to a service centre equipped with a suitable test bench. In either situation, a reliable, simple to use test instrument is required to check both pump flow and relief valve setting.

Pump flow rates in steering systems are typically in the range 15 to 20 L/min at pressures around 170 to 180 bar. The Webtec RFIK 30 test unit has a measurement range of 2 to 30 L/min at pressures up to 420 bar so is ideally suited for this purpose where measured values are likely to be in the mid range of the test unit's ratings

As pumps wear increase, the clearances between components, (and hence internal leakage), will also increase. So although a pump may still produce its specified flow rate at low pressure when leakages are small, the pump output flow may reduce significantly as the pressure increases to its normal operating value. By incorporating a pressure balanced loading valve in its design, the Webtec unit is able to simulate normal system operating pressure at the pump outlet. Installing the test unit between the pump outlet and the vehicle steering control unit, the pump flow rate can be checked against specification using the test unit's flow meter. The in-built pressure gauge enables the loading valve to be adjusted to ensure that the pump is delivering flow at its normal operating pressure.

To check the system relief valve setting, the test unit loading valve can be closed further, thus increasing the pump outlet pressure to a point where the pressure no longer continues to rise. This then indicates the pressure setting of the system's relief valve.

If the flow rate indicated on the test unit is less than the specified amount then the pump may not necessarily be at fault. A reduced flow rate could also be caused by a leaking relief valve or an incorrect drive to the pump, or an incorrect motor speed if driven by an electric motor. Further investigation may therefore be required if a flow deficiency is discovered. The test unit is protected from over-pressurisation by means of a burst disc should the system relief valve fail to operate for any reason (but this is an unlikely situation).

When flow passes across the relief or loading valve at high pressure, heat is generated. With a relatively small reservoir the temperature of the system fluid can increase quite rapidly if the test process is prolonged. The RFIK test unit therefore incorporates a fluid temperature gauge which will indicate when an excessive temperature level is being approached and testing should be paused. Also, when using a temporary pipe connection from the test unit to the system reservoir, care should be taken to ensure that the reservoir fluid does not become unduly aerated.

Due to their larger size and greater steering forces necessary, off-road vehicles often use true hydrostatic steering i.e. where there is no mechanical linkage from the steering wheel to the vehicle's steered wheels. In such applications, pump flows up to 200 L/min may be required, in which case Webtec's larger RFIK 60, 120 or 200 test units would be suitable.

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