4C-3/145
1975-10-14

Memo 4C-3/145

To: Distribution 14 October 1975

From: G. Lammer + H.D. Lemmel

Subject: NDS CINDA Manual Update

Please, find enclosed, for your information, the updated pages of the NDS Cinda-Manual. They supersede the respective pages of the old manual, a copy of which has been distributed to you.

Besides corrections of obvious mistakes and of some superseded information, they include the following main alterations since the last update (74-10-25):

Elements and isotopes: how to enter metastable targets (p. 3.4)

Quantities: revised definitions of RES,DIN,NF,FPG;
revised explanation of TSL; omission of ACT,RIR
(pp. 3.7, 3.9-3.11)

Operation codes: operations 'KILL' and 'LINK' added
(p. 3.21)

Energy-range: explanation of numerical entries (p. 3.24)
and changes in alfabetic energy combinations
according to CCDN-computer programme (p. 3.28)

We would like to ask you that the updated NDS-manual is considered in drafting the final version of the (general) Cinda-manual.

Attachment

Clearance: J.J. Schmidt

Distribution:

L. Lesca, NDCC (5)
S. Pearlstein, NNCSC (5)
V. Manokhin, CJD (5) H. Goldstein (1)

NDS: P.M. Attree
M. Khalil
H.D. Lemmel
A. Lorenz
K. Okamoto
J.J. Schmidt
R. Yaghubian
G. Lammer
file

NDS CINDA 75-10-15

NDS CINDA MANUAL

1. Inter-Center cooperation

   Responsibilities for preparing Cinda entries
   Book-production deadlines

2. NDS internal matters

   Cinda-Exfor interrelations

   Cinda card-check program

3. Input format for normal entries

   col. 1 - 5: Elements, Compounds
   col. 6 - 8: Quantities
   col. 9-11: Lab
   col.12-14: Block-Nr.
   col. 15 : Compiler symbol
   col. 16 : Operation code
   col. 17 : Hierarchy
   col. 18 : Work-type
   col.19-26: Energy
   col.27-41: Ref-type and documentation
   col.42-44: Ref-date
   col.45-80: Author, comments

4. Input format for special entries

   Coverage-control entries
   Modification entries
   Deletion entries
   Block-linking entries
   Data-index entries
   Translations

5. Retrievals and listings

   Retrieval specifications at NDCC

   How to read an NDCC internal listing

6. Book production

   NDCC/NDS interface format

Appendices:

7. CINDU Manual (Distribution: NDS only)

8. Dictionaries: labs, journals, reports, books/conferences

Distribution:

Parts 1-7:	P.Attree	A.Calamand	F.Hirschbichler	M.Khalil
	G.Lammer	J.Lemley	H.Lemmel	A.Lorenz
	K.MacLaughlin	K.Okamoto	J.Schmidt	P.Smith
	M.Vlasov	R.Yaghubian	NDS Library	Spare Copy
	Master Copy			

Parts 1,3-6: V.Manokhin (2x)

Parts 1,3,4.1,8: M.Balakrishnan

Parts 1-6: (for information only)
C.Dunford H.Goldstein A. Schofield

NDS CINDA 85-10-15

NDS CANADA 75-10-15

Valid pages

page	last update
0.1	75-10-15
0.2	75-10-15
0.3	75-10-15
1.1	75-10-15
1.2	75-10-15
1.3	
1.4	75-2-3
1.4a	75-2-3
1.5	
2.1	
2.2	
2.3	
2.4	
2.5	
2.6	
2.7	74-10-25
2.8	74-8-1
2.9	74-8-1
2.10	75-10-15
2.11	75-10-15
2.12	74-8-1
2.13	75-10-15

page	last update
3.1	75-10-15
3.2	75-10-15
3.3	
3.4	75-10-15
3.5	
3.6	74-10-25
3.7	75-10-15
3.8	74-10-25
3.9	75-10-15
3.10	75-10-15
3.11	75-10-15
3.12	74-10-25
3.13	74-10-25
3.14	74-10-25
3.15	74-10-25
3.15 a	74-10-25
3.16	
3.17	74-8-1
3.18	74-5-28
3.19	
3.20	
3.21	75-10-15
3.22	
3.23	75-10-15
3.24	75-10-15
3.25	
3.26	74-10-25
3.27	
3.28	75-10-15
3.29	74-10-25
3.30	
3.31	
3.32	
3.33	
3.34	
3.35	
3.36	74-10-25
3.37	74-10-25
3.38	74-10-25

page	last update
4.1	
4.2	75-10-15
4.3	75-10-15
4.4	75-10-15
4.4a	75-10-15
4.4b	75-10-15
4.5	74-8-1
4.6	
4.7	74-5-28
5.1	
5.2	
5.3	
5.4	
5.5	74-5-28
6.1	
6.2	
6.3	
6.4	
6.5	
6.6	
6.7	
6.8	
6.9	
6.10	
6.11	
6.12	
6.13	
7.1	
7.2	74-10-25
7.3	
7.4	
7.5	74-10-25
7.6a	,,
7.6b	,,
7.6c	,,
7.6d	,,
7.6e	,,
7.7	,,
7.8	
7.9	
7.10	
7.11	
7.12	

Check that your Manual is up-to-date!!! The last updates were dated:

74-5-28
74-8-1
74-10-25
75-10-15

1.1

NDS CINDA 75-10-15

Proposed Manual Entry (HDL 74-3-1)

Responsibilities for preparing Cinda-entries

1. Journals, reports and books (exceptions see items 2 and 4 below) are covered by
   NNCSC, when they appear in USA or Canada (area 1);
   NDCC, when they appear in a country of area 2, (except IAEA publications);
   NDS, when they appear in a country of area 3 or at IAEA;
   CJD, when they appear in the USSR (area 4).

   For the definition, which country belongs to which area, see item 9 below.

2. Translation series, that is translation-journals (such as SJA, TAF, for some time part of JNE, etc.) and translation-report-series (such as AEC-TR-, etc.) are covered by NDS, irrespective of the country in which they appear.

3. Conferences (preprints and/or proceedings) are covered by

   NDS, when they are organized by IAEA or when the proceedings are published by IAEA.

   For all other conferences the place of the conference determines the responsible center.

   For proceedings appearing in a journal or within a report-series Cinda-entries are made under the journal-code or report-code by the center defined under 1. above.

4. For EANDC- and INDC- reports the following rules apply:

   a) EANDC- and INDC-report-codes are ignored when there is also a more original report-code printed on the cover (such as UKNDC-, USNDC-, or a lab-report code), the more original report-code determining the center responsible for preparing Cinda-entries.

   b) Reports which have an EANDC-code only or which have an INDC- and an EANDC- code and no other code, are entered by NDCC, the INDC-code being ignored.

   c) INDC-reports which have only an INDC-code and no other code on their covers, are entered by NDS. Exceptions (resp. clarifications):

      - INDC(JAP)-reports are not entered by NDS but by the Japanese Cinda compiler.

      - The USSR-reports ICD-, YFI-, YK- are entered by CJD even if they were distributed with an INDC-code on their covers. NDS is responsible for entering the English translations of these.

1.2

NDS-CINDA-75-10-15

5. Revisions of existing Cinda-entries as required for blocking, correcting, adding of "no-book flags", etc. are to be made by

NNCSC, when the lab is in USA or Canada (area 1);
NDCC, when the lab is in a country of area 2, (except for lab = IAE);
NDS, when the lab is in a country of areas 3 or 4 (or when lab = IAE).

6. Data-index lines are prepared by

NDCC, when they originate from a country in areas 1 or 2;
NDS, when they originate from a country in areas 3 or 4.

7. Master-File: NDS sends all entries (including those from CJD) to NDCC for entry into the master-file, even if those entries contain labs or references from the NNCSC area.

8. Note: When someone prepares Cinda-entries from literature outside his area of responsibility (which is most welcome in the cases of correcting mistakes or of detecting and closing gaps) care should be taken, e.g. by a letter to the responsible center, that no duplications are created.

9. Definition of areas:

1 = USA, Canada
2 = Austria, Belgium, Denmark, Finland, France, Germany (Fed.Rep.), Greece, Ireland, Italy, Japan, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, Turkey, UK.
4 = USSR
3 = all other countries.

NDS CINDA 75-10-15

Reference check (27-41)

Check the following:

a If Ref-type = J, go to A.
b If 32-41 equals ŦObBEbPUBL, go to B.
c If Ref-type = R, go to C.
If Ref-type = Q, go to C.
If Ref-type = S, go to C.
d If Ref-type = C, go to D.
e If Ref-type = L, go to E.
f If Ref-type = 4, go to F.
g If Ref-type = 3, go to G.
h If Ref-type = blank, go to H.
i If Ref-type = T or W, no further check in cols. 28-41.
j If Ref-type = other: error.

General note: Note that the Exfor dictionaries include invalid codes which are marked with the character "Ø" in col. 80. See also the general note under "Lab-check".

A. Journals

Take the Exfor table of journal codes. Sort this table by area in the sequence 3,4,2,1. This sequence corresponds to the frequency that journal codes occur in NDS Cinda entries.

If the journal-code has a slash (/) in its 4th position, remove the slash and move the character from the 5th position into the 4th position. For example: change FIZ/S to FIZS
JNE/A to JNEA
(JNE/AB to JNEA) :this is wrong, but does not disturb the check-programme
but keep JP/A as JP/A.

A special code, which is permitted in Cinda, is JNAB (Exfor: JNE/AB).

If Ref-type = J make the following checks:

1 Check 28-31 against table of journal-codes. If no match, error message.

2 Check each single position between 32 and 41: all must be either blank or numeric. The left-most digit encountered in any of the fields 32-35, 36-37, 38-41 must not be a zero.
For one permitted exception see 5.

3 Any of the fields 32-35 or 38-41 must not be totally blank. Field 36-37 may be blank.

4 In any of the fields 32-35 or 38-41 the following combinations are forbidden (b = blank, n = any digit 0-9):

bnbn
nbbn
nbnb

5 In field 38-41 there may be a hyphen and 3 blanks in any sequence. (This indicates that the page-number is not known.)

NDS CINDA 85-10-15

B. Preprints of journal articles:

If 32-41 equals TObBEbPUBL,

1 Check 28-31 against table of journal-codes. If no match, error message.

2 Check that ref-type is W. If not, error message.

C. Reports: If Ref-type = R or Q or S

No further check is made except comparing the report-code against the Exfor dictionary.

The report-code has flexible length varying between 2 characters including the hyphen (e.g. N-) and 10 characters (e.g. NAA-SR-MEM or NASA-TN-D-). The position 11 in the Exfor dictionary should be ignored, because this position is often dropped in Cinda due to space limitations: the Exfor code NAA-SR-MEMO-1234 must be shortened in Cinda to NAA-SR-MEM1234.

Report-code and report-number are separated by a hyphen. But within the report-code or within the report-number one or more further hyphens can occur.

That hyphen which is to be regarded as delimiter of the report-code, can be defined such that it must be followed by a digit 1→9. Exceptions: 1. The report-number must not start before position 32. Therefore, short report-codes like AE- (or N-) must have 1 (or 2) blank(s) in position 31 (and 30). 2. If no hyphen followed by a digit is found in positions 28-37 (e.g. NAA-SR-MEM), do not search further but compare field 28-37 against field 1-10 of Exfor dictionary.

Not more than 3 hyphens including the delimiter need be assumed within the report-code. A possible way to define the length of a report-code:
Search in 29 - 37 from left to right for the first hyphen. Check whether the position following the hyphen is a digit 1→9 (or blank if the hyphen is in positions 29 or 30).
If yes, it's o.k.
If not, search for the next hyphen. Check whether the position following the hyphen is a digit 1→9.
If yes, it's o.k.
If not, search for the third hyphen.
If m is the position in which the last hyphen was found, set n = m-27. If no hyphen was found in the field 29 - 37, set n = 10. Now take the table of report-codes, consider only the first n characters of the report-codes, and compare the field 28 - (27+n) against the table of report-codes.
If a match is found, it's o.k.
If not, error message.

D. Conferences

Take the Exfor table of conference codes. Consider only the first 8 characters of each code. Omit the book-codes, which have no digits in the first 2 positions. Search the table from the end to the beginning, since more recent conferences occur more often.

NDS CINDA 75-10-15

G. Evaluated Data

If Ref-type = 3,

1 Check that 28-36 is AUSTR-DFN, if not, go to 11, if yes, go to 2

2 41 must be a letter or a point; otherwise error,
37-39 must each be numerical or blank,
40 must be numeric, must not be blank.

3 Check 17: the hierarchy-code must be D. But if the operation-code is M or D, the hierarchy-code must be D or blank.

4 Check 18: the work-type code must be D. But if the operation-code is M or D, the work-type must be D or blank.

11 At present: error message.
In future: check for other library-name. (Presently AUSTR-DFN is the only evaluated-data library which NDS enters in Cinda.)

H. If Ref-type = blank:

This is only permitted if operation-code = M or D, and if 27-41 is totally blank.

Ref-date (42-44)

Accepted months in position 42: blank, digits 0-9, ø, N, D

Accepted years in positions 43-44: 42 to (current + 1).

If op-code = D or M, 42-44 may be totally blank.

Comments (45-80)

If op-code = D, this field(45-80) is not checked.

If op-code = M and Energy-field contains a serial-number, this field is either totally blank or checked as if op-code = A or B.

If op-code = M and Energy-field contains a valid energy-entry (that is, if the energy-field is not totally numeric), the field 73-80 must contain a totally numeric serial-number between 00020000 and 00700000. The field 45-72 is either totally blank or checked as if op-code A or B.

If op-code = A or B, this field must not be totally blank. Check the following.

The first item must be the author's name, delimited by plus or point.

Permitted signs within the author's name are alphabetics, apostrophy, hyphen and underscore.

Assume the length of author's name varying between 2 and 20 characters. The longest name existing in file seems to be: Sriramachandra Murty, the shortest:Fu.

Point in pos. 45 indicates that no author is given.

If hierarchy-code = D, neither author nor point is given.

Except for author's name and serial number, the following signs can be used in the Comments: Numbers, Latin capitals and + - = . , / ' ( )

NDS CINDA 75-10-15

CINDA ENTRY FORM

IAEA NUCLEAR DATA SECTION

Date .... Page ....

Compiler .... Checked ....

Punched .... Verified ....

WHITE CARDS

Numbers		Letters
0, 0	zero	Ø
1	one	i, I
2, 2	two	Z
5	five	S
7	seven	J

* Leave blank, exept compilers at NDS

for Delete/Modify same as original

serial-nr for Delete/Modify

Element S (1–2)	Element A (3–5)	Q (6–8)	Lab (9–11)	* Block Nr. (12–14)	Compiler (15)	* Operation (16)	* Hierarchy (17)	Worktype (18)	Energy Min ± (19–22)	Energy Max ± (23–26)	Ref Type (27)	Documentation: RP number page / REPORT – number page / Conf # Paper Nr / Conf Vol Page / Jour Vol Nr Page (28–41)	Ref Date (42–44)	Author + . (45–52)	Comments e.g. Method, Results (state if Graph or Table or NDG) [when En. modified] [Serial-nr] (53–80)
1															
2															
3															
4															
5															
6															
7															
8															
9															
10															
11															
12															
13															
14															
15															
16															
17															
18															
19															3.1
[20]															

A 1/Rev 3(May 75)

NDS CINDA 75-10-15

No blank A-field:

H	001
D	002
T	003
HE	004
BE	009
C	012
N	014
Ø	016
F	019
NA	023
AL	027
P	031
SC	045
V	051
MN	055
CØ	059
AS	075
Y	089
NB	093
RH	103
I	127
CS	133
LA	139
PR	141
TB	159
HØ	165
TM	169
TA	181
AU	197
BI	209
TH	232

Compounds:

H	WTR	Water
H	BNZ	Benzene
H	MTH	Methane
H	PFN	Paraffin
H	PHL	Phenyls
H	PLE	Polyeth.
H	CXX	other org.
D	D2Ø	D20 + HDO
D	DXX	D-comp.
T	TXX	T-comp.
BE	ØXI	Be-oxides
N	AIR	Air
N	AMM	Ammonia
SI	ØXI	Si-oxides
ZR	HYD	Zr-hydr.
U	ØXI	U-oxides
others:		CMP in A-field

Quantity codes

EVL	Evaluation	NF	Fission	ABS	Absorption
TØT	Total	ETA	Eta	RIA	Res Integral
RES	Reson Params	ALF	Alpha	NG	(n,γ)
STF	Strnth Fnctn	NU	Nu	SNG	Spect (n,γ)
SEL	Elastic	NUD	Delayd Neuts	NP	(n,p)
DEL	Diff Elastic	NUF	Frag Neuts	ND	(n,d)
PØL	Polarization	SFN	Spect Fiss n	NT	(n,t)
PØT	Potntal Scat	SFG	Spect Fiss γ	NHE	(n,He3)
SCT	Scattering	NFY	Fiss Yield	NA	(n,α)
SNE	Nonelastic	FRS	Frag Spectra	NNP	(n,np)
NEG	Nonelastic γ	CHG	Frag Charge	NND	(n,nd)
SIN	Tot Inelaste	GF	Photo-Fissn	NNT	(n,nt)
DIN	Diff Inelast	FPG	Fiss Prod γ	NNA	(n,nα)
DNG	Inelastic γ	RIF	Res Int Fiss	LDL	Lvl Density
N2N	(n,2n)			GN	(γ,n)
N3N	(n,3n)				
TSL	Thermal Seat				
NEM	n Emission				

Note: The quantities NPR REM RIG are no longer used but still exist in the file.

Data-Type

E	Expt
T	Theo
R	Revw
C	Comp
D	Eval
M	ExTh

Ref-Type

J	Jour
R	Rept
Q	Prog
C	Conf
S	Conf, rpt
L	Book
T	Diss
W	Priv
4	Exfor
3	eval data

Alphabetic Energy-Entries

MAXW	Maxwellian spectrum average
PILE	thermal reactor spectrum average
FAST	fast reactor spectrum average
CØLD	subthermal spectrum average
FISS	fission neutron spectrum average
SPØN	spontaneous fission
NDG	energy not relevant, or: energy not given (better: enter approx. energy)

The codes TR UP (= from threshold and up) are still accepted but should no longer be used. Instead, approximate or guessed energy values should be entered.

Operation:

A	single line unblocked, or lines of a new block
B	add line to existing block
D	delete
M	modify

Hierarchy:

M	main publication (almost not used!)
T	translation
N	not to appear in Cinda book
D	data index entry

NDS CINDA 75-10-15

Cols 1 - 5: Elements and isotopes

For the coding of a nucleus (isotopes or elements) the following format rules apply:

a. enter the element-symbol in the S-field (cols 1 and 2). If the element symbol has only one character, enter it in col 1 and leave col 2 blank.

b. enter the isotope-number in the A-field (cols 3 - 5), right adjusted with leading zeros.

c. for elements with natural mixture of two or more isotopes leave the A-field blank.

d. for monoisotopic elements and nearly monoisotopic elements the isotope number must be entered, and a blank A-field is forbidden. See the list of such cases on the reverse side of the Cinda entry form (page 3.2).

f. the hydrogen isotopes are entered as H 001 D 002 T 003 .

g. Metastable targets are coded with their element-symbol and isotope number as in the ground state, showing the word META or METASTABLE after the author's name in the comment.

h. If a measurement has been performed on a sample consisting of a natural isotopic mixture, but properties of some of the isotopes have been deduced, entries must be prepared both for the natural element and the appropriate isotopes.

i. If an article concerning the inverse reaction allows useful information to be deduced about the reaction as initiated by neutrons it should be entered, under the neutron reaction of which it is the inverse, with the word INVERSE (or abbreviation INV.) immediately after the author's name in the comment.

Thus if a measurement of C^{13} (α,n) O^{16} gives information relevant to the O^{16} (n,α) reaction an entry should be made under O^{16} N, ALPHA. However useful information can usually be extracted only where an absolute value is given of the cross section leading to the ground state of a stable product nucleus (in the example, O^{16}).

k. There are some controversial element symbols in the literature. The agreed codes for Cinda and Exfor are:

argon AR (not A)
iodine I (not J)
einsteinium ES (not E)
element 104: kurchatovium, KU

NDS CINDA 25-10-15

Col. 6-8: Quantity

In the list below, the quantity codes, their expansions appearing in the book, and their definitions are given. On the pages following thereafter a list is given of the light-element reactions and their Cinda codes.

For inverse reactions see the page "cols 1-5: elements and isotopes"

EVL **Evaluation** **Definition:** A complete and consistent set of cross-sections in some energy range. Evaluation entries are made only for such complete sets, when a separate entry is prepared in addition for each quantity given in the evaluation. (A "best value" derived from comparing different $\bar{\nu}$ measurements would be entered under 'Nu' only).

Note: In the case of less important or superseded evaluations the entries for the individual quantities should get the "no-book flag", such that only the entry under 'Evaluation' remains in the book.

TOT **Total** $\sigma_{nT}(E)$ **Definition:** The total neutron cross-section.

If transmission data only are given, and no total cross-sections were derived, entry is made under TOT with an appropriate comment in free text.

RES **Reson Params** $\Gamma\ \Gamma_f\ \Gamma_\gamma\ J\ \langle D\rangle$ etc **Definition:** All resonance parameter information, such as total width, partial widths for fission, gamma emission or particle emission, spins of resonances, average level spacing, Adler-Adler parameters.
Enter the target nucleus, not the compound nucleus!
Enter the energy values of the lowest and highest resonance observed, not the larger energy range of incident neutrons.

STF **Strnth Fnctn** **Definition:** The strength function

$\left\langle \frac{\Gamma}{D} \right\rangle = \frac{\Sigma \Gamma_T}{\Delta E}$ where D is the mean level spacing and $\Delta E = E_{max} - E_{min}$. Comments should show whether S or P-wave resonances are referred to. The energy limits refer to resonance energies. Enter the target nucleus, not the compound nucleus.

SEL **Elastic** $\sigma_{n,n}(E)$ **Definition:** The total elastic scattering cross-section, integrated over all angles. Scattering amplitude measurements are entered under 'Elastic', with a note in the comment, "n-p scattering" is elastic scattering on H 001.

DEL **Diff Elastic** $\sigma_{n,n}(E,\theta)$ **Definition:** Angular distribution (not normalized) or differential scattering cross-section (normalized) for elastically scattered neutrons. Where the author has integrated a distribution already normalized at one angle to give the total elastic scattering cross-section, enter also under 'Elastic'. Note: Prior to introducing the quantity 'Polarization', many polarization measurements involving elastic scattering have been entered under 'Diff Elastic', with a note in the comment; these entries will be corrected as time permits.

Note: The transport cross-section, which is given in some evaluated-data libraries, is entered under DEL with an appropriate note in the comments.

POL **Polarization** **Definition:** All polarization measurements for neutrons in the exit channel, following scattering or any other reaction. Note: This quantity was introduced in 1969; previously, polarization following elastic scattering has been indexed under 'Diff Elastic'.

NDS CINDA 75-10-15

DIN **Diff Inelast** $\sigma_{n,n'}(E,\theta)$ $\sigma_{n,n'}(E;E')$ $\sigma_{n,n'}(E;E',\theta)$

Definition: Angular distributions or energy spectra of inelastically scattered neutrons, or partial cross-sections for inelastic scattering. Examples of use:

1) the angular distribution of inelastically scattered 14 MeV neutrons from Ca^{40};
2) the energy spectrum recorded at 90° scattering angle for inelastically scattered neutrons.
3) cross-sections for scattering to the 6.14 MeV level in O^{16}, the reaction $O^{16}(n,n')O^{16}$;
4) cross-section for excitation of metastable state by inelastic scattering, like $Ag^{107}(n,n')Ag^{107m}$.

Note: As for 'Tot Inelastic', the category covers only **nuclear** scattering.

DNG **Inelastic γ** $\sigma_{n,n'}(E;E_\gamma)$ $\sigma_{n,n'}(E;E_\gamma,\theta)$

Definition: Information on production cross-section, angular distributions or energy spectra for gamma rays following the inelastic scattering of neutrons. **Note:** Many inelastic scattering experiments measure the production cross-section for a specific gamma ray. This cross-section will in general differ from the cross-section for excitation of its state of origin, but will be equal if gamma-ray cascades to and from the level can be excluded. In this case, entries should be made under 'DNG' and 'DIN'.

(n,2n) $\sigma_{n,2n}(E)$ $\sigma_{n,2n}(E,E')$ $\sigma_{n,2n}(E;E',\theta)$

Definition: Information on (n, 2n) and (n, 2nC) reactions, (C = charged particles). This quantity includes integral and differential data, which should be specified in the Comment. Note that also the proton spectrum from the reaction D002 (n, 2n p) is entered under this quantity (compare the light-nuclei reactions on the subsequent pages).
If the neutrons from the (n,2n) reaction were not separated from inelastically scattered neutrons, rather use the quantity 'NEM'.
The reactions (n, 2n f) and (n, 3n) are not included under this quantity.

N3N (Rare!) **(n,3n)** $\sigma_{n,3n}(E)$ etc.....

Definition: Information on (n, 3n) and (n, 3nC) reactions (C = charged particles). Details similar as for (n,2n). In the experimental practice it is very difficult to distinguish (n,3n) reactions from other neutron-producing reactions, and in such cases the quantity 'NEM' will be more appropriate. Proper N3N data exist, for example, in evaluated data files.

TSL **Thermal Scat**

Definition: Information on the elastic and inelastic scattering of slow neutrons (energy below about 1 eV) in gases, liquids, crystals etc., where chemical binding forces, molecular or crystal vibrations etc. are involved. Papers with main emphasis on solid state physics which do not give microscopic data should be excluded. **Note:** The classification of slow neutron data has not been fully consistent, and some molecular scattering data will be found under 'Elastic', 'Diff Inelast', etc.

NDS CINDA 75-10-15

Fission $\sigma_{n,f}(E)$ **Definition:** The cross-section for neutron induced fission, or for inelastic scattering to the spontaneously fissioning isomer. In the latter case, a second entry is made under DIN. A number of quantities below cover details of the fission reaction. Note: The quantities NU, NUD, SFN, SFG, NFY, FRS, CHG, and FPG are also used for spontaneous fission, but nor for photo-fission The quantity NF does not apply to spontaneous fission. The corresponding quantity for spontaneous fission is the half-life of the nucleus, which is not to be entered at all.

ETA **Eta** $\eta = \frac{\bar{\nu}\sigma_{n,f}}{\sigma_{n,\gamma}+\sigma_{n,f}}$ **Definition:** The number of neutrons emitted per absorption. **Use:** For fissionable elements only. For non-fissionable elements 'n Emission' is used.

ALF **Alpha** $\alpha = \frac{\sigma_{n,\gamma}}{\sigma_{n,f}}$ **Definition:** The capture to fission cross-section ratio.

NU **Nu** ν **Definition:** ν, the number of prompt neutrons emitted per fission. **Use:** Information covered includes $\bar{\nu}$ (the average number of fission neutrons), the probability distribution of ν per individual fission and angular distributions for fission neutrons. **Note:** Information on neutrons from a given fragment is entered under 'Frag Neuts', that for delayed neutrons in general under 'Delayd Neuts'. prompt or total

NUD **Delayed Neuts** **Definition:** Information on yields, energies, etc., of delayed neutrons from fission.

NUF **Frag Neuts** **Definition:** Information on neutrons emitted by a given fission fragment. **Note:** Distributions of ν vs. fragment mass are entered under this quantity.

SFN **Spect Fiss n** **Definition:** Spectrum of neutrons emitted in fission. **Use:** For spectra, mean energies, etc.

SFG **Spect Fiss γ** **Definition:** Spectrum of prompt gamma rays emitted in fission. Compare FPG.

NFY **Fiss Yield** **Definition:** Yields of fission products or fission fragments (prompt, direct, chain or cumulative). The probabilities for binary or ternary fission are entered under this quantity. Note: specify independent, cumulative or chain yield in the comment.

FRS **Frag Spectra** **Definition:** The energy or angular distribution of fission products. **Note:** Before January 1966, this information was entered under 'Fiss Yield'.

CHG **Frag Charge** **Definition:** Information on the charge distribution of fission fragments, charge dispersion, most probable charge $Z_p(A)$, fractional yields for A=const., etc.

GF **Photo-Fissn** **Definition:** Information on gamma ($E\gamma \leqslant 15$ MeV) induced fission. **Use:** Cross-section, yields and spectra of neutrons and fragments, etc. Note that this is the only CINDA quantity dealing with photo-fission. All other fission quantities are exclusively reserved for neutron-induced (or spontaneous) fission.

FPG **Fiss Prod γ** **Definition:** Prompt γ-rays emitted in fission when they are assigned to fission products (otherwise see FPG), and all delayed γ-rays, emitted in the course of the decay of the fission products. Use: Spectra, mean energies, yields etc. Note: The quantity relates only to unseparated fission products. A very few entries for fission product betas appear under this heading. Also K, L, M X-rays from fission products are entered here.

NDS CINDA 75-10-15

RIF **Res Int Fiss** $\int_{E_{min}}^{E_{max}} \frac{\sigma_{n,f}(E)}{E} dE$

Definition: Resonance integral, fission. E_{min} (and E_{max} if finite) to be entered in the energy field.

ABS **Absorption** $\sigma_{nA}(E)$

Definition: The absorption cross-section, $\sigma_{nA} = \sigma_{nT} - \sigma_{nS}$, i.e. the sum of all partial cross-sections except for elastic and inelastic scattering. This quantity should be used only when two or more reactions are involved. Where absorption is, throughout the data set considered, identical with the (n,γ) reaction, entries are made under NG and not under ABS. For fissile isotopes at energies below the (n,2n) or (n,p) threshold, absorption equals capture plus fission: ABS = NG + NF .

Note: Many authors use the term "absorption" with different definitions. Check, which Cinda quantity is meant.

RIA **Res Int Abs** $\int_{E_{min}}^{E_{max}} \frac{\sigma_{nA}(E)}{E} dE$

Definition: The resonance integral for absorption. or capture.

Specify in Comments, which resonance-integral is given.

(REM) **Disappearanc** $\sigma_{nD}(E)$

Definition: The disappearance (or removal) cross-section for neutrons, i.e. the cross-section for all processes producing no emergent neutron, $\sigma_{nD} = \sigma_{n,\gamma} + \sigma_{nC}$ (C = charged particle). Usually it includes also a portion of the elastic scattering cross-section, where the neutrons are scattered into large angles and are subsequently absorbed. - It differs from the absorption cross-section in not including $\sigma_{n,2n}$, $\sigma_{n,np}$ etc.

This quantity is not used at NDS but exists in the file.

(RIG) **Res Int Capt** $\int_{E_{min}}^{E_{max}} \frac{\sigma_{n,\gamma}(E)}{E} dE$

Definition: Resonance integral for radiative capture.

Definitions have been confusing in earlier Cinda Manuals. Use the code RIA instead with explanation in Comments.

NG **(n, γ)** $\sigma_{n,\gamma}(E)$

Definition: Radiative capture cross-section, $\sigma_{n,\gamma}$.

SNG **Spect (n, γ)**

Definition: Spectrum of prompt gamma rays or conversion electrons following neutron capture. **Note:** The term 'gamma decay' includes the competing processes of internal conversion and pair production, so that conversion electron spectra from neutron capture would be entered under 'Spect (n, γ)' with an appropriate comment.

Note: Do not enter the compound nucleus but the target nucleus before neutron capture.
Do not make entries for delayed gammas following beta decay.

NOS CINDA 51-01-15

Col. 16: Operation code:

Superseding the prescriptions in Nigel's Manual, the following operation codes are used:

'A' = addition of an unblocked single line to the file;

= addition of a new block to the file: all lines of a new block get the operation code A. (A new block submitted by NDS can have block-numbers of the type "Bnn" or "4..".)

'B' = addition of one or more lines to a line or block already existing in the file. (Such entries cannot have a block-number starting with "B.." but must use the block-number used in the file, for example "473" or "150".)

See under "cols 12-14: Block-number" for some more details.

'D' = delete an entry (specified by S,A,Q,Lab, Block-number, Serial-number). See page "Deletions" for details.

'M' = modify an entry. For details see page "Modifications".

'K' = kill a whole block. For details see page "Deletion of blocks".

'L' = link block X to block Y (specified by S, A, Q, Lab, common to the two blocks, Block numbers of X and Y and the serial number of one entry in each). Block X will be killed, and copies of the entries in it added to block Y with new serial numbers. For details, see page "Linking of two blocks".

Col. 18: Work-type

Col 18	Abbreviation in printout	
E	Expt	Experimental measurement
T	Theo	Theoretical calculation
M	ExTh	Experimental measurement plus a theoretical calculation extensive enough to merit separate publication (a comparison of an elastic angular distribution with an optical model calculation is not regarded as fulfilling this criterion)
C	Comp	Compilation of experimental (or theoretical) data
D	Eval	Evaluation (critical examination of data, eventually producing a "best" or "recommended" value or set of values, even if only a single quantity is covered Compare also the quantity EVL, page 3.7.
R	Revw	Review (survey of experimental or theoretical information)

Only for occasional use in centers:

Adding a data-tag to an entry (+ at the right-hand margin of the book page) can be done by means of artificial work-type codes:

In new entries (operation code A or B):

X = Expt, with data-tag
B = ExTh, with data-tag

In modify-entries (operation code M):

X = add a data-tag to an existing Expt-entry
B = " " " " " " ExTh "
E = remove data-tag from existing Expt-entry
M = " " " " " . " ExTh "

Data-index lines get the data-tag automatically, disregarding whether they are entered with work-type E or X.

At NDS work-type codes X and B are not used any more.

NDS (INDA 75-10) 5BN

Cols. 19-26: Energy Range

These columns show the lowest (cols. 19-22) and highest (cols. 23-26) incident neutron energies considered in the given reference for the given reaction.

1. A numerical energy value is entered in exponent notation in electron volts (eV) in the following form:

	Energy Min ± (19 20 21 22)	Energy Max ± (23 24 25 26)
0.0253 eV is entered:	2.5-2	
1 eV is entered:	1.0+0	
187 eV is entered:	1.9+2	
363 keV is entered:	3.6+5	
14 MeV is entered:	1.4+7	
the energy range from 100 keV to 1.2 MeV is entered:	1.0+5	1.2+6

2. Some special cases must be considered, which are entered in the following form:

	Energy Min ± (19 20 21 22)	Energy Max ± (23 24 25)
Energy equals zero. This should only be used for theoretical, calculated or evaluated data where really zero is meant. Otherwise an approximate realistic low energy should be entered instead.	0.0+0	
Negative resonance energies: (only one significant digit) — 0.2 eV:	-2+0	
— 2.2 eV:	-2+1	
No incident neutrons, but the reaction considered is spontaneous fission:	SPON	

3. Approximate energies can be entered when the reference does not provide more information:

	Energy Min ± (19 20 21 22)	Energy Max ± (23 24 25 26)
in the order of some eV:	+0	
in the order of some hundred eV:	+2	
in the keV range:	+3	+5
etc.		

NDS: CINDA 75-10-15

7. Energy-combinations

All physically possible energy entries are accepted.* The Cinda compiler should however consider carefully what the entries really mean. Some examples:

Energy	
Min ±	Max ±
2.5-2	1.1-1
MAXW	1.1-1
-2	1.1-1
MAXW	
MAXW	2.5-2
* MAXW	FAST
-2	+6
4.5-1	
	2.0+2
0.0+0	2.2+6
2.5-2	2.2+6

this means: data are given in the energy range from 0.025 eV to 0.11 eV. However, this entry can also mean: data are given only at 0.025 eV and at 0.11 eV. For distinction it is useful to give the number of data points in the Comments.

this means: data are given averaged over a thermal Maxwellian spectrum and also at 0.11 eV. - This entry does <u>not</u> mean: data are given averaged over a thermal Maxwellian and also point data from thermal energy up to o.11 eV. For this case two entries must be made for the same reference: first entry: from about thermal energy up to 0.11 eV second entry: thermal Maxwellian average

this means: data are given at 0.025 eV and averaged over a thermal Maxwellian. (At present the inverted entry, <u>25-2 MAXW</u> is rejected by the input checking program.)

this means: data given are averaged over a thermal Maxwellian spectrum and over a fast reactor spectrum (e.g.: comparison of fission-yield data in both spectra). -It does <u>not</u> mean: point data $\sigma(E)$ are given from the thermal to the fast neutron energy range; this could be entered as shown here.

this means: data only at 0.45 eV. - It does <u>not</u> mean: $\sigma(E)$ down to 0.45 eV, upper limit not given. - However for resonance-integrals this entry means: low limit of integral is 0.45 eV.

this means: upper limit is 200 eV, the lower limit is not given (usually an approximate lower limit should at least be entered). - For strength-functions it means: all resonances up to 200 eV have been considered.

this means: from 0 to 2.2 MeV. Was this really meant? For nu-bar data 0 MeV usually means 0.0253 eV and should be entered as such.

* Note: Energy combinations with a numerical entry in the E-min field and an alfabetic entry in the E-max field are presently not accepted. Also a few alfabetic energy combinations, e.g. MAXW FISS (= data in a thermal Maxwellian and in a fission neutron spectrum), are not provided for in the internal Cinda file. Should such entries occur, they will be rejected by the NDCC input checking program and returned to NDS by the Feedback mechanism. Such an entry would then be split into two entries, e.g. one for MAXW and one for FISS.

Modifications

To modify an existing entry; this entry is addressed by filling in the following information:

col. 1-14 (S,A,Q,Lab,Block-Nr)

copy the entry to be modified

col. 15: symbol of compiler making the modification

col. 16: operation-code 'M'

col. 19-26 (energy-field): serial-number of the entry to be deleted, right-adjusted with leading zeros, for example 00576928

Exception: when the energy is to be modified, the serial-number is entered in cols. 73-80.

Information to be modified:

col. 17: Hierarchy

if blank: hierarchy is not changed

if a valid hierarchy-code is filled in, the new hierarchy supersedes the earlier one. Hierarchy 'D' is not accepted in a modify-entry.

if underscore: the earlier hierarchy is changed to blank (= hierarchy 3).

col. 18: Worktype

if blank worktype is not changed

if a valid worktype-code is filled in, the new work-type code supersedes the earlier one.

col. 19-26: Energy

E-min and E-max together are considered as one single field. In a modification entry, this field must not contain any blank.

If the energy of the existing entry is not to be changed, the serial-number is entered in the energy field as explained above.

If the energy of the existing entry is to be changed, fill in the energy-value(s) as it should appear after the revision. Both energy-subfields (E-min and E-max) are to be filled in, even if only one of them is to be changed. Any blanks must be filled with underscores (_). Modifications to the energy will be rejected if the energy field contains a blank space. Examples:

Original entry to be modified	Modify-entry	Entry in the file after modification
MAXW FISS	MAXW __+6	MAXW +6
25-2	MAXW ____	MAXW
17+5 30+6	13+5 30+6	13+5 30+6
17+5 30+6	13+5 ____	13+5
50+3	10-2 50+3	10-2 50+3
14+7 15+7	____ 15+7	15+7

NDS-CINDA 75-10-15

col. 27-41: Reference

The ref-type and the reference (but without the ref-date) are considered as one field to be modified. The revised reference, with ref-type, is entered as for a new entry. If this field is blank, the reference is left unchanged.

col. 42-44: Ref-date

Enter as for a new entry. If the field is left blank, the ref-date will be left unchanged. If the month is not known, enter underscore.

col. 45-80: Comment

The revised comment is entered as for a new entry. There are two minor points limiting revised comments:

(a) If the energy as well as the comment is being modified, then cols. 73-80 are taken up by the serial-number. These columns are reset to blank by the input program, but eight characters of comment space are lost. If you cannot do without, make two separate modify-entries, one to modify the energy-field and another to modify the comments-field.

(b) If the comment of a data-index entry is modified, the hierarchy-code "D" in column 17 must be entered. Otherwise the input-program will not discover that the modify-entry is a data-index entry for which no author's name is needed in the comments.

Note: In general, a compiler should modify entries only within his field of responsibility; incidental errors should be corrected when they are found, even if the entry belongs to some other compiler's responsibility. Systematic revisions should be coordinated with the other centers in order to avoid duplication of work.

NDS CINDA 75-10/5

Deletion of single lines (unblocked or within a block)

For deleting an existing entry:

col. 1-14 (S,A,Q,Lab,Block-Nr)
copy the entry to be deleted

col. 15: symbol of compiler making the deletion

col. 16: operation-code 'D'

col. 19-26 (energy-field): serial-number of the entry to be deleted, right-adjusted with leading zeros, for example 00576928.

col. 27-80: any information entered here will be ignored. You may wish to enter here the reference or the reason for the deletion, for easier checking of the deletion-entry.

Usage:

1. When S,A,Q or Lab of a single line is to be changed; when a single line whithin an existing block has to be "de-blocked"(i.e. removed from its original block and entered as a new one or added to another block in the file). Delete the entry and re-enter the corrected version.

2. When a duplication of single lines exists in the file, the worse one of the cuplicate is deleted.

   Warning: when it is not obvious which of the duplicates is the worse one, the following danger exists: someone else may detect the same duplication and he decides to delete the one entry, whereas you incidentally decide to delete the other. Result: both are lost. For safety, one could delete both and write a new entry. Physicists at NDS are asked to mark any deletion in the lab-sort listing.

3. When an unblocked entry has to be added to an existing block, the operation 'LINK' should be used. (See the page "Linking of two blocks")

NDS CINDA 75-10-15
NEW PAGE

Deletion of blocks

Format for deletion of a whole block:

col. 1-14: S,A,Q,Lab,Block-nr of the block to be deleted

col. 15: symbol of compiler making the deletion (NDS: for deletions, the compiler-symbol is '0')

col. 16: operation-code 'K'

col. 19-26 (energy-field): serial-number of the first entry in the block as it appears in the CCDN-listing, right-adjusted with leading zeros. Another serial number from the block may be used, but a warning message will be printed after the Cinda update.

col. 28-31 (journal-field): the word 'KILL'

Usage: 1) When S,A,Q or Lab of an existing block is to be changed, this is done by deleting the block and reentering each line as for a new block.

2) In case of duplication of blocks, the worse of both is to be deleted. The same warning as for deletion of single lines applies (see page 4.4)

3) When a block consisting of one or more lines should be linked to another block existing in the file, this is done by the operation LINK (see page "Linking of two blocks")

NDS CINDA 75-10-0 New Page

Linking of two blocks

Format for linking block X to block Y, i.e. Y is enlarged:

col. 1-11: S,A,Q,Lab common to both blocks

col. 12-14: Block-nr of X (block to be added to Y)

col. 15: symbol of compiler (NDS: for this operation, the compiler-symbol is '0')

col. 16: operation-code 'L'

col.19-26: Serial no. of the first entry in block X

col.28-31: The work 'LINK'

col.42-44: Block No. of Y (block to be enlarged, in the Reference 'DATE' field)

col.73-80: Serial no. of the first entry in block Y.

Usage: Connecting entries which belong to the same experiment and should thus be blocked together