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NOISE MONITORING OF A MILITARY TRAINING FIELD

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1. INTRODUCTION

A new military camp and training field was opened during the summer 1997 in Rena, a small village 200 km north of Oslo, Norway. A number of military training activities are planned to take place in this new field, such as shooting with light and heavy weapons, explosive detonations and combat vehicle driving exercises. Due to the expected significant increase in community noise exposure, a rather detailed noise regulation plan was worked out and implemented by the State Pollution Agency. Based on predicted noise levels from the different activities, a set of noise limits is given, depending on the type of activity, residential area etc. Depending on the activity, the noise limits are given both as maximum levels (L_{CX} ,L_{AI} ,L_{AFast}) and equivalent levels (L_{CDN} ,L_{ADEN}) , averaged over one year.

2. NOISE MONITORING SYSTEM

To comply with the noise regulations, a noise measuring system has been established for continuos monitoring of community noise levels. The system includes seven fixed and one mobile measuring units. The fixed measuring positions are situated in the most populated areas around the training field, as shown in figure 1. As outlined in figure 2, each measuring unit comprises a Norsonic NE116 sound level meter and a radio link transmitting the noise level data to the central unit in the camp. The PC/NT 4.0 based central unit consists of a data logger module, a database module and a user interface module. An example from the user interface showing measured data is given in figure 3.

The four noise indices L_{Aeq} ,L_{Ceq} ,L_{AI} and L_{Cpeak} are measured, transferred and stored in the database each second. The one-second data are integrated into 1 min, 1 hour and 1 day equivalent noise levels. An activity log is also reported and stored in the database, together with meteorological data. From these data, the noise impact from the military activity is deduced and reported.

3. FURTHER DEVELOPMENT

So far, the noise data are manually inspected and evaluated. Comparing the measured noise levels with the activity log identifies the different military activities and the associated noise levels. A routine for automatic identification of the different noisy activities is now being developed, based on the use of neural networks. The 1 s time series of the noise indices are used as input to the neural network.

A further development will utilise case based reasoning (CBR) to make a decision support systems to increase the efficiency of activity planning. The system will be used to optimise the activities in order to minimise environmental impact. The fully developed environmental monitoring and control system will include:

- prediction of noise levels caused by specific activities
- predictions based on topographical and meteorological data
- decision support based on accumulated experience
- identification of noise critical activities
- activity planning for minimum environmental impact
- systematic use of noise complaints from residents
- early warning to the community about especially noisy activities

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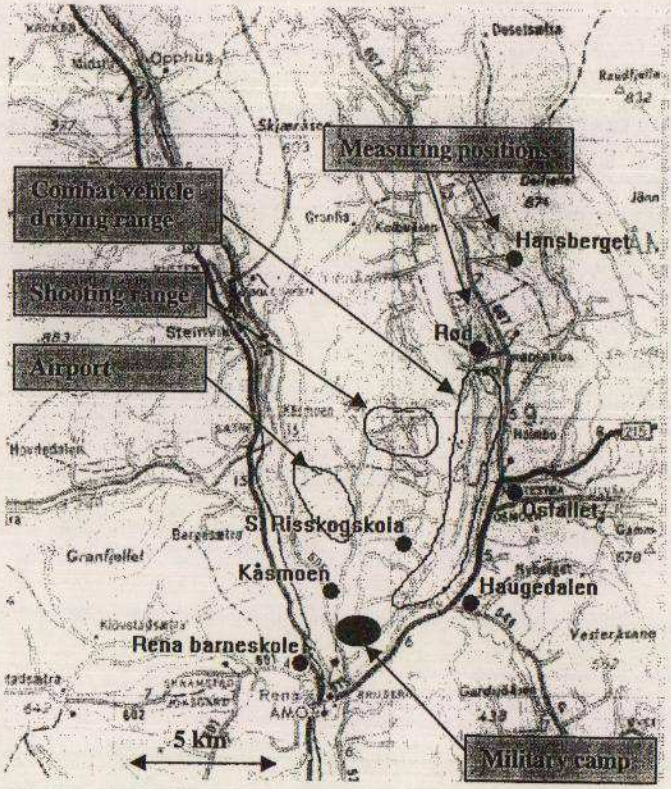

Figure 1

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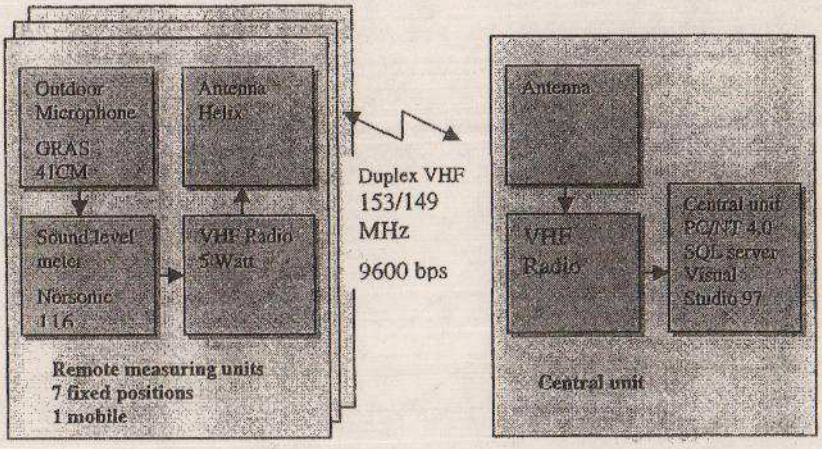

Figure 2

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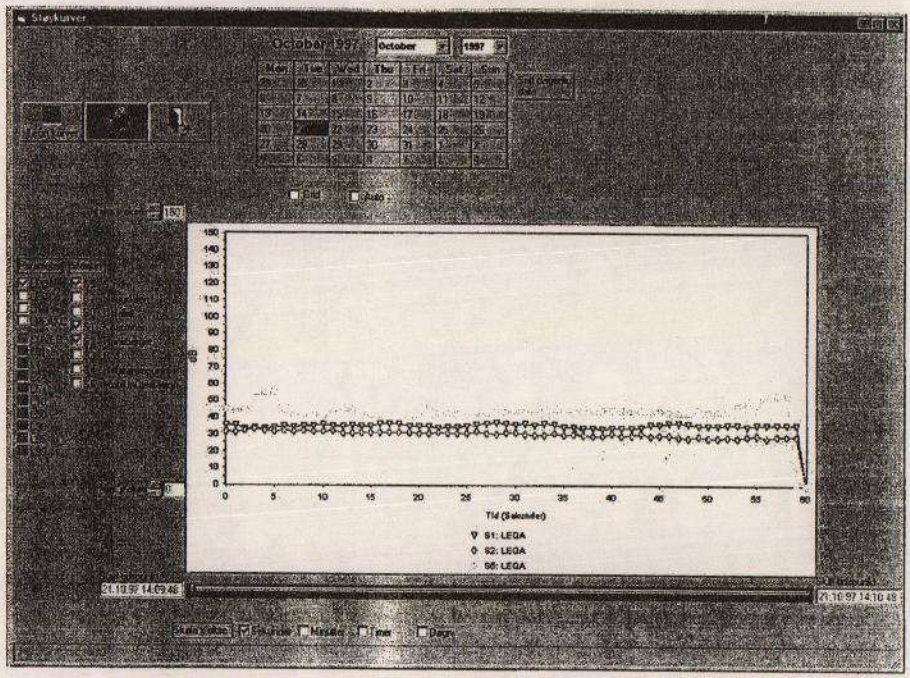

Figure 3