Air brake testing – instructions

UK Statutory Instrument 1981 No. 1189 (Construction & Use Amendment) requires that new vehicles' braking systems comply with EEC Regulatio 13 Annex 13 (Anti lock) or EEC Directive 79-489 (Load Sensing). Regulations now demand that, for vehicles coming into service after 1st April 198 this regulation or directive must be complied with *EVERY TIME* the vehicle is used on the road, in terms of performance, construction and fitting.

INTRODUCTION

The test checks outlined in this programme have been designed to monitor the performance of an air brake system. The entire system, from th compressor through to the actuators can be easily checked (preferably by two people) in a short period of time, by carrying out the following test PLEASE NOTE; THESE ARE STATIC TESTS ONLY. THEY MUST NOT BE INTERPRETED AS OVERRULING THE IMPORTANCE OF THE VEHICL MANUFACTURER'S RECOMMENDATIONS.

TEST CHECKS

The system shown on the user guide in the lid of the Test Case is typical of a vehicle conforming to National Type Approval. The positioning an number of test points may differ from those shown but they MUST be adjacent to at least one actuator in each circuit and be fitted either side of th load sensing valve. Test points are readily available and can be added to a circuit where required. Using the system shown in the case, the check in the following instructions can be carried out. Remember, that the pressures quoted are typical only - check the actual pressures in the vehicl manual.

CHECK 1 - SYSTEM PROTECTION VALVE

Drain all the reservoirs, taking note that they are all dry. If any moisture is present in them, check the operation of the air dryer. Connect the Test Case to test points C on all reservoirs. Start the engine and confirm that the compressor charges the system to cutout pressure within 6 minutes (full engine revs may be used to achieve this). The low-pressure warning should stop when the pressure reaches approximately 4 bar.

While the system is charging, check that one of the service brake reservoirs charges before the spring brake/trailer supply reservoir. When the system reaches the cutout pressure, confirm that the air dryer purges and that the compressor remains off load.

The system protection valve must be capable of isolating a failed circuit, while allowing the remaining "good" circuits to receive air from the compressor up to the opening pressures of the protection valve elements. These opening pressures will always be below the governor/ un-loader cutout pressure.

For example, with a gauge connected to C1 and another gauge at C3, which is now drained down to zero, gauge C1 should drop no lower than 4.5 bar. If the spring brake/ trailer supply reservoir is left "failed" (drain tap open) and all other reservoirs are drained to zero, then the "good" reservoirs should recover to approximately 6 bar, while the spring brake/ trailer supply reservoir remains "failed". This test can be repeated, failing each reservoir in turn while checking that the others recover. Disconnect the gauges after completing this test.

CHECK 2 - SERVICE BRAKE

With the Test Case connected to test points A and D, operate the foot brake valve slowly and confirm that both gauge readings are the same, within 0.2 bar. Release the foot brake and confirm that both gauges drop together. Note that on some vehicles with an air/hydraulic brake system, the dual foot brake valve may be biased in favour of the primary circuit. In this case, with the gauges positioned as above, one gauge will show 1.4 bar before the other gauge reacts. Disconnect gauges after completing the test.

CHECK 3 - LOAD SENSING VALVE

With the system at the governor/unloader valve cutout pressure, connect the Test Case to test points D and E (either side of the load sensing valve). Note the input and output pressures on the vehicle's load sensing valve plate. If, for example, the vehicle is unladen and the foot brake fully applied, the gauge at D should show the foot valve pressure (as in Check 2) while gauge E shows the reduced pressure as shown on the plate. With the vehicle fully laden, the two gauges should show equal pressures. Check that the arm and linkage dimensions correspond to those shown on the plate. Disconnect the gauges after completing test.

CHECK 4 - HAND VALVE (SECONDARY/ PARKING BRAKE)

It will be necessary to use the Trailer Test coupling adaptors SK2910/3 or SK2910/4 (imperial or metric) for this and Check 5.

On the system shown, the hand control valve controls both the secondary and the parking functions. On some vehicles, the hand valve may control only the parking brake while the secondary brake is achieved by either half of the dual foot brake valve (check with your vehicle manual). In this case, the secondary (blue) line can only be pressurised automatically if there is a failure (during a brake application) of the service (control) line coupling head.

Ensure that the parking brake is applied. Connect the Test Case to test point B1 or B2 and to test point F (2 line system) or G (3 line system). The gauges at B1 or B2 and F or G should show zero pressure.

Ensuring that the wheels are chocked, move the hand valve handle to the SECONDARY position. The gauge at points B1 or B2 should remain at zero while the gauge at points F or G shows a minimum pressure of 6 bar.

Move the hand valve handle to the OFF position. The gauge at points B1 or B2 should show a pressure of 6 bar (typically) while that at F or G shows a drop to zero.

NOTE: If the vehicle has a 3/2 line towing option as shown, and the two line coupling heads are connected (as for towing a two line trailer) then the service line test gauge at point F should show at least 6 bar when the tractor's hand control valve is in the secondary brake mode.

Return the hand valve handle to PARK. Leave the gauge at test point B1. Remove the gauges from points F and G. Connect a gauge to test point A.

ANTI-COMPOUNDING CHECK

With the hand control valve in the PARK mode, make a full service brake (foot brake) application. As the gauge at test point A (service brake diaphragm) shows a rise in pressure (up to approximately 6 bar) so should that a point B1 as the anti-compounding (differential protection) valve releases the spring brakes.

Release the foot brake. Both the gauges should drop to zero as the service brake releases and the spring brake applies. Remove the gauges from test points A and B1. Repeat this test with gauges connected to test points B2 and E. Disconnect the gauges after completing this test.

CHECK 5 - TRAILER BRAKE CIRCUIT AND CONTROLS

Connect the Test Case to test points F, G, and H. With the system fully charged, the gauge at point H (emergency supply line) must show a pressure of between 6.5 and 8 bar. Make a full service brake (foot brake) application. The test gauge at point F must show a pressure of between 6 and 7.5 bar. Release the foot brake and confirm that the gauge at point F shows an immediate drop to zero. Residual pressure at this point is an indicator that the service (control) line may remain pressurised and cause the trailer brakes to apply.

With the brakes off, the pressure at trailer control valve port 4.3 and 1.1 should be equal. Any drop at 4.3 will cause the trailer brakes to apply.

Note: On a "true" two-line trailer system (NOT shown in the diagram) trailer control valve 4.3 will be connected directly to hand control valve port 2.2. As the hand valve is operated and the pressure at trailer control valve port 4.3 drops, the trailer brakes should start to apply. Disconnect the gauges after completing this test.

TRAILER BRAKE SYSTEM

The system shown is a "true" three-line system where the spring brakes provide the secondary and parking brake functions. On a two-line system the spring brakes will be used as the parking brake and a secondary brake application will activate the service brake diaphragms. Where single diaphragm chambers are used, parking will be via the mechanical hand brake.

CHECK 6 - TRAILER SERVICE BRAKE (TWO-LINE SYSTEM)

Having established from Check 5 that the Emergency line coupling head pressure is a minimum of 6.5 bar, connect the Test Case to test point M to confirm this.

Connect the Test Case to test points J and K. With a full service brake application, the load sensing valve input pressure should be at least 6 bar and its output pressure (in unladen condition) should be as stated on the load sensing plate. In the laden condition, both gauges should show the same pressure. The test gauge at point M should show a pressure drop as the brake applies.

Remove the test gauge from point M and connect it to point L. Make a full brake application and confirm that the pressure at point L is equal to that at point K. Release the brakes and disconnect the gauges after completing this test.

CHECK 7 - TRAILER SECONDARY/PARK (TWO LINE SYSTEM WITH SPRING BRAKES)

When a secondary brake application is made on the towing vehicle, the trailer brake response should be as for service brake application (see Check 6).

PARKING BRAKE

Connect the Test Case to test points L, M and N. With the system fully charged, the gauge at point M should show a minimum of 6.5 bar. On applying the trailer parking brake, the gauge at point N should show a pressure drop down to zero. Release the parking brake. The gauge at point N should now show a pressure of approximately 6 bar. If the emergency (supply) line is now disconnected, the spring brakes should immediately react and the gauge at N record a drop to zero.

If the manoeuvring valve is operated, gauge N should rise to approximately 6 bar. Confirm that the trailer brakes are now released. On closing the manoeuvring valve, gauge N should drop to zero. The brakes should now be applied. Reinstate the emergency (supply) line.

ANTI-COMPOUNDING CHECK

With the parking brake applied, make a full service brake application. The gauge at point L should show a rise (up to 6 bar) as will the gauge at point N, as the anti-compounding (differential protection) valve releases the spring brakes. On releasing the service brakes, both gauges should show a drop to zero as the service brake is released and the spring brakes re-apply. Disconnect all the gauges after completing this test.

CHECK 8 - TRAILER SERVICE BRAKE (THREE LINE SYSTEM SHOWN)

Ensure that the air brake system is fully charged, that the wheels are chocked and that the parking brake is off. Connect the Test Case to test points J, K and M. The gauge at point M should show at least 6.5 bar. Apply the service brake. The gauge at J should show at least 6 bar, while the gauge at K (in unladen condition) shows the stated load sensing valve output pressure. In the laden condition, both gauges should show the same pressure. Disconnect the gauge from point J and connect it to point L. Apply the service brake and confirm that the gauges at K and L show the same pressure. Release the service brake. Disconnect the gauge from K and connect it to point N.

CHECK 9 - SECONDARY/PARK (THREE-LINE SYSTEM SHOWN)

Fully apply the towing vehicles secondary brake. The gauge at point N should record a pressure drop down to zero as the spring brakes apply. When the towing vehicle's parking brake is applied the trailer spring brakes must release and gauge N show approximately 6 bar. Apply the trailer parking brake and confirm that the gauge at N again registers a drop down to zero pressure.

ANTI-COMPOUNDING CHECK

Make a full service brake application. Gauge L should show at least 6 bar while the gauge at point N shows a similar rise as the spring brakes are released. Release the service brake and the parking brake. Finally disconnect the emergency (supply) line. Gauge N should drop immediately to zero as the spring brakes apply. On operating the manoeuvring valve, gauge N should rise to approximately 6 bar as the spring brakes are released. Release the manoeuvring, apply the parking brake and confirm that gauge N shows zero pressure. Disconnect all the gauges from the test points after completing this test.

The tests are now complete and any component failures will have to be pinpointed where gauge readings differ from those previously described. Specific vehicle systems may differ in detail from that shown in the diagram.