

IEEE Standard Multichannel Analyzer (MCA) Histogram Data Interchange Format for Nuclear Spectroscopy

Sponsor

**Nuclear Instruments and Detectors Committee
of the
IEEE Nuclear and Plasma Sciences Society**

Reaffirmed March 30, 2006
Approved September 17, 1992

IEEE-SA Standards Board

Approved March 9, 1993
Reaffirmed January 13, 2000

American National Standards Institute

Abstract: A standard format for data interchange used to transfer multichannel pulse height data on magnetic media between laboratories is provided. The terms used in file records are defined. The contents consist only of ASCII characters and can be transmitted over networks and other direct links. Example programs to read data in FORTRAN, BASIC, and C are provided.

Keywords: data transfer, histogram data interchange, multichannel analyzer, multichannel pulse height data, nuclear spectroscopy

The Institute of Electrical and Electronics Engineers, Inc.
345 E. 47th Street, New York, NY 10017

Copyright © 1993 by The Institute of Electrical and Electronics Engineers, Inc.
All Rights Reserved. Published 1993. Printed in the United States of America.

ISBN 155937-261-3

No part of this publication may be reproduced in any form, in an electronic retrieval system or otherwise, without the prior written permission of the publisher.

IEEE Standards documents are developed within the Technical Committees of the IEEE Societies and the Standards Coordinating Committees of the IEEE Standards Board. Members of the committees serve voluntarily and without compensation. They are not necessarily members of the Institute. The standards developed within IEEE represent a consensus of the broad expertise on the subject within the Institute as well as those activities outside of IEEE that have expressed an interest in participating in the development of the standard.

Use of an IEEE Standard is wholly voluntary. The existence of an IEEE Standard does not imply that there are no other ways to produce, test, measure, purchase, market, or provide other goods and services related to the scope of the IEEE Standard. Furthermore, the viewpoint expressed at the time a standard is approved and issued is subject to change brought about through developments in the state of the art and comments received from users of the standard. Every IEEE Standard is subjected to review at least every five years for revision or reaffirmation. When a document is more than five years old and has not been reaffirmed, it is reasonable to conclude that its contents, although still of some value, do not wholly reflect the present state of the art. Users are cautioned to check to determine that they have the latest edition of any IEEE Standard.

Comments for revision of IEEE Standards are welcome from any interested party, regardless of membership affiliation with IEEE. Suggestions for changes in documents should be in the form of a proposed change of text, together with appropriate supporting comments.

Interpretations: Occasionally questions may arise regarding the meaning of portions of standards as they relate to specific applications. When the need for interpretations is brought to the attention of IEEE, the Institute will initiate action to prepare appropriate responses. Since IEEE Standards represent a consensus of all concerned interests, it is important to ensure that any interpretation has also received the concurrence of a balance of interests. For this reason IEEE and the members of its technical committees are not able to provide an instant response to interpretation requests except in those cases where the matter has previously received formal consideration.

Comments on standards and requests for interpretations should be addressed to:

Secretary, IEEE Standards Board
445 Hoes Lane
P.O. Box 1331
Piscataway, NJ 08855-1331
USA

IEEE Standards documents are adopted by the Institute of Electrical and Electronics Engineers without regard to whether their adoption may involve patents on articles, materials, or processes. Such adoption does not assume any liability to any patent owner, nor does it assume any obligation whatever to parties adopting the standards documents.

Introduction

(This introduction is not a part of IEEE Std 1214-1992, IEEE Standard Multichannel Analyzer (MCA) Histogram Data Interchange Format for Nuclear Spectroscopy.)

This document provides a standard format for histogram data for nuclear spectroscopy to facilitate interchange of such data between and within institutions.

At the time it approved this standard, the Nuclear Instruments and Detectors Committee of the IEEE Nuclear and Plasmas Sciences Society had the following membership:

Sanford Wagner, Chair

Louis Costrell, Secretary

Muzaffer Atac
J. G. Bellian
J. A. Coleman
W. K. Dawson
J. F. Detko

Edward Fairstein
F. S. Goulding
F. A. Kirsten
H. W. Kraner
G. L. Miller

D. E. Persyk
P. L. Phelps
D. E. Stilwell
K. L. Swinth
F. J. Walter

Ronald M. Keyser served as project leader for the development of this standard.

At the time it balloted and approved this standard, the Accredited Standards Committee N42 on Radiation Instrumentation had the following personnel:

Louis Costrell, Chair

Sue Vogel, Secretary

Joseph G. Bellian
Hugh R. Brashear
Ernesto A. Corte
Louis Costrell
Julian Forster
John M. Gallagher
Gerald Goldstein

Edward Groeber
J.B. Horner Kuper
Jesse Lieberman
D.A. Mack
James E. McLaughlin
Paul L. Phelps

Jack M. Selby
Carl R. Siebentritt
Anthony J. Spurgin
Edward J. Vallario
Lee J. Wagner
Sanford Wagner
Edward C. Wenzinger

When the IEEE Standards Board approved this standard on September 17, 1992, it had the following membership:

Marco W. Migliaro, Chair

Donald C. Loughry, Vice Chair

Andrew G. Salem, Secretary

Dennis Bodson
Paul L. Borrill
Clyde Camp
Donald C. Fleckenstein
Jay Forster*
David F. Franklin
Ramiro Garcia
Thomas L. Hannan

Donald N. Heirman
Ben C. Johnson
Walter J. Karplus
Ivor N. Knight
Joseph Koepfinger*
Irving Kolodny
D. N. "Jim" Logothetis
Lawrence V. McCall

T. Don Michael*
John L. Rankine
Wallace S. Read
Ronald H. Reimer
Gary S. Robinson
Martin V. Schneider
Terrance R. Whittemore
Donald W. Zipse

*Member Emeritus

Also included are the following nonvoting IEEE Standards Board liaisons:

Satish K. Aggarwal
James Beall
Richard B. Engleman
David E. Soffrin

Rochelle L. Stern
IEEE Standards Project Editor

Contents

CLAUSE	PAGE
1. Scope.....	1
2. Purpose.....	1
3. Definitions.....	1
4. General.....	3
ANNEXES	
Annex A Example FORTRAN program segment to read data	6
Annex B Example BASIC program to read data.....	7
Annex C Example C program to read data	9

IEEE Standard Multichannel Analyzer (MCA) Histogram Data Interchange Format for Nuclear Spectroscopy

1. Scope

This standard applies to multichannel pulse height data used in nuclear spectroscopy. It is independent of the source of the data, the device which wrote the data, the device which reads the data, and the medium containing the data.

2. Purpose

The purpose of this standard is to provide a format for data interchange that can be used to transfer multichannel pulse height data between laboratories, and to distribute this data for testing purposes. In order to be compatible with a large number of computer languages, computers, and hardware links, the complete file must be written in ASCII. It is intended that these files be converted to the local format before being used.

3. Definitions

3.1 acquisition start time: The start time of the acquisition of the histogram data, as

DD/MM/YR_HH:NN:SS_

where the '_' (underscore character) is an ASCII space; DD is the day; MM is the month; YR is the year; HH is the hours; NN is the minutes; and SS is the seconds.

3.2 ADC number: A four-character number identifying the ADC (analog to digital converter) used for the data. Leading spaces are interpreted as leading zeros. Normally, the ADC numbers would start at 1 and go up in sequence for a given system. Different systems in a specific laboratory could use non-sequential numbers, e.g., 1 to 4, and 11 to 14, for different types of equipment.

3.3 energy and channel pairs: The energy (keV) of the corresponding channel is stored as energy-channel pairs. Each member of the pair is stored as a 16-character floating point number, with unused pairs being ASCII spaces or zeros. They are stored as ordered pairs, i.e., the first entry is the energy, the second is the channel at that energy, the third is the energy, the fourth is the channel at that energy, and then to the next record. This is intended to provide sufficient numbers of channel pairs to allow for an adequate reconstruction of the energy-channel function by the analysis program.