Microprocessor based data acquisition system for the spectral line receiver of the mm-wave radio telescope

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A microcomputer system (DAS-M68) based on Motorola 68000 microprocessor was developed for acquiring data from two types of backend spectrometers, namely filter bank and acousto-optic system (AOS), connected to the 10.4m mm wave radio telescope at the Raman Research Institute. The control parameters (pre-integration time, post-integration factor, number of records etc.) of both the spectrometers and mode of operation (beam, frequency or position switching) for Dicke switching of the receiver are initially passed on to this microcomputer from the host computer PDP 11/84 via a parallel interface DR11C output port and observation is started. At the end of observation, the data is received by the DR11C input port.

A 12 bit fast analog to digital convertor facilitates the data acquisition. Filter bank data is integrated in the software, while the data from the AOS is integrated in the charge coupled device and transferred to the microcomputer during the setting time after switching, thereby achieving the time division multiplexing of the data from both the spectrometers.

DAS-M68 has 760 kilobytes of system memory. Separate ON-DATA and OFF-DATA buffers are defined in the system memory for each spectrometer. Receiver ON-OFF switching signal directs the data to these buffers. The data are integrated into the final buffer only when the telescope is tracking within the error zone during the observation. Available system memory is enough for one hour data at 0.5s typical switching rate used in our telescope.