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Gammasphere Software Development

Progress Report

Department of Physics and Astronomy
Mississippi State University
Mississippi State, Mississippi 39762

Prepared for the U.S. Department of Energy
Under Contract Number DE-FG05-92ER40726

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Gammasphere Software Development

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January, 1994

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Summary

This report describes the activities of the nuclear physics group at Mississippi State University which were performed during the 1993 calendar year under contract DE-FG05-92ER40726 with the Department of Energy. During 1993, the second year of our project, we have made significant progress in our focus areas: chairing the Gammasphere Software Working Group (SWG); assisting with the porting and enhancement of the ORNL UPAK histogramming software package; and developing standard formats for Gammasphere data products. In addition, we have established an new public ftp archive to distribute software and software development tools and information.

We are continuing to provide leadership for the Gammasphere Software Working Group (SWG) by organizing and chairing meetings, distributing Working Group summaries and disseminating related information. The SWG had its third full meeting during this grant period and three new members were added. The meeting summary has been compiled and distributed to interested members of the Nuclear Physics Community. Additional copies are available on request. A complete report was provided to the Gammasphere User's Group at the APS Division of Nuclear Physics meeting. A summary of the report was included in the most recent Gammasphere News Letter. The three standing subcommittees also continue to make valuable contributions in their specific areas.

The subcommittee on a "standard format for histogram data" has developed a semi-final version of the Universal Histogram Object (UHO) specification. The basic specification has been reported at two professional meetings and input from numerous researchers has been considered. A number of developers, including the LBL and ORNL groups, have agreed to include support for the UHO in their histogramming software.

We are continuing to assist software developers in adapting and testing the ORNL SUNPAK software package for use at Gammasphere. We are using the SUNPAK on different Sparcstation configurations with different monitors and with different window managers (OpenLook and Motif). We provide our test results to the software developers at ORNL who are porting and maintaining the SUNPAK software.

Our nuclear group continues to involve several graduate, undergraduate and high school students. Two graduate students and an undergraduate student are partially funded by the project. Mr. Pete Varmette finished his masters degree during this last grant period and is now working on a Ph.D. degree in our group. A very exciting element of our research effort is the involvement of

high school students from the Mississippi School of Math and Science. Our nuclear research program annually provides a unique experience for the student who participate.

I. Introduction

This report describes the 1993 activities of the nuclear physics research group at Mississippi State University under contract DE-FG05-92ER40726 with the Department of Energy. This document and the accompanying SWG-III summary are submitted to comply with DoE grant requirements. Chapters II-VIII describe the various activities of our research group. Chapter II describes the role of students in our research program. The final two sections of this report list the abstracts, publications and presentations which resulted from our research and a short chronology of relevant events. Also included with this report is the Summary and Presentations of the Third Gammasphere Software Issues Workshop.

II. Student Involvement

The MSU nuclear research group recognizes the importance of providing students with a rewarding research experience. Each year we include graduate students, undergraduate students, and high school students in our research program. Two of our graduate students and one of our undergraduates receives partial support from our current grant. One graduate student has already received his masters degree based on research in this program.

1. Graduate Students

There are currently four graduate students working in the nuclear physics group at Mississippi State University. Two of these students are working on Gammasphere software development. Mr. Pete Varmette (who spent the summer of 1992 working at LBL with Gammasphere researchers in developing an automated liquid nitrogen fill system for Gammasphere) is continuing to work in several software related areas. These include the development of data formats and testing of the UPAK software from ORNL. Mr. Pete Varmette finished his masters degree in 1993 and is now working on a Ph.D. degree in our group. Ms. Anita Triveda is working primarily in the area of UPAK testing but also works on the development of the SHOW application. She is also part time at the Mississippi State University Engineering Research Center and acts as our liaison there. Two other graduate students, Mr. Morris Fields and Mr. Hazem Tliemat are working in nuclear spectroscopy and relativistic hydrodynamics.

2. Undergraduate Students

Two undergraduate students, Mr. Charles Beyer and Mr. Larry Gariepy currently work in the nuclear research group. Mr. Beyer is seeking a B.S. degree in physics and works on UHO

testing and development. Mr. Gariepy is seeking a double major in Computer Science and Mathematics. His research involves the study of message passing techniques in Solaris, the SUN operating system.

3. High School Students

The Nuclear group provides a unique opportunity for local high school students to participate in DoE sponsored research. In a cooperative program between Mississippi State University (MSU) and the Mississippi School for Math and Science (MSMS) in Columbus MS our research group is reaching out to the best, most promising, high school students in Mississippi. Each year the MSMS sends students to MSU to interact with our research group and become involved in hands-on scientific research. The students spend three hours a week doing research at MSU with our group for the entire academic year. At the end of the year each student writes a report and makes a presentation to other students from the MSMS.

This year two MSMS students, Kohl Gill and Drew Pruett, have been applying nuclear spectroscopy techniques experimental data on Gold 186 and Palladium 106. In their research the students have become familiar with our UNIX based computer facility and several analysis programs. They have acquired substantial experience using the Display, Analysis, and Manipulation Module (DAMM). DAMM is part of SUNPAK, a computer software package that was written at Oak Ridge National laboratory and is being supplied to the Gammasphere facility.

III. Activities of the Software Working Group

The Gammasphere Software Working Group (SWG) was established by the director of the Gammasphere project to "generate software that will be useful in Gammasphere operation, data acquisition, and/or data analysis and to interact with Gammasphere management to develop an effective interface for user access to and use of the Gammasphere computer facilities". The SWG grew from nine to thirteen permanent members during this last year. The committee had its third major meeting this year at Lawrence Berkeley Laboratory. The first two SWG meetings were held at Mississippi State University and at the APS Nuclear Physics Division meeting in Santa Fe New Mexico.

The three standing SWG subcommittees continue to contribute in our focus areas. The subcommittee on Data Formats has prepared a semi-final draft of the UHO specification. Adoption of the UHO will encourage data sharing and tool sharing. The draft specification is included in this document as an appendix. The subcommittee on Parallel Programming is tracing developments in distributed parallel systems which could impact the use of the Gammasphere computer system. The subcommittee on Graphical User Interface issues is aiding in the port of the ORNL software to a distributed SUN-based, OpenLook/Motif compatible package. The bound proceedings of the three SWG meetings and the draft UHO specification is available from the SWG committee.

IV. Development of a Histogram Format

One of the goals of the SWG was to encourage the nuclear physics community to contribute to the development of high quality software for the Gammasphere. The absence of a standard data format was clearly identified as one of the primary obstacles to sharing the software that already existed and the development of new software tools. To study this situation and to develop a data format that could serve the community the subcommittee for a histogram standard was formed. With the help of this committee and others in the nuclear physics community, we have developed a universal histogram object (UHO) that defines a file format and provides for an object oriented programming model. We are also developing an example application, SHOW, that provides a library of callable subroutines which illustrate basic UHO operations. The UHO header files and the source code for the SHOW program are available on the MSU nuclear group public ftp archive.

1. The Universal Histogram Object

The following is a preprint on the UHO file specification:

UHO File format Specification

A Universal Histogram Object For Nuclear Science

R.B. Piercey, P. Varmette, C.J. Beyer, *Mississippi State University*

R.A. Belshe, *Lawrence Berkeley Laboratory*

R.W. MacLeod, *AECL Research*

and

R.L. Varner, *Oak Ridge National Laboratory,*

Abstract

One of the primary obstacles to widespread sharing of data and data display/analysis tools in nuclear research is the absence of a generally accepted histogram file format. We have developed a universal histogram object (UHO) that defines a file format and provides for an object

oriented programming model. The UHO file format consists of a list of self describing records. Each record is identified by a tag and contains the record size. In addition to the data record itself, special record types specify such things as display characteristics, calibrations, annotations, regions, markers, sort conditions, etc. Records and record fields are provided to support graphical user interfaces and heterogeneous distributed systems. The UHO also supports event-by-event data acquisition by providing for "intelligent" histogram objects that can accept event record buffers and sort the events based on Condition and Region records.

Introduction

In recent years, nuclear and high-energy, experimental research efforts have involved an increasing number of researchers and institutions. The researchers generally share the experimental data from an experiment which may be analyzed by several different groups at their home institutions. The results of the analysis must then be formatted and often redistributed for review and inclusion in reports and manuscripts. Formats for handling and storing the data have been independently developed at several national laboratory and university research sites, but no generally accepted standard has emerged. The existence of many different data formats makes sharing data unnecessarily complex and time consuming. Translation of histogram data often results in duplicated effort. In addition, many of the formats that have developed over the years are platform dependent and do not support heterogeneous network environments. Also, there is little built-in support for the new GUI and "workspace/workgroup" paradigms.

Several of the heavy-ion laboratories in the US and at least one commercial firm have histogram formats that have been adopted in the user community. CERN also has distributed a system for displaying and analyzing histogram data, but the histogram data format has not found a wider acceptance than the PAW and HBOOK user communities. The NCSC has created the HDF which provides a very general data format. The HDF system includes formats for histogram data but the format is complex and has not achieved widespread use in the nuclear physics research community.

A widely used, standard format would save many hours of research time and promote data and tool sharing. We have developed a universal histogram object (UHO) which incorporates

characteristics of formats used at the major research laboratories. The UHO is self describing, platform independent and supports GUI and workspace application models. The UHO is based on object oriented programming concepts and provides both a file format and a programming model. It may be extended by the user to include any application specific requirements.

A Universal Histogram Object

The Universal Histogram Object (UHO) is a self describing data format that can be used to represent histogram and associated data on file media, in cpu memory or during network transmissions. In addition, the UHO suggests an object oriented programming model which includes mechanisms for display, manipulation and analysis tools.

Multi-dimensional histograms of arbitrary size are supported in the UHO. The UHO also provides for associated data structures such as markers, cursors, regions, axes, calibrations, scale factors, etc. These structures can be manipulated interactively by the user and are saved with the histogram data. This insures that when a histogram, which has been saved, is reopened, the "state" of the associated structures can be restored, preserving the users "workspace". Such behavior obviates the necessity of re-formatting the data when it is reopened. By adding new UHO associated structures, the UHO behavioral model may easily be customized and extended by the user.

UHO Design Guidelines

In designing a format for histogram data, several criteria were applied.

- Usability

The UHO specification provides for suport of graphical user iterfaces and the workspace concept. It is simple to understand and to use. It may be implementated partially or fully depending on the users needs. The programming model can be implemented in such a way that the file format and memory images are (longword) isomorphic.

- Portability

The UHO format is designed to be machine portable. This means that UHO data and formatting information must be readable with many different machine types. In support

of this requirement, UHO record types are selfidentifying and data fields are 32 bit word aligned. Also bit level representations are discouraged.

- Flexibility

The UHO may be implemented to varying degrees. It may serve only as an intermediate porting format when data is to be moved from one system to another or it may be implemented fully to support file storage, complexGUIs, work space preservation, data analysis, etc. The UHO provides for histogramming in arbitrary dimensions, the definition of regions and conditions, and for event-by-event sorting.

- Extensibility

By allowing additional record types to be defined, the UHO can be extended to support custom applications or new data types.

UHO File Format

The UHO file is a list of self-identifying elements or records. Each record has a type and a size. This allows an application program to check for record types that it knows and skip those that it does not need or recognize. For example, a application tool which analyzes data in a "batch" mode may not need any information about how to display the data. However, a plotting or drawing program would need detailed information of this type. Each record may also be owned by a parent record so that hierarchical structures are possible.

A list of UHO record types is given in table 1. The "DATA" record contains the actual histogram data and information on the byte order, word size and data lengths. The "ERRS" record contains errors for the data in the "DATA" record and allows errors to be propagated through histogram manipulations and for error bars (or other representations) to be drawn with the data. The "DSPL" record contains the information required to draw the "counts" axis of the histogram. This includes the minimum and maximum values to display and symbol and color information. The "PARM" record includes similar information about the channel axes. There will usually be a "PARM" record for each of the dimensions of the histogram. "CALB" records provide calibration information for each of the channel axes. The "MARK" and "REGN" records define markers and regions in the histogram. There may be several of each of these in a UHO object. The "COND" record is a set of conditions or filters which regulate how blocks of events are sorted. A condition

requires that a particular parameter set be contained in one or more histogram regions. The "ANOT" records are used to add anotations to any of the UHO records.

TYPE	TAG	Versio n	STATUS	Notes
Histogram Data	DATA	1.0	Develop	
Errors Data	ERRS	1.0Beta	Develop	Contains associated errors data
Display Info	DSPL	1.0	Develop	
Parameter Info	PARM	1.0	Develop	
Calibration Info	CALB	1.0Beta	Develop.	
Region Info	REGN	1.0Beta	Develop	
Marker Info	MARK	1.0Beta	Develop	
Anotation Info	ANOT	1.0Beta	Develop	
Archive Dir	ADIR	1.0Beta	Develop	
Archive Data	ARCH	1.0Beta	Develop	
Animation Data	ANIM	1.0Beta	Develop	
Frame Data	FRAM	1.0Beta	Develop	

Table 1. The UHO record types.

UHO Record Format

UHO record types have a common format. Each has a 4-byte tagword in the first 4 bytes that identifies that record type. The total record size is given in the next 4 bytes. A record version and ID are provided to identify and differentiate records of the same base type. The record Owner ID allows records to be associated in a hierarchical fashion. A variable amount of record data can be included since the record size is imbedded in the structure. In order to support file-

image/memory-image isomorphism on an arbitrary machine, all data are aligned on 32 bit word boundaries.

Field	Type	Notes
Tag	4 bytes	
Size	size_t	
Version	4 bytes	
ID	4 bytes	
Owner ID	4 bytes	
User Data	4 bytes	
Record Data		
•		
•		
•		
•		

Table 2. The UHO record format.

UHO object behavior

In addition to a file format, the UHO suggest an object oriented model for applications that manipulate the UHO files. A unique feature of the UHO is the conceptual model shown in figure 1 that is suggested for the process of sorting or histogramming multiparameter data. In the UHO model, events or blocks of events are sent to histograms as high-level messages. Each histogram object may have sorting conditions built in via COND records, while the sorting mechanisms are included as UHO member functions or methods. In an object oriented implementation, the sort conditions could be configured interactively by the user and stored as a part of the histogram object.

Figure 1. Event messages containing the multi-parameter event data are sent to the UHO which contains the sort conditions as member data and the sorting procedures as member functions. Other member functions are called to display and manipulate the histogram.

2. The SHOW application Example

SHOW: A UHO Example Implementation

We have developed an example application (SHOW) which illustrates the use of most of the UHO records and suggests a rudimentary interface for manipulating the record objects. The Show program is able to read, write and display UHO files and provides a graphical user interface for manipulating certain characteristics of the data.

Show Memory Management

While both static and dynamic memory models may be used to manipulate UHO files, in general an application tool or program that intends to read a UHO file into memory will not know in advance how much memory is required. In these cases memory must be allocated dynamically. The Show application uses a dynamic memory model and maintains the various UHO records as a number of linked lists or queues. Fields in each record are reserved to store the pointer to the next item in the list. A structure is allocated to store the pointers to the first element in each list, and each list item will then point to the next list element as shown in figure 2. List items may be added or removed by user interactions or other processes. In such interactive models, memory may often become fragmented and unusable as hundreds of list elements are allocated and de-allocated. Depending on the OS memory management sophistication, the programmer may be required to perform periodic maintenance to insure an efficient memory map of the associated items in the list.

Figure 2. UHO records of a given type are maintained as linked lists in memory.

The current version of SHOW is implemented in C, a procedural programming language. The Show application provide procedures to allocate, de-allocate and manipulate each linked list. In a full implementation of the UHO model, object oriented programming may be used to

encapsulate the UHO data and member functions. When the histogram is saved or closed, the disk file is updated to reflect the new list elements. The separation of algorithmic and user-interface code in the SHOW example is consistent with client-server models and distributed systems. In general the UHO/SHOW model may be implemented in a wide variety of hardware and software environments.

Conclusions

In the current prototype implementation, SHOW, the UHO model has proven to be flexible and powerful. We are continuing to refine the UHO formats and are extending the SHOW example to illustrate additional techniques. We propose to use the UHO file format as the standard Gammasphere histogram data format or as a standard export format for users who wish to transport data to formats other than those supported at the Gammasphere facility. We would like to thank the Department of Energy for partial support of this project (DE-FG05-92ER40726).

Viewing Options Menu

Data Point Symbol Menu

Objects Menu

Edit marker...

Label: 511 keV

Color: ☐ Black

Contents: ☐ Label

Data Value: 210785 ☐ ☐

Channel Value: 1317 ☐ ☐

Options: ☒ Show Border ☐ Data Anchor
☒ Show Line

Edit

Marker Dialog Box

UHO Markers

Cursors

V. Development of a User Interface Shell

The complete software environment for the Gammasphere facility consists of a number of major components developed at sites other than the Lawrence Berkeley Laboratory. For example, histogramming software will be contributed by the Oak Ridge National Laboratory, while calibration and simulation software will be developed at Argonne National Lab. Other laboratories and university research groups are also expected to contribute.

The participation of many groups in the development of the Gammasphere software will provide the facility with a wealth of high quality, high performance software tools that would otherwise be unavailable. However, these independently designed components present the user with a significant challenge. Since each has been designed based on a different functional model and since the authors have implemented different user interfaces, the learning curve can be so steep that many of the excellent tools may go essentially unused.

In light of this situation, there is considerable interest in the implementation of a consistent graphical user interface (GUI) for the Gammasphere software environment, particularly for those elements which provide the basic user features such as histogram generation, histogram display and histogram analysis, etc. However, it is unreasonable to expect independent developers to redesign their software to incorporate the same user interface model.

The Oak Ridge National Laboratory histogramming software package (UPAK) is of special interest. In addition to the job of porting the software elements to the SPARC-based machines, it has been pointed out that some effort should be expended in developing a full graphical user interface for UPAK. A subcommittee has been formed to identify the relevant issues and to suggest enhancements where they could significantly improve the usability of the software.

DO_SHELL

In order to address the concerns of the committee, we are developing an application shell (do_shell) which can be user configured to provide a GUI for any target application operated via a command line interface (e.g., the Oak Ridge Histogramming Package). The do_shell application is an X based Graphical User Interface (GUI) shell program. The current version of do_shell uses the xview toolkit to provide the buttons and other widgets interface to an base application. Interprocess communication is handled with the ToolTalk message services. Do_shell opens a base frame which has a base panel attached to it. The top portion of the base panel has a panel text widget followed by various user widgets. Do_shell currently uses ToolTalk functions to pass

integer and string arguments to the target application. The ToolTalk routines are user activated by clicking on a button on the do_shell control panel. Below the base panel is a standard tty window where commands may be issued and messages displayed. Do_shell can be configured to automatically launch the target application, effectively hiding the complex relationship between the control shell and the target application. Once configured the target application operates as if it had a GUI rather than a command line interface. In order to support bidirectional communication with the do_shell interface a target program must support the ToolTalk messaging protocol.

A control flow diagram of do_shell and a target program is shown in figure 1. As discussed, the implementation of the the do_shell application will allow users to operate the UPAK and other software modules without learning the program specific command structure.

Flow chart for the proposed GUI shell to run on the SPARCstation.

Other areas where the UPAK user interface could be improved include window behavior, printing features and general window manager interoperation. For example, the ability to support simple cut and paste operations from Damm into drawing programs would be a useful extension.

Such complex enhancements would require some modifications to the UPAK source code and would have to be closely coordinated with the Oak Ridge programming team.

The announcement of the Common Open Software Environment (COSE) in March of 1993 has prompted the Unix user community to rethink its GUI development. It is in this light that our do_shell program is being ported from Xview to the X toolkit (Xt). Tooltalk will also play a central role in the new COSE consortium and ToolTalk support will be included in MSU application development.

VI. An FTP Site for Software Development Support

In order to make the results of our work generally available, we have established a public ftp site at MSU. Final products as well as works-in-progress are posted regularly so that the user community has the most recent versions of the data formats, subroutine libraries and programming examples. In addition, we post information on industry trends and solicit input from the user community. The Site Manual and a current directory for the site are provided in an appendix.

VII. Testing the ORNL SUNPAK Software

We have been testing the compatibility of the ported UPAK software package and are providing the test results to ORNL. The most recent test summary is included as an appendix.

VIII. Other Work

Mixed-symmetry States In Gold 186

Mr. Morris Fields is currently working towards his Masters degree by studying mixed-symmetry states in Au^{186} . He is currently analyzing gamma-ray spectra acquired in an experiment done at the Holifield Heavy Ion Research Facility (HHIRF) at Oak Ridge National Laboratory. Mr. Pete Varnette is analyzing data from a similar experiment to study Pd^{106} .

Numerical Algorithms for Relativistic Hydrodynamic Collisions

Mr. Hazem Tliemat and Ms. Anita Trevida are collaborating with the MSU Engineering Research Center (ERC) to develop grid-based numerical algorithms to study relativistic hydrodynamic collisions between heavy nuclear. Animated video sequences have been produced and are available from our group or the ERC.

IX. Publications, Abstracts and Presentations

Publications

Reprints Removed

"Performance of a three-element thin film detector," Z. Milosevich, M.L. Muga, R.L. Coldwell, G.J. Bamford, P.S. Haskins and **R.B. Piercey**, Nucl. Instr. and Meth. in Phys. Res., **A320**, pp. 471-478. (1992)

"Coulomb Excitation Studies to High Spin In ^{248}Cm ," **R.B. Piercey**, C. Michel, E. Grosse, H. Emling, D. Schwalm, H.J. Wollersheim, J.H. Hamilton, A.V. Ramayya and N. Trautmann, J. Phys. G: Nucl. Part. Phys. **19**, (1993), 849-860.

"Multiparameter Data Acquisition System for a Germanium Compton Telescope," J.E. Mckisson, P.S. Haskins, **R.B. Piercey**, G.W Phillips, and S.E. King, (To be published).

"Design of a Laboratory-Based Germanium Double Compton Telescope," P.S. Haskins, J.E. Mckisson, G.W Phillips, S.E. King, and **R.B. Piercey**, (To be published).

"Laboratory testing of a Volume-Imaging Germanium Compton Camera," P.S. Haskins, J.E. Mckisson, G.W Phillips, S.E. King, R.A. August, **R.B. Piercey**, and R.C. Mania (To be published).

Abstracts

"Gamma-ray Imaging with a Germanium Double-Compton Telescope," P.S. Haskins, J.E. Mckisson, G.W. Phillips, S.E King, **R.B. Piercey**, (Presented to the DARPA Nuclear Non-Proliferation Sensors Symposium, Patric AFB, February 10, 1993).

"Covariant, Grid-Based Numerical Algorithms for Nuclear Hydrodynamics," **R.B. Piercey**, B.K. Soni, H. Tleimat and Anita Trevedi (Presented to the Mississippi State Annual Conference on Differential Equations & Computational Simulations, Mississippi State University, Mississippi State, MS, March 19, 1993).

"A Macintosh-Based, Transportable, Multiparameter Data Acquisition System," **R.B. Piercey** and D.K. Fulton (Presented to IEEE Real Time 93 Conference, Vancouver, CANADA, June, 1993).

"A Universal Histogram Object For Nuclear Science," **R.B. Piercey**, R.A. Belshe, R.W. MacLeod and R.L. Varner (Presented to IEEE Real Time 93 Conference, Vancouver, CANADA, June, 1993).

"Multiparameter Data Acquisition System for a Germanium Compton Telescope," J.E. Mckisson, P.S. Haskins, **R.B. Piercey**, G.W Phillips, and S.E. King, (Presented to IEEE Nuclear Science Symposium, San Francisco, CA, Nov., 1993).

"Design of a Laboratory-Based Germanium Double Compton Telescope," P.S. Haskins, J.E. Mckisson, G.W Phillips, S.E. King, and **R.B. Piercey**, (Presented to IEEE Nuclear Science Symposium, San Francisco, CA, Nov., 1993).

Siminars and Oral Reports

"Future Computing-OS Wars," Mississippi State University, Mississippi State, MS, April 29.

"Multiparameter Data Acquisition," Jackson State University, Jackson, MS, October 7.

"Report of the Software Working Group Activities to the Gammasphere User's Group," APS Nuclear Physics Division Meeting, Pacific Grove, CA, October 20-23.

X. Project Chronology

March 19, 20 (Mississippi State)

Professor Piercey participated in the review of and attended the "Annual Conference on Differential Equations & Computational Simulations" where he presented a paper and chaired a technical session.

March 28-April 1 (Santa Clara, CA)

Professor Piercey attended the annual SUN Microsystems sponsored developer conference.

April 29 (MSU)

Professor Piercey gave seminar on "Future Computing-OS Wars" for the Physics Department.

May 15 (MSU MS)

Professor Piercey conducted an Oral Exam for Mr Pete Varmette. Mr. Varmette was awarded the Masters Degree for his work in Nuclear Physics.

May 1-15 (MSU MS)

Professor Piercey arranged for Pete Varmette to work with Gerry Fishman and Pat Lestrade at NASA Huntsville in the Summer.

June 6-13 (Vancouver CA)

Professor Piercey attended the IEEE Real Time 93 Conference and presented two Papers.

July 28- August 1 (Berkeley CA)

Professor Piercey attended and chaired the third meeting of the SWG in Berkeley CA.

October 7 (Jackson, MS)

Professor Piercey gave a seminar in the physics department at Jackson State University on Multiparameter Data Acquisition.

October 20-23 (Pacific Grove CA)

Professor Piercey attended the Division of Nuclear Physics APS meeting and gave a presentation to the GammaSphere Users Group. Also participated in group discussions regarding workstation selection for the the nuclear science community.

November 1-5 (Sanfrancisco CA)

Professor Piercey attended the IEEE Nuclear Science Symposium. Co-presented two papers.

Appendix 1. UHO C Language Header Files

An example UHO TEXT record

TEXT	1	8192					
0	0	0	0	0	0	1	0
0	1	1	0	1	0	0	0
0	0	1	2	0	0	1	1
2	1	0	1	1	2	2	3
0	3	5	4	3	2	2	1
2	1	5	1	2	6	4	3
4	3	4	3	1	5	3	6
1	6	5	7	3	6	4	5
4	5	5	8	8	4	4	1
3	4	7	9	4	8	8	7
11	13	11	8	10	10	7	9
5	13	11	8	12	9	6	14
10	9	7	10	10	10	11	14
3	9	11	13	11	8	12	10
7	10	12	9	8	14	8	13
4	9	6	3	4	5	1	5
1	5	8	7	8	3	3	7
5	7	6	3	4	5	5	3
8	4	6	2	2	7	5	5
7	6	5	3	4	6	7	9
2	3	5	7	5	2	7	5
4	6	7	4	7	7	3	5
4	4	5	6	5	3	3	2
5	8	3	7	6	3	5	2

a total of 1024 lines of text

UHO C Language Programming Structures

UHO "DATA" record format

The uho_DATA structure holds the data in memory and is copied to disk when a histogram is saved as a file. The structure is extended to hold the length array as well as the histogram data. The data[1] field contains the first length value (the only one for 1D histogram). For a 1D histogram and a word_size of 4, data[2] would contain the contents of channel 1.

Histogram data records contain the actual histogram data and are used to flag the beginning of a associated records and to specify the nature of the data record. Data records specify the rank or dimension of the histogram file. A rank of one would correspond to single parameter histogram. A rank of two would mean a two parameter histogram and so on. The word size of the histogram is the storage size in bytes for the contents of a particular channel. The format says how the data is arranged in the data record. Following the format field, the length of each parameter is given. When a data record is encountered in a file the following records are interpreted as belonging to that histogram. When a new data record is encountered it marks the beginning of the next histogram. In this way multiple histograms may be included in a single file. Data records specify the rank or dimension of the histogram file.

```
typedef struct uho_DATA {
```

uhoTag	rec_tag;	/* 'DATA'	*/
size_t	rec_size;	/* size in bytes of this record */	
long	rec_vers;	/* version of record (1.0B)	*/
long	rec_ID;	/* unique ID of record	*/
long	dt_usr_data;	/* the usr can store anything here	*/
long	dt_byte_order;	/* byte order 0x01020304	*/
time_t	dt_creat_time;	/* the creation time	*/
long	dt__rank;	/* identifiys the data rank: 1D, 2D,..	*/
long	dt_word_size;	/* byte, word, long, etc.	*/

```
long      dt_format;      /* int, float, etc      */
long      dt_compress;    /* how data is compressed */
long      dt_data[1];     /* length array(longs), data follows */
```

```
} uho_DATA;
```

UHO "TEXT" record format

```
typedef struct uho_TEXT {  
  
    uhoTag    rec_tag;    /* 'TEXT' */  
    char      data[1];    /* rank, len1, len2,... lenN, data1, data2... */  
  
} uho_TEXT ;
```

UHO "ERRS" record format

```
typedef struct uho_ERRS {  
  
    uhoTag    rec_tag;    /* 'ERRS' */  
    size_t    rec_size;    /* size in bytes of this record */  
    long      rec_vers;    /* version of structure (1.0B) */  
    long      rec_ID;    /* unique ID of record */  
    long      er_usr_data; /* The usr can store anything here */  
    long      er_owner_ID; /* owner ID of record */  
    long      er_format;    /* sqrt, explicit, symmetric, etc */  
    long      er_draw_freq; /* gain to apply during sorting */  
    long      er_data[1];    /* length array(longs), data follows */  
  
} uho_ERRS ;
```

UHO "DSPL" record format

The uho_DSPL record holds additional drawing control information and the value axes descriptors. There should only be one uho_DSPL record even for higher dimensional data.

Histogram "markers" are used to annotate the histogram and can be used to maintain feature lists or simply to add comments to the histogram plots.

```
typedef struct uho_DSPL {
```

uhoTag	rec_tag;	/* 'DSPL' */
size_t	rec_size;	/* size in bytes of this record */
long	rec_vers;	/* version of structure (1.0B)*/
long	rec_ID;	/* unique ID of record */
long	dp_usr_data;	/* the usr can store data here */
long	dp_owner_ID;	/* unique ID of record */
XRectangle	dp_window_rect;	/* how to draw the window */
XRectangle	dp_display_rect;	/* where to draw the data */
struct rgbColor	dp_fore_color;	/* window background color */
struct rgbColor	dp_back_color;	/* window background color */
long	dp_plot_symbol;	/* Dots,Squares,Lines */
long	dp_symbol_size;	/* symbol size */
long	dp_symbol_fill;	/* to fill the Plot */
long	dp_remove_lines;	/* remove hidden lines */
long	dp_val_min;	/* smallest value displayed */
long	dp_val_max;	/* largest value displayed */
long	dp_vert_mode;	/* cLINEAR or cLOG */
long	dp_view_persp;	/* cHUMAN, cTFLESCOPIC..*/
long	dp_view_type;	/* cSURFACE, cSCATTER..*/
long	dp_maj_intrvl;	/* majr intrvl for the val axis */
long	dp_min_intrvl;	/* minr intrvl for the val axis */
long	dp_font_name[128];	/* specifies font for the axis */
long	dp_show_grid;	/* says whether to draw grid */
long	dp_auto_axes;	/* automatically adjust axes */

```
long          dp_auto_scale;      /* auto adjust vertical scale */
long          dp_draw_axis;       /* says to draw value axis   */
long          dp_axis_label[cMAX_LABEL_LENGTH];/* label */

} uho_DSPL;
```


UHO "PARM" record format

The uho_PARM record holds the descriptive information for each dimension of the data array. For example, if the rank is 2, there can be up to 2 uho_PARM records. The uho_PARM record provides a next_PARM field to enable link-list storage in memory.

"Parameter" records are used to specify how to sort event data and interpret and draw the histogram data. There may be no PARM records, or there may be one for each of the parameter or dimensions in the n-dimensional data set (rank of them).

```
typedef struct uho_PARM {
```

uhoTag	rec_tag;	/* 'PARM'	*/
size_t	rec_size;	/* size in bytes of this record	*/
long	rec_vers;	/* version of structure (1.0B)	*/
long	rec_ID;	/* unique ID of record	*/
long	pm_usr_data;	/* the usr can store data here	*/
long	pm_owner_ID;	/* owner ID of record	*/
long	pm_parm_num;	/* belongs to this hist dimension	*/
void	*next_PARM;	/* points to the next PARM record	*/
long	pm_sort_parm;	/* which event parm to sort	*/
float	pm_sort_gain;	/* gain to apply during sorting	*/
long	pm_sort_offset;	/* offset to apply during sorting	*/
long	pm_next_chan;	/* place holder for strip charts	*/
long	pm_disp_min;	/* min channel currently displayed	*/
long	pm_disp_max;	/* max channel currently displayed	*/
long	pm_curs_min;	/* position of the lower cursor	*/
long	pm_curs_max;	/* position of the upper cursor	*/
float	pm_axis_rot;	/* rotation about this axis	*/
long	pm_maj_intvl;	/* major interval for drawing axis	*/
long	pm_min_intvl;	/* minor interval for drawing axis	*/
char	pm_draw_axis;	/* says to draw the axes	*/

```
char      pm_axis_label[cMAX_LABEL_LENGTH]; /* label*/
```

```
} uho_PARM;
```

UHO "CALB" record format

The uho_CALB record holds the optional calibration data for each dimension. For example, if the rank is 2, there can be up to 2 uho_CALB records. The uho_CALB record provides a next_CALB field to enable link-list storage in memory.

```
typedef struct uho_CALB {  
  
    uhoTag    rec_tag;           /* 'CALB' */  
    size_t    rec_size;         /* size in bytes of this record */  
    long      rec_vers;         /* version of structure (1.0B) */  
    long      rec_ID;           /* unique ID of record */  
    long      ca_usr_data;       /* the usr can store data here */  
    long      ca_owner_ID; /* unique ID of record */  
    long      ca_parm_num;       /* belongs to this hist dimension */  
    void      *next_CALB; /* points to the next CALB record */  
    long      ca_use_calb;       /* says to use the calibration */  
    float      ca_calb_coef[1]; /* calibration coefficient */  
    char      ca_calb_units[cMAX_LABEL_LENGTH]; /* units */  
  
} uho_CALB;
```

UHO "REGN" record format

The "regions" structures allows n-dimensional volumes to be specified in the histogram data. This allows ranges and regions of data to be marked along with the specific features identified with the markers. In addition, regions from any open histogram may be specified in the sorting "conditions".

```
typedef struct uho_REGN {
```

uhoTag	rec_tag;	/* 'REGN'	*/
size_t	rec_size;	/* size in bytes of this record	*/
long	rec_vers;	/* version of structure (1.0B) */	
long	rec_ID;	/* unique ID of record	*/
long	rg_usr_data;	/* the usr can store data here	*/
long	rg_owner_ID;	/* unique ID of record	*/
void	*next_REGN;	/* points to the next REGN record	*/
long	rg_flags;	/* visible, selected, etc	*/
long	rg_rank;	/* says what kind of region	*/
XColor	rg_color;	/* region color	*/
long	rg_font_num;	/* font for region text	*/
long	rg_font_sytle;	/* font style for region text	*/
long	rg_font_size;	/* font size for region text	*/
long	rg_font_just;	/* font justification for region text	*/
XRectangle	rg_rect;	/* enclosing rect for the region	*/
long	rg_num_pts	/* num of points in polygon	*/
XPoint	rg_point[1]	/* list of points defines a ploygon	*/
char	rg_name[cMAX_LABEL_LENGTH];	/* name	*/

```
} uho_REGN;
```

UHO "COND" record format

The uho_COND record holds the description of the condition that is to be applied to a particular ntuple. The fundamental test is whether the ntuple specified by the cond_parm[i] ntuple of rank lies in the region specified by rg_name.

The "conditions" block is a set of conditions or filters which regulate how blocks of events are sorted. These conditions may require that a particular parameter be included in one or more histogram regions, or it may require that a user supplied function evaluate to true.

```
typedef struct uho_COND {
```

uhoTag	rec_tag;	/* 'COND'	*/
size_t	rec_size;	/* size in bytes of this record	*/
long	rec_vers;	/* version of structure (1.0B) */	
long	rec_ID;	/* unique ID of record	*/
long	cd_usr_data;	/* the usr can store data here	*/
long	cd_owner_ID;	/* ID of owner record	*/
void	*next_COND;	/* points to next COND record	*/
long	cd_rank;	/* rank of n-tuple test	*/
long	cd_mask;	/* bit test mask	*/
long	cd_parm_1;	/* parm 1 to test	*/
long	cd_parm_2;	/* parm 2 to test	*/
long	cd_num_pts;	/* number of points in polygon	*/
long	cd_parm[1];	/* ntuple for testing	*/
char	cd_name[cMAX_LABEL_LENGTH];	/* name of condition*/	

```
} uho_COND;
```

UHO "MARK" record format

```
typedef struct uho_MARK {
```

uhoTag	rec_tag;	/*'MARK'	*/
size_t	rec_size;	/* size in bytes of this record	*/
long	rec_vers;	/* version of structure (1.0B) */	
long	rec_ID;	/* unique ID of record	*/
long	mk_usr_data;	/* the usr can store data here */	
long	mk_owner_ID;	/* unique ID of record	*/
void	*next_MARK;	/* points to the next MARK record	*/
long	mk_flags	/* visible, selected, showmode,.....	*/
long	mk_anchor;	/* says stick to data or window	*/
long	mk_border;	/* specifies border style	*/
long	mk_contents;	/* specifies what to show	*/
long	mk_x_start;	/* chan or x pix location of label	*/
long	mk_y_start;	/* val or y pix location of label	*/
long	mk_x_stop;	/* chan or x pix location of line	*/
long	mk_y_stop;	/* val or y pix location of line	*/
XColor	mk_color;	/* marker color	*/
long	mk_font_num;	/* font for marker text	*/
long	mk_font_sytle;	/* font style for marker text	*/
long	mk_font_size;	/* font size for marker text	*/
long	mk_font_just;	/* font justification for marker text	*/
char	mk_text[cMAX_LABEL_LENGTH];	/* name	*/

```
} uho_MARK;
```

UHO "ANOT" record format

```
typedef struct uho_ANOT {
```

uhoTag	rec_tag;	/* 'ANOT'	*/
size_t	rec_size;	/* size in bytes of this record	*/
long	rec_vers;	/* version of structure (1.0B) */	
long	rec_ID;	/* unique ID of record	*/
long	at_usr_data;	/* the usr can store data here */	
long	at_owner_ID;	/* unique ID of record	*/
void	*next_ANOT;	/* points to the next ANOT record	*/
char	at_font_name[128];	/* specifies font for the anotation	*/
char	at_text[1];	/* anotation text starts here	*/

```
} uho_ANOT;
```

UHO "ADIR" record format

```
typedef struct uho_ADIR {
```

uhoTag	rec_tag;	/* ADIR	*/
size_t	rec_size;	/* size in bytes of this record	*/
long	rec_vers;	/* version of structure (1.0B) */	
long	rec_ID;	/* unique ID of record	*/
long	ad_usr_data;	/* the usr can store data here */	
long	ad_owner_ID;	/* ID of parent record	*/
void	*next_ADIR;	/* points to the next ARCHJ record	*/
long	ad_num_entries;	/* identifiys the data rank: 1D, 2D,..	*/
long	ad_rank;	/* identifiys the data rank: 1D, 2D,..	*/
long	ad_word_size;	/* byte, word, long, etc.	*/
long	ad_format;	/* int, float, etc	*/
long	ad_compress;	/* how data is compressed	*/
long	ad_data_offset;	/* offset to first data byte	*/
long	ad_data_size;	/* size in bytes of data	*/

```
} uho_ADIR ;
```


UHO "ARCH" record format

```
typedef struct uho_ARCH {
```

uhoTag	rec_tag;	/* ARCH	*/
size_t	rec_size;	/* size in bytes of this record	*/
long	rec_vers;	/* version of structure (1.0B) */	
long	rec_ID;	/* unique ID of record	*/
long	ar_usr_data;	/* the usr can store data here */	
long	ar_owner_ID;	/* ID of parent record	*/
void	*next_ARCH;	/* points to the next ARCH record	*/
long	ar_data[1];	/* data follows	*/

```
} uho_ARCH;
```

UHO "FRAM" record format

```
typedef struct uho_FRAM {  
  
    uhoTag      rec_tag;          /* 'FRAM' */  
    size_t      rec_size;        /* size in bytes of this record */  
    long        rec_vers;        /* version of structure (1.0B) */  
    long        rec_ID;          /* unique ID of record */  
    long        fr_usr_data;     /* the usr can store data here */  
    long        fr_owner_ID;     /* unique ID of record */  
    void        *next_FRAM;      /* points to the next FRAM record */  
    XRectangle  fr_rect;         /* enclosing rect for animation */  
    char        an_data[1];     /* Frame data starts here */  
} uho_FRAM;
```

UHO "ANIM" record format

```
typedef struct uho_ANIM {
```

uhoTag	rec_tag;	/* ANIM	*/
size_t	rec_size;	/* size in bytes of this record	*/
long	rec_vers;	/* version of structure (1.0B) */	
long	rec_ID;	/* unique ID of record	*/
long	an_usr_data;	/* the usr can store data here */	
long	an_owner_ID;	/* unique ID of record	*/
void	*next_ANIM;	/* points to the next ANOT record	*/
XRectangle	an_rect;	/* enclosing rect for animation	*/
void	*an_frame;	/* pointer to current frame	*/
long	an_speed;	/* frame speed	*/
long	an_loop;	/* says whether to loop	*/
char	an_font_name[128];	/* specifies font for the anotation	*/

```
} uho_ANIM;
```

An example UHO histogram hex dump

0000000 4441 5441 0000 802c 0000 0000 0000 0000 /* DATA */

0000020 00000000 00000000 00000000 00000001

0000040 0000 0004 0000 0000 0000 0000 0000 1fff

0000060 0018 37b3 0000 0006 0000 0001 0000 0022

0000100 0000 0071 0000 010b 0000 048e 0000 6074

0000120 0001 663f 0001 6b19 0001 669f 0001 694e

0000140 0001 648f 0001 6645 0001 65ba 0001 6271

0000160 0001 609d 0001 5e83 0001 5f12 0001 5ce1

.

.

.

.

0100000 0000 0149 0000 016f 0000 0153 0000 0155

0100020 0000 0168 0000 0157 0000 0157 0000 015c

0100040 0000 0159 0000 0159 0000 0162 4453 504c /* DSPL */

0100060 0000 02b0 0000 0000 0000 0000 0000 0000

0100100 0000 0000 0000 0000 0000 0000 0000 0000

0100120 0000 0000 0000 0000 0000 00ff 00ff 00ff

0100140 0000 0001 0000 0000 0000 0000 0000 0001

0100160 0000 0001 0018 37b3 0000 0001 0000 0001

0100200 0000 0002 0000 0064 0000 000a 0000 0000

0100220 0000 0000 0000 0000 0000 0000 0000 0000

*

0101220 0000 0000 0000 0001 0000 0000 7661 6c75

0101240 6500 0000 0000 0000 0000 0000 0000 0000

0101260 0000 0000 0000 0000 0000 0000 0000 0000

*

0101320 0000 0000 0000 0000 0000 0000 5041 524d /* PARM */

0101340 0000 0090 0000 0000 0000 0000 0000 0000

0101360 0000 0000 0000 0001 0000 0000 0000 0000

0101400 3f80 0000 0000 0000 0000 0000 0000 0000

0101420 0000 1ffe 0000 0096 0000 1f68 0000 0000

0101440 0000 03e8 0000 00c8 0000 0000 7061 7261

0101460 6d00 0000 0000 0000 0000 0000 0000 0000

0101500 0000 0000 0000 0000 0000 0000 0000 0000

*

0101554

Appendix 2. Preliminary SUNPAK Test Results

1. DAMM Module Tests

FOR FILE/DEVICE ASSIGNMENT SYNTAX

IN	FIL.EXT	Open N-file (EXT = SPK or HIS)	y
OU	FIL.EXT	Open O-file (EXT = SPK or HIS) - OUTPUT for SPK only	y
OU	FIL.SPKNEW	Create and open O-file (SPK-file for output)	y
QF	FIL.EXT	Open Q-file (EXT = SPK or HIS) - for display only	y
RF	FIL.EXT	Open R-file (EXT = SPK or HIS) - for display only	y
SF	FIL.EXT	Open S-file (EXT = SPK or HIS) - for display only	y
BAN	FIL	Open FIL.BAN for store recall proj etc	y
BAN	FILNEW	Create & open FIL.BAN for store recall etc	y
CLO	F	Closes F-file (where F = N O P Q R S or BAN)	y
DFIL		Displays data files currently open	y
CMD	CON:	Set CMD-input to be from VDT	y
CMD	FIL	Set CMD-input to be from FIL.CMD & process	y
LON/LOF		Turn output to damm.log ON/OFF (def= OFF)	y

FOR SCREEN SETUP COMMANDS

FIGI		Set screen configuration library to default	y
FIGF	FILNAM	Read screen configuration library from ILNAM	y
FIG	N	Set current screen configuration to type-N	y
DLAF	MS	Set FIG-delay to milliseconds (default=1000)	y
DLAD	MS	Set Display-delay to milliseconds (default=500)	y
WIN	ID (dflt=1)	Set subsequent displays to be in window-ID	y
AXON	ID (dflt)	Enable the drawing of axis for window-ID	y
AXOF	ID	Disable the drawing of axis for window-ID	y
CMAP		Set color map to default ("takes" after next FIG)	y
CMAP	FILNAM	Set color map from FILNAM ("takes" after next FIG)	y
REVV		Reverse all color specs ("takes" after next FIG)	y
DLNS	N	Set # disp-lines = N - for HELP DDIR & DSUM	y
CURT	LIVE (default)	Set full-wind cursor to track mouse LIVE	y
CURT	X	New full-wind cursor generated via mouse-click or key	y
SSI		Set screen to initial - erase all graphic windows	y

FOR SCREEN CONFIGURATION DIAGRAMS

1-[]	2-[] []	3-[] []	4-[] []	5-[] []	6-[] []	7-[] []	8-[] []
	[]	[] []	[]	[] []	[]	[] []	
			[]	[] []	[]	[] []	
					[]	[] []	

9-[[]]	10-[[]]	11-[--]	12-[--]	13-[--]	14-[--]	15-[2D]	16-[2d]
[]	[]		[--]	[--]	[--]		
[]	[]		[--]	[--]			
[]	[]			[--]			
[]	[]						

FOR EXPLANATION OF "VARIABLES IN FILE NAMES"

One symbol (integer variable) may be incorporated in a FILENAME specification as the following examples illustrate:

SYM=3

OU FIL"SYM".SPKNEW ;Creates and opens FIL3.SPK

$$I=0$$

LOOP 3

$$I = I + 1$$

IN FIL "I".SPK :Opens (in succession) FIL1.SPK FIL2.SPK FIL3.SPK

•

•

ENDLOOP

FOR LOOP EXECUTION AND SYMBOL DEFINITION

SYM = EXPRESSION, - Define symbol (SYM) up to 100 symbols supported.

DSYM		Displays list of currently defined symbols & values	y
LOOP	N	Starts LOOP (executed N-times) N=SYM or CONST	y
CMD		Nesting supported	y
CMD		# lines between 1st LOOP & matching ENDL = 100	y

FOR DIRECTORY DISPLAY CMDS.

DIR		Display Input file directory on VDT	y
DIR	N	Display Input file directory on VDT	y
DIR	O	Display Output file directory on VDT	y
DIR	P	Display P-file directory on VDT	y
DIR	Q	Display Q-file directory on VDT	y
DIR	R	Display R-file directory on VDT	y
DIR	S	Display S-file directory on VDT	y
DIR	BAN	Display BAN-file directory on VDT	y
LDIR ...		Lists directory on Log-file/device	y
DDIR	KF	Display/Log directory of KF-file in more detail	y

FOR SOME GENERAL DEFINITIONS

B1	Memory Buffer-1
B2	Memory Buffer-2
ID	The ID-number of histogram to be read
NUID	Next ID-number to be assigned to output histogram
LO	A first-channel-number (usually of a Gate)
HI	A last- channel-number (usually of a Gate)
FAC	A multiplication factor

MEANING OF THE INDIVIDUAL COMMAND-CHARACTERS .

I	Input or read
O	Output or write
A	Add or accumulate
S	Shift (gain shift)
GX	Gate on X-parameter (i.e. parameter # 1)
GY	Gate on Y-parameter (i.e. parameter # 2)
1	Buffer-1
2	Buffer-2
M	Multiply
C	Crunch
D	Divide
SET	FOR SOME SETUP CMDS

COMMANDS FOR SETTING UP NEXT ID# STD GAIN-SHIFT & CRUNCH FACTOR ..

NUID	IV	Set next ID to be used to IV	y
IDST	N	Set ID-step to be used in implied I/O loops	y
GASP	XI1X12XF1XF2NCF	Standard gain shift specification	y
SIDA		Says treat 16-bit HIS-file data as signed	y
USDA		Says treat 16-bit HIS-file data as un-signed (deft)	y
IO		FOR I/O SYNTAX	y

COMMANDS WHICH INPUT OR INPUT/OUTPUT 1-D HISTOGRAMS .

I	ID	Input to B1	y
IS	ID	Input to B1 gain shift B1	y
IA	IDFAC	Input to B1 $B2=B2+FAC*B1$	y
ISA	IDFAC	Input to B1 shift $B1 B2=B2+FAC*B1$	y
IO	ID	Input to B1 output B1	y
ISO	ID	Input to B1 shift B1 output B1	y
IO	IDAIDB	Input to B1 output B1 (for ID=IDAIDB)	y
ISO	IDAIDB	Input to B1 shift output (for ID=IDAIDB)	y
O1		Output B1	y
O2		Output B2	y

FOR 2-D GATING SYNTAX COMMANDS .

GY	IDLOHI	Y-gate to B1	y
GYS	IDLOHI	Y-gate to B1 shift B1	y
GYO	IDLOHI	Y-gate to B1 output B1	y
GYO	IDAIDBLOHI	Y-gate to B1 output B1 (for ID=IDAIDB)	y
GYSO	IDLOHI	Y-gate to B1 shift & output B1	y
GYSO	IDAIDBLOHI	Y-gate to B1 shift & output B1 (for ID=IDAIDB)	y
GYA	IDLOHIFAC	Y-gate to B1 $B2=B2+FAC*B1$	y
GYSO	IDLOHIFAC	Y-gate to B1 shift B1 $B2=B2+FAC*B1$	y
GX	IDLOHI	X-gate to B1	y
GXS	IDLOHI	X-gate to B1 shift B1	y
GXO	IDLOHI	X-gate to B1 output B1	y
GXO	IDAIDBLOHI	X-gate to B1 output B1 (for ID=IDAIDB)	y
GXSO	IDLOHI	X-gate to B1 shift & output B1	y
GXSO	IDAIDBLOHI	X-gate to B1 shift & output B1 (for ID=IDAIDB)	y
GXA	IDLOHIFAC	X-gate to B1 $B2=B2+FAC*B1$	y
GXSA	IDLOHIFAC	X-gate to B1 shift B1 $B2=B2+FAC*B1$	y
O1		Output B1	y
O2		Output B2	y

FOR PROJECTION SYNTAX COMMANDS

PJ	IDBIDDEGR	PROJ TO B1	y
PJS	IDBIDDEGR	Proj to B1 shift B1	y
PJO	IDBIDDEGR	Proj to B1 output B1	y
PJO	IDAIDBBIDABIDBDEGR	Proj to B1 output B1	y
PJSO	IDBIDDEGR	Proj to B1 shift & output B1	y
PJSO	IDAIDBBIDABIDBDEGR	Proj shift output	y
PJA	IDBIDDEGRFAC	Proj to B1 $B2=B2+FAC*B1$	y
PJSA	IDBIDDEGRFAC	Proj to B1 shift B1 $B2=B2+FAC*B1$	y
PJAL		Project all bananas in currently open	y
O1		Output B1	y
O2		Output B2	y

(DEGR = Projection-axis angle in degrees)

ID denotes histogram-ID; BID denotes banana-ID

FOR BUFFER MANIPULATION CMDS

M1	XM	Multiply B1 by XM	y
M2	XM	Multiply B2 by XM	y
C1	ICRUN	Crunch B1 by ICRUN (standard crunch unchanged)	y
C2	ICRUN	Crunch B2 by ICRUN (standard crunch unchanged)	y
S1		Shift B1 by standard GASP	y
S2		Shift B2 by standard GASP	y
S1	XI1XI2XF1XF2NC	Shift B1 as specified	y
S2	XI1XI2XF1XF2NCF	Shift B2 as specified	y
Z1		Zero B1	y
Z2		Zero B2	y
A12	FAC	$B2=B2+FAC*B1$	y
A21	FAC	$B1=B1+FAC*B2$	y
SWAP		Swap B1 & B2	y
M2D1	FAC	$B2=(FAC*B2)/B1$	y
O1		Output B1	y
O2		Output B2	y

COMMANDS WHICH LIST DATA ON TERMINAL OR PRINTER.

PR1		Print B1	y
PR2		Print B2	y
D1	LOHI	Display B1 (channels LO thru HI)	y
D2	LOHI	Display B2 (channels LO thru HI)	y
PPL		FOR COMMANDS RELATED TO PRINTER-PLOTS	y

COMMANDS RELATED TO PRINTER-PLOTS .

SKRZ		Set to skip repeated-zeros for printer plots	y
PLRZ		Set to plot repeated-zeros for printer plots	y
PLG	IDLOHINCYC	Input to B1 & LOG plot	y
PLN	IDLOHINCFS	Input to B1 & LIN plot	y
PLG	IDAIDBLOHINCYC	Input to B1 & LOG plot (for ID=IDAIDB)	y
PLN	IDAIDBLOHINCFS	Input to B1 & LIN plot (for ID=IDAIDB)	y
PLG1	LOHINCYC	Log Printer-plot of B1	y
PLG2	LOHINCYC	Log Printer-plot of B2	y
PLN1	LOHINCFS	Linear Printer-plot of B1	y
PLN2	LOHINCYC	Linear Printer-plot of B2	y

(NCFS = # of counts full-scale for LIN plots)

(NCYC = # of cycles for LOG plots)

COMMANDS WHICH MODIFY CHANNEL CONTENTS

SET1	ICNYV	Set channel ICN of B1 to YV	y
SET2	ICNYV	Set channel ICN of B2 to YV	y
SET1	LOHIYV	Set channels LO-thru-HI of B1 to YV	y
SET2	LOHIYV	Set channels LO-thru-HI of B2 to YV	y
SET1	LOHIYAYB	Set channels LO-thru-HI of B1 to YA-thru-YB	y
SET2	LOHIYAYB	Set channels LO-thru-HI of B2 to YA-thru-YB	y
ADD1	ICNYV	Add YV to channel ICN of B1	y
ADD2	ICNYV	Add YV to channel ICN of B2	y
ADD1	LOHIYV	Add YV to channels LO-thru-HI of B1	y
ADD2	LOHIYV	Add YV to channels LO-thru-HI of B2	y
ADD1	LOHIYAYB	Add YA-thru-YB to channels LO-thru-HI of B1	y
ADD2	LOHIYAYB	Add YA-thru-YB to channels LO-thru-HI of B2	y

SOME CMDS RELATED TO TESTING

GEN	IDKOKXNCH	Generate test spectrum in B1 (NCH channels)	y
COMP	NCH	Compare first NCH-channels of B1 & B2	y
SUM1	LOHI	Display sum of counts LO-thru-HI of B1	y
SUM2	LOHI	Display sum of counts LO-thru-HI of B2	y

1-D DISPLAY COMMANDS (NORMAL)

DLAD	DS	Set Display-delay to MS milliseconds (deft=500)	y
LIN/LOG		Set display to linear/log (default is linear)	y
ST/OV		Set to disp mult hist stacked/overlayed (dflt = OV)	y
CAL	ABC	Define energy calibration $E=A+B*Chan+C*Chan**2$	y
COL	IJK...	Defines color sequence for display	y
KRUD	NC	KRUNch Display(draw 1 histogram vector per NC chan)	y
GWID	WID	Define cursor-mode sum-region width (channels)	y
DNOR	LOHI	Normalize displayed data to count-sum of chans LOHI	y
DL	LOHI	Set display limits (minmax chan#)	y
DMM	LOHI	Set display limits (minmax counts)	y
D	IDLST	Display histogram ID's contained in IDI.ST	y
DX	IDLST	Display IDLST (range defined by expand-region)	y
SUML	LOHI	Define sum region for SUM command below	y
SUM	IDLST	Sum counts (LOHI) (IDLST same as D except C illegal)	y
C		Enter cursor-mode	y
SSI		Set screen to initial - erase all graphic windows	y

C1 - FOR 1-D DISPLAY COMMANDS (I-KEY CURSOR)

LF-ARROW		Set expand-region lo-limit	y
RT-ARROW		Set expand-region hi-limit	y
E		Expand display	y
V		Make marker display visible/invisible (toggles)	y
DN-ARROW		Pan DOWN - move picture so cursor-chan at right-screen	y
UP-ARROW		Pan UP - move picture so cursor-chan at left-screen	y
L		Set sum-region lo-limit	y
H		Set sum-region hi-limit	y
G		Set sum-region limits (LO=XCUR HI=XCUR+WID-1)	y
S		Display sum centroid & fwhm of sum region	y
A		Display sum centroid & fwhm of sum region	y
C		Draw peak-marker and display chan# at cursor pos	y
P		Draw peak-marker and display energy at cursor pos	y
/		Display/log XCUR YCUR channel# & energy	y
Q		Quit cursor-mode (return to normal-mode)	y
PLON		Turns peak logging (to damm.log) ON	y
PLOF		Turns peak logging (to damm.log) OFF (default)	y

damm.log may be read (skipping prog date & time) as follows:

```

READ(LU10)IFLGIDCHENER(FILNAM(I)I=116)
10 (29XA4I102F10.02X16A4)

```

Where: IFLG = 'MARK' for marked peak log entry

ID = Spectrum ID number

CH = Peak location in channels

ENER = Peak "energy" from calibration constants

FILNAM = First 64 characters of spk- or his-filename

2-D DISPLAY COMMANDS (NORMAL)

CMAP		Set color map to default ("takes" after next FIG)	y
CMAP	FILNAM	Set color map from FILNAM ("takes" after next FIG)	y
ZLEV	N	Set # of color/grey-scale intensity levels to N	y
ZLEV		Set # of color/grey-scale intensity levels to 10 (dflt)	y
GRAS	IJK..	Set grey-scale values (range 0-100) & ZLEV (# entries)	y
ZINT	COLR	Set 2-D intensity mapping to Color (default)	y
ZINT	GREY	Set 2-D intensity mapping to Grey-scale	y
ZINT	DOTS	Set 2-D intensity mapping to Dot-matrix (3x3 or 5x5)	y
ZSON		Z-scale ON - displays counts vs colors legend (default)	y
ZSOF		Z-scale OFF	y
ZLOG		Set 2-D display to log (default)	y
XC	LOHI	Set min & max X-channel numbers for display	y
YC	LOHI	Set min & max Y-channel numbers for display	y
ZMM	LOHI	Set min & max counts/channel for display & count-sum	y
ZMM	LO	Sets min & searches for max (semi-autoscale)	y
ZMM		Searches for min & max (full-autoscale)	y
DD	ID	Display 2-D histogram ID from IN-file	y
DD	KFID	Display 2-D histogram ID from KF-file	y
DDX	ID	Display 2-D histogram ID from IN-file (expand region)	y
DDX	KFID	Display 2-D histogram ID from KF-file (expand region)	y
DDID		Shows ID-number & Filename for current 2-D display	y
ZBL		Zero in-core BAN-library	y
LBL		List in-core BAN-ID numbers	y
C		Enter cursor-mode	y
SSI		et screen to initial - erase all graphic windows	y

FOR 2-D DISPLAY COMMANDS (I-KEY CURSOR)

LF-ARROW		Set expand-region lo-left- limit	y
RT-ARROW		Set expand-region hi-right-limit	y
V		Make expand markers visible/invisible (toggles)	y
1		Move display such that cursor is at lo-left	y
2		Move display such that cursor is at hi-left	y
3		Move display such that cursor is at hi-right	y
4		Move display such that cursor is at lo-right	y
Z		Zero (open) active XY-list	y
A		Add point to active XY-list	y
D		Dele nearest point in active XY-list	y
M		Move nearest point in active XY-list to cursor pos	y
I		Insert a point in active XY-list at cursor position	y
L		List active XY-list (on VDT)	y
B		Draw active BAN & BAN's in in-core library	y
G		Prompt for ID & read into in-core BAN-library	y
O		Open nearest in-core BAN for modification	y
S		Prompt for ID & store in in-core library & on disk	y
R		Store nearest BAN with original ID	y
F		Remove nearest BAN from in-core library & erase	y
K		Delete nearest BAN from in-core library and disk	y
T		Totalize counts in nearest BAN (active or not)	y
P		Totalize and & save X- & Y-projections on PLOP.SPK	y
/		Display XY-coordinates of cursor	y
E		Expand	y
Q		Quit cursor-mode (return to normal-mode)	y
PLON		Turns position logging (to damm.log) ON	y
PLOF		Turns position logging (to damm.log) OFF (default)	y

damm.log may be read (skipping prog date & time) as follows:

```

READ(LU10)IFLGIDXCYC(FILNAM(I)I=116)
10 (29XA4I102F10.02X16A4)

```

Where: IFLG = 'MAR2' for marked position log entry

ID = Histogram ID number

XC = X-position in channels

YC = Y-position in channels

FILNAM = First 64 characters of spk- or his-filename

COMMANDS RELATED TO PEAK-FINDING DISPLAY LOGGING

FIND		Turn peak-find & display ON (BIAS=5.0 FWHM=5)	y
FIND	BIASFWHM	Turn peak-find & display ON	y
NOFI		Turn peak-find & display OFF (default is OFF)	y
PLON		Turns peak logging (to damm.log) ON	y
PLOF		Turns peak logging (to damm.log) OFF (default)	y
FPB		FOR MANUAL ENTRY OF PEAK BACKGROUND & SKIP-REGIONS	y
PZOT		Zero the Peak Library	y
PK	XWASLOASHI	List of complete peak specifications	y
BZOT		Delete Fixed Background array	y
BACK	X1Y1 X2Y2 ..	XY-points for fixed background	y
SKIP		Without List turns SKIP OFF	y
SKIP	11I2 J1J2 ..	Up to 4 regions to omit from Fit	y

DEFINITION OF FWHM ASYM WLIM ALIM NBC ECAL

FW	FWAFWBFWC	Coefficients for standard width function	y
ASYM	ASLOASHI	Standard Lo-Side and Hi-Side asymmetries	y
WLIM	FWLOFWHI	Variation limit factors for peak widths	y
ALIM	FALOFAHI	Variation limit factors for peak asymmetries	y
NBC	NBC	Number of power series terms in variable BGD	y
WOOD	ON/OFF	Says turn Woods-Saxon background term ON/OFF	y
ECAL	ECOECAECB	Coefficients for standard energy calibration	y

RELATIVE INTENSITY FIXING COMMANDS

RELI	XR	Specifies that the relative intensity of the library peak nearest to channel X is to be R.	y
RELI	ZOT	Says delete all relative intensity entries	y
RELI	OFF	Says turn OFF (disable) relative intensity control	y
RELI	ON	Says turn ON (enable) relative intensity control	y

VARIATION CONTROL COMMANDS

DPX	XSTEPDXMAX	Initial step size and limit for peak pos	y
DEL	DELDELFACTDEL	Initial step size step size multiplier and	y
VB		Use Variable Background (the default)	y
FB		Use Fixed Background if available	y
VX	KVAR	Kind of variation for peak positions	y
VW	KVAR	Kind of variation for peak widths	y
VALO	KVAR	Kind of variation for Lo-Side asymmetries	y
VAHI	KVAR	Kind of variation for Hi-Side asymmetries	y

KVAR = UIND - says vary Unconditionally Independently
 = CIND - says vary Conditionally Independently
 = ULOC - says vary Unconditionally Locked
 = CLOC - says vary Conditionally Locked
 = FIX - says keep Fixed - this the default assignment

GENERAL FIT DISPLAY CONTROL COMMANDS

WIN	NW	Set subsequent displays to be in window-NW	y
LIN/LOG		Set graphic display to LIN (default) or LOG	y
DMM	MINMAX	Set display limits (minmax counts) MIN or MAX = X says use min or max data value	y
DL	ILOIHI	Set display-range (channel# limits)	y
DS	ID	Display spectrum# ID (range defined by DL)	y
DS	IDILOIHI	Display spectrum# ID (DL values replaced) (MAX value of IHI-ILO = 8191)	y
DSX	ID	Display Data defined by Expand Region	y
C		Enter I-key cursor-mode	y
DF		FOR COMMANDS RELATED TO DISPLAY OF FITS	y
WIN	NW	Set subsequent displays to be in window-NW	y
MON/MOF		Turn peak-markers ON/OFF for DF (dflt=ON)	y
DFI		Set to display (DF) DATAFITBGD (default)	y
DPK		Set to display (DF) DATAFITPEAKSBGD	y
DPPB		Set to display (DF) DATAFIT(PEAKS+BGD)BGD	y
DF		Display Fit (channel-limits given by Fit-range)	y
DF	ILOIHI	Display Fit (channel-limits given by ILOIHI)	y
DC	NPK	Display Calculated peak # NPK+ RESIDUAL	y

FIT CONTROL COMMANDS

FIT	IDILOIHI	Fit Request - (non-linear gradient search)	y
GFIT	IDILOIHI	Fit request - (gaussian method)	y
RFIT	IDILOIHI	Resume FIT/GFIT start with Parms from last Fit	y
LFIT	IDILOIHI	Linear Fit - no non-linear search (Fit-range specified by ILOIHI)	y
FIT	ID X	Fit Range specified by cursors (Fit Region)	y
GFIT	ID X	Fit Range specified by cursors (Fit Region)	y
RFIT	ID X	Fit Range specified by cursors (Fit Region)	y
LFIT	ID X	Fit Range specified by cursors (Fit Region)	y
Ctrl/C		Terminates Fit-in-progress	y

COMMANDS WHICH DISPLAY PEAKS BGD-POINTS & FIT-PARMS

PRP	XLOXHI	Display peaks from Library in range XLO thru XHI	y
PRP		Display all peaks from Library	y
PRB		Display all fixed background points	y
FSTAT		Display current fit-parameters	y

COMMANDS RELATED TO LIST PRINT OR HARD-COPY

KPPL	NONE	Do no printer plots (default)	y
	FITS	Plot FITS only	y
	ALL	Plot FITS COMPONENTS and RESIDUALS	y
PR		Print and Plot results of last Fit on printer	y
DR		List results of last Fit on VDT (terminal)	y

COMMANDS WHICH SAVE FIT PAREMETERS IN LIBRARY

SAV	IJ	Save all Parms from peaks I thru J of last Fit in PK-LIB	y
SAX	IJ	Save X-Parms for peaks I thru J of last Fit	y
SAW	IJ	Save W-Parms for peaks I thru J of last Fit	y
SAL	IJ	Save ASL-Parms for peaks I thru J of last Fit	y
SAH	IJ	Save ASH-Parms for peaks I thru J of last Fit	y

(If IJ omitted indicated Parms from ALL peaks are saved)

COMMANDS WHICH SET FIT PARAMETERS

SET-	X1X2	Set STD WIDTH and ASYM for peaks in range X1-X2 values (defined by FWA FWB FWC ASLO ASHI)	y
SETW	X1X2	Set WIDTH for peaks in range X1-X2 to STD value	y
SETW	X1X2WAWBWC	Set WIDTH for peaks in range X1-X2 to value defined by WAWBWC (FWAFWBFWC unchanged)	y
SETL	X1X2	Set ASLO for peaks in range X1-X2 to STD value	y
SETL	X1X2ASLOT	Set ASLO=ASLOT for peaks in range X1-X2	y
SETH	X1X2	Set ASHI for peaks in range X1-X2 to STD value	y
SETH	X1X2ASHIT	Set ASHI=ASHIT for peaks in range X1-X2	y

(If X1X2.. omitted indicated Parms for ALL peaks are set)

LIST OF DEFAULT PARAMETER VALUES

DEL = 0.05 FWLO = 0.5 VX = CIND NBC = 2
 DELFAC=0.25 FWHI = 2.0 VW = CLOC WOOD = OFF
 NDEL = 1 FALO = 0.5 VALO = FIX KPPL = NONE
 XSTEP = 0.5 FAHI = 2.0 VAHI = FIX
 DXMAX = 5.0 ASLO = 0.0
 ASHI = 0.0

FOR 1-KEY (OR 2-KEY) CURSOR RELATED COMMANDS

Type C to enter cursor-mode

P/UP		Add/Delete peak to Library (pos specified by cursor)	y
M		Move nearest displayed peak to cursor pos (FW ASYM unchanged)	y
X/UX		Fix/Free peak position (for displayed peak nearest to cursor)	y
W/UW		Fix/Free peak width (for displayed peak nearest to cursor)	y
L/LUL		Fix/Free Lo-Side ASYM (for displayed peak nearest to cursor)	y
H/UH		Fix/Free Hi-Side ASYM (for displayed peak nearest to cursor)	y
O/UO		Turn peak ON/OFF (for displayed peak nearest to cursor)	y
B/UB		Add/Delete background point at cursor position	y
LF-ARO		Set Expand Region Lo-Limit	y
RT-ARO		Set Expand Region Hi-Limit	y
		Set Fit Region Lo-Limit	y
		Set Fit Region Hi-Limit	y
/		Display chan# cursor Y-value chan contents	y
S		Disp sum cent & fwhm of Fit-Reg - DAT()DAT() defines BGD	y
A		Disp sum cent & fwhm of Fit-Reg - CUR()CUR() defines BGD	y
Q		Return from cursor control routine	y
E		Expand display (region defined by <- ->)	y

HISTOGRAM XFER COMMANDS

HOU	FILNAM	Open FILNAM for histogram Output	y
GSX	XI1XI2 XF1XF2	Define X-gain-shift	y
GSY	YI1YI2 YF1YF2	Define Y-gain-shift	y
GSXOF/GSYOF		Turn OFF X/Y-gain-shift	y
SNEG OFF		Turn OFF reset of neg 16bit out data (default)	y
SNEG IV		Says set negative 16-bit output data to IV (you MUST use SIDA mode for this to work!!)	y
HSTA		Shows files open & gain-shift data	y
HCOP	IDIIDO <FI>	Copy F*IDI (Input) to IDO (Output)	y
HADD	IDIIDO <FI><FO>	Add FI*IDI to FO*IDO	y
HDIV	IDIIDO <FI>	Div FI*IDI by IDO & save in IDO	y
SHIF	IDIIDO	Gain-shift IDI & store in IDO	y
SHAD	IDIIDO <FI><FO>	Gain-shift IDI & add to IDO	y
HSET	IDOIV	Set IDO on Output file to IV	y
HZOT	IDO	Set IDO on Output file to 0	y

SPK-SUMS HIS-SUMS AND DIRECTORY COMMANDS

DDIR	KF	Display directory of KF-file Where KF = NOPQRS (default is N) and denotes IN-FIL OU-FIL P-FIL Q-FIL R-FIL S-FIL	y
DSUM	KF	Displays count-sum of all histograms in KF-file Where KF has same meaning as above	y

MOUSE BUTTON DEFINITIONS (when in 1-KEY cursor mode)

BUD	LMR	Defines LeftMiddleRight buttons for cursor in D-window	y
BUDD	LMR	Defines LeftMiddleRight buttons for cursor in DD-window	y
BUDS	LMR	defines LeftMiddleRight buttons for cursor in DS-window	y
BUD	LHS	Example (cursor in 1-D) L-butt sets sum-reg lo-limit M-butt sets sum-reg hi-limit R-butt requests S-sum	y
BUDD	ATZ	Example (cursor in 2-D) L-butt adds banana points M-butt totalizes enclosed counts R-butt zots banana	y
XY		FOR XY-LINE DISPLAY COMMANDS	y
XYF	filename	Opens XY-file and reads in all data	y
XYI		Displays XY IDs which have been read in	y
XYD	I J K L ..	Displays XY data for IDs (I J K L ..) into active window (default = window 1 or set by WIN command)	y
XYP	I J K L ..	Same as XYD except that XY-points are shown in addition to the connecting vectors XYD or XYP with no ID-list uses previous ID-list	y
XYC	KOL	Specifies the "color" for subsequent XY displays Legal values of KOL are: WHIT - compliment white - CMAP entry 34 RED - compliment red - CMAP entry 35 GREE - compliment green - CMAP entry 36 BLUE - compliment blue - CMAP entry 37 RG - compliment red-green - CMAP entry 38 RB - compliment red-blue - CMAP entry 39 GB - compliment green-blue - CMAP entry 40	y

Note: Displays are done in "compliment mode" so that displaying the samey ID a second time will erase it displaying a third time will show it etc.

LABELING COMMANDS

LA7	text	Adds line of "text" to LA7 label	y
LA8	text	Adds line of "text" to LA8 label	y
LA9	text	Adds line of "text" to LA9 label	y
LAZ7		Deletes all lines of LA7 label	y
LAZ8		Deletes all lines of LA8 label	y
LAZ9		Deleted all lines of LA9 label	y
LAL		Displays current labels - LA7 LA8 LA9	y
LAC	KOL	Specifies label color for subsequent displays Legal values of KOL are: WHIT - compliment white - CMAP entry 34 RED - compliment red - CMAP entry 35 GREE - compliment green - CMAP entry 36 BLUE - compliment blue - CMAP entry 37 RG - compliment red-green - CMAP entry 38 RB - compliment red-blue - CMAP entry 39 GB - compliment green-blue - CMAP entry 40	

Label Display Commands (l-key cursor-mode)

KEY	ACTION		
7		Displays LA7 at cursor location (compliment mode)	y
8		Displays LA8 at cursor location (compliment mode)	y
9		Displays LA9 at cursor location (compliment mode)	y
0		Locks previously displayed labels against subsequent change	y

(i.e. all labels displayed in a given window will be fixed),
(enables the drawing of additional labels).

Label Pointer Commands (l---key cursor-mode)

KEY	ACTION		
=		Adds a vector point to current list and draws point or line	y
-		Deletes last vector point in current list and erases line	y
;		Locks current vector list against subsequent change and	y
.		enables new list	y

y: The command is working.

The tables were generated according to 1993 release of Damm.

2. LEMO Module Tests

CODE CONTENTS

ASN		File and Tape opening & closing commands
TAPE		Tape control commands
COPY		Copy and Modify-Copy commands
CMD		Command-file operations
EVNT		Event-file Exam & Copy Commands
MISC		Miscellaneous & non-standard tape processing commands
DISP		commands which display Data-records

COMMANDS FOR OPENING & CLOSING FILES & TAPES .

IN	rstx	Specifies Tape (rst0 rst etc.) for INPUT	Y
OUX	rsty	Specifies Tape (rst0 rst etc.) for OUTPUT-X (X=1 3)	?
CLI		Close INPUT	?
CLOX		Close OUTPUT-X (X=1 3)	Y
ULI		Unload and close INPUT	Y
ULOX		Unload and close OUTPUT-X (X=1 3)	?
MILF	FILE.MIL	Read & process FILE.MIL (required for Modify-Copy)	?
CMDF	FILE.CMD	Assign FILE.CMD as CMD-file (not read yet)	Y
END		Terminates Program	Y

TAPE CONTROL COMMANDS ..

RDI	N	Read N records from INPUT	Y
RDOX	N	Read N records from OUTPUT-X (X=1 3)	?
FRI		Forward N records on INPUT	Y
FROX	N	Forward N records on OUTPUT-X (X=1 3)	?
BRI	N	Backup N records on INPUT	Y
BROX	N	Backup N records on OUTPUT-X (X=1 3)	?
FFI	N	Forward N files on INPUT	Y
FFOX	N	Forward N files on OUTPUT-X (X=1 3)	?
BFI	N	Backup N files on INPUT	Y
BFOX	N	Backup N files on OUTPUT-X (X=1 3)	?
RWI		Rewind INPUT	Y
RWOX		Rewind OUTPUT-X (X=1 3)	?
BTI		Go to bottom of INPUT (to DBL-EOF backup 1 EOF)	Y
BTOX		Go to bottom of OUTPUT (to DBL-EOF backup 1 EOF)	?
CLI		Close INPUT	Y
CLOX		Close OUTPUT-X (X=1 3)	?
ULI		Unload and close INPUT	Y
ULOX		Uuload and close OUTPUT-X (X=1 3)	?
FIND	N	Find HEADER-# N (does 1 BACKSPACE if found)	Y
DTIT		Displays next TITLE & HEADER-# & backspaces	Y

COMMANDS FOR COPY & MODIFY-COPY .

COPY	N	Copy N files from INPUT to OUTPUT-1	?
CREC	N	Copy N records from INPUT to OUTPUT-1	?
CC		Continue COPY - saves file- or record-count	?
EOFX		Write EOF on OUTPUT-X (not normally needed)	?
MILF	FIL	Read FIL.MIL file (required for MOC)	?
UCOM	TEXT	Send TEXT to "USERCMP"	Y
INIT		Resets Modify-Copy Input & Output buffers	Y
RECO	LBYT	Output-RECL (BYTES) (DFLT=8192)(MOC mode only)	?
ZBUC		Zero total Input & Output buffer counters	Y
MOC	N M	Modify-Copy (N-files/M-records - 1st to occur)	?
MOCO	N M	Modify-Copy-Continue (waits for tape)	?
MOCE	N M	Modify-Copy (END on request complete)	?
Ctrl/C		To interrupt READ or COPY process	Y
END		Terminates Program	Y

COMMANDS RELATED TO COMMAND-FILES .

CMD	FILE	- Assign FILE.CMD as CMD-file (not read yet)	Y
CCMD		- Continue reading CMDS from CMD-file	Y
CLCM		- Continue with last CMD from file (backspaces)	Y
CCON		- Continue reading CMDS from CON:	Y
MSG	TEXT	- Display TEXT (44 bytes) on CON:	Y
END		- Terminates program	Y

COMMANDS FOR EXAMINATION AND COPY-TO-TAPE OF EVENT-LIST FILES.

INFI	filename	- Specify input file for exam (RDI) & copy-to-tape	Y
HTIT	TITLE	- TITLE contains title for next tape header	Y
HNUM	HN	- HN specifies next tape header number to use	Y
HOUT		- Outputs tape header and increments HN	Y

MISCELLANEOUS & NON-STANDARD TAPE RELATED COMMANDS .

L001	SKIP NPPE	Specify non-standard Input Tape (see HANDBOOK)	?
L002		Specify HHIRF standard input tape (default)	?
SWAB		Says byte-swap input records (see document)	?
SWOF		Says byte-swap off (default)	Y
SHON		Says byte-swap headers once more than data	Y
SHOF		Says byte-swap headers & data the same way	Y
RBON		Turn calls to REBUF ON	Y
RBOF		Turn calls to REBUF OFF (default)	Y
UPOF		Turn User-processing OFF (default)	Y
UPON		Turn User-processing ON (NPRAW=0 RECL=8192 bytes)	Y
UPON	NPARU	Turn User-processing ON (RECL=8192 bytes)	Y
UPON	NPRAW RECL	Turn User-processing ON	Y
RECO	NBYTES	Specify output record length (dflt=8192 bytes)	Y
FCOP	FILNAM.EXT	Copy FILNAM.EXT to OUTPUT-1 (80 byte ASCII)	?
TCOP	FILNAM.EXT	Copy INPUT-TAPE to FILNAM.EXT (80 byte ASCII)	?
STEX	FILNAM.EXT	Store TEXT-BLKS on FILNAM.EXT	?
END		Terminates Program	Y

COMMANDS FOR READING & DISPLAY OF DATA-RECORDS

RDI	N	Read N records from INPUT	Y
RDOX	N	Read N records from OUTPUT-X (X=1 3)	?
PEV	IA IB	Print 16-bit word IA thru IB in EVENT format	?
DEV	IA IB	Display 16-bit word IA thru IB in EVENT format	?
PZ	IA IB	Print 16-bit word IA thru IB in HEX format	Y
DZ	IA IB	Display 16-bit word IA thru IB in HEX format	Y
PA	IA IB	Print 16-bit word IA thru IB in ASCII format	Y
DA	IA IB	Display 16-bit word IA thru IB in ASCII format	Y
PI	IA IB	Print 16-bit word IA thru IB in INT*2 format	Y
DI	IA IB	Display 16-bit word IA thru IB in INT*2 format	Y
PIF	IA IB	Print 32-bit word IA thru IB in INT*4 format	Y
DIF	IA IB	Display 32-bit word IA thru IB in INT*4 format	Y

Y: Command is working

? : Command is not working or can not be checked because we have only one tape drive.

Appendix 3. MSU FTP Site Manual

FTP SITE_MANUAL

Last Edited Sat Jan 29 10:56:27 CST 1994

SITE_MANUAL is a user manual of sorts for Mississippi State University Department of Physics and Astronomy Nuclear Group's anonymous ftp site. Feedback can be directed to cj@ph.msstate.edu, pgv1@ph.msstate.edu, or rbp@ph.msstate.edu.

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GAINING ACCESS.
RETRIEVING FILES.
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DIRECTORY HIERARCHY.

*

GAINING ACCESS

This section describes how to access this ftp site. Note that the information that is written to the screen may vary according to the version of the ftp software running on your computer.

```
your prompt> ftp nucphy.ph.msstate.edu
Connected to nucphy.ph.msstate.edu.
220 nucphy FTP server (SunOS 4.1) ready.
Name (nucphy.ph.msstate.edu:pgv1): anonymous
331 Guest login ok, send ident as password.
```

Password:anonymous

230 Guest login ok, access restrictions apply.

ftp> ls

200 PORT command successful.

150 ASCII data connection for /bin/ls (130.18.152.62,1060) (0 bytes).

Incoming

SITE_MANUAL

bin

dev

etc

pub

usr

226 ASCII Transfer complete.

35 bytes received in 0.091 seconds (0.38 Kbytes/s)

ftp>

*

RETRIEVING FILES

This section describes how to retrieve files from this site. After gaining

access to this site (See above) decide what files are of interest to you

(For more information see section DIRECTORY HIERARCHY) then change into the pub directory.

ftp> cd pub

250 CWD command successful.

ftp> ls

200 PORT command successful.

150 ASCII data connection for /bin/ls (130.18.152.62,1284) (0 bytes).

LISTINGS

distributions

mirror

226 ASCII Transfer complete.

33 bytes received in 0.063 seconds (0.51 Kbytes/s)

ftp>

Now change into the appropriate subdirector(ies/y) and retrieve the appropriate files with use of the get or mget commands. For on-line help type "help get" or "help mget" while in the ftp program. The "" are not necessary.

ftp> cd distributions

250 CWD command successful.

ftp> cd subdirectory/subdirectory

250 CWD command successful.

ftp>ls

README

file1

file2

file3

226 ASCII Transfer complete.

47 bytes received in 0.067 seconds (0.68 Kbytes/s)

ftp> get README

200 PORT command successful.

150 ASCII data connection for README (130.18.152.62,1287) (2171 bytes).

226 ASCII Transfer complete.

local: README remote: README

2225 bytes received in 0.048 seconds (46 Kbytes/s)

ftp> quit

221 Goodbye.

your prompt>

*

DOWNLOADING FILES

This section describes how to upload software onto this anonymous ftp site. After gaining access to this site (See section GAINING ACCESS) change into the Incoming directory. Only authorized users may upload files to this ftp site. If you would like to get authorization to upload software that is consistent with the field of Nuclear Physics please e-mail cj@ph.msstate.edu or pgv1@ph.msstate.edu.

```
ftp> cd Incoming
250 CWD command successful.
ftp> ls
200 PORT command successful.
150 ASCII data connection for /bin/ls (130.18.152.62,1061) (0 bytes).
Radware
SUNPAK
USORT
misc
226 ASCII Transfer complete.
30 bytes received in 0.1 seconds (0.29 Kbytes/s)
ftp>
```

Then change into the appropriate subdirectory and use the put or mput commands to upload the desired files. For on-line help type "help put" or "help mput" while in the ftp program. The "" are not necessary. The subdirectory should be one of the following, Radware, SUNPAK, USORT, or misc.

```
ftp> cd subdirectory
250 CWD command successful.
ftp> put your_files
200 PORT command successful.
150 ASCII data connection for this_file (130.18.152.62,1064).
226 ASCII Transfer complete.
ftp>
```

For security reasons users will not be allowed to read the Incoming

subdirectories. However, this does not mean that your files were not uploaded. If the suspense of whether or not all was succesful e-mail either cj@ph.msstate.edu or pgv1@ph.msstate.edu and we will acknowledge the upload.

```
ftp> pwd
257 "/Incoming/subdirectory" is current directory.
ftp> ls
200 PORT command successful.
150 ASCII data connection for /bin/ls (130.18.152.62,1063) (0 bytes).
. unreadable
226 ASCII Transfer complete.
14 bytes received in 0.073 seconds (0.19 Kbytes/s)
ftp> quit
221 Goodbye.
your prompt>
```

*

DIRECTORY HIERARCHY

This section describes the directory hierarchy and gives a description of the contents of each directory along with each file in the directory. `SITE_MANUAL` is this document which is a user manual for this site.

drwxr-xr-x 6 cj	512 Jan 26 10:16 Incoming/
-rw-r--r-- 1 pgv1	38066 Jan 27 15:59 SITE_MANUAL
drwxrwxr-x 2 cj	512 Jul 6 1993 bin/
drwxrwxr-x 2 cj	512 Jul 6 1993 dev/

drwxrwxr-x 2 cj 512 Jul 6 1993 etc/
drwxrwxr-x 4 cj 512 Jan 27 14:11 pub/
drwxrwxr-x 3 cj 512 Jul 6 1993 usr/

bin:

systems directory

dev:

systems directory

etc:

systems directory

usr:

systems directory

Incoming:

total 4

drwxrwx-wx 2 cj 512 Jan 26 09:32 Radware/
drwxrwx-wx 2 cj 512 Jan 26 10:57 SUNPAK/
drwxrwx-wx 2 cj 512 Jan 27 13:13 USORT/
drwxrwx-wx 2 cj 512 Jan 26 09:33 misc/

Incoming/Radware:

This directory is used exclusively for uploads pertaining to Radware.

Incoming/SUNPAK:

This directory is used exclusively for uploads pertaining to SUNPAK.

Incoming/USORT:

This directory is used exclusively for uploads pertaining to USORT.

Incoming/misc:

This directory is used for uploads not pertaining to any of the above.

This directory contains a file called LISTINGS which is a listing 'ls -lR' of all of the files on this site at this level and lower. All downloading should be done from this directory and below.

pub:

total 3

-rw-rw-r-- 1 cj	853 Jan 20 08:32 LISTINGS
drwxrwxr-x 7 cj	512 Jan 27 13:13 distributions/
drwxr-xr-x 3 root	512 Jan 27 13:17 mirror/

This directory contains subdirectories that contain software that is distributed by or through the Nuclear Group's ftp site.

pub/distributions:

total 6

drwxrwxr-x 2 cj	512 Sep 10 10:18 Radware/
drwxr-xr-x 2 cj	512 Sep 3 08:13 Sol_Dev_Con/
drwxr-xr-x 2 root	512 Jan 28 07:11 UHO.h/
drwxr-xr-x 3 root	512 Jan 27 13:13 USORT/
drwxr-xr-x 4 cj	512 Oct 7 07:35 development-tools/
drwxrwxr-x 2 cj	512 Jan 8 16:45 show/

This directory contains the latest version of David Radford and

Randy MacLeod's high-spin data analysis software for Unix.

pub/distributions/Radware:

total 11131

```
-rw-rw-r-- 1 cj      4973921 Aug 31 09:32 Escl8rDemoDec.tar.Z
-rw-rw-r-- 1 cj      3805335 Aug 31 09:15 Escl8rDemoSun.tar.Z
-rw-rw-r-- 1 cj          2479 Sep 10 10:18 README
-rw-rw-r-- 1 cj      1716545 Aug 31 09:03 RadwareAug93.tar.Z
-rw-rw-r-- 1 cj       412623 Aug 31 10:23 iccDEC.tar.Z
-rw-rw-r-- 1 cj       425314 Aug 31 10:38 iccSUN.tar.Z
```

This directory contains slides and CD materials from the technical workshops at the March 1993 Solaris Developer Conference.

pub/distributions/Sol_Dev_Con:

total 1457

```
-rw-r--r-- 1 cj          279 Sep  3 08:11 README
-rw-r--r-- 1 cj      121035 Sep  3 07:54 ddi.tar.Z
-rw-r--r-- 1 cj      897329 Sep  3 07:57 mt.tar.Z
-rw-r--r-- 1 cj      436763 Sep  3 07:54 xglpex.tar.Z
```

This directory contains the Universal Histogram Object (UHO) header file.

pub/distributions/UHO.h:

total 19

```
-rw-r--r-- 1 root      19169 Jan 28 07:11 uho.h
```

This directory contains USORT software and related material.
USORT is a UNIX based modular program for the sorting of
gamma-ray spectroscopic data.

pub/distributions/USORT:

total 1

drwxr-xr-x 2 ftp 512 Jan 27 13:13 usort1.1B_distribution_notes/

This directory contains USORT distribution notes.

pub/distributions/USORT/usort1.1B_distribution_notes:

total 58

-rw-r--r-- 1 ftp 3255 Jan 26 19:50 ABOUT_USORT
-rw-r--r-- 1 ftp 592 Jan 26 19:50 ACQUIRING_USORT
-rw-r--r-- 1 ftp 9157 Jan 26 19:50 USORT_COMMANDS
-rw-r--r-- 1 ftp 2768 Jan 26 19:50 USORT_DISCLAIMER
-rw-r--r-- 1 ftp 5678 Jan 26 19:50 USORT_HISTORY
-rw-r--r-- 1 ftp 10251 Jan 26 19:50 USORT_INSTALLATION
-rw-r--r-- 1 ftp 23865 Jan 26 19:50 USORT_OVERVIEW

This directory contains ToolTalk programs and utilities for
programming with Sun's ToolTalk.

pub/distributions/development-tools:

total 446

drwxr-xr-x 2 cj 512 Oct 7 07:31 .cap/
-rw-r--r-- 1 cj 265 Oct 7 07:31 INDEX
-rw-r--r-- 1 cj 129 Oct 7 07:31 README
drwxr-xr-x 3 cj 512 Oct 7 07:32 ToolTalk/

```
-rw-r--r-- 1 cj      924 Oct  7 07:31 appmap.iafa
-rw-r--r-- 1 cj    81920 Oct  7 07:31 appmap.tar
-rw-r--r-- 1 cj     1014 Oct  7 07:31 solaris2_sample_drivers_june93.iafa
-rw-r--r-- 1 cj   358201 Oct  7 07:31 solaris2_sample_drivers_june93.tar.Z
```

This directory contains ToolTalk programs and utilities for
programming with Sun's ToolTalk.

pub/distributions/development-tools/.cap:

total 3

```
-rw-r--r-- 1 cj      75 Oct  7 07:31 ToolTalk
-rw-r--r-- 1 cj     81 Oct  7 07:31 appmap.tar
-rw-r--r-- 1 cj     96 Oct  7 07:31 solaris2_sample_drivers_june93.tar.Z
```

This directory contains ToolTalk programs and utilities for
programming with Sun's ToolTalk.

pub/distributions/development-tools/ToolTalk:

total 194

```
drwxr-xr-x 2 cj      512 Oct  7 07:32 .cap/
-rw-r--r-- 1 cj     244 Oct  7 07:31 INDEX
-rw-r--r-- 1 cj     134 Oct  7 07:31 README
-rw-r--r-- 1 cj     750 Oct  7 07:32 TT-c++.iafa
-rw-r--r-- 1 cj   99107 Oct  7 07:32 TT-c++.tar.Z
-rw-r--r-- 1 cj     659 Oct  7 07:32 ttsnoop.iafa
-rw-r--r-- 1 cj   78131 Oct  7 07:32 ttsnoop.tar.Z
```

pub/distributions/development-tools/ToolTalk/.cap:
total 0

This directory contains source code for the UHO file format. The object of show is to demonstrate the use of a universal histogram data storage format. Show executes a series of functions that manipulate the histogram record in memory. The idea in separating all the record handling functions was to give other programmers the option of using our record handling routines without necessarily using our program. All of the universal histogram handling routines are contained in the directory src/uho of the release.

pub/distributions/show:
total 389

-rw-r--r--	1 cj	686 Jan 8 16:45 NEW.Jan-8
-rw-r--r--	1 cj	2171 Jan 8 16:45 README
-rw-r--r--	1 cj	28 Jan 8 16:45 RELEASE.00.3.0
-rw-r--r--	1 cj	377517 Jan 8 16:45 show.tar.Z

This directory contains mirrored software from other anonymous ftp sites.

pub/mirror:
total 1

drwxr-xr-x	5 cj	512 Jan 27 13:17 Linux/
------------	------	-------------------------

This directory contains Linux software and documentation which is a UNIX-like operating the runs on a PC. Slackware is mirrored from sunsite.unc.edu and contains the full operating system, gnu compilers and Xfree 86 release.

pub/mirror/Linux:

total 4

drwxr-xr-x 3 cj	512 Nov 9 15:38 linux.docs/
drwxr-xr-x 2 cj	512 Nov 9 18:15 misc/
drwxr-xr-x 45 cj	1536 Nov 9 16:38 slackware/

This directory contains linux documentations.

pub/mirror/Linux/linux.docs:

total 307

-rw-r--r-- 1 cj	11253 Aug 22 17:28 LILO-FAQ
-rw-r--r-- 1 cj	43324 Aug 22 18:41 NET-2-FAQ
-rw-r--r-- 1 cj	38237 Jul 21 1993 faq_11.p1
-rw-r--r-- 1 cj	56179 Jul 21 1993 faq_11.p2
-rw-r--r-- 1 cj	33478 Jul 21 1993 faq_11.p3
-rw-r--r-- 1 cj	29999 Jul 21 1993 faq_11.p4
-rw-r--r-- 1 cj	42286 Jul 21 1993 faq_11.p5
-rw-r--r-- 1 cj	48264 Jul 21 1993 faq_11.p6
-rw-r--r-- 1 cj	5230 Jul 21 1993 faq_11.toc
drwxr-xr-x 2 cj	512 Jun 21 1993 ps/

This directory contains linux documentations in the postscript format.

pub/mirror/Linux/linux.docs/ps:

total 1472

```
-rw-r--r-- 1 cj      739505 Jun 21 1993 faq_1.ps
-rw-r--r-- 1 cj      742550 Jun 21 1993 faq_2.ps
```

This directory contains miscellaneous linux files.

pub/mirror/Linux/misc:

total 2154

```
-rw-r--r-- 1 cj      120822 Nov  9 18:15 distribution-HOWTO
-rw-r--r-- 1 cj      315933 Nov  9 16:46 dungeon-src.tar.Z
-rw-r--r-- 1 cj      277478 Nov  9 16:46 gnuchess-src.tar.Z
-rw-r--r-- 1 cj      1337669 Nov  9 16:47 linux-0.99.13.tar.Z
-rw-r--r-- 1 cj       13052 Oct  7 10:31 rawrite.exe
-rw-r--r-- 1 cj       2835 Nov  9 16:36 snd-driv-2.0.README
-rw-r--r-- 1 cj       91484 Nov  9 16:37 snd-util-2.0.tar.gz
```

The slackware package contains the linux kernel and utilities,
gnu compilers and utilities, the Xfree86 windows package and
an automated installation process.

pub/mirror/Linux/slackware:

total 8690

```
-rw-r--r-- 1 cj       1768 Nov  9 13:47 .desc.txt
-rw-r--r-- 1 cj       9655 Nov  9 13:47 00index.txt
-rw-r--r-- 1 cj       4475 Nov  9 13:47 ANNOUNCE.1.0.2
-rw-r--r-- 1 cj        27 Nov  9 13:47 ANNOUNCE.1.0.4
-rw-r--r-- 1 cj        27 Nov  9 13:47 ANNOUNCE.1.0.5
-rw-r--r-- 1 cj       4741 Nov  9 13:47 ANNOUNCE.1.1.0
-rw-r--r-- 1 cj      19329 Nov  9 13:47 FILE_LIST
-rw-r--r-- 1 cj       6126 Nov  9 13:47 OldChangeLog
```

-rw-r--r-- 1 cj	13052 Nov 9 13:47 RAWRITE.EXE
-rw-r--r-- 1 cj	1771 Nov 9 13:47 README_5_25_install
-rw-r--r-- 1 cj	17915 Nov 9 13:48 README_ChangeLog
-rw-r--r-- 1 cj	4967 Nov 9 13:48 README_INSTALL
-rw-r--r-- 1 cj	9029 Nov 9 13:48 README_KERNEL_SPECS
-rw-r--r-- 1 cj	1758 Nov 9 13:48 README_MIRROR_LIST
-rw-r--r-- 1 cj	4723 Nov 9 13:48 SLACKWARE_MINI_FAQ
drwxr-xr-x 2 cj	512 Nov 9 14:16 a1/
drwxr-xr-x 2 cj	512 Nov 9 14:17 a10/
drwxr-xr-x 2 cj	512 Nov 9 14:21 a11/
drwxr-xr-x 2 cj	512 Nov 9 14:25 a12/
drwxr-xr-x 2 cj	512 Nov 9 14:28 a13/
drwxr-xr-x 2 cj	512 Nov 9 14:33 a14/
drwxr-xr-x 2 cj	512 Nov 9 14:37 a2/
drwxr-xr-x 2 cj	512 Nov 9 14:41 a3/
drwxr-xr-x 2 cj	512 Nov 9 14:45 a4/
drwxr-xr-x 2 cj	512 Nov 9 14:51 a5/
drwxr-xr-x 2 cj	512 Nov 9 14:55 a6/
drwxr-xr-x 2 cj	512 Nov 9 14:58 a7/
drwxr-xr-x 2 cj	512 Nov 9 15:01 a8/
drwxr-xr-x 2 cj	512 Nov 9 15:06 a9/
-rw-r--r-- 1 cj	1474560 Nov 9 13:53 alpha
-rw-r--r-- 1 cj	770458 Nov 9 13:57 alpha.gz
-rw-r--r-- 1 cj	1228800 Nov 9 14:01 bloader
-rw-r--r-- 1 cj	599667 Nov 9 14:02 bloader.gz
-rw-r--r-- 1 cj	1474560 Nov 9 14:06 bootdisk
-rw-r--r-- 1 cj	750884 Nov 9 14:08 bootdisk.gz
drwxr-xr-x 2 cj	512 Nov 9 15:10 e1/
drwxr-xr-x 2 cj	512 Nov 9 15:10 e2/
drwxr-xr-x 2 cj	512 Nov 9 15:13 e3/
drwxr-xr-x 2 cj	512 Nov 9 15:18 e4/
drwxr-xr-x 2 cj	512 Nov 9 15:24 e5/
drwxr-xr-x 2 cj	512 Nov 9 15:28 f1/
drwxr-xr-x 2 cj	512 Nov 9 15:32 iv1/
drwxr-xr-x 2 cj	512 Nov 9 15:34 iv2/
drwxr-xr-x 2 cj	512 Nov 9 15:38 oi1/

drwxr-xr-x 2 cj	512 Nov 9 15:41 oi2/
drwxr-xr-x 2 cj	512 Nov 9 15:42 oi3/
drwxr-xr-x 2 cj	512 Nov 9 15:47 oop1/
drwxr-xr-x 2 cj	512 Nov 9 15:48 q1/
drwxr-xr-x 2 cj	512 Nov 9 15:49 q2/
-rw-r--r-- 1 cj	1474560 Nov 9 14:11 rescue
-rw-r--r-- 1 cj	890063 Nov 9 14:13 rescue.gz
drwxr-xr-x 2 cj	512 Nov 9 15:52 scripts/
drwxr-xr-x 2 cj	512 Nov 9 15:53 tcl1/
drwxr-xr-x 2 cj	512 Nov 9 15:58 x1/
drwxr-xr-x 2 cj	512 Nov 9 16:01 x2/
drwxr-xr-x 2 cj	512 Nov 9 16:04 x3/
drwxr-xr-x 2 cj	512 Nov 9 16:07 x4/
drwxr-xr-x 2 cj	512 Nov 9 16:10 x5/
drwxr-xr-x 2 cj	512 Nov 9 16:13 xap1/
drwxr-xr-x 2 cj	512 Nov 9 16:14 xap2/
drwxr-xr-x 2 cj	512 Nov 9 16:17 xd1/
drwxr-xr-x 2 cj	512 Nov 9 16:20 xd2/
drwxr-xr-x 2 cj	512 Nov 9 16:23 xd3/
drwxr-xr-x 2 cj	512 Nov 9 16:26 xv1/
drwxr-xr-x 2 cj	512 Nov 9 16:29 xv2/
drwxr-xr-x 2 cj	512 Nov 9 16:31 y1/

pub/mirror/Linux/slackware/a1:

total 1240

-rw-r--r-- 1 cj	312 Nov 9 14:13 .desc.txt
-rw-r--r-- 1 cj	312 Nov 9 14:13 00index.txt
-rw-r--r-- 1 cj	401086 Nov 9 14:14 base.tgz
-rw-r--r-- 1 cj	3293 Nov 9 14:14 devs.tgz
-rw-r--r-- 1 cj	1509 Nov 9 14:14 disk1
-rw-r--r-- 1 cj	23788 Nov 9 14:15 etc.tgz
-rw-r--r-- 1 cj	258981 Nov 9 14:15 idekern.tgz
-rw-r--r-- 1 cj	45199 Nov 9 14:15 lilo.tgz


```
-rw-r--r-- 1 cj      294043 Nov  9 14:15 scsikern.tgz
-rw-r--r-- 1 cj      166841 Nov  9 14:16 shadow.tgz
-rw-r--r-- 1 cj        8566 Nov  9 14:16 tagfile
-rw-r--r-- 1 cj        8566 Nov  9 14:16 tagfile.org
-rw-r--r-- 1 cj        8513 Nov  9 14:16 tagfile.pat
```

pub/mirror/Linux/slackware/a10:

total 1323

```
-rw-r--r-- 1 cj       104 Nov  9 14:16 .desc.txt
-rw-r--r-- 1 cj       104 Nov  9 14:16 00index.txt
-rw-r--r-- 1 cj       264 Nov  9 14:16 diska10
-rw-r--r-- 1 cj    533570 Nov  9 14:17 gcc245.tgz
-rw-r--r-- 1 cj    787416 Nov  9 14:19 gxx245.tgz
```

pub/mirror/Linux/slackware/a11:

total 1222

```
-rw-r--r-- 1 cj       208 Nov  9 14:19 .desc.txt
-rw-r--r-- 1 cj       208 Nov  9 14:19 00index.txt
-rw-r--r-- 1 cj       449 Nov  9 14:19 diska11
-rw-r--r-- 1 cj    490266 Nov  9 14:20 gdb.tgz
-rw-r--r-- 1 cj     2830 Nov  9 14:20 gonzo.tgz
-rw-r--r-- 1 cj     3063 Nov  9 14:20 gp9600.tgz
-rw-r--r-- 1 cj     62037 Nov  9 14:20 ksh.tgz
-rw-r--r-- 1 cj    368203 Nov  9 14:21 lib444.tgz
-rw-r--r-- 1 cj    288530 Nov  9 14:23 p2c.tgz
```

pub/mirror/Linux/slackware/a12:

total 1224

-rw-r--r--	1	cj	208	Nov	9	14:23	.desc.txt
-rw-r--r--	1	cj	208	Nov	9	14:23	00index.txt
-rw-r--r--	1	cj	46244	Nov	9	14:23	dip.tgz
-rw-r--r--	1	cj	895	Nov	9	14:23	diska12
-rw-r--r--	1	cj	281828	Nov	9	14:24	english.tgz
-rw-r--r--	1	cj	184382	Nov	9	14:24	f2c.tgz
-rw-r--r--	1	cj	63942	Nov	9	14:24	lxpatch.tgz
-rw-r--r--	1	cj	114149	Nov	9	14:25	man2.tgz
-rw-r--r--	1	cj	513682	Nov	9	14:26	objc245.tgz

pub/mirror/Linux/slackware/a13:

total 1263

-rw-r--r--	1	cj	234	Nov	9	14:26	.desc.txt
-rw-r--r--	1	cj	234	Nov	9	14:26	00index.txt
-rw-r--r--	1	cj	65867	Nov	9	14:26	butils10.tgz
-rw-r--r--	1	cj	1805	Nov	9	14:26	diska13
-rw-r--r--	1	cj	122822	Nov	9	14:27	man3.tgz
-rw-r--r--	1	cj	40343	Nov	9	14:27	manpgs.tgz
-rw-r--r--	1	cj	268972	Nov	9	14:27	pine3051.tgz
-rw-r--r--	1	cj	661009	Nov	9	14:28	smail.tgz
-rw-r--r--	1	cj	44580	Nov	9	14:28	sound.tgz
-rw-r--r--	1	cj	54365	Nov	9	14:29	tar1112.tgz

pub/mirror/Linux/slackware/a14:

total 1420

-rw-r--r--	1	cj	130	Nov	9	14:29	.desc.txt
-rw-r--r--	1	cj	130	Nov	9	14:29	00index.txt
-rw-r--r--	1	cj	885	Nov	9	14:29	diska14
-rw-r--r--	1	cj	784853	Nov	9	14:31	extra444.tgz

```
-rw-r--r-- 1 cj      642595 Nov  9 14:33 groff.tgz
-rw-r--r-- 1 cj        154 Nov  9 14:33 install.end
```

pub/mirror/Linux/slackware/a2:

total 1425

```
-rw-r--r-- 1 cj      338 Nov  9 14:33 .desc.txt
-rw-r--r-- 1 cj      338 Nov  9 14:33 00index.txt
-rw-r--r-- 1 cj    649163 Nov  9 14:34 bin.tgz
-rw-r--r-- 1 cj     1038 Nov  9 14:34 diska2
-rw-r--r-- 1 cj    46921 Nov  9 14:34 e2fsbn.tgz
-rw-r--r-- 1 cj    29081 Nov  9 14:34 getty.tgz
-rw-r--r-- 1 cj    38453 Nov  9 14:34 gzip124.tgz
-rw-r--r-- 1 cj    68763 Nov  9 14:35 lpr.tgz
-rw-r--r-- 1 cj    45911 Nov  9 14:35 make368.tgz
-rw-r--r-- 1 cj    39490 Nov  9 14:35 ps.tgz
-rw-r--r-- 1 cj   136626 Nov  9 14:35 shlibs.tgz
-rw-r--r-- 1 cj   172893 Nov  9 14:36 usrbin4.tgz
-rw-r--r-- 1 cj   143186 Nov  9 14:36 util.tgz
-rw-r--r-- 1 cj    28267 Nov  9 14:37 zoneinfo.tgz
```

pub/mirror/Linux/slackware/a3:

total 1345

```
-rw-r--r-- 1 cj      312 Nov  9 14:37 .desc.txt
-rw-r--r-- 1 cj      312 Nov  9 14:37 00index.txt
-rw-r--r-- 1 cj     1478 Nov  9 14:37 diska3
-rw-r--r-- 1 cj   199405 Nov  9 14:38 dos049.tgz
-rw-r--r-- 1 cj    53232 Nov  9 14:38 pmake44b.tgz
-rw-r--r-- 1 cj   167969 Nov  9 14:39 pmake44s.tgz
-rw-r--r-- 1 cj   166504 Nov  9 14:39 rcs56a.tgz
-rw-r--r-- 1 cj    90810 Nov  9 14:40 sc.tgz
```

```
-rw-r--r-- 1 cj      18973 Nov  9 14:40 select15.tgz
-rw-r--r-- 1 cj      20776 Nov  9 14:40 sysvinit.tgz
-rw-r--r-- 1 cj     148751 Nov  9 14:40 tcsh604.tgz
-rw-r--r-- 1 cj      40199 Nov  9 14:40 term108x.tgz
-rw-r--r-- 1 cj     399184 Nov  9 14:42 uucp104.tgz
```

pub/mirror/Linux/slackware/a4:

total 1328

```
-rw-r--r-- 1 cj       234 Nov  9 14:42 .desc.txt
-rw-r--r-- 1 cj       234 Nov  9 14:42 00index.txt
-rw-r--r-- 1 cj     146157 Nov  9 14:42 cnews.tgz
-rw-r--r-- 1 cj       645 Nov  9 14:42 diska4
-rw-r--r-- 1 cj     53055 Nov  9 14:43 gettys.tgz
-rw-r--r-- 1 cj     83249 Nov  9 14:43 joe.tgz
-rw-r--r-- 1 cj     44454 Nov  9 14:43 keytbls.tgz
-rw-r--r-- 1 cj     482492 Nov  9 14:45 man.tgz
-rw-r--r-- 1 cj     26739 Nov  9 14:45 national.tgz
-rw-r--r-- 1 cj     490119 Nov  9 14:46 tcpip.tgz
```

pub/mirror/Linux/slackware/a5:

total 1383

```
-rw-r--r-- 1 cj       416 Nov  9 14:46 .desc.txt
-rw-r--r-- 1 cj       416 Nov  9 14:46 00index.txt
-rw-r--r-- 1 cj     136184 Nov  9 14:47 bin4.tgz
-rw-r--r-- 1 cj     221253 Nov  9 14:48 comms.tgz
-rw-r--r-- 1 cj     28025 Nov  9 14:48 cpio23.tgz
-rw-r--r-- 1 cj     29085 Nov  9 14:48 deliver.tgz
-rw-r--r-- 1 cj     41043 Nov  9 14:48 diff24.tgz
-rw-r--r-- 1 cj      2330 Nov  9 14:48 diska5
-rw-r--r-- 1 cj     32318 Nov  9 14:48 e2fssrc.tgz
```

```
-rw-r--r-- 1 cj      71124 Nov  9 14:48 elfabi.tgz
-rw-r--r-- 1 cj    126679 Nov  9 14:49 jove4147.tgz
-rw-r--r-- 1 cj      4931 Nov  9 14:49 mt.tgz
-rw-r--r-- 1 cj    216961 Nov  9 14:49 nn6418.tgz
-rw-r--r-- 1 cj    122880 Nov  9 14:50 nn6418m.tar
-rw-r--r-- 1 cj    177330 Nov  9 14:51 svgalib8.tgz
-rw-r--r-- 1 cj    93932 Nov  9 14:51 term108s.tgz
-rw-r--r-- 1 cj     33191 Nov  9 14:51 tracROUT.tgz
```

pub/mirror/Linux/slackware/a6:

total 1196

```
-rw-r--r-- 1 cj      182 Nov  9 14:51 .desc.txt
-rw-r--r-- 1 cj      182 Nov  9 14:51 00index.txt
-rw-r--r-- 1 cj   138029 Nov  9 14:51 binutils.tgz
-rw-r--r-- 1 cj   471733 Nov  9 14:53 clisp.tgz
-rw-r--r-- 1 cj      880 Nov  9 14:53 diska6
-rw-r--r-- 1 cj   495624 Nov  9 14:55 perl.tgz
-rw-r--r-- 1 cj    52272 Nov  9 14:55 quota.tgz
-rw-r--r-- 1 cj    29242 Nov  9 14:55 syslogd.tgz
```

pub/mirror/Linux/slackware/a7:

total 1267

```
-rw-r--r-- 1 cj      130 Nov  9 14:55 .desc.txt
-rw-r--r-- 1 cj      130 Nov  9 14:55 00index.txt
-rw-r--r-- 1 cj      388 Nov  9 14:55 diska7
-rw-r--r-- 1 cj   257337 Nov  9 14:56 elm2421.tgz
-rw-r--r-- 1 cj   880157 Nov  9 14:58 lx99p13.tgz
-rw-r--r-- 1 cj   118555 Nov  9 14:59 tin12p2.tgz
```

pub/mirror/Linux/slackware/a8:

total 1408

-rw-r--r--	1	cj	182	Nov	9	14:59	.desc.txt
-rw-r--r--	1	cj	182	Nov	9	14:59	00index.txt
-rw-r--r--	1	cj	1129	Nov	9	14:59	diska8
-rw-r--r--	1	cj	488105	Nov	9	14:59	ghostscr.tgz
-rw-r--r--	1	cj	497255	Nov	9	15:00	gsfonts1.tgz
-rw-r--r--	1	cj	44443	Nov	9	15:00	mailx.tgz
-rw-r--r--	1	cj	196078	Nov	9	15:01	ncurses.tgz
-rw-r--r--	1	cj	164083	Nov	9	15:02	trn25.tgz

pub/mirror/Linux/slackware/a9:

total 1358

-rw-r--r--	1	cj	130	Nov	9	15:02	.desc.txt
-rw-r--r--	1	cj	130	Nov	9	15:02	00index.txt
-rw-r--r--	1	cj	35703	Nov	9	15:02	bc.tgz
-rw-r--r--	1	cj	240	Nov	9	15:02	diska9
-rw-r--r--	1	cj	1195121	Nov	9	15:06	gsfonts2.tgz
-rw-r--r--	1	cj	134118	Nov	9	15:06	inc444.tgz

pub/mirror/Linux/slackware/e1:

total 1015

-rw-r--r--	1	cj	130	Nov	9	15:06	.desc.txt
-rw-r--r--	1	cj	130	Nov	9	15:06	00index.txt
-rw-r--r--	1	cj	355	Nov	9	15:06	diske1
-rw-r--r--	1	cj	1018813	Nov	9	15:10	ebin19a.tgz
-rw-r--r--	1	cj	1941	Nov	9	15:10	tagfile
-rw-r--r--	1	cj	1941	Nov	9	15:10	tagfile.org

pub/mirror/Linux/slackware/e2:

total 939

-rw-r--r--	1 cj	78 Nov 9 15:10	.desc.txt
-rw-r--r--	1 cj	78 Nov 9 15:10	00index.txt
-rw-r--r--	1 cj	130 Nov 9 15:10	diske2
-rw-r--r--	1 cj	950190 Nov 9 15:13	e19misc.tgz

pub/mirror/Linux/slackware/e3:

total 1243

-rw-r--r--	1 cj	78 Nov 9 15:13	.desc.txt
-rw-r--r--	1 cj	78 Nov 9 15:13	00index.txt
-rw-r--r--	1 cj	281 Nov 9 15:13	diske3
-rw-r--r--	1 cj	1254727 Nov 9 15:18	e19elc.tgz

pub/mirror/Linux/slackware/e4:

total 1051

-rw-r--r--	1 cj	78 Nov 9 15:18	.desc.txt
-rw-r--r--	1 cj	78 Nov 9 15:18	00index.txt
-rw-r--r--	1 cj	161 Nov 9 15:18	diske4
-rw-r--r--	1 cj	1061412 Nov 9 15:21	e19els1.tgz

pub/mirror/Linux/slackware/e5:

total 796

```
-rw-r--r-- 1 cj      104 Nov  9 15:21 .desc.txt
-rw-r--r-- 1 cj      104 Nov  9 15:21 00index.txt
-rw-r--r-- 1 cj      161 Nov  9 15:21 diske5
-rw-r--r-- 1 cj    802082 Nov  9 15:24 e19els2.tgz
-rw-r--r-- 1 cj       43 Nov  9 15:24 install.end
```

pub/mirror/Linux/slackware/fl:

total 990

```
-rw-r--r-- 1 cj      260 Nov  9 15:24 .desc.txt
-rw-r--r-- 1 cj      260 Nov  9 15:24 00index.txt
-rw-r--r-- 1 cj      647 Nov  9 15:24 diskf1
-rw-r--r-- 1 cj       36 Nov  9 15:24 install.end
-rw-r--r-- 1 cj     3490 Nov  9 15:25 install.txt
-rw-r--r-- 1 cj     2674 Nov  9 15:25 makeflop
-rw-r--r-- 1 cj   982932 Nov  9 15:28 manyfaqs.tgz
-rw-r--r-- 1 cj     1771 Nov  9 15:28 read5_25.txt
-rw-r--r-- 1 cj     4723 Nov  9 15:28 slakware.faq
-rw-r--r-- 1 cj     1676 Nov  9 15:28 tagfile
-rw-r--r-- 1 cj     1676 Nov  9 15:28 tagfile.org
```

pub/mirror/Linux/slackware/iv1:

total 1319

```
-rw-r--r-- 1 cj      156 Nov  9 15:28 .desc.txt
-rw-r--r-- 1 cj      156 Nov  9 15:28 00index.txt
-rw-r--r-- 1 cj      118 Nov  9 15:28 diskiv1
-rw-r--r-- 1 cj    160765 Nov  9 15:28 ivincs.tgz
-rw-r--r-- 1 cj   1161472 Nov  9 15:32 ivlibs31.tgz
-rw-r--r-- 1 cj      1849 Nov  9 15:32 tagfile
-rw-r--r-- 1 cj      1849 Nov  9 15:32 tagfile.org
```

pub/mirror/Linux/slackware/iv2:

total 836

-rw-r--r--	1 cj	130 Nov 9 15:32	.desc.txt
-rw-r--r--	1 cj	130 Nov 9 15:32	00index.txt
-rw-r--r--	1 cj	124 Nov 9 15:32	diskiv2
-rw-r--r--	1 cj	351458 Nov 9 15:33	doc31.tgz
-rw-r--r--	1 cj	475731 Nov 9 15:34	idraw.tgz
-rw-r--r--	1 cj	14 Nov 9 15:34	install.end

pub/mirror/Linux/slackware/oi1:

total 1290

-rw-r--r--	1 cj	182 Nov 9 15:34	.desc.txt
-rw-r--r--	1 cj	182 Nov 9 15:34	00index.txt
-rw-r--r--	1 cj	7398 Nov 9 15:34	aletter.txt
-rw-r--r--	1 cj	1886 Nov 9 15:34	copying
-rw-r--r--	1 cj	243 Nov 9 15:34	diskoi1
-rw-r--r--	1 cj	225000 Nov 9 15:35	oiinc.tgz
-rw-r--r--	1 cj	1029908 Nov 9 15:38	oilib.tgz
-rw-r--r--	1 cj	29589 Nov 9 15:38	oimisc.tgz

2 of 2

pub/mirror/Linux/slackware/oi2:

total 861

-rw-r--r--	1 cj	182 Nov 9 15:38	.desc.txt
-rw-r--r--	1 cj	182 Nov 9 15:38	00index.txt
-rw-r--r--	1 cj	1886 Nov 9 15:38	copying
-rw-r--r--	1 cj	324 Nov 9 15:38	diskoi2
-rw-r--r--	1 cj	135913 Nov 9 15:39	oidemos.tgz
-rw-r--r--	1 cj	207893 Nov 9 15:40	oidoc.tgz
-rw-r--r--	1 cj	165860 Nov 9 15:41	oiman.tgz
-rw-r--r--	1 cj	317779 Nov 9 15:41	uib.tgz

pub/mirror/Linux/slackware/oi3:

total 1358

-rw-r--r--	1 cj	156 Nov 9 15:42	.desc.txt
-rw-r--r--	1 cj	156 Nov 9 15:42	00index.txt
-rw-r--r--	1 cj	7398 Nov 9 15:42	aletter.txt
-rw-r--r--	1 cj	1886 Nov 9 15:42	copying
-rw-r--r--	1 cj	81 Nov 9 15:42	diskoi3
-rw-r--r--	1 cj	15 Nov 9 15:42	install.end
-rw-r--r--	1 cj	1366076 Nov 9 15:46	oistat.tgz

pub/mirror/Linux/slackware/oop1:

total 365

-rw-r--r--	1 cj	130 Nov 9 15:46	.desc.txt
-rw-r--r--	1 cj	130 Nov 9 15:46	00index.txt
-rw-r--r--	1 cj	96 Nov 9 15:46	diskoop1
-rw-r--r--	1 cj	33 Nov 9 15:46	install.end
-rw-r--r--	1 cj	354142 Nov 9 15:47	smaltalk.tgz
-rw-r--r--	1 cj	44 Nov 9 15:47	tagfile

pub/mirror/Linux/slackware/q1:

total 648

-rw-r--r--	1 cj	208 Nov 9 15:47	.desc.txt
-rw-r--r--	1 cj	208 Nov 9 15:47	00index.txt
-rw-r--r--	1 cj	3906 Nov 9 15:47	bootkern.log
-rw-r--r--	1 cj	1272 Nov 9 15:47	diskq1
-rw-r--r--	1 cj	2950 Nov 9 15:47	idekern.log
-rw-r--r--	1 cj	285412 Nov 9 15:48	idekern.tgz
-rw-r--r--	1 cj	143 Nov 9 15:48	readme
-rw-r--r--	1 cj	3850 Nov 9 15:48	scsikern.log
-rw-r--r--	1 cj	339933 Nov 9 15:49	scsikern.tgz

pub/mirror/Linux/slackware/q2:

total 980

-rw-r--r--	1 cj	104 Nov 9 15:49	.desc.txt
-rw-r--r--	1 cj	104 Nov 9 15:49	00index.txt
-rw-r--r--	1 cj	349 Nov 9 15:49	diskq2
-rw-r--r--	1 cj	31 Nov 9 15:49	install.end
-rw-r--r--	1 cj	983098 Nov 9 15:52	lx99p13p.tgz

pub/mirror/Linux/slackware/scripts:

total 76

-rw-r--r--	1 cj	156 Nov 9 15:52	.desc.txt
-rw-r--r--	1 cj	156 Nov 9 15:52	00index.txt
-rw-r--r--	1 cj	270 Nov 9 15:52	INDEX
-rw-r--r--	1 cj	2519 Nov 9 15:52	makeboot

```
-rw-r--r-- 1 cj      2674 Nov  9 15:52 makeflop
-rw-r--r-- 1 cj     19173 Nov  9 15:52 pkgtool
-rw-r--r-- 1 cj    48619 Nov  9 15:52 setup
```

pub/mirror/Linux/slackware/tcl1:

total 424

```
-rw-r--r-- 1 cj      156 Nov  9 15:52 .desc.txt
-rw-r--r-- 1 cj      156 Nov  9 15:52 00index.txt
-rw-r--r-- 1 cj      759 Nov  9 15:52 diskctl
-rw-r--r-- 1 cj       13 Nov  9 15:52 install.end
-rw-r--r-- 1 cj     1630 Nov  9 15:52 tagfile
-rw-r--r-- 1 cj     1630 Nov  9 15:52 tagfile.org
-rw-r--r-- 1 cj    416171 Nov  9 15:54 tcltkdis.tgz
```

pub/mirror/Linux/slackware/x1:

total 1366

```
-rw-r--r-- 1 cj      260 Nov  9 15:54 .desc.txt
-rw-r--r-- 1 cj      260 Nov  9 15:54 00index.txt
-rw-r--r-- 1 cj     1138 Nov  9 15:54 diskx1
-rw-r--r-- 1 cj     8896 Nov  9 15:54 readme
-rw-r--r-- 1 cj     2550 Nov  9 15:54 tagfile
-rw-r--r-- 1 cj     2550 Nov  9 15:54 tagfile.org
-rw-r--r-- 1 cj     2561 Nov  9 15:54 tagfile.pat
-rw-r--r-- 1 cj    379570 Nov  9 15:55 x_8514.tgz
-rw-r--r-- 1 cj    428066 Nov  9 15:57 x_mach32.tgz
-rw-r--r-- 1 cj    383529 Nov  9 15:58 x_mach8.tgz
-rw-r--r-- 1 cj    132831 Nov  9 15:58 xf_doc.tgz
```

pub/mirror/Linux/slackware/x2:

total 1402

-rw-r--r--	1 cj	182 Nov 9 15:58	.desc.txt
-rw-r--r--	1 cj	182 Nov 9 15:58	00index.txt
-rw-r--r--	1 cj	1272 Nov 9 15:58	diskx2
-rw-r--r--	1 cj	337989 Nov 9 15:59	x_mono.tgz
-rw-r--r--	1 cj	417388 Nov 9 16:00	x_s3.tgz
-rw-r--r--	1 cj	405704 Nov 9 16:01	x_svga.tgz
-rw-r--r--	1 cj	63049 Nov 9 16:01	xf_cfg.tgz
-rw-r--r--	1 cj	155813 Nov 9 16:01	xpm32g.tgz

pub/mirror/Linux/slackware/x3:

total 1339

-rw-r--r--	1 cj	130 Nov 9 16:01	.desc.txt
-rw-r--r--	1 cj	130 Nov 9 16:01	00index.txt
-rw-r--r--	1 cj	577 Nov 9 16:01	diskx3
-rw-r--r--	1 cj	357768 Nov 9 16:02	x_vga16.tgz
-rw-r--r--	1 cj	685124 Nov 9 16:04	xf_lib.tgz
-rw-r--r--	1 cj	291072 Nov 9 16:04	xman1.tgz

pub/mirror/Linux/slackware/x4:

total 1395

-rw-r--r--	1 cj	104 Nov 9 16:04	.desc.txt
-rw-r--r--	1 cj	104 Nov 9 16:04	00index.txt
-rw-r--r--	1 cj	431 Nov 9 16:04	diskx4
-rw-r--r--	1 cj	839711 Nov 9 16:07	xf_bin.tgz
-rw-r--r--	1 cj	563200 Nov 9 16:08	xfonts1.tgz

pub/mirror/Linux/slackware/x5:

total 1192

-rw-r--r--	1	cj	130	Nov	9	16:08	.desc.txt
-rw-r--r--	1	cj	130	Nov	9	16:08	00index.txt
-rw-r--r--	1	cj	436	Nov	9	16:08	diskx5
-rw-r--r--	1	cj	27	Nov	9	16:08	install.end
-rw-r--r--	1	cj	1179036	Nov	9	16:10	xfonts2.tgz
-rw-r--r--	1	cj	28128	Nov	9	16:10	xlock.tgz

pub/mirror/Linux/slackware/xap1:

total 1334

-rw-r--r--	1	cj	312	Nov	9	16:11	.desc.txt
-rw-r--r--	1	cj	312	Nov	9	16:11	00index.txt
-rw-r--r--	1	cj	1264	Nov	9	16:11	diskxap1
-rw-r--r--	1	cj	198531	Nov	9	16:11	gs_x11.tgz
-rw-r--r--	1	cj	352123	Nov	9	16:12	libgr13.tgz
-rw-r--r--	1	cj	133883	Nov	9	16:12	seyon.tgz
-rw-r--r--	1	cj	746	Nov	9	16:12	tagfile
-rw-r--r--	1	cj	746	Nov	9	16:12	tagfile.org
-rw-r--r--	1	cj	747	Nov	9	16:12	tagfile.pat
-rw-r--r--	1	cj	14794	Nov	9	16:12	vgaset.tgz
-rw-r--r--	1	cj	181826	Nov	9	16:12	workman.tgz
-rw-r--r--	1	cj	192635	Nov	9	16:13	xfileman.tgz
-rw-r--r--	1	cj	208506	Nov	9	16:13	xv300.tgz

pub/mirror/Linux/slackware/xap2:

total 997

-rw-r--r--	1	cj	156	Nov	9	16:13	.desc.txt
------------	---	----	-----	-----	---	-------	-----------


```
-rw-r--r-- 1 cj      156 Nov  9 16:13 00index.txt
-rw-r--r-- 1 cj      581 Nov  9 16:13 diskxap2
-rw-r--r-- 1 cj    328203 Nov  9 16:14 gchess.tgz
-rw-r--r-- 1 cj       33 Nov  9 16:14 install.end
-rw-r--r-- 1 cj    82315 Nov  9 16:14 xfm12.tgz
-rw-r--r-- 1 cj    575837 Nov  9 16:15 xrest.tgz
```

pub/mirror/Linux/slackware/xd1:

total 1262

```
-rw-r--r-- 1 cj      182 Nov  9 16:15 .desc.txt
-rw-r--r-- 1 cj      182 Nov  9 16:15 00index.txt
-rw-r--r-- 1 cj      530 Nov  9 16:15 diskxd1
-rw-r--r-- 1 cj      372 Nov  9 16:15 tagfile
-rw-r--r-- 1 cj      372 Nov  9 16:16 tagfile.org
-rw-r--r-- 1 cj      378 Nov  9 16:16 tagfile.pat
-rw-r--r-- 1 cj   882894 Nov  9 16:17 xf_kit.tgz
-rw-r--r-- 1 cj   381219 Nov  9 16:18 xman3.tgz
```

pub/mirror/Linux/slackware/xd2:

total 1371

```
-rw-r--r-- 1 cj      104 Nov  9 16:18 .desc.txt
-rw-r--r-- 1 cj      104 Nov  9 16:18 00index.txt
-rw-r--r-- 1 cj      492 Nov  9 16:18 diskxd2
-rw-r--r-- 1 cj   785636 Nov  9 16:20 xf_prog.tgz
-rw-r--r-- 1 cj   589852 Nov  9 16:21 xkitlib1.tgz
```

pub/mirror/Linux/slackware/xd3:

total 1081

```
-rw-r--r-- 1 cj      130 Nov  9 16:21 .desc.txt
-rw-r--r-- 1 cj      130 Nov  9 16:21 00index.txt
-rw-r--r-- 1 cj      531 Nov  9 16:21 diskxd3
-rw-r--r-- 1 cj       10 Nov  9 16:21 install.end
-rw-r--r-- 1 cj    1014600 Nov  9 16:23 xf_pex.tgz
-rw-r--r-- 1 cj     77878 Nov  9 16:23 xkitlib2.tgz
```

pub/mirror/Linux/slackware/xv1:

total 1446

```
-rw-r--r-- 1 cj      208 Nov  9 16:23 .desc.txt
-rw-r--r-- 1 cj      208 Nov  9 16:23 00index.txt
-rw-r--r-- 1 cj      272 Nov  9 16:23 diskxv1
-rw-r--r-- 1 cj      541 Nov  9 16:23 tagfile
-rw-r--r-- 1 cj      541 Nov  9 16:23 tagfile.org
-rw-r--r-- 1 cj      545 Nov  9 16:24 tagfile.pat
-rw-r--r-- 1 cj    127112 Nov  9 16:24 xv32_sa.tgz
-rw-r--r-- 1 cj    854927 Nov  9 16:26 xv32_so.tgz
-rw-r--r-- 1 cj    453903 Nov  9 16:26 xvol32.tgz
```

pub/mirror/Linux/slackware/xv2:

total 1442

```
-rw-r--r-- 1 cj      182 Nov  9 16:26 .desc.txt
-rw-r--r-- 1 cj      182 Nov  9 16:27 00index.txt
-rw-r--r-- 1 cj      486 Nov  9 16:27 diskxv2
-rw-r--r-- 1 cj        9 Nov  9 16:27 install.end
-rw-r--r-- 1 cj    848510 Nov  9 16:28 xv32_a.tgz
-rw-r--r-- 1 cj    232996 Nov  9 16:29 xv32exmp.tgz
-rw-r--r-- 1 cj    346301 Nov  9 16:29 xvinc32.tgz
-rw-r--r-- 1 cj      5440 Nov  9 16:29 xvmenus.tgz
```

pub/mirror/Linux/slackware/y1:

total 968

-rw-r--r--	1 cj	156 Nov 9 16:29	.desc.txt
-rw-r--r--	1 cj	156 Nov 9 16:29	00index.txt
-rw-r--r--	1 cj	972602 Nov 9 16:31	bsdgames.tgz
-rw-r--r--	1 cj	657 Nov 9 16:31	disky1
-rw-r--r--	1 cj	23 Nov 9 16:31	install.end
-rw-r--r--	1 cj	1628 Nov 9 16:31	tagfile
-rw-r--r--	1 cj	1628 Nov 9 16:31	tagfile.org

DATE

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END