

# EXPERIMENTAL INVESTIGATION OF THENSION-DEFORMATION SITUATION ON CHARACTERISTIC MEASURING PLACES OF BUS TYPE T715

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**Abstract:** In this paper investigations about characteristic tension deformation situation on characteristic measuring places of superstructure are made. Results from all measuring places are very important for calculation lasting dynamic strengthens of bearing construction and superstructure. From the tension situation of the superstructure it was defined 12 measuring places (points) where the tension has maximum value. Results from the investigations and conclusions are presented.

**Keywords:** BEARING CONSTRUCTION, MODEL, SAFETY SPACE

## 1. Introduction

Objective view of relation between superstructure and bearing construction by turning out of the buses can be experimentally done with specific programmed investigations on more frames and models. Results from these experimental investigations and suitable analysis are basis phase of general methodology for the way of projecting and construction of the bus superstructure, and also contribution for contemporary way of calculation.

Experimental investigations for tension-deformation situation in characteristic measuring places, defined in basis of tension levels from theoretical investigations, figure 1, was made by tensor-metrical measuring band type HBM.

Measuring bands by suitable installation were connected with 8 channel multiplayer of signals and by magneto phone for results recording; By the way it was given opportunity for continually measuring of deformation tension changing

After measuring results were processing with printer and presenting like oscillate-diagrams.

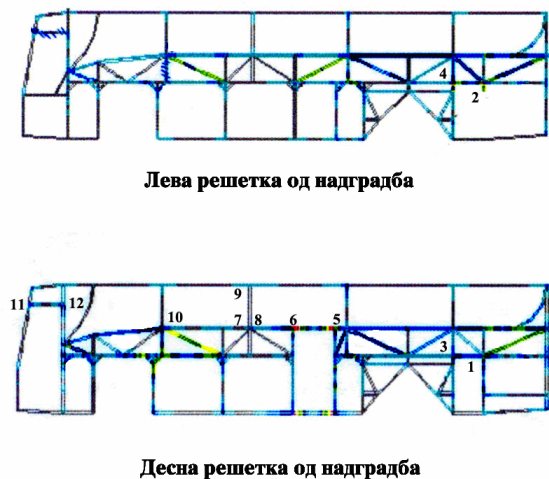


Fig. 1 Schematic view of measuring places of the bus.

For processing and filtering the noises was used two chanall printer FLUKE 105B wich was velocity evidenced in the time of impact by the pendulum.

It is nessesary to point that static measurings are made on three diametral frames produced by different quality of materials; Investigations with the impact by the pendulum also by different quality of materials of three models of the superstructure on real size, but measuring places were made a choise according awarded tension situation by calculation way on whole superstructure of the bus by programe package NISA.

## 2. Results from loadings in real condition of exploitation

Awarded results from investigations, in real working conditions of buses exploitation, are given in diagrams below. Illustration of these results is dependding road sections. In the introduction of this paper, figure 1 is places of measuring points given.

Begining zero values are for bus which is in rest position, without of passangers which is deffined and the begining load. This zero begining and real loading, is giving opportunitie for results precessing from the messeasuring, for example: dependency of loads changing for selected road section from other road and exploitation factors.

On the bus type T715 are experimental exploitation investigations made of tension-deformation situation of the constructure of the bus superstructure on normal and characteristic conditions of exploitation.

Results from the messearments for good asphalt are given on diagrams (Fig.2 to 6 and Table 1).

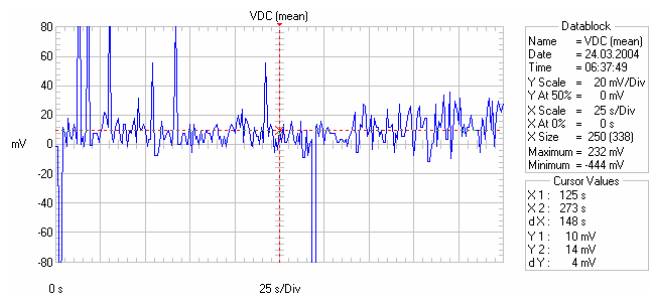


Fig. 2 Tension situation in good road conditions – measuring place number 2.

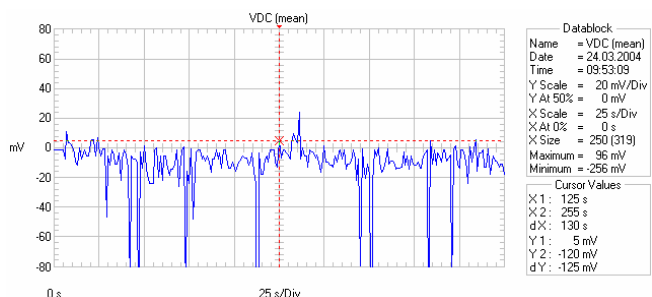


Fig. 3 Tension situation in good road conditions – measuring place number 9.

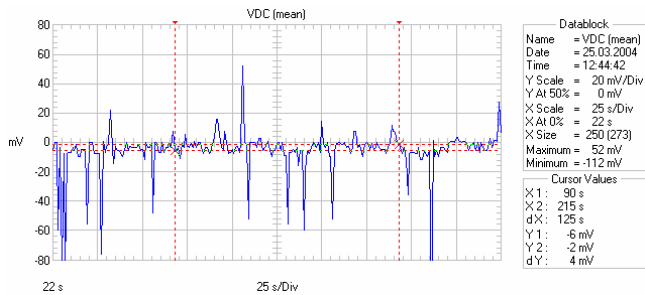


Fig. 4 Tension situation in good road conditions – measuring place number 10

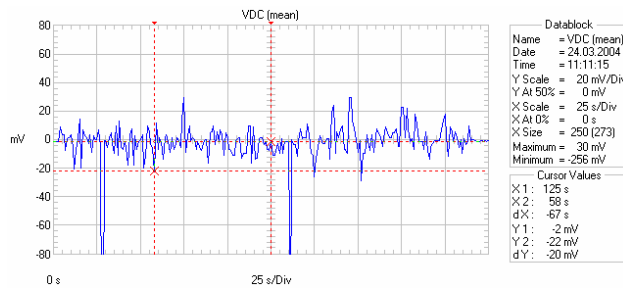


Fig. 8 Tension situation in bad road conditions – measuring place number 9

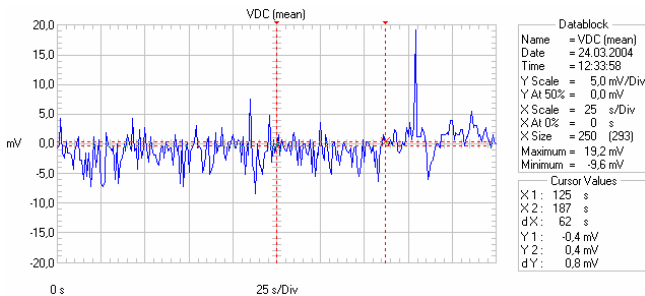


Fig. 5 Tension situation in good road conditions – measuring place number 11

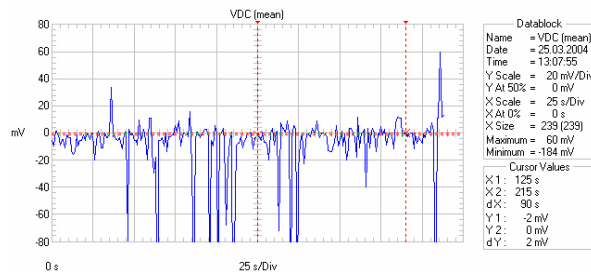


Fig. 9 Tension situation in bad road conditions – measuring place number 10

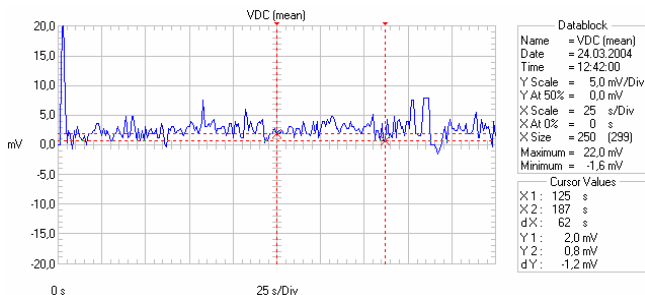


Fig. 6 Tension situation in good road conditions – measuring place number 12

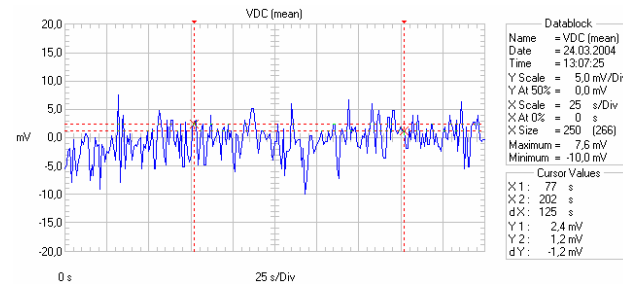


Fig. 10 Tension situation in bad road conditions – measuring place number 11

Table 1: Tension situation by measuring places for good road conditions.

Measuring place	Tension situation min [N/mm <sup>2</sup> ]	Tension situation max [N/mm <sup>2</sup> ]
MM2	0	21
MM9	-2	0
MM10	-3	8
MM11	-5	2
MM12	0	5

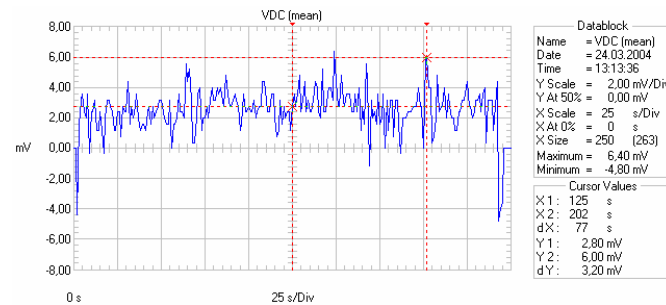


Fig. 11 Tension situation in bad road conditions – measuring place number 12

Table 2: Tension situation by measuring places for bad road conditions.

Measuring place	Tension situation min [N/mm <sup>2</sup> ]	Tension situation max [N/mm <sup>2</sup> ]
MM2	-4	16
MM9	-11	11
MM10	-16	6
MM11	-5	8
MM12	0	5

Results from the measurements by measuring places for bad road and road from cubes, are given on diagrams (Fig.7 to 11 and Table 2).

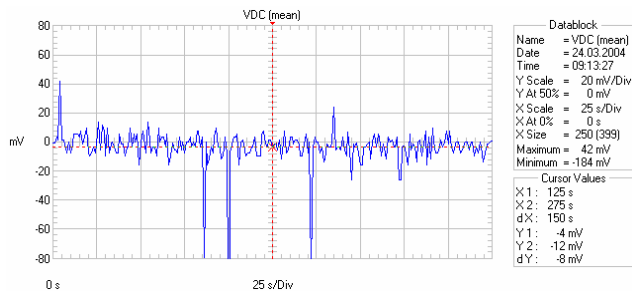


Fig. 7 Tension situation in bad road conditions – measuring place number 2

### 3. Conclusion

For the road sections in the programme and plan for investigations it was measuring in exploitation conditions planned to be realized in normal condition of work, on different characteristic road sections and velocity of driving which are permitted.

Road section – old road Petrovac - Katlanovo – this section of road was chosen according the plan and program of investigations. In this investigation the bus was full with passengers. Besides investigations in normal exploitation conditions, it was decides to be realized investigations in particular characteristic conditions. Measuring points: MM1, MM2, MM3 and MM4 are placed on basis construction; behind back bearing axis with the differential; which was made conditions for awarding loadings on this part of the construction.

Measuring points: MM7, MM8, MM9 and MM10 are chosen for finding tensions on one part of superstructure and the influence of this part of constructor on bearing bus constructor. Measuring places: MM11 u MM12 can give us information about relations of tension situation of constructor solution of behind door.

From the diagrames we can see tension situation for meseasuring places for different type of road condition.

Besides diagrams, which give us graphical interpretation of basis elements of static meseasuring values, in tables are given their analytical interpretation.

Besides avrage values from these diagrams, we can find and middle values.

For total annousment loadings of superstructure in coditions of buses real exploitation, we have not need to obtain just avrage value, we should know low of it is changing. Basis of all recorded datas is: to define basis conclusions for loadings and dimension of the buses superstructure. For choising type investigations, awarded results by meseasuring places are on complete diagrams presented. From these diagrams we can see changing of tension situation of the bus superstructure and the bus, by meseasuring places deppending of the time of the investigation.

Middle values of loadings on superstructure increase depending of load changing of the bus.

Difference between average values of tension situation of superstructure generally depending of the investigating conditions (type of the road (asphalts, bad asphalt and road from cubes)).

Values of the tensions with probability of 90 % in good (typical) conditions of exploitation are between -5 and 21 [N/mm<sup>2</sup>].

Values of the tensions with probability of 90 % in bad conditions of exploitation are between -11 and 16 [N/mm<sup>2</sup>].

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