

# EXPRESS METHOD FOR THE MEASUREMENT OF EFFICIENCY OF THE CAR BRAKING SYSTEM

Dr. Dvalishvili T., *Akaki Tsereteli State University, c. Kutaisi, Georgia*  
 Prof. Bobokhidze B., *Akaki Tsereteli State University, c. Kutaisi, Georgia*

**Abstract:** *In work the new direction in diagnostics and new method of express measurement of efficiency of the car braking system. This express-method enables us to define the validity or stability of the car braking system during the short term of time (20-25 seconds) when the wheels are undergoing the load. For this purpose the original stand running is created as a type of drum which costs on springs and the stand itself reacts on results of measurement. The new method and the device are providing the permanent and operative control of the car braking system. (the patent № P 3481).*

**Keywords:** *diagnosis, express monitoring, brake system, automobile*

## 1. Introduction

The express-controlling method of efficiency of braking operation systems of different automobiles, which is based on a development of the limiting moments for braking operation in order to brake the loading weights on wheels. There is compiled an equation of movement, which describes this process and also there are designed the dynamic parameters of it.

The testings of diagnostic stands enable to confirm a mechanical and technological acceptability of essential decrease of labour input of car braking system (cbs) for the same car.

## 2. Preconditions and means for resolving the problem

The general attribute of failure of the car braking system is the reduction of its efficiency expressed in increase of a brake way and drifts during a braking time. The braking efficiency is decreased because of the faulty drive gear which is meant a little constructive (failure hydro and pneumatic circuits), and operational (pollution, attrition, oiling, escape of operational liquids, etc.) parameters. Therefore the making of the correct diagnosis is quite complicated process and it needs a long time for it. The offered stand of a type of drum, which in comparison with the existing (tape, inertial) stands is very simple in order to make a diagnosis in a short time. Proceeding from the above-stated theme, which is devoted to the present work, still keeps an urgency despite of its popularity.

In order to provide a good and safety traffic it is necessary to provide a technical serviceability and suitability of the (cbs). Existing methods and stands used for the checking of serviceability of cbs do not provide an estimation of all the parameters of braking operation completely and thus it is impossible to make a diagnosis of its condition quickly. In presented work the simplified express train - method of an estimation of efficiency of braking operation is developed and there is offered the stand of its implementation. Together with a direct this method has also a by-effect which is consisting that the produced braking is adequated to radial loading and that enables to keep the durability of details of cbs. To develop this express-controlling method of defining of suitability of car braking system and diagnostic stands there have been solve the following tasks:

Development of a method of efficiency car braking system according to loading on the wheels:

Development of a method of a braking efficiency operated according to a principle of "yes" or "no";

Creation of the special stand with the special drums, which provide an implementation of the offered method in time and inexpensive:

Making a laboratorial- computer and road- experimental testings and investigations in order to define an accuracy of operation of a method and the device of cbs.

An object of research is a development of a method of an express-controlling and the creation a diagnostic device of efficiency of the car braking system.

The permanent control on a state of a car braking system and efficiency of an estimation of the diagnosis at load on sprockets is a problematics of the indicated question.

In order to solve stated problems there are used in work the bases of the theory of reliability, controlling and diagnostics, maintenance and repair: modern methods of mathematical modeling and of experimental researches, the bases of theory of mistakes : mathematical statistics of the theory of probability.

The express- method for the estimation of efficiency of cbs and the same stand enable to define a condition of braking system during a short term of time (20-25 sec) and that enables to save time for the controlling and diagnostics and to eliminate a technical failure of the automobile.

Diagnostic methods, laboratorial and road - experimental testings, and also the mathematical model, dynamic researches and computer model provide a high accuracy and reliability of results.

The description of conditions of operation of the stand which consists the following units and details (Fig.1): racing drums 1, the top basic frame 2, the bottom basic frame 3, the bearing of racing drums 4, the electric motor of a direct current of 5 racing drums with bases 6, barriers with an arrow 7 and an alarm bulb 8; the top frame with the guide rails 9, springs 10, kardane transmission 11, shlitce links 12, a frictional brake of 16 racing drums, a centrifugal regulator 15, coupling 13, the gauge of defining of weight 14, a driving electromagnet 18, the concrete base 19 and the central switch 20. The stand operates in following way: with the purpose of separate check of front and back wheels the vehicle moves in on the stand at first with the front wheels and then with the back wheels; for this moment each racing drum is in the braked condition, operated by a central switch and by a centrifugal regulator 15; a driving electromagnet is switched on in this moment; Then by means of the central switch there are seting in power the Drums of the stand and then the basic drum starts to rotate together with a centrifugal regulator 15. As a result the little Loads and contacts of a driving electromagnet move away opposite to each other; at the same time the drive of an electromagnet 17 will be switched off; during the rotation of racing drums the wheels of the car (the position is not born) are rotated as well. In process of normal weight loadings of racing drums the gauge 14 working on a principle of a rheostat is turned on which transfers the electromotive power to the electric motor of a constant current 5 brake moments joins. During the rotation of drums the centrifugal regulator which, sets in power an electromagnet of a drum 7 and then will lift upwards its arrow with an alarm bulb 8 will start to rotate. As a result the motion of the car is delayed.. After that the operator brakes the car and then we are faced to two cases: 1) if the braking system of the car

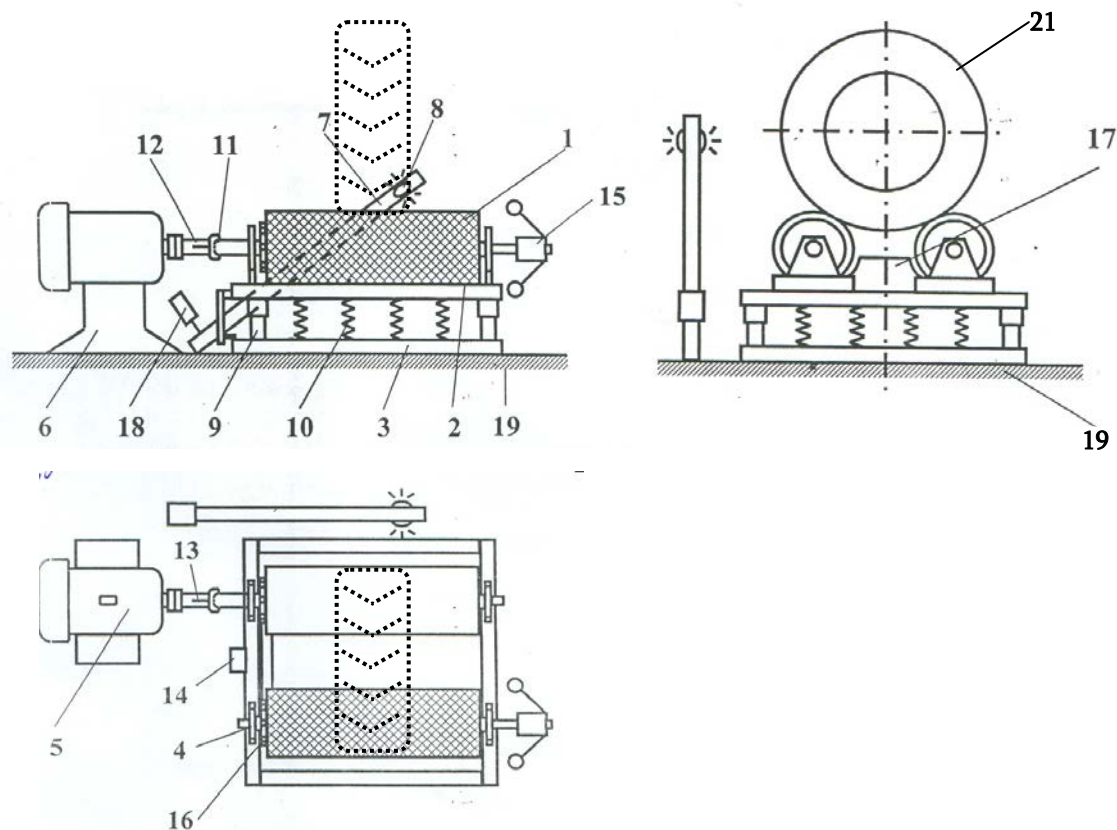


Fig.1. The diagnostic stand the express -control

is serviceable (i.e. All parameters meet the requirements) Then conducting wheels stop the basic drums, the centrifugal regulator 15 stops also, the little loads move to each other, the electromagnet 18 of the barriers 7 is switched off, the arrow falls downwards and the light bulb 8 switched off as well. At this time each centrifugal regulator we shall include a brake 16 and the vehicle will leave the stand. 2) if the braking system is not serviceable,

the rotation of drums does not stop, i.e. a centrifugal regulator still continues to rotate, the bariere sets in power on the top position and the brakes of drums are deenergizing. In this condition the car cannot overcome the resistance between barriers and conducting wheels, wheels are between drums, i.e. in this case the car will not pass the test and it will leave the stand in backward motion. Further the central switch 20 of electric motors 5 will be switched off from the electric system.

By results of test it was found out, that the diagnostic parameters which were received at the stand are corresponded to the parameters which were received in traffic conditions, but in case of the inefficient diagnosis of size of a brake way and a time of delay they have been occur outside of the recommended limits. A program of the engineering analysis has been compiled by us, MSC.VISUALNACTRAN 4D, also the computer model of the stand was created and carried out the same testings; on the basis of them it was derived the graphic characteristics (diagrams) which represent the operating process of a method and the stand

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