

ANNEXURE 4.4

SINGLE CAR TEST

Single Car Test' is performed on a coach to ensure proper functioning of Air Brake System. It is generally performed on the sick coach that are attended on the sick line or on the coaches that are subjected to primary maintenance schedule 'C'. Single car test is also carried out after Periodic Overhauling and after every change of distributor valve in the workshop. A photograph of a single car test rig coupled to a coach is shown in Figure 1.

Note : Whenever any subassembly of the air brake system on a coach is changed, it is recommended that single car testing must be done for the coach.

The different tests performed during single car test of a coach:-

- Test1:** Leakage Test.
- Test2:** Sensitivity and Insensitivity Test.
- Test3:** Brake Application and Release Test.
- Test4:** Graduated Application and Release Test.
- Test5:** Emergency Brake Application Test.
- Test6:** Passenger Emergency Valve Test.
- Test7:** Guard's Emergency valve Test
- Test8:** Check and adjust Slack Adjuster.

1. TOOLS & EQUIPMENTS

- Single Car Test Rig.
- Spanners 10mm, 12mm

2. CONCEPT

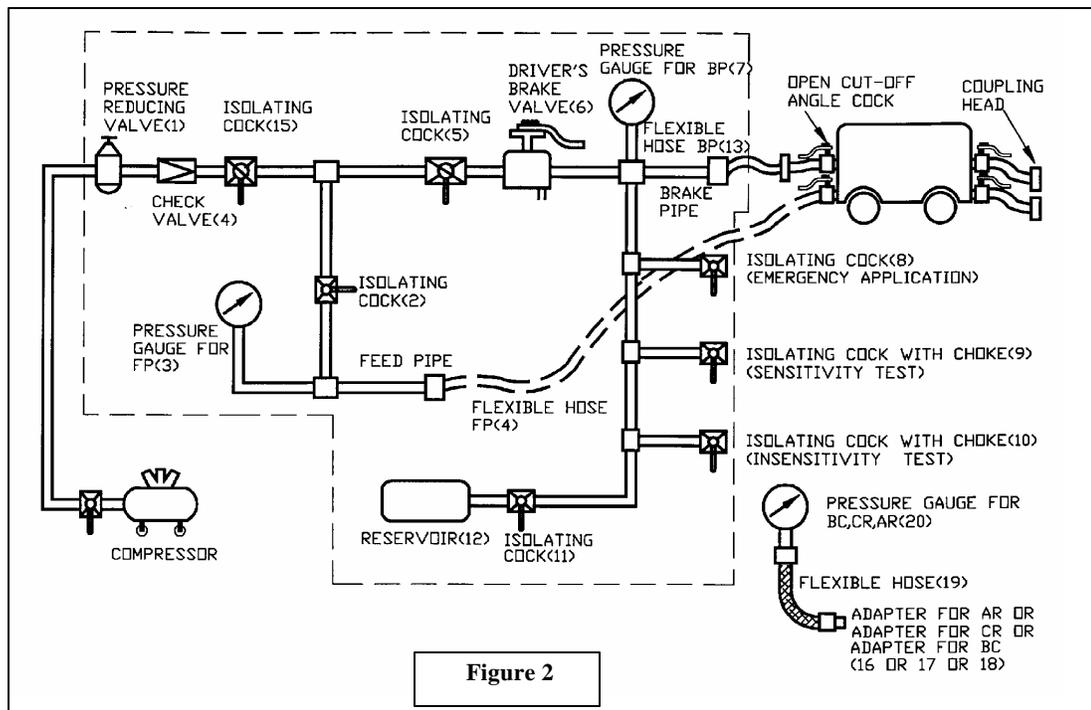
Single Car Test is performed, by using a portable device called 'Single Car Test Rig'. This test rig provides all facilities like that of a driver's brake valve. The source of compressed air for test rig is through a compressor installed in sick lines for conducting various tests without the need of a locomotive. A schematic layout of 'Single Car Test Rig' is shown in figure 2



Figure 1

3. PREPARATION FOR TEST

- i) Place the coach on the pit line for single car test.
- ii) Arrange the single car test rig device near the coach.
- iii) Ensure adequate air supply so that steady pressure of 7.5 kg/cm^2 is maintained at the inlet of single car test device.
- iv) Close isolating cock of the distributor valve and the pipe connected between the compressor and Single Car Test Device (SCTD).
- v) Open cut off angle cocks of both BP and FP on both ends of the coach.
- vi) Connect the near end of coach under test, to the test rig by connecting both brake pipe (BP) and feed pipe (FP) through coupling heads.
- vii) Open isolating cock (2) and (5) of the test rig that are connected to feed pipe and brake pipe of the coach. Open isolating cock (15) also.
- viii) Blow air into both BP and FP to scavenge the pipes.
- ix) Open dirt chamber of the Dirt Collector and clean the accumulated dirt and moisture, after cutting off air supply. Re-assemble the dirt collector.



- x) Connect dummy coupling to BP and FP hose coupling on the far end of the coach. Close isolating cock (2) and (5).
- xi) Connect pressure gauges on Auxiliary reservoir and brake cylinders.
- xii) Open isolating cocks (2) and (5) of the test rig that are connected to feed pipe and brake pipe of the coach. Close the isolating cocks (8),(9),(10) and (11) of the Test rig.
- xiii) Open isolating cock of the distributor valve.
- xiv) Open the BP and FP angle cocks of the near end of the coach
- xv) Close both angle cocks at the other end of the coach.
- xvi) Keep the driver's brake valve handle in release position and charge the system. Check BP and FP pressures of the test rig and these should be $5 \pm 0.1 \text{ kg/cm}^2$ and $6 \pm 0.1 \text{ kg/cm}^2$ respectively. Wait for 3 minutes to ensure stabilized pressure.
- xvii) Before conducting the tests it is important to ensure that the entire Test Rig is pressure tight.

4.0 TESTS

4.1 Test1: Leakage Test

- Close cock (5) of the test rig and record the drop in BP pressure for 3 minutes. The drop should not exceed 0.2 kg/cm^2 in one minute.
- Close FP cock (2) and record the drop. It should not exceed 0.2 kg/cm^2 in one minute.
- Joints/connections to sub-assemblies. It should be tested with soap water for ascertaining leakage. Any leakage found should be rectified.

4.2 Test2: Sensitivity and Insensitivity Test

- i) Open cocks (2), (5) and (11) of the test rig, to fully charge the system including the reservoir.
- ii) Close cock (5) and open cock (9) to reduce the air pressure in the BP choke at the rate of 0.6 kg/cm^2 in 6 seconds.
- iii) Check sensitivity by recording the time within which brakes get applied.
- iv) Close cock (9), after the test.
- v) Open cock (5) and charge the air brake system till brakes are released.

- vi) Close cock (5) and now open cock (10) to reduce the air pressure in the BP choke at the rate of **0.3 kg/cm²**
- vii) Check the insensitivity by recording the time within which the brakes do not apply.
- viii) Close cock (10) and (11) of the test rig, after the test.

4.3 Test3: Brake Application and Release Test

- i) Open cocks (2) and (5) of the test rig, and charge the system for 5 minutes.
- ii) Keep brake application to full service position by driver's brake valve on the test rig.
- iii) Record the Brake Cylinder (BC) filling time for BC pressure rising from **0 to 3.6 kg/cm²**. The filling time should be between 3 to 5 seconds.
- iv) Record the maximum BC pressure when it get stabilized, which should be **3.8 +/- 0.1 kg/cm²**.
- v) Record the BC piston stroke and check that brake blocks are binding on wheels. Piston stroke should be between 85 to 130 mm.
- vi) Release the brakes through driver's brake valve by charging the BP to **5 kg/cm²**, after conducting the test.
- vii) Record the draining time of both the cylinders for BC pressure dropping from **3.8 to 0.4 kg/cm²**. This should be between **15 to 20 seconds**. The piston should reach initial position and brake blocks should get released fully.

4.4 Test4 : Graduated Application and Release Test

- i) Charge the brake pipe and feed pipe at **5 kg/cm²** and **6 kg/cm²** respectively.
- ii) Apply brake in steps by driver's brake valve handle and record the Brake Pipe Pressure (BP) and the Brake Cylinder (BC) pressure.
- iii) BC pressure should rise in steps and BP pressure should decrease in steps.
- iv) Release the brakes in steps by driver's brake valve handle and record the BP and BC pressure.

- v) BC pressure should decrease in steps and BP pressure should rise in steps. When the BP pressure rises to **4.85 kg/cm²** the BC will get fully released.

4.5 Test5 : Emergency Brake Application and Release Test

- i) Charge fully the Air Brake system of the coach by opening cock (5) of the test rig.
- ii) Open cock (8) for emergency application.
- iii) Record the Brake Cylinder (BC) pressure and check for any leakage in BC for **5 minutes**.
- iv) Pull the manual release handle for a short time (about 10 seconds).
- v) Check BC pressure drops to zero.
- vi) Close cock (8) and open cock (5) of the test rig, after the test is over.

4.6 Test6: Passenger Emergency Valve Test

- Open cock (5) and (2) of the test rig and charge the brake pipe and feed pipe at **5 kg/cm²** and **6 kg/cm²** respectively.
- Pull the alarm chain from inside the coach.
- Observe alarm disc rotates situated on the end wall.
- Observe air exhaust with hissing sound from (pilot valve) PEASD and PEAV that are connected to the Brake Pipe (BP).
- Observe partial brake gets applied.
- Observe that the Micro/limit switch operates and indication lamp on the coach glows.
- Observe the drop in brake pipe pressure on the test rig.
- Reset the alarm signal disc with the help of resetting key or with the fixed key.
- Hissing sound should stop and brakes should get released.

4.7 Test7: Guard's Emergency Van Valve Test

- i) Open cock (5) and (2) of the test rig and charge the brake pipe and feed pipe at **5 kg/cm²** and **6 kg/cm²** respectively.
- ii) Close cock (5) and then operate guard's Valve handle.
- iii) Observe the air from Brake Pipe (BP), exhausts with hissing sound and the brakes in the guard van gets applied depending on exhaust of air.
- iv) Reset the handle and observe the exhaust of air stops.
- v) Observe and note the drop in BP pressures on test rig.
- vi) Observe simultaneous drop of BP and FP pressure gauges provided in guard's Van.
- vii) Close the Guard's van valve.
- viii) Observe standard safety precautions.

4.8 Test8: Check and Adjust Slack Adjuster

a) Control Dimension 'A' for slack Adjuster

Slack adjuster is a device for automatic adjustment of the clearances between the wheel and the brake blocks. It quickly adjusts to; too large or too small clearances to the pre-determined value-dimension 'A' during application and release of brake.

Procedure

- i) Ensure the air brake is in fully released condition and the brake rigging is in proper condition.
- ii) Apply brake three to four times to ease the rigging, by dropping the air pressure in the brake pipe.
- iii) Ensure once again the brake rigging in full release condition.
- iv) Set the dimension 'A' between the control rod head and the barrel head to **16 + 2/-0 mm for 13t bogies** and **22 +2/-0 mm for 16.25 bogies**.
- v) Remove pin securing the control rod in the 'U' bracket.

- vi) Detach control rod and rotate to enable refitting control rod and pin when the dimension 'A' is correct.
- vii) Apply brake few times at correct brake pipe pressure.
- viii) Check the limits specified.
- ix) Recheck dimension 'A' with brakes fully released and correct, if necessary.
- x) Lock the control rod head firmly with nut and tooth lock washer. Secure pin with split pin.
- xi) Observe the necessary safety precautions.

b) Dimension 'e' of Slack Adjuster.

The dimension 'e' which is **375 +/-25mm** represents the capacity available for adjustment and will decrease as wear takes place at the brake shoes, wheels and pin joints.

The maximum value of dimension 'e' should be within the permissible limits for each value when:

- i) All brake shoes are new.
- ii) All pin joints have new pins and bushes.
- iii) All wheels are new.
- iv) Adjust the length of one of the pull rods and piston stroke is checked again, if dimension 'e' is not within permissible limits.

5. PROFORMA FOR SINGLE CAR TEST

PROFORMA FOR SINGLE CAR TEST			
Coach No.:			
Type of DV:			
BP pressure:			
FP pressure:			
	Check	Specified	Actual
1.	Leakage Rate a) Brake pipe b) Feed pipe	0.2 kg/cm ² /min (max.) 0.2 kg/cm ² /min (max.)	
2.	a) Brake cylinder filling time (from 0 to 3.6 kg/cm ²) b) Max. BC pressure	3 to 5 seconds 3.8 +/-0.1 kg/cm ²	
3.	Brake cylinder release time (from 3.8 to 0.4 kg/cm ²)	15 to 20 seconds	
4.	Sensitivity and insensitivity a) Brake application when BP is reduced at the rate of 0.6 kg/cm ² in 6 seconds b) Brake application when BP is reduced at the rate of 0.3 kg/cm ² in 60 seconds	Brake should apply Brake should not apply	
5.	Emergency brake application and release Maximum brake cylinder pressure Manual release of brake cylinder after emergency	3.8 +/-0.1kg/cm ² Brake cylinder should get fully released	
6.	Graduated application and release a) Application b) Leakage in BC pressure in 5 minutes after emergency application c) Release	BP pressure decreases in steps and BC pressure builds up in steps 0.1 kg/cm ² within 5 minutes BP pressure increases in steps and BC pressure reduces in steps	
7.	Piston stroke	85 to 130 mm	
8.	Passenger alarm system Pull the handle Reset PEASD	1) Air to exhaust from PEAV & PEASD 2) Brakes should apply 3) Coach indication light should glow Exhaust of air should stop and indication light should extinguish	
9.	Guard's emergency valve test a) Operate Guard's valve handle b) Normalise the handle c) Testing of BP and FP gauge in guard's compartment	1) BP air to exhaust 2) Brakes should apply Air exhaust to stop Gauges should register variation in BP and FP pressure	