9 CINDA

The Computer Index to Neutron Data (CINDA) is a bibliographic file, containing references to neutron reaction data and some photonuclear reaction data. The file covers the literature since the discovery of the neutron. It originated with Prof. Herbert Goldstein of Columbia University as a card index to the nuclear reaction data literature. The effort to maintain this data base is now part of an international collaboration between the Nuclear Data Section of the IAEA, Vienna, which publishes the annual hard copy edition, the NEA Data Bank, Paris, the Nuclear Data Center (CJD), IPPE, Obninsk and the National Nuclear Data Center, Brookhaven National Laboratory.

This bibliography is unique in structure as it is data oriented rather than reference oriented. In the usual bibliography, there is a single entry for each publication or reference. In CINDA, there can be many entries for each publication, one for each data set reported. For example, if a publication reports on a measurement of the total cross sections for Fe and for ^{56}Fe and the differential elastic scattering cross section for Fe, there will be three entries in the data base. All references to the same data are linked together in a CINDA "block" along with references to experimental or evaluated data if available.

9.1 CINDA Organization

The CINDA data base contains a record for each reference to either a measurement, calculation, evaluation or review of a neutron reaction. Each of these records contains the target nuclide, the reaction and quantity, the laboratory where the work was done, the type of reference (journal, conference, etc.), the reference, the energy range, the first author, and brief comments. The reaction and quantity are rather broadly defined. For example, NP refers to the (n,p) reaction cross section and also secondary energy and angular distributions.

Each reference to the same data is linked to a CINDA "block". This block contains a main reference, usually a journal publication and all other references to the data from journals, conferences, reports, theses, etc. For experimental and evaluated data, the block may also contain a reference to the compiled experimental data in the CSISRS data base or the evaluated data in the ENDF data base.

9.2 CINDA Options

The main menu of the CINDA retrieval program has seven options, SELECT, RETRIEVE, NEW_FILE, FORMAT, CITE, HELP and EXIT. With the SELECT option, the user enters data selection criteria. The CINDA blocks corresponding to the selection criteria can be retrieved with the the RETRIEVE option. The RETRIEVE option is active only if data has been selected using the SELECT option. The NEW_FILE and FORMAT options select the output media and output format respectively. See Section 5.6 and Section 5.5 for a discussion of the CITE and HELP options respectively.

9.3 SELECT

The SELECT option should be used to choose the bibliographic data which can then be retrieved and sent to either the user's terminal or to a disk file. The following retrieval criteria can be specified.

Retrieval Parameters

Parameter	Type
Element	numeric or character
Mass	numeric or character
Quantity	numeric or character
Laboratory	character
Publication Date	numeric
Energy Range	numeric
Publication Type	character
Work Type	character

A detailed description of how to specify input for each different retrieval parameter is given in succeeding sections.

Video

The parameter selection form illustrated in the following figure is used to enter the retrieval criteria. Each field is displayed along with its current value. The selection expression in any field can be changed by moving to that field with the UP-ARROW or DOWN-ARROW key and then entering the new value. At the bottom of the display is brief information on the form and contents required for data entry in the selected field. The last item in the form is an OK/QUIT toggle which can be changed by depressing the SPACE BAR. Entry of a RETURN key on this field will cause the data base to be searched for the selected data if the toggle is on OK or will return to the top-level menu if on QUIT.

Sequential

The data selection menu is followed by the parameter selection form. A list of the retrieval parameters is displayed along with its current value and an integer identification number. At the prompt, select the fields to modify by entering the ID numbers separated by a comma. Entering ALL will select all parameters. You will be prompted for a new data selection expression for each chosen field one at a time. Enter a new expression, or a question mark (?) for brief information on the form and contents required for data entry in the selected field. A RETURN without any preceding characters will leave the field unchanged. After responding for all chosen fields, the parameter selection form appears again with updated parameter selection values. At this point, additional fields may be modified. Optionally, by entering DONE, the data base will be searched for the selected data, or by entering QUIT, the program will return to the top-level menu.

Parameter Selection in Video Environment

Neutron Reaction Data Bibliography - CINDA

SELECT

Format : **Narrow User** File : **User Terminal**

Element	**Zr**
Mass	**92–94**
Quantity	**TOT**
Laboratory	**ORL**
Publication Date	**–90**
Energy Range(eV)	**1.E+5–**
Publication Type	
Work Type	**E**
OK/QUIT	**OK**

Enter a range of publication dates with two dates separated by a minus sign. Each date has the form year_month (YYMM). A blank implies ALL dates. Missing lower or upper dates mean the lowest or highest possible values respectively.

example: 8506–9312 selects June 1985 through December 1993.

Use the UP- and DOWN-ARROWS to move between fields.

9.3.1 Retrieval Parameter Selection

A retrieval is made from the CINDA data base on the basis of user supplied values or range of values for one or more of the retrieval parameters. If no selection is supplied for a parameter, then it is assumed that all values for that parameter are desired. A range consists of two values separated by a minus sign (–). The four possible constructions are

$value_1$	equal to $value_1$
$value_1$–$value_2$	between $value_1$ and $value_2$
$value_1$–	greater than or equal to $value_1$
–$value_2$	lees than or equal to $value_2$

There are 8 different parameters whose values can be specified in order to select data from this data base. Some of these data are essentially numeric in nature, some are character data, and some are both. The detailed description of how to specify value for each different retrieval parameter follows.

Element — A target nuclide can be specified its chemical symbol or by the number of protons in its nucleus. The data base contains information for nuclei from H to Ha (recently renamed to Dubnium) (Z=1 to 105) and for neutrons (Z=0). Element symbols may also be entered interchangeably with proton numbers. Use the code FPROD to retrieve references coded only under the general category of fission products. Use MANY to retrieve references coded only under the general category of many target nuclides. A range of elements is interpreted as all elements with proton numbers between the minimum and maximum specified. For example

U–94	selects target nuclides with proton numbers 92 (Uranium), 93 (Neptunium), and 94 (Plutonium).
FPND	selects only target nuclides indexed as fission products.

Mass — A target nuclide is characterized by the number of nucleons (protons and neutrons) in its nucleus. The data base contains information for target nuclei with mass numbers between 1 and 266. A range specification will retrieve information for all targets with masses between the lower and upper values. Use the code ISOT to indicate all isotopes of a nucleus, ELEM to indicate only the natural element target and COMP for all compounds of the target nucleus. See table below for list of compounds indexed. For example

52–56	selects target nuclides with mass numbers between 52 and 56.
ELEM	selects only natural elemental target nuclides.
D2O	selects only heavy-waterelemental targets.

Recognized Compound Codes

Code	Equivalent	Explanation
BNZ	401	Benzene
CXX	403	Organic Compounds
MTH	405	Methane
PFN	407	Paraffin
PHL	409	Phenyl
PLE	411	Polyethylene
WTR	413	Water
CMP	415	Any Compound
OXI	417	Oxide
AIR	419	Air
AMM	421	Ammonia Compounds
HYD	423	Hydrides
DXX	435	Deuterium Compounds
D2O	437	Heavy Water
TXX	445	Tritium Compounds

Quantity — Data are indexed by the reaction and additionally sometimes by the reaction parameter measured. Each recognized quantity is represented by a three character code. For example, SEL represents the elastic scattering cross section and DEL represents the differential elastic scattering cross section. On the other hand, NA represents any parameter of the (n,α) reaction including both cross sections and secondary particle distributions. Each code has a numerical equivalent which determines the output sorting order. A range specification will retrieve information for all quantities with internal numerical equivalents between the lower and upper values.

TOT–DEL	selects total and elastic cross sections and elastic neutron angular distributions.
3–7	selects the same quantities.

Recognized Quantity Codes

Code	Equivalent	Explanation
EVL	1	Evaluation
TOT	3	Total
SEL	5	Elastic
DEL	7	Differential Elastic
POL	9	Polarization
POT	11	Potential Scattering
SIN	13	Total Inelastic
DIN	17	Differential Inelastic
TSL	19	Thermal Scattering Law
SCT	21	Total Scattering
SNE	23	Nonelastic
ABS	25	Absorption
RIA	27	Absorption Resonance Integral
NG	31	Radiative capture
RIG	33	Capture Resonance Integral
SNG	35	Capture Gamma Spectrum
DNG	37	Inelastic Gamma Spectrum
NEG	39	Nonelastic Gamma Spectrum
N2N	41	(n,2n)
NXN	43	(n,xn) $n \geq 2$
NEM	45	Neutron emission
NX	46	Nuclide production
NP	47	(n,p)
NNP	49	(n,np)
PEM	50	Proton Emission
ND	51	(n,d)
NND	53	(n,nd)
DEM	54	Deuteron Emission
NT	55	(n,t)

Recognized Quantity Codes (cont.)

Code	Equivalent	Explanation
NNT	57	(n,nt)
TEM	58	Triton Emission
NHE	59	(n,^{3}He)
NA	61	(n,α)
NNA	63	(n,nα)
AEM	64	α Emission
NF	65	Fission
RIF	67	Fission Resonance Integral
ALF	69	Capture to Fission Ratio
ETA	71	Neutrons Emitted per Absorption
NU	73	Neutrons Emitted per Fission
NUD	75	Delayed Fission Neutrons
NUF	77	Fission Fragments
SFN	79	Fission Neutron Spectrum
SFG	81	Fission Gamma Spectrum
FPG	83	Fission Product Gamma Spectrum
FPB	84	Fission Product Beta Spectrum
NFY	85	Fission Product Yields
FRS	87	Fission Fragment Spectra
CHG	89	Fission Fragment Charge Distribution
RES	91	Resonance Parameters
STF	93	Strength Functions
LDL	95	Level Density
GN	97	Photo-neutron
GF	99	Photo fission

Laboratory — The laboratory or organization at which the work was done is represented by a three character code. The possible list of codes is extensive. One should refer to the CINDA publication for a complete list of codes and their meaning. A range specification will retrieve information for all laboratories between the lower and upper values in alphabetic order.

BNL	Brookhaven National Laboratory, USA.
ORL	Oak Ridge National Laboratory, USA.
HAR	Harwell Laboratory, UK.

Publication Date — Selection can be made on the basis of the publication date of a reference. This date is entered in the form of year and month (YYMM). A range of publication dates can be given.

8506–9312	selects publications dates between June 1985 and December 1993.

Energy Range — References may be selected on the basis of the incident energy range covered by the data described in the publication. Energies are stored in the the CINDA data base to two significant figures only, in units of electron-volts. If specified, energies should be given as range of energies. Either floating point or exponential notation may be used. If the energies are entered in units of electron-volts, the energy range must be followed by a comma and a units code. The units codes are MV (mV), K (keV), M (MeV), and G (Gev).

1.0–10.E+6	selects references to data with energies between 1 ev and 10 MeV.
3.5–20.,K	selects references to data with energies between 3.5 keV and 20 keV.

Publication Type — Selection can be made on the basis of the type of reference. The user should enter a single character to make this choice.

A or blank	All	no selection on reference type.
B	Book	select only those references which would appear in the CINDA publication, excluding obsolete or preliminary publications.
P	Primary	select only journal references.

Work Type — Selection can be made on the basis of the type of work described in the reference. The user should enter a single character to make this choice.

A or blank	All	no selection on work type.
E	Experimental	select only those references which report an experimental measurement.
T	Theoretical	select only select only those references which report on theoretical calculations.
R	Review	select only select only those references which report reviews or evaluations.

9.4 RETRIEVE

When the data selection parameters have been supplied, the data base is searched. If no records exist, then the user is informed. Otherwise, the list of CINDA blocks which contain records statsfying the retrieval criteria are saved. The main menu appears with the RETRIEVE option now active as illustrated in the following figure. By executing this option, the currently selected data will be output to the user's terminal or to a disk file in the selected format.

Main Menu Display in Video Environment

Neutron Reaction Data Bibliography - CINDA

NEUTRON REACTION BIBLIOGRAPHIC RETRIEVAL PROGRAM
Data Base last updated on 13–Nov–1997

Format : **Narrow User** File : **User Terminal**

Element : **ZR** Mass : **92–94** Quantity : **TOT** Laboratory : **ORL**

SELECT **RETRIEVE** **NEW_FILE** **FORMAT** **HELP** **DONE**

RETRIEVE - Retrieve current list of CINDA blocks

When output to disk, the retrieval proceeds uninterrupted in the format selected in the FORMAT option. A message indicating that the output to disk is in progress is displayed. This message disappears when the retrieval has been completed. When terminal output has been selected, in video mode, the output is scrolled whereas in sequential mode, it is paged.

Video In video mode, the movement within the output of the data is controlled by four scrolling options in the menu:

FORWARD — to move forward a page,
BACKWARD — to move backward a page,
START — to move to the first page,
END — to move to the last page.

When one of the options is not logically possible because of the current position within the data output, then it does not appear in the menu. For example, FORWARD and END do not appear when the window is displaying the last page of the data. Selecting DONE indicates that the user has finished viewing the information for the current nucleus; selecting QUIT will terminate display of the current retrieval.

Sequential In the sequential mode, the display is nearly identical to that of the video mode. The menu items are displayed at the bottom of the screen are are identical in both modes. Select a menu item by entering the first character of the item name.

A sample CINDA retrieval output is shown below. Information for each target nucleus is displayed separately. If there is more than one full screen to be displayed for a nucleus, then the output can be scrolled. At the top of the screen the target nucleus is displayed. For each reference, the energy range, laboratory, work type, reference type, reference and comments are displayed in one or two lines. A CINDA "block" is indicated by the display of the quantity on the first line of the block. To proceed to the next target nucleus, select DONE from the menu; to terminate the output of retrieved data select QUIT.

Sample CINDA Terminal Output in Video Environment

```
                                 ZR-93
   Quantity       Energy Range   Lab          (Reference/Comments)

Total             1.0+0    +2    ORL   Expt Conf 58GENEVA16 150  5809
                                          Harvey+.PPR673,NDG,TOF
                  1.0+0 1.0+2    ORL   Expt Prog WASH-192    32  5703
                                          Harvey+
Total             6.0+1 6.1+3    ORL   Expt Jour NSE   92   525  8604
                                          Macklin+ GRPHS.
                  6.0+1 6.0+3    ORL   Expt Rept DOE-NDC-38 138  8605
                                          Macklin+ NDG.
                  1.1+2 6.1+3    ORL   Expt Data EXFOR12923.     8603
                                          TRANSM DATA ON ZR-0,CSISRS/A.

   [DONE]         QUIT
DONE - Proceed to display data for next target nucleus
```

9.5 SEND

Use this option to download the data file containing the current retrieval. This option appears in the menu only when a file of retrieved data exists. This option is identical to the FILE/SEND option described in Section 15.1.3.

9.6 NEW_FILE

The output from the retrieval can be displayed on the user's terminal or stored in a disk file. This option can be used to change the currently selected output destination. The default destination is the user's terminal. If you wish to direct output to a disk file, you MUST use this option to supply a name for the file before proceding with the retrieval. The disk storage of output files and their naming conventions are discussed in Section 3.4. The user's terminal can be indicated by specifying a file `TT:` or `TTY:`.

When this option is selected, a prompt appears and the user enters a new file specification. Entering a RETURN without a file specification is interpreted as selecting the user terminal for output. The video and sequential mode operation is the same.

9.7 FORMAT

The output can be generated in one of two formats. This option permits the selection of the output format from the two choices. The default selection is **Wide User** format for terminals with 132-character display capability or for disk output.

Narrow User Format

The **Narrow Table** format is a tabular output limited to 80 character output lines. In this format, two lines are required to display all data for a single reference record. The comments will appear indented on a second line.

Wide User Format

The **Wide Table** format is designed for 132 character line output. In this format, all data for a reference record can be displayed on a single line. For terminal output, unless the user has specified that his output device is 132-character capable(see Section **??**), the output will revert to the **Narrow Table** format.

HTML Format

The **HTML** format produces an output file which can be viewed in a WEB browser such as NETSCAPE.

Video In the video mode, a menu of the three format options is displayed. Upon selection of a format, the option terminates and the file specification in the screen display is updated.

Sequential The new output format is selected by entering the first character of the format name at the prompt. Entry of a RETURN will select the default format, the **User** format.