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## MOBILE ENVIRONMENTAL RADIATION MONITORING STATION

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### Introduction

A mobile environmental radiation monitoring station has been developed and established for the Israeli Ministry of Environment (see Fig. 1). The radiation monitoring station is ready for immediate placing in any required location, or can be operated from a vehicle.

The station collects data from the detector and transfers it via cellular communication network to a Computerized Control Center (CCC) for data storage, processing, and display.

The mobile station is fully controlled from the CCC. Routinely, the mobile station responds to the CCC data request accumulated since the last communication session. In case of fault or alarm condition in the mobile station, a local alarm is activated and immediately initiates communication with the CCC via cellular communication network.

The mobile station is linked to an existing network of stationary environmental radiation monitoring stations, connected to the CCC.

The mobile station is encased in a portable crate which enables easy operation. The monitoring system detector can be placed inside a portable crate or located on a special stand using a 15 meters cable.

The monitoring station includes: A WR-20 gamma radiation detector, ENVIRAM B-10 processing and display unit, FEP (Front End Processor) local data logging unit, dial modem for cellular network communication, cellular adapter, and cellular telephone with back-up battery.

Fig. 2 depicts a block diagram of the radiation monitoring system.

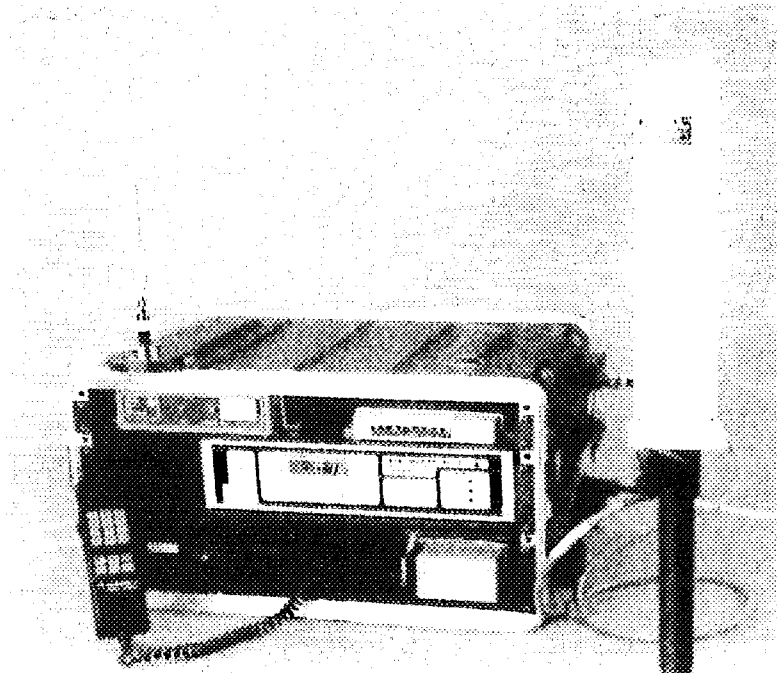


Fig. 1. - Mobile Environmental Radiation Monitoring Station

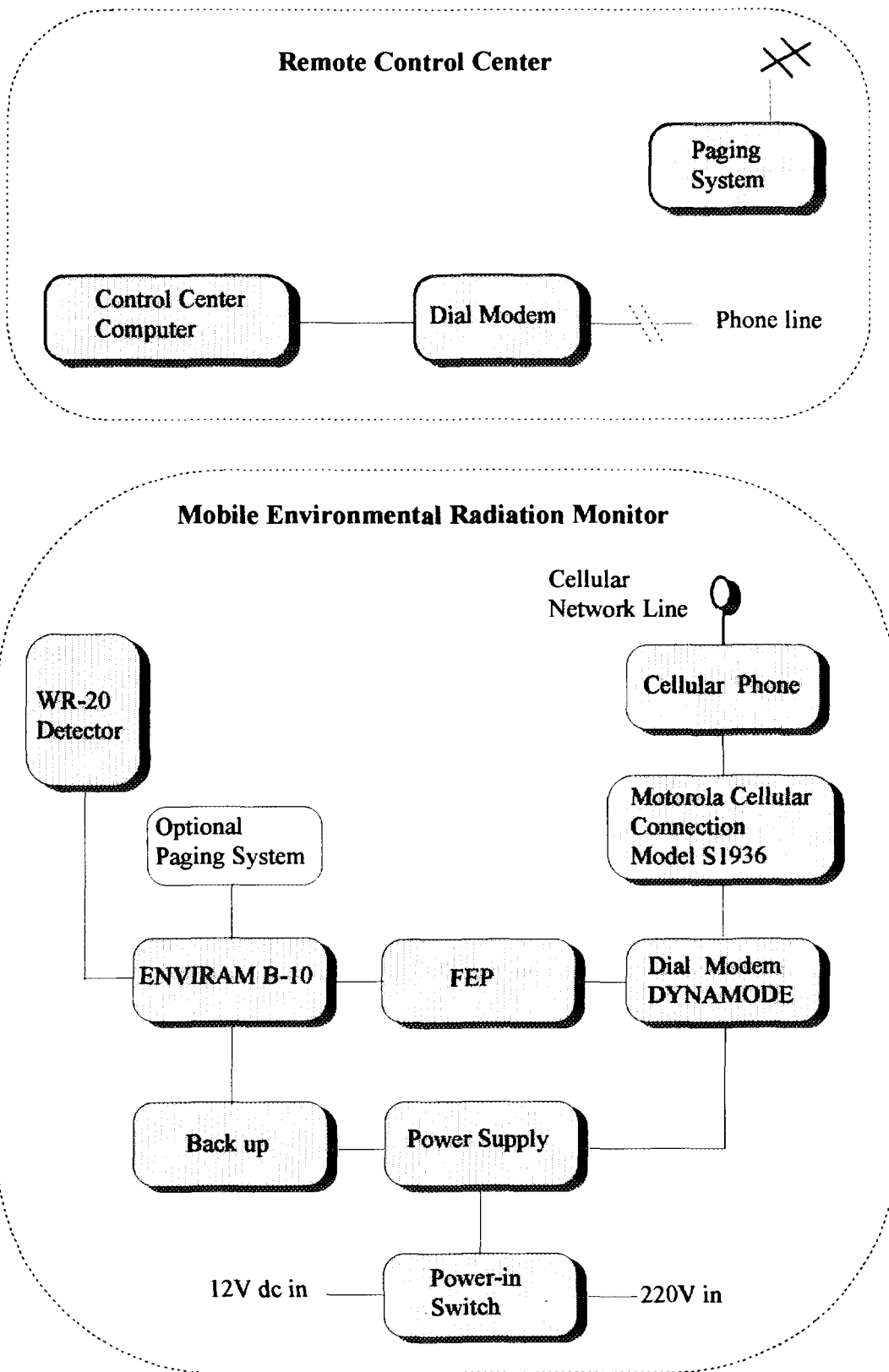


Fig. 2 - Block Diagram of the Mobile Radiation Monitoring System

### **WR-20 Detector**

The WR-20 high sensitive, wide range gamma detector, consists of two Geiger Muller counting tubes. The detector covers dose rates from 5 $\mu$ R/h to 100 R/h with flat energy response from 0.055 to 3.0 Mev.

The detector is most reliable, with built- in malfunction diagnostics for high voltage and detector failures. The detector is ruggedly built to withstand extreme weather conditions.

### **ENVIRAM B-10 <sup>[1]</sup>**

The ENVIRAM monitor provides continuous measurement, radiation dose rate, accumulated data, and system parameters on real time. In case of failure or threshold exceeding, a visual and audible alarm is activated. In addition, "change-over dry contacts" operate the wireless communication unit via the "paging network".

The ENVIRAM monitoring system has a variety of diagnostic and back-up safety features. Data transmission and control to and from a remote station are performed via RS-232 communication standard.

### **FEP - Front End Processor**

The FEP unit collects data from the ENVIRAM monitor by a serial communication interface, stores the data in an internal memory, and establishes communication with the CCC by a dial-up modem via cellular network. The FEP collects data independently from the ENVIRAM B-10, stores up to 200 samples, and sends the data to the CCC upon request. In case of malfunction or threshold alarm, the FEP initiates immediate communication with the CCC and sends an appropriate message. In case of malfunction, communication breakdowns, or power failure, data can be stored in the FEP for later retrieval and processing.

### **Modem**

The mobile station is able to communicate with the CCC, send and receive data via cellular network using a suited dial-up modem supporting V42 bis protocol. The modem was initialized to obtain reliable communication protocol with the cellular adapter.

### **Cellular Adapter - Motorola s1936**

The cellular adapter connection is an accessory for a Motorola II mobile telephone which can be used with peripheral devices compliant with the telephone industry, meeting RJ11C specifications.

The Cellular adapter generates ring voltages and decodes "Touch Tone" operating with a Cellular phone.

### **Cellular phone Motorola 3900.**

Mobile telephone for cars, series II.

### **Back-up**

A 12V 9Ah rechargeable back-up battery is connected to the ENVIRAM in case of power failure.

### **Computerized Control Center (CCC)<sup>[2]</sup>**

The control center collects data from the mobile station via telephone line. This accumulated data base enables management of alarms and failures diaries, and a measurements archive. The stored data in the archive is used for data processing, graphical display of dose rate values vs. time, and reports printout (see Fig. 3).

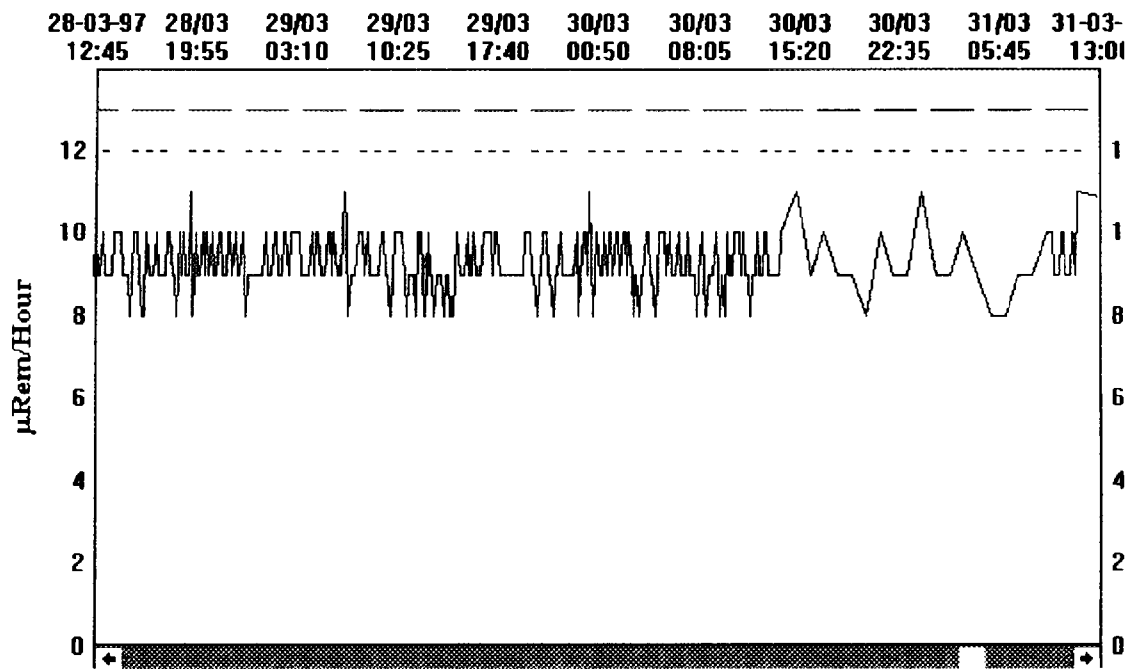


Fig 3. - Graphical data processing display

### Summary

The mobile station is added to the existing environmental radiation monitoring networks, and provides an adequate solution for placing an immediate, temporary, measuring station. The station is most reliable and easy to operate.

### References:

- [1] T. Mazor, A. Shuster, Y. Shemesh, H. Harush, H. Assido, **The Israeli Radioactive Monitoring Network**, Research Laboratories Annual Report 1993, IA-1486, pp. 131÷132.
- [2] T. Mazor, **Proposal for Environmental Radiation Monitoring System**, Nov.1991, Rotem Industries Inc.