§23. CHS Data Acquisition and Analysis System

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In this fiscal year, the Cinos and VAX data acquisition and analysis system acquired the experiment data of 10Mbytes/shot (1.3Gbytes/day); totally 160Gbytes/year. This data capacity is 2 times larger than that of last year. The rate of operation was about 98%. The data acquisition system Cinos acquired 50 % of 10Mbytes/shot. These data acquisition systems are in a transition phase from VAX computer system to Cinos fast signal processing system. The low speed data acquisition and control CAMAC module is being replaced with Cinos/VME modules. We added the new data acquisition Cinos/VME modules, which are high resolution 32 channel multi-plexus AD/C (16bit, 100KHz, 1Mbytememory) × 4 modules,16ch discrete AD/C (16bit,100KHz, 1Mbyte memory) × 3 modules, 5 reflection VME memory modules and a VME controller.

We are continuously developing the Cinos signal processing systems. Five systems of Cinos are being used from last year, and five Cinos were added this fiscal year. The Cinos signal processing system is totally 10 systems. The new five Cinos systems have the new AD/Cs, reflection memories above mentioned and a new MPU of PPC. We are installing these modules now. Cinos has the algorithm that a process is executed with the fast time; generally, this time is expanded or contracted by the computer load. However Cinos is keeping a fast time irrespective of the CPU load, because Cinos has scheduling performers for I/O optimum and has the Keeping Liner Time Law (KLTL) method. KLTL is composed of very simple process control algorithm and bus monitoring unit in Cinos. KLTL operation keeps the rigid scheduling on I/O control, but this method is dependent on the hardware unit and simple control software, then we have not experienced a serious trouble. We developed a random interrupt generator of CAMAC standard. Refer to Fig. 1. The purpose is to study the effect of minimum interval time interruption to the KLTL. Conventional computer is necessary to have the few hundred microseconds as the interrupt interval time. In the same way, the method of KLTL works for a long time interval of interrupt. Therefore short time interval of interrupt may break the KLTL. This short time corresponds nearly to the speed of CPU clock frequency. We measured this short critical time by using a random interrupt generator. It was important study to know the condition where KLTL method breaks. Random interrupt time generator can generate an interrupt signal randomly to Cinos controller from the 10 microseconds to 1 minute. The method of observation is as follows. An interrupt signal of starting time is caused by generator and Cinos controller can get this signal after the constant time. The difference between the Cinos receiving the time and the starting time is constant time. This difference is equivalent to the possible minimum time of interrupt on the Cinos when the I/O unit puts the continuous interrupt signal to the Cinos controller and KLTL will be not able to execute under the shorter time than this difference time. The result is shown in Fig.2. An averaging time line shows an Expectation mark and observation result shows a Result mark. For every trial, less than 10microseconds of the fluctuation occur around the Expectation line. This may be caused by VME controller and electronic circuit. We acquired knowledge from this result; I/O unit and program sequence can't work with the interrupt signal interval less than about 70 microseconds for KLTL method. KLTL running in the actual employment will require 2 times of the minimum interrupt interval.

Figure.1 Random interrupt time generator.

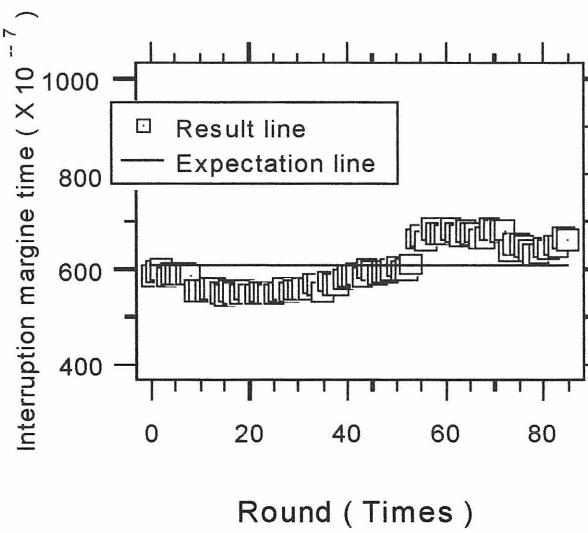

Figure 2. Experimental results on Cinos interrupt time under continuous interruption.