An Automatic and Real-time Restoration of Gamma Dose Data by Radio Telemetry

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1. Introduction

On-line gamma monitoring system based on a high pressurized ionization chamber has been used for determining airborne doses surrounding HANARO research reactor at KAERI (Korea Atomic Energy Research Institute) [1-5]. It is composed of a network of six monitoring stations and an on-line computer system. It has been operated by radio telemetry with a radio frequency of 468.8 MHz, which is able to transmit the real-time dose data measured from a remote ion chamber to the central computer for ten seconds-to-seconds. Although radio telemetry has several advantages such as an effective and economical transmission, there is one main problem that data loss happen because each monitoring post only stores 300 radiation data points, which covers the previous sequential data of 50 minutes from the present in the case of a recording interval time of 10 seconds

It is possible to restore the lost data by an off-line process such as a floppy disk or portable memory disk but it is ineffective method at the real-time monitoring system. Restoration, storage, and display of the current data as well as the lost data are also difficult in the present system.

In this paper, an automatic and real-time restoration method by radio telemetry will be introduced.

2. Methods and Results

In order to make an automatic and real-time restoration by radio telemetry, a new electronic circuit board and an integrated operation program is developed. Fig .1 shows the block diagram of a network of six monitoring stations and an on-line computer system. The new electronic circuit board is able to store the radiation data with a time flag of six or more months if the recording interval time is 10 seconds. The operation program automatically sends the time correction command to the six monitoring posts for a daily synchronization between the monitoring posts and the central control computer as a Korean mean time.

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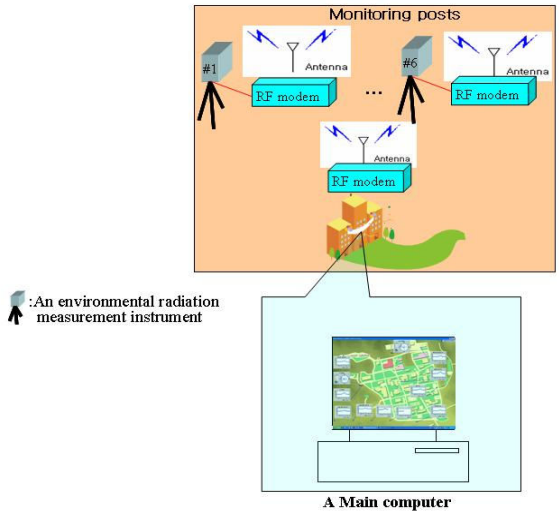


Figure 1. Block diagram of a network of six monitoring stations and an on-line computer system surrounding KAERI (Korea Atomic Energy Research Institute)

The automatic command for a daily synchronization between the monitoring posts and the central control computer as a Korean mean time is sequentially sent from year to time using “A” command.

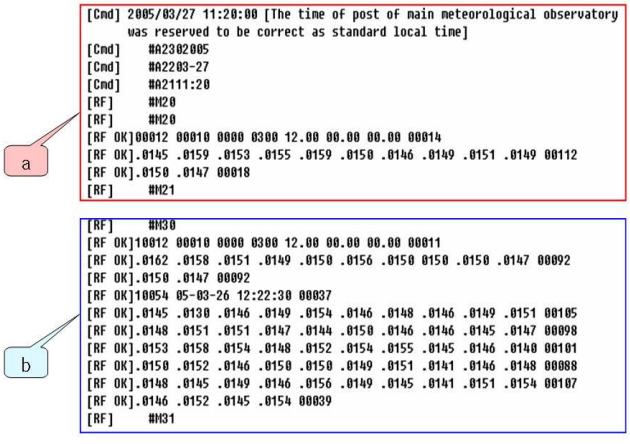
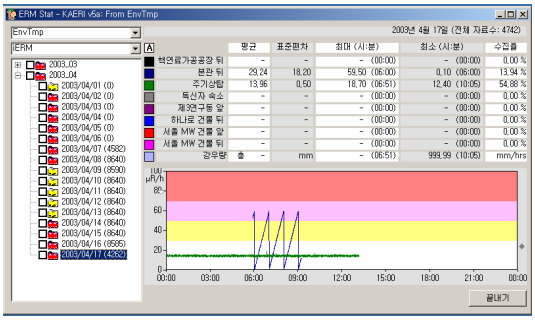


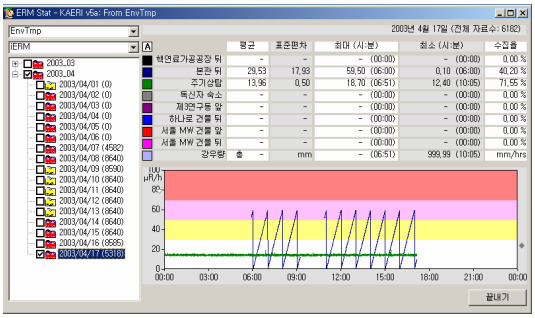
Figure 2. An automatic restoration of a simulated radiation data; (a) automatic command for a daily synchronization between the monitoring posts and the central control computer as a Korean mean time, (b) automatic and simultaneous collection of the previous and current radiation data with a time flag.

After a time correction, the “M” command requests the entire buffer data of the monitoring post contacted. By the “M20” command, the buffer data of monitoring post having the ID number 2 start to be collected and stored to the host computer. The first line after the “M20” command indicates the data information as shown in Fig. 2(a) and the following lines are the radiation data.

The #2 monitoring posts send 12 radiation data points respectively and then the “M21” command will make the buffer data reset. As shown in Fig. 2(b), if the buffer has the previous non-sequential radiation data, the collection method is slightly different. First the current data is collected, next is the indication line including the number of data, the beginning time of the non-sequential previous radiation data, and then the radiation data is finally collected.



(a)



(b)

Figure 3. Process of an automatic restoration of the simulated radiation data by a radio communication, (a) the failure of a data collection at the central control computer by a communication error, (b) process of an automatic and simultaneous restoration for previous failure data and the current data

Process of an automatic and a simultaneous restoration for the non sequential-previous data and the current data is shown in Fig.3. The failure of a data collection at the central control computer by a communication error is shown in Fig. 3(a). Fig. 3 (b) shows the automatic restoration for the previous non-sequential data.

3. Conclusion

All the types of the previous radiation data (non-sequential scattered or previous data of several posts) for six or more months could be restored by using two components having the function of a time flag and a daily synchronization without additional equipments. With this system, an automatic and real-time restoration of gamma dose data by radio telemetry was completely performed and it was also tested for more than one year. From the test results, the data collection rate was dramatically improved without any tedious manual work, which was almost about 100 % for one year. This new method has been applied for an effective gamma dose control surrounding the nuclear facilities at KAERI and is valuable for promoting public confidence.

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