DOE/EV-0009

Supplement to CAMAC* Standards and Reports

*Computer Automated Measurement and Control

Prepared and Adopted by
U.S. NIM Committee
(National Instrumentation Methods)

March 1978

U.S. Department of Energy
Assistant Secretary for Environment
Division of Biomedical and
Environmental Research

*Computer Automated Measurement and Control

DISCLAIMER

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NOTICE

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National Technical Information Service (NTIS)
U.S. Department of Commerce
5285 Port Royal Road
Springfield, Virginia 22161

Price: Printed Copy: $ 4.00
Microfiche: $ 3.00

ABSTRACT and FOREWORD

Several Department of Energy and IEEE Standards and reports are concerned with the CAMAC modular instrumentation and digital interface system. Since, these documents are under continual review, clarifications, corrections and modifications are made from time to time. This supplement compiles all such material in a single document that is to be revised and reissued as necessary.

KEY WORDS: CAMAC, COMPUTER INTERFACING, CONTROL SYSTEMS, INSTRUMENTATION, INSTRUMENTATION STANDARDS, INTERFACING, STANDARDS, SUPPLEMENT

CONTENTS

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CAMAC SPECIFICATIONS AND REPORTS

Title	IEEE, ANSI Std No.	IEC No.	DOE No.	EURATOM (EUR) No. or ESONE No.
Modular Instrumentation and Digital Interface System	IEEE 583-1975* ANSI/IEEE 583-1975*	516	**	EUR 4100e
Serial Highway Interface System	IEEE 595-1976* ANSI/IEEE 595-1976*	†	**	EUR 6100e
Parallel Highway Interface System (CAMAC)	IEEE 596-1976*	552	**	EUR 4600e
Block Transfers in CAMAC Systems	IEEE 683-1976	†	**	EUR 4100 suppl
CAMAC Instrumentation and Interface Standards***	SH06437*** (Library of Congress No. 76-39660)	-	-	-
Amplitued Analogue Signals within a 50Ω System	-	-	TID-26614	EUR 5100e
The Definition of IML A Language for use in CAMAC Systems	-	-	TID-26615	ESONE/IML/01
Multiple Controllers in a CAMAC Crate	†	-	DOE/EV-0007	EUR 6500e
CAMAC Tutorial Articles	-	-	TID-26618	-
Real-Time BASIC for CAMAC	-	-	TID-26619	ESONE/RTB/02
Recommendations for CAMAC Serial Highway Drivers and LAM Graders for the SCC-L2	-	-	DOE/EV-0006	ESONE/SD/02
Supplement to CAMAC Standards and Reports	†	-	DOE/EV-0009	-

*Includes supplementary information
**Superseded by corresponding IEEE Standard listed
***This is a hard cover book that contains IEEE Stds 583-1975, 595-1976, 596-1976 and 683-1976 plus introductory material
†In preparation

AVAILABILITY OF DOCUMENTS

IEEE - IEEE Service Center, 445 Hoes Lane, Piscataway, New Jersey 08854, U.S.A.

IEC - International Electrotechnical Commission, 1. rue de Varembe, CH-1211 Geneva 20, Switzerland

DOE & TID - National Bureau of Standards, Washington, D.C. 20234, U.S.A., Attn: L. Costrell

EURATOM - Office of Official Publications of the European Communities, P. O. Box 1003, Luxembourg

ESONE - Commission of the European Communities, CGR-BCMN, B-2440 GEEL, Belgium, Attn: ESONE Secretariat, H. Meyer

1. General

In this supplement, reference is made to page numbers in the Department of Energy (DOE) and IEEE documents. In general, these page numbers are different from those in the corresponding EUR, ESONE and IEC documents.

2. Information and Mailing List

Those desiring information or who wish to be placed on the NIM-CAMAC mailing list so as to receive addenda and supplements issued by the NIM Committee, and to be kept current on NIM-CAMAC matters, should write to:

Louis Costrell, Chairman
NIM Committee
National Bureau of Standards
Washington, D.C. 20234

In Europe, information regarding CAMAC can be obtained from:

H. Meyer, ESONE Secretariat
Commission of the European Communities, CGR-BCMN
B-2440 GEEL, Belgium

3. Drawings

Reduced size copies of the CAMAC drawings are included in the reports. It is anticipated that these small scale drawings will be adequate for the many users and for those whose only CAMAC construction consists of building circuits into CAMAC plug-in units that have been produced elsewhere. However, large scale copies of some of the drawings will be useful to manufacturers of crates and plug-in units. Those desiring large scale drawings should write to the Chairman of the NIM Committee (see Section 2). The large scale drawings will be kept current with regard to corrections and modifications. Users are cautioned to ascertain that they are working with the latest revisions of all drawings. The CAMAC drawings that constitute part of the CAMAC reports are listed below:

Fig No. In IEEE Std 583-1975	NIM Dwg No.	Title
-	NA-600	Drawing List
1	ND-601	Unventilated Crate - Front View
2	ND-602	Plan View of Lower Guides in Crate
3	ND-603	Crate - Side View, Section
4	ND-604	Plug-in Unit - Side and Rear Views
5	ND-605	Dataway Connector
6	ND-606	Ventilated Crate - Front View
7	ND-607	Adaptor for NIM Units
8	ND-608	Typical Printed Wiring Card
12	ND-549	NIM-CAMAC Coaxial Connectors Type 50CM
Fig (IEEE Std 595-1976)		
A2-3	NE-3297	SCC Type L-2 Block Diagram
Fig (IFFF Std 596-1976)		
7	ND-609	Crate Controller Type A-1
Fig (DOE/EV-007 and IEEE 675)		
A1-1	ND-3416	CAMAC Crate Controller Type A-2

4. Recent Changes

Recent changes involve IEEE Std 583-1975 and the 583-1975 portion of the IEEE CAMAC Book SH06437. These changes are as follows:

4.1 200V dc and 117V ac Busses - Assignment of Dataway lines and contacts for 200V dc and 117V ac cancelled effective January 1, 1978. The pertinent modifications of the CAMAC standards are as listed in Sections 5 and 8.1 herein for:

P14, Table 1
P15, Table 2
P16, Table 3
P17, Section 4.4
P40, Table 10
P41, Section 8
P56, Table C1

Background information - 200V dc and 117V ac were previously nonmandatory voltages. These assignments have been cancelled in order to avoid hazardous voltages on the connectors. The Dataway lines involved are now designated "Reserved" lines.

4.2 Chamfer on Module Connector - A chamfer of 0.3 mm max X 0.3 mm max is permitted on the two vertical edges of the module edge connector. The pertinent modifications of the CAMAC standards are as listed in Sections 5 and 8.1 herein for:

P11, Section 4.2.2
P46, Figure 5

Background information - This change was made to assist entry of the edge connector into the Dataway connector and in recognition of common manufacturing practices.

5. IEEE Std 583-1975 - Corrections and Modifications

583

P6, (unmarked page preceding P7) Fig K5.4.3.5 - should read Table K5.4.3.5. Transfer this listing to bottom of preceding page.

P11, 4.2.2 - At end of the "Supplementary Information" add:

A chamfer of 0.3 mm max X 0.3 mm max is permitted on the two vertical edges of the connector (see 5.2, Section a-a of Fig 5).

P12, 4.2.3 - At the bottom right of page 12 and top of page 13 delete the sentence reading "The fixing screw .... further into the crate."

P14, Table 1 - Near the bottom, under "Additional Power Lines", delete:

+200V dc	+200	1	Low current for indicators, etc.
117V ac (Line)	ACL	1	
117V ac (Neutral)	ACN	1	

At the bottom of the table add:

Reserved	Undesignated	3

P15, Table 2 - Near the bottom:

Replace:	+200V dc	+200
by:	Reserved(C)*	-

Replace:	117V ac Line	ACL	ANC	117V ac Neutral
by:	Reserved(A)*	-	-	Reserved(B)*

*Reserved(C) was previously assigned to +200V dc, Reserved(A) to 117V ac Line and Reserved(B) to 117V ac Neutral, all non-mandatory voltages. Effective 1 January 1978, these assignments were cancelled in order to avoid hazardous voltages on the connectors.

P16, Table 3 - Same as for P15, Table 2 - see above.

P17, 4.4. - Delete the last two sentences immediately above "Supplementary Information" on page 17.

P21, Table 4 - For Codes F(8)-F(11), Function using the R or W lines should read Functions not using the R or W lines.

P22, 5.4.1.1 - In the 1st block change 6.2.2 to read 6.2.3.

P23, Fig K5.4.1A, note 3 - Second sentence should be replaced by See Section 5.4.1.3.

P24, Note (2), A15 should read A(15).

P25, 5.4.1.3 - In the last paragraph, 4100C should read 4100e.

5.4.1.4 - At the bottom of page 25 add:

(See Sections 5.4.3.3 and 5.4.3.4)

583

P28, 5.4.3.4 - O=1 should read Q=1.

P29, 5.5.2 - The first paragraph is mandatory and should be enclosed in a block.

P34, 7.1.1 - This paragraph is mandatory and should be enclosed in a block.

7.1.2 - The first paragraph is mandatory and should be enclosed in a block.

P35 - At bottom of page, NOTE should read NOTE 1.

P38 - Table 7 should read as below (Note particularly that 199μA should read 100μA. Other than that, the only changes are the addition of lines needed for interpretation):

Table 7

STATE OF LINE	CURRENT TO AND FROM PATCH CONNECTIONS	
	Outputs	Inputs
'1' State at +0·5V	Units must be capable of drawing more than 15mA from connection when generating '1'.	Unit must not feed more than 2mA into connection.
	Unit must not feed more than 300μA into connection when generating '0'.	
'0' State at +3·5V	Pull-up capability (current fed into connection):	100μA minimum 300μA maximum

P40, Table 10 - In the column labeled "Notes", (1), (2) and (3) are notes concerned with the entire table. Therefore, they should be relocated to appear beneath the table.

In the table delete:

+200V dc	+60V,	-20V	0.1A	
117V ac			0.5A	Frequency 47-63 Hz to be obtained from an isolating transformer.

P41, Section 8 - Change the 2nd and 3rd sentences of the 3rd paragraph to read:

"There are heavy-current lines for +12V and -12V dc, and a low-current line for an independent and isolated Clean Earth (ground) return E. The 12V lines are not necessarily powered unless specifically required for use."

In the 1st sentence of "Supplementary Information, Power Line Standards", delete ", and +200V dc and 117V ac."

Note: See changes herein for page 15, Table 2.

583

P46, Fig 5 - Add under "Notes"

(5) A chamfer of 0.3 mm max X 0.3 mm max is permitted on the two vertical edges of the connector even though section a-a of 5.2 shows zero chamfer.

Fig 5 - At bottom of 5.5, "Mounting face, commonly" should read "Mounting face, commonly coincides with socket vertical datum."

P50, Figs 9 & 10 - Add notes (5) and (6), as follows to both Figure 9 and Figure 10. (These notes serve as clarification only and are consistent with the text):

(5) For all signals the minimum rise or fall time is 10 ns. See Section 7.1.

(6) Signal transition at t_0 or t_9 may be absent if the signals on command or data lines are the same for the immediately preceding or following operations. See Section 7.1.3.1.

P50, Fig 10 - In Note (4), Fig 17 should read Fig 9.

P51, Fig 11 - Under the title add:

Note: See also Figures K5.4.1A, B, C

P56, Table C1 - Should be labeled Table C1 continued

Change A 117V ac Live to A Reserved(A)*
Change B 117V ac Neutral to B Reserved(B)*
Change C +200 to C Reserved(C)*
Change D +200R to D Reserved(D)*

Add:

*Reserved(C) was previously assigned to +200V dc, Reserved(A) to 117V ac Line and Reserved(B) to 117V ac Neutral. Effective 1 January 1978, these assignments are cancelled in order to avoid hazardous voltages on the connectors.

P60, Table 3 - Title should read "Contact arrangement for preferred auxiliary connectors."

P62, D8 - Replace the 3rd paragraph by:

From turn-on, the power supply outputs shall stabilize to within ± 1% of their final values within 1 minute for constant line, load, and ambient temperature. The outputs shall turn on in an asymptotic manner, i.e., without overshoot. The transient during turn-off shall not result in any voltage exceeding 107% of nominal value when tested at any current within rating, with a resistive load.

583

P63, D-15(3) - Add:

The thermal warning lamp may be neon lamp, as shown, or a solid state indicator may be used.

P65, Fig D1 - In Note 7, Section I should read Section D20.

Under Notes, add Note 9, as follows:

(9) A suitable solid state indicator may be used in lieu of the neon lamp shown for a thermal warning light.

P66, Fig D2 - In note 6 PG25 should read PG26 and Appendix AC should read Appendix C.

P67, Figures D3 & D4 - Delete the portion of Figures D3 and D4 labeled TURN-ON TRANSIENT.

P72, Table 4 - For Codes F(8)-F(11), Functions using the R and W lines should read Functions not using the R and W lines.

P73, Index - Opposite "Branch Highway - use of", replace 3(g) by 3(7).
Opposite "Connector Socket, Dataway, replace K4.1.2 by 4.1.2

595

6. IEEE Std 595-1976 - Corrections and Modifications

P7, 14.22, - Replace SUM by L-sum

P18, 3.1.1 - Change beginning of 2nd paragraph to read "The complete Command message..."

P21, Table 3.1 - In last column delete Strobe.

3.4.9 - In last line of 1st paragraph replace Section 4 by Section 14.

P27, 4.1.2 - The 2nd paragraph should be located at the end of Section 4.1.2.

P37, Fig 7-2 - Replace 1/2 { 8830 or 9614 } by { 1/2 9634 or 1/2 9638 or 1/4 MC3487 }

Fig 7-3 - Replace 1/2 { 75107, 75207 / 75108, 75208 } by { 1/2 9637 or 1/4 MC3486 }

P39, Fig 8-1 - Change bottom line to read:

Differential delay: $|t_x - t_y| \leq 0.05\ T_{min}$, if this is consistent with conditions at (d).

P48, 12.1.2 - In last line in first block, replace l by I.

P49, 12.3.3 - In 6th line, replace SUM by L-sum.

P50, 12.4.1 - In the 7th line on page 50, replace respond to by be able to execute.

P54, 14.2.2 - Replace SUM by L-sum in two places

14.2.5 - Replace SUM by L-sum.

595

P58, 14.4.1 - In 7th line below block, replace SUM by L-sum.

P59, 14.5.2 - In 2nd line, replace SUM by L-sum.

P60, 15.1.1 - Change 10th line of 3rd paragraph to read;

"SCC is bypassed by the external device it cannot transmit messages to."

P61, Fig 15-1 - Under the figure title replace the parenthetical note by:

In a bypass device for bit-serial D-port signals this arrangement is duplicated for data and clock signals.

Fig 15-2 - Under the figure title replace the notes by:

In a Loop Collapse device for bit-serial D-port signals this arrangement is duplicated for data and clock signals.

The clock signals output to the disconnected part of the SH Loop is held in a fixed logic state by the conditions at *-*.

P72, A1.6.2 - Replace the paragraph in the block by:

Any front panel features in addition to those required by Section A1.6.1 must not affect operational interchangeability.

P74, A2.3.2 - In the 3rd line of the right hand column change crate to controller.

P81, Index - Insert "L-sum 14.2.2(Table 14-1)."

P83, Index - Delete "Sum-signal 14.2.2 (Table 14-1)."

7. IEEE Std 596-1976 - Corrections and Modifications

596

P31, A1-8 - In the second line from the bottom:

Change ·A(1-7)·

to ·A(0-7)·

P32, A1-9 - In the left block, second line from the bottom:

Change ·BG·

to ·$\overline{BG}$·

P34, Fig 7 - In almost the exact center of the drawing, Table IX should read Table 9.

8. IEEE Book SH06437, CAMAC Instrumentation and Interface Standards - Corrections and Modifications

SH06437-583

8.1 IEEE Std 583-1975 portion of IEEE CAMAC Book SH06437

P11, 4.2.2 - At end of the "Supplementary Information" add:

A chamfer of 0.3 max X 0.3 max is permitted on the two vertical edges of the connector (see 5.2 Section a-a of Fig 5).

P14, Table 1 - Near the bottom, under "Additional Power Lines", delete:

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by:	Reserved(C)*	-		
Replace:	117V ac Line	ACL	ANC	117V ac Neutral
by:	Reserved(A)*	-	-	Reserved(B)*

*Reserved(C) was previously assigned to +200V dc, Reserved(A) to 117V ac Line and Reserved(B) to 117V ac Neutral, all non-mandatory voltages. Effective 1 January 1978, these assignments were cancelled in order to avoid hazardous voltages on the connectors.

P16, Table 3 - Same as for P15, Table 2 - see above.

P17, 4.4 - Delete the last two sentences immediately above "Supplementary Information" on page 17.

P38, Table 7 - Horizontal line above "pull-up capability" should extend all the way to the right (above "0 State at +3.5V).

P40, Table 10 - In the column labeled "Notes", (1), (2) and (3) are notes concerned with the entire table. Therefore, they should be relocated to appear beneath the table.

In the table delete:

+200V dc	+60V, -20V	0.1A	
117V ac		0.5A	Frequency 47-63 Hz to be obtained from an isolating transformer.

SH06437-583

P41, Section 8 - Change the 2nd and 3rd lines of the 2nd paragraph to read:

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Note: See changes herein for page 15, Table 2.

P46, Fig 5 - Add under "Notes"

(5) A chamfer of 0.3 max X 0.3 max is permitted on the two vertical edges of the connector even though section a-a of 5.2 shows zero chamfer.

P50, Figs 9 & 10 - Add notes (5) and (6), as follows, to both Figure 9 and Figure 10:

(5) For all signals the minimum rise or fall time is 10 ns. See Section 7.1.

(6) Signal transition at t_0 to t_9 may be absent if the signals on command or data lines are the same for the immediately preceding or following operations. See Section 7.1.3.1.

These notes serve as clarification only and are consistent with the text.

P56, Table C1 - Should be labeled Table C1 continued

Change	A 117V ac Line	to A Reserved(A)*
Change	B 117V ac Neutral	to B Reserved(B)*
Change	C +200	to C Reserved(C)*
Change	D +200R	to D Reserved(D)*

Add:

*Reserved(C) was previously assigned to +200 dc, Reserved(A) to 117V Line and Reserved(B) to 117V ac Neutral. Effective 1 January 1978, these assignments are cancelled to order to avoid hazardous voltages on the connectors.

P62, D8 - Replace the 3rd paragraph by:

From turn-on, the power supply outputs shall stabilize to within ±1% of their final values within 1 minute for constant line, load, and ambient temperature. The

P62, D8 Continued -

outputs shall turn on in an asymptotic manner, i.e., without overshoot. The transient during turn-off shall not result in any voltage exceeding 107% of nominal value when tested at any current within rating, with a resistive load.

SH06437-583

P63, D-15(3) - Add:

The thermal warning lamp may be neon lamp, as shown, or a solid state indicator may be used.

P67, Figures D3 & D4 - Delete the portion of Figures D3 and D4 labeled TURN-ON TRANSIENT.

SH06437-595

SH06437-596

8.2 IEEE Std 595-1976 Portion of IEEE CAMAC Book SH06437

Make all corrections listed in Section 6 except that for P37, 3.4.9. (The P37, 3.4.9 error in IEEE Std 595-1976 has already been corrected in IEEE CAMAC Book SH06437.)

8.3 IEEE Std 596-1976 Portion of IEEE CAMAC Book SH06437

Make all corrections listed in Section 7.

☆ U.S. GOVERNMENT PRINTING OFFICE: 1978— 261-324/2