IV. Image Processing

Systems for Data Processing in Nuclear Medicine Using a Small General Purpose Computer

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We have interfaced a scintillation camera in real time to a small general purpose computer (PDP-12C).

This system consists of a dual AD converter, a interface module, a computer, a storage scope and a teletypewriter.

Position signals of a scintillation camera are converted into a digital format and are fed to a interface module.

Data area of RI image for a predetermined matrix size is 40×40, and is displayed on a storage scope.

The interface module has a multi-channel-scaler mode and it is useful for dynamic function study of RI image. The time base of this module is 1 msec to 40 sec and the data of 2 channels are acquired up to 512 points. Output data of a computer are recorded by a teletypewriter and displayed on a storage scope. Soft wear for this system is divided into three classes. The first is for data acquisition, the second is for data display and the third is for data processing. These programmings are available when the memory of this computer is built up to 8K.

A Model of Data Processing System in Nuclear Medicine

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Models of multi-channel-pulse-hight-analyser type data processor which are used in nuclear medicine have usually fixed manupulation mechanisms, and are often inconvenient for the research purpose in this field.

In this paper, a new model of data processing system was outlined. The system was developed by cooperative study of authors, and was designed to have a widely flexible programming system.

The system was arranged to be able to offer connections with many kinds of RI instruments, e.g., a whole-body counter, a four channel renogram apparatus, a scinti-scanner, a scinti-camera, etc., and capable of online data storage, manupulation and display.

The outline of the system consisted of fol-

lowing components, (1) Inputs; a multiple data acquisition mode system, i.e., multi-channel spectrum analysers, time-sequenced scalers and scanner-type/camera-type image analysers, (2) Data processor; a small general purpose digital computer with 4096 words core memory system, (3) Analog outputs; a CRT display and a X-Y recorder, (4) Digital outputs; a typewriter and a tape puncher, (5) Supplement memory; a high speed magnetic tape recorder, which is used for the storage of man yprocessing programs as well as for the RI data accumulation, (6) Controller; the system is partially operated by a panel-button handling, although the most of controlling and applied programming were directed through the typewriter. The latter method provided a widely flexible data processing.

Data Acquisition and Processing of a Human whole Body Counter by On-line Computer System

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Recently, a human whole body counter has a tendency to develop more simple or complicated structure.

We have attempted to install a system of data acquisition and automatic post processing of data by an on-line computer system for a human whole body counter in National Institute of Radiological Sciences.

1. New system of the human whole body counter

Pulses from detector are sent to a computer center through impedance converter by on-line cable and are connected analogue to digital converter. The output of the analogue to digital converter is changed by an input format converter in such a format that is defined by program and is connected to INC units or SEQ unit. Energy pulse height distribution is collected at an INC mode. At a SEQ mode, pulse height information from the analogue to digital converter is collected in time sequence corresponding to the detection time of each γ-ray pulse.

A cathode ray tube as a monitor and input-output type-writer for communication with computer are established in the human whole body counter site.

2. Soft-ware of the new system

A soft-ware consists of programs of gain control of the detector (HCI-01), data acquisition by the INC mode (HCI-02) and the SEQ mode (HCS-01) and post processing of the data.

The HCI-02 program collects the data in one of two INC areas alternatively, and the collected data in another INC area are transfered to a disk pack storage unit. Switching of the two INC areas are made by timing signals from a timer that can generate an interrupt signal at a fixed time interval. Those data in disk pack are pulse height distribution of the fixed time interval, in other words whole body distribution of radio-isotopes. Those data include all data that could be obtained with a past human whole body counter system, in addition to the information of scattered γ-rays. Therefore, it is possible that we can make a correction of degraded γ-rays in human body using the information of scattered γ-rays.

The HCS-01 program collects all data from the detector. We can pick up freely essential