In order to create the pulse sequences with a computer, we have used an approach which is simpler and cheaper than that reported in the literature(2). We designed and built a unit which is controlled by an 8-bit microcomputer SuperBrain (Intertec Data System Inc.). A simplified diagram of the unit is given in Fig. 6. It is based on the 8253-5 programmable timer. Each timer has three 16-bit counters. The basic clock frequency (1 MHz) is divided by the two first counters for the repetition rate of the sequences τ_o^{-1}. The other counters give the delays τ_1, τ_2 and τ_3. All counters are controlled through the OUT instruction of the microprocessor in the computer. The widths of the pulses are manually controlled by monostable multivibrators (M.S.).

The choice of a microcomputer which has a Fortran-80 compiler with IN and OUT subroutines makes writing, debugging and changing the software very simple. We used the Polling method by which the computer reads (by IN) a flag which is set up by the last pulse (P_4). A 'high' flag tells the computer to set the counters for the next series of pulses. This technique enabled us to write software without having to resort to machine language.

The generator of an NMR T_1 pulse sequence presented here represents a very general approach, by which any pulse sequence can be generated using simple hardware design and simple Fortran (or Basic) programs.

REFERENCES:

1. See for example, Fukushima, E. and Roeder, S.B.W., Experimental Pulse NMR (A Nuts and Bolts Approach) Addison-Wesley, London, 1981.
2. Saint Jalmes, H. and Barjhoux, Y., Rev. Sci. Instrum. 53, 1 (1982)

DISTRIBUTED HIERARCHICAL RADIATION MONITORING SYSTEM

N. Tsouri and D. Barak

A large data acquisition and control system was designed to monitor the raidation level around a nuclear facility. Special emphasis was placed on achieving reliability, availability, simple operating procedures and short maintenance time.

The design of the system is based on a three-level hierarchical structure. The highest level consists of a main computer, the second level includes a microprocessor (μP) based group-controllers and the lowest level consists of μP based counter modules (Fig. 7). Each counter module collects data from N radiation detectors and, according to the radiation level, activates alarms and control functions. Each group controller communicates with four counter modules via the secondary communication loop. All group controllers are linked to the main computer via the main communication loop.

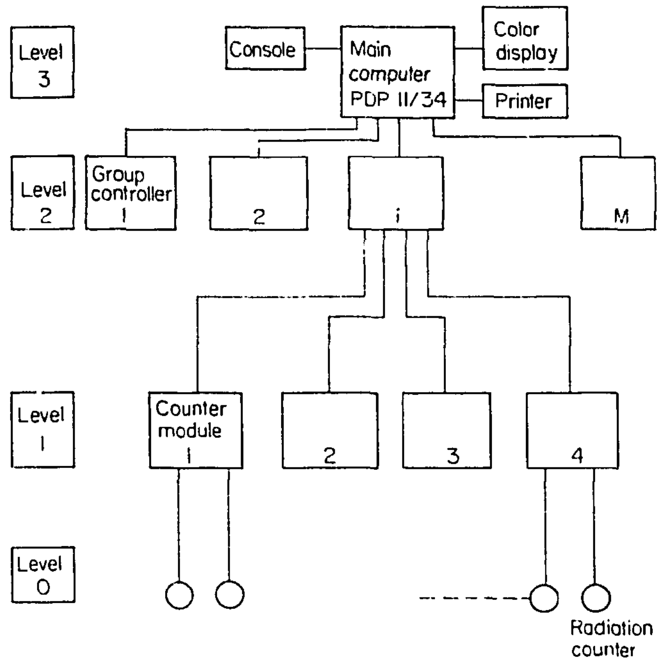

Fig. 7

Block diagram of the hierarchical distributed radiation monitoring system.

A MICROPROCESSOR-BASED POWER CONTROL DATA ACQUISITION SYSTEM(1)†

S. Greenberg

A microprocessor-based data acquisition system for power plant management was investigated and developed. The current and power data of about 100 analog channels are sampled and collected in real-time. These data are subsequently processed to calculate the power factor ($\cos\phi$) for each channel and the maximum demand. The data are processed by an AMD 9511 Arithmetic Processing Unit and the whole system is controlled by an Intel 8080A CPU. All this information is then transferred to a universal computer through a synchronized communication channel. The optimization computations are performed by the high level computer. Different ways of performing the data search over a large number of channels were investigated. A particular solution to overcome the gain and offset drift of the A/D converter, using software, was proposed. The 8080A supervises the collection and routing of data in real-time, while the 9511 performs calculations using these data.

REFERENCE:

1. Greenberg, S., NRCN-514, 1982, in Hebrew.

†M.Sc. thesis, Ben Gurion University of the Negev, Beer-Sheva, 1982.