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Labor für Elektronik und Meßtechnik

CAMAC-Bibliographie
Supplement

I. Tradowsky-Thal

GESELLSCHAFT FÜR KERNFORSCHUNG M. B. H.

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Zusammenfassung

Dieser Bericht enthält neben Nachträgen zur CAMAC-Bibliographie (KFK 1471) die Titelangaben der von September 1971 bis August 1972 erschienenen Veröffentlichungen über das CAMAC-System, jeweils einschließlich der Zusammenfassung in Englisch, soweit sie vom Autor angegeben wurde. Jedes der 112 Literaturzitate ist – in der Art von Karteikarten – auf einem Raum von DIN A 6-Format untergebracht, wobei die Zusammenfassung auf der Rückseite steht.

Abstract

This report contains both addenda to the CAMAC Bibliography (KFK 1471) and the bibliographical references of the publications on the CAMAC system from September 1971 to August 1972, and the abstract respectively, if given by the author. Each of the 112 citations is placed on a 14.8 mm · 10.5 mm field with the abstract on the back side.

Manuskript eingereicht am 22. 8. 1972

Lewis, A.

Guidelines for a CAMAC Programming Language

U.K.A.E.A. Research Group, Report AERE – R 6266, Harwell 1969, 4 S.

Collins, G. B.

Computer Interface Methods and Standards

U.K.A.E.A. Reactor Group, Report AEEW – M 986, Winfrith 1970, 12 S.

Proceedings of a Seminar on "CAMAC" for the Marine Environment held at The Atomic Energy Research Establishment, Harwell, April 7th 1970

U.K.A.E.A. Research Group, Report AERE – M 2318, Harwell 1970, 31 S.

Pyle, I. C. (Editor); Calderbank, M. C.; Hall, J. W.; Langsford, A.; Lewis, A.; Poole, P. C.; Taylor, J. R.

Papers on Real-Time Programming

U.K.A.E.A. Research Group, Report AERE – R 6432, Harwell 1970, 34 S.

An informal one-day meeting was held in the Cockcroft Hall at Harwell on Tuesday, 7th April 1970, on the subject of data transfer in the marine instrumentation field. The aim was to provide a forum for exposition and discussion of data transfer between measurement devices and computer, and between the computer and its ancillary equipment for data presentation. The seminar was oriented solely to the field of marine instrumentation.
During the morning session Harwell specialists outlined the CAMAC instrumentation scheme, which is being adopted by a number of organisations in a variety of fields, and can be used as a standard interface between digital computers and peripheral devices. The afternoon session was concerned with operational experience of the CAMAC system, discussion of other systems, and a general discussion of the problems presently encountered in this field. Time was provided for discussion of the CAMAC scheme and its relevance to instrumentation needs in the marine environment, this being one possible way of computer processing marine data. It was hoped that any practical alternative schemes would be compared with possible applications of CAMAC.

The papers in this report were written for discussion at a symposium on Real-Time Programming Languages held at Harwell on the 4th June, 1970. The symposium brought together views from a variety of activities within the Research Group of the Atomic Energy Authority (Harwell and Culham), including system programming for main site computers, design and programming of on-line computer systems, design of hardware for real-time computer systems and diversification work.
To follow up the valuable interchange of ideas (and remarkable similarity of outlook from independent sources), the symposium papers are being published in this form to reach a wider audience. We hope to hold another symposium in the Autumn.

CAMAC is a unique computer peripheral system orientated towards on-line real-time data handling and process control. It is the direct hardware analogue of a high level programming language, and to realise the full potential of CAMAC, it must be programmed in a suitable language.
The hardware characteristics are outlined and those facilities not available in current languages but necessary for the implementation of a CAMAC system are discussed.

The functions of a computer interface are reviewed, and the various levels at which interfaces arise are described. The basic principles of computer interfaces are discussed, and their similarity is contrasted with the wide variety of sensors and actuators, to which connection may be required.
Conventional Computer interface equipment using electromechanical multiplexers is mentioned, and attention is then focussed on recent developments which attempt to reduce interfacing costs. These include modulated data highways and interrogative systems.
The requirements and applicability of interface standards are discussed. Two complementary standards, BS4421 (1969) and CAMAC are described, with examples of their wider application.

van Breda, I. G.

Telescope Interface Compatibility

11th Colloquium of the Internat. Astron. Union, Edinburgh, August 1970
In: Proceedings of the 11th Colloquium of the International Astronomical Union August 1970. Publ. of the Roy. Observatory, Edinburgh, 8 (1971) S. 50 – 51

Salmon, L.; Creevy, M. G.

An On-Line Computer System for Instrumental Analysis of Air, Water and Soil

U.K.A.E.A. Research Group, Report AERE – R 6524, Harwell 1970, 17 S.
S. auch: Symposium on Use of Nucl. Techn. in the Measurement & Control of Environmental Pollution, Salzburg, 26 – 30 October 1970.
In: Nuclear Techniques in Environmental Pollution. Wien: IAEA 1971. S. 47 – 61 = Proceedings Series, STI/PUB 268

Currie, W. M.

Data Processing at Harwell

Conf. on Lab. Automation, London, 10th to 12th November, 1970
In: Proceedings of the Conference on Laboratory Automation. I.E.R.E. Conf. Proc. No. 20. London: I.E.R.E. 1970. S. 83 – 97

CAMAC: Développement d'un Nouveau Système d'Instrumentation Nucléaire

C.E.A., Monographie CEA – Novembre 1970, Saclay 1970, 7 S.

Some 22 small computers are used at Harwell for data acquisition, control of measurements and the logging of equipment. These are considered under three categories, the direct application of nuclear techniques in physics and chemistry, the control and logging of neutron or X-ray diffraction measurements, and miscellaneous automated measurement applications.

The question of standardization of mechanical and electronic interfaces on telescopes is discussed and a proposal is made that Camac be adopted as an international astronomical computer interface standard.

Neutron activation analysis is a well-established technique for the determination of elements in environmental material. A computer system is described which simultaneously accumulates gamma-ray spectra from several detectors, performs appropriate data transfers and carries out numerical analyses. A twelve thousand word store is used supported by a mega-word disc. Routine analyses are performed on short-lived nuclides with a sodium iodide detector whilst longer-lived material is measured with germanium (lithium) detectors.

Vojinović, M.

Sistem nuklearnih instrumenata za rad sa računskim mašinama CAMAC (Nuclear Instrument System for Work With Computers, Orig. serbokroat.)

Nuklearna Energija 6 (1971) Nr. 1, S. 19 – 23

Adams, P.

Beamline Computer Control by Interpreter

Proc. of the 1971 Particle Accelerator Conf., Accelerator Engng. & Technol., Chicago, March 1 – 3, 1971 (IEEE Trans. Nucl. Sci. 18 (1971) Nr. 3) S. 361 – 362

Iselin, F., u. a.

HP–CC (HP – CAMAC Single Crate Interface) Type 066

CERN–NP CAMAC Note No. 27 – 00, Genève 1971, 16 S.

Machen, D. R.; Biswell, L. R.

A Standard Interface Concept for Computer-Controlled Particle Accelerators

Proc. of the 1971 Particle Accelerator Conf., Accelerator Engng. & Technol., Chicago, March 1 – 3, 1971 (IEEE Trans. Nucl. Sci. 18 (1971) Nr. 3) S. 363 – 364

The computer control system for the K9 separated beam is described. This beamline is a multi-energy/multi-particle beam and the principal aim of the computer system is to reduce the time taken to tune the beam to a new energy. The hardware comprises a 12K PDP–8 with disk and magnetic tape, a Teletype and logging typewriter. Control of the magnet currents and collimators is via a multi-crate CAMAC system, which also serves for data acquisition. The software system is based on a real-time, high level language interpreter. Besides allowing the users to write their programs in a high level language (similar to FORTRAN), the interpreter also provides all the executive functions required with a disc-based, real-time system. Because an interpreter is used, programs can be written or modified on-line and tried out immediately. The relatively slow execution speed of the interpreter is no disadvantage. The system allows high level language and machine code program segments to be combined in any program.

A survey of the existing (and planned) particle accelerators throughout North America and Europe will immediately indicate the unmistakable proliferation of either partial, or total, digital computer control systems. The cybernetic-like tentacles of these systems have reached into the most remote areas of the particle accelerator. One also realizes that each facility has designed special hardware, unlike any other, to handle the interface problem between the accelerator and the computer. A further look will convince one that the various interface problems are not, in principle, different.
This paper will discuss a practical solution to the standard interface concept for computer control systems. Such an accelerator/computer-independent scheme for interface could well save many man-years of redundant design effort and invoke considerable cost savings in system implementation. A system organized about the dataway and branch/control highway of the CAMAC standard is a potential contender.

The development of electronic nuclear instrumentation in connection with the requirements, needs, and possibilities that computers may secure is discussed. The role and the place of the new system of electronic instruments designed for work with computers in real time is described. Typical functional modules are presented, and some examples of the application of the new system of electronic instruments are outlined. (Cited as given in Nuclear Science Abstracts.)

The HPCC (Hewlett-Packard – Crate Controller) type 066 is a two-unit-wide CAMAC module occupying the two rightmost stations of a CAMAC crate (i.e. the control station and one normal station), and interfacing the dataway of this crate with a Hewlett-Packard computer 2114/15/16/00. Two standard HP 12566A microcircuit interface cards (ground-true I/O devices), IC_1 and IC_2, are used in the computer frame, establishing two channels between the HPCC and the computer itself.
The first channel is reserved for control output and CAMAC demands input, the second channel is an input/output data channel. For reasons of simplicity (and cost), the word length in all types of transfers is limited to 16 bits in parallel. In order to allow fast autonomous data transfers (function = Read/Write), the unit provides the address autoscan facility (so-called "sequential addressing") and can also transfer a block of data from (or to) a single module, the synchronization being obtained by means of a look-at-me. The duration of the dataway cycle generated by the HPCC must be less than 1.4 μsec.

Taylor, J. R.; Hooton, I. N.; Lewis, A.; Whitehead, N. P.

Papers on Real-Time Programming (3)

U.K.A.E.A. Research Group, Report AERE – R 6813, Harwell 1971, 15 S.

Słaby, M.; Barciewicz, H.

Camac – modułowy system budowy elektronicznej apparatury pomiarowej (Camac – Modular Design System of Electronic Instruments, Orig. poln.)

Pomiary, Automatyka, Kontrola 17 (1971) S. 318 – 320

Currie, W. M.; Langsford, A.; Hall, J. W.

Papers on Real-Time Programming (2)

U.K.A.E.A. Research Group, Report AERE – R 6571, Harwell 1971, 34 S.

Langsford, A.; Jarvis, O. N.; Whitehead, C.

DAMUSC – A Direct Access, Multi-User Synchrocyclotron Computer

U.K.A.E.A. Research Group, Report AERE – R 6832, Harwell 1971, 16 S.

The papers in this report were written for discussion at a symposium on Real-Time Programming held at Harwell on the 7th October, 1970, as a sequel to the first symposium reported in 'Papers on Real-Time Programming' (A.E.R.E./R.6432).
A third internal symposium (still limited to the U.K.A.E.A. Research Group) was planned for the 2nd December, 1970. The papers discussed at that meeting will be published as a further report.

A multi-user real-time computer system has been provided to ease the data collection problem for nuclear physics experiments performed on the Harwell 110" Synchrocyclotron. This paper presents the design principles which led to the choice of a Honeywell DDP–516 computer and the decision to implement data collection and experiment control though CAMAC. System aspects of both hardware and software are considered in some detail and the paper summarises user experience acquired during the two years of operation. The system has been designed to support three users simultaneously, although there are restrictions which depend upon the inter-play of a number of parameters of which the most significant is the availability of core store.

The papers in this report were written for discussion at a symposium on Real-Time Programming held at Harwell on the 2nd December, 1970, as the third in a series held during the year. At this symposium, specific real-time languages (RTL, PEARL) were compared and discussed, and the problem of specifying a suitable programming language to be used with CAMAC was explored.
Some of the material presented at the symposium has been published separately, and is not repeated here. The relevant report is 'A Basis for a Small Computer Modular Executive' by A. Lewis, Electronics and Applied Physics Division, Harwell. (A.E.R.E./R.6600).
Recognising the interest in this subject and the symposium, a wider meeting was planned, to bring together people from laboratories throughout the U.K. and Europe. The proceedings of that meeting will be published as a book.

The "CAMAC" – a versatile modular system having internationally defined mechanical and electrical parameters is manufactured by some leading companies. This system is especially useful in data transmission and processing in control engineering where electronic computers are employed. This article describes the principles of design and use of mechanical subassemblies of this system, i.e. boxes and blocks (panels). Production of these subassemblies has been started by the "Polon" works in Krakow.

Barthel, H.; Gagel, G.

ADC-Steuerung in CAMAC-Norm für Multikoinzidenz-Messungen

Kernforschungszentrum Karlsruhe, Bericht KFK 1405, Karlsruhe 1971, 23 S.

Buchanan, J. A.

Rice University Microprogrammed CAMAC/PDP–11 Data-Acquisition System

LAMPF Summer Study Session, Los Alamos, August 9 – 14, 1971
In: Los Alamos Scientific Laboratory, Report LA–4824, Los Alamos 1971, S. 181 – 184

Butler, H. S.; Biswell, L. R.; Machen, D. R.; Thomas, R. F.

LAMPF Data-Acquisition System

LAMPF Summer Study Session, Los Alamos, August 9 – 14, 1971
In: Los Alamos Scientific Laboratory, Report LA–4824, Los Alamos 1971, S. 185 – 189

Mack, D. A.

CAMAC Concepts

Symposium "Advanc. Electronics for Astron. – 1971", Santa Cruz, 31 August – 2 September 1971. In: Publ. Astron. Soc. Pacific 84 (1972) Nr. 492, S. 167 – 175
S. auch: Lawrence Berkeley Laboratory, University of California, Report LBL–326, Berkeley 1971, 20 S.

A status report on the LAMPF data acquisition system is given. Small digital computers will be dedicated to each experiment, with a data link between the LAMPF and the Central Computing Facility (CCF). CAMAC was adopted as the standard for interfacing experimental apparatus to each computer. Computer hardware, PDP–11 software, and the CAMAC interface are discussed. The computer network being developed at the LASL CCF is described. The basic tenet of control philosophy for the beam-line experiment is that the switchyard, the primary beam lines, and the permanent parts of the secondary beam lines will be controlled from a central point in order to ensure that the consequences of a parameter change affecting more than one experimenter are considered before the change is made. (Cited as given in Nuclear Science Abstracts.)

CAMAC is a digital data-handling system, incorporating a modular equipment approach, designed to communicate via a data transfer highway with a computer. Mechanical, electrical and logic features are specified to provide system compatibility. Developed by the ESONE Committee of European Laboratories, CAMAC has become adopted internationally as a standard for data acquisition and control.

A CAMAC module has been designed for data transfer from analogue-to-digital converters (ADC's) for pulse height analysis system.
At end of conversion the ADC control module holds the ADC data in a buffer register, adds a source characteristic and requests transfer to the computer by a Look-at-Me signal. Several ADC control modules are easily combined for coincidence operations of two or more ADC's. Four gate inputs of the module initiate conversion of either single or coincident analogue signals. The source characteristic contains an ADC identification and the number of the gate input involved in the conversion.

The design goal of the Rice University data acquisition system is to output only selected data at the maximum tape transfer rate, with as much real-time analysis as possible. A PDP–11/20 with 24K words of 980-ns interleaved memory serves as the central processor. A microprogrammed I/O processor (MIOP) is the link between the computer and the CAMAC branch highway. The CAMAC MIOP is described in some detail. Command list chaining and data analysis are discussed. Since much of the activity usually required of the central processor is not performed by the MIOP, much more CPU time is available for partial data analysis; less than half the acceptable data rate would saturate a conventional system. (Cited as given in Nuclear Science Abstracts.)

van Breda, I. G.

CAMAC Multicrate Systems

Symposium "Advanc. Electronics for Astron. – 1971", Santa Cruz, 31 August – 2 September 1971
In: Publ. Astron. Soc. Pacific 84 (1972) Nr. 492, S. 212 – 216

Hyman, J. T.

Computer Controls: State of the Art and Future Developments

8th Internat. Conf. on High-Energy Accelerators, Geneva, 20 – 24 September, 1971. In: Proceedings of the 8th International Conference on High-Energy Accelerators CERN 1971. Ed. by M. H. Blewett. Geneva: European Organization for Nuclear Research 1971. S. 415 – 420
S. auch: Rutherford High Energy Laboratory, Report RPP/A85, Chilton 1971, 5 S.

Lane, H.; Moir, J.; Morgan, R. H. C.; Mott, E. M.; Nevitt, J.; Smith, J. V.; Turner, J.

Hardware for a Computer Control System for the 1.5m Bubble Chamber Beamline at Nimrod

8th Internat. Conf. on High-Energy Accelerators, Geneva, 20 – 24 September, 1971
In: Proceedings of the 8th International Conference on High-Energy Accelerators CERN 1971. Ed. by M. H. Blewett. Geneva: European Organization for Nuclear Research 1971. S. 435 – 436

Fischer, P. M.; Fröhlich, D.

CAMAC-Verstärker LEM–52/10.3.

Kernforschungszentrum Karlsruhe, Bericht KFK 1460, Karlsruhe 1971, 27 S.

A control and acquisition system based on a PDP–8 and Camac has been provided for the K9 separated bubble chamber beam. Multiplexed control of magnets and collimators is included.

A computer controlled linear amplifier in CAMAC, consisting of a linear amplifier ORTEC type 410 and a control unit, is described. The parameters for the gain adjustment are computer-controlled. The variation of the parameters is done by relais and by a stepping motor driving a potentiometer with ten turns. The amplifier will be used in a fission experiment.

The control unit of the module consists of several function units such as a command decoding unit, a unit for parameter variation in steps, a unit for continuous parameter variation, a unit to normalize the module automatically, a status register and a module characteristic register. These function units are described. The commands for the module are listed.

Noise measurements have been performed at the same ORTEC type 410 amplifier in two modes: with an without computer control equipment. No significant differences could be detected.

General properties of the ESONE Standard Branch Highway are discussed in relation to astronomical requirements.

A review of the current state of the accelerator computer control art is presented and a number of interesting new developments highlighted. An attempt is made to indicate future lines of development in the next few years.

Gruber, P.; Ottes, J.; Tentunian, V.

CAMAC Manual Crate Controller Typ LEM–52/7.2.

Kernforschungszentrum Karlsruhe, Bericht KFK 1479, Karlsruhe 1971, 11 S.

Ottes, J.; Tradowsky, K.

Das CAMAC-System rechnergeführter Elektronik. Einführung und heutiger Stand.

Atomwirtsch. – Atomtechn. 16 (1971) S. 516 – 519
S. auch: Kernforschungszentrum Karlsruhe, Bericht KFK 1466, Karlsruhe 1971, 4 S.

Brantl, K.; Svoboda, A.

Nová modulová přístrojova stavebnice, určená pro přístroje jaderné techniky (New Modular System Conception of Nuclear Instrumentation, Based on the "CAMAC" System, Orig. tschech.)

Jaderná Energie 17 (1971) S. 345 – 347

Gallice, P.

Informations sur le Système "CAMAC"

Journées d'études de la Société Française des Electroniciens et Radioélectriciens sur les appareils de mesure électronique pilotés par ordinateurs, Lannion, 6 – 7 Octobre 1971
In: C.E.A., Rapport CEA CONF. 1968, Saclay 1971, 16 S.

The European Nuclear Research Centres jointly compiled in the years 1968/1969 a Euratom Report: "CAMAC – a Modular Instrumentation System for Data Handling–Description and Specification". This effort resulted in an international collaboration in the field of computer orientated electronics which extended far beyond the original setting. The great interest in this CAMAC System led also to a considerable extension of the ESONE Committee beyond the Euratom countries. The system has now also spread outside Europe and has been taken over by the USAEC as a standard system. The specifications of the CAMAC system are described here in detail. They possess three important advantages: they permit the construction of compatible modules; the only system part which is required for connection to the computer is the system controller; the system permits the provision of compatible software.

This paper describes shortly the system organization of CAMAC (mechanical, electrical principal specifications, interconnections and programmation) and summarizes the list of industrial products.

A controller for manual operation of the CAMAC Dataway has been designed. Four completely independent commands NAF can be stored. The device can be operated in three different modes: "Single Step", "Instruction" and "Run". The dynamic behaviour of the signals on the Dataway meets the specifications. Operating frequencies are 10, 1000 and 250000 operations per second to facilitate oscillographic display. As far as possible and useful the device has been designed similar to the Crate Controller Type A.
Read information is stored and displayed. Write data can be generated by means of toggle switches or taken out of the read buffer, thus providing a means of module-to-module transfer.

Müller, K. D.

Rechnereinsatz bei kernphysikalischen Experimenten

Interkama '71, 5. Internat. Kongr. mit Ausstell. für Meßtechn. u. Automatik, Düsseldorf, 14. – 20. Oktober 1971
In: Interkama 1971. Vorträge zum Internationalen Kongreß mit Ausstellung für Meßtechnik und Automatik, Düsseldorf, 14. bis 20. Oktober 1971. München, Wien: R. Oldenbourg 1972. S. 340 – 344

Hooton, I. N.; Lewis, A.

CAMAC in Real-Time Computer Systems

U.K.A.E.A. Research Group, Report AERE – R 6931, Harwell 1971, 5 S.
S. auch: IEEE Nucl. Sci. Symposium, San Francisco, November 3 – 5, 1971. In: IEEE Trans. Nucl. Sci. 19 (1972) Nr. 1, S. 480 – 482

Briandet, Ph.

CAMAC Applications

Ecole Polytechnique, Laboratoire de Physique Nucléaire des Hautes Energies, Rapport LPNHE 10.71 (01), Paris 1971, 11 S.

Douglass, T. D.

NIM and CAMAC Prove Feasibility of Standard Instrument Modules

Res./Dev. 22 (1971) Nr. 11, S. 20 – 22

Until recently small computers have been used in nuclear research for two main applications. One, for experimental control and two for data acquisition. Applications for one and two will be given; one is the control of a neutron triple-axis spectrometer and two single or multiparameter analysis with a computer. Future trends using an international standardized modular instrumentation system for data handling (Camac) will be given.

The performance of real-time systems depends on the combination of data acquisition and processing times. Programmed input-output is too slow and data channels are insufficiently flexible for general use with CAMAC. The provision of a separate peripheral processor gives optimum real-time performance. The overall design philosophy and the implications for system software are discussed.

Kinbara, S.

Introduction to the CAMAC System (Orig. jap.)

J. Atomic Energy Soc. Japan 13 (1971) S. 635 – 641

Costrell, L.

An Introduction to CAMAC

CAMAC Bull. (1971) Nr. 2, S. 3 – 6

Dupuy, G.

Ensemble de Mesures Automatiques

CAMAC Bull. (1971) Nr. 2, S. 7 – 11

MacLennan, D. N.

Analysis of Underwater Sound Recordings

CAMAC Bull. (1971) Nr. 2, S. 12 – 14

This paper describes a system designed for automatic measurements of device characteristics by means of a set of programmable generators and instruments connected to the device under test. The whole system is interfaced to the computer by CAMAC equipment. In one crate are all the various analogue-to-digital converters, digital-to-analogue converters and multiplexers which are necessary for the computer to handle the various parameters of the measuring instruments and the corresponding data.

A CAMAC-compatible system is described which interfaces an analogue tape recorder to a digital computer, and displays the computer output on a CRT. Under program control, sound recordings from a sea-bed hydrophone array are digitised by ADCs for the computation of power spectra and correlation functions. At the same time the position of an acoustic 'pinger' (pulse generator) relative to the array can be computed from measurements of pinger pulse arrival times at the hydrophones.

A description is given of CAMAC, a standard devised for the interface of computer systems. The basic requirements for the standard are reviewed, and compared with other similar standards such as NIM. The CAMAC is an "advanced" standard, and at the same time has great flexibility. Described in particular detail are the construction, dataway and command-signals. In the interface, the design of the crate-controller is especially important. The applicability of the CAMAC differs from one computer to another.

The CAMAC instrumentation system developed by the ESONE Committee of European laboratories has been endorsed by the US AEC NIM Committee as a dataway system complementary to the NIM (Nuclear Instrument Module) system. CAMAC is described in a general way in this condensed version of the introductory paper of the CAMAC Tutorial Sessions of the 1970 IEEE Nuclear Science Symposium.

Heep, W.; Ottes, J. G.; Tradowsky, K.

Design Characteristics for CAMAC Modules

CAMAC Bull. (1971) Nr. 2, S. 15 – 16

Halling, H.; Zwoll, K.; Müller, K. D.

A Versatile PDP–11 CAMAC Crate Controller for Nuclear Data Acquisition and Processing

CAMAC Bull. (1971) Nr. 2, S. 17 – 18

Mertens, B.

A CAMAC Operating System for Control Applications

CAMAC Bull. (1971) Nr. 2, S. 19 – 20

Sarquiz, M.; Valois, P.

An Approach to a CAMAC Language

CAMAC Bull. (1971) Nr. 2, S. 20 – 22

A simple CAMAC operating system has been developed using FORTRAN to a large extent. This software allows the handling of the CAMAC control system associated with the Jülich Isosynchronous Cyclotron on the basis of a symbolic language. Additional features include three levels of different priority, definitions of symbolic programs in real time and assignment of these programs to the different levels in real time. Great emphasis has been placed on reliability and error detection.

The CAMAC software facilities being developed at SACLAY are described. Although this approach demonstrates some discrepancies and is possibly more restrictive than the approach being made by the ESONE Software Working Group, the work is considered valuable as a 'bootstrap' to test users' reactions.

General rules for designing CAMAC modules are proposed: i.e., modules should have status and control registers at fixed sub-addresses; the generation and handling of the L signal should be standardised; in response to all valid commands the modules should generate the Q signal.
These rules satisfy the CAMAC specifications and are intended to assist the design engineer. Acceptance of the rules would help to generate modules having a certain degree of common features which could ease software work.

A crate system controller has been designed to offer an economical and simple interface between the CAMAC dataway and unibus of the PDP–11. This unit has the capability of transferring commands as well as 16 or 24 bit data words between the computer and a single module in programmed, increment to memory, add to memory, block and scan transfer modes. An interrupt vector-generator module provides fast LAM handling. To provide a versatile system the software for controlling the interface was kept simple and powerful.

Loevenich, H.; Pofahl, E.; Halling, H.; Zwoll, K.

An Uncomplicated Module-Characteristic for a CAMAC Module

CAMAC Bull. (1971) Nr. 2, S. 23

Buchanan, J. A.; Jones, H. V.

CAMAC Multi-Microprogrammed IO Processor

IEEE Nucl. Sci. Symposium, San Francisco, November 3 – 5, 1971
In: IEEE Trans. Nucl. Sci. 19 (1972) Nr. 1, S. 682 – 688

Bertolucci, B.; Horelick, D.; Rosche, F.

CAMAC Discriminator-Gated Latch With Digital Multiplicity Logic, "TITO"

IEEE Nucl. Sci. Symposium, San Francisco, November 3 – 5, 1971
In: IEEE Trans. Nucl. Sci. 19 (1972) Nr. 1, S. 526 – 533

Dhawan, S.

YALE-NAL CAMAC System

IEEE Nucl. Sci. Symposium, San Francisco, November 3 – 5, 1971
In: IEEE Trans. Nucl. Sci. 19 (1972) Nr. 1, S. 689 – 695

A CAMAC Branch Driver is described which provides multiple channel direct memory access to a host computer via a single DMA interface. Command lists in computer memory select micro-programmed sequences, stored in a fast-access Control Memory, which transfer data between CAMAC devices and lists in computer memory.

The details of a CAMAC system for a high energy physics experiment are described here. This is a multicrate system using a type A controller and branch highway and has been in physics use since January, 1971. The branch driver and most of the modules are commercially available.

A 16-channel discriminator gated-latch CAMAC module using MECL II has been designed and built for use in a phototube trigger hodoscope array. The module includes individual discriminator outputs, analog summing outputs, and high speed digital multiplicity outputs which are processed by an "analyzer" in order to decide if the particle multiplicity is suitable for streamer chamber firing. Latch data are transmitted to a PDP–9 for recording and further processing.

Oakes, A. E.

ALGEN: A Microprogrammable CAMAC Branch Driver/Controller

IEEE Nucl. Sci. Symposium, San Francisco, November 3 – 5, 1971
In: IEEE Trans. Nucl. Sci. 19 (1972) Nr. 1, S. 696 – 698

Halling, H.; Zwoll, K.; Müller, K. D.

Versatile PDP–11 CAMAC Crate Controller for Nuclear Data Acquisition and Processing

IEEE Nucl. Sci. Symposium, San Francisco, November 3 – 5, 1971
In: IEEE Trans. Nucl. Sci. 19 (1972) Nr. 1, S. 699 – 703

Lewis, A.

Some Software Implications of CAMAC Instrumentation

IEEE Nucl. Sci. Symposium, San Francisco, November 3 – 5, 1971. In:
IEEE Trans. Nucl. Sci. 19 (1972) Nr. 1, S. 704 – 705
S. auch: U.K.A.E.A. Research Group, Report AERE – R 6986, Harwell 1972, 3 S.

Freytag, D.

A Simple CAMAC System

IEEE Nucl. Sci. Symposium, San Francisco, November 3 – 5, 1971
In: IEEE Trans. Nucl. Sci. 19 (1972) Nr. 1, S. 719 – 720

CAMAC provides an interface through which a computer interacts with its environment.
External parameters are represented by hardware registers which are accessed by the computer in a uniform manner, therefore explicit I/O coding is unnecessary. The paper discusses the implications of implied I/O software efficacy in real time systems.

A data acquisition system using CAMAC hardware and a very basic set of CAMAC rules is described. With a modest effort and at low cost an approximately 1000 bit system has been assembled in a University lab and is now used in a counter-digital spark chamber system. Simple interfacing modules to multichannel Nixi display, printer, incremental tape unit and PDP8 and PDP15 computer are described.

The computer and Branch Driver are the two most expensive devices associated with a typical CAMAC system. This paper describes a device which has been designed to replace both the computer and the Branch Driver of many systems – at less than half the cost.
Algen (a contraction of algorithm generator) may also be used with a computer, serving as a unique Branch Driver which can relieve the computer program of many "housekeeping" duties.

A crate system controller has been designed with the aim to offer an economical and simple interface between CAMAC Dataway and Unibus of the PDP–11. This unit has the capability of transferring commands as well as 16 or 24 bit data words between the computer and a single module in programmed, increment to memory, add to memory and block transfer mode. An interrupt vector-generator module provides fast LAM handling. In line with the purpose to provide a versatile system the software for controlling the interface was kept simple and powerful.

Dhawan, S.

On the Design of CAMAC Branch Drivers

IEEE Nucl. Sci. Symposium, San Francisco, November 3 – 5, 1971
In: IEEE Trans. Nucl. Sci. 19 (1972) Nr. 1, S. 721 – 725

Iselin, F., u. a.

Branch Mixer Unit Type 049

CERN–NP CAMAC Note No. 37 – 00, Genève 1971, 5 S.

Bercaw, R. W.

A Stored Program Channel Processor for CAMAC

Digital Equipment Computer Users Soc. Meet., San Francisco, November 11 – 13, 1971
S. auch: NASA Techn. Mem. X – 67985, (Cleveland) 1971, 7 S.

Langsford, A.

An Implementation of a Virtual CAMAC Processor and its Assembly Language

U.K.A.E.A. Research Group, Report AERE – R 6914, Harwell 1971, 24 S.

The unit is used for mixing two branch sources for driving a CAMAC branch highway or a highway made up from Branch Selector Units (BSU) type 079. On the front panel there are three standard highway connectors, two for inputs, one for output. Provisions are made for internal termination of the three connectors.

Programmers of real-time systems, using CAMAC equipment, generate CAMAC transfers through a virtual CAMAC processor which interprets introductions within an input-output program segment. A symbolic assembly language for this virtual processor permits access to the full range of processor instructions to enable programmers to code I/O segments more accurately and efficiently. While this implementation is conceived in terms of a Honeywell DDP–516 processor, the concept is processor independent. By providing a virtual CAMAC processor – which can, in the future, be readily modified – a satisfactory design for a hardware CAMAC processor and a CAMAC language structure will be realised more readily.

An interface for the CAMAC branch highway to a computer is called a branch driver. The design of a branch driver with various capabilities is studied and the modular aspects of the design are explored. The design is divided into three sections, namely, computer, branch highway and internal. This approach has been implemented on the PDP8 and the PDP15 and also, in the near future, on the PDP11 computer.

A PDP–15 interface has been developed for the CAMAC instrumentation standard which implements the features of both the addressable I/O bus and the single cycle data channel. The data channel section forms an independent I/O processor which executes programs stored in core. Programs consist of CAMAC commands plus special control characters and commands.

Heep, W.; Ottes, J.; Tradowsky, K.

Alarm-Verarbeitung und autonomer Datentransfer im CAMAC-System

Kernforschungszentrum Karlsruhe, Externer Bericht 22/71 – 7, Karlsruhe 1971, 25 S.

Bisby, H.

The CAMAC Interface and Some Applications

Radio & Electronic Eng. 41 (1971) S. 527 – 537

Heinrich, G.

Ein vielseitiges modulares Prozeßrechnersystem

Elektr. Ausrüst. 12 (1971) Nr. 6, S. 39 – 43

Iselin, F., u. a.

CAMAC Timing With Special Reference to Crate Controllers

CERN–NP CAMAC Note No. 38 – 00, Genève 1971, 10 S.

A method of demand handling in the CAMAC system is described which meets fully the specifications given in EUR 4100 and 4600. The method has been chosen on grounds of simplicity and general applicability of demand handling procedures at the expense of (unnecessary) flexibility as given by the hardware concept of the CAMAC system. The method provides maximum appeasement in an otherwise perhaps turbulent alarm situation. General endorsement of the proposed procedures would be valuable in the software field, too.

CAMAC is a definitive style for implementing the interface conditions which exist when many channels of input/output information share a common data-processor/controller. The features of CAMAC are described to indicate the applicability of CAMAC-compatible equipment and programming to real-time situations. Some of these are illustrated by typical systems which use either a computer or a simpler device as the central processor/controller.

Smith, K. R. E.; Drury, D. M.; Toy, N. V.

The CAMAC System of Data Handling

J. Instn. Nucl. Eng. 13 (1972) S. 20 – 25

Iselin, F., u. a.

Autonomous Transfer Controller for PDP 11 Type 081

CERN–NP CAMAC Note No. 40 – 00, Genève 1972, 7 S.

Iselin, F., u. a.

D.O.R. (Decoded Output Register) Type 102

CERN–NP CAMAC Note No. 39 – 00, Genève 1972, 5 S.

Bisby, H.

The CAMAC Standard (Text of a Presentation to the ACTP Advisory Committee Meeting at Harwell, Thursday, 2nd December, 1971.)

U.K.A.E.A. Research Group, Report AERE – M 2507, Harwell 1972, 6 S.

The PDP11 Autonomous Transfer Controller, CERN–NP Type 081 (ATC) is intended for use when Data is to be transferred from an array in one Memory Area to an array in another as quickly as possible. The device may be used as a general purpose transfer controller but its major purpose is to enhance the operation of the CA–11 CAMAC Interface by effectively providing Direct Memory Access (DMA). All Test and Control operations associated with the transfer of a Data Block are performed instantly by hardware and use of the Unibus is limited to the movement of Data only. Thus the increase in transfer rate is obtained by eliminating the housekeeping usually performed by software. The ATC is a quad-height card which plugs into a PDP11 System Unit Type BB11 and is used in conjunction with several DEC Flip Chip Cards for ease of Unibus interfacing.

For those not able to attend we publish the text of a Lecture delivered especially for the Institution at the Royal Naval College, Greenwich in June last, together with a report of the ensuing discussion.

The CAMAC module "DECODED OUTPUT REGISTER", type 102, is intended for driving up to 63 relays, lamps or similar devices in applications where only one of many (devices) should be activated at a time.
The module contains a 6 bit register which is loaded from CAMAC. This register drives a 1 of 64 decoder connected to device-driving transistors. There is also a BUSY signal sent out when changing device (relay, etc.).

De Agostino, E.; Rispoli, B.

Il sistema CAMAC (The CAMAC System, Orig. ital.)

Not. Comitato Nazionale Energia Nucleare (CNEN) 18 (1972) Nr. 2, S. 55 – 74

Cohn, C. E.; Rudnick, S. J.

CAMAC Crate Controllers for the Systems SEL–840 and Honeywell DDP–24 Computers

Argonne National Laboratory, Report ANL–7886, Argonne 1972, 38 S.

Huffer, E.

Data Switches

Ecole Polytechnique, Laboratoire de Physique Nucléaire des Hautes Energies, Rapport LPNHE 2.72 (01), Paris 1972, 10 S.

Wilde, P.

A CAMAC Language

CAMAC Bull. (1972) Nr. 3, S. 5 – 6

Data switches serve two purposes: they can either extend the sense switches usually provided on computer control panels or allow a program to fetch manually set data words.
There are two versions of this circuit: one is a self-powered rack mounted unit which can be directly linked to the Varian 620 computers, the other is a Camac module and can thus be used with any computer linked to a Camac crate. The first version answers a specific need while the second is more general in its aim; both are described in some detail in this paper as they can be found useful by users of many computers.

A CAMAC programming language is being developed by the Software Working Group. This paper is a general introduction to this language. It discusses the advantages of such a language and gives examples of some of the statement types. A method of implementing a translator for the language is suggested.

The article describes the CAMAC modular system developed by the representatives of European nuclear laboratories under the auspices of the ESONE Committee.

CAMAC crate controllers have been designed and built for the Systems SEL–840 and Honeywell DDP–24 computers. These controllers are practical, highly flexible, and efficient without excessive hardware complication. They communicate directly with the computer input/output busses. Each controller operates one crate only. All data transfers are programmed; there is no provision for use of direct memory access. Many of the design concepts are applicable to controllers for other computers. This report presents user-oriented functional descriptions of the operations of the controllers, followed by detailed descriptions of their logic.

Iselin, F.; Löfstedt, B.; Ponting, P.

CAMAC Dataway – Branch Highway Timing Relationship Via the Crate Controller. Discussion, Specifications and Options.

CAMAC Bull. (1972) Nr. 3, S. 7 – 8

Van den Berg, P. C.; Rietveld, H. M.

A Computer Control-System for Neutron Physics Experiments

CAMAC Bull. (1972) Nr. 3, S. 10 – 11

Sanghera, D.

Multi-Channel Analyser System in CAMAC

CAMAC Bull. (1972) Nr. 3, S. 9

Burley, A. C.; Prior, G. M.; Adams, A. M.; Kingham, E. G.

A CAMAC System for Control of a Diffractometer

CAMAC Bull. (1972) Nr. 3, S. 12 – 14

This article describes a time sharing system for the computer control of one new and six existing experiments. The interfaces of the existing experiments and the complete instrumentation for the new experiments are designed according to CAMAC standards.

This article describes the use of CAMAC to control an X-Ray diffractometer. A CAMAC single-crate system is controlled by a dataway controller which operates on both a fixed programme set up on a plug-board and a variable programme read into the system from paper-tape.

An overall timing diagram is presented containing timing information about the Dataway and the Branch Highway, the correlation of which is done by the Crate Controller (typically A or similar). Some necessary new criteria and definitions are included as well as CERN-NP preferred, but narrower, tolerances for crate controllers. A new 'HOLD' feature is described.
The diagram presented should help to remove existing ambiguities. It proposes definitions or test values where appropriate (see details in CERN–NP CAMAC Note 38–00).

The techniques of multi-channel analysis are well established and various hardware designs incorporating a digital computer have been implemented in the past. CAMAC offers a simple, modular and powerful analysis hardware at low cost. This paper discusses a Multi-channel Analyser System using CAMAC-compatible units and a general purpose digital computer (Honeywell H. 316).

Klessmann, H.; Pangritz, H.; Wawer, W.

A Standard Port for Communication With CAMAC Peripherals

CAMAC Bull. (1972) Nr. 3, S. 15 – 16

Kessel, W.; Rüschmann, G.; Staudte, R.

MONICA, Interface Module Controlling NIM Via CAMAC

CAMAC Bull. (1972) Nr. 3, S. 17 – 19

Kollbach, D.; Wawer, W.

Implementation of Some Details in CAMAC Crate Controller Type A

CAMAC Bull. (1972) Nr. 3, S. 20 – 22

CAMAC: Organization of Multi-Crate System. Specification of the Branch Highway & CAMAC Crate Controller Type A.

United States Atomic Energy Commission, Report TID–25876, Washington 1972, 42 S.

A Crate Controller, which exceeds the minimum requirements stated in EUR 4600, has been developed to study the implementation of recommended features and the effects of noisy environment.

CAMAC is a design for modular equipment systems used on-line with digital processors and computers and incorporates a comprehensive data transfer highway (Dataway). This extension to the CAMAC specifications defines a Branch Highway and a standard Crate Controller for communication between a system controller or computer and as many as seven crates. The specification has been developed by the ESONE Committee of European Laboratories and has been endorsed by the U.S. AEC Committee on Nuclear Instrument Modules (NIM Committee). Except for pages i–vii and page 30A, this report is identical to Euratom Report EUR 4600e dated October 1971. AEC Report TID–25877 constitutes a supplement to and is to be used in conjunction with this report. The basic CAMAC specifications are defined in AEC Report TID–25875.

Frequently in CAMAC instrumentation systems, external, non-CAMAC equipment is employed which either cannot be, or has not been, designed according to CAMAC standards. In general, these 'peripheral' units can be linked with the CAMAC system by means of standard input or output modules which provide a simple, but versatile, digital port for 24-bit parallel data transfers. The port enables handshake control of the data transfers to ensure synchronisation with the speed of the peripheral, where this facility is provided. Additional signals are provided for very basic control functions only. This digital port for communication with CAMAC peripherals is defined to be compatible with the relevant specifications of EUR 4100e. It has been introduced as a laboratory standard at HMI Berlin and presented to the German 'Studiengruppe für Nukleare Elektronik' as a guideline for designers of computer-controlled external equipment.

A CAMAC module is described that delivers both analogue and digital signals to an external device. In addition to two 12-bit output registers, two independent analogue-outputs with 10- and 12-bit resolution via a current-source are provided. The intention is to control different NIM modules or other external devices by a computer via CAMAC without the necessity of having expensive DAC's and registers in the devices themselves. The general idea as well as the technical data of the module are given.

Iselin, F., u. a.

CAMAC Products Reference

CERN–NP CAMAC Note No. 23 – 02, Genève 1972, 27 S.

Iselin, F., u. a.

A CAMAC – CAMAC Link (LRX Type 110, LTX Type 111, LBUF Type 113)

CERN–NP CAMAC Note No. 41 – 00, Genève 1972, 9 S.

Barnes, R. C. M.; Whiteman, A. R. C.

CAMAC – Bibliography Covering Period 1968 – 71

U.K.A.E.A. Research Group, Report AERE – Bib 180, Harwell 1972, 12 S.

Borcherding, K.; Gruber, P.; Ottes, J.; Tradowsky, K.

CAMAC-50-MHz-Zähler-Modul Typ LEM–52/1.6. Spezifikation und Beschreibung.

Kernforschungszentrum Karlsruhe, Bericht KFK 1467, Karlsruhe 1972, 35 S.

This report is a description of the CAMAC 50-MHz Scaler type LEM–52/1.6. The scaler is one module of a Scaler-Timer System. The other modules – the timer, the binary-to-decimal converter with display – just as the software belonging to this system will be introduced in subsequent reports.
The scaler described here is equipped with a 24-bit preset scale register which can be reduced to 18, 16 or 12 bits and allows reading even during the gate time. The state of the scaler including the LAM source is represented in the status register which permits reading all over the time but postulates reading in the case of the scaler's LAM (Look-at-Me) caused by an overflow. Setting of the operating mode is done with the control register. The overflow signal preselected with the flip-flop "Select Channel" is to be connected due to the requirements either to the patch lead P1 or to the jack "Overflow" in the front panel. This enables the scaler to be used as an interval time preset scaler if cabled with the CAMAC Timer type LEM–52/2.6.
TTL or NIM level signals can trigger the input "Signal" and the dead time is defined with 20 ns. The level of triggering the input "Inhibit" must be TTL. In addition to this the input "Signal" can be gated with NIM level signals at the input "Gate" enabled or disabled by the control register. – A lamp indicates the state of the LSB.

By means of the Link Transmitter (LTX type 111) and the Link Receiver (LRX type 110) it is possible to create a link between two CAMAC systems. The link system can handle two types of information, data and status. A dataword is of 16 bits and a status word has 13 bits for the user and 3 bits are foreseen for controlling the link system. To adapt the link to two asynchronous CAMAC systems there are a total of three overlap registers in the link (LTX + LRX), i.e. it is possible to "stack" three words in a "queue". The link receiver can be extended with buffer Memory modules (LBUF type 113).

Tradowsky, K.

CAMAC – Ein System rechnergeführter Elektronik

3. Internat. Kongr. „Datenverarbeit. im eur. Raum", Salzburg, 4. – 8. April 1972
In: 3. Internationaler Kongreß „Datenverarbeitung im europäischen Raum". Kongreßdokumentation. Wien: Johanna Metek 1972. Vol. 2, S. 287 – 292

Collins, G. B.; Keats, A. B.

Experience in the Use of a Standard Computer Interface for Laboratory Automation Systems

Conf. on Trends in On-Line Computer Control Syst., Sheffield, 18 – 20 April 1972
In: Trends in On-Line Computer Control Systems. IEE Conf. Publ. No. 85. London: IEE 1972. S. 40 – 46

Attwenger, W.

Industrielle Prozeßerfassung, CAMAC-System im Einsatz

3. Internat. Kongr. „Datenverarbeit. im eur. Raum", Salzburg, 4. – 8. April 1972
In: 3. Internationaler Kongreß „Datenverarbeitung im europäischen Raum". Kongreßdokumentation. Wien: Johanna Metek 1972. Vol. 2, S. 293 – 297

Attwenger, W.

Some Recent Implementations of Computer Control in Austria, Using a Standard Interface (CAMAC)

Conf. on Trends in On-Line Computer Control Syst., Sheffield, 18 – 20 April 1972
In: Trends in On-Line Computer Control Systems. IEE Conf. Publ. No. 85. London: IEE 1972. S. 117 – 120

Peatfield, A. C.

The Potential of a Standard Highway-Interface (CAMAC) for Computer Systems in Real-Time Applications

Conf. on Trends in On-Line Computer Control Syst., Sheffield, 18 – 20 April 1972
In: Trends in On-Line Computer Control Systems. IEE Conf. Publ. No. 85. London: IEE 1972. S. 142 – 146

CAMAC – Organisation of Multi-Crate Systems – Specification of the Branch Highway and CAMAC Crate Controller Type A

Commission of the European Communities, Report EUR 4600 e, Luxembourg 1972, 46 S.

Biswell, L. R.; Rajala, R. E.

A Microprogrammed Branch Driver (MBD) for a PDP–11 Computer

Los Alamos Scientific Laboratory, Report LA–4916–MS, Los Alamos 1972, 12 S.

Iselin, F., u. a.

Long Distance Branch Highway (Branch Transmitter Type 100, Branch Receiver Type 101)

CERN–NP CAMAC Note No. 42 – 00, Genève 1972, 7 S.

A microprogrammed branch driver (MBD) is the interface between a Digital Equipment Corporation (DEC) PDP–11 computer and a multicrate CAMAC system. This unit is a multiple, direct memory access (DMA) channel branch driver.
The requirements for an MBD are discussed in the introduction, and stem from a Los Alamos Scientific Laboratory (LASL) study group report on the design of the Los Alamos Meson Physics Facility (LAMPF) data-acquisition system. Because of the desire for a standard system, the types of experiments and data rates, and the varying complexity of data-acquisition systems, it was decided that a microprogrammable, multiple DMA channel branch driver was required.
Basic specifications and capabilities of the MBD are discussed and a block-diagram-type operation is presented, which includes the modes, registers, priority structure, interrupts, DMA channels, instruction set, branch driver, and initialization and run procedures. Modes of operation and design options are given, and the standard logic used to fabricate the MBD, the hardware system, is discussed. Included are diagnostic and standard driver routines, and a program example.

The "Long Distance Branch Highway" facility allows extension of the Branch Highway (EUR 4600e) of a CAMAC system to several hundred metres. It consists of two CAMAC units: the Branch Transmitter type 100, the Branch Receiver type 101. It can be used between a Branch Driver (Interface) and crate(s), or between crates.

The CAMAC Specification (EUR 4100 e), drawn up by European laboratories under the auspices of the ESONE Committee, defined the means of communication, within a CAMAC crate, between modules and a crate controller. This extension to the specification defines a CAMAC Branch Highway for communication between the crate controllers in seven crates and a system controller or computer. The connections from units to the Highway are specified in sufficient detail to ensure compatibility between units from different sources of design and production. A standard CAMAC Crate Controller Type A is specified, and there are general recommendations for all crate controllers used with the Branch Highway.
This specification does not invalidate other methods of interconnection, including those using crate controllers dedicated to specific computers. The USAEC NIM Committee has endorsed this specification and will publish an identical document (TID–25876).

Ottes, J. G.

CAMAC – Ein System rechnergeführter Elektronik. Zentrale Steuerung für Datenendstelle.

Elektronik 21 (1972) S. 169 – 172

Hoag, A. A.

Instrumentation for the KPNO (Kitt Peak National Observatory) and CTIO (Cerro Tololo Inter-American Observatories) 4 meter Reflectors

ESO/CERN Conf. on Auxiliary Instrumentation for Large Telescopes, Geneva, May 2 – 5, 1972
In: Proceedings of the ESO/CERN Conference on Auxiliary Instrumentation for Large Telescopes. Ed. by S. Laustsen & A. Reiz. Geneva: European Southern Observatory 1972. S. 39 – 53

Stephens, C. L.; van Breda, I. G.

The Use of CAMAC for Telescope Instrumentation

ESO/CERN Conf. on Auxiliary Instrumentation for Large Telescopes, Geneva, May 2 – 5, 1972
In: Proceedings of the ESO/CERN Conference on Auxiliary Instrumentation for Large Telescopes. Ed. by S. Laustsen & A. Reiz. Geneva: European Southern Observatory 1972. S. 499 – 514

Iselin, F., u. a.

CC11 (CAMAC Crate – PDP11 Interface) Type 116

CERN–NP CAMAC Note No. 43 – 00, Genève 1972, 17 S.

General properties of the Camac System are discussed together with some applications to specific astronomical instruments.

A system controller matches the standard parts of a CAMAC system to a given computer. The configuration of the equipment is determined by the branch highway, by wordsize and structure of the input/output channels of the computer, and finally by the nature and number of the capabilities required. The article discusses a controller for operation at a data terminal of a multiple-access system.

The CC–11 is a program-controlled interface between the dataway of a CAMAC crate (ESONE – EUR 4100) and the Unibus of a PDP 11 computer (DEC – Unibus interface manual).

Robin, G.; Gallice, P.

Système CAMAC – Informations Practiques pour son Utilisation avec un Calculateur

C.E.A., Rapport CEA N 1549, Saclay 1972, 20 S.

Iselin, F., u. a.

CERN–NP Type 057 CAMAC Interfaces and Their Use

CERN–NP CAMAC Note No. 31 – 01, Genève 1972, 34 S.

Trebst, H.–J.

Methods of Demand-Handling

CAMAC Bull. (1972) Nr. 4, S. 3 – 5

Barnes, R. C. M.

The Revised CAMAC Specification EUR 4100e (1972)

CAMAC Bull. (1972) Nr. 4, S. 6 – 8

This paper describes some methods and uses of demand-handling in CAMAC Dataway and Branch Highway Systems and gives an example of a LAM-sorting unit.

This note summarizes the interconnection system between numerical nuclear physics equipment and a computer. Complementary information is given on the adapting of a particular language to the system with the normal programming envisaged.

A revised version of the basic CAMAC Specification, defining the Dataway and mechanical standards, is being published as EUR 4100e (1972) and TID–25875. This paper describes the main changes that have been introduced.

Lefevre, Y.; Axmann, A.

A Versatile Interconnection of Four Spectrometers to a PDP–11 Computer

CAMAC Bull. (1972) Nr. 4, S. 9 – 11

Clarke, D.; Collins, M. W.; Wardle, A. G.

Application of a Multicrate CAMAC System to a Pion Electroproduction Experiment (PEP)

CAMAC Bull. (1972) Nr. 4, S. 12 – 15

Servent, J. M.

Nuclear Spectrometry

CAMAC Bull. (1972) Nr. 4, S. 15 – 16

Whitehead, C.; Jarvis, O. N.; Langsford, A.

The Computer System of the Harwell Synchrocyclotron Group

CAMAC Bull. (1972) Nr. 4, S. 18 – 19

To illustrate some interesting features of using CAMAC with an on-line computer, SAIP–SCHLUMBERGER has developed an experimental system for nuclear spectrometry. This system and its software are not the most sophisticated, many other improvements can be provided but they fill the main function encountered in the nuclear spectrometry field.

A direct-access multi-user system (DAMUSC) allows data collection from several independent nuclear physics experiments, using a single central computer and multiprogramming techniques. The experiments are interfaced through CAMAC in each of the remote counting rooms. These CAMAC crates are connected to a CAMAC system-crate in the computer room by parallel highways. User programs are supported by OLERT – an on-line real-time executive – with user coded modifications to take account of CAMAC hardware and the extensive use of magnetic tapes.

Data Acquisition and Processing over long distances generate great problems which can be solved by using an extension of the PDP–11 UNIBUS. The new BUS, consisting of 100 balanced lines, may have any length. A unit called a SYSTEM CONTROLLER takes the place of both the usual SYSTEM CONTROLLER and CRATE CONTROLLER. The primary interfacing of four spectrometers is done using CAMAC modules and crates.

Signals from a bank of photomultipliers are buffered in a NIM fast-logic system and event data-buffers and other functions interfaced via CAMAC to a Honeywell DDP–516 computer. The DDP–516 is connected via a CAMAC data-link interface and an IBM 1800 multiplexer to a large time-shared IBM 360/65 computer. Feedback of status information and the display of the results of current data analysis allow efficient control of the experiment to be exercised.

Keats, A. B.; Collins, G. B.

CAMAC Systems at the Atomic Energy Establishment Winfrith, Dorset (U.K.)

CAMAC Bull. (1972) Nr. 4, S. 20 – 22

May, F.; Schwarzer, J.

A Slave-Controller for CAMAC Sub-Systems

CAMAC Bull. (1972) Nr. 4, S. 23 – 24

Stüber, W.

Direct Connection of CAMAC Crate Controllers Type 'A' to the PDP–11 Unibus

CAMAC Bull. (1972) Nr. 4, S. 25 – 26

Iselin, F., u. a.

BAC (Bit-to-Address Coder) Type 103

CERN–NP CAMAC Note No. 36 – 00, Genève 1972, 15 S.

Standard Crate Controllers Type 'A' can be easily interfaced to a PDP–11 computer using an interface between the UNIBUS and CAMAC branch for only those signals which are not compatible. The number of incompatible signals is kept low by using some of the UNIBUS address lines as CAMAC F-code lines. The method described is mainly of advantage for small CAMAC systems but can be extended to large systems.

The capability of two on-line computer systems using CAMAC interfaces at the AEEW is described. One is concerned with plant dynamic measurements, and requires occasional interface reconfiguration. The second is for the automation of a radioactive sample analysis laboratory controlled by a Honeywell H316 computer. A third system is under development, in which a CAMAC interface is being implemented in parallel with an existing interface on a Ferranti Argus 500 computer. The architecture of the Ferranti-CAMAC dataway controller is outlined and its application described.

A programmable controller for an independent CAMAC sub-system is described together with an application which does not employ a computer. This controller can be installed in any station of the CAMAC crate and can use the Dataway during the time when the crate-controller does not. These CAMAC sub-systems may be used advantageously for control and/or data-handling systems which do not warrant the use of a computer, although connection to a computer is not precluded.

CAMAC – A Modular Instrumentation System for Data Handling – Revised Description and Specification

Commission of the European Communities, Report EUR 4100 e, Revised version 1972, Luxembourg 1972, 64 S.

CAMAC – A Modular Instrumentation System for Data Handling – Specification of Amplitude Analogue Signals

Commission of the European Communities, Report EUR 5100 e, Luxembourg 1972, 10 S.

Tradowsky, K.

CAMAC – Specification of Amplitude Analogue Signals. Extension of the Specification of Amplitude Analogue Signals (EUR 5100 [1972]) and Comments of the ESONE Working Group.

Kernforschungszentrum Karlsruhe, Bericht KFK 1641, Karlsruhe 1972, 20 S.

Heep, W.; Hellmann, G.

CAMAC-BCD-Binär-Umsetzer für 6 BCD-Dekaden Typ LEM–52/5.7.

Kernforschungszentrum Karlsruhe, Bericht KFK 1643, Karlsruhe 1972, 7 S.

This report is written as an extension of the Specification of Amplitude Analogue Signals published as Euratom Report EUR 5100 and relates to signals which are recommended for use by CAMAC compatible units. It specifies amplitude analogue signals whose rise times are shorter than 50 ns (corresponding to a 3 db upper cutoff frequency of approximately 7 MHz). A terminated 50 Ω system with 0 to − 1 volt working range is recommended. The technical part of this recommendation has been agreed upon by the US AEC NIM Committee.
In Part B comments of the ESONE Working Group are given for explanation.

A BCD-to-binary converter for a maximum of 6 decades in the CAMAC system is described. The conversion time of the converter is about 300 ns.

CAMAC is a modular data handling system with widespread use with on-line digital computers. It is based on a digital highway for data and control. The CAMAC Specification ensures compatibility between equipment from different sources. This revised specification introduces several new features, but is consistent with the previous version (EUR 4100e, 1969).
The CAMAC system was specified by European laboratories, through the ESONE Committee, and has been endorsed by the USAEC NIM Committee, who have an identical specification (TID–25875).

The EURATOM Report EUR 4100e (1972) defines the essential features of the CAMAC system of instrumentation. This system is primarily for on-line use with digital controllers or computers.
This document specifies amplitude analogue signals which are recommended for use by CAMAC compatible units, unless there are strong technical reasons to the contrary.

Tradowsky, K.

CAMAC – Specification of Amplitude Analogue Signals. Proposal of the ESONE Working Group on Analogue Signals for EUR 5100 (1973) and Comments.

Kernforschungszentrum Karlsruhe, Bericht KFK 1660, Karlsruhe 1972, 23 S.

Heep, W.; Hellmann, G.

CAMAC-Realzeituhr Typ LEM–52/25.2.

Kernforschungszentrum Karlsruhe, Bericht KFK 1673, Karlsruhe 1972, 16 S.

Dietzel, G.; Fischer, P.-M.

CAMAC-Impulsgenerator LEM–52/13.2.

Kernforschungszentrum Karlsruhe, Bericht KFK 1672, Karlsruhe 1972, 17 S.

Fischer, P.-M.; Fröhlich, D.

CAMAC-Verstärker LEM–52/10.2.

Kernforschungszentrum Karlsruhe, Bericht KFK 1685, Karlsruhe 1972, 23 S.

A CAMAC module containing a real-time clock and a counter for days is described. The resolution of the real-time clock is 1 sec. The counter for the days and the real-time clock can be preset via switches at the front panel where their contents are displayed, too.
If necessary the real-time clock accepts a synchronising pulse from a master clock. The real-time clock generates an L signal each time a programmable time interval has expired.

A computer-controlled linear amplifier in CAMAC, consisting of a linear amplifier CANBERRA type 1417 and a control unit, is described. The parameters for the gain adjustment and for pulse shaping are computer-controlled. The variation of the parameter "coarse gain" is done by relays, the variation of the parameter "fine gain" is done by a stepping motor driving a servo potentiometer with ten turns and the variation of the parameter "pulse shaping" is done by a direct-current motor. The commands for the module are listed.
Noise measurements have been performed at the same amplifier CANBERRA type 1417 in two modes: with and without computer control equipment. No significant differences could be detected.

The EURATOM Report EUR 4100e defines the essential features of the CAMAC system of instrumentation. This system is primarily for on-line use with digital controllers or computers. This report specifies amplitude analogue signals which are recommended for use by CAMAC compatible units and summarises the contents of EUR 5100 (1972) and its extension published as KFK 1641.
There are two classes of signals according to whether their rise times are shorter or longer than 30 ns (corresponding to a 3 db cutoff frequency of approximately 11 MHz). For signals with rise times longer than 30 ns the + 5 volt class (5PB) with 50 Ω output and a matched or unmatched termination is recommended. For signals with rise times shorter than 30 ns the – 1 volt class (1NB) with a terminated 50 Ω system is recommended.
In Part B comments of the ESONE Working Group are given for explanation.

A computer-controlled pulse generator in CAMAC, consisting of a pulse generator ORTEC Type 419 and a control unit, is described. The parameter "pulse amplitude fine" and a special parameter "partial range" to obtain an accuracy for adjustment of about $4 \cdot 10^{-4}$ are computer-controlled. The variation of the parameters is done by relays and by a stepping motor driving a servo potentiometer with ten turns. The CAMAC pulse generator will be used in a fission experiment.

Gruber, P.

CAMAC-Datenweg-Prüf- und -Anzeige-Modul LEM–52/16.2.

Kernforschungszentrum Karlsruhe, Bericht KFK 1687, Karlsruhe 1972, 9 S.

Heep, W.; Hellmann, G.

CAMAC-Differenzzeituhr Typ LEM–52/25.1.

Kernforschungszentrum Karlsruhe, Bericht KFK 1689, Karlsruhe 1972, 14 S.

CAMAC: A Modular Instrumentation System for Data Handling. Description and Specification.

United States Atomic Energy Commission, Report TID–25875 (to be published)

Supplement to CAMAC Instrumentation System Specifications

United States Atomic Energy Commission, Report TID–25877 (to be published)

CAMAC is a digital data handling system in wide-spread use with on-line digital processors and computers. The system is based on a digital highway for data and control. Mechanical and signal standards are specified to ensure physical and operational compatibility between units from different sources. Except for pages i–vi, 46A and 46B, this report is identical to EURATOM Report EUR 4100e dated 1972. AEC Report TID–25877 constitutes a supplement to and is to be used in conjunction with this report. This revised specification introduces several new features but is consistent with the previous version (EUR 4100e, 1969).
The CAMAC system was specified by European laboratories through the ESONE Committee and has been endorsed by the U.S. AEC NIM Committee.

This report constitutes a supplement to and is to be used in conjunction with AEC Report TID–25875 (EUR 4100e, 1972), which describes the CAMAC modular instrumentation system for data handling, and AEC Report TID–25876 (EUR 4600e, 1972) which defines a CAMAC branch highway and crate controller. The supplement makes recommendations concerning the implementation and interpretation of the specifications and includes descriptions of preferred practices and current applications.

This module stores in the unaddressed mode the command, read and write information from the dataway up to the next dataway operation. The strobe S1 or S2, with which the dataway information is stored, may be selected by a front panel switch. In the addressed mode the module stores data only, if it is addressed by a station number. The stored information may be displayed sequentially in blocks at the front panel by 24 light diodes.
A push button at the front panel allows to produce the L signal. The condition of the Inhibit (I) line is displayed directly.

A CAMAC module consisting of four time interval scalers is described. Each scaler has a length of 12 bit and is presettable with the 2's complement of the desired number. To generate time intervals between 1 msec and about 68 min a choice can be made between four clock pulse freqencies. When the preset time expires, L signal is generated.