ANNALS of the ORADEA UNIVERSITY.

Fascicle of Management and Technological Engineering, Volume VII (XVII), 2008

ASPECTS REGARDIND NOISE LEVEL MEASURING PROCEDURE GENERATED BY THE SURFACE TRAFFIC IN ORADEA URBAN AREA

Florin BLAGA, Voichița HULE, Alexandru-Viorel PELE, Radu Cătălin ȚARCĂ
Universitatea din Oradea, Facultatea IMT, fblaga@uoradea.ro

Keywords: noise level, traffic intensity

Abstract: The paper presents some of the research results conducted in the University of Oradea regarding noise level evaluation in Oradea urban area.

1. INTRODUCTION

Traffic noise indicators computation is made through intermediary method recommended by the European Council NMPB – Routes 96 and French standard XPS 31 – 133.

According to this method, L_{den} day-evening-night index number is computed in decibels according to the equation:

$$L_{den} = 10 \lg \frac{1}{24} \left(12 \cdot 10^{\frac{L_{day}}{10}} + 4 \cdot 10^{\frac{L_{evening}+5}{10}} + 8 \cdot 10^{\frac{L_{night}+10}{10}} \right) \quad (1)$$

Table 1. Daily intervals for noise index computation

Day interval	Index	Time interval
Day	L_{day}	07.00 – 19.00
Evening	$L_{evening}$	19.00 – 23.00
Night	L_{night}	23.00 – 07.00

L_{day} index (day noise index) is associated with discomfort during the day period.

$L_{evening}$ index (evening noise index) is associated with the evening period discomfort.

L_{night} index (night noise index) is associated with the night discomfort when sleeping disturbance may occur.

L_{den} index (day-evening-night noise index) is an aggregate index associated with total discomfort, during 24 hours period of time.

These indexes are computed for all periods of the day (day, evening, night) during an entire calendar year.

The paper presents the noise level measuring procedure in the places with intense traffic inside Oradea urban area.

2. MEASUREMENT PROCEDURE

2.1. Measuring zones identification

Four measurements points has been identified as the most affected by the surface traffic noise level. According to the traffic intensity evaluation (figure 1), the most affected areas are The Continental Bridge, Crisul Supermarket area, Decebal Bridge, Dacia Boulevard.

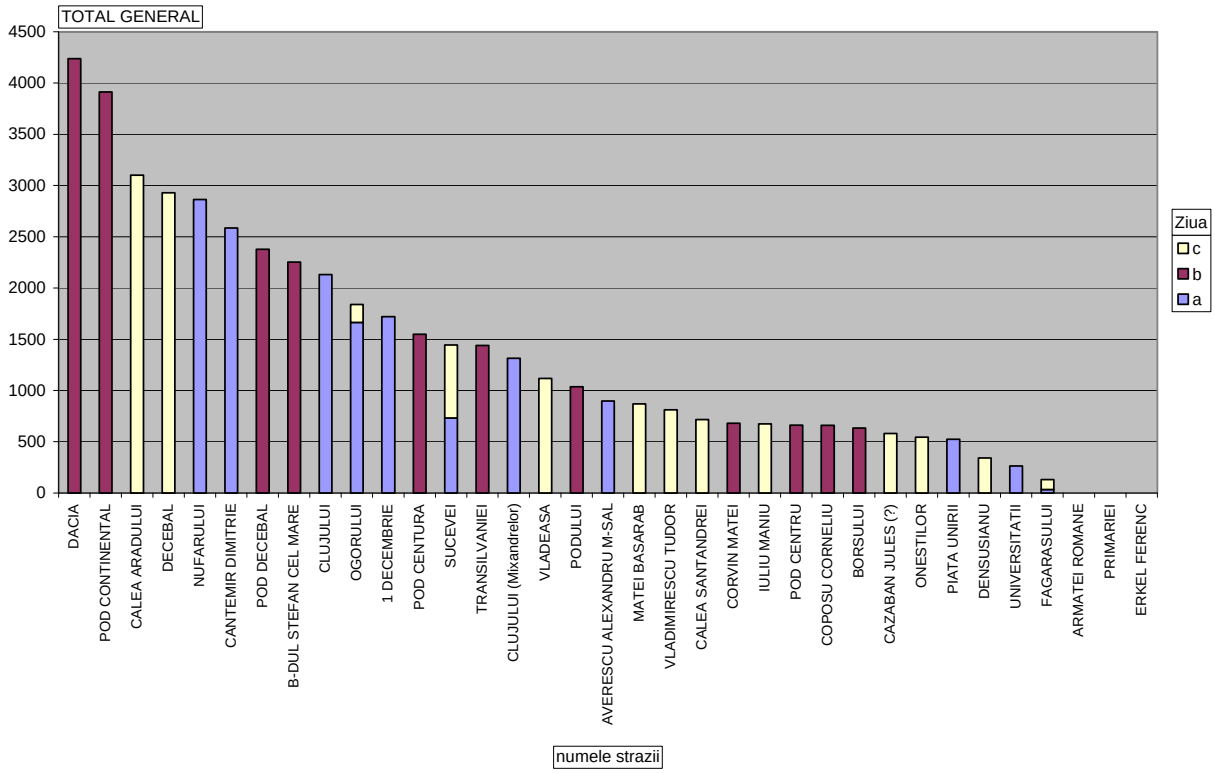

Fig. 1. Traffic intensity in Oradea urban area

Interest zones details and measuring points are presented in figures 2, 3, 4 and 5.

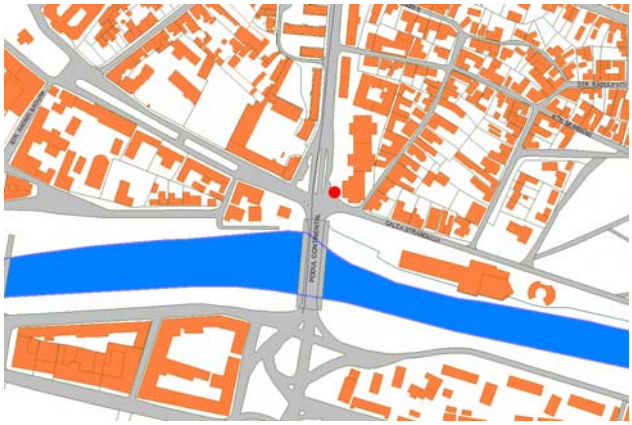

Fig. 2. **Continental Bridge Area**

Fig. 3. **Crişul Supermarket Area**

Fig.4. **Decebal Bridge Area**

Fig.5. **Dacia Boulevard Area**

2.2. Measurements schedule

Measurement took place during a week period of time (Monday, Tuesday, Wednesday, Thursday and Friday), on three moments of the day (Figure 7):

I. Day: - 7^{30} o'clock– intense traffic;
- 11^{00} o'clock – less intense traffic;
- 14^{00} o'clock – intense traffic;
- 18^{00} o'clock – less intense traffic

II. Evening: - 20^{00} o'clock.

III. Night: - 23^{00} o'clock.

2.3. Measurement process

Integrated system used for measurements is presented in figure 6.

Fig. 6. Data measurement and processing equipment

Fig. 7. Measurement process

Digital sound meter – Center 322 is designed for sound level measurements in civil and industrial sectors. Its characteristics are as follows: RS – 232 interface for PC data transfers; memory for 32 000 samples; minim/maxim functions; 0,1 Db resolution; accuracy: ± 1,5 dB; Levels: Lo = 30 – 80 dB, Med = 50 – 100 dB, Hi = 80 – 130 dB, Auto = 30 – 130 dB; dynamic domain: 50 dB; frequency domain: 31,5 Hz – 8 KHz; lifetime: 50 hours (with alkaline battery); accessories: battery, owner's manual, case, software –RS 232 cable

3. MEASUREMENT DATABASE CREATION AND LOAD

For each measurement a file is defined in which acquired data should be saved. In the following different type of records and databases are presented. In figure 8 measurement results during the "day" period of time at 7^{30} (intense traffic) and 11^{00} (less intense traffic) are presented. For a set of measured data the following can be revealed:

- maximum value of noise level;
- minimum value of noise level;
- average value of noise level;
- sampling period;
- through cursor each actually parameter value inside measuring interval can be expressed.

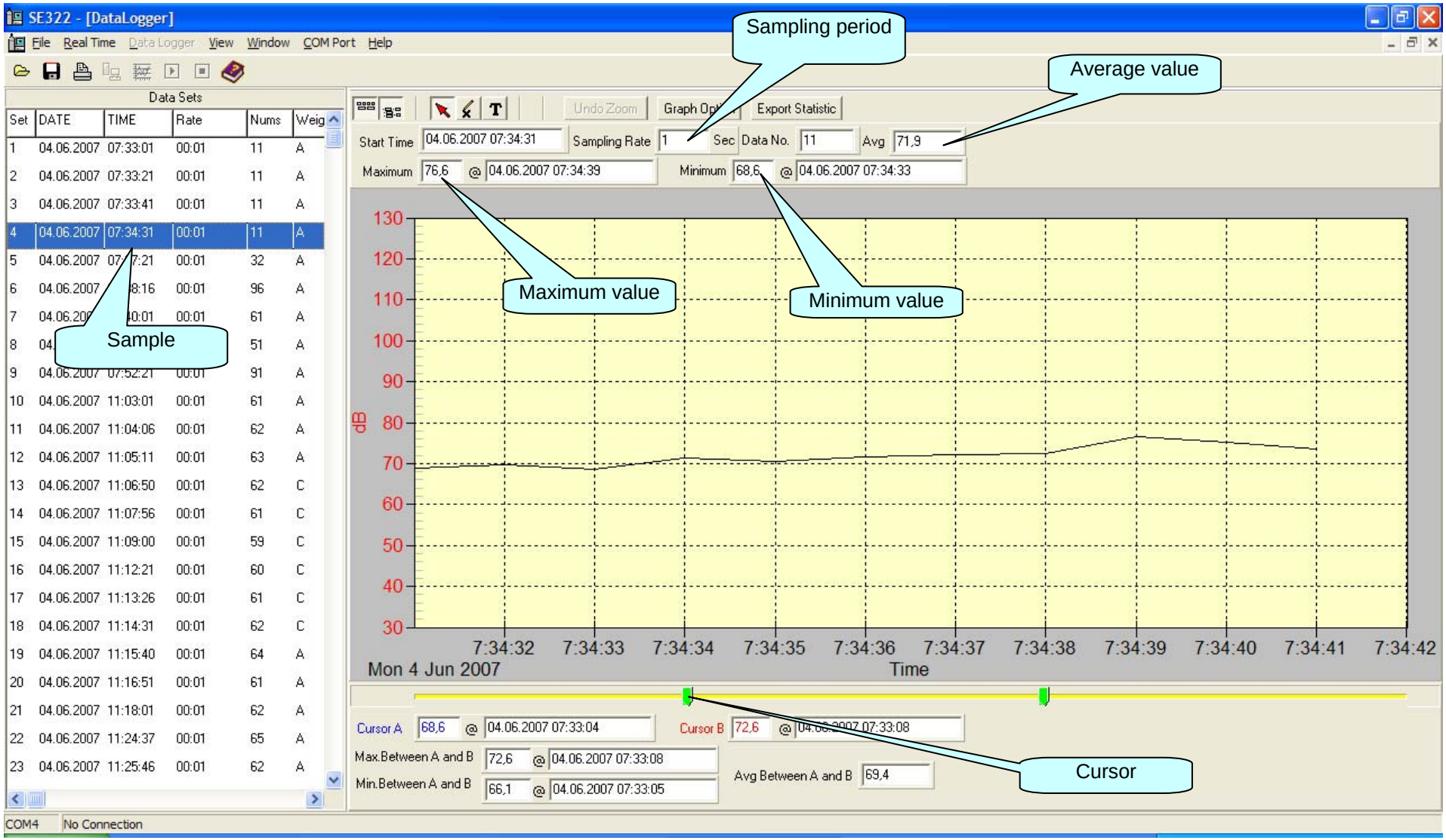

Fig. 8. Measurement results at "day" moment of time

Data files achieved during measurements are available in the following formats: text (Figure 9), Microsoft® Excel® (Figure 10) and plotted data (Figure 11).

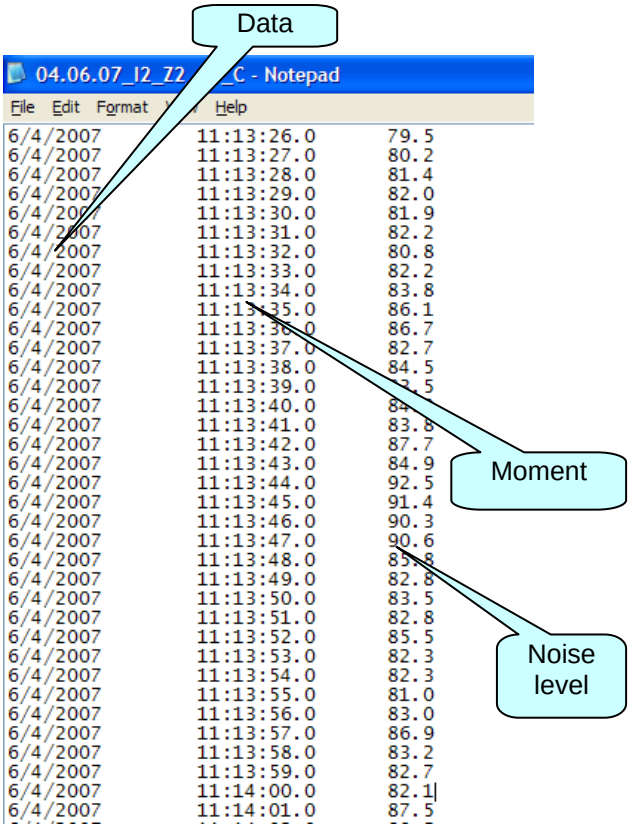

Fig. 9. Text formatted data

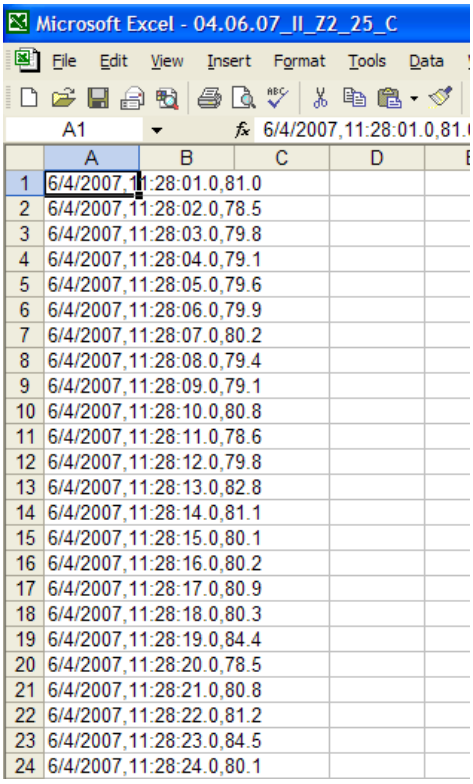

Fig. 10. Excel formatted data

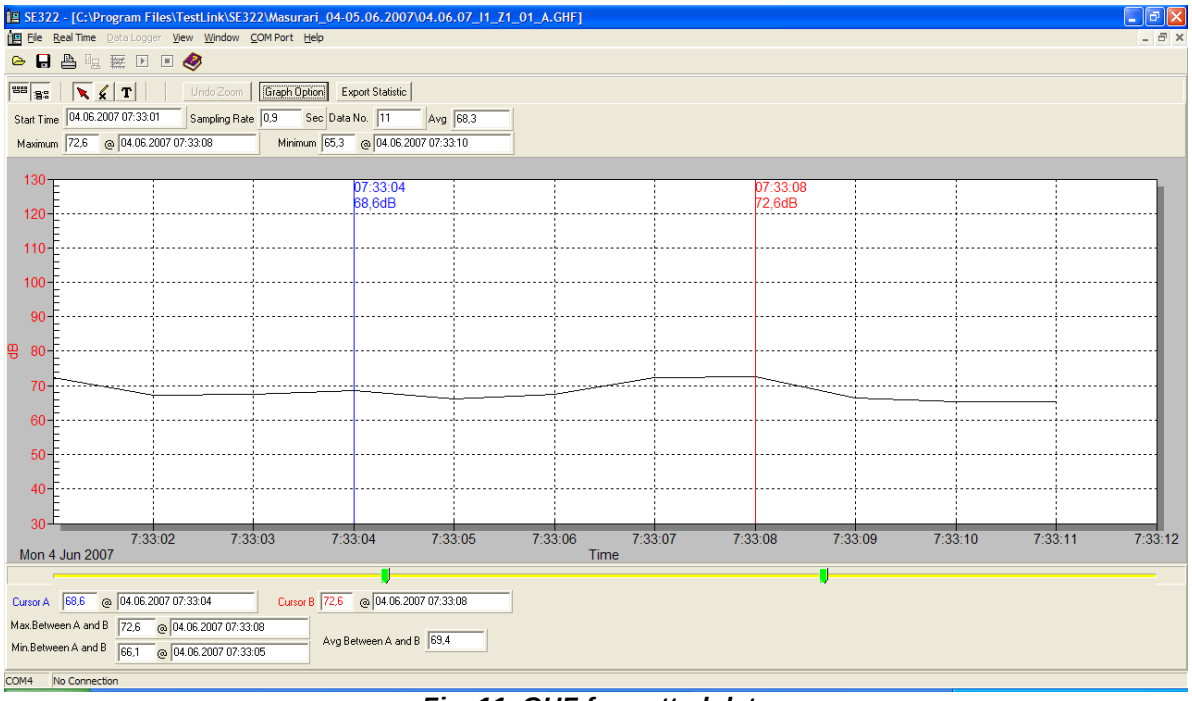

Fig. 11. GHF formatted data

Also, data formats available for Matlab conditioning can be achieved.

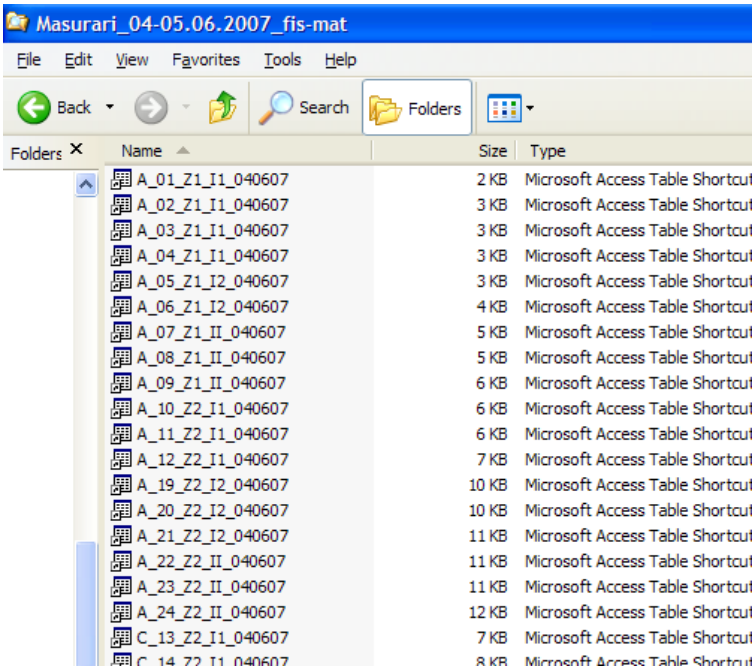

Fig. 12. .mat type files

4. CONCLUSIONS

This stage's aim was the identification of sonic polluted areas, accommodation of the researches team members with measuring devices, effective measurements, data acquisition and conditioning.

Different formats in which data can be presented and organized offer multiple possibilities for data storage and conditioning.

Surface traffic noise monitoring and measurement raises difficulties regarding measuring process continuity. This problem shall be solved during next stages of the project.

Acknowledgments

The authors acknowledge the support of the Projects CEEX 129/2006 and 751/2006.

BIBLIOGRAPHY

[1] Brittain, Frank H., Parzych, David J., Modeling the reduced insertion loss of a sound barrier in a downward refracting atmosphere for a petrochemical plant, INTER-NOISE 2006, 3-6 DECEMBER 2006, HONOLULU, HAWAII, USA

[2] Jabben, J., Dassen, A.G.M., Nijland H. A, Staatsen, B.A.M, A model for Noise mapping, The Netherlands, Proceedings of Internoise 1999, Fort Lauderdale FL 1999 .

[3] Serrano, Susana; Vida, Jerónimo; Ruiz, Diego P., El problema del ruido de tráfico en la autovía de circunvalación de Granada -pacs reference: 43.50 Rq, Dpto. Física Aplicada, Facultad de Ciencias, Universidad de Granada

[4] Swart, W.J.R., Odijk, M. and Jabben, J., Experimental validation of a model for barrier noise attenuation, The 2002 International Congress and Exposition on Noise Control Engineering, Dearborn, MI, USA August 19-21, 2002

[5] **** Dep. for Transport UK (2003): Transport Analysis Guidance, http://www.webtag.org.uk/webdocuments/3_Expert/3_Environment_Objective/3.3.2.htm