INTERFACING OF TRISTAN CONTROL SYSTEM

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Abstract

In order to provide a homogeneous access method for various control objectives of TRISTAN, a standardized hardware interface was designed and applied in practice. A dozen of CAMAC modules are available for the present purpose.

Introduction

The design efforts of the front-end interfacing of the accumulator ring control system were presented. Basic features of the present interfacing scheme will be succeeded by the main ring control; the overall design was already described in ref. [1]. In a software level, the system's homogeniety was maintained by a special control language NODAL and a concept of DATA MODULE. On the other hand, in a hardware level, we needed something matured standard as a guiding principle.

CAMAC as an Interface Standard

In the early stage of the design efforts, we decided to adopt CAMAC standards as a front-end interface. It was not always a common style and never trivial to apply CAMAC in a process control field.

We found some advantages to use CAMAC in an accelerator control system: they are

1. The systems constructed with CAMAC are transportable from one laboratory to another, almost in an independent way of the computer system.
2. Wide varieties of CAMAC modules are already commercially available, reducing a risk to develop a fully new system.
3. A branch highway system, a serial highway system, and a stand-alone system can be operated almost in a same way; that is essential for a system's maintenance and a development as well as to increase flexibility.

There exist, however, shortcomings.

1. CAMAC is rather old standard and does not always match to the present computer/electronics technology.
2. Because CAMAC was originally never designed to use in an industrial field, some features, which were inevitable to a process control, were not specified. The recent recommendation [2] [3] deals with additional specifications when CAMAC is applied to an industrial usage.

General Feature

All the interface modules were designed according to the following principles.

1. Each module has automonous functions of power-on reset and power-on/off output disable.
2. We have no device-oriented modules. All inputs/outputs on a board have same interface. Analogs and digitals are completely separated.
3. The highest byte of the CAMAC word is used as a data-tag for a maintenance purpose.
4. The CAMAC functions are so designed as to reduce software protocol. If we need some complicated protocol, we are go-

ing to use an one board micro-computer system under control of the host computer.

Intelligent CAMAC

We have a group of modules called as intelligent CAMAC; they are interconnected each other by a special bus called as STD-BUS [4]. One of the modules, a micro-computer board, is installed Zilog's Z80 microcomputer. Following software's are provided prior to the general application.

1. Interactive monitor program
2. Tiny BASIC with CAMAC capability
3. ROM writer handler
4. GPIB handler

The items 1, 2 and 3 are only for a maintenance and/or a development purpose.

List of the Modules

Following modules were developed in the present effort.

1. Status Input Gate
2. Interlock Input Register
3. Status Output Register
4. Active I/$\bar{O}$ Register
5. Passive I/$\bar{O}$ Register
6. 32-channel Scanning A/D Converter (Dual Slope)
7. 32-channel Scanning A/D Converter (Sample and Hold)
8. 8-channel 12 bit D/A Converter
9. 6-channel Dual Pulse Train Generator
10. 16-channel RC Filter
11. Status I/$\bar{O}$ Tester
12. Micro-computer Board
13. CAMAC Auxiliary Crate Controller
14. Rom Writer Board
15. STD-Z80 Board Adapter with GRIB Interface

The mass-production and the installations will take place in this and next fiscal years.

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References

[1] H. Ikeda et al., IEEE Trans. NS-28 (1981) 2359.
[2] European CAMAC Association, Recommendations for the industrial Application of CAMAC, ECA/ISG 81/1, May 1981.
[3] European CAMAC Association, Recommendations for Analog Signals for CAMAC in Industrial Applications, ECA/ISG 81/2, May 1981.
[4] The STD-BUS was originally designed by Prolog and MOSTEK for a manufacturer's own standard.