



आजादी का  
अमृत महोसूव

भारत सरकार – रेल मंत्रालय  
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No. MC/LHB/Brake

Date: 10.10.2023

**PCMEs  
All Zonal Railways & PUs**

**Sub:** Wheel Shelling in LHB Coaches of IR.

- Ref:** i) RDSO letter no. MC/LHB/Brake dated 15.04.2019.  
 ii) RDSO letter no. MC/LHB/Brake dated 17.12.2019.  
 iii) RDSO letter no. MC/LHB/Brake dated 19.01.2017.

In order to address the problem of Wheel Shelling in LHB Coaches of IR, RDSO has issued necessary instructions to ZRs after carrying out detailed study through letters under reference. But, as per the reports received from ZRs, the problem of wheel shelling is still persisting & being reported in LHB Coaches.

Accordingly, to prevent wheel shelling in LHB Coaches, a check sheet for examination of the brake system of LHB Coaches in various maintenance schedules has been prepared and enclosed herewith. Zonal Railways are requested to ensure the examination and record observations as specified in the enclosed check sheet. PUs are requested to follow OEMs instructions to ensure proper installation, commissioning and testing of WSP before turning out the coaches.

This is for kind information and necessary action please.

**DA:** As above.

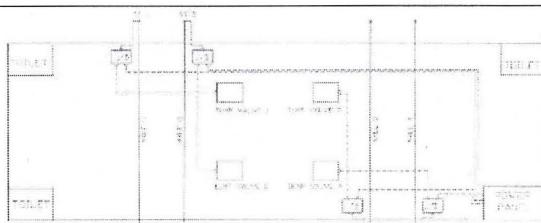
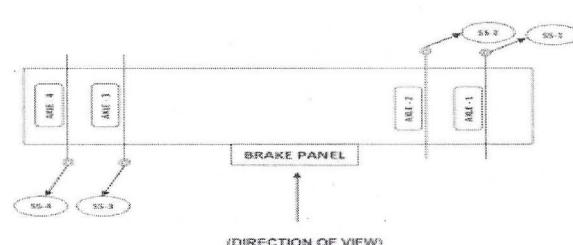
*AKS*  
10.10.2023  
(Anil Kumar Singh)  
Executive Director (Stds.)/Carriage

**Copy to:**

- a) EDME (Coaching), Railway Board – for kind inf. pls.
- b) CRSE (Coaching), All Zonal Railways – for kind inf. and necessary action pls.

**CHECKSHEET FOR LHB BRAKE SYSTEM**

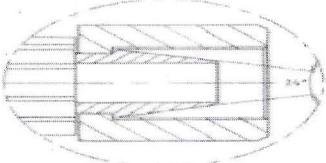
**A. D1 Schedule:**

SN	Test Parameters	Specified Value	Observation	Remarks
1.	<b>Brake Cylinder Pressure</b>			
	Apply brake & measure the Brake cylinder pressure	3.0 ± 0.1kg/cm <sup>2</sup> 3.8 ± 0.1kg/cm <sup>2</sup> (for LHB Double Decker coaches)	OK/Not OK	If found beyond prescribed limit, adjust through DV or send for repairing on test bench if not possible to adjust
2.	Ensure free movement of Brake Calipers	Check by manually shaking the Brake Calipers for proper working	OK/Not OK	Check breather plug for availability and blockage also. Check for timely release of brake cylinder and calipers.
3.	<b>Ensuring Integrity of electrical connections of WSP System</b>			
I.	WSP wiring layout and ensure integrity of electrical connections	As per RDSO Drg. No.CG-18246 and wiring shall be as per OEMs manual. Check for intactness of connections, cases of breakage/loose fitment of connectors	OK/Not Ok	 All connectors should be fitted properly on junction boxes, loose/ broken connectors may cause disruption of speed signals to processors
II.	Check for ingress of water	Check speed sensor connectors, junction box for proper sealing to prevent ingress of water	OK/Not OK	If not properly sealed replace the connectors, provide sealant on joints to prevent ingress of water
4.	<b>Preventive checks on WSP</b>			
	Check the WSP system with Zero Kg/Cm <sup>2</sup> pressure in rake	No WSP system should be in 'ON' condition in any of the coach	OK/Not OK	If system found switched ON, check pressure switch and K05 relay for proper working, this indicates pressure switch/K05 either defective or bypassed and direct supply coming in system.
5.	<b>WSP Self-Test</b>			
I.	Apply brake in the coach	Brake shall be applied	OK/Not OK	
II.	Ensure WSP unit shows no error	9.9/99		If any error/failures observed regarding sensor, dump valve, cards, attend during maintenance as per OEM trouble shooting manual
III.	Press "S2" switch (In KBI)/ "TEST" (in Faiveley)/"Left Keypad" (in Escorts) on micro-processor for few seconds till "8888" display on screen. Self-test of WSP starts and dumpvalves will starts operating.	Ensure sequential purging of Dump Valves starting from Axle-1 to Axle-4 in-sequence by hearing sound		OK/Not OK  <i>(Use paper tape at exhaust port of Dump valve for visual confirmation)</i> <b>AXLE &amp; SPEED SENSORS NUMBERING PATTERN IN LHB COACHES</b> 

		On Dump Valve testing brake calipers/brake pads should be loosen during venting of air of concerned dump valve.	OK/Not OK <ul style="list-style-type: none"><li>If brake pads not found releasing check the BC pipe line, dump valve wiring for proper sequence.</li><li>Dump Valve also to be check for proper venting if venting of air not proper, dump valve assembly may got choked.</li></ul>
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### B. D2 Schedule:

Following activities to be carried out in addition to activities of D1 schedule:

SN	Test Parameters	Specified Value	Observed Value	Remarks
1.	Air Brake Pipes & Fittings			
I.	Flexible Air Hose for Body to Bogie (650mm) Drg. No.CG-19036	• Verify for Swivel end and 11 mm Ball should have passed through the pipe.	OK/Not OK	
II.	Flexible Air Hose for Brake Actuator (500 mm) Drg. No.CG-19037	• Check for intactness of condition, no any multiple fitting/washer allowed.	OK/Not OK	 (Reference sketch of hose)
2.	Timer Setting for K-05 Relay (01No.)	10+1 minutes (For Knorr & Escorts)/ 02 minutes (For Faiveley)	OK/Not OK	If parameters not found OK, replace the K05 relay.
3.	Pressure Switch	Cut-in pressure: $1.8 \pm 0.1 \text{ Kg/cm}^2$	System should be switched ON	If not getting switched ON/OFF means pressure switch is defective
		Cut-off pressure: $1.3 \pm 0.1 \text{ Kg/cm}^2$	System should be switched OFF (after recommended time of K05)	
4.	Speed Sensors Test to be done on brake applied condition	Condition and installation of phonic wheel	Check for proper installation of phonic wheel on axle end cap and for proper teeth's of phonic wheels.	<p>1..... 2..... 3..... 4.....</p> <ul style="list-style-type: none"> <li>If Phonic wheel found dented, damaged, teeth damaged replaced the phonic wheel.</li> <li>Check phonic wheel for loose/ eccentric fitment, if found eccentric open and refit properly.</li> <li>Use only recommended brand (LPS/TVS/Unbrako/DFL fasteners of M8-35/22 mm length high tensile bolt).</li> <li>Use spring washer as per IS &amp; also use Loctite during fitment.</li> <li>Torque values also to be check with calibrated torque wrench.</li> </ul>

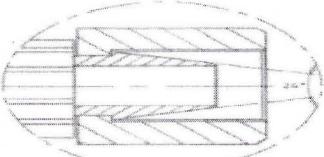
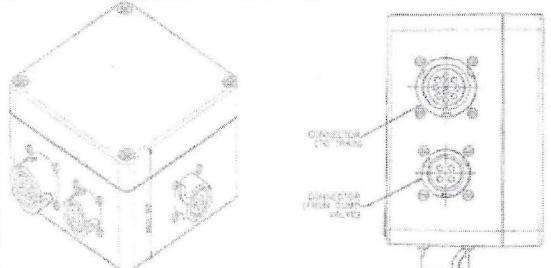
### C. D3 Schedule:

Following activities to be carried out in addition to activities of D2 schedule:

SN	Test Parameters	Specified Value	Observed Value	Remarks
1.	Speed Sensors Test to be done on brake applied condition			
a.	Fit 1st, 2nd, 3rd, and 4th Sensor (duly wired to WSP) on the mounting flange of the "Pole wheel simulator" respectively one by one.	Respective 1st, 2nd, 3rd and 4th Dump valve shall operate (Air Exhaust shall take place when dump valve operates)	OK/Not OK	<ul style="list-style-type: none"> <li>If Dump valve found not venting means either sensor defective or sensor wiring sequence/continuity issue.</li> <li>Dump Valve may also got defective.</li> </ul>
b.	Run "Pole wheel simulator" for <2 seconds	This checks that the respective speed sensor is providing the	(OK/Not OK)	If no signal observed, check the wiring connections, speed sensor/ card.

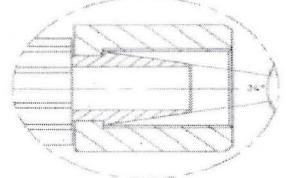
		speed signal to WSP		
2.	<b>Gap between Speed Sensor and Toothed Wheel</b>			
	To be checked by filler gauge at each axle	0.9mm-1.4mm	At Axle 1	
			At Axle 2	
			At Axle 3	
			At Axle 4	

#### D. Shop Schedules (SS-I/SS-II/SS-III):

SN	Test Parameters	Specified Value	Observed Value	Remarks
<b>1. Air Brake Pipes &amp; Fittings</b>				
I.	Flexible Air Hose for Body to Bogie (650mm) Drg. No.CG-19036	<ul style="list-style-type: none"> <li>Verify for Swivel end and 11 mm Ball should have passed through the pipe.</li> <li>Check for intactness of condition, no any multiple fitting/washer allowed.</li> </ul>	OK/Not OK	 <p>(Reference sketch of hose)</p>
II.	Flexible Air Hose for Brake Actuator (500 mm) Drg. No.CG-19037		OK/Not OK	
<b>2. Dump Valves Choke Sizes</b>				
	Brake System Make/Model	Exhaust Choke size	Charging Choke size	Exhaust Choke Size      Charging Choke Size
I.	Knorr-Bremse (Model MGS2)	No choke	9 mm	
II.	Faiveley Transport (Model SWKP AS20R)	No choke	9 mm	
III.	Faiveley Transport (Model AEFG2)	6 mm	4 mm	
IV.	Escorts (Model PE 94 MSV)	No choke	9 mm	
<b>3. Ensuring Integrity of electrical connections of WSP System</b>				
	Modified junctionbox	As per RDSO Drg. No. CG-19005, check for proper installation and condition of connectors.	OK/Not OK	
<b>4. Preventive checks on WSP</b>				
<b>I. Continuity of wiring between speed sensor and junction box</b>				
	Two wires continuity, check using multi-meter	Continuity shall be OK 1 <sup>st</sup> Sensor 2 <sup>nd</sup> Sensor 3 <sup>rd</sup> Sensor 4 <sup>th</sup> Sensor •Check as and when failures repeated on display in coach and symptoms of shelling noticed. •Check during commissioning for new coaches or shop turned out coaches mandatorily.	1 <sup>st</sup> Sensor	
			2 <sup>nd</sup> Sensor	
			3 <sup>rd</sup> Sensor	
			4 <sup>th</sup> Sensor	
<b>II. Between Junction Box and WSP Panel</b>				
a.	Disconnect the WSP connector at 1 <sup>st</sup> , 2 <sup>nd</sup> , 3 <sup>rd</sup> & 4 <sup>th</sup> Junction Box respectively	Fault code "11", "21", "31", "41" (for Escorts make "1.1", "2.1", "3.1", "4.1") will display respectively on microprocessor and it cannot be reset	OK/Not OK	If failures not observed during disconnection on WSP processor check/replace WSP Cards than further repeat the exercise

b.	Connect back the WSP connector properly and Push the Reset	Fault code shall be resetted	OK/Not OK <i>Fault shall be disappeared from display</i>	
<b>III. Between Dump Valve and WSP Panel</b>				
a.	Disconnect the Dump Valve connector at 1 <sup>st</sup> , 2 <sup>nd</sup> , 3 <sup>rd</sup> , 4 <sup>th</sup> Dump Valve respectively	Fault code "13", "23", "33", "43" (For <b>KBI make</b> ) / Fault code "14", "24", "34", "44" (For <b>Faiveley make</b> ) / Fault code "1.3/1.6", "2.3/2.6", "3.3/3.6", "4.3/4.6" (For <b>Escorts make</b> ) will be displayed on microprocessor and it cannot be reset	OK/Not OK <i>If failures not observed during disconnection on WSP processor check / replace WSP Cards than further repeat the exercise</i>	
b.	Connect back the Dump Valve connector properly and Push the Reset	Fault code shall be resetted	OK/Not OK <i>Fault shall be disappeared from display</i>	
<b>5. Speed Sensors Test to be done on brake applied condition</b>				
a.	Fit 1 <sup>st</sup> , 2 <sup>nd</sup> , 3 <sup>rd</sup> , and 4 <sup>th</sup> Sensor (duly wired to WSP) on the mounting flange of the "Pole wheel simulator" respectively one by one.	Respective 1 <sup>st</sup> , 2 <sup>nd</sup> , 3 <sup>rd</sup> and 4 <sup>th</sup> Dump valve shall operate (Air Exhaust shall take place when dump valve operates).	OK/Not OK	<ul style="list-style-type: none"> <li>If Dump valve found not venting means either sensor defective or sensor wiring sequence/continuity issue.</li> <li>Dump Valve may also got defective.</li> </ul>
b.	Condition and installation of phonic wheel	Check for proper installation of phonic wheel on axle end cap and for proper teeth's of phonic wheels.	OK/Not OK	<p>1..... 2..... 3..... 4.....</p> <ul style="list-style-type: none"> <li>If Phonic wheel found dented, damaged, teeth damaged replaced the phonic wheel.</li> <li>Check phonic wheel for loose/ eccentric fitment, if found eccentric open and refit properly.</li> <li>Use only recommended brand (LPS/TVS/Unbrako/DFL fasteners of M8-35/22 mm length high tensile bolt).</li> <li>Use spring washer as per IS &amp; also use Loctite during fitment.</li> <li>Torque values also to be check with calibrated torque wrench.</li> </ul>
c.	Run "Pole wheel simulator" for <2 seconds	This checks that the respective speed sensor is providing the speed signal to WSP.	(OK/Not OK)	If no signal observed, check the wiring connections, speed sensor/ card.

#### E. In case of wheel shelling/repeated failures of WSP:

SN	Test Parameters	Specified Value	Observed Value	Remarks		
<b>1. Air Brake Pipes &amp; Fittings</b>						
I.	Flexible Air Hose for Body to Bogie (650mm) Drg. No.CG-19036	<ul style="list-style-type: none"> <li>Verify for Swivel end and 11 mm Ball should have passed through the pipe.</li> <li>Check for intactness of condition, no any multiple fitting/ washer allowed.</li> </ul>	OK/Not OK	 <p>(Reference sketch of hose)</p>		
II.	Flexible Air Hose for Brake Actuator (500 mm) Drg. No.CG-19037		OK/Not OK			
<b>2. Preventive checks on WSP</b>						
<b>I. Continuity of wiring between speed sensor and junction box</b>						
	Two wires continuity, check using multi-meter	Continuity shall be OK	1 <sup>st</sup> Sensor			
			2 <sup>nd</sup> Sensor			

			3 <sup>rd</sup> Sensor		
			4 <sup>th</sup> Sensor		
<b>II. Between Junction Box and WSP Panel</b>		<ul style="list-style-type: none"> <li>• Check as and when failures repeated on display in coach and symptoms of shelling noticed.</li> <li>• Check during commissioning for new coaches or shop turned out coaches mandatorily.</li> </ul>			
a.	Disconnect the WSP connector at 1 <sup>st</sup> , 2 <sup>nd</sup> , 3 <sup>rd</sup> & 4 <sup>th</sup> Junction Box respectively	Fault code "11", "21", "31", "41" (for Escorts make "1.1", "2.1", "3.1", "4.1") will display respectively on microprocessor and it cannot be reset	OK/Not OK	If failures not observed during disconnection on WSP processor check / replace WSP Cards than further repeat the exercise	
b.	Connect back the WSP connector properly and Push the Reset	Fault code shall be reseted	OK/Not OK	<i>Fault shall be disappeared from display</i>	
<b>III. Between Dump Valve and WSP Panel</b>					
a.	Disconnect the Dump Valve connector at 1 <sup>st</sup> , 2 <sup>nd</sup> , 3 <sup>rd</sup> , 4 <sup>th</sup> Dump Valve respectively	Fault code "13", "23", "33", "43" (For <b>KBI make</b> )/Fault code "14", "24", "34", "44" (For <b>Faiveley make</b> )/Fault code "1.3/1.6", "2.3/2.6", "3.3/3.6", "4.3/4.6" (For <b>Escorts make</b> ) will be displayed on microprocessor and it cannot be reset	OK/Not OK	If failures not observed during disconnection on WSP processor check / replace WSP Cards than further repeat the exercise	
b.	Connect back the Dump Valve connector properly and Push the Reset	Fault code shall be reseted	OK/Not OK	<i>Fault shall be disappeared from display</i>	
<b>3. Speed Sensors Test to be done on brake applied condition</b>					
a.	Fit 1st, 2nd, 3rd, and 4th Sensor (duly wired to WSP) on the mounting flange of the "Pole wheel simulator" respectively one by one.	Respective 1st, 2nd, 3rd and 4th Dump valve shall operate (Air Exhaust shall take place when dump valve operates).	OK/Not OK	<ul style="list-style-type: none"> <li>• If Dump valve found not venting means either sensor defective or sensor wiring sequence/continuity issue.</li> <li>Dump Valve may also got defective.</li> </ul>	
b.	Condition and installation of phonic wheel	Check for proper installation of phonic wheel on axle end cap and for proper teeth's of phonic wheels.	OK/Not OK	<ul style="list-style-type: none"> <li>1.....</li> <li>2.....</li> <li>3.....</li> <li>4.....</li> <li>• If Phonic wheel found dented, damaged, teeth damaged replaced the phonic wheel.</li> <li>• Check phonic wheel for loose/ eccentric fitment, if found eccentric open and refit properly.</li> <li>• Use only recommended brand (LPS/TVS/Unbrako/DFL fasteners of M8-35/22 mm length high tensile bolt.</li> <li>• Use spring washer as per IS &amp; also use Loctite during fitment.</li> <li>Torque values also to be check with calibrated torque wrench.</li> </ul>	
<b>4. Gap between Speed Sensor and Toothed Wheel</b>					
To be checked by filler gauge at each axle	0.9mm-1.4mm	At Axle 1			
		At Axle 2			
		At Axle 3			
		At Axle 4			

5.	WSP Self-Test	
a.	WSP data download and analysis	<p>Download the recorded data of WSP to analyze the failures details</p> <p>Downloaded/ Not downloaded</p> <ul style="list-style-type: none"> <li>•If not downloading, check the WSP installed in software and connecting cables. Reinstall the software if corrupted through OEM.</li> <li>•Analyses the data and take preventive measures if required.</li> </ul>

[Signature of SSE/JE (Maintenance)]

