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Motorcycle braking – Global Technical Regulation No. 3

Proposal for amendments to Global Technical Regulation No. 3 (Motorcycle brake systems)

Submitted by the representative from Italy*

The text reproduced below was prepared by the expert from Italy in order to introduce amendments to clarify the current text for the use of Combined Braking Systems (CBS). The modifications to the current text of the Regulation are marked in bold for new or strikethrough for deleted characters.

* In accordance with the programme of work of the Inland Transport Committee for 2010–2014 (ECE/TRANS/208, para. 106, ECE/TRANS/2010/8, programme activity 02.4), the World Forum will develop, harmonize and update Regulations in order to enhance the performance of vehicles. The present document is submitted in conformity with that mandate.

Statement of Technical Rationale and justification

I. Objective

The objective of this proposal is to recommend the adoption of an amendment to the current Global Technical Regulation (GTR) regarding motorcycle brake systems. At the June 2013 session of the Executive Committee (AC.3), Contracting Parties to the 1998 Global Agreement, under the World Forum for Harmonization of Vehicle Regulations (WP.29), gave their consent to amend UN GTR on Motorcycle Brake Systems (UN GTR No. 3).

II. Introduction

1. One of the main purposes of UN GTR No. 3 is intended to reduce the injuries and fatalities associated with motorcycle accidents through addressing the braking performance of motorcycles as a means of improving road safety.

2. UN GTR No. 3 provides clear and objective test procedures and requirements that can be easily followed and also addresses the development in current CBS and ABS technologies.

3. The current provision in UN GTR No. 3 (§ 3.1.9), requiring that "two separate brake systems may only share a common brake if a failure in one system does not affect the performance of the other", limits the application of Combined Brake Systems (CBS).

4. Not all CBS architectures can meet this requirement although they will outperform conventional brake systems.

5. Not all CBS architectures were however considered at the time the original CBS requirements were drafted (in the 1980s) and it is therefore understood that GRRF did not intentionally exclude such systems by introducing this requirement.

6. In order to ensure that, in case of a failure in one system, the performance of the other system still equals that of a conventional system, it is proposed to allow that two separate brake systems share a brake and/or a transmission, provided that the other system meets the single brake system performance requirements in case of a failure of such shared components(s). To that end, a failure test is proposed for CBS brake systems of Architecture B. IMMA is of the opinion that such a failure test requirement should ensure the acceptance of such a CBS in terms of demonstrated robustness and guaranteed minimum braking performance.

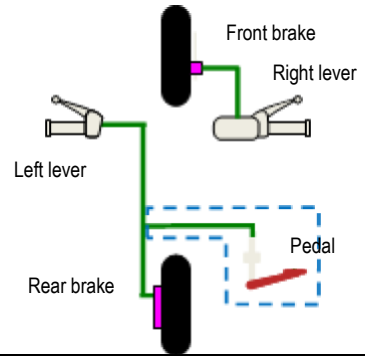
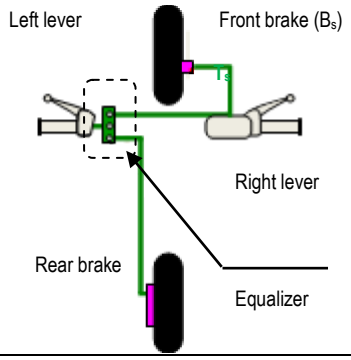
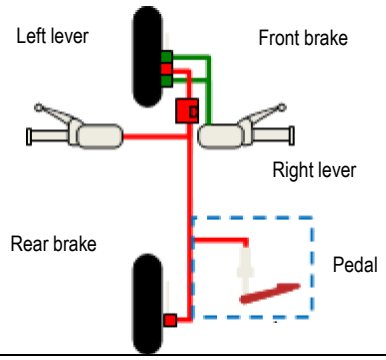
III. Justification of changes

7. The current provision in UN GTR No. 3 (§3.1.9), requiring that "two separate brake systems may only share a common brake if a failure in one system does not affect the performance of the other", limits the application of Combined Brake Systems (CBS).

8. Not all CBS architectures can meet this requirement although they will outperform conventional brake systems.

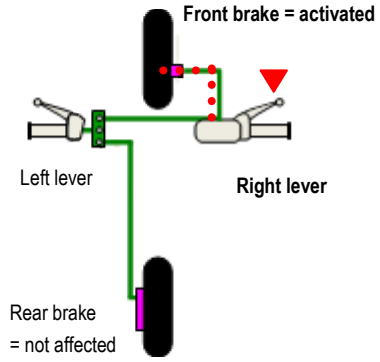
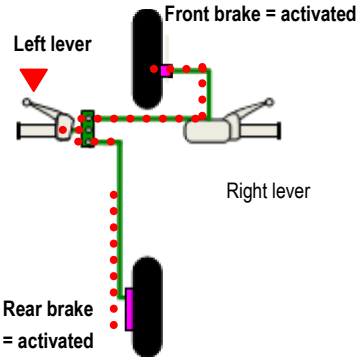
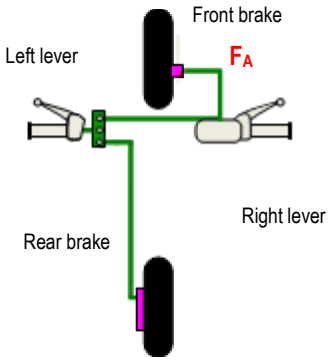
9. Not all CBS architectures were however considered at the time the original CBS requirements were drafted (in the 1980s) and it is therefore understood that GRRF did not intentionally exclude such systems by introducing this requirement.

10. Architecture B is an example of a CBS that shares a transmission (T_s) and a brake (B_s).

Conventional Brake System	Combined Brake System (CBS)	
Architecture A	**Architecture B**	**Architecture C**
		
▪ Left lever (pedal) operates rear brake only ▪ Right lever operates front brake only	▪ Left lever operates CBS ▪ Right lever operates front brake only	▪ Left lever (pedal) operates CBS ▪ Right lever operates front brake only

CBS Architecture B

11. While a failure in e.g. the "front system" (F_A) may affect the performance of the CBS, the rear system (operated by the left lever) will continue to be operational.

Normal operating conditions		Fail conditions
Right lever operation	**Left lever operation (CBS)**	**Failure A (FA)**
		

Front brake	Defect
Rear brake	Operational by left lever

12. In order to ensure that, in case of a failure in one system, the performance of the other system still equals that of a conventional system, it is proposed to allow that two separate brake systems share a brake and/or a transmission, provided that the other system meets the single brake system performance requirements in case of a failure of such shared components(s). To that end, a failure test is proposed for CBS brake systems of

Architecture B. IMMA is of the opinion that such a failure test requirement should ensure the acceptance of such a CBS in terms of demonstrated robustness and guaranteed minimum braking performance.

Other CBS architectures such as Architecture C

13. A failure test is not necessary for this type of CBS architecture because there are no shared components with the exception of a brake cylinder which is one of the components that are regarded to not be liable to breakage as described in 12.1. (b).

IV. Proposal

Paragraph 3.1.9, amend to read:

"3.1.9 In cases where two separate service brake systems are installed, the systems may share a common brake~~, if a failure in one system does not affect the performance of the other~~ **and a common transmission**, if **the requirements of Annex 3 paragraph 12 are met.**"

Insert new paragraph 12., to read:

"**12. CBS failure test**

12.1. General information:

(a) This test will only apply to vehicles fitted with CBS of which the separate service brake systems share components;

(b) The test is to confirm the performance of the service brake systems in the event of failure of one of the common components. Certain parts, such as the brake itself, the brake cylinders and their pistons (except the seals) the push rods, the cam assemblies and the master cylinders (except the seals), shall not be regarded as liable to breakage if they are amply dimensioned, are readily accessible for maintenance, and exhibit sufficient safety features and therefore shall be exempted from a failure test.

12.2. Test conditions and procedure:

(a) In case a vehicle is fitted with CBS of which the separate service brake systems share components, carry out the test set out in section 3. of this Annex, (dry stop test – single brake control actuated) with a simulated failure of the common component.

(b) Laden.

12.3. Performance requirements

When the brakes are tested in accordance with the test procedure set out in paragraph 12.2., the stopping distance shall be as specified in column 2 or the MFDD shall be as specified in column 3 of the following table:

Column 1	*Column 2*	*Column 3*
Vehicle Category	*STOPPING DISTANCE (S) (Where V is the specified test speed in km/h and S is the required stopping distance in metres)*	*MFDD*
Front wheel(s) braking only		
3-1	$S \leq 0.1\,V + 0.0111\,V^2$	≥ 3.4 m/s^2
3-2	$S \leq 0.1\,V + 0.0143\,V^2$	≥ 2.7 m/s^2
3-3	$S \leq 0.1\,V + 0.0087\,V^2$	≥ 4.4 m/s^2
3-4	$S \leq 0.1\,V + 0.0105\,V^2$	≥ 3.6 m/s^2
3-5	$S \leq 0.1\,V + 0.0117\,V^2$	≥ 3.3 m/s^2
Rear wheel(s) braking only		
3-1	$S \leq 0.1\,V + 0.0143\,V^2$	≥ 2.7 m/s^2
3-2	$S \leq 0.1\,V + 0.0143\,V^2$	≥ 2.7 m/s^2
3-3	$S \leq 0.1\,V + 0.0133\,V^2$	≥ 2.9 m/s^2
3-4	$S \leq 0.1\,V + 0.0105\,V^2$	≥ 3.6 m/s^2
3-5	$S \leq 0.1\,V + 0.0117\,V^2$	≥ 3.3 m/s^2

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