**An Integrated System for Production of Neutronics
and Photonics Computational Constants
Volume 1 Revision 3**

**ECSIL: A SYSTEM FOR STORAGE, RETRIEVAL, AND
DISPLAY OF EXPERIMENTAL NEUTRON DATA**

D. E. Cullen, K. L. Hill, R. J. Howerton, and S. T. Perkins

MASTER

September 1, 1976

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Foreword

The UCRL-50400 series describes an integrated and computer-oriented system for the production and application of neutronics and photonics calculational constants.

The system must supply reliable up-to-date data, select specific types of data on request, provide output in a variety of forms -- ultimately in the form of input to other computer codes -- and function rapidly and efficiently. The system has now been developed to a point where these goals are being realized.

The UCRL-50400 series, *An Integrated System for the Production of Neutronics and Photonics Calculational Constants*, comprises the following volumes:

- Vol. 1 Rev. 3, *EXCEL: A System for Storage, Retrieval, and Manipulation of Experimental Neutron Data*, September 1976.
- Vol. 2 Rev. 2, *Neutron-Induced Interactions: Full Range of Experimental Data*, July 1976.
- Vol. 3 Rev. 2, *Neutron-Induced Interactions: Range of Experimental Data*, July 1976.
- Vol. 4, *EXCEL-2: User's Manual*, April 1971.
- Vol. 5, Rev. 1, *EXCEL: A Code for the Production of Neutronics Data and Cross Section Data*, September 1975.
- Vol. 6, Rev. 1, *Calculated Ranges of Neutron-Induced Reaction Cross Sections from 1.0 eV to 100 MeV Incident for the Full Range of Neutron Data*, October 1975.
- Vol. 7 Part A Rev. 1, *Major Neutron-Induced Reactions ($A \leq 40$): Neutrons, Experimental Data*, July 1976.
- Vol. 7 Part B Rev. 1, *Major Neutron-Induced Reactions ($A \leq 40$): Neutrons, Experimental Data*, July 1976.
- Vol. 8 Rev. 1 Part A, *Neutron-Induced Reactions ($A \leq 40$): Neutrons, Experimental Data*, July 1976.
- Vol. 8 Rev. 1 Part B, *Neutron-Induced Reactions ($A \leq 40$): Neutrons, Experimental Data*, July 1976.
- Vol. 9, *Thermal Ranges of Neutron Reactions Induced by Neutrons, Photons, Deuterons, Tritons, and Alpha Particles*, September 1970.
- Vol. 10, *Calculated Experimental Data for Neutron-Induced Interactions*, July 1976.

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ECSIL: A SYSTEM FOR STORAGE, RETRIEVAL, AND DISPLAY OF EXPERIMENTAL NEUTRON DATA

Abstract

We present the Experimental Cross-Section Information Library (ECSIL) as of September 1, 1976 with its associated formats, conventions, and supporting programs. This volume also includes forms (i.e., plots, indexes, and listings) and the order in which data and bibliographic information may be obtained.

Introduction

In 1958, Lawrence Livermore Laboratory (LLL) installed a computerized system for the storage and retrieval of experimental neutron-interaction data. This experimental cross-section information library has developed gradually and is still being improved.

The present ECSIL system comprises two separate files: a numeric data file and a bibliographic information file. The two files are linked by a four-digit number uniquely assigned to each reference.

In 1959 and 1960, LLL published tabulations of integrated and differential neutron cross sections below 15 MeV. Since that time, the number of entries in the system has increased by more than an order of magnitude. Consequently, the current library contains too much data (over 1.6 million data points) to publish tabulations; the resulting volumes would be prohibitively expensive and bulky. However, by presenting the data in graphs^{1,2} and on microfiche,³ we can significantly reduce expense and bulk. Moreover, bulk reduction means that indexes⁴ and bibliographies⁵ can be added to aid data manipulation.

Relationship to Other Volumes

This volume, which describes the ECSIL system, is closely related to other volumes of the UCRL-50400 Series. It defines ECSIL conventions and explains how to use ECSIL's supporting programs.

- Volume 1 contains bibliographic indexes that can be used to determine whether a given reference is included in the ECSIL system and which experimental data are associated with the reference.
- Volume 2 lists data indexes that can be used to determine the data in the library for a given isotope or reaction.
- Volume 3 presents graphs of all total, elastic, capture, and fission integral cross sections. It also supplies data on λ (neutrons/fission), α (capture/fission ratio), and β (neutrons/nonelastic event).
- Volume 4 presents graphs of all other integrated (as opposed to angular distribution) cross sections, including (n,n') , (n,α) , etc.
- Volume 5 contains the ECSIL library contents tabulated on microfiche.
- Volume 6 lists indexes and tabulated resonance parameters in ECSIL.
- Volume 7 lists tabulated selected resolved resonance parameters.
- Volume 8 lists tabulated selected unresolved resonance parameters.

Corrections and Suggestions

Users of these volumes have been a major aid in detecting and reporting erroneous data that have crept into ECSIL. They have also suggested improvements in the format and scope of these volumes. Please communicate all corrections and suggestions to:

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Many experimenters have furnished us with their data before publication. To them, especially, we offer our grateful thanks. Finally, we would like to express our sincere gratitude to Violet Gambie and Sally Mooney for their efforts in maintaining the bibliographic file.

ECSIL System

This volume describes:

- *Classification scheme for ECSIL* to classify experimental neutron-induced cross sections and related information.
- *The numeric data file and the card-image file.* The numeric data file is large, encompassing 1 603 679 points expressed in 12 800 000 computer words. This is stored in a binary format for rapid computer readout and interpretation. There is also a card-image format, used to prepare new numeric data for inclusion in or retrieval from the data library.
- *Indexing scheme for ECSIL.* Indexes to the ECSIL data library are stored in four sort orders in a format designed for economic computer readout and interpretation. Many questions about data availability can be answered by examining these index files instead of searching the ECSIL library.
- *Bibliographic information file and the bibliography program's operation.* The bibliography information file is relatively small; its 4646 references are stored for simplicity as 16 000 card images. The same card-image format is used to prepare new bibliographic information for inclusion in or retrieval from the library.
- *Computer programs used* not only to maintain the current numeric data file and bibliographic information file but also to prepare indexes, listings, and plots of the data. These indexes, listings, and plots are routinely prepared after every update and published periodically.¹⁻³
- *Proposed changes to the ECSIL system* and numeric data formats to allow the system to handle cross sections for any incident particle [e.g., $(n,p)^4$], and to describe any emerging particle [e.g., angular distribution of either n or p from the reaction $(n,n^0p)^5$]. The new data conventions and formats will not alter the bibliographic system. Presently, this new format is implemented on an experimental basis to handle data on charged particles, pions, etc. Barring complications, it will be adopted in the future to replace the current ECSIL format.

ECSIL Conventions

The ECSIL data system describes experimental neutron-induced cross sections and related information by indicating:

- **Target**. The ZA-number describes the target. There are several special conventions. For example, A is set at zero for elemental mixtures. For compounds, the Z of the element that appears first in the molecular formula is used and A is defined as 300 plus the molecular weight (e.g., H₂O is assigned Z = 1 and A = 318). For unstable targets, the longest-lived isomer is assigned the ZA-number of the target. Short-lived isomers are assigned the Z of the target and A is defined as 600 plus the atomic weight of the target (e.g., ^{242m}Am is assigned Z = 95 and A = 842). See Table 1 for a complete list of compounds and special isotones.
- **Basic-C-number**. A numeric equivalent is used to designate the interaction: total, elastic, capture, etc. In ECSIL, this numeric equivalent becomes the basic-C-number. Table 2 gives a complete list of all basic-C-numbers.
- **C-number-increment**. A numeric equivalent designates the interaction properties measured, such as cross section, angular distribution, or energy distribution. In ECSIL, this numeric equivalent becomes the C-increment-number. The total C-number used to describe the interaction and its property is the sum of the C-number increment and the basic-C-number (e.g., 11 indicates the total (n,n') cross section, while 311 indicates the (n,n') secondary neutron energy spectrum). Table 3 gives a complete list of all C-number-increments. Table 4 lists miscellaneous quantities not included in the basic-C-number, C-number-increment scheme.
- **S-number**. A numeric equivalent further qualifies or describes the interaction. This quantity indicates conditions such as target temperature, the cross section for excitation of one or more levels of the residual nucleus, and the cross section for production of one or more photons. In ECSIL, this numeric equivalent becomes the S-number. Table 5 gives a complete list of all S-numbers.

Table 1. Compounds and special isotopes (assigned ZA's).

Assigned ZA- number	Material	Assigned ZA- number	Material
1302	H ₂ (gas)	14360	SiO ₂
1308	H ₂ O	16364	SiC ₂
1320	D ₂ O	22349	TiH _{0.6}
5370	B ₂ O ₃	22350	TiH _{1.9}
6328	C ₆ H ₄	26460	Fe ₂ O ₃
6341	CH ₃ OH	27660	60 ^m Co
6376	C ₅ H ₆	40391	ZrH _{0.63}
6384	C ₆ H ₁₂	40392	ZrH _{0.98}
6386	C ₆ H ₁₄	40393	ZrH _{1.5}
6392	C ₃ H ₈ O ₃	46394	ZrH _{1.98}
6404	C ₈ H ₈	40395	Zircaloy-2
6492	C ₁₀ H ₈ O ₄	40423	ZrO ₂
6652	C ₂₅ H ₅₂	52723	123 ^m Te
7328	N ₂ (gas)	60636	Nd ₂ O ₃
7353	NH ₄ Cl	61742	148 ^m Pm
7398	NH ₄ Br	82909	RADIO-Pb
7445	NH ₄ I	92570	UO ₂
8331	O ₂ (gas)	95842	242 ^g Am
12340	NiO	95844	244 ^g Am
13401	Al ₂ O ₃	99854	254 ^m Es

Table 2. Basic reaction designator (basic-C-number).

Basic C- number	Cross-section type	Basic C- number	Cross-section type
1	Total	25	(n,X) charged-particle emission
2	Elastic	26	(n,p)
3	Nonelastic	27	(n,Xp)
4	Neutron emission (elastic + nonelastic)	28	(n,d)
5	Total scattering (inelastic + elastic)	29	(n,Xd)
6	Neutron nonelastic emission	30	(n,t)
7	Removal	31	(n,Xt)
8	-	32	(n, ³ He)
9	-	33	(n,X ³ He)
10	-	34	(n, α)
11	(n,n')	35	(n,X α)
12	(n,2n)	36	Activation
13	(n,3n)	37	(n,2 α)
14	(n,n'p)	38	-
15	(n,n'd)	39	-
16	(n,n't)	40	-
17	(n,n', ³ He)	41	Bound atom
18	(n,n', α)	42	Free atom
19	(n,4n)	43	Coherent scattering
20	-	44	Incoherent scattering
21	Absorption	45	Potential scattering
22	(n,fission)	46	$\bar{\nu}_p$, prompt neutrons per fission (average)
23	(n, γ)	47	$\bar{\nu}_d$, delayed neutrons per fission (average)
24	(n,X γ) gamma-ray production	48	n, neutrons produced per nonelastic
		49	α , capture-to-fission ratio

Table 3. Reaction-designator increments (C-increment).

C-increment-number	Reaction property (units)	Definition
0	Integrated cross sections (b) or related parameters	
50	Spectrum-averaged cross sections (b)	
100 ^d	Angular distributions (b/sr)	$\Delta(E, \theta)$
200	Energy distributions (b/MeV)	$\Delta(E, E')$
250 ^d	Angular distributions ^d integrated between fixed angular limits (b)	$\Delta(E, \theta_{\min}^{\theta_{\max}})_{\text{lab}}$
300 ^d	Differential energy distributions (b/sr MeV)	$\Delta(E, E')_{\text{lab}}$
350 ^d	Partial distributions integrated between fixed energy and angular limits (b)	$\Delta(E, E'_{\min} E'_{\max}, \theta_{\min}^{\theta_{\max}})_{\text{lab}}$
400	Energy distributions integrated between fixed energy limits (b)	$\Delta(E, E'_{\min} E'_{\max})$
450 ^d	Legendre expansion of angular distributions - $\sigma_n(E)$ (dimensionless)	$\Delta(E, \theta) = \sigma(E) \sum_{n=0}^{\infty} \frac{2n+1}{4\pi} P_n(E) P_n(\cos\theta)$
500	Resonance integrals (b)	$R.I. = \int_{E_{\min}}^{E_{\max}} \Delta(E) \frac{dE}{E}$
550 ^d	Polarization (dimensionless)	$P(E, \theta)$
600 ^d	Partial distributions integrated between fixed energy limits (b/sr)	$\Delta(E, E'_{\min} E'_{\max}, \theta)_{\text{lab}}$
650 ^d	Partial distributions integrated between fixed angular limits (b/MeV)	$\Delta(E, E', \theta_{\min}^{\theta_{\max}})_{\text{lab}}$
850	C/S ratios (dimensionless)	
900	Miscellaneous quantities	See Table 4.

^d Angular distributions for all unique α, β, γ reactions are expressed in the center-of-mass system. Multibody reactions are expressed in the laboratory frame of reference (as opposed to the center-of-mass frame of reference).

Table 4. Reaction designator for miscellaneous quantities.

C		Spectra parameters	
901	Nuclear temperature, nonelastic (excluding fission)		
902	Nuclear temperature, total nonelastic		
903	Nuclear temperature, fission		
904	Nuclear temperature, inelastic (first neutron)		
905	Nuclear temperature (second neutron)		
		Thermal parameters	
911	Thermal scattering law, $S(\alpha, \beta)$		
		Average resonance parameters	
941	$\bar{D}$ observed	944	$\bar{D}^0$
942	$\bar{D}_f^Y$	945	$\bar{D}_f^0$
943	$\bar{D}_f$	946	$\bar{D}_f^0$
		Resolved resonance parameters	
951	E_0 (energy only)	966	$g\Gamma_n$
952	J, π	967	$g\Gamma_n^0$
953	λ	968	$g\Gamma_Y$
954	g	969	Γ_n/Γ_t
955	J_0	970	Γ_a/Γ_t
956	Γ_t	971	Γ_Y/Γ_t
957	Γ_n	972	Γ_n/Γ_a
958	Γ_n^0	973	Γ_f/Γ_t
959	Γ_Y	974	Γ_f/Γ_a
960	Γ_f	975	Γ_Y/Γ_f
961	Γ_a	976	Γ_t^0
962	Γ_a^0	977	Γ_f^0
963	Γ_p	978	Γ_Y^0
964	$g\Gamma_n^1$	979	Γ_n^0
965	$g\Gamma_n^2$	980	$\sigma_0 \Gamma_n/\Gamma_t$
		981	$\sigma_0 \Gamma_f/\Gamma_t$
		982	$\sigma_0 \Gamma_a/\Gamma_t$
		983	$\sigma_0 \Gamma_Y/\Gamma_t$
		984	$\sigma_0 \Gamma_f/\Gamma_t$
		985	$\sigma_0 \Gamma_f^2/\Gamma_t$
		986	$g_Y \Gamma_n/\Gamma_t$
		987	$2g_n^2/\Gamma_t$
		988	Γ_t^2/Γ_0
		989	g_n^0/Γ_f
		990	$g_f \Gamma_n/\Gamma_t$
		991	$\sigma_0 \Gamma_f/\Gamma_t$
		992	$\Gamma_n^0/\Gamma_f/\Gamma_t$
		993	$g(\Gamma_n)^-$
		994	$g\Gamma_n^1$

Table 5. Reaction-designator modifier^a (S-number).

S-number	Modification (units)
1	Level excitation (MeV)
2	Isomer production (sec)
3	Isomer production (min)
4	Isomer production (hr)
5	Isomer production (d)
6	Isomer production (yr)
7	Photon production (MeV)
8	Unresolved level excitation (MeV)
9	Material temperature (K)
10	Unresolved photon production (MeV)
11	Spin state (dimensionless)
12	Isotope bound in material (dimensionless)
13	Oriented crystal (Miller number)
14	Electron production (MeV)
20	Transmission measurement (b/atom)

^a S + 10 indicates relative distribution.

ECSII. Numeric Data-Card Format

Each data point in the ECSII numeric data-card format (Table 6) is described by 8 required quantities and from 4 to 10 experimentally measured components. All fields in the format are numeric (as opposed to alphanumeric) and must be right adjusted. The end of a file is indicated by an end-of-file card, replacing the end-of-file sentinel (i.e., $Z = 300$) used in earlier versions of ECSII.

The card format allows six of the measured components to appear on a first card and the remaining four on a second card. The second card is present only if more than six components are required to describe the data point. Therefore, each data point is described by either one or two card images.

Table 6. ECHSHE numeric database card format.

Card	Field	Format	Columns	Definition	Relevant tables
1	1	13	1-3 ^a	Z (atomic number of target)	1
	2	13	4-6	A (atomic weight of target)	1
	3	13	7-9	C (interaction numeric equivalent)	2, 3, 4
	4	12	10-11 ^b	S (interaction modifier)	7
	5	E10.3	12-21	Measured components (1 to 10)	8
	6	E10.3	22-31		
	7	E10.3	32-41		
	8	E10.3	42-51		
	9	E10.3	52-61		
	10	E10.3	62-71		
	11	11	72	Status ^c	9
	12	12	73-74	Year (last two digits; e.g., 1972 => 72)	
	13	14	75-78	Reference number	
	14	12	79-80	Subreference number	
2 ^{b,a}			1-11	(Blank)	
	15	E10.3	12-21	Measured components (continued)	8
	16	E10.3	22-31		
	17	E10.3	32-41 ^b		
	18	E10.3	42-51		
			52-71	(Blank)	
	19	11	72	Status ^c	
	20	12	73-74	Year	} Must be identical to corresponding columns on first card ^c
	21	14	75-78	Reference number	
	22	12	79-80	Subreference number	

^a Presence of second card is indicated by adding 5 to status (e.g., status = 1 means preliminary data, one card for data point; status = 6 means preliminary data, two cards for data point).

^b Second or continuation card is present only if data point requires more than six measured components to describe it.

^c Only the status field indicates continuation. These fields are used to check that the continuation card, if required, is indeed present.

FORMAT FOR CARD 1

This section explains the fields on the first data card (Fig. 1).

Field 1: Atomic Number (Z) of Target

For molecules, the Z of the target is defined to be the Z of the first element in the molecular formula (e.g., for H_2O , Z is defined to be 1, the Z for hydrogen). See Table 1 for the present table of compounds and special isotopes.

Field 2: Atomic Weight (A) of Target

For naturally occurring elemental mixtures of isotopes, A is defined to be zero. For monoisotopic elements, the mass number of the single isotope is used (e.g., Fluorine, $A = 19$). For molecules, A is defined to be the molecular weight of the molecule, rounded to the nearest integer, plus 300 [e.g., for H_2O , $A = (\text{molecular weight of } H_2O) + 300 = 318$]. For isomers, the A-number of the longest-lived level is defined to be the mass number (e.g., ^{242m}Am , $A = 242$). For the shorter-lived level, the A-number is defined to be the mass number plus 600 (e.g., ^{242g}Am , $A = 242 + 600 = 842$). Radiolead is arbitrarily assigned the A-value of 999. See Table 1 for a complete list of all compounds and special isotopes. General rules for A are

- $A = 0$ - Naturally occurring elemental mixture.
 - $1 \leq A \leq 299$ - Individual isotope.
 - $300 \leq A \leq 599$ - Molecule.
 - $600 \leq A \leq 988$ - Short-lived isomeric level.
 - $A = 999$ - Radiolead.
- } see Table 1

Field 3: Interaction Designator (C)

The interaction designator is the numeric sum of two numbers, the basic-C and the C-increment. The basic-C-number describes the interaction (e.g., 1 = total, 2 = elastic, etc.), as defined in Table 2. The C-increment-number describes the interaction property as defined in Table 3 [e.g., from Table 2, (n,n') is described by a basic C = 11; the interaction designator for the (n,n') cross section is 11, $(11 + 0)$, whereas 311 $(11 + 300)$ indicates an (n,n') secondary neutron-energy spectrum].

A number of miscellaneous, usually derived quantities do not lend themselves to the scheme outlined above. These quantities, assigned C-numbers from 900 to 999, are defined in Table 4. Table 7 defines the contents of each field for each range of the numeric interaction designator (C).

1	2	3	4	5	6	7	8	9	10	11	12	13	14
Z	A	C	S	D ₁	D ₂	D ₃	D ₄	D ₅	D ₆	Status	Year	Ref. No.	Sub-ref.
1-3	4-6	7-9	10-11	12-21	22-31	32-41	42-51	52-61	62-71	72	73-74	75-78	79-80

Fig. 1. Numeric data card format: Card 1.

Table 7. Field definitions for each numeric interaction-designator (C) range.

Table 7 (Cont.)

Field 4: Interaction Modifier (S)

Table 8 defines all interaction modifiers. Relative distributions are indicated by $S \pm 80$ (e.g., 0 ± 20). $S = 0$ indicates a free-atom cross-section element; $S = 22$, $S = 80$ indicates a relative fission cross-section (dimensionless); $S = 0$ or 80 indicates that only the minimum number of fields are present, whereas all other S values require one or more X_p fields. (See Table 7 for the position of X_p fields for each range of the interaction designator C , and Table 8 for the number of X_p fields allowed for each S -value.)

Fields 1 to 10: Experimentally Measured Components ($X_p = 0$)

Fields 5 to 10 on the first card (and fields 1 to 6 on the second card, if required) contain the actual results of the measurements. Table 7 defines the physical significance of each measured component for each range of the interaction designator (C). ECSE system conventions adopted for handling or interpreting the measured components follow:

- Energy is left blank for energy-dependent parameters (e.g., free-atom cross section).

Table 8. Interaction designator modifier (S-number).^a

S	Modifier	X_i^b field definition (units)	Allowed $X_i^{b,c}$ fields
1	Level excitation	Energy of excited level (MeV)	1-6
2	Isomer production	Half-life of isomer ^d (sec)	1-6
3	Isomer production	Half-life of isomer ^d (min)	1-6
4	Isomer production	Half-life of isomer ^d (hr)	1-6
5	Isomer production	Half-life of isomer ^d (day)	1-6
6	Isomer production	Half-life of isomer ^d (yr)	1-6
7	Photon production	Energy of photon (MeV)	1-6
8	Unresolved level excitation	Lower (X_1) and upper (X_2) (MeV)	2
9	Material temperature	Energy limits of temperature levels (K ^e)	1
10	Unresolved photon excitation	Lower (X_1) and upper (X_2) energy limits of photons (MeV)	2
11	Spin state	J (dimensionless)	1
12	Isotope bound in material	ZA ^f of binding material (dimensionless)	1
13	Oriented crystal	Miller number (HKL)	1
14	Electron production	Energy of electron (MeV)	1-6
20	Transmission measurements ^g	Target thickness (b/atom)	1

^a S + 80 indicates relative distribution.^b All X_i fields are nonnegative (i.e., zero or positive).^c Multiple X_i fields must be in ascending order (i.e., $X_i < X_{i+1}$).^d Half-life = 0.0 indicates stable isotope.^e If not specified, cross sections are at room temperature (293 K).^f ZA = 1000Z + A (see Table 1 for compounds and special isotopes).^g No longer carried in ECSIL library. Converted to cross section without multiple scattering correction (noted in bibliography).

- A standard set of units (as opposed to arbitrary units) are used. These units are: MeV, barns, steradians, and seconds. Energy levels are in MeV. An exception: half-lives are expressed in seconds, minutes, hours, days, or years (see Table 7).
- The library contains only the latest data. Older data are deleted from the library. Renormalized data are carried in the final form. A6SH does not contain transmission data for absorption sections.
- Uncertainties (e.g., cross-section error, energy resolution) are always expressed in the same units as the data with which they are associated (e.g., cross section and error both in barns, energy and error in MeV).
- For spectrum-averaged cross sections, no attempt is made to distinguish between thermal (Maxwellian) and thermal-reactor spectrum-averaged cross sections. Both are designated as spectrum-averaged cross sections at 0.025 eV. Similarly, fission-spectrum-averaged cross sections are entered with an equivalent energy of 2.0 MeV. Further differentiation is left to the annotations in the bibliographic library.
- Angular information of all two-body interactions are expressed in the center of mass system. Multibody reactions are naturally in the laboratory system.
- Legendre coefficients are normalized (Table 9); however, a_0 is never input.
- All resonance integrals include the λ_0 contribution.
- If for a resonance integral no upper energy limit is available, it is assigned a large value (e.g., 15 MeV).
- Spectrum-averaged C in the epithermal energy region is defined in the same manner as the ratio of the capture-resonance integral to that of λ_0 . It is thus assigned a C of 5.9 to resonance integrals that are λ_0 only (99 (spectrum-averaged)).
- Parity ($C = 572$) is defined as ± 1.0 for $+$ or $-$ parity, or 0 .
- Fission widths may have either a plus (+) or minus (-) sign because they are associated with the interference term in a multichannel calculation.

Field 11: Status Designator

The status indicates the current state or condition of a data point.

Table 9 lists the three status categories and their numeric equivalents.

Table 9. Status designators.

Designator	Status
0 (or blank), 5 ²¹	Data usable without restriction
1, 6 ²¹	Preliminary data
2, 7 ²¹	Data not to be released (usually at request of author)

²¹ For data points that require two input cards.

Status designator +5) is used in the card format to indicate that the data point is continued onto a second card. For example, a 1 in the status designator field indicates a preliminary data point contained on one line. A 6 indicates a preliminary data point whose components are continued onto a second card. The status designator on the second card must be identical to that on the first.^{*}

Field 12: Year

These are the last two digits of the year in which the data was published for in the case of a private communication, the last two digits of the year in which the data was received (e.g., 1973 → 73).

Field 13: Reference Number

A serial four-digit reference number is assigned when the reference number is entered into the system. Reference numbers are never reassigned even after data are deleted from the library.

Field 14: Subreference Number

This is designed to differentiate between portions of the data from a given reference. It's presently unused (i.e., always zero 00).

Footnote:

^{*} Although not which set of numbers is used, the status stored in the second card must be the 0, 1, or 2. This is important in planning preliminary releases of data from the EUSL files. Any such preliminary release on the original status designator if it produces data in the first column of the table.

FORMAT FOR CARD 2

This section explains the fields on the second data card (Fig. 2).

Card 2 only is present if over six experimentally measured components are required to describe a given data point. The presence of this continuation card is indicated by a status of five or greater (see field 11). The status, as well as year, reference number, and subreference number, must be identical on both first and second cards. Columns 1 to 11 (Z, A, C, S fields) on the second card must be blank.

Fields 5 to 18: Experimentally Measured Components.

Fields 5 to 16 of card 1 for all conventions associated with the experimental components.

Fields 17 to 22: Status, Year, Reference Number, and Subreference Number.

These items on the continuation card must be identical to the corresponding fields on the first card. See fields 11 to 14 of card 1 for all conventions associated with these fields.

Pages 3 and 4 illustrate the LCSH card image format as it applies to the σ elastic cross section ($C = 2$) and angular distributions ($C = 102$). Pages 5 to 7 illustrate the interpreted histories and plots of data obtained from the LCSH code.

	15	16	17	18		Status	Year	Ref.	Subref.
(blank)	σ_T	σ_{el}	σ_{in}	σ_{out}	Line			σ_{in}/σ_{out}	σ_{in}/σ_{el}
1	10	11	12	13	14	15	16	17	18

FIG. 2. Numerical data and format for the second data card.

92235	2	0	1.9000	-7	2.1000	1	0551329	0
92235	2	0	2.2000	-7	1.0000	1	0551329	0
92235	2	0	2.4000	-7	1.7000	1	0551329	0
92235	2	0	2.7100	-7	1.4700	1	058395	0
92235	2	0	3.0000	-7	1.3000	1	0551329	0
92235	2	0	3.0000	-7	2.1000	1	0551329	0
92235	2	0	3.3000	-7	1.0000	1	0551329	0
92235	2	0	3.7000	-7	1.5000	1	0551329	0
92235	2	0	4.0000	-7	1.6000	1	0551329	0
92235	2	0	4.4000	-7	6.0000	0	0551329	6
92235	2	0	4.9000	-7	1.1000	1	0551329	0
92235	2	0	5.5000	-7	1.2000	1	0551329	0
92235	2	0	5.8000	-7	1.1000	1	0551329	0
92235	2	0	6.2000	-7	1.2500	1	0551329	0
92235	2	0	6.2000	-7	1.0500	1	0551329	0
92235	2	0	6.5000	-7	1.3500	1	2671493	0
92235	2	0	6.8000	-7	1.3000	1	0551329	0
92235	2	0	7.0000	-7	1.1500	1	0551329	0
92235	2	0	7.0000	-7	1.6000	1	0551329	0
92235	2	0	7.5000	-7	1.3400	1	2671493	0
92235	2	0	7.5000	-7	1.3000	1	0551329	0
92235	2	0	7.5600	-7	1.4100	1	4.0000	1
92235	2	0	8.0000	-7	9.5000	0	0551329	0
92235	2	0	8.3000	-7	1.3100	1	2671493	0
92235	2	0	8.5000	-7	1.1500	1	0551329	0
92235	2	0	9.0000	-7	1.2500	1	0551329	0
92235	2	0	9.4000	-7	1.3200	1	2671493	0
92235	2	0	9.7000	-7	1.2500	1	0551329	0
92235	2	0	1.0300	-6	1.4100	1	0681530	0
92235	2	0	1.0440	-6	1.3400	1	058395	0
92235	2	0	1.0500	-6	1.2100	1	2671493	0
92235	2	0	1.0500	-6	1.5500	1	0681530	0
92235	2	0	1.1000	-6	1.4000	1	0551329	0
92235	2	0	1.1500	-6	1.3500	1	2671493	0
92235	2	0	1.1500	-6	1.4300	1	0681530	0
92235	2	0	1.1800	-6	1.5800	1	0681530	0
92235	2	0	1.2000	-6	1.6000	1	0551329	0
92235	2	0	1.2500	-6	1.3000	1	2671493	0
92235	2	0	1.2700	-6	1.4500	1	0681530	0
92235	2	0	1.3000	-6	1.3500	1	0551329	0
92235	2	0	1.3100	-6	1.5700	1	0681530	0
92235	2	0	1.3500	-6	1.3200	1	2671493	0
92235	2	0	1.4000	-6	1.0000	1	0551329	0
92235	2	0	1.4300	-6	1.4400	1	0681530	0
92235	2	0	1.4500	-6	1.3000	1	2671493	0
92235	2	0	1.4700	-6	1.4600	1	0681530	0
92235	2	0	1.5000	-6	9.0000	0	0551329	0
92235	2	0	1.5500	-6	1.2800	1	2671493	0
92235	2	0	1.5800	-6	1.3500	1	0681530	0
92235	2	0	1.6100	-6	1.5200	1	0681530	0
92235	2	0	1.6500	-6	1.2400	1	2671493	0
92235	2	0	1.6900	-6	1.4600	1	0681530	0
92235	2	0	1.7000	-6	9.0000	0	0551329	0
92235	2	0	1.7200	-6	1.4300	1	0681530	0
92235	2	0	1.7500	-6	1.2700	1	2671493	0
92235	2	0	1.8000	-6	1.2600	1	0681530	0
92235	2	0	1.8000	-6	1.2960	1	0551329	0
92235	2	0	1.8100	-6	1.2400	1	058395	0
92235	2	0	1.8300	-6	1.4300	1	0681530	0
92235	2	0	1.8500	-6	1.2300	1	2671493	0

Fig. 3. Card format for ^{235}U elastic cross section.

92235102 0 5.0000-1	-4.9970-1 2.3000-1	057 444 0
92235102 0 5.0000-1	-2.5850-1 2.7000-1	057 444 0
92235102 0 5.0000-1	2.9630-4 3.5000-1	057 444 0
92235102 0 5.0000-1	2.5910-1 4.6000-1	057 444 0
92235102 0 5.0000-1	5.0000-1 5.5000-1	057 444 0
92235102 0 5.0000-1	7.0720-1 8.1000-1	057 444 0
92235102 0 5.0000-1	8.6610-1 1.1500-0	057 444 0
92235102 0 5.0000-1	8.0630-1 1.2900-0	057 444 0
92235102 0 5.0000-1	0.0000-0 2.6000-1	1561377 0
92235102 0 5.0000-1	0.0000-0 2.3000-1	1681377 0
92235102 0 5.0000-1	-5.4250-1 1.3000-1	057 444 0
92235102 0 5.0000-1	-4.3970-1 2.1000-1	057 444 0
92235102 0 5.0000-1	-2.5850-1 2.5000-1	057 444 0
92235102 0 5.0000-1	0.0000-0 1.8000-1	1561377 0
92235102 0 5.0000-1	2.9630-4 1.3000-1	057 444 0
92235102 0 5.0000-1	2.5910-1 1.6000-1	057 444 0
92235102 0 5.0000-1	5.0020-1 2.5000-1	057 444 0
92235102 0 5.0000-1	7.0720-1 5.4000-1	057 444 0
92235102 0 5.0000-1	8.6610-1 1.1000-0	057 444 0
92235102 0 5.0000-1	9.0630-1 1.2700-0	057 444 0
92235102 0 5.0000-1	-8.1602-1 4.9000-2	0723788 0
92235102 0 5.0000-1	-8.1915-1 6.0000-2	0723788 0
92235102 0 5.0000-1	-7.6604-1 5.7000-2	0723788 0
92235102 0 5.0000-1	-6.4278-1 1.1100-1	0723788 0
92235102 0 5.0000-1	-5.0030-1 1.5700-1	0723788 0
92235102 0 5.0000-1	-3.4202-1 2.1900-1	0723788 0
92235102 0 5.0000-1	-2.5882-1 2.3900-1	0723788 0
92235102 0 5.0000-1	-1.7354-1 2.5200-1	0723788 0
92235102 0 5.0000-1	0.0000-0 1.8000-1	1561377 0
92235102 0 5.0000-1	0.0000-0 2.3300-1	0723788 0
92235102 0 5.0000-1	1.7354-1 1.8000-1	0723788 0
92235102 0 5.0000-1	3.4202-1 1.7600-1	0723788 0
92235102 0 5.0000-1	5.0030-1 1.2600-1	0723788 0
92235102 0 5.0000-1	5.7357-1 1.9200-1	0723788 0
92235102 0 5.0000-1	6.4278-1 3.0100-1	0723788 0
92235102 0 5.0000-1	7.0710-1 4.6300-1	0723788 0
92235102 0 5.0000-1	7.6604-1 6.7500-1	0723788 0
92235102 0 5.0000-1	8.1915-1 8.5400-1	0723788 0
92235102 0 5.0000-1	8.6602-1 1.1687-0	0723788 0
92235102 0 5.0000-1	9.0630-1 1.5200-0	0723788 0
92235102 0 5.0000-1	9.3959-1 1.8910-0	0723788 0
92235102 0 5.0000-1	0.0000-0 1.8000-1	1561377 0
92235102 0 5.0000-1	8.6602-1 4.7000-2	0723788 0
92235102 0 5.0000-1	-8.1915-1 4.5000-2	0723788 0
92235102 0 5.0000-1	-7.6604-1 4.5000-2	0723788 0
92235102 0 5.0000-1	-6.4278-1 6.6200-2	0723788 0
92235102 0 5.0000-1	-5.0000-1 1.0600-1	0723788 0
92235102 0 5.0000-1	-3.4202-1 1.6800-1	0723788 0
92235102 0 5.0000-1	-2.5882-1 1.9300-1	0723788 0
92235102 0 5.0000-1	-1.7354-1 2.1600-1	0723788 0
92235102 0 5.0000-1	0.0000-0 2.1900-1	0723788 0
92235102 0 5.0000-1	1.7354-1 1.7900-1	0723788 0
92235102 0 5.0000-1	3.4202-1 1.1100-1	0723788 0
92235102 0 5.0000-1	5.0000-1 7.0000-2	0723788 0
92235102 0 5.0000-1	5.7357-1 1.8200-1	0723788 0
92235102 0 5.0000-1	6.4278-1 1.8000-1	0723788 0
92235102 0 5.0000-1	7.0710-1 3.1700-1	0723788 0
92235102 0 5.0000-1	7.6604-1 5.5400-1	0723788 0
92235102 0 5.0000-1	8.1915-1 9.8700-1	0723788 0
92235102 0 5.0000-1	8.6602-1 1.2450-0	0723788 0

Fig. 4. Card format for ²³⁵U elastic angular distributions.

REFERENCE	ENERGY MeV	DATA ME	σ _{tot} BARN	DATA BARN	REFERENCE	ENERGY MeV	DATA ME	σ _{tot} BARN	DATA BARN
66 3649	0.1112	+	1.8885	1.9243	66 3649	0.3312	+	1.3086	1.2472
66 3649	0.1141	+	2.3836	1.9243	66 3649	0.3341	+	1.2569	1.2472
66 3649	0.2001	+	1.5795	1.7097	66 3649	0.3371	+	1.1598	1.2472
66 3649	0.2221	+	5.2124	1.2062	66 3649	0.3401	+	1.0758	1.2472
66 3649	0.2991	+	7.5593	1.1695	66 3649	0.3431	+	1.0703	1.2472
66 3649	0.3211	+	6.5594	1.2977	66 3649	0.3461	+	1.0693	1.2472
66 3649	0.3382	+	2.3453	1.1426	66 3649	0.3491	+	1.0683	1.2472
66 3649	0.3412	+	1.3733	1.0865	66 3649	0.3521	+	1.0673	1.2472
66 3649	0.3474	+	1.4559	1.0775	66 3649	0.3551	+	1.0663	1.2472
66 3649	0.3505	+	1.2318	1.0590	66 3649	0.3581	+	1.0653	1.2472
66 3649	0.3559	+	1.3646	1.0230	66 3649	0.3611	+	1.0643	1.2472
66 3649	0.3599	+	1.3613	1.0265	66 3649	0.3641	+	1.0633	1.2472
66 3649	0.3663	+	1.3202	1.0222	66 3649	0.3671	+	1.0623	1.2472
66 3649	0.3695	+	1.3265	1.0125	66 3649	0.3701	+	1.0613	1.2472
66 3649	0.3759	+	1.4731	1.7.3656	66 3649	0.3731	+	1.0603	1.2472
66 3649	0.3791	+	1.5142	1.7.5712	66 3649	0.3761	+	1.0593	1.2472
66 3649	0.3856	+	1.4826	1.7.1443	66 3649	0.3791	+	1.0583	1.2472
66 3649	0.3889	+	1.3865	1.6.9425	66 3649	0.3821	+	1.0573	1.2472
66 3649	0.3955	+	1.3203	1.6.8215	66 3649	0.3851	+	1.0563	1.2472
66 3649	0.3988	+	1.1435	1.6.7175	66 3649	0.3881	+	1.0553	1.2472
66 3649	0.4055	+	1.4404	1.7.2520	66 3649	0.3911	+	1.0543	1.2472
66 3649	0.4089	+	1.3967	1.6.9839	66 3649	0.3941	+	1.0533	1.2472
66 3649	0.4137	+	1.3334	1.6.8170	66 3649	0.3971	+	1.0523	1.2472
66 3649	0.4191	+	1.2752	1.6.3760	66 3649	0.4001	+	1.0513	1.2472
66 3649	0.4260	+	1.3262	1.6.1312	66 3649	0.4031	+	1.0503	1.2472
66 3649	0.4294	+	1.2333	1.6.1515	66 3649	0.4061	+	1.0493	1.2472
66 3649	0.4356	+	1.2317	1.6.1585	66 3649	0.4091	+	1.0483	1.2472
66 3649	0.4393	+	1.2211	1.6.2025	66 3649	0.4121	+	1.0473	1.2472
66 3649	0.4470	+	1.2889	1.6.4445	66 3649	0.4151	+	1.0463	1.2472
66 3649	0.4535	+	1.2966	1.6.4730	66 3649	0.4181	+	1.0453	1.2472
66 3649	0.4577	+	1.1259	1.7.0644	66 3649	0.4211	+	1.0443	1.2472
66 3649	0.4613	+	1.0944	1.7.4722	66 3649	0.4241	+	1.0433	1.2472
66 3649	0.4680	+	2.3565	1.1.1922	66 3649	0.4271	+	1.0423	1.2472
66 3649	0.4733	+	2.5572	1.1.2746	66 3649	0.4301	+	1.0413	1.2472
66 3649	0.4795	+	1.9380	1.0.9920	66 3649	0.4331	+	1.0403	1.2472
66 3649	0.4833	+	1.6915	1.0.9550	66 3649	0.4361	+	1.0393	1.2472
66 3649	0.4908	+	1.7934	1.7.3395	66 3649	0.4391	+	1.0383	1.2472
66 3649	0.4946	+	1.2724	1.6.8521	66 3649	0.4421	+	1.0373	1.2472
66 3649	0.5022	+	1.0244	1.5.1372	66 3649	0.4451	+	1.0363	1.2472
66 3649	0.5050	+	3.3916	1.0.5988	66 3649	0.4481	+	1.0353	1.2472
66 3649	0.5137	+	1.2513	1.6.2595	66 3649	0.4511	+	1.0343	1.2472
66 3649	0.5176	+	1.4403	1.7.2005	66 3649	0.4541	+	1.0333	1.2472
66 3649	0.5254	+	1.4210	1.6.1092	66 3649	0.4571	+	1.0323	1.2472
66 3649	0.5293	+	1.5339	1.7.6575	66 3649	0.4601	+	1.0313	1.2472
66 3649	0.5372	+	1.2655	1.6.4505	66 3649	0.4631	+	1.0303	1.2472
66 3649	0.5412	+	1.4331	1.5.0655	66 3649	0.4661	+	1.0293	1.2472
66 3649	0.5497	+	1.4455	1.5.1425	66 3649	0.4691	+	1.0283	1.2472
66 3649	0.5533	+	1.2411	1.6.2254	66 3649	0.4721	+	1.0273	1.2472
66 3649	0.5565	+	1.4233	1.7.1110	66 3649	0.4751	+	1.0263	1.2472
66 3649	0.5656	+	1.4388	1.7.1744	66 3649	0.4781	+	1.0253	1.2472
66 3649	0.5734	+	1.4688	1.6.8440	66 3649	0.4811	+	1.0243	1.2472
66 3649	0.5815	+	1.7972	1.6.6357	66 3649	0.4841	+	1.0233	1.2472
66 3649	0.5854	+	1.4411	1.5.4572	66 3649	0.4871	+	1.0223	1.2472
66 3649	0.5925	+	1.2248	1.4.8111	66 3649	0.4901	+	1.0213	1.2472

Fig. 5. Interpreted listing of ²³⁵U elastic cross sections.

69 15 76

Elastic
Angular Differential

79 - 68

[illegible]

Fig. 6. Interpreted listing of ^{235}C elastic angular distributions.

Fig. 7. Plot of ^{235}U elastic cross section.

Fig. 7 (cont.)

ECSIL Numeric Data-Library Format

LIBRARY ORGANIZATION

Although the following description of the ECSIL library discusses quantities that appear to be fixed-point (e.g., ZA, word counts), every word within the ECSIL numeric data library is stored in floating-point.

The data points within the ECSIL numeric data library are sorted according to the numeric equivalents used to describe the target (Z,A), the interaction (C,S), etc. Status, year, reference number, and subreference number are not used to sort the library.

The overall sorting order of the information in the data file is to arrange all data first by the ZA-number ($1000Z + A$). With the exception of resolved resonance parameters ($951 \leq C \leq 999$), the next sort is on C-number (see Tables 2, 3, and 4). Excluding all resonance parameters ($041 \leq C \leq 999$), this is followed by a sort on the S-numbers and their pertinent data fields, X_i (see Table 7). Subsequent sorting criteria depend on the interaction property measured. Table 10 describes all sort criteria after ZA.

LIBRARY FILE STRUCTURE

Figure 8 displays the organization of the ECSIL data library.

The numeric data library has 12 files, each containing a range of Z-values. These files are always read from disk, as opposed to magnetic tape, and are identified as follows:

<u>Filename</u>	<u>Z-range</u>
LIB001	1-7
LIB002	8-13
LIB003	14-22
LIB004	23-26
LIB005	27-34
LIB006	35-45
LIB007	46-59
LIB008	60-78
LIB009	79-91
LIB010	92
LIB011	93-94
LIB012	95-

Table 10. Sort order of ECSIL data library within a given ZA.

C-range	Sorting criteria					
	1	2	3	4	5	6
1-99	C	S	X_i^a	E^b		
101-149	↑	↑	↑	E	$\cos\theta$	
201-249				E	E'	
251-299				E	$(\cos\theta)_{\min}$	
301-349				E	E'	$\cos\theta$
351-399				E	$E'_{\min}$	$(\cos\theta)_{\min}$
401-449				E	$E'_{\min}$	
451-499				E	ℓ	
501-549				$E_{\min}$		
551-599				E	$\cos\theta$	
601-649				E	$E'_{\min}$	$\cos\theta$
651-699				E	E'	$(\cos\theta)_{\min}$
801-849				ZA_D^c	C_D^d	E
900-904				E	$E'_{\min}$	
911			↓	T	α	δ
941-943		0^e	0	$E_{\min}$	J^f	
944-946		0	0	$E_{\min}$	ℓ	J^f
951-999	951	0	0	E	C	

^a If $S = 0$, sort key defines $X_i \equiv -1.0$; $i = 1, 6$.

^b Activation ($C = 36$) is a special case. The sorting criterion is first ZA_2 , the ZA of the activation product, then E.

^c ZA_D identifies isotope in denominator of ratio.

^d C_D identifies reaction in denominator of ratio ($C_D = 1$ to 49).

^e Defined as 0 for sort key.

^f Defined as -1.0 for sort key if J not given ($S = 0$).

- a - End-of-file and record sentinels are no longer used.
- b - ZA = 1000Z + A; first word of each binary record; applied to all data points in record.
- c - Count of additional data components (0 to 6).
(All words in CCSIL, including additional data count, are floating-point numbers.)
- d - CS = 100C + S.
- e - Reference = (status no.) $\times 10^8$ + (yr) $\times 10^6$ + (Ref. No.) $\times 10^2$ + (subref. No.).

FIG. 8. Data-library format.

The division of the library into a number of relatively small volumes, each with a separate Z-range, greatly simplifies updating and retrieval. Only those volumes affected need be present on the disks.

Each of the 12 library volumes consists of a number of variable-length data records, with each record up to 5000 words. The file is terminated by an end-of-file. This replaces the end-of-file sentinel used in earlier versions of ECSIL.

A given variable-length data record only applies to a single ZA. However, for a given ZA, there may be as many data records as are required to hold all of the data points associated with the ZA, with each record 5000 words or less. The ZA appears only once in each data record, as the first word (in floating point). The remainder of the data record is a series of data points. Since the data records are of variable length, no end-of-record sentinel is used (as in earlier versions of ECSIL).

Each data point consists of 7 to 13 words. The first seven words contain the minimum information associated with a data point: , S, status, year, reference number, subreference number, four measured compositions, and a count of the extra number word (0 to 6 in floating point). The remaining zero to six words contain additional measured compositions, as outlined in the description of the numeric data-card format. The contents of the first seven words * follow:

<u>Word</u>	<u>Description of contents</u>
1	1
2	2
3	3
4	4
5	5
6	6
7	7
8	8
9	9
10	10
11	11
12	12
13	13
14	14
15	15
16	16
17	17
18	18
19	19
20	20
21	21
22	22
23	23
24	24
25	25
26	26
27	27
28	28
29	29
30	30
31	31
32	32
33	33
34	34
35	35
36	36
37	37
38	38
39	39
40	40
41	41
42	42
43	43
44	44
45	45
46	46
47	47
48	48
49	49
50	50
51	51
52	52
53	53
54	54
55	55
56	56
57	57
58	58
59	59
60	60
61	61
62	62
63	63
64	64
65	65
66	66
67	67
68	68
69	69
70	70
71	71
72	72
73	73
74	74
75	75
76	76
77	77
78	78
79	79
80	80
81	81
82	82
83	83
84	84
85	85
86	86
87	87
88	88
89	89
90	90
91	91
92	92
93	93
94	94
95	95
96	96
97	97
98	98
99	99
100	100

1 Additional word count (0 to 6)*
2 Combined CS* = 100 C+S
3 Measured quantity (1) }
4 Measured quantity (2) } See Table 7 for definition of each
5 Measured quantity (3) } range of C-values.
6 Measured quantity (4) }
7 Combined Ref. No.* = status $\times 10^8$ + yr $\times 10^6$ + (Ref. No.) $\times 10^3$ +
(subref. No.). (Status is always stored as 0, 1, or 2.)

* All words in library are floating-point.

The contents of the remaining fields are

Word Description of contents

8	Measured quantity (5)	} See Tables 7 and 8 for definitions of each value of S and range of C-values.
9	Measured quantity (6)	
10	Measured quantity (7)	
11	Measured quantity (8)	
12	Measured quantity (9)	
13	Measured quantity (10)	

Each data point is immediately followed by another until the end of the variable-length data record is reached. The record address of the first point in the record is always the second word (immediately following ZAO). If P_1 is the record address of the first word of the 1st data point on the record and N_1 is the corresponding additional word count, the record address of the first word of the $(i + 1)^{th}$ data point is $P_{i+1} = P_1 + iN_1$ (i.e., $i + N_1$ words from the start of the 1st data point).

ECSIL Reaction-Index Format

Each entry in the ECSIL reaction index describes an experimental measurement involving a single target and reaction. Presently, there are over 18 000 such entries in this index. The program ECSDIX makes such indexes in four sorting orders, identified by the letters A to D:

- A = Z/A C/S/E
- B = ref./Z/A C/S/E
- C = C/S/Z/A E
- D = mass/ C C-Increment/S/Z/A E

All four index files have an identical format (Fig. 9).

Since most of the above quantities have already been described, Table 11 simply summarizes the format and special conventions used in the reaction-index files.

Table 11. Format and special conventions for reaction-index files.

Field	Format	Columns	Definition
1	-	1	(Blank)
2	1-	2-3	Z
3	1-	5-7	A
4	13	16-19	C
5	12	21-22	S
6	110.3	23-22	Lowest energy of isomer (eV)
7	110.3	23-32	Highest energy of isomer (eV)
8	11	33	Status
9	12	34-35	Yr
10	13	36-39	Reference number
11	12	40-41	Subreference number
12	16	42-47	Number of experimentally measured points
13	13	48-50	Index to ECSIL vol. containing this entry (1 for volume 1 to 12)
14	1X,11	51-52	Blank, "N", or "C": Indicate non-accepted entries (originally automatically rejected by program ECSDIX)

Fig. 9. Reaction-index format.

Because of the relatively small size of these index files, it is simple and economical to answer many questions about data availability without recourse to searching the entire ECSSL Library. Questions that can be answered immediately include:

- Do you have any (n, n') data for ^{59}Co ?
- How relevant is the total data for ^{235}U ?
- Do you have any (n, X)-photon angular distributions for natural iron?

Figures 10-14 illustrate portions of the four index files:

FIGURE 10. A-Z-E-order

FIGURE 11. A-Z/A-E/Sn-order

FIGURE 12. A-Z/A-E-order

FIGURE 13. A-Z/A-E-Increment S, Z/A/E-order

Figures 10-14 illustrate how various indexes can be used to locate entries for ^{235}U elastic cross-section data.

Figure 15 illustrates all reaction index entries for the ^{235}U entry (A = 92, Z = 92, A.C. = 0, 235, 2, 0) and angular distributions (A.C. = 0, 235, 2, 0).

Figure 16 illustrates a portion of the references from INDEX for ^{235}U .

Figures 17-20 illustrate what other reactions can be retrieved for ^{235}U .

Figure 21 illustrates a portion of the references for ^{235}U .

Figure 22 illustrates a portion of the references for ^{235}U .

Figure 23 illustrates a portion of the references for ^{235}U .

Figure 24 illustrates a portion of the references for ^{235}U .

92235	1	0	1.070E-01	5.990E-01	7339+500	388	10	N
92235	1	0	1.905E-01	1.277E-02	66151+00	1934	10	N
92235	1	0	4.960E-01	1.517E-01	7132+000	1680	10	C
92235	1	0	5.020E-01	9.500E-01	61006+500	4	10	N
92235	1	0	5.067E-01	9.916E-00	7533+100	688	10	N
92235	1	0	10.063E-01	1.497E-00	61002+00	69	10	N
92235	1	0	1.500E-00	2.000E-00	7237+800	3	10	N
92235	1	0	1.500E-00	4.000E-00	61593+00	16	10	N
92235	1	0	1.253E+00	1.490E-01	61705+000	106	10	N
92235	1	0	7.050E-00	1.495E-01	57002+00	5	10	N
92235	1	0	1.740E-01	2.890E-00	60567300	4	10	N
92235	1	0	7.490E-06	7.243E-04	610436300	5769	10	C
92235	1	0	1.900E-07	7.903E-07	55132900	33	10	N
92235	1	0	2.710E-07	7.740E-06	5003990	3	10	N
92235	1	0	6.500E-07	9.456E-05	61267149300	216	10	N
92235	1	0	1.020E-06	2.990E-05	68193000	234	10	N
92235	1	0	7.388E-06	1.307E-04	60369300	1364	10	N
92235	1	0	3.000E-01	1.495E-00	61027300	26	10	N
92235	1	0	4.000E-01	6.000E-01	56133100	24	10	N
92235	1	0	5.000E-01	1.000E-00	56014900	2	10	N
92235	1	0	6.500E-01	1.000E-00	57044400	2	10	N
92235	1	0	1.500E-00	2.000E-00	7237+800	3	10	N
92235	1	0	5.000E-01	1.000E-00	56014900	2	10	N
92235	1	0	9.000E-01	9.000E-01	61075400	1	10	N
92235	1	0	3.000E-00	2.500E-00	56015100	2	10	N
92235	1	0	3.000E-00	3.000E-00	55144800	1	10	N
92235	1	0	4.000E-00	4.000E-00	55138300	2	10	N
92235	1	0	8.100E-00	6.100E-00	69162800	1	10	N
92235	1	0	8.100E-00	1.410E-01	58099200	3	10	N
92235	1	0	3.240E-01	1.870E-01	61070600	4	10	N
92235	1	0	8.2500E-01	1.200E-00	57044400	4	10	N
92235	1	0	8.500E-01	2.000E-00	59007700	3	10	N
92235	1	0	9.000E-01	9.000E-01	61075400	1	10	N
92235	1	0	1.500E-00	2.000E-00	7237+800	3	10	N
92235	1	0	2.000E-00	2.000E-00	69259800	3	10	N
92235	1	0	4.000E-00	7.500E-00	69491600	3	10	N
92235	1	0	1.500E-00	2.000E-00	7237+800	15	10	N
92235	1	0	1.300E-01	1.500E-00	60166137700	54	10	N
92235	1	0	8.500E-01	2.000E-00	59007700	7	10	C
92235	1	0	7.000E-00	8.000E-00	6026629200	15	10	N
92235	1	0	3.000E-00	1.630E-07	51416000	33	10	N
92235	1	0	2.340E-08	2.810E-06	62135900	131	10	N
92235	1	0	2.500E-08	2.500E-08	54133000	1	10	N
92235	1	0	2.500E-08	2.500E-08	50131100	1	10	N
92235	1	0	2.530E-08	2.530E-08	46131300	1	10	N
92235	1	0	2.510E-08	2.510E-08	54127900	1	10	N
92235	1	0	9.934E-07	1.746E-05	75326300	1702	10	N
92235	1	0	1.020E-06	7.100E-06	58146300	9	10	N
92235	1	0	4.400E-03	4.080E-02	56301600	6	10	N
92235	1	0	2.400E-02	2.400E-02	61134400	1	10	N
92235	1	0	2.400E-02	6.000E-01	54133000	3	10	N
92235	1	0	1.450E-01	1.001E-04	55096900	190	10	N
92235	1	0	2.860E-02	9.400E-07	57091800	82	10	N
92235	1	0	1.000E-03	4.400E-07	56102100	51	10	N
92235	1	0	1.300E-03	1.200E-04	56094500	46	10	N
92235	1	0	1.090E-04	1.090E-07	61128100	26	10	N
92235	1	0	1.110E-08	6.020E-02	58122200	336	10	N
92235	1	0	1.170E-08	9.910E-04	61039600	269	10	N
92235	1	0	1.340E-08	7.970E-05	66101300	1592	10	N
92235	99	0	2.500E-08	2.500E-08	55131500	1	10	N
92235	99	0	2.500E-08	2.500E-08	55139800	1	10	N
92235	99	0	2.500E-08	2.500E-08	56138400	1	10	N
92235	99	0	2.500E-08	2.500E-08	58145200	1	10	N
92235	99	0	2.500E-08	2.500E-08	60036000	1	10	N
92235	99	0	2.500E-08	2.500E-08	66107700	1	10	N
92235	99	0	2.500E-08	2.500E-08	67114200	1	10	N
92235	99	0	2.500E-08	2.500E-08	67153900	1	10	N
92235	99	0	1.500E-04	1.133E-02	6026923800	15	10	N
92235	99	0	1.500E-04	2.750E-02	620103400	32	10	N
92235	102	0	1.000E-01	1.000E-00	60166137700	7	10	N
92235	102	0	5.000E-01	1.000E-00	37044400	18	10	N
92235	102	0	1.500E-00	5.000E-00	7237+800	137	10	N
92235	102	0	2.000E-00	4.000E-00	69259800	27	10	N
92235	102	0	2.500E-00	2.500E-00	55144800	10	10	N
92235	124	0	1.090E-00	1.480E-01	66102700	6	10	N
92235	124	10	1.000E-00	8.000E-00	74356900	126	10	N
92235	124	10	1.000E-00	1.480E-01	66102700	60	10	N
92235	124	10	1.000E-00	1.480E-01	74354400	45	10	N
92235	203	0	2.000E-00	4.000E-00	59259800	60	10	N
92235	211	0	2.000E-00	4.000E-00	69259800	42	10	N
92235	222	0	1.000E-00	1.500E-00	7237+800	1300	10	N
92235	222	0	2.500E-08	2.500E-08	55026700	56	10	N
92235	222	0	1.000E-01	1.000E-01	65126900	42	10	N
92235	222	0	4.000E-01	4.000E-01	73376900	91	10	N
92235	222	0	5.000E-01	5.000E-01	72367000	54	10	N
92235	222	0	6.290E-06	3.941E-05	69364400	46	10	N
92235	324	0	1.000E-00	2.000E-00	72344300	26	10	N
92235	324	0	6.000E-00	7.000E-00	60931600	73	10	N
92235	324	0	5.000E-00	8.000E-00	73346600	97	10	N
92235	403	0	2.000E-00	3.000E-00	69259800	2	10	N
92235	452	0	3.000E-01	1.495E-00	61127300	152	10	N
92235	452	0	1.000E-01	6.000E-01	66013100	120	10	N
92235	522	0	1.500E-07	1.460E-01	64117500	1	10	N
92235	522	0	9.000E-07	2.000E-00	55136500	1	10	N
92235	522	0	1.500E-07	1.500E-07	67114200	1	10	N
92235	522	0	1.500E-07	1.500E-07	61660800	3	10	N
92235	522	0	2.000E-07	2.050E-05	68364000	6	10	N
92235	522	0	1.500E-07	1.000E-00	61629900	1	10	N
92235	522	0	1.000E-07	1.000E-01	64127700	1	10	N
92235	522	0	5.000E-07	1.000E-01	64127800	1	10	N
92235	522	0	5.000E-07	1.460E-01	61113700	1	10	N
92235	522	0	5.000E-07	1.500E-01	71327000	2	10	N
92235	522	0	5.000E-07	1.200E-01	74354400	1	10	N
92235	522	0	6.000E-01	1.400E-01	63131000	1	10	N
92235	523	0	5.000E-07	1.500E-01	67114200	1	10	N
92235	523	0	5.000E-07	1.500E-01	61629900	3	10	N
92235	523	0	5.000E-07	1.400E-01	64127700	1	10	N
92235	523	0	5.000E-07	1.400E-01	64127800	1	10	N
92235	523	0	5.000E-07	1.400E-01	64127900	1	10	N
92235	523	0	5.000E-07	1.400E-01	64128000	1	10	N
92235	523	0	5.000E-07	1.400E-01	64128100	1	10	N
92235	523	0	5.000E-07	1.400E-01	64128200	1	10	N
92235	523	0	5.000E-07	1.400E-01	64128300	1	10	N
92235	523	0	5.000E-07	1.400E-01	64128400	1	10	N
92235	523	0	5.000E-07	1.400E-01	64128500	1	10	N
92235	523	0	5.000E-07	1.400E-01	64128600	1	10	N
92235	523	0	5.000E-07	1.400E-01	64128700	1	10	N
92235	523	0	5.000E-07	1.400E-01	64128800	1	10	N
92235	523	0	5.000E-07	1.400E-01	64128900	1	10	N
92235	523	0	5.000E-07	1.400E-01	64129000	1	10	N
92235	523	0	5.000E-07	1.400E-01	64129100	1	10	N
92235	523	0	5.000E-07	1.400E-01	64129200	1	10	N
92235	523	0	5.000E-07	1.400E-01	64129300	1	10	N
92235	523	0	5.000E-07	1.400E-01	64129400	1	10	N
92235	523	0	5.000E-07	1.400E-01	64129500	1	10	N
92235	523	0	5.000E-07	1.400E-01	64129600	1	10	N
92235	523	0	5.000E-07	1.400E-01	64129700	1	10	N
92235	523	0	5.000E-07	1.400E-01	64129800	1	10	N
92235	523	0	5.000E-07	1.400E-01	64129900	1	10	N
92235	523	0	5.000E-07	1.400E-01	64130000	1	10	N

Fig. 10. INEXA list of elastic data index.


```

92235 1 0 8.063E-01 1.497E+00 64102800 69 10
92235 1 0 1.500E+00 2.300E+00 72378800 3 10 N
92235 1 0 1.900E+00 8.000E+00 61058100 16 10
92235 1 0 2.253E-00 1.490E-01 67075000 466 10
92235 1 0 7.050E+00 1.425E+01 57002200 5 10
92235 1 0 1.730E+01 2.890E+01 60067300 4 10
92235 1 9 7.490E-06 7.243E-04 64096300 5769 10 C
92235 2 0 1.900E-07 2.000E-06 95132900 33 10
92235 2 0 2.710E-07 7.740E-06 58039600 7 10
92235 2 0 6.500E-07 9.450E-05 65267149300 216 10
92235 2 0 1.030E-06 2.990E-05 68153000 234 10
92235 2 0 7.198E-06 1.907E-04 66364900 1364 10 N
92235 2 0 3.000E-01 1.495E+00 64127300 28 10
92235 2 0 4.000E-01 6.000E-01 66133100 24 10
92235 2 0 5.000E-01 1.000E+00 56014900 2 10
92235 2 0 5.000E-01 1.000E+00 57044400 2 10
92235 2 0 1.500E+00 2.300E+00 72378800 3 10 N
92235 52 0 2.500E-08 2.500E-08 51130300 1 10
92235102 0 1.300E-01 1.900E-01 68137700 7 10
92235102 0 5.000E-01 1.000E+00 57044400 18 10
92235102 0 1.500E+00 5.500E+00 72378800 137 10 N
92235102 0 2.000E+00 4.000E+00 69259800 27 10
92235102 0 2.500E+00 2.500E+00 55144800 10 10
92235452 0 3.000E-01 1.495E+00 64127300 152 10
92235452 0 4.000E-01 6.000E-01 64133100 120 10
92235 3 0 5.000E-01 1.000E+00 56014900 2 10
92235 3 0 5.000E-01 9.000E-01 61075400 1 10
92235 3 0 1.000E+00 2.500E+00 56015100 2 10
92235 3 0 3.000E+00 3.000E+00 55144800 1 10
92235 3 0 4.000E+00 4.500E+00 55138300 2 10
92235 3 0 8.100E+00 8.100E+00 65122800 1 10
92235 3 0 8.100E+00 1.410E+01 58052200 3 10
92235 3 0 1.340E+01 1.870E+01 61070600 4 10
92235 3 8 2.500E-01 1.000E+00 57044400 10 10
92235203 0 2.000E+00 4.000E+00 69259800 60 10
92235403 0 2.000E+00 3.000E+00 69259800 2 10
92235 5 8 5.500E-01 2.000E+00 59007700 3 10 N
92235665 0 5.000E-01 2.000E+00 59007700 46 10
92235 11 0 5.000E-01 9.000E-01 61075400 1 10
92235 11 0 1.500E+00 2.300E+00 72378800 3 10 N
92235 11 0 2.000E+00 4.000E+00 69259800 3 10
92235 11 0 4.000E+00 7.500E+00 69259800 3 10
92235 11 1 1.500E+00 2.300E+00 72378800 15 10 N
92235 11 8 1.300E-01 1.500E+00 68137700 54 10
92235 11 8 5.500E-01 2.000E+00 59007700 7 10 C
92235 11 9 1.500E+00 2.500E+00 72378800 15 10 N
92235211 0 2.000E+00 4.000E+00 69259800 42 10
92235 12 0 7.000E+00 8.000E+00 6026209200 2 10
92235 21 0 3.000E-09 1.630E-07 53145600 33 10
92235 21 0 2.340E-08 2.210E-06 62135240 131 10
92235 21 0 2.500E-08 2.500E-08 54130000 1 10
92235 21 0 2.500E-08 2.500E-08 56131700 1 10
92235 21 0 2.530E-08 2.530E-08 46131300 1 10
92235 21 0 2.530E-08 2.530E-08 54127900 1 10
92235 21 0 8.934E-07 1.746E-03 75326300 1702 10 N
92235 21 0 .025E-06 1.210E-06 58146300 9 10
92235 21 0 4.400E-04 4.380E-02 56061600 6 10
92235 21 0 2.400E-02 2.400E-02 65136400 1 10
92235 21 0 2.400E-02 8.800E-01 58133600 3 10
92235 71 0 1.100E-08 1.975E-01 75326300 274 10 C

```

Fig. 13. INDEX listing of 235U elastic data index.

ECSIL Bibliographic-Information Format

A card-image format (Fig. 14) is used throughout the ECSIL bibliographic information system: for preparation of new information, for storage, for retrieval.

FIXED-FIELD INPUT

Field 1: Operation Code

For the vast majority of the references in the bibliographic file, this field is blank. The only exceptions to this rule are alternate forms for the reference, usually conferences. For example, there are a number of references from the conference *Nucl. React. w/Light Nucl./Nucl. Struct. Rossendorf (1967)*. However, references from this conference may also be listed under: *Proc. Int. Conf. Nucl. React. w/Light N-N Struct. Rossendorf (1967)*. Reference number 2917 was used to enter the latter title and to indicate that in lieu of this title the user should look under the former title. Such alternate references are the only reference numbers not associated with data in the numeric data file. The operation code minus (-) is used in this case to indicate that the reference number is merely an alternate form.

The only operation codes found in the library are blank or minus (-). However, this column is used during update or retrieval runs to indicate retrieval (R) or deletion (D) of the reference number that appears in field 2, cols. 2 to 5. Therefore, a complete list of operation codes is:

Blank - Normal reference

- - Alternate form for reference

R - Retrieve reference number in field 2	} Only fields 1 and 2 are used on cards that have these operation codes
D - Delete reference number in field 2	

Field 2: Reference Number

This field is blank on all but the first card of each reference number. The reference number is a unique four-digit integer that must be assigned to each primary reference entered into the bibliographic library.

Field 3: Subreference Number

This field is designed to differentiate between portions of the data from a given reference. It is presently unused (i.e., the field is always blank).

Fig. 14. Bibliographic information card format.

Field 4: Card-Sequence Number

This integer begins with 1 on the first card of each reference number and sequentially increases on successive cards of the reference number. If there are over 99 cards for a given reference number, the sequence may be repeated from 1 to 99 (as many times as required). There is no limit to the number of cards per reference.

Field 5: Card Type

Each card of a reference number must be designated as type 1, 2, or 3 to indicate: (1) reference information, (2) commentary, or (3) cross reference information.

VARIABLE-FIELD INPUT

Columns 12 to 72 of the bibliographic information cards contain reference information on which the field boundaries are determined by the punctuation rather than fixed column limits. Spaces are ignored except as noted. Information should follow in the order indicated.

The contents of a bibliographic information card depends on the card type (See field 5, above). The following section describes each of the three card types.

Type 1

Type 1 cards describe the primary reference by giving the journal or report-series title, qualifying information (e.g., part, section, series, etc.), volume, page, and/or report number, followed by the year, a list of authors, and finally the institution. Any number of type 1 cards may be used. There

are four distinct fields that may appear on a type 1 card: reference, date, authors, and institution. Conventions associated with these fields follow:

Reference -- The report or publication title must appear on the first card of any reference number and cannot be continued onto subsequent cards. The reference is considered to extend from col. 12 up to the date. Acceptable abbreviations should be used whenever possible. (See the current alphabetically ordered bibliographic list.⁵)

- Maximum reference length is 55 characters (cols. 12 to 72 = 61 cols. = 55 reference + 6 date)
- Publications divide into three types that require different coding conventions:

1. Periodicals

- Journal Name -- Use accepted abbreviations whenever possible. (See the current alphabetically ordered bibliographic list.⁵)
- Qualifying information -- Optional further description of journal name but not actually part of it (e.g., series, section, part). If present, this field must begin with a comma.
- Volume -- Must be numeric and end with a comma.
- Page -- Must be numeric.

2. Reports

- Report Series -- Use accepted abbreviations whenever possible. (See the current alphabetically ordered bibliographic list.⁵)
- Report Number -- Must be numeric and immediately preceded by a hyphen.
- Qualifying information -- Optional further description of report name but not actually part of it (e.g., series, section, part). All information between the last numeric characters of the report number and the date is considered to be qualifying information.

3. Other publications

- Name or Title of Publication -- Use accepted abbreviations whenever possible. (See the current alphabetically ordered bibliographic list.⁵)
- Qualifying Information -- Optional further description of publication name but not actually part of it (e.g., series, section, part). If present, this field must begin with a comma.

Date -- Must follow the reference and must also be on the first card.

The date must be given as a four-digit integer enclosed in parenthesis in the form (19XX) or, if the document is undated, use (0000). The date, which should

be the year of the publication or private communication, is always six characters long.

Authors -- Names may follow the date, either immediately on the first card or on following cards.

-- Maximum author's name length is 28 characters.

-- Any number of authors may be listed.

-- An author's name may never be continued onto a subsequent card, (i.e., must be wholly on one card).

-- Any number of authors may appear on card.

-- Any number of cards may be used to list authors.

Punctuation rules that allow an individual author's name to be recognized and manipulated by a computer follow:

-- Initials (if present) must precede the last name.

-- Each initial may contain more than one letter, but each initial must be followed by a period (e.g., Yu. S. Zamyatnin).

-- Commas (e.g., H. E. Montgomery, Jr.) and single blanks (e.g., T. W. De Witt) are allowed.

-- The end of an author's name is indicated by a comma followed by a blank if another author's name follows, (e.g., R. K. Smith, R. L. Henkel). In the case of the last author, follow with two blanks or a blank followed by a parenthesis (e.g., T. S. Green (AWRE)).

-- An author's name may not contain a comma followed by a blank, two blanks, or a blank followed by a parenthesis.

Institution -- If present, the institution name should follow the last author's name and be enclosed in parenthesis [e.g., T. S. Green (AWRE)]. The institution refers to the place where the work was done, not an author's place of employment.

Type 2

Comments consisting of alphanumeric text may be input as desired in the variable field part of type 2 cards (cols. 12 to 72). This information may be used to describe the experiment or the data. Any number of comment cards may be used, all identified as type 2.

Type 3

Cross-reference information, in exactly the same format as type 1 cards, appears on type 3 cards. The following conventions replace those used in earlier versions of ECSII:

- Cross references of the form "SEE ALSO REFERENCE XXXX," where XXXX may be any reference number in the library, may appear only as a comment (type 2) card.
- For statements such as "SEE ALSO" followed by a reference name, "SEE ALSO" should be on a comment (type 2) card and the reference name on the following (type 3) card.
- Each cross reference must appear on a new card.
- There is no limit to the number of cross references per reference number.

Figures 15 and 16 illustrate the bibliographic cards for bibliographic references 1348 to 1360 and 2061 to 2087. The former illustrates the use of

```

1351 11 AERE-PR/P-B PAGE 5 (1965) D.D.JAMES (AERE)
    23 PHYS. AND CHEM. OF FISSION. IAEA. SALZBURG. 1. 235 (1965)
    32 TIME OF FLIGHT TECHNIQUE
1352 11 LANOC(UK)-MIL (1964) F.D.BROOKS, J.E.JOLLY (AERE)
    29 TIME OF FLIGHT TECHNIQUE. AREA ANALYSIS OF RESONANCES. AN
    32 UPPER LIMIT OF 0.00087 EV WAS ALSO CALCULATED FOR THE AVERAGE
    42 FISSION WIDTH UP TO 120 EV.
1353 11 UK/USSR SEMINAR ON NUCLEAR CONSTANTS. MOSCOW, UK/2U (1968)
    21 M.ASGHAR, M.C.MOXON, N.J.PATTENDEN (AERE)
    31 LANOC(UK)-103AL (1968)
    43 IAEA CONF. ON NUCLEAR DATA. PARIS. PAPER CN-23/31 (1965)
    52 THE 1968 DATA SUPERCEDES THAT REPORTED IN 1966. AREA ANALYSIS
    62 BASED ON VARIOUS COMBINATIONS OF TOTAL, SCATTERING AND
    72 CAPTURE YIELDS. WE HAVE GIVEN HERE THE RESONANCE PARAMETERS
    82 BASED ON THE AUTHOR'S RECOMMENDATIONS-COMBINATIONS OF ALL 3
    92 YIELDS BELOW 500 EV. COMBINATION OF TRANSMISSION AND
    102 CAPTURE FROM 500 TO 750 EV. TRANSMISSION RESULTS ABOVE 750 EV
    112 THE AUTHORS FURTHERMORE RECOMMEND THAT THE QUOTED ERRORS ON
    122 THE RESONANCE PARAMETERS BE INCREASED BY A FACTOR OF 3.
    132 BEST RESOLUTION WAS 3 NSEC/M ON THE TOTAL CROSS SECTION
    142 MEASUREMENTS.
1354 11 IAEA CONF. ON NUCLEAR DATA. PARIS. PAPER CN-23/89 (1965)
    21 K.H. BOCKHOFF, A.DE KEYSER, M.KOLAR, H.MARTIN (EURATOM)
    32 TIME OF FLIGHT TECHNIQUE. SHAPE ANALYSIS OF THE RESONANCES.
    42 RESONANCE ENERGY ONLY DATA ARE SUPERCEDED BY RESULTS OF
    52 REFERENCE 1534. RESOLUTION WAS 6 NSEC/M UP TO 210 EV. THEN
    62 1.8 NSEC/M UP TO 310 EV. THEN 1.9 NSEC/M UP TO 500 EV.
1355 11 NUCLEAR PHYS. 85, 305 (1966) M.ASGHAR, C.M.CHAFFEY.
    21 M.C.MOXON (AERE)
    32 TIME OF FLIGHT CAPTURE AND SCATTERING MEASUREMENTS. AREA
    42 ANALYSIS. IN GAMMA CROSS SECTIONS VALUES BELOW 50 BARNS
    52 OBTAINED FROM SAMPLE THICKNESS OF 2.56 E-03 ATOMS/B AND ABOVE
    62 50 BARNS OBTAINED FROM SAMPLE THICKNESS OF 1.17 E-04 ATOMS/B
    72 AS PER THE AUTHOR'S PRESCRIPTION. CROSS SECTIONS IS ALSO
    82 AVERAGED OVER 32 CHANNELS. CHANNEL WIDTH OF 0.25 MICROSEC AND
    92 FLIGHT PATH OF 32.5 M
1356 11 IAEA CONF. ON NUCLEAR DATA. PARIS. PAPER CN-23/58 (1965)
    21 P.H.WHITE, J.M.A.REICHELTL, G.P.WARNER (AERE)
    32 0.053 EV VALUE CONSIST OF ONE MONOENERGETIC AND TWO THERMAL
    42 NEUTRON FLUX MEASUREMENTS ALL OTHER ENERGIES UTILIZED
    52 MONOENERGETIC NEUTRONS. WE HAVE TAKEN THE U235 FISSION CROSS
    62 SECTION AT 2200 M/SEC AS 579.5 BARNS
1357 11 IAEA CONF. ON NUCLEAR DATA. PARIS. PAPER CN-23/79 (1965)
    21 F.FOORTMANS, H.CEULEMANS, M.NEVE DE MEVERONIES (BELGIUM)
    32 RESONANT SCATTERING METHOD. CRYSTAL SPECTROMETER
    43 CONF. ON NEUTRON C/S TECHNOLOGY. WASH.D.C., P.755 (1965)
1358 11 CONF. ON NEUTRON C/S TECHNOLOGY. WASH.D.C., P.910 (1965)
    21 D.D.SIMPSON, R.G.FLUNARTY, M.S.MOORE, N.H.MARSHALL.
    31 B.C.DIVEN, A.HEMMENDINGER
    42 MULTILEVEL ANALYSIS. GAMMA-GAMMA WAS TAKEN AS 0.040 EV. THE
    52 CROSS SECTION IS GIVEN IN REF. 1061. THE SIGN ON THE FISSION
    62 WIDTH IS TO BE ASSOCIATED WITH THE FISSION INTERFERENCE TERM
    72 EXISTENCE OF LEVELS AT 21.70, 22.50, 25.64, 27.27, 34.15,
    82 36.65, 38.40, 39.50, 40.30, 43.95, 50.90, 52.60, 53.40, AND
    92 61.30 EV IS ONLY PROBABLE. LEVELS AT 20.39, 24.72, 27.34
    102 35.58, 38.37, 42.16, 44.39, 47.05, 54.15, AND 55.40 EV MAY BE
    112 ASSUMED TO BE SINGLE LEVEL PARAMETERS BECAUSE OF WEAK
    122 INTERFERENCE
1959 11 ATOMNAYA ENERGIYA 13, 368 (1962) V.F.GERASIMOV, V.S.ZENKEVICH
    21 U55R1
  
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Fig. 15. Bibliographic card format: cross references and comment cards.

cross references and comment cards (see Ref. No. 1353); the latter illustrates the use of an alternate form for a reference [see Ref. No. 2078 or 2900, each of which has a minus (-) in col. 1].

Figures 17 to 19, using Ref. No. 1356 as an example, illustrate how vol. 2 of UCRL-50400 presents the bibliographic information: first the bibliography, next the reference title in the alphabetic listing, finally the authors in the alphabetic author citations.

2068 11 J. EXPTL. THEORET. PHYS. (USSR) 45, 1294 (1963) D. SELIGER,
21 N. ILIESCU, KIM H. SAN, O. LONGO, L. B. PIKE, NER, E. I. SHARAPOV,
31 (JINR)
42 TIME OF FLIGHT, DETECTED CAPTURE AND SCATTERING
53 BNL-325 2ND ED. SUPPL. 2 (1965)
62 FOR COMMENTS PERTAINING TO LEVEL ASSIGNMENTS BY NUCSC,
72 NATURAL ELEMENT AND ENRICHED ISOTOPES, RESOLUTION OF 90 - 80
82 NSEC/M

2069 11 PHYS. REV. 133, 378 (1964) S. A. COX (ANL)
22 ACTIVATION

2070 11 J. INORG. NUCLEAR CHEM. 27, 903 (1965) J. F. EMERY (ORNL)
22 ACTIVATION

2071 11 NUCLEAR PHYS. 31, 166 (1962) R. E. SHAMU (U. WISC.)
22 GAS SCINTILLATION COUNTER

2072 11 PHYS. REV. 116, 1516 (1959) D. P. MANN, W. H. HATSON, R. E. CHRIEN,
21 R. L. ZIMMERMAN, R. B. SCHWARTZ (BNL)
32 FAST CHOPPER, RESOLUTION WAS 70 NSEC/M, AREA ANALYSIS
2073 11 NUCLEAR SCIENCE AND ENGINEERING 21, 114 (1965) S. L. RUBY,
21 R. ELLIOTSON (ANL)
32 ACTIVATION

2074 11 ACTA PHYSICA ACAD. SCI. HUNGARICAE 20, 193 (1966) I. ANGELI,
21 I. HUNYADI (DEBRECEN)
32 TRANSMISSION

2075 11 NUCLEAR PHYS. 72, 298 (1955) N. ILIESCU, KIM H. SAN,
21 L. B. PIKE, NER, E. I. SHARAPOV, KH. SIRAZHET, (JINR)
32 TRANSMISSION, SCATTERING, CAPTURE MEASUREMENTS ALL MADE TO
42 EXCLUDE SYSTEMATIC ERRORS. SEE ALSO REFERENCE 2077, NATURAL
52 ELEMENT AND ENRICHED ISOTOPES, RESOLUTION VARIED FROM 40 - 80
62 NSEC/M

2076 11 J. NUCLEAR ENERGY P3, 443 (1969) N. D. DUDEY, R. R. HEINRICH,
21 A. A. MADSON (ANL)
32 ACTIVATION METHOD RELATIVE TO U235(N,F) AND Au-197(N,GAMMA
42 CROSS SECTIONS

2077 11 J. EXPTL. THEORET. PHYS. (USSR) 49, 410 (1955) KIM H. SAN,
21 L. B. PIKE, NER, KH. SIRAZHET, E. I. SHARAPOV, (JINR)
32 PULSED REACTOR WITH TIME OF FLIGHT. SEE ALSO REFERENCE 2075
42 ENRICHED ISOTOPES, RESOLUTION VARIED FROM 40 - 80 NSEC/M
2078 11 PROC. WORKING CONF. ON SLOW NEUTRON PHYSICS, DUBNA (1961)
22 NOTE IN LIEU OF THIS TITLE, SEE
32 ACCT-TR-5734 (1961)

2079 11 PHYS. REV. C, 3, 2447 (1971) J. B. GARG, L. J. RAINWATER,
21 W. M. HAYEN, JR. (COLUMBIA U.)
32 ANALYSIS OF CROSS SECTION DATA PRESENTED IN REF. BNL-7111N
42 FLIGHT TECHNIQUE, RESOLUTION OF 0.5 NSEC/M, MULTILEVEL
52 ANALYSIS. SEE ALSO REF. 814

2080 11 NUCLEAR DATA FOR REACTORS, IAEA VIENNA, VOLS. 1 AND 2 (1967)
22 NOTE IN LIEU OF THIS TITLE, SEE
32 IAEA CONF. ON NUCLEAR DATA, PARIS (1966)

2081 11 BULL. AM. PHYS. SOC. 13, 1665 (1968) J. H. MC HALLY,
21 K. WOLFSBERG, B. J. DROPSKY, J. H. BARNES (LASL)
32 TIME OF FLIGHT TECHNIQUE FROM THE POMERAN NUCLEAR EXPERIMENT
2082 11 WASH. 127 PAGE 179 (1969) S. A. HINSIEIN, R. C. BLOCK (ORNL)
23 PHYS. REV. LETTERS 22, 495 (1969)
32 COINCIDENCE BETWEEN IONIZATION CHAMBER AND SCINTILLATION TUBE
42 TO MEASURE NUCL. THE AVERAGE FISSION NEUTRON MULTIPLICITY, THE
52 HIGHER VALUES WERE ASSIGNED TO THE 2ND STATE AND THE LOWER
62 VALUES TO THE 1ST STATE
73 BULL. AM. PHYS. SOC. 13, 1408 (1968)
2083 11 YAO, 112, 6, 765 (1967) P. E. VORONIN (USSR)
22 ANALYSIS OF DATA OF CROSS SECTION DATA FROM REFERENCE 1

127 00-75	ECN: 7500 BIBLIOGRAPHY REF NO ORDERED	REF NO 1350
401 BIBLIOGRAPHY	TARGET EN RANGE MEV PIS DESCRIPTION	
1970 1. A JILEY (AERE) AREA AND SHAPE ANALYSIS OF CROSS SECTION REPORTED IN REF 98B RESOLUTION WAS 2.6 NSEC/M AERE PRIND B PAGE 2 (1965)	94 PU-239 1 02-04 2 90-04 162 RES PARAM	
1970 2. KEDE PRIND B PAGE 5 (1965) G D JAMES (AERE) PHYS AND CHEM OF FISSION TELA SALZBURG, 1, 235 (1965) TIME OF FLIGHT TECHNIQUE	94 PU-239 5 50-05 8 56 05 10 RES PARAM	
1970 3. LANDUWILL 1969: J D BROOKS, J E JOLLY (AERE) TIME OF FLIGHT TECHNIQUE AREA ANALYSIS OF RESONANCES AN UPPER LIMIT OF 0.00027 EV WAS ALSO CALCULATED FOR THE AVERAGE FISSION WIDTH UP TO 120 EV	94 PU-240 3 82-05 3 82 04 1 RES PARAM	
1970 4. USSR SEMINAR ON NUCLEAR CONSTANTS MOSCOW, UN-PC 1968 M ASGAR, M C HUDON, N J PATTERSON (AERE) ENERGY 10-15 MeV AREA CONT ON NUCLEAR DATA PARIS, PAPER CN-23/41 (1968) THE FOUR DATA SURFACES THAT REPORTED IN 1968 AREA ANALYSIS BASED ON VARIOUS COMBINATIONS OF TOTAL, SCATTERING AND AVERAGE FIELDS WE HAVE GIVEN HERE THE RESONANCE PARAMETERS BASED ON THE AUTHOR'S RECOMMENDATIONS--COMBINATIONS OF ALL 5 FIELDS BELOW 500 EV, COMBINATION OF TRANSMISSION AND CAPTURE FROM 500 TO 750 EV, TRANSMISSION RESULTS ABOVE 750 EV THE ALTHOUGH FURTHERMORE BETTERMENT THAT THE QUOTED ERRORS IN THE RESONANCE PARAMETERS BE INCREASED BY A FACTOR OF 3 BEST RESOLUTION WAS 3 NSEC/M ON THE TOTAL CROSS SECTION MEASUREMENTS	94 PU-240 2 00-05 7 51-04 2 AV RES PARAM 94 PU-240 2 05-05 1 45-02 101 RES PARAM	
1970 5. AREA CONT ON NUCLEAR DATA PARIS, PAPER CN-23/41 (1968) M BODCHOFF, A DE REYSER, W POLAK, W MARTIN, FURUTOMI TIME OF FLIGHT TECHNIQUE SHAPE ANALYSIS OF THE RESONANCE RESONANCE ENERGY ONLY DATA ARE SUPERSEDED BY RESULTS OF REFERENCE 1970-4. RESOLUTION WAS 0.00027 EV UP TO 410 EV, THEN 1.6 NSEC/M UP TO 110 EV, THEN 0.00027 EV UP TO 550 EV	94 PU-240 2 14-05 6 78 24 57 RES PARAM	
1970 6. NUCLEAR PHYS RES 35N 1968 M ASGAR, M C HUDON, N J PATTERSON (AERE) TIME OF FLIGHT CAPTURE AND SCATTERING MEASUREMENTS AREA ANALYSIS IN GAMMA CROSS SECTIONS VALUES BELOW 50 HANNA OBTAINED FROM SAMPLE THICKNESS OF 0.56 E DIALYSIS AND ABOUT NO HANNA OBTAINED FROM SAMPLE THICKNESS OF 1.1 E DIALYSIS AS PER THE AUTHOR'S PRESCRIPTION, CROSS SECTION VALUES AVERAGED OVER 30 CHANNELS, HANNA WITHIN 0.1 EV HANNA AND CAPTURE WITHIN 0.2 EV	94 PU-240 5 40-05 9 40 04 40 RES PARAM 94 PU-240 6 00-05 8 00 04 40 RES PARAM 94 PU-240 6 40-05 8 40 04 40 RES PARAM	
1970 7. AREA CONT ON NUCLEAR DATA PARIS, PAPER CN-23/41 (1968) M BODCHOFF, M C HUDON, N J PATTERSON (AERE) TIME OF FLIGHT CAPTURE AND SCATTERING MEASUREMENTS AREA ANALYSIS IN GAMMA CROSS SECTIONS VALUES BELOW 50 HANNA OBTAINED FROM SAMPLE THICKNESS OF 0.56 E DIALYSIS AND ABOUT NO HANNA OBTAINED FROM SAMPLE THICKNESS OF 1.1 E DIALYSIS AS PER THE AUTHOR'S PRESCRIPTION, CROSS SECTION VALUES AVERAGED OVER 30 CHANNELS, HANNA WITHIN 0.1 EV HANNA AND CAPTURE WITHIN 0.2 EV	94 PU-240 5 40-05 9 40 04 40 RES PARAM 94 PU-240 6 00-05 8 00 04 40 RES PARAM 94 PU-240 6 40-05 8 40 04 40 RES PARAM	

Fig. 17. Bibliographic listing: reference-number ordered.

ALPHABETIC	7622 BIBLIOGRAPHIC	ALPHABETIC	ALPHABETIC
 

Fig. 19. Bibliographic listings: alphabetically ordered - part 1.

ECSIL Program System

OVERVIEW

The programs used to maintain and edit the ECSIL Library are all written in Fortran and are presently on ILL's CDC-7600 computers and IBM-1360 computer. This document describes these programs.

The ECSIL program library includes a complete set of file maintenance functions: insert, reference, update, delete, and retrieval operations. These functions are designed to utilize capabilities and prepare index listings, and are supported by a set of graphic displays.^{1,2,3} There are also many programs for transferring experimental data to the ECSIL format or for analyzing the data and calculations based on data retrieved from the ECSIL file.^{4,5,6,7,8,9,10,11} This document will describe only the file maintenance and retrieval programs.

The ECSIL program system is outlined from the viewpoint of both user and programmer. The user is shown the programs for the user by providing similar input and output lines, and the programmer is shown the input options and output lines, and by providing the program names to reference the required information. These programs are described in order to learn and remember.

The ECSIL program system is for the CDC-7600 computer by utilizing the small core memory of the computer. In particular, the small core memory of the CDC-7600 computer is 20 K₁₀ words; minimum use is 10 K₁₀ words, and maximum use is 20 K₁₀ words; in the case exceeding 20 K₁₀ words and exceeding 20 K₁₀ words, the ECSIL calculation of features is not possible. The ECSIL program system is designed to utilize the small core memory of the CDC-7600 computer by utilizing the small core memory of the CDC-7600 computer.

PROGRAMS AND INPUT

The ECSIL program system is designed to utilize the small core memory of the CDC-7600 computer by utilizing the small core memory of the CDC-7600 computer. The ECSIL program system is designed to utilize the small core memory of the CDC-7600 computer by utilizing the small core memory of the CDC-7600 computer.

The ECSIL program system is designed to utilize the small core memory of the CDC-7600 computer by utilizing the small core memory of the CDC-7600 computer. The ECSIL program system is designed to utilize the small core memory of the CDC-7600 computer by utilizing the small core memory of the CDC-7600 computer. The ECSIL program system is designed to utilize the small core memory of the CDC-7600 computer by utilizing the small core memory of the CDC-7600 computer.

UNITED STATES DEPARTMENT OF AGRICULTURE

Report of the

Commissioner of the General Land Office
 to the President of the United States
 in relation to the
 public lands of the United States
 and the
 management of the same
 by the
 General Land Office
 Department of the Interior
 Washington, D. C.
 1906

Approved for publication
 by the
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 and the
 Secretary of the Interior
 1906

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 1906

table 12 (cont.)

Input						
	Card cols.	Description	default option	Files in	Files out	
output device (0 = BSP, 1 = TTY)	1-9		0	SORTED	PLTCOO	
USII source (1=2 = cards, 3 = library)	6-10		0	INDEXB	PLTODI	
Status selector (0 = no status, 2 = all data)	26-30		0	LIB001		
Plot mode (0 = 1 = default)	31-35		1		LISTS	
Individual scaling				LIEG12	CARDS	
Overlap sysm inv/X - Y						
Overlap sysm X-Y						
Scale X-Y						
Reference-number ordered						
= 6 Reverse chronological (latest first)						
Error bars (0 = none, 1 = X, 2 = Y, 3 = both)	66-70					
Min. points/plot	71-75		0			
Max. points/plot	26-30		1000			
Plots/figure	31-35		0			
Evaluated data (0 = none, 1 = ERD, 2 = INDEX/B 3 = IAR)	56-60		0			
USII-evaluated match (0 = ZA, 1 = Z)	61-65		0			
Plot title size	66-70		100			
Starting page no.	71-75		none			
USII-evaluated separator (0 = both, 1 = USII, 2 = evaluated)	76-80		0			
Retrievals (2 or 4 cards per retrieval)	2-X	1-80	c			
output device (0 = BSP, 1 = TTY)	1-9		0	BIBLIB	BIBSR1	BIBLST
Search criteria (0 = both bibliography and data index; 1 = all bib, match data index; 2 = all data index, match bib)	6-10		0	INDEXB	AUTSRT	ACULST
					REFSR1	REFLST
output device (0 = BSP, 1 = TTY)	1-9		0	L1B001	SORTED	
Retrieve card title size	6-10		100			
Retrievals (2 or 4 cards per retrieval)	2-X	1-80	c			
				L1B012		

Table 12 (cont.)

Even when the INPUT file is present, a minimum number of parameters must be supplied by the user. All programs read only one parameter card that specifies program options. Several programs then read additional cards that describe the data to be retrieved, deleted, plotted, etc.

The following general rules apply to the parameter card:

- All input is integer and in 15 format whenever possible.
- Arrays of yes/no type choices will be right-adjusted into series of five or 10 columns (e.g., 1X, 4E1; 3X, 7I1).
- Yes (or "do it") is always indicated by a one (1) (or > 0), and no (or "don't") is always indicated by a zero (0) (or ≤ 0).
- Columns 1 to 5 always indicate the output listing device [0 = high speed printing (HSP), 1 = teletype (TTY)]. HSP is always the default option, if the INPUT file is not present.

The following rules apply to all cards, if any, following the parameters card:

- All cards are in the ECSIL card-image format and specify data requests (e.g., retrieve, delete, plot, list).
- Each data request is specified by one or, if cards are continued, two pairs of cards; the former of each pair giving the lower limit of each field and the latter giving the upper limit.
- Limits may be specified for any or all of the 18 fields described in the card format.
- A blank (not zero) field indicates "no limit," whereas a zero field indicates a zero (0) limit [e.g., "blank-A (atomic weight)-field limits" indicates the whole gamut, including all isotopes and compounds of the element, whereas "zero-field limits" indicates only the elemental mixture ($A = 0$)].
- The end of the input cards is indicated by an end-of-file.
- For programs that expect data requests, the default option (no INPUT file or no requests on the input file) is to request everything (e.g., retrieve, plot, list everything). "Delete everything" has no meaning; the program will simply terminate.

Output Listings

The output listing provided by every program provides enough information to properly document and simply check the operation of any program or series of programs. The information supplied by all programs includes

- Identification of the program, computer, and date.
- Interpretation of all data requests (always on HSP).
- Statistics of all data points and/or cards read and/or written by the program. These statistics monitor not only the size of the library and card files but also program operation. They insure point and card "conservation" during any sort/merge, update, delete, and/or editing operation. Each statistic can be independently obtained from at least two programs (e.g., the number of points in each library volume is defined during an update and may be verified during a data-index creation).

Unless the program encounters an error condition, this is the only output listing information supplied. An update operation, for instance, normally has only 14 lines of information output: identification of program, computer, and date; one line of statistics for each of the 12 library volumes; and statistics for the entire library. This output information is in a form that can be retained to document each version of the library.

Filenames

The use of standard filenames has greatly simplified the input and made disk files easily recognizable. All output files are left on disk to facilitate storage in the photostore and allow as many copies as required to be made. Standard filenames are defined below.

Binary Library — The existing 12 volumes of the ECSIL binary-data library are referred to by the filenames: LIB001, LIB002, ... LIB011, and LIB012. During a library update or deletion, the altered volumes of the library are defined as temporary files: TMP001, TMP002, ... TMP011, and TMP012. At the conclusion of the library update or deletion, the original volumes (if altered) are renamed as a backup version as: OLD001, OLD002, ... OLD011, and OLD012. The new altered volumes become: LIB001, LIB002, ... LIB011, and LIB012. Therefore, following an update or deletion, the current library will still be LIB001 to LIB012. The replaced volumes will be OLD001 to OLD012 (only those replaced), and the temporary files TMP001 to TMP012 will have disappeared.

In summary:

LIB0NN (NN = 01 to 12) — Current ECSIL binary-data files.

OLD0NN (NN = 01 to 12) — Penultimate ECSIL binary-data files.

TMP0NN (NN = 01 to 12) — Temporary files.

Numeric Data Cards -- Data-card files are considered to be either sorted or unsorted and are referred to by the filenames: SORTED or UNSORT respectively. Multiple SORTED files to be merged together to form a single sorted file are called SORT001, SORT002, ... SORT0NN (as many as required) and the merged output file will be called SORTED. In summary:

SORTED -- Sorted ECSIL numeric data-card images.

UNSORT -- Unsorted ECSIL numeric data-card images.

SORT0NN (NN = 01 to 99) -- Individually sorted files to be merged.

Evaluated Cross Sections -- The Livermore Evaluated Nuclear Data Library (ENDL), the Evaluated Nuclear Data File/version B (ENDF/B), or the TART multigroup data are read in the ENDF/B format using the filename ENDFIN.

Numeric-Data Listing, Plotting, and Index Files -- Interpreted listings and plots are always on plot files D0, D1, D2 ... DX (as many as required; the last file always DX; and, if there's only one file, it's DX). The plot files are normally then processed through the program PROC⁶ to obtain such hardcopy as 35-mm film, microfiche, and printer output. Reaction indexes have four sort orders: (1) Z/A/C/S/E (library order), (2) Ref. No./Z/A/C/S/E (reference-number order), (3) C/S/Z/A/E (interaction-number order), (4) Basic C/C Increment/S/Z/A/E (basic interaction-number order). Both machine-readable and interpreted-listing files are made for each sort order. The machine-readable files are named: INDEXA, INDEXB, INDEXC, and INDEXD, while the interpreted listings are named: LISTA, LISTB, LISTC, and LISTD. In summary:

D0, D1, D2 ... DX: -- Plotted and/or listed data files (UCRL-50400 Vols. 7,8).

INDEXN (N = A to D) -- Machine-readable reaction-index files.

LISTN (N = A to D) -- Interpreted reaction-index files (UCRL-50400 Vol. 3).

Bibliographic Card-Image Files -- The current bibliographic library is named BIBLIB and the penultimate version is named BIBOLD. Three additional bibliographic filenames have been defined: BIBUPD contains all new bibliographic information for inclusion in the library as well as for deletion and retrieval requests; BIBRET contains bibliographic information retrieved from the library; BIBDEL contains bibliographic information deleted from the library. In summary:

BIBLIB -- Current bibliographic library file.

BIBOLD -- Penultimate bibliographic library file.

BIBUPD - Update (new bibliographic information), deletion, and retrieval request file.

BIBRET -- Retrieved bibliographic card file.

BIBDEL -- Deleted bibliographic card file.

Bibliographic Listing and Index Files - Three bibliographic listing and index orders are routinely prepared: a reference-number-ordered, combined bibliographic and data index; an alphabetically ordered listing of all references; and an alphabetically ordered listing of all author citations. For each ordering, a machine-readable file and an interpreted listing are made. In summary:

BIBSRT - Machine-readable, reference-number-ordered, combined bibliography and data index.

REFSRT - Machine-readable, alphabetically ordered references.

AUTSRT - Machine-readable, alphabetically ordered author citations.

BIBLST - Interpreted, combined bibliography and data index.*

REFLST - Interpreted, alphabetically ordered references.*

AULIST - Interpreted, alphabetically ordered author citations.*

Scratch Files - Scratch files, as many as are required, are named SCR1, SCR2, etc. All scratch files are destroyed at the end of the program.

PROGRAM OPERATION

The following 10 sections describe each of the ECSIL programs in the order in which they are normally used to first check and enter numeric data into the library; to delete or retrieve data; and to create listings, plots, and indexes of the data. We then describe the programs used to update the bibliography. This is followed by a summary of the program in alphabetic order.

Program Names

The programs will be discussed in the following order:

* UCRL-50400 Vol. 2.

Data

- ECSCEX - Create a census (i.e., define the number of data points per ZA or Z) or check the ECSIL numeric binary-data library or card format.
- ECSORT - Sort cards into ECSIL binary-data library or other order.
- ECSMRG - Merge sorted card files into ECSIL numeric data library or other order.
- ECSUPD - Update the ECSIL numeric binary-data library by merging points into library.
- ECSDEL - Delete points from ECSIL numeric binary-data library.
- ECSRET - Retrieve points from ECSIL numeric binary-data library.
- ECSDEX - Create index files from the ECSIL numeric binary library or a card-image file.
- ECSPLT - Create interpreted listings and/or plots of data from the ECSIL numeric binary library or a card-image file.

Bibliography

- ECSBIB - Merge information into, delete information from, and/or retrieve information from the ECSIL bibliographic library.
- ECSPOP - Create listings and index files from the ECSIL bibliographic library.

Program Availability

All ECSIL programs have been compiled, loaded, and are ready for execution. They may be obtained from the IBM-1360 photostore, where they are stored under the name of the program in the .T:ECSIL directory of user 394800 (e.g., ELF RDS .394800:ECSIL:ECSPLT / 1 1 will retrieve the ECSIL listings and plotting code ECSPLT, ready for immediate execution).

Library Availability

The current ECSIL numeric and bibliographic files are available from the IBM-1360 photostore, where they are stored under the name of the file in the .T:LIBE directory of user 394800 (e.g., ELF RDS .394800:LIBE:BIBLST / 1 1 will retrieve the listing of the reference-number-ordered, combined bibliography and data indexes). The files always available under .T:LIBE are

LIBONX (NN = 01 to 12) - Current ECSIL data library.

BIBLIB - Current ECSIL bibliographic library.

INDEXN (N = A to D) -- Machine-readable indexes to ECSIL data library.

LISTN (N = A to D) -- Interpreted indexes to ECSIL data library (UCRL-

50400 Vol. 3).

BIBLST -- Interpreted, reference-number-ordered, combined bibliography
and data indexes.

REFLST -- Interpreted, alphabetically ordered references.

AULIST -- Interpreted, alphabetically ordered authors.

A thorough discussion of each program follows.

ECSCEN

(Checking/Census of Data Library or Cards)

Purpose

ECSEN counts the data points per ZA and Z (census) or checks either the ECSIL numeric binary-data library or a card-image file. The census also defines total point and computer word counts for each volume and for the library as a whole. In the checking mode, ECSEN checks the consistency of individual data points and tests based on the relative position of data points in the library (e.g., duplicate points, similar points, etc.).

Limitations

If a card-image file is used to create a census, the file must be in library sort order (see ECSORT and ECSMRG).

Core

SCM at 21 K₁₀ words; LCM at 4 K₁₀ words.

Time

1.8 min to read entire library and create census of check.

Files In (Fig. 20)

UNSORT - Data in ECSIL card-image format, unsorted.

or

SORTED - Data in ECSIL card-image format, sorted.

or

LIB001 - Current ECSIL binary-data library volumes (only those volumes

LIB002 present will be used, missing volumes will be skipped and will not cause program to abort).

LIB012

INDEXA - During census creation, substitute for missing library volumes (e.g., new library census is census of changed library volumes plus entries from INDEXA of last version).

Files Out (Fig. 20)

CHKLST - Disk file of library or card-image check run.

BUMMER - Deletion cards in the ECSIL format suitable for use with the library deletion program ECSDEL. Two cards are output for each error message to allow deletion of each Z/A/C/S/Ref. No.

Fig. 20. ECSCEN operation.

Input Parameters

Card	Columns	Format	Description
1	1-3	15	Output device (0 = USP, 1 = IY, 2 = disk file CHKLS1)
	6-10	15	Source of data to check
			0 = Library
			1 = UNSORT (no sort-order checks)
			2 = SORTED (perform sort-order checks)
			3 = Library
	11-15	15	Operation (0 = CENSUS, 1 = CHECK, 2 = CHECK and OUTPUT deletion cards)
	16-20	15	Checking mode
			0 = One error message per Z/A/C/S/Ref. No.
			1 = One error message of each type per Z/A/C/S/Ref. No.
			2 = All error messages
2	1-80	8011	Error flag for each error check described in the following list of error checks. If card 2 is not present, all tests are performed. If card 2 is present, it may be used to perform or suppress any of the tests. Consider card 2, columns 1 to 77, corresponding to test 1-77 described on the following page. Then each column is used as a flag to indicate
			1 = Perform test
			0 = No test

Output Examples

Figures 21 and 22 contain examples of a library census and of a portion of a report on library checks.

The census listing (Fig. 21) contains a count of the number of points of interest in the USM for each MA. The census is divided into sections to define the number of points in each of the 12 columns of the library, followed by a total for the entire library. Finally, the census contains a count of the number of points in the library for each MA.

The library check listing (Fig. 22) indicates possible problems with the library. The data are presented in a table which allows the library to be sorted in the order of the number of errors. A = 0, B = 1, C = 2, D = 3, E = 4, F = 5, G = 6, H = 7, I = 8, J = 9.

EC511-7600 CENSUS FOR L18001 151431222 08/13/76

ZA POINTS	ZA POINTS	ZA POINTS	ZA POINTS	ZA POINTS
1001 1539	1002 2890	1003 240	1302 42	1318 5415
1320 3822	2000 3300	2001 1408	2004 47	3000 2932
3006 5711	3007 3447	4009 10226	5000 1495	5010 5411
5011 2265	5370 5	6000 25709	6012 1878	6013 227
6328 9	6370 8	6404 9	6492 140	7000 9861
7014 2646	7015 3454	7328 38		
L18001 TOTALS	POINTS=	98174		

EC511-7600 CENSUS FOR L18002 151431222 08/13/76

ZA POINTS	ZA POINTS	ZA POINTS	ZA POINTS	ZA POINTS
8000 16941	8016 2742	8017 6	8018 621	8332 51
9019 6728	10000 716	10020 497	10021 2	10022 242
11022 3	11023 22095	12000 6162	12023 1	12024 451
12025 167	12026 191	12340 1	13027 33782	13402 14
L18002 TOTALS	POINTS=	91253		

EC511-7600 CENSUS FOR L18003 151431222 08/13/76

ZA POINTS	ZA POINTS	ZA POINTS	ZA POINTS	ZA POINTS
14000 19223	14028 5127	14029 320	14030 53	14360 3706
15031 3450	16000 10707	16032 1224	16033 6	16034 49
17000 8091	17035 426	17036 2	17037 118	18000 704
18036 497	18038 3	18040 168	19000 9510	19039 1039
19040 5	19041 168	20000 19357	20040 6572	20042 1458
20043 36	20044 125	21046 2	21048 5	21049 2482
21046 1	22000 17474	22046 998	22047 400	22048 1632
22049 1424	22050 733			
L18003 TOTALS	POINTS=	118036		

EC511-7600 CENSUS FOR L18004 151431222 08/13/76

ZA POINTS	ZA POINTS	ZA POINTS	ZA POINTS	ZA POINTS
23000 20098	23050 1376	23051 1481	24000 14877	24050 1544
24052 1010	24053 2651	24054 1162	25054 1	25055 14774
26000 39446	26054 1831	26056 3582	27057 1445	27058 74
28460				
L18004 TOTALS	POINTS=	168154		

Fig. 21. Library census (sample).

54135	84	54136	5	55133	8581	55134	2	55135	3
55137	1	56000	2065	56130	4570	56132	29	56134	47
56135	586	56136	36	56137	76	56138	205	56139	3
57000	1608	57138	32	57139	1463	57140	3	58000	2712
58136	4	58138	10	58140	230	58141	1	58142	190
58143	1	58144	2	59141	3193	59142	1	59143	2

LIBRARY TOTALS POINTS 175577

1951-7600 CENSUS FOR LIBRARY 1945-31227 08-13-76

ZA POINTS	ZA POINTS	ZA POINTS	ZA POINTS	ZA POINTS
60000	1987	60142	17608	60143
60146	11213	60148	12225	60150
61147	446	61148	10	61149
62144	51	62145	13	62147
62150	53	62151	467	62152
63000	1292	63151	6409	63152
63160	1	64000	4307	64152
64156	145	64157	482	64158
65000	2261	65156	57	65158
66142	534	66163	493	66164
68000	1728	68162	126	68164
68168	275	68170	344	68169
69000	1484	70168	39	70170
70173	442	70174	250	70176
71176	495	72000	2627	72174
72178	184	72179	318	72180
73180	1	73181	5289	74180
74182	2104	74183	872	74184
75185	569	75186	1	75187
76186	33	76187	229	76188
76189	49	77000	1768	77189
78190	1	78192	3	78194
79197	1	80198	48	

LIBRARY TOTALS POINTS 104649

1951-7600 CENSUS FOR LIBRARY 1945-31227 08-13-76

ZA POINTS	ZA POINTS	ZA POINTS	ZA POINTS	ZA POINTS
80199	46941	81198	58	82000
82199	191	83000	53	84000
85197	581	86198	545	87000
88000	145	89000	2405	90000
90999	413	91000	2411	92000
93000	1	93197	1	94000
94191	1	95192	2281	96000
97000	1	97198	901	

LIBRARY TOTALS POINTS 11985

154431222 08-13-76

2A POINTS	2A POINTS	2A POINTS	2A POINTS	2A POINTS
9200	9470	92030	9247	92233
92030	92037	1032	92238	94173
92213	1	92240	1	92245
92249	1	92249	1	92249

154431222 08-13-76

2A POINTS	2A POINTS	2A POINTS	2A POINTS	2A POINTS
93236	93237	93238	93239	93240
93241	93242	93243	93244	93245
93246	93247	93248	93249	93250

154431222 08-13-76

2A POINTS	2A POINTS	2A POINTS	2A POINTS	2A POINTS
93251	93252	93253	93254	93255
93256	93257	93258	93259	93260
93261	93262	93263	93264	93265

154431222 08-13-76

2A POINTS	2A POINTS	2A POINTS	2A POINTS	2A POINTS
93266	93267	93268	93269	93270
93271	93272	93273	93274	93275
93276	93277	93278	93279	93280

154431222 08-13-76

2A POINTS	2A POINTS	2A POINTS	2A POINTS	2A POINTS
93281	93282	93283	93284	93285
93286	93287	93288	93289	93290
93291	93292	93293	93294	93295

154431222 08-13-76

2A POINTS	2A POINTS	2A POINTS	2A POINTS	2A POINTS
93296	93297	93298	93299	93300
93301	93302	93303	93304	93305
93306	93307	93308	93309	93310

154431222 08-13-76

2A POINTS	2A POINTS	2A POINTS	2A POINTS	2A POINTS
93311	93312	93313	93314	93315
93316	93317	93318	93319	93320
93321	93322	93323	93324	93325

154431222 08-13-76

2A POINTS	2A POINTS	2A POINTS	2A POINTS	2A POINTS
93326	93327	93328	93329	93330
93331	93332	93333	93334	93335
93336	93337	93338	93339	93340

154431222 08-13-76

2A POINTS	2A POINTS	2A POINTS	2A POINTS	2A POINTS
93341	93342	93343	93344	93345
93346	93347	93348	93349	93350
93351	93352	93353	93354	93355

154431222 08-13-76

2A POINTS	2A POINTS	2A POINTS	2A POINTS	2A POINTS
93356	93357	93358	93359	93360
93361	93362	93363	93364	93365
93366	93367	93368	93369	93370

154431222 08-13-76

2A POINTS	2A POINTS	2A POINTS	2A POINTS	2A POINTS
93371	93372	93373	93374	93375
93376	93377	93378	93379	93380
93381	93382	93383	93384	93385

154431222 08-13-76

2A POINTS	2A POINTS	2A POINTS	2A POINTS	2A POINTS
93386	93387	93388	93389	93390
93391	93392	93393	93394	93395
93396	93397	93398	93399	93400

CCSL-7500 LIBRARY CHECK 10102145Z 08/25/76

ZA	C	S	REF	ERROR
1001	5	0	786	ERROR 1 0000E-02 LESS THAN 1/1000 DATA 2 0350E-01
1001	42	0	786	ERROR 1 3000E-02 LESS THAN 1/1000 DATA 2 0580E-01
1002	312	0	3752	1 7000E+00 ENERGY OUT OF RANGE
1318	911	0	2505	ERROR 7 6000E-03 OVER 5 TIMES DATA 1 4980E-03
1320	911	0	2505	ERROR 3 3940E-03 OVER 5 TIMES DATA 1 4980E-03
2003	1	0	776	ERROR 2 2000E-01 LESS THAN 1/1000 DATA 2 2250E-04
2003	12	0	2519	ERROR 1 1000E-02 OVER 5 TIMES DATA 1 0000E-03
2003	26	0	519	7 1010E+00 CROSS SECTION OUT OF RANGE AT 8 6500E-03 MEV
3006	15	0	841	3 3500E+00 ENERGY OUT OF RANGE
3006	15	0	589	4 4000E+00 ENERGY OUT OF RANGE
3006	15	0	1632	5 8300E+00 ENERGY OUT OF RANGE
3006	26	1	3927	0 CHECK LEVEL OR PHOTON ENERGY
3006	30	0	3801	4 5860E+00 CROSS SECTION OUT OF RANGE AT 1 0380E-03 MEV
3006	84	0	1125	2 3000E-01 ENERGY OUT OF RANGE
3006	102	0	1613	ERROR 4 5000E-02 OVER 5 TIMES DATA 2 2000E-03
3006	126	1	3927	0 CHECK LEVEL OR PHOTON ENERGY
3006	128	1	1636	0 CHECK LEVEL OR PHOTON ENERGY
3006	130	0	1635	8 0000E-02 ENERGY OUT OF RANGE
3006	130	0	3491	1 0000E-01 ENERGY OUT OF RANGE
3006	130	0	525	1 5000E-01 ENERGY OUT OF RANGE
3006	130	0	1630	1 9000E-01 ENERGY OUT OF RANGE
3006	130	0	1638	2 0000E-01 ENERGY OUT OF RANGE
3006	130	0	3729	2 5000E-01 ENERGY OUT OF RANGE
3006	480	0	3729	2 5000E-01 ENERGY OUT OF RANGE
3006	615	0	841	4 0000E+00 ENERGY OUT OF RANGE
3006	680	0	5259	1 031E-02 ENERGY OUT OF RANGE
3006	884	0	3934	1 0000E-05 ENERGY OUT OF RANGE
3007	4	1	841	0 CHECK LEVEL OR PHOTON ENERGY
3007	11	1	1632	0 CHECK LEVEL OR PHOTON ENERGY
3007	34	1	1504	0 CHECK LEVEL OR PHOTON ENERGY
3007	105	1	1633	0 CHECK LEVEL OR PHOTON ENERGY
3007	105	8	1622	0 CHECK LEVEL OR PHOTON ENERGY
3007	105	8	1639	0 CHECK LEVEL OR PHOTON ENERGY
3007	126	1	3441	0 CHECK LEVEL OR PHOTON ENERGY
3007	128	1	1298	0 CHECK LEVEL OR PHOTON ENERGY
3007	128	1	2690	0 CHECK LEVEL OR PHOTON ENERGY
3007	128	1	3441	0 CHECK LEVEL OR PHOTON ENERGY
3007	131	1	3298	0 CHECK LEVEL OR PHOTON ENERGY
3007	616	0	841	5 0000E-01 ENERGY OUT OF RANGE
4009	12	0	763	ERROR 2 0000E-03 OVER 5 TIMES DATA 5 0000E-04
4009	12	0	116	ERROR 1 0000E-01 OVER 5 TIMES DATA 1 6000E-02
4009	12	1	1105	9 1000E-02 2 9000E-00 X(1) FIELD MUST BE IN ASCENDING ORDER
4009	34	0	160	7 4000E-01 ENERGY OUT OF RANGE
4009	34	1	2367	0 CHECK LEVEL OR PHOTON ENERGY
4009	34	1	3501	0 CHECK LEVEL OR PHOTON ENERGY
4009	34	1	2367	0 CHECK LEVEL OR PHOTON ENERGY
4009	462	0	685	ERROR 3 5000E-02 OVER 5 TIMES DATA 3 0000E-03
4009	612	00	917	1 5000E-03 ENERGY OUT OF RANGE
4009	612	00	917	1 1000E-01 CROSS SECTION OUT OF RANGE AT 1 4000E-01 MEV
5000	1	0	1002	ERROR 1 0000E-02 OVER 5 TIMES DATA 1 7000E-04
5010	2	0	3513	ERROR 1 1310E-03 LESS THAN 1/1000 DATA 2 1243E-00
5010	34	0	3499	1 231E+01 CROSS SECTION OUT OF RANGE AT 2 443E-03 MEV
5010	34	0	802	7 9010E+00 CROSS SECTION OUT OF RANGE AT 6 0000E-04 MEV
5010	34	0	1020	6 9000E+00 CROSS SECTION OUT OF RANGE AT 1 0700E-04 MEV
5010	34	0	1649	5 6700E+00 CROSS SECTION OUT OF RANGE AT 1 1500E-04 MEV
5010	34	0	392	4 3000E+00 CROSS SECTION OUT OF RANGE AT 1 0000E-02 MEV

Fig. 22. Library check example.

```

5010 34 0 279 4.4000E-00 CROSS SECTION OUT OF RANGE AT 2.5000E-02 MEV
5010 34 1 1940 0. CHECK LEVEL OR PHOTON ENERGY
5010 34 1 742 0. CHECK LEVEL OR PHOTON ENERGY
5010 34 1 3202 0. CHECK LEVEL OR PHOTON ENERGY
5010 34 1 3202 LEVEL ENERGY 4.7800E-01 EXCEEDS INCIDENT ENERGY 2.0494E-02
5010 34 1 1940 LEVEL ENERGY 4.7800E-01 EXCEEDS INCIDENT ENERGY 9.8000E-02
5010 34 1 742 LEVEL ENERGY 4.7800E-01 EXCEEDS INCIDENT ENERGY 2.1500E-01
5010 128 1 1650 0. CHECK LEVEL OR PHOTON ENERGY
5010 128 1 1636 0. CHECK LEVEL OR PHOTON ENERGY
5010 130 1 1916 0. CHECK LEVEL OR PHOTON ENERGY
5010 134 1 3202 0. CHECK LEVEL OR PHOTON ENERGY
5010 884 1 1050 2.5000E-08 ENERGY OUT OF RANGE
5010 884 1 1050 0. CHECK LEVEL OR PHOTON ENERGY
5010 884 1 1050 LEVEL ENERGY 4.7800E-01 EXCEEDS INCIDENT ENERGY 2.5000E-08
5010 884 1 1051 2.5000E-08 ENERGY OUT OF RANGE
5010 884 1 1051 0. CHECK LEVEL OR PHOTON ENERGY
5010 884 1 1051 LEVEL ENERGY 4.7800E-01 EXCEEDS INCIDENT ENERGY 2.5000E-08
5010 884 1 1052 2.5000E-08 ENERGY OUT OF RANGE
5010 884 1 1052 0. CHECK LEVEL OR PHOTON ENERGY
5010 884 1 1052 LEVEL ENERGY 4.7800E-01 EXCEEDS INCIDENT ENERGY 2.5000E-08
5010 884 7 3259 9.4262E-04 ENERGY OUT OF RANGE
5010 884 7 3259 4.7800E-01 4.7800E-01 KILL FIELDS MUST BE IN ASCENDING ORDER
5010 952 0 3143 -9.4000E-01 RESONANCE ENERGY OUT OF RANGE
5010 953 0 3143 -9.4000E-01 RESONANCE ENERGY OUT OF RANGE
5010 962 0 3143 -9.4000E-01 RESONANCE ENERGY OUT OF RANGE
5011 34 1 3942 0. CHECK LEVEL OR PHOTON ENERGY
5011 130 1 3299 0. CHECK LEVEL OR PHOTON ENERGY
5011 134 1 3942 0. CHECK LEVEL OR PHOTON ENERGY
5011 884 0 932 1.0000E+01 CROSS SECTION OUT OF RANGE AT 1.4800E-01 MEV
5011 952 0 121 IDENTICAL POINT IN REF. 72 AT 4.3000E-01 MEV
5011 953 0 3133 IDENTICAL POINT IN REF. 72 AT 4.3000E-01 MEV
5011 953 0 121 IDENTICAL POINT IN REF. 3133 AT 4.3000E-01 MEV
6000 1 0 3493 ERROR 9.1566E-08 LESS THAN 1/5000 DATA 1.0300E-03
6000 5 0 785 ERROR 2.0000E-03 LESS THAN 1/1000 DATA 4.7430E+00
6000 42 0 3176 ERROR 4.5000E-03 LESS THAN 1/1000 DATA 4.7450E+00
6000 102 0 3247 ERROR 2.0000E-04 LESS THAN 1/1000 DATA 2.2090E-01
6012 34 1 821 0. CHECK LEVEL OR PHOTON ENERGY
6012 34 1 780 0. CHECK LEVEL OR PHOTON ENERGY
6012 34 1 3202 0. CHECK LEVEL OR PHOTON ENERGY
6012 34 1 3022 0. CHECK LEVEL OR PHOTON ENERGY
6012 62 0 2990 3.6000E-10 CROSS SECTION OUT OF RANGE AT 2.0000E-00 MEV
6012 111 1 1655 ERROR 1.5000E-03 OVER 5 TIMES DATA 1.0000E-04
7000 1 0 63 ERROR 2.9000E+00 OVER 5 TIMES DATA 1.8000E-01
7000 54 0 62 ERROR 1.5000E-02 OVER 5 TIMES DATA 2.0000E-03
7000 124 7 3504 ERROR 5.9688E-03 OVER 5 TIMES DATA 3.9450E-04
7014 26 1 519 0. CHECK LEVEL OR PHOTON ENERGY
7014 26 1 523 0. CHECK LEVEL OR PHOTON ENERGY
7014 26 1 801 0. CHECK LEVEL OR PHOTON ENERGY
7014 30 1 523 0. CHECK LEVEL OR PHOTON ENERGY
7014 30 1 2806 0. CHECK LEVEL OR PHOTON ENERGY
7014 34 1 523 0. CHECK LEVEL OR PHOTON ENERGY
7014 34 1 801 0. CHECK LEVEL OR PHOTON ENERGY
7014 34 1 2806 0. CHECK LEVEL OR PHOTON ENERGY
7014 34 1 523 0. CHECK LEVEL OR PHOTON ENERGY
7014 34 1 3942 0. CHECK LEVEL OR PHOTON ENERGY
7014 37 1 1943 0. CHECK LEVEL OR PHOTON ENERGY
7014 76 0 2796 2.5000E-08 ENERGY OUT OF RANGE
7014 76 0 2821 2.5000E-08 ENERGY OUT OF RANGE
7014 120 1 646 0. CHECK LEVEL OR PHOTON ENERGY
7014 124 1 1673 ERROR 1.0000E-03 OVER 5 TIMES DATA 1.0000E-04

```

Fig. 22 (cont.)

7014 128 1 1673	0.	CHECK LEVEL OR PHOTON ENERGY
7014 128 1 1899	0.	CHECK LEVEL OR PHOTON ENERGY
7014 128 1 2009	0.	CHECK LEVEL OR PHOTON ENERGY
7014 130 1 1673	0.	CHECK LEVEL OR PHOTON ENERGY
7014 130 1 1999	0.	CHECK LEVEL OR PHOTON ENERGY
7014 134 1 3292	0.	CHECK LEVEL OR PHOTON ENERGY
7014 134 1 3942	0.	CHECK LEVEL OR PHOTON ENERGY
7014 134 1 1933	0.	CHECK LEVEL OR PHOTON ENERGY
7014 134 1 1933	ERROR 1.7000E-05 OVER 5 TIMES DATA 1.0000E-04	
7014 134 81 3358	1.3000E+01	CROSS SECTION OUT OF RANGE AT 1.4100E+01 MEV
7014 134 81 3358	0.	CHECK LEVEL OR PHOTON ENERGY
7014 234 0 1672	8.4000E-01	ENERGY OUT OF RANGE
7014 953 0 3008	IDENTICAL POINT IN REF. 480 AT 1.5950E+00 MEV	
7015 128 1 1673	0.	CHECK LEVEL OR PHOTON ENERGY
8000 1 0 3458	ERROR 1.8860E+00 OVER 5 TIMES DATA 1.2400E-01	
8000 34 1 782	0.	CHECK LEVEL OR PHOTON ENERGY
8016 34 1 1920	0.	CHECK LEVEL OR PHOTON ENERGY
8016 34 1 2365	0.	CHECK LEVEL OR PHOTON ENERGY
8016 34 1 3942	0.	CHECK LEVEL OR PHOTON ENERGY
8016 128 1 1639	0.	CHECK LEVEL OR PHOTON ENERGY
8016 128 1 2590	0.	CHECK LEVEL OR PHOTON ENERGY
8016 134 1 2365	0.	CHECK LEVEL OR PHOTON ENERGY
8016 134 1 1920	0.	CHECK LEVEL OR PHOTON ENERGY
8016 134 1 3942	0.	CHECK LEVEL OR PHOTON ENERGY
8016 134 81 3654	3.6000E+02	CROSS SECTION OUT OF RANGE AT 1.3500E+01 MEV
8016 134 81 3654	0.	CHECK LEVEL OR PHOTON ENERGY
8016 134 88 3654	3.8000E+01	CROSS SECTION OUT OF RANGE AT 1.3500E+01 MEV
8016 953 0 2408	IDENTICAL POINT IN REF. 489 AT 1.0000E+00 MEV	
8017 84 0 2927	2.5000E-08	ENERGY OUT OF RANGE
9019 12 3 3988	1.0810E+02	USE HOURS NOT MINUTES
9019 26 1 742	0.	CHECK LEVEL OR PHOTON ENERGY
9019 34 1 742	0.	CHECK LEVEL OR PHOTON ENERGY
9019 62 0 3809	1.0000E+00	ENERGY OUT OF RANGE
9019 62 0 3979	1.5000E+00	ENERGY OUT OF RANGE
9019 105 1 1687	0.	CHECK LEVEL OR PHOTON ENERGY
9019 128 1 2587	0.	CHECK LEVEL OR PHOTON ENERGY
9019 128 1 1688	0.	CHECK LEVEL OR PHOTON ENERGY
9019 128 1 2219	0.	CHECK LEVEL OR PHOTON ENERGY
9019 130 1 2219	0.	CHECK LEVEL OR PHOTON ENERGY
9019 324 0 3628	ERROR 4.8800E-05 OVER 5 TIMES DATA 5.7700E-06	
9019 953 0 2	IDENTICAL POINT IN REF. 325 AT 2.7000E-02 MEV	
10000 1 0 2998	ERROR 1.0000E-03 LESS THAN 1/1000 DATA 2.3670E-00	
10000 1 0 570	ERROR 2.0000E-03 LESS THAN 1/5000 DATA 1.3940E-01	
10020 26 1 3186	0.	CHECK LEVEL OR PHOTON ENERGY
10020 34 1 1980	0.	CHECK LEVEL OR PHOTON ENERGY
10020 34 1 3186	0.	CHECK LEVEL OR PHOTON ENERGY
10020 37 1 3186	0.	CHECK LEVEL OR PHOTON ENERGY
10020 134 1 1920	0.	CHECK LEVEL OR PHOTON ENERGY
10021 34 0 2824	9.6000E-01	CROSS SECTION OUT OF RANGE AT 2.5000E-08 MEV
11023 1 0 228	ERROR 3.0000E-03 LESS THAN 1/1000 DATA 3.7710E+00	
11023 1 0 3555	ERROR 4.542E-09 LESS THAN 1/5000 DATA 8.7600E-05	
11023 11 0 3837	ERROR 1.3100E-02 OVER 5 TIMES DATA 2.2000E-03	
11023 11 1 714	0.	CHECK LEVEL OR PHOTON ENERGY
11023 18 0 2895	ERROR 1.9000E-02 OVER 5 TIMES DATA 1.0000E-03	
11023 26 1 1717	0.	CHECK LEVEL OR PHOTON ENERGY
11023 34 1 1717	0.	CHECK LEVEL OR PHOTON ENERGY
11023 62 0 3981	1.5000E+00	ENERGY OUT OF RANGE

Fig. 22 (cont.)

List of Error Checks

Each of the following tests is applied to each and every data point in the ECSIL library or ECSIL card-image file. In addition, the targets Z and A are checked for range and ratio. Special materials ($A \geq 300$) are checked to insure they are defined.

- 1 - Extra word (Xi) count-range test
- 2 - Activation ($C = 36$) Z-range test
- 3 - Activation ($C = 36$) A-range test
- 4 - Activation ($C = 36$) - test for possible unique reaction
- 5 - Activation ($C = 36$) - should be capture ($C = 23$)
- 6 - Activation ($C = 36$) - should be n,n ($C = 11$)
- 7 - Activation ($C = 36$) - should be $n,2n$ ($C = 12$)
- 8 - Allowable basic C-number
- 9 - Allowable C-increment-number
- 10 - Transmission data ($S = 20$) should not be in library
- 11 - Allowable S-number
- 12 - Allowable C-number (C -increment + basic C)
- 13 - Energy allowable for target and reaction (ZA,C)
- 14 - Cross-section allowable for target and reaction (ZA,C)
- 15 - Cosine out of range
- 16 - For energy ranges - minimum less than maximum
- 17 - Error field range test
- 18 - Error too big compared to data
- 19 - Activation ($C = 36$) - check Z-to-A ratio
- 20 - Extra words (Xi) cannot be negative
- 21 - Extra words must be in ascending order ($Xi < Xi + 1$)
- 22 - Compare energy level to incident-particle energy
- 23 - Half-life should be in minutes not seconds
- 24 - Half-life should be in hours not minutes
- 25 - Half-life should be in days not hours
- 26 - Half-life should be in years not days
- 27 - Level or photon energy too high
- 28 - J-value range test
- 29 - Bound-in ($S = 12$) Z-range test
- 30 - Bound-in ($S = 12$) A-range test
- 31 - Bound-in ($S = 12$) Z-to-A-ratio test

- 32 -- Bound-in ($S = 12$) undefined-special-A ($A \geq 300$)
- 33 -- Legendre-order range test
- 34 -- L-value range test
- 35 -- Resonance energy ($C = 951$), no accompanying parameter
- 36 -- Parity-value test
- 37 -- Ratio data ($C = 851$ to 899), denominator C must be basic C ($C = 1$ to 49)
- 38 -- Ratio data ($C = 851$ to 899), denominator C allowable
- 39 -- Ratio data ($C = 851$ to 899), denominator Z-range test
- 40 -- Ratio data ($C = 851$ to 899), denominator A-range test
- 41 -- Ratio data ($C = 851$ to 899), denominator Z-to-A-range test
- 42 -- Ratio data ($C = 851$ to 899), denominator undefined special-A ($A \geq 300$)
- 43 -- J-value $1/2$ -integer test
- 44 -- L-value integer test
- 45 -- Temperature ($S = 9$) range test
- 46 -- Resolved resonance parameters ($C \geq 950$), $S = 0$
- 47 -- Unresolved resonance parameters ($C = 940$ to 949), $S = 0$ or 11
- 48 -- Library sort-order test
- 49 -- Status range test
- 50 -- Year range test
- 51 -- Reference-number range test
- 52 -- Subreference-number range test
- 53 -- Legendre-coefficient range test
- 54 -- Resonance-energy range test
- 55 -- Nuclear-temperature range test
- 56 -- Identical point in another reference
- 57 -- Identical points in the same reference
- 58 -- Level ($S = 1$ or 8) vs photon ($S = 7$ or 10) check
- 59 -- C-number does not allow spin ($S = 11$)
- 60 -- C-increment > 0 , does not allow basic C > 40
- 61 -- Activation ($C = 36$) - should be n, α ($C = 34$)
- 62 -- Similar points in the same reference (points differ only in cross section)
- 63 -- Legendre-order integer test
- 64 -- L-order range test
- 65 -- L-order error test

- 66 - Activation (C = 36) - should be n,p (C = 26)
- 67 - Data error too small compared to data
- 68 - Activation (C = 36) - should be n,^o3n (C = 13)
- 69 - Activation (C = 36) - should be n,4n (C = 19)
- 70 - Activation (C = 36) - should be n,t (C = 30)
- 71 - Activation (C = 36) - should be n,d (C = 28)
- 72 - Activation (C = 36) - combination of target ZA and activated ZA impossible
- 73 - Energy error too small compared to energy
- 74 - Overflow
- 75 - Underflow
- 76 - Undefined
- 77 - Illegal level or photon energy test

ECSORT
(Sorting Data Cards)

Purpose

ECSORT sorts numeric data in the ECSIL card-image format into one of three standard orders or into a generalized sort based on any combination of seven fields. The standard orders available are

- (1) Z/A/C/S/E - Library order
- (2) Z/A/C/S/Ref. No./E - Reaction/Reference Number order
- (3) Ref. No./Z/A/C/S/E - Reference-Number order

The sort continues according to the order outlined under the ECSIL library organization for each C-range.

The generalized sort is any ordering of from one to seven of the following fields (followed by a sort on energy):

- (1) Z
- (2) A
- (3) C
- (4) S
- (5) Status
- (6) Year
- (7) Reference Number

The sort order is indicated by using the above indexes in the order desired. For example, the three standard sorts correspond to

- (1) Z/A/C/S/E - 1234
- (2) Z/A/C/S/Ref. No./E - 12347
- (3) Ref. No./Z/A/C/S/E - 71234

An example of a chronologically ordered file is

Year/Z/A/C/S/E - 61234

Limitations

There is no limit to the number of cards sorted by ECSIL. The program will create a series of sorted files each up to 15 000 points. If there is more than one file, they are not merged together, and ECSMRG must be used to merge them.

Core

SCM at 28 K₁₀ words; LCM at 16 K₁₀ words.

Time

1.2 min per 25 000 cards sorted.

Files In (Fig. 23)

UNSORT Numeric data to be sorted in ECSIL card-image format.

Files Out (Fig. 23)

- SORT001 Sorted card files; each file up to 15 000 points; as many files as required.

SORT002

•
•
•

Input Parameters

Card	Cols.	Format	Description
1	1-5	15	Output-device selector (0 = HSP, 1 = TTY)
	6-10	15	Sort order = 0 Z/A/C/S/E (library) = 1 Z/N/C/S/Ref. No./E (reaction/reference) = 2 Ref. No./Z/A/C/S/E (reference) = 3 General
13-20		711	General sort index used for general sort order only. Use any of the seven available columns; e.g., 1234000 is considered identical to 0001234 or 1020304.

Output Listing Example

ECSIL-7600 SORT RUN 09:03:33Z 06/11/76

FILENAME	POINTS	CARDS
SORT001	15000	15465
SORT002	15000	16012
SORT003	7015	7028
UNSORT	37015	38505

Fig. 23. ECSORT operation.

ECSMRG
(Merging Sorted Data Cards)

Purpose:

ECSMRG merges sorted cards into one of three standard orders or a generalized merge based on any combination of seven fields. The merge orders are identical to those used by ECSORT as are the input parameters (INPUT files) and names of files to be merged. See ECSORT for a description of available merge orders. The program determines which files to merge by opening them in order (SORT001, SORT002, etc.) until it cannot locate a file.

Limitations:

From one to 10 sorted files may be merged together. If only one file is present, it is simply renamed from SORT001 to SORTED and execution is terminated.

Core:

SCM at 18 K₁₀ words; LCM at 8 K₁₀ words.

Flow:

0.7 min per 25,000 cards merged.

File - In (Fig. 25)

SORT001 - Sorted card files, of any length, from one to 10 files.

SORT002

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SORT010

File - Out (Fig. 25)

SORTED - Merged card file.

Fig. 25. ECSMRG flowchart.

Input Parameters

Cards	Cols.	Format	Description
1	1-2	I5	Output-device selector (0 = HSP, 1 = TTY)
	6-10	I5	Merge order = 0 - Z/A/C/S/E (Library) = 1 - Z/A/C/S/Ref. No./E (reaction/Library) = 2 - Seq. No./Z/A/C/S/E (reference) = 3 - General
13-20	1-11	I11	General merge index (used for general merge order only). Use any of the seven available columns; e.g., 1234000 is considered identical to 0001234 or 1020304. See ECSORT for general index definitions.

Output File Example

CARD = 000 MERGE RUN 09:01:33.06.11.76		
1 - 1A9	900008	CARDS
1000	15000	15465
0 - REF 02	10000	16012
1 - 1A9	1000	7928
1000	27004	38505

ECSUPD
(Updating Data Library)

THE UNIVERSITY OF CHICAGO

ECSDH updates the ECCH numeric data binary library by reading data points in the ASCII card-image format and merging them into the library. Deletions are not performed by the update program (see ECSDDEL).

1998, 1999, 2000, 2001, 2002, 2003, 2004, 2005, 2006, 2007, 2008, 2009, 2010, 2011, 2012, 2013, 2014, 2015, 2016, 2017, 2018, 2019, 2020, 2021, 2022, 2023, 2024, 2025, 2026, 2027, 2028, 2029, 2030, 2031, 2032, 2033, 2034, 2035, 2036, 2037, 2038, 2039, 2040, 2041, 2042, 2043, 2044, 2045, 2046, 2047, 2048, 2049, 2050, 2051, 2052, 2053, 2054, 2055, 2056, 2057, 2058, 2059, 2060, 2061, 2062, 2063, 2064, 2065, 2066, 2067, 2068, 2069, 2070, 2071, 2072, 2073, 2074, 2075, 2076, 2077, 2078, 2079, 2080, 2081, 2082, 2083, 2084, 2085, 2086, 2087, 2088, 2089, 2090, 2091, 2092, 2093, 2094, 2095, 2096, 2097, 2098, 2099, 2100, 2101, 2102, 2103, 2104, 2105, 2106, 2107, 2108, 2109, 2110, 2111, 2112, 2113, 2114, 2115, 2116, 2117, 2118, 2119, 2120, 2121, 2122, 2123, 2124, 2125, 2126, 2127, 2128, 2129, 2130, 2131, 2132, 2133, 2134, 2135, 2136, 2137, 2138, 2139, 2140, 2141, 2142, 2143, 2144, 2145, 2146, 2147, 2148, 2149, 2150, 2151, 2152, 2153, 2154, 2155, 2156, 2157, 2158, 2159, 2160, 2161, 2162, 2163, 2164, 2165, 2166, 2167, 2168, 2169, 2170, 2171, 2172, 2173, 2174, 2175, 2176, 2177, 2178, 2179, 2180, 2181, 2182, 2183, 2184, 2185, 2186, 2187, 2188, 2189, 2190, 2191, 2192, 2193, 2194, 2195, 2196, 2197, 2198, 2199, 2200, 2201, 2202, 2203, 2204, 2205, 2206, 2207, 2208, 2209, 2210, 2211, 2212, 2213, 2214, 2215, 2216, 2217, 2218, 2219, 2220, 2221, 2222, 2223, 2224, 2225, 2226, 2227, 2228, 2229, 2230, 2231, 2232, 2233, 2234, 2235, 2236, 2237, 2238, 2239, 2240, 2241, 2242, 2243, 2244, 2245, 2246, 2247, 2248, 2249, 2250, 2251, 2252, 2253, 2254, 2255, 2256, 2257, 2258, 2259, 2260, 2261, 2262, 2263, 2264, 2265, 2266, 2267, 2268, 2269, 2270, 2271, 2272, 2273, 2274, 2275, 2276, 2277, 2278, 2279, 2280, 2281, 2282, 2283, 2284, 2285, 2286, 2287, 2288, 2289, 2290, 2291, 2292, 2293, 2294, 2295, 2296, 2297, 2298, 2299, 2300, 2301, 2302, 2303, 2304, 2305, 2306, 2307, 2308, 2309, 2310, 2311, 2312, 2313, 2314, 2315, 2316, 2317, 2318, 2319, 2320, 2321, 2322, 2323, 2324, 2325, 2326, 2327, 2328, 2329, 2330, 2331, 2332, 2333, 2334, 2335, 2336, 2337, 2338, 2339, 2340, 2341, 2342, 2343, 2344, 2345, 2346, 2347, 2348, 2349, 2350, 2351, 2352, 2353, 2354, 2355, 2356, 2357, 2358, 2359, 2360, 2361, 2362, 2363, 2364, 2365, 2366, 2367, 2368, 2369, 2370, 2371, 2372, 2373, 2374, 2375, 2376, 2377, 2378, 2379, 2380, 2381, 2382, 2383, 2384, 2385, 2386, 2387, 2388, 2389, 2390, 2391, 2392, 2393, 2394, 2395, 2396, 2397, 2398, 2399, 2400, 2401, 2402, 2403, 2404, 2405, 2406, 2407, 2408, 2409, 2410, 2411, 2412, 2413, 2414, 2415, 2416, 2417, 2418, 2419, 2420, 2421, 2422, 2423, 2424, 2425, 2426, 2427, 2428, 2429, 2430, 2431, 2432, 2433, 2434, 2435, 2436, 2437, 2438, 2439, 2440, 2441, 2442, 2443, 2444, 2445, 2446, 2447, 2448, 2449, 2450, 2451, 2452, 2453, 2454, 2455, 2456, 2457, 2458, 2459, 2460, 2461, 2462, 2463, 2464, 2465, 2466, 2467, 2468, 2469, 2470, 2471, 2472, 2473, 2474, 2475, 2476, 2477, 2478, 2479, 2480, 2481, 2482, 2483, 2484, 2485, 2486, 2487, 2488, 2489, 2490, 2491, 2492, 2493, 2494, 2495, 2496, 2497, 2498, 2499, 2500, 2501, 2502, 2503, 2504, 2505, 2506, 2507, 2508, 2509, 2510, 2511, 2512, 2513, 2514, 2515, 2516, 2517, 2518, 2519, 2520, 2521, 2522, 2523, 2524, 2525, 2526, 2527, 2528, 2529, 2530, 2531, 2532, 2533, 2534, 2535, 2536, 2537, 2538, 2539, 2540, 2541, 2542, 2543, 2544, 2545, 2546, 2547, 2548, 2549, 2550, 2551, 2552, 2553, 2554, 2555, 2556, 2557, 2558, 2559, 2560, 2561, 2562, 2563, 2564, 2565, 2566, 2567, 2568, 2569, 2570, 2571, 2572, 2573, 2574, 2575, 2576, 2577, 2578, 2579, 2580, 2581, 2582, 2583, 2584, 2585, 2586, 2587, 2588, 2589, 2590, 2591, 2592, 2593, 2594, 2595, 2596, 2597, 2598, 2599, 2600, 2601, 2602, 2603, 2604, 2605, 2606, 2607, 2608, 2609, 2610, 2611, 2612, 2613, 2614, 2615, 2616, 2617, 2618, 2619, 2620, 2621, 2622, 2623, 2624, 2625, 2626, 2627, 2628, 2629, 2630, 2631, 2632, 2633, 2634, 2635, 2636, 2637, 2638, 2639, 2640, 2641, 2642, 2643, 2644, 2645, 2646, 2647, 2648, 2649, 2650, 2651, 2652, 2653, 2654, 2655, 2656, 2657, 2658, 2659, 2660, 2661, 2662, 2663, 2664, 2665, 2666, 2667, 2668, 2669, 2670, 2671, 2672, 2673, 2674, 2675, 2676, 2677, 2678, 2679, 26

The card set be turned into the Library must be sorted into library order (see: CDSOL and CDSMCO).

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"... it is a word which is not worth."

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2.000 to read entire library and merge 25 000 points.

110 111 112 113 114 115 116 117 118 119 120 121 122 123 124 125 126 127 128 129 130 131 132 133 134 135 136 137 138 139 140 141 142 143 144 145 146 147 148 149 150 151 152 153 154 155 156 157 158 159 160 161 162 163 164 165 166 167 168 169 170 171 172 173 174 175 176 177 178 179 180 181 182 183 184 185 186 187 188 189 190 191 192 193 194 195 196 197 198 199 200 201 202 203 204 205 206 207 208 209 210 211 212 213 214 215 216 217 218 219 220 221 222 223 224 225 226 227 228 229 230 231 232 233 234 235 236 237 238 239 240 241 242 243 244 245 246 247 248 249 250 251 252 253 254 255 256 257 258 259 260 261 262 263 264 265 266 267 268 269 270 271 272 273 274 275 276 277 278 279 280 281 282 283 284 285 286 287 288 289 290 291 292 293 294 295 296 297 298 299 300 301 302 303 304 305 306 307 308 309 310 311 312 313 314 315 316 317 318 319 320 321 322 323 324 325 326 327 328 329 330 331 332 333 334 335 336 337 338 339 340 341 342 343 344 345 346 347 348 349 350 351 352 353 354 355 356 357 358 359 360 361 362 363 364 365 366 367 368 369 370 371 372 373 374 375 376 377 378 379 380 381 382 383 384 385 386 387 388 389 390 391 392 393 394 395 396 397 398 399 400 401 402 403 404 405 406 407 408 409 410 411 412 413 414 415 416 417 418 419 420 421 422 423 424 425 426 427 428 429 430 431 432 433 434 435 436 437 438 439 440 441 442 443 444 445 446 447 448 449 450 451 452 453 454 455 456 457 458 459 460 461 462 463 464 465 466 467 468 469 470 471 472 473 474 475 476 477 478 479 480 481 482 483 484 485 486 487 488 489 490 491 492 493 494 495 496 497 498 499 500 501 502 503 504 505 506 507 508 509 510 511 512 513 514 515 516 517 518 519 520 521 522 523 524 525 526 527 528 529 530 531 532 533 534 535 536 537 538 539 540 541 542 543 544 545 546 547 548 549 550 551 552 553 554 555 556 557 558 559 560 561 562 563 564 565 566 567 568 569 570 571 572 573 574 575 576 577 578 579 580 581 582 583 584 585 586 587 588 589 590 591 592 593 594 595 596 597 598 599 600 601 602 603 604 605 606 607 608 609 610 611 612 613 614 615 616 617 618 619 620 621 622 623 624 625 626 627 628 629 630 631 632 633 634 635 636 637 638 639 640 641 642 643 644 645 646 647 648 649 650 651 652 653 654 655 656 657 658 659 660 661 662 663 664 665 666 667 668 669 670 671 672 673 674 675 676 677 678 679 680 681 682 683 684 685 686 687 688 689 690 691 692 693 694 695 696 697 698 699 700 701 702 703 704 705 706 707 708 709 710 711 712 713 714 715 716 717 718 719 720 721 722 723 724 725 726 727 728 729 730 731 732 733 734 735 736 737 738 739 740 741 742 743 744 745 746 747 748 749 750 751 752 753 754 755 756 757 758 759 760 761 762 763 764 765 766 767 768 769 770 771 772 773 774 775 776 777 778 779 780 781 782 783 784 785 786 787 788 789 790 791 792 793 794 795 796 797 798 799 800 801 802 803 804 805 806 807 808 809 810 811 812 813 814 815 816 817 818 819 820 821 822 823 824 825 826 827 828 829 830 831 832 833 834 835 836 837 838 839 840 841 842 843 844 845 846 847 848 849 850 851 852 853 854 855 856 857 858 859 860 861 862 863 864 865 866 867 868 869 870 871 872 873 874 875 876 877 878 879 880 881 882 883 884 885 886 887 888 889 890 891 892 893 894 895 896 897 898 899 900 901 902 903 904 905 906 907 908 909 910 911 912 913 914 915 916 917 918 919 920 921 922 923 924 925 926 927 928 929 930 931 932 933 934 935 936 937 938 939 940 941 942 943 944 945 946 947 948 949 950 951 952 953 954 955 956 957 958 959 960 961 962 963 964 965 966 967 968 969 970 971 972 973 974 975 976 977 978 979 980 981 982 983 984 985 986 987 988 989 990 991 992 993 994 995 996 997 998 999 1000 1001 1002 1003 1004 1005 1006 1007 1008 1009 1010 1011 1012 1013 1014 1015 1016 1017 1018 1019 1020 1021 1022 1023 1024 1025 1026 1027 1028 1029 1030 1031 1032 1033 1034 1035 1036 1037 1038 1039 1040 1041 1042 1043 1044 1045 1046 1047 1048 1049 1050 1051 1052 1053 1054 1055 1056 1057 1058 1059 1060 1061 1062 1063 1064 1065 1066 1067 1068 1069 1070 1071 1072 1073 1074 1075 1076 1077 1078 1079 1080 1081 1082 1083 1084 1085 1086 1087 1088 1089 1090 1091 1092 1093 1094 1095 1096 1097 1098 1099 1100 1101 1102 1103 1104 1105 1106

Data in ICSTL card-image format, sorted into library order.

2

selected data in ASCII card-image format, sorted into library order.

and divided into 12 separate files each corresponding to the 12-volume range of the individual EUSC Library volumes.

•

500

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Lemma 6. Let α be affected by the update; need be present; $c \in C$; $t \in T$. Then:

1211 LIBRARY VOLU. 1

1. *Chlorophyll a* (Chl *a*)

91-0017 Penetration of SHL board's library to the community. *Journal of the American Society of Information Science*, 1991, 42/1, 1-10.

1992) – volumes attracted by the update, these are the α and β volumes, α being the volume of the update.

1

• • •

6.1. Now, parent loss, loss_p , is defined as:

 

THE ELEMENTS OF ALGEBRA

THE ELEMENTS OF ALGEBRA, PART I. BY JOHN H. COOPER, M.A., F.R.S. LONDON: PRINTED BY J. JOHNSON, ST. PAUL'S CHURCH-YARD, 1773.

THE ELEMENTS OF ALGEBRA, PART II. BY JOHN H. COOPER, M.A., F.R.S. LONDON: PRINTED BY J. JOHNSON, ST. PAUL'S CHURCH-YARD, 1773.

THE ELEMENTS OF ALGEBRA, PART III. BY JOHN H. COOPER, M.A., F.R.S. LONDON: PRINTED BY J. JOHNSON, ST. PAUL'S CHURCH-YARD, 1773.

THE ELEMENTS OF ALGEBRA, PART IV. BY JOHN H. COOPER, M.A., F.R.S. LONDON: PRINTED BY J. JOHNSON, ST. PAUL'S CHURCH-YARD, 1773.

THE ELEMENTS OF ALGEBRA, PART V. BY JOHN H. COOPER, M.A., F.R.S. LONDON: PRINTED BY J. JOHNSON, ST. PAUL'S CHURCH-YARD, 1773.

THE ELEMENTS OF ALGEBRA, PART VI. BY JOHN H. COOPER, M.A., F.R.S. LONDON: PRINTED BY J. JOHNSON, ST. PAUL'S CHURCH-YARD, 1773.

FIG. 26. LCSDEL operation.

Flow out (Fig. 26)

OLD012 Generated data points by the FCHL candidate term.

OLD001 Candidate FCHL Minus-data Library volume contribution. LIB001

OLD002 LIB002 selected by the selection. These are the original

Library volume before deletion.

OLD012

LIB001 New created FCHL Minus-data Library volume before deletion

LIB002 LIB001 selected by the selection will after deletion

LIB012 LIB002

Input Parameter

Card	Value	Format	Description
1	1-5	15	Output device (0 = HSP, 1 = TTY)
	6-10	15	Disposition of outmoded library volumes = 0 - Leave on disk as OLD001, OLD002, etc. = 1 - Destroy (minimize disk storage requirements)
	11-15	15	Deleted card-file size in thousands of cards (e.g., 10 = 10 000 cards). Default is 100 000 cards.
2-5	1-50		Deletions in the ECHL data-card format. Each request consists of one or two pairs of cards, the former of each pair specifying a lower limit and the latter specifying an upper limit for each of the 18 fields defined in the format. A blank field indicates no limit. For continuation cards, is read from the second card.

Output Listing Example

ECS11-7600 LIBRARY DELECTION RUN 09:59:30U 09/13/76

LIBRARY STATISTICS

LIBRARY VOLUME	ORIGINAL POINTS	FINAL POINTS	DELETED POINTS
LIB001	98174	97142	1032
LIB002	91265	91256	9
LIB003	118154	115006	3148
LIB004	108202	106986	1216
LIB005	110209	110016	193
LIB006	89921	84145	5776
LIB007	125624	124602	1022
LIB008	204263	202128	2135
LIB009	119650	118240	1410
LIB010	240018	218813	21205
LIB011	229551	229487	64
LIB012	70513	69127	1385
TOTALS	1605544	1566949	38595

DELETION REPORT

REQ. NO.	POINTS	
1	6283	
2	12016	
3	84	
4	20212	
	POINTS	CARDS
TOTALS	38595	39413

ECSRET
(Retrieving From Data Library)

Purpose

ECSRET retrieves data points from the ECSIL numeric binary-data library based on a series of retrieval requests. All retrieved data points are written in the SORTED file in the ECSIL card-image format. Each retrieval request is in the ECSIL data-card format and consists of one or, in the case of continuation cards, two pairs of cards. The first card of each pair specifies a lower limit for each of the 18 fields described in the card format. The second card specifies an upper limit for the corresponding fields. A blank field indicates no limit; a zero (0) means a zero limit [e.g., the limit indicated by the blank A-field includes the elemental mixture ($A=00$), all isotopes, and all compounds]. A zero-field limit indicates the elemental mixture ($A = 0$) exclusively.

Limitations

Requests may be in any order, with up to 100 requests (i.e., 200 or 400 cards). The operation of the program can be greatly expedited by specifying a Z-range for each request. This makes it possible to examine only certain ECSIL Library volumes and data records. Failure to specify a Z-range will require the program to read and examine the entire ECSIL Library. Retrieved data points are always in library order; use ECSORT and ECSMRG to obtain other orderings.

Core

SCH at 28 K₁₀ words; ECM at 4 K₁₀ words.

Time

2.0 min to read entire library and retrieve 25 000 points.

Files. In (Fig. 23)

- LIB001 Current ECSIL binary-library volumes (only those library volumes affected by the deletion need be present; e.g., to retrieve a set of ²³⁵U fission data from the library, only LIB010 need be present). See description of ECSIL Library file structure to
- LIB012 define the Z-range for each library volume.

Files out (Fig. 23)

- OUT.D Retrieved data points in the ECSIL card-image format.

Input Parameters

Card	Cols.	Format	Description
1	1-5	15	Output device (0 = RSP, 1 = PTY)
	6-10	15	Retrieved card-file size in thousands of cards (e.g., 10 = 10 000). Default is 100 000 cards.
2-N	1-80		Retrievals in the ECSIL data-card format. Each request consists of one or two pairs of cards, the former of each pair specifying a lower limit and the latter specifying an upper limit for each of the 18 fields defined in the format. A blank field indicates no limit. For continuation cards, status is read from second card.

Output Listing Example

ECSIL-7600 LIBRARY RETRIEVAL RUN 09:59:30 09/13/76

RETRIEVAL REPORT

REQ. NO.	POINTS	
1	5283	
2	12016	
3	84	
4	26212	
	POINTS	CARDS
TOTALS	38595	39413

Fig. 22. LIB operation.

ECSDEX

(Indexes to Data Library)

Purpose

ECSDEX creates index files for either the ECSIL numeric binary-data library or a card-image file. Index files may be created in any or all of four sort orders: (1) Z/A/C/S/E (library order), (2) Ref. No./Z/A/C/S/E (reference number order), (3) C/S/Z/A/E (interaction-number order), (4) Basic C/C Increment/S/Z/A/E (basic interaction-number order). Both machine-readable and interpreted listing files may be made for each sort order.

Limitations

If index files are to be made from a card-image file, the card-image file must be sorted in the library order (see ECSORT). The file INDEXA is used to make the files INDEXB, INDEXC, and/or INDEXD. The files LISTA-D are then made from the corresponding file INDEXA. Therefore, to make INDEXB-D, INDEXA must first exist or be made from cards or the library. Similarly, to make LISTA-D, the corresponding file INDEXA-D must exist or be made during execution.

Core

SCM at 29 K₁₀ words; LCM at 6 K₁₀ words.

Time

2.2 min to read entire library and create all index files.

Files In (Fig. 28)

INDEXA	Z/A/C/S/E-ordered machine-readable index (if col. 7 = 0).*
or	
SORTED	Card-image file (if col. 7 = 1 or 2).
or	
LIB001	Current ECSIL binary-data library volumes (if col. 7 = 3). (Only
LIB002	those volumes present will be used. Missing volumes will be
	skipped or INDEXN used to fill in entries; this will not cause
	program to abort.)
LIB012	
INDEXX0	Old index used to define new (N) or changed (C) entries.
INDEXXN	Index used to fill in for any missing library volumes (e.g.,
	new index combines index for changed library volumes with entries
	from last index-INDEXN).

* refers to columns of input card.

Fig. 28. ECSDEX operation.

Files Out (Fig. 28)

INDEXA - Z/A/C/S/E-order (if col. 7 > 0).

INDEXB - Ref. No./Z/A/C/S/E-order
(if col. 8 > 0).

INDEXC - C/S/Z/A/E-order (if col. 9 > 0).

INDEXD - Basic C/C Increment/S/Z/A/E-order
(if col. 10 > 0).

LISTA - Z/A/C/S/E-order (if col. 12 > 0).

LISTB - Ref. No./Z/A/C/S/E-order
(if col. 13 > 0).

LISTC - C/S/Z/A/E-order (if col. 14 > 0).

LISTD - Basic C/C Increments/S/Z/A/E-order
(if col. 15 > 0).

Machine-readable

Index

files

Interpreted

Index

files

Input Parameters

Card	Cols.	Format	Description
1	1-5	15	Output device (0 = HSP, 1 = TTY)
	7	11	Source of INDEXA (0 = it exists, 1 or 2 = cards, 3 = library)
	8	11	INDEXB option (0 = no, 1 = create)
	9	11	INDEXC option (0 = no, 1 = create)
	10	11	INDEXD option (0 = no, 1 = create)
	12	11	LISTA option (0 = no, 1 = create)
	13	11	LISTB option (0 = no, 1 = create)
	14	11	LISTC option (0 = no, 1 = create)
	15	11	LISTD option (0 = no, 1 = create)

Input Listing Examples

Figures 29 to 32 illustrate the contents of the index files INDEXA to INDEXD for the ^{56}Fe (n,n') cross sections ($C = 11$) and angular distributions ($C = 111$). Subsequent pages (Figs. 33 to 36) contain examples of interpreted listings from the files LISTA to LISTD. Lastly, Fig. 37 presents sample bibliographic information and corresponding data indexes for two sample references (Ref. No. = 3837 and 4069). (See program ECSPDP for preparation of this latter file.)

26054951	0	7	822E-03	5.200E-02	6829*200	6	N	260556	26	0	1.480E-01	1.480E-01	68271100	1	N
26054951	0	8	100E-03	5.700E-02	5902*2900	2	N	260556	26	0	1.480E-01	1.480E-01	68407100	1	N
26054951	0	1	020E-02	7.000E-02	7030*6900	4	N	260556	26	0	1.484E-01	1.484E-01	61067900	1	N
26054951	0	9	200E-02	8.010E-01	56031900	8	N	260556	26	0	1.500E-01	1.500E-01	60062800	1	N
26054951	0	9	800E-02	5.080E-01	62074300	56	N	260556	26	0	1.510E-01	1.510E-01	59166300	1	N
260556	0	1	1440E-06	1.440E-06	65039400	1	N	260556	26	0	1.527E-01	1.527E-01	60533300	1	N
260556	1	0	1.860E-01	6.570E-01	62074700	485	N	260556	26	4	1.254E-01	1.870E-01	62056200	6	N
260556	1	0	5.090E-02	5.050E-02	71321400	1	N	260556	26	7	1.400E-01	1.400E-01	64185900	1	N
260556	2	0	4.600E-03	7.550E-02	68199800	7	N	260556	2680	1	1.360E-01	1.460E-01	68299600	6	N
260556	2	0	4.050E-02	5.980E-02	71321400	2	N	260556	27	0	1.320E-01	1.320E-01	57087700	1	N
260556	3	0	8.100E-02	1.970E-01	65122800	2	N	260556	34	1	1.460E-01	1.460E-01	67271000	1	N
260556	11	7	9.30E-01	2.125E-02	75383700	585	N	260556	11	0	7.300E-08	7.300E-08	51158400	1	N
260556	1	0	1.830E-02	2.430E-02	65232100	3	N	260556	43	0	7.300E-08	7.300E-08	51158400	1	N
260556	0	2	500E-02	2.500E-02	55004100	1	N	260556	73	0	2.500E-08	2.500E-08	52032200	1	N
260556	1	0	1.510E-01	1.510E-01	69366200	1	N	260556	7387	2	5.500E-08	2.530E-08	71486200	2	N
260556	1	1	8.70E-01	1.162E-02	73406900	67	N	260556	76	0	1.000E-02	1.000E-02	68998000	1	N
260556	1	1	8.64E-01	2.478E-02	62059700	55	N	260556	76	0	1.000E-02	1.000E-02	70389700	1	N
260556	1	1	4.780E-01	3.962E-02	75381900	125	N	260556	76	0	2.000E-02	2.000E-02	64171100	1	N
260556	1	1	4.200E-01	1.790E-02	71324300	10	N	260556	76	0	2.000E-02	2.000E-02	67109500	1	N
260556	1	1	1.000E-02	2.200E-02	63082800	2	N	260556	77	0	2.000E-02	2.000E-02	68998000	1	N
260556	1	1	1.000E-02	3.950E-02	68184500	27	N	260556	76	0	4.400E-02	4.400E-02	64171100	1	N
260556	1	1	1.25E-02	1.500E-02	68184500	26	N	260556	102	0	6.300E-01	9.700E-01	67097100	63	N
260556	1	1	1.370E-02	3.760E-02	67339700	14	N	260556	102	0	1.800E-02	1.800E-02	72452600	17	N
260556	1	1	3.990E-02	3.990E-02	65101600	7	N	260556	102	0	4.500E-02	7.550E-02	68199800	85	N
260556	1	1	4.600E-02	7.550E-02	68199800	46	N	260556	102	0	5.30E-02	5.30E-02	71321400	19	N
260556	1	1	5.050E-02	5.580E-02	71321400	12	N	260556	111	1	1.370E-02	4.900E-02	68295800	119	N
260556	1	1	1.00E-01	1.400E-01	64185900	2	N	260556	111	1	1.424E-02	2.15E-02	70387700	225	N
260556	1	1	3.360E-02	3.760E-02	67339700	2	N	260556	111	1	2.145E-02	4.39E-02	68047600	1	N
260556	12	0	1.188E-01	1.476E-01	75381900	7	N	260556	111	1	4.600E-02	7.550E-02	68195300	85	N
260556	12	0	1.400E-01	1.400E-01	62337400	1	N	260556	111	1	5.050E-02	5.580E-02	71321400	95	N
260556	12	0	1.510E-01	1.510E-01	69366200	1	N	260556	111	1	1.400E-01	1.400E-01	72340600	1	N
260556	14	0	1.400E-01	1.400E-01	61036100	1	N	260556	111	7	8.700E-01	5.982E-02	75381900	144	N
260556	21	0	1.400E-02	5.900E-02	64099800	33	N	260556	111	7	1.426E-02	2.12E-02	70370700	225	N
260556	24	0	4.800E-01	4.000E-01	56000900	1	N	260556	111	7	2.500E-02	1.410E-01	74394100	291	N
260556	24	7	1.000E-02	2.600E-02	65103600	22	N	260556	111	7	2.800E-02	2.000E-02	65171500	3	N
260556	24	7	1.000E-02	3.300E-02	68172600	9	N	260556	111	8	5.050E-02	5.580E-02	71321400	19	N
260556	24	7	2.900E-02	2.900E-02	61065800	1	N	260556	11181	2	2.450E-02	2.450E-02	56047600	15	N
260556	26	0	3.950E-02	4.100E-01	67115000	9	N	260556	124	7	9.500E-01	3.000E-02	63178800	10	N
260556	26	0	1.579E-02	3.949E-02	73382000	56	N	260556	124	7	5.600E-01	4.950E-01	64171100	109	N
260556	26	0	4.770E-02	0.233E-01	64184600	17	N	260556	124	7	2.560E-02	2.560E-02	60066600	11	N
260556	26	0	6.060E-02	8.290E-02	65171400	4	N	260556	124	7	2.800E-02	2.800E-02	65171500	1	N
260556	26	0	1.260E-01	1.998E-01	65184700	20	N	260556	124	7	2.870E-02	2.870E-02	61065800	1	N
260556	26	0	1.358E-01	6.73E-01	62100800	3	N	260556	124	7	2.530E-02	4.950E-02	68091800	1	N
260556	26	0	1.400E-01	1.400E-01	55020200	1	N	260556	124	7	3.700E-02	3.700E-02	55047300	1	N
260556	26	0	1.400E-01	1.400E-01	57021700	1	N	260556	124	7	1.430E-01	1.430E-01	67171000	1	N
260556	26	0	1.400E-01	1.400E-01	61136100	1	N	260556	124	7	1.350E-01	1.350E-01	58094100	1	N
260556	26	0	1.410E-01	1.410E-01	52008400	1	N	260556	124	7	6.100E-02	7.300E-02	74394100	1	N
260556	26	0	1.410E-01	1.410E-01	60063700	1	N	260556	124	7	3.974E-02	9.54E-02	74394100	1	N
260556	26	0	1.410E-01	1.410E-01	61065100	1	N	260556	124	7	1.870E-01	1.870E-01	71321400	1	N
260556	26	0	1.414E-01	1.414E-01	57023500	1	N	260556	124	7	2.000E-01	2.000E-01	61136100	1	N
260556	26	0	1.440E-01	1.440E-01	62050800	1	N	260556	124	7	6.400E-01	6.400E-01	68199800	1	N
260556	26	0	1.440E-01	1.440E-01	72346300	1	N	260556	124	7	2.000E-01	2.000E-01	64171100	1	N
260556	26	0	1.450E-01	1.450E-01	53027000	1	N	260556	124	7	1.140E-01	1.140E-01	64235400	1	N
260556	26	0	1.450E-01	1.450E-01	68103000	1	N	260556	124	7	1.140E-01	1.140E-01	65171500	1	N
260556	26	0	1.450E-01	1.450E-01	63100900	1	N	260556	124	7	1.140E-01	1.140E-01	64171100	1	N
260556	26	0	1.450E-01	1.450E-01	72334500	1	N	260556	124	7	1.140E-01	1.140E-01	64171100	1	N
260556	26	0	1.460E-01	1.460E-01	69235400	2	N	260556	124	7	1.140E-01	1.140E-01	64171100	1	N
260556	26	0	1.470E-01	1.470E-01	64184600	1	N	260556	124	7	1.140E-01	1.140E-01	64171100	1	N
260556	26	0	1.470E-01	1.470E-01	68255300	1	N	260556	124	7	1.140E-01	1.140E-01	64171100	1	N
260556	26	0	1.480E-01	1.480E-01	64083000	1	N	260556	124	7	1.140E-01	1.140E-01	64171100	1	N

Fig. 29. INDEXA list of α for $\alpha = 0, 1, 2, \dots, 10$.

75124951	0	4	750E-06	1.501E-02	75393500	300	0	N	
75124952	0	4	750E-06	9.965E-04	75393500	2	0	N	
75124953	0	1	750E-06	9.965E-04	75393500	267	0	N	
75124954	0	1	750E-06	2.115E-02	75393500	3	8	N	
75124955	0	1	750E-06	2.115E-02	75393500	237	8	N	
75124956	0	6	250E-06	6.250E+00	75393500	21	8	N	
75124957	1	6	250E-06	6.250E+00	75393500	21	8	N	
75124958	0	4	750E-06	2.169E+00	75393700	945	2	N	
75124959	0	1	750E-06	3.260E+00	75393700	293	3	N	
75124960	0	7	180E-06	2.169E+00	75393700	985	4	N	
75124961	1	1	750E-06	9.800E-04	75393700	112	11	N	
75124962	0	1	750E-06	5.660E-05	75393900	53	10	N	
75124963	0	2	190E-06	1.015E-01	75393900	54	3	N	
75124964	0	0	1	923E-02	7539400E	4	9	N	
75124965	0	5	177	35	1.038E-01	75394000	134	9	N
75124966	0	2	000E-02	75394000	2	9	N		
75124967	0	4	750E-06	9.300E-02	75394000	37	2	N	
75124968	0	4	750E-06	1.945E+01	75394200	245	1	N	
75124969	0	1	510E-02	773E+01	75394200	3377	8	N	
75124970	0	1	190E-06	2.192E-06	75394300	220	6	N	
75124971	0	1	190E-06	1.992E-04	75394300	1029	6	N	
75124972	0	1	150E-06	2.278E-05	75394300	17	6	N	
75124973	0	4	750E-06	4.762E-05	75394300	5	6	N	
75124974	0	8	191E-06	2.730E+00	75394400	9	10	N	
75124975	0	8	210E-06	2.730E+00	75394400	18	10	N	
75124976	0	1	030E-06	5.947E-03	65304500	120	3	N	
75124977	0	3	510E-06	2.550E-08	66384500	1	3	N	
75124978	1	5	010E-06	2.415E-05	75394600	139	8	N	
75124979	0	5	060E-07	1.000E-01	75394600	1	8	N	
75124980	1	0	2	501E-03	75394600	5	8	N	
75124981	0	1	000E-07	2.957E-04	75394600	269	9	N	
75124982	0	2	510E-06	2.630E+00	75394700	1	7	N	
75124983	0	5	000E-03	6.000E-02	75394800	15	7	N	
75124984	0	5	070E-03	5.978E-03	75394800	4	7	N	
75124985	0	5	058E-03	5.978E-03	75394800	126	1	N	
75124986	0	1	750E-06	1.915E+00	67394900	33	9	N	
75124987	0	1	750E-06	1.475E+01	75395100	1	1	N	
75124988	0	1	750E-06	1.475E+01	75395100	1	7	N	
75124989	0	1	750E-06	1.475E+01	75395100	25	0	N	
75124990	0	1	750E-06	1.475E+01	75395100	28	8	N	
75124991	0	1	750E-06	1.475E+01	75395100	1	8	N	
75124992	0	1	750E-06	1.475E+01	75395100	24	0	N	
75124993	0	1	750E-06	1.475E+01	75395100	24	0	N	
75124994	0	1	750E-06	1.475E+01	75395100	24	0	N	
75124995	0	1	750E-06	1.475E+01	75395100	24	0	N	
75124996	0	1	750E-06	1.475E+01	75395100	24	0	N	
75124997	0	1	750E-06	1.475E+01	75395100	24	0	N	
75124998	0	1	750E-06	1.475E+01	75395100	24	0	N	
75124999	0	1	750E-06	1.475E+01	75395100	24	0	N	

92238	73	0	1.000E+00	1.000E+00	73106500	1	10	N
92239	73	0	1.000E+00	1.000E+00	73106500	1	10	N
92240	22480	2	500E-08	2.500E-08	73106500	38	6	N
92241	2480	2	500E-08	2.500E-08	73106500	25	6	N
92242	2480	2	500E-08	2.500E-08	73106500	52	6	N
92243	2480	2	500E-08	2.500E-08	73106500	13	12	N
 

[illegible]

26054951	0	7.820E-03	5.200E-02	69294200	6	N
26054951	0	8.100E-03	5.400E-02	55022600	2	N
26054951	0	1.020E-02	7.700E-02	70206800	4	N
26054951	0	9.200E-02	4.010E-01	56011800	5	N
26054951	0	9.800E-02	5.050E-01	62074700	54	N
26056	10	1.440E-06	1.440E-06	65094900	1	N
26056	10	1.860E-01	6.670E-01	62074700	485	N
26056	10	5.050E-00	5.050E-00	71321400	1	N
26056	20	4.600E-00	7.550E-00	68199800	7	N
26056	20	5.050E-00	5.580E-00	71321400	2	N
26056102	0	6.300E-01	9.700E-01	67027100	63	N
26056102	0	1.800E-00	1.800E-00	72020600	17	N
26056102	0	4.600E-00	7.550E-00	68199800	85	N
26056102	0	5.050E-00	5.580E-00	71321400	2	N
26056	30	6.100E-00	1.970E-01	65122800	19	N
26056	110	7.930E-01	2.120E-00	75363700	595	N
26056	110	1.830E-00	2.430E-03	65212100	3	N
26056	110	2.500E-00	2.500E-00	55004100	1	N
26056	110	3.00E-01	1.510E-01	69366200	1	N
26056	111	8.470E-01	1.160E-00	73068900	67	N
26056	111	8.640E-01	2.478E-00	62059700	55	N
26056	111	8.760E-01	3.960E-00	75386900	125	N
26056	111	9.270E-01	1.790E-00	71321400	10	N
26056	111	1.000E-00	1.200E-00	63082300	2	N
26056	111	1.000E-00	3.950E-00	12184500	27	N
26056	111	1.125E-00	1.500E-00	68154600	26	N
26056	111	1.370E-00	5.760E-00	63339700	14	N
26056	111	3.990E-00	3.990E-00	65101600	7	N
26056	111	4.600E-00	7.550E-00	68199800	46	N
26056	111	5.050E-00	5.580E-00	71321400	12	N
26056	111	7.140E-01	1.430E-01	68189500	2	N
26056	111	3.360E-00	3.760E-00	67339700	2	N
26056111	1	1.370E-00	4.490E-00	68258900	119	N
26056111	1	1.426E-00	2.152E-00	70320700	225	N
26056111	1	2.450E-00	2.450E-00	96047600	1	N
26056111	1	4.600E-00	7.550E-00	68199800	85	N
26056111	1	5.050E-00	5.580E-00	71321400	97	N
26056111	1	1.400E-01	1.400E-01	72340600	11	N
26056111	7	6.700E-01	3.962E-00	75386900	144	N
26056111	7	1.425E-00	2.152E-00	70320700	225	N
26056111	7	2.500E-00	1.41E-01	74394100	291	N
26056111	7	2.800E-00	2.800E-00	65171500	3	N
26056111	9	5.050E-00	5.580E-00	71321400	19	N
26056111	9	2.450E-00	2.450E-00	96047600	15	N
26056111	11	1.188E-01	1.476E-01	75386900	7	N
26056	12	0.1400E-01	1.400E-01	62337400	1	N
26056	12	0.1510E-01	1.510E-01	69366200	1	N
26056	14	0.1400E-01	1.400E-01	61036100	1	N
26056	21	0.1400E-02	5.900E-02	64059800	33	N
26056	23	0.400E-01	4.000E-01	56003900	1	N
26056	23	0.2500E-08	2.500E-08	52034200	1	N
26056	23	0.2530E-00	2.530E-08	71382200	25	N
26056	24	7.1200E-00	2.640E-00	85132300	22	N
26056	24	1.000E-00	3.300E-00	62172600	9	N
26056	24	2.900E-00	2.900E-00	61068500	1	N
26056124	1	5.500E-01	3.000E-00	63172800	12	N
26056124	7	6.600E-01	4.050E-01	64173000	109	N
26056124	7	2.560E-00	2.560E-00	60066600	11	N
26056124	7	2.800E-00	2.800E-00	69171500	3	N
26056124	7	2.670E-00	2.670E-00	61068500	5	N

Fig. 32. INDEXC listing of ^{56}Fe (n,n') data index.

27-04-76

ELSI-7000 REACTION INDEX 24 ORDERED

24 - 2625-

TARGET	CODE	S	E-MIN-MEV	E-MAX-MEV	REFERENCE	POINTS	REACTION DESCRIPTION
N	26-Fe-54	1	3.600	5.6500	1	75 3078	10 RESONANCE PARAMETERS
N	26-Fe-54	1	7.757	9.1725	1	71 2073	10 RESONANCE PARAMETERS
N	26-Fe-54	1	7.820	9.5000	2	69 2642	8 RESONANCE PARAMETERS
N	26-Fe-54	1	8.100	9.5000	2	55 2929	8 RESONANCE PARAMETERS
N	26-Fe-54	1	1.320	2.7700	2	70 3068	8 RESONANCE PARAMETERS
N	26-Fe-54	1	5.200	2.4010	1	85 118	8 RESONANCE PARAMETERS
N	26-Fe-54	1	9.800	2.5065	1	62 147	8 RESONANCE PARAMETERS
N	26-Fe-54	1	1.400	6.440	6	85 249	10 TOTAL
N	26-Fe-54	1	1.800	1.6750	1	62 147	10 TOTAL
N	26-Fe-56	1	5.050	0.5050	0	71 3214	7 ELASTIC
N	26-Fe-56	2	5.050	0.5050	0	69 2999	2 ELASTIC
N	26-Fe-56	3	5.050	0.5050	0	71 3214	2 NONELASTIC
N	26-Fe-56	1	8.100	1.9700	1	65 1028	2 NONELASTIC
N	26-Fe-56	1	9.980	1.2190	1	75 3857	50 N.N.
N	26-Fe-56	1	1.830	0.2450	0	65 2321	3 N.N.
N	26-Fe-56	1	2.500	0.2500	0	55 41	1 N.N.
N	26-Fe-56	1	1.510	1.5100	1	59 3663	1 N.N.
N	26-Fe-56	1	8.470	1.1650	1	71 4069	67 N.N.
N	26-Fe-56	1	8.642	1.4780	0	62 587	30 N.N.
N	26-Fe-56	1	8.780	1.9620	0	75 3689	125 N.N.
N	26-Fe-56	1	9.200	1.7950	0	71 3243	10 N.N.
N	26-Fe-56	1	1.500	1.2000	0	63 828	2 N.N.
N	26-Fe-56	1	1.000	0.9000	0	62 1805	21 N.N.
N	26-Fe-56	1	1.125	1.5000	0	68 1546	25 N.N.
N	26-Fe-56	1	1.370	1.7600	0	67 3397	14 N.N.
N	26-Fe-56	1	1.990	1.9900	0	69 1016	7 N.N.
N	26-Fe-56	1	2.550	2.5500	0	68 1890	46 N.N.
N	26-Fe-56	1	5.050	5.5900	0	11 3214	12 N.N.
N	26-Fe-56	1	4.000	1.4000	1	84 1895	2 N.N.
N	26-Fe-56	1	3.360	3.7600	0	67 3397	0 N.N.
N	26-Fe-56	1	1.080	1.4760	1	75 4807	7 N.N.
N	26-Fe-56	1	1.400	1.4000	1	62 3274	4 N.N.
N	26-Fe-56	1	1.510	1.5100	1	69 3262	1 N.N.
N	26-Fe-56	1	1.400	1.4000	1	61 361	1 N.N.
N	26-Fe-56	1	4.000	4.3000	2	64 596	31 ADDITION
N	26-Fe-56	1	4.000	4.0000	1	16 4	1 N.GAMMA
N	26-Fe-56	1	1.000	2.6410	0	65 1023	20 N.GAMMA
N	26-Fe-56	1	1.050	3.7000	0	63 1726	9 N.GAMMA
N	26-Fe-56	1	2.920	0.9000	0	31 686	1 N.GAMMA
N	26-Fe-56	1	3.950	2.1410	1	67 1522	9 N.D.
N	26-Fe-56	1	3.970	0.9440	0	71 3342	16 N.D.
N	26-Fe-56	1	5.700	2.0310	1	64 1846	47 N.D.
N	26-Fe-56	1	6.060	0.2500	0	68 1714	11 N.D.
N	26-Fe-56	1	1.250	1.9080	1	63 1867	28 N.D.
N	26-Fe-56	1	1.390	1.4730	1	62 1008	3 N.D.
N	26-Fe-56	1	1.400	1.4000	1	25 202	3 N.D.
N	26-Fe-56	1	1.400	1.4000	1	57 211	1 N.D.
N	26-Fe-56	1	1.400	1.4000	1	61 361	1 N.A.
N	26-Fe-56	1	1.410	1.4100	1	58 84	1 N.D.
N	26-Fe-56	1	1.410	1.4100	1	60 847	1 N.D.
N	26-Fe-56	1	1.410	1.4100	1	61 644	1 N.D.
N	26-Fe-56	1	1.410	1.4100	1	57 535	1 N.D.

TARGET CODE S E-MIN-MEV E-MAX-MEV REFERENCE POINTS REACTION DESCRIPTION

*** 1 102 ***

24 - 2625-

Fig. 33. LISTA listing of ⁵⁶Fe (n,n') data index.

[illegible]

Fig. 33 (cont.)

GPO-76

FISIC REACTION INDEX BASIC REACTION INDEX

24-25000

TARGET CODE	S	E	MIN	MEV	E	MAX	MEV	REFERENCE	POINTS	REACTION DESCRIPTION	
N	26	Fe	54	1	5.500	0	5.578	15	5578	RESONANCE PARAMETERS	
N	26	Fe	54	1	7.757	0	7.757	31	2079	RESONANCE PARAMETERS	
N	26	Fe	54	1	7.800	0	7.800	65	2944	RESONANCE PARAMETERS	
N	26	Fe	54	1	8.100	0	8.100	55	2649	RESONANCE PARAMETERS	
N	26	Fe	54	1	1.000	0	7.700	70	3088	RESONANCE PARAMETERS	
N	26	Fe	54	1	9.200	0	9.010	1	56	1.6	RESONANCE PARAMETERS
N	26	Fe	54	1	9.800	0	9.065	1	60	747	RESONANCE PARAMETERS
N	26	Fe	56	1	1.440	0	1.440	65	9849	TOTAL	
N	26	Fe	56	1	1.860	0	1.670	1	62	147	TOTAL
N	26	Fe	56	1	5.050	0	5.050	0	71	3214	TOTAL
N	26	Fe	56	1	6.000	0	7.550	0	68	1988	ELASTIC
N	26	Fe	56	10P	5.300	0	9.700	67	971	63	ELASTIC ANGULAR DISTRIBUTION
N	26	Fe	56	10P	8.800	0	9.800	0	72	4065	ELASTIC ANGULAR DISTRIBUTION
N	26	Fe	56	10P	4.600	0	7.550	0	68	1988	ELASTIC ANGULAR DISTRIBUTION
N	26	Fe	56	10P	7.050	0	5.580	0	71	3214	ELASTIC ANGULAR DISTRIBUTION
N	26	Fe	56	11	8.100	0	9.700	65	1209	NON-ELASTIC	
N	26	Fe	56	11	7.958	0	7.129	0	75	3857	585 N.N.
N	26	Fe	56	11	1.880	0	2.430	0	65	2301	3 N.N.
N	26	Fe	56	11	2.500	0	2.500	0	55	11	1 N.N.
N	26	Fe	56	11	5.100	0	1.510	0	69	3662	1 N.N.
N	26	Fe	56	11	8.470	0	1.162	0	73	4069	61 N.N.
N	26	Fe	56	11	8.647	0	1.478	0	67	507	56 N.N.
N	26	Fe	56	11	8.780	0	1.962	0	75	3889	125 N.N.
N	26	Fe	56	11	4.200	0	1.790	0	71	3215	10 N.N.
N	26	Fe	56	11	1.000	0	1.200	0	83	848	2 N.N.
N	26	Fe	56	11	1.000	0	5.950	0	62	1845	27 N.N.
N	26	Fe	56	11	1.125	0	1.500	0	68	1546	26 N.N.
N	26	Fe	56	11	1.870	0	5.760	0	67	3397	14 N.N.
N	26	Fe	56	11	5.950	0	5.950	0	65	1016	7 N.N.
N	26	Fe	56	11	2.400	0	7.550	0	68	1998	41 N.N.
N	26	Fe	56	11	5.050	0	5.050	0	71	3215	12 N.N.
N	26	Fe	56	11	1.400	0	1.400	0	64	1899	2 N.N.
N	26	Fe	56	11	8.360	0	5.760	0	67	3397	12 N.N.
N	26	Fe	56	11	1.110	0	4.400	0	66	2983	119 N.N.
N	26	Fe	56	11P	1.420	0	2.150	0	70	3475	205 N.N.
N	26	Fe	56	11P	2.450	0	2.450	0	56	476	1 N.N.
N	26	Fe	56	11P	4.600	0	1.550	0	68	1988	65 N.N.
N	26	Fe	56	11P	5.050	0	5.050	0	71	3214	90 N.N.
N	26	Fe	56	11P	1.400	0	1.400	0	72	3406	11 N.N.
N	26	Fe	56	11P	8.700	0	1.360	0	75	3889	144 N.N.
N	26	Fe	56	11P	1.400	0	2.150	0	70	3507	205 N.N.
N	26	Fe	56	11P	2.500	0	1.410	0	64	2041	191 N.N.
N	26	Fe	56	11P	5.800	0	2.800	0	67	1714	3 N.N.
N	26	Fe	56	11P	8.500	0	5.080	0	71	3214	19 N.N.
N	26	Fe	56	11P	9.700	0	2.470	0	56	476	15 N.N.
N	26	Fe	56	12	1.080	0	1.780	0	74	3807	1 N.N.
N	26	Fe	56	12	1.400	0	1.400	0	62	1874	1 N.N.
N	26	Fe	56	12	5.050	0	1.610	0	69	3662	1 N.N.
N	26	Fe	56	14	1.400	0	1.400	0	61	361	1 N.N.
N	26	Fe	56	21	1.400	0	5.400	0	64	948	33 ABSORPTION
N	26	Fe	56	23	4.000	0	4.000	0	50	9	1 RESONANCE

TARGET CODE S E MIN MEV E MAX MEV REFERENCE POINTS REACTION DESCRIPTION

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24-25000

Fig. 36. LISTD listing of $^{56}\text{Fe}(n,n')$ data index.

07-DW-76	EC5IL-7600 BIBLIOGRAPHY	REF NO	ORDERED	REF NO + 1800		
REF BIBLIOGRAPHY	TARGET	EN	RANGE	REF	PTS	DESCRIPTION
1832	58-EP-162	1	48-21	1	48-01	1 N, 2N
	58-EP-166	1	48-01	1	48-01	1 N, P
	59-TM-169	1	48-01	1	48-01	1 N, 2N
	70-YB-168	1	48-01	1	48-01	1 N, 2N
	70-YB-170	1	48-01	1	48-01	1 N, 2N
	70-YB-174	1	48-01	1	48-01	1 N, P
1833 PHYS. REV. C, 10, 1064 (1974) S. A. ELBAKH, J. J. VAN HEERDEN, D. R. GILL, N. AMMER, M. J. MC DONALD, G. C. NEILSON, M. K. DAWSON (U. OF ALBERTA) VAN DE GRAAFF NEUTRON SOURCE	64-CD-160	1	05-00	2	13-00	2D N, N
1834 BULL. AM. PHYS. SOC. 15, 1372 (1970) H. W. FINK, W. D. LU (GEORGIA TECH.) (D, T) NEUTRON SOURCE	28-NI-58	1	44-01	1	44-01	1 N, 2N
	28-NI-58	1	44-01	1	44-01	1 N, P
	28-NI-58	1	44-01	1	44-01	1 ACTIVA1
	48-CD-106	1	44-01	1	44-01	1 N, P
	48-CD-106	1	44-01	1	44-01	1 N, P
	50-SN-112	1	44-01	1	44-01	1 N, 2N
	50-SN-112	1	44-01	1	44-01	2 N, P
	50-SN-112	1	44-01	1	44-01	1 ACTIVA1
1835 PHYS. REV. C, 11, 462 (1975) M. I. LIOU, G. HACKEN, L. J. RAINWATER, U. N. SINGH (COLUMBIA U.) SYNCHROCYCLOTRON NEUTRON SOURCE	66-DY-160	1	04-01	1	09-03	2 AV RES. PARAM
	66-DY-160	1	04-25	1	09-03	157 RES. PARAM
	66-DY-161	2	71-00	9	90-04	2 AV RES. PARAM
	66-DY-161	2	71-00	9	90-04	528 RES. PARAM
	66-DY-162	5	45-00	1	58-00	1 AV RES. PARAM
	66-DY-162	5	45-00	1	58-00	500 RES. PARAM
	66-DY-163	1	72-00	9	90-04	2 AV RES. PARAM
	66-DY-163	1	72-00	9	90-04	257 RES. PARAM
	66-DY-164	1	47-04	2	11-02	3 AV RES. PARAM
	66-DY-164	1	47-04	2	11-02	237 RES. PARAM
1836 PHYS. LETTERS, B, 58, 293 (1975) C. LAGRANGE, R. E. SHAMU, T. M. BARROWS, G. P. LASSON, G. HARDIE, F. D. MC DANIEL (U. OF KENTUCKY) VAN DE GRAAFF (D, D) NEUTRON SOURCE	62-SH-148	5	25-00	5	25-00	21 ELASTIC D.A.
	62-SH-154	6	25-00	6	25-00	21 ELASTIC D.A.
1837 CONF. ON NEUTRON C/S TECHNOLOGY KNOXVILLE, T. 191 (1975) F. G. PEF, M. E. KINNEY, B. L. MACKIN (ORNL) ELECTRON LINAC NEUTRON SOURCE	11-NA-25	4	47-01	2	16-00	345 N, N
	14-51-20	1	79-00	3	52-00	253 N, N
	20-PE-56	7	93-01	2	12-00	585 N, N
1838 PHYS. REV. C, 8, 2352 (1973) G. A. KERNORTH, J. P. LEMLEY, C. E. OLSEN, F. T. SEIBEL, J. M. T. DABBS, JR., N. M. HILL (ORNL) ELECTRON LINAC NEUTRON SOURCE	93-AP-237	1	47-06	8	84-04	112 RES. PARAM
1839 PHYS. REV. LETTERS 31, 1077 (1978) G. A. KERNORTH, C. E. OLSEN, F. T. SEIBEL, J. M. T. DABBS, JR., N. M. HILL (ORNL) ELECTRON LINAC NEUTRON SOURCE	02-U-235	1	13-06	5	56-05	53 RES. PARAM
1840 PHYS. REV. C, 12, 102 (1975) M. I. LIOU, L. J. RAINWATER, G. HACKEN, U. N. SINGH (COLUMBIA U.) SYNCHROCYCLOTRON NEUTRON SOURCE	81-TL-241	2	10-00	1	01-31	54 RES. PARAM
	81-TL-203	0	1	90-02		4 AV RES. PARAM
	81-TL-203	3	79-05	1	03-01	114 RES. PARAM
REF BIBLIOGRAPHY	TARGET	EN	RANGE	REF	PTS	DESCRIPTION
						REF NO + 1840
						*** 3 512 ***

*** 3 512 ***

REF NO + 1800

Fig. 37. BIBLST listing of ^{56}Fe (n,n') reference bibliography.

ECSPLT

(Plots, Listings From Data Library or Cards)

Purpose

ECSPLT creates interpreted listings and/or plots of data from the ECSIL numeric binary-data library or a card-image file. Plots of the data may have evaluated data from ENDL,⁷ ENDF/B,⁸ or TARTAN⁹ multigroup data overlaid on the plots. To facilitate comparison of experimental data, physically comparable data sets may also be presented on separate plots with separate or similar scaling.

Limitations

If a card image file is used to create plots, it must be in library sort order (see ECSORT and ECSMRG). Requests may be in any order. There is a maximum of 100 requests (i.e., 200 or 400 cards). The operation of the program can be greatly expedited by specifying a Z-range for each request. This makes it possible to examine only certain volumes and data records, not the entire library. Failure to specify a Z-range will require the program to read and examine the entire ECSIL library. The evaluated data must be in the ENDF/B format⁸ and linear-linear interpolatable between tabulated points.

Core

SCM at 30 K₁₀ words; LCM at 8 K₁₀ words.

Time

2.5 min to read entire library and plot 25 000 points (400 plots).

Files In (Fig. 38)

SORTED -- Card-image file.

or

LIB001 -- Current ECSIL binary-data library volumes (only those library

LIB002 volumes affected by the requests need be present; e.g., to plot

. the ²³⁵U fission cross sections from the library, only LIB010

. need be present). See description of ECSIL library file structure

LIB012 to define the Z-range for each library volume.

ENDFIN -- Comparative data (ENDL, ENDF, or TART) in the ENDF/B format.⁸

Files Out (Fig. 38)

DO -- Plot files of plots and/or listings that may be processed by

D1 FROG⁶ to obtain such hardcopy as 35-mm film, microfiche, and

. printer output.

.

DX

Fig. 38. ECSPLT operation.

Input Parameters

Card	Cols.	Format	Description
1	1-5	15	Output-listing device (0 = RSP, 1 = TTY)
	6-10	15	ECSIL data format (0 or 3 = library, 1 or 2 = cards)
	11-15	15	(No longer used)
	16-20	15	(No longer used)
	21-25	15	(No longer used)
	26-30	15	Status selector (0 = no status 2 data, 1 = all data)
			Plotting-mode selector
			= 1 individual energy-ordered plots
			= 2 overlapping plots, same barns limits
			= 3 overlapping plots, same barns and MeV limits
			= 4 all plots, same barns and MeV limits
			= 5 reference-number ordered
			= 6 reverse chronological (latest year first)

Card	Cols	Format	Description
	36-40	15	Error bar selector = 0 no error bars = 1 energy error bars = 2 cross-section error bars = 3 energy and cross-section error bars
	41-45	15	Minimum number of points to produce a plot ^d
	46-50	15	Maximum number of points per plot ^d
	51-55	15	Number of plots per frame (1 to 10)
	56-60	15	Evaluated data selector = 0 none = 1 EXBL = 2 EXDP/B = 2 EXRI
			} All evaluated data must be in the EXDP/B format. This option only changes the title on the output plots.
	61-65	15	ECSEL-evaluated data-match criteria ^b = 0 Za = 1 Z. If one is natural
	66-70	15	Length of plotting files (in thousands of words)
	71-75	15	Starting page number for first section of plots
	76-80	15	ECSEL-evaluated separation flag = 0 plot both ECSEL and evaluated data = 1 only plot ECSEL data = 2 only plot evaluated data
J-N	1-80	15	Retrievals in the ECSEL data-card format. Each request is composed of one or two pairs of cards, the former of each pair specifying a lower limit and the later specifying an upper limit for each of the 18 fields defined in the format. A blank field indicates no limit.

^d To plot all points, input 99999

^b The ECSEL and evaluated data are usually considered to be present if a natural isotope is available for the same reaction and isotope (ZAX). When ECSEL and evaluated data are not both available for a given isotope (ZAX), this option may be used to compare data for the natural elemental (ZAX=0) version of the reaction with the most abundant isotope from the other library.

Input is plotted as follows:

Case 1: Data plotting range from 10^{-10} to illustrate the wide dynamic range. This can be used to produce logarithmic or linear output. For example, in the case of the ^{235}U fission cross section, $1000-10^{-10}$ is 1.7 indicates that measurements of ^{235}U cross section over 1 to 10^{-10} eV. The subsequent output (Figs. 39 to 47) present the five cases to illustrate how data for a reference (44541-3600) can be further examined.

Case 1: Plot ^{235}U fission cross section between 10^{-10} and 10^{-5} MeV (1-10 eV) from Ref. No. 3600, using one plot per page (col. 55 = 1).

Input

1	3	0	0	0	0	0	6	6	10.00	1
92.03	22	1.0000	-	6						
92.03	22	1.0000	-	5						

3640
3620

Fig. 39. PDSIL-3600 Graphic output as it appears in PDS-36000 Vol. 1.

Output Listing

ECSIL-7600 PLOTTING RUN 13:58:04Z 09/14/76

TARGET	C	S	PLOTS	FRAME	PLOT	LIST ENCL	701
92-E-235	22	0	1	1	584	0	7168
TOTALS			1	1	584	0	

07-04-76

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TARGET EN. PANEL MLY PTO EFSCB, P10N

THE COLUMBIA U.
NEWS SYNDICATE/STRO

17-CL-35	C	1-13-01	2	AV. RES PARAM
17-CL-36	1	97-04 1 98-01	30	RES PARAM
17-CL-37	8	30-07 9-31-1-2	1	AV. RES PARAM
17-CL 37	8	31-03 9-22-02	18	RES PARAM

3635 PHYS. REV. C, 11, 2022 (1975) H. I. LIOU, J. MAINWATER,
S. HACKEN, D. H. SINGH (COLUMBIA U.)
NEUTR. SYNCHROCYCLOTRON.

72-HF-177	0	5-96-04	2	AV RES PA
72-HF-177	1	09-06	5	96-04 379 RES:PARAM
72-HF-178	7	77-06	7	19-04 1 AV RES PARAM

32-24-86	5 58+00 2 55+00	16 N.P	
30-26-66	5 58+00 9 56+00	16 N.P	C-S PATIO
49-14-112	7 54-01 4 50-31	52 N.P	
49-14-113	7 54-01 1 00+01	52 N.P	C-S PATIO

SHET BULL. AM. PHYS. SOC. 20, 471 (1975) D. C. SANTRY, J. M. BUTLER
(CHALK R. I.)
VAN DE GRAAFF AND TANDEM VAN DE GRAAFF NEUTRON SOURCES.

54-19-1-1-1 54-19-1-1-1 54-19-1-1-1 54-19-1-1-1

3618 DISSERTATION ABSTRACTS B. 28. 1934-1981: M. DI VACELOMM,
E. G. BILPUCH, M. W. NEWSON (DUKE U.).
VAN DE GRAFF ACCELERATOR SOURCE

4-10-92	1	30	3	4	40	133	1014
4-20-92	1	30	3	6	53	217	1014
4-22-92	1	30	3	6	40	133	131
4-23-92	1	30	3	6	40	133	1014
4-24-92	1	30	3	6	40	133	1014
4-25-92	1	30	3	6	40	133	1014
4-26-92	1	30	3	6	40	133	1014
4-27-92	1	30	3	6	40	133	1014
4-28-92	1	30	3	6	40	133	1014
4-29-92	1	30	3	6	40	133	1014
4-30-92	1	30	3	6	40	133	1014
4-31-92	1	30	3	6	40	133	1014
5-1-92	1	30	3	6	40	133	1014
5-2-92	1	30	3	6	40	133	1014
5-3-92	1	30	3	6	40	133	1014
5-4-92	1	30	3	6	40	133	1014
5-5-92	1	30	3	6	40	133	1014
5-6-92	1	30	3	6	40	133	1014
5-7-92	1	30	3	6	40	133	1014
5-8-92	1	30	3	6	40	133	1014
5-9-92	1	30	3	6	40	133	1014
5-10-92	1	30	3	6	40	133	1014
5-11-92	1	30	3	6	40	133	1014
5-12-92	1	30	3	6	40	133	1014
5-13-92	1	30	3	6	40	133	1014
5-14-92	1	30	3	6	40	133	1014
5-15-92	1	30	3	6	40	133	1014
5-16-92	1	30	3	6	40	133	1014
5-17-92	1	30	3	6	40	133	1014
5-18-92	1	30	3	6	40	133	1014
5-19-92	1	30	3	6	40	133	1014
5-20-92	1	30	3	6	40	133	1014
5-21-92	1	30	3	6	40	133	1014
5-22-92	1	30	3	6	40	133	1014
5-23-92	1	30	3	6	40	133	1014
5-24-92	1	30	3	6	40	133	1014
5-25-92	1	30	3	6	40	133	1014
5-26-92	1	30	3	6	40	133	1014
5-27-92	1	30	3	6	40	133	1014
5-28-92	1	30	3	6	40	133	1014
5-29-92	1	30	3	6	40	133	1014
5-30-92	1	30	3	6	40	133	1014
5-31-92	1	30	3	6	40	133	1014
6-1-92	1	30	3	6	40	133	1014
6-2-92	1	30	3	6	40	133	1014
6-3-92	1	30	3	6	40	133	1014
6-4-92	1	30	3	6	40	133	1014
6-5-92	1	30	3	6	40	133	1014
6-6-92	1	30	3	6	40	133	1014
6-7-92	1	30	3	6	40	133	1014
6-8-92	1	30	3	6	40	133	1014
6-9-92	1	30	3	6	40	133	1014
6-10-92	1	30	3	6	40	133	1014
6-11-92	1	30	3	6	40	133	1014

3040 J. NUCLEAR ENERGY 25, 263 (1971); A. J. GERDTER & W. H. HARRIS
GUEL
ELECTRON LINAC DRIFT-SPACE PHOTONEUTRON SOURCE

12 0 235 2 01 08 1 09-05 970 11 150
30 0 235 1 07 07 2 05-05 6 11,1 155 HES INT

1941 J. NUCLEAR ENERGY 26, 293 (1972) A. J. DERLUTH, C. WAGGARS
TIGLEY
ELECTRON LINAC NEUTRON SOURCE

94 JUL 239 1 49 08 2 51 05 565 H.F.155
94 JUL 239 6 00 06 3 00 05 6 H.F.155 RF* NT

3542 J. NUCLEAR ENERGY 26, 693 (1972), by H. LOMARINO, J. P. LEBLANC
REF BIBLIOGRAPHY

9. D1-249: 2 00:05 6 7-04 . 1/ RES PARA
TARGE 1 (% RANGE MEJ. D15 (8 55R:P110B.

• • • *2. 1992* • • •

RL4 P42 = 1642

Fig. 40. ECS11-3640 bibliography as it appears in UCRL-50400 Vol. 2.

Fig. 41. Case 1. Data points for ECS IL-364C, from 1 to 10 eV.

Fig. 43. Case 3. Data compared to ENDL evaluation.

5317-1011

00 14 35

Cross Section

92 07 235

ENDL-7104

Fig. 44. Case 3. ENDL evaluation.

Fig. 45. Case 4. Data compared to TART multigroup constants.

Fig. 46. Case 4. TART multigroup constants.

[illegible]

Year	Month	Day	Time	Location	Activity	Remarks
1911	Jan	1	10:00	St. Paul	Prayer	
1911	Jan	2	10:00	St. Paul	Prayer	
1911	Jan	3	10:00	St. Paul	Prayer	
1911	Jan	4	10:00	St. Paul	Prayer	
1911	Jan	5	10:00	St. Paul	Prayer	
1911	Jan	6	10:00	St. Paul	Prayer	
1911	Jan	7	10:00	St. Paul	Prayer	
1911	Jan	8	10:00	St. Paul	Prayer	
1911	Jan	9	10:00	St. Paul	Prayer	
1911	Jan	10	10:00	St. Paul	Prayer	
1911	Jan	11	10:00	St. Paul	Prayer	
1911	Jan	12	10:00	St. Paul	Prayer	
1911	Jan	13	10:00	St. Paul	Prayer	
1911	Jan	14	10:00	St. Paul	Prayer	
1911	Jan	15	10:00	St. Paul	Prayer	
1911	Jan	16	10:00	St. Paul	Prayer	
1911	Jan	17	10:00	St. Paul	Prayer	
1911	Jan	18	10:00	St. Paul	Prayer	
1911	Jan	19	10:00	St. Paul	Prayer	
1911	Jan	20	10:00	St. Paul	Prayer	
1911	Jan	21	10:00	St. Paul	Prayer	
1911	Jan	22	10:00	St. Paul	Prayer	
1911	Jan	23	10:00	St. Paul	Prayer	
1911	Jan	24	10:00	St. Paul	Prayer	
1911	Jan	25	10:00	St. Paul	Prayer	
1911	Jan	26	10:00	St. Paul	Prayer	
1911	Jan	27	10:00	St. Paul	Prayer	
1911	Jan	28	10:00	St. Paul	Prayer	
1911	Jan	29	10:00	St. Paul	Prayer	
1911	Jan	30	10:00	St. Paul	Prayer	
1911	Jan	31	10:00	St. Paul	Prayer	
1911	Feb	1	10:00	St. Paul	Prayer	
1911	Feb	2	10:00	St. Paul	Prayer	
1911	Feb	3	10:00	St. Paul	Prayer	
1911	Feb	4	10:00	St. Paul	Prayer	
1911	Feb	5	10:00	St. Paul	Prayer	
1911	Feb	6	10:00	St. Paul	Prayer	
1911	Feb	7	10:00	St. Paul	Prayer	
1911	Feb	8	10:00	St. Paul	Prayer	
1911	Feb	9	10:00	St. Paul	Prayer	
1911	Feb	10	10:00	St. Paul	Prayer	
1911	Feb	11	10:00	St. Paul	Prayer	
1911	Feb	12	10:00	St. Paul	Prayer	
1911	Feb	13	10:00	St. Paul	Prayer	
1911	Feb	14	10:00	St. Paul	Prayer	
1911	Feb	15	10:00	St. Paul	Prayer	
1911	Feb	16	10:00	St. Paul	Prayer	
1911	Feb	17	10:00	St. Paul	Prayer	
1911	Feb	18	10:00	St. Paul	Prayer	
1911	Feb	19	10:00	St. Paul	Prayer	
1911	Feb	20	10:00	St. Paul	Prayer	
1911	Feb	21	10:00	St. Paul	Prayer	
1911	Feb	22	10:00	St. Paul	Prayer	
1911	Feb	23	10:00	St. Paul	Prayer	
1911	Feb	24	10:00	St. Paul	Prayer	
1911	Feb	25	10:00	St. Paul	Prayer	
1911	Feb	26	10:00	St. Paul	Prayer	
1911	Feb	27	10:00	St. Paul	Prayer	
1911	Feb	28	10:00	St. Paul	Prayer	
1911	Feb	29	10:00	St. Paul	Prayer	
1911	Mar	1	10:00	St. Paul	Prayer	
1911	Mar	2	10:00	St. Paul	Prayer	
1911	Mar	3	10:00	St. Paul	Prayer	
1911	Mar	4	10:00	St. Paul	Prayer	
1911	Mar	5	10:00	St. Paul	Prayer	
1911	Mar	6	10:00	St. Paul	Prayer	
1911	Mar	7	10:00	St. Paul	Prayer	
1911	Mar	8	10:00	St. Paul	Prayer	
1911	Mar	9	10:00	St. Paul	Prayer	
1911	Mar	10	10:00	St. Paul	Prayer	
1911	Mar	11	10:00	St. Paul	Prayer	
1911	Mar	12	10:00	St. Paul	Prayer	
1911	Mar	13	1			

Fig. 47 (cont.)

Case 2 Plot the same data with cross-section error bars (col. 40 = 2).

Input

1	3	0	0	0	0	0	2	6	1000	1	
92235	22	1.0000-	6								3640
92235	22	1.0000-	5								3640

Output Listing

ECSSIL-7600 PLOTTING RUN 13:58:04Z 09/14/76

TARGET	C	S	PLOTS	FRAME	PLOT	LIST ENO	X(1)
92-U -235	22	0	1	1	584	0	
TOTALS			1	1	584	0	

Case 3 Plot the same data with a comparison of the ENEL ²³⁵U fission cross section (col. 60 = 1).

Input

1	3	0	0	0	0	0	2	6	1000	1	
92235	22	1.0000-	6								3640
92235	22	1.0000-	5								3640

Output Listing

ECSSIL-7600 PLOTTING RUN 13:58:04Z 01/14/76

TARGET	C	S	PLOTS	FRAME	PLOT	LIST ENO	X(1)
92-U -235	22	0	1	1	584	0 7168	
TOTALS			1	1	584	0	

Case 4 Plot the same data with a comparison of the TART-175 group constants (col. 60 = 1).

Input

1	3	0	0	0	0	0	2	6	1000	1	
92235	22	1.0000-	6								3640
92235	22	1.0000-	5								3640

Output Listing

ECSSIL-7600 PLOTTING RUN 13:58:04Z 09/14/76

TARGET	C	S	PLOTS	FRAME	PLOT	LIST TART	X(1)
92-U -235	22	0	1	1	584	0 7168	
TOTALS			1	1	584	0	

Case 5 - List ^{235}U fission cross section between 10^{-6} and 10^{-5} MeV
 (1-10 eV) from Ref. No. 3640 (col. 41-50 = 9999999999, which forces all points
 to be listed since no reference in the library has 99 999 points).

Input

1	1	0	0	0	0	0	0999999999	
92235	22	1.0000	- 6					3640
92235	22	1.0000	- 5					3640

Output Listing

ECSIL-7600 PLOTTING RUN 13:58:04Z 09/14/76

TARGET	C	S	PLOTS	FRAME	PLOT	LIST	X(L)
92-U-235	22	0	6	1	0	584	
TOTALS			6	6	0	584	

ECSLIB

(Updating, Retrieving From Bibliographic Library)

Purpose

ECSLIB merges information into, deletes information from, and retrieves information from the ECSIL bibliographic library. Information to be merged is in the ECSIL bibliographic card-image format. Information to be deleted or retrieved is indicated by using the operation code (col. 1) and reference number (cols. 2-5) fields. The operation code for deletion is D, that for retrieval is R.

Limitations

The information to be merged and requests for deletion or retrieval need not be in reference-number order. There is a limit of 1000 bibliographic cards to be merged, deleted, or retrieved. For simple retrieval (i.e., no changes to library), the operation of the program can be expedited by indicating retrieval only on the input card (e.g., col. 10 = 0).

To replace a reference in the ECSIL bibliographic library, it is not necessary to delete it and follow it with a replacement. The program will automatically replace the reference, write the original into the deletion file (BIBDEL), and indicate what it has done in the output listing.

Core

SCM at 6 K₁₀ words; LCM at 7 K₁₀ words.

Time

0.2 min to read entire bibliography and merge, delete, or retrieve 300 reference numbers.

Files In (Fig. 48)

BIBLIB - Current version of ECSIL bibliographic file.

BIBUPD - Bibliographic information to be merged, deleted, or retrieved.

(See section on bibliographic-card format.)

Files Out (Fig. 48)

BIBOLD - Penultimate version of ECSIL bibliographic file. This was current bibliographic file before update (only used in merge/delete mode of program).

BIBLIB - New current version of ECSIL bibliographic file.

BIBDEL - Bibliographic information deleted from library (only used if a deletion occurs).

Fig. 48. ECSBIB operation.

BIBRET - Bibliographic information retrieved from library (only used if a retrieval occurs).

BIBNEW } Scratch files
BIBTMP }

Input Parameters

Card	Cols.	Format	Description
1	1-5	15	Output device (0 = BSP, 1 = TTY)
	6-10	15	Operating mode (0 = retrieval only, 1 = any combination of merge, delete, and retrieve)
11-15	15	= 0	Sort bibliographic files, then merge them into library
		= 1	Sort only (i.e., create minilibrary)
		= 2	Merge only

Output Listing Example

ECSIL-7600 BIBLIOGRAPHIC SYSTEM= 10:50:43 08/30/76

2987 DELETED
3263 DELETED
3650 DELETED
3729 DELETED
4013 DELETED

	RETRIEVED	DELETED	MERGED	INITIAL LIBRARY	FINAL LIBRARY
CARDS	0	25	0	15186	15161

Figure 49 illustrates data in the ECSIL bibliographic format. Note the alternate forms for Refs. 2078 and 2089, as indicated by a minus (-) in col. 1 and the wording in each line. Program ECSP0P provides interpreted listings of the bibliographic library.

```

2068 11 J. EXPTL. THEORET. PHYS. (USSR) 45, 1294 (1963) D. SELIGER,
      21 N. ILIESCU, KIM HI SAN, D. LONGO, L. B. PIXEL MER, E. I. SHARAPOV
      31 JINRI
      42 TIME OF FLIGHT, DETECTED CAPTURE AND SCATTERING
      53 BNL 323 2ND ED. SUPPL. 2 (1965)
      62 FOR COMMENTS PERTAINING TO LEVEL ASSIGNMENTS BY NNCS
      72 NATURAL ELEMENTS AND ENRICHED ISOTOPES, RESOLUTION OF 50
      82 10-6 NSEC/M.
2069 11 PHYS. REV. 133, 378 (1964) S. A. COX (ANL)
      22 ACTIVATION
2070 11 J. INORG. NUCLEAR CHEM. 27, 903 (1965) J. F. EMERY (ORNL)
      22 ACTIVATION
2071 11 NUCLEAR PHYS. 31, 168 (1962) R. E. SHAMU (U. WISC.)
      22 GAS SCINTILLATION COUNTER
2072 11 PHYS. REV. 116, 1516 (1959) D. P. FANN, R. M. WATSON, R. E. CHRIEN,
      21 R. L. ZIMMERMAN, R. B. SCHWARTZ (BNL)
      32 FAST CHOPPER, RESOLUTION WAS 70 NSEC/M. AREA ANALYSIS
2073 11 NUCLEAR SCIENCE AND ENGINEERING 21, 314 (1965) S. L. RUBY,
      21 R. L. LITSON (ANL)
      32 ACTIVATION
2074 11 ACTA PHYSICA ACAD. SCI. HUNGARICAE 20, 193 (1966) I. ANGELI,
      21 L. H. VADI (DEBRECEN)
      32 TRANSMISSION
2075 11 NUCLEAR PHYS. 72, 298 (1965) N. ILIESCU, KIM HI SAN,
      21 L. B. PIXEL MER, E. I. SHARAPOV, KH. SIRAZHET, JINRI
      32 TRANSMISSION, SCATTERING, CAPTURE MEASUREMENTS ALL MADE TO
      42 EXCLUDE SYSTEMATIC ERRORS SEE ALSO REFERENCE 2077, NATURAL
      52 ELEMENT AND ENRICHED ISOTOPES RESOLUTION VARIED FROM 40 - 80
      62 NSEC/M.
2076 11 J. NUCLEAR ENERGY 23, 443 (1969) N. D. DUDEY, R. R. HEINRICH,
      21 A. E. MADSON (ANL)
      32 ACTIVATION METHOD, RELATIVE TO 0235 (IN F) AND 80-197 (IN GAMMA)
      42 CROSS SECTIONS.
2077 11 J. EXPTL. THEORET. PHYS. (USSR) 49, 410 (1965) KIM HI SAN,
      21 L. B. PIXEL MER, KH. SIRAZHET, E. I. SHARAPOV (JINRI)
      32 PULSED REACTION WITH TIME OF FLIGHT SEE ALSO REFERENCE 2075
      42 ENRICHED ISOTOPES RESOLUTION VARIED FROM 40
2078 11 PROC. WORKING CONF. ON SLOW NEUTRON PHYSICS, DUBNA (1961)
      22 NOTE IN LIEU OF THIS TITLE, SEE
      32 ACC. TR-5734 (1961)
2079 11 PHYS. REV. C, 1, 2447 (1971) J. B. GARO, L. J. HAINWATER,
      21 W. M. HAVENS, JR. (COLUMBIA U.)
      32 ANALYSIS OF CROSS SECTION DATA PRESENTED IN REF. B14, TIME OF
      42 FLIGHT TECHNIQUE, RESOLUTION OF 0.4 NSEC/M. MULTILEVEL
      52 ANALYSIS. SEE ALSO REV. B14
-2080 11 NUCLEAR DATA FOR REACTORS (AEA VIENNA, VOLS. 1 AND 11 (1967))
      22 NOTE IN LIEU OF THIS TITLE, SEE
      32 IAEA CONF. ON NUCLEAR DATA, PARIS (1966)
-2081 11 BULL. AM. PHYS. SOC. 13, 1605 (1968) J. H. MC NALLY,
      21 K. HOLTSBERG, B. J. DROPSKY, J. H. BARNES (LASL)
      32 TIME OF FLIGHT TECHNIQUE FOR THE FORWARD NUCLEAR EXPLOSION
      42 WASH-1127 PAGE 179 (1969) S. M. WASSERMAN, R. C. BLOCH (FEP)
      52 PHYS. REV. LETTERS 21, 195 (1969)
      62 COINCIDENCE BETWEEN IONIZATION CHAMBER AND SCINTILLATION TUBE
      72 TO MEASURE THE AVERAGE FISSION NEUTRON MULTIPLICITY, THE
      82 HIGHER VALUES WERE ASSIGNED TO THE 3.0-5.0 Å AND THE LOWER
      92 VALUES TO THE 5-11 Å STATE
      102 BULL. AM. PHYS. SOC. 14, 1708 (1969)
2083 11 AD-117, 6, 764 (1968) P. L. YORDONIKOV (USSR)
      32 ANALYSIS UP TO 104 EV OF CROSS SECTION DATA FROM REFERENCE
  
```

FIG. 49. ECSIL bibliographic data.

ECSPOP

(Indexes to Bibliographic Library)

Purpose

ECSPOP creates listings and index files from the ECSIL bibliographic system. Three listings and index files are created: a combined complete bibliography and data index; an alphabetic reference index, and an alphabetic author-citation index. Each of these files is created in two forms: machine-readable and interpreted listings.

The listings may be based on the entire bibliographic file and reference-number-order data index (see ECSDEX). Alternately, the listings may be based on all bibliographic information and only the corresponding data indexes (e.g., determine what was measured for any set of reference numbers). Or listings may be based on all data indexes and only the corresponding bibliographic information (e.g., define the bibliographic information for any set of data indexes).

Limitations

If a minibibliographic library is used to determine the corresponding data indexes, the bibliographic information must be in ascending reference-number order. If the data-index file (INDEXB) is used, it must be in reference-number order (see ECSDEX). If either the bibliographic file (BIBLIB) or the data index file (INDEXB) is not present on the disk, the program will process the other file. If both are missing, the program will abort.

Core

SCM at 25 K₁₀ words; LCM at 9 K₁₀ words.

Time

1.5 min to read all files and create all listings and index files.

Files In (Fig. 50)

BIBLIB -- Current bibliographic information library.

INDEXB -- Ref. No./Z/A/C/S/E-ordered data index (see ECSDEX).

Files Out (Fig. 50)

BISSRT -- Combined bibliography and data index.

REFSRT -- Alphabetic reference index.

AUTSRT -- Alphabetic author-citation index.

BIBLST -- Combined bibliography and data index.

REFLST -- Alphabetic reference index.

AUTLST -- Alphabetic author-citation index.

} Machine-readable

} Interpreted listings

Fig. 50. ECSPOP operation.

Input Parameters

Card	Cols.	Format	Description
1	1-5	15	Output device (0 = HSP, 1 = TTY)
	6-10	15	Search criteria
			= 0 - All bibliography and data indexes
			= 1 - All bibliography corresponding data indexes
			= 2 - All data indexes corresponding bibliography

Output Listing Example

ECSIL-7600 BIBLIOGRAPHIC INDEX RUN 13:38:41U 08/30/76

LIBRARY STATISTICS

CARD COUNT	15201
COMMENT COUNT	7524
REFERENCE COUNT	4046
CROSS-REFERENCES	1321
AUTHOR COUNT	11741
LONGEST REF	61
LONGEST AUTHOR	25

Figure 51 illustrates cards in the ECSIL bibliographic format. Using Ref. 1087 as an example, Figs. 52-54 illustrate how the bibliographic information from the BIBLST, REFLST, and AULIST files appear in UCRL-50400 Vol. 2.

108 11 PHYS. REV. 137, 325 (1965) C.D. BOWMAN, M.S. COOPS.
21 G.F. AUCHINCLOSS, S.C. FULTZ (ILL.)
32 TIME OF FLIGHT TECHNIQUE. CROSS SECTION NORMALIZED TO 3.13
42 PLUS/MINUS 0.15 BARNS AT 0.025 EV. CROSS SECTION DATA
52 OBTAINED FROM C.D. BOWMAN. AREA AND SHAPE ANALYSIS.
63 UCRL-7871 (1964)

1085 11 PHYS. AND CHEM. OF FISSION. IAEA, SALZBURG, 2, 25 (1965)
21 D.W. COLVIN, H.D. SOMMERBY (AERE, HARELL)
32 PARTIAL DATA PRESENTED
43 AERE-PR/MP-8 PAGE 9 (1965)
52 BORON PILE MEASUREMENT. WE HAVE TAKEN NU PROMPT AS 2.414
62 (THERMAL) AND 3.763 FOR U235 AND CF252, RESPECTIVELY
73 IAEA CONF. ON NUCLEAR DATA, PARIS, PAPER CN-23/33 (1966)
83 CANDO(UK)-525 (1965)
92 RENORMALIZED TO NUBAR = 3.73 FOR THE SPONTANEOUS FISSION
102 OF CF252

1086 11 AERE-PR/MP-8 PAGE 10 (1965) N.J. PATTENDON (AERE)
22 DETERMINE AVERAGE CAPTURE FROM PREVIOUS MEASUREMENTS

1087 11 J. NUCLEAR ENERGY 22, 93 (1964) H. CONDE, J. HANSEN.
21 H. HOLMBERG (SMEDEN)
33 CANDO(UK)-441 PAGE 1 (1966)
43 CANDO(UK)-524 (1966)
53 IAEA CONF. ON NUCLEAR DATA, PARIS, PAPER CN-23/19 (1966)
62 LARGE LIQUID SCINTILLATOR. RELATIVE TO NU=3.764 FOR
72 THE SPONTANEOUS FISSION OF CF252
82 RENORMALIZED TO NUBAR = 3.73 FOR THE SPONTANEOUS FISSION
92 OF CF252

1088 11 ANL-6600 PAGE 1 (1965) A.H. JAFFE, J.L. LERNER (ANL)
23 BNL-732 (N-6) PAGE 2 (1962)
32 SCINTILLATION DETECTOR

1089 11 BNL-732 (N-6) PAGE 2 (1962) R.V. BABCOCK (WESTINGHOUSE)
22 MEASUREMENTS RELATIVE TO SIGMA F U-235

1090 11 J. NUCLEAR ENERGY 21, 671 (1967) P.H. WHITE, G.P. WARNER (AERE)
22 MEASUREMENTS RELATIVE TO U235 FISSION CROSS SECTIONS.
32 PRELIMINARY RESULTS PUBLISHED IN
43 CNR/PR-3 P.20 (1965)
53 CNR/PR-3 P.20 (1965)
63 CANDO(UK)-775 (1966)

1091 11 PHYS. AND CHEM. OF FISSION. IAEA, SALZBURG, 1, 219 (1965)
21 P.H. WHITE, J.D. HODGKINSON, G.J. WALL (AERE)
32 RELATIVE TO U-235 SIGMA F

1092 11 E.G. SILVER (ORNL)
22 NUCLEAR SCIENCE AND ENGINEERING 5, 49 (1959) G.D. SAUSSURE.
32 FAST COINCIDENCE TECHNIQUE. RELATIVE TO NU BAR FOR U-235.
42 WE HAVE TAKEN NU PROMPT FOR U235 (THERMAL) AS 2.414.
52 PRELIMINARY RESULTS REPORTED IN
63 ORNL-2081 PAGE 105 (1965)
73 WASH-19 (1956)
82 RENORMALIZED TO NUBAR = 3.73 FOR THE SPONTANEOUS FISSION
92 OF CF252

1093 11 MRC-135 (CANDO(UK)/28-U) PAGE 8 (1963) P. MITCHELL (AERE)
22 MEASUREMENTS MADE RELATIVE TO U-235

1094 11 AERE-PR/MP-8 PAGE 1 (1966) G.D. WES, D.A.J. ENDACOTT (AERE)
22 TIME OF FLIGHT. DATA ENTERED 90th CADMIUM AND B4C
32 FILTERS. DATA NORMALIZED TO 1.0 JENKINS DATA

1095 11 ORNL-CF-51-12-151 (1952) H.S. WILKINSON
22 BASED ON AU CROSS SECTION = 9.1 BARNES

1096 11 PHYS. REV. 95, 1298 (1966) H.A. GREENH, H.O. MENLOVE
21 (LOCKHEED)
32 ACTIVATION TECHNIQUE. LAST CORRECTION TO DATE

Fig. 51. ECSIL bibliographic card format.

$$e_{\alpha} = \frac{1}{2}(\mathbf{e}_{\alpha} + \mathbf{e}_{-\alpha}) \quad \text{and} \quad e_{\beta} = \frac{1}{2}(\mathbf{e}_{\beta} + \mathbf{e}_{-\beta})$$

Compilation and Loading Instructions for ECSIL Programs

The photostore presently stores the ECSIL Fortran programs under J94800:ECSILPRGM. Table 13 summarizes how to compile and load all the ECSIL programs using the CHAF compiler.

Table 13. Loading conventions and requirements.

<i>Card file</i>	<i>Binary file</i>	<i>Subroutine Libraries required to load (all require ORDERLIB)</i>
ECSBIB	SAVBIB	ECSLIB
ECSGEN	SAVGEN	ECSLIB
ECSDEL	SAVDL	REDLIB, ECSLIB
ECSDEX	SAVDLX	REDLIB, ECSLIB
ECSMRG	SAVMRG	REDLIB, ECSLIB
ECSORT	SAVORL	REDLIB, ECSLIB
ECSPLT	SAVPLT	REDLIB, PLTLIB, ECSLIB
ECSPOP	SAVPOP	REDLIB, ECSLIB
ECSRET	SAVRET	REDLIB, ECSLIB
ECSSUB	ECSLIB ⁴	
ECSUPD	SAVUPD	REDLIB, ECSLIB
ECSEX	SAVEX	REDLIB, ECSLIB
PLTLIB	PLTLIB ⁴	
SPLT112	SAV12 REDLIB ⁴	ECSLIB

⁴ Libraries used by other programs.

To read program ECSPLT from the photostore (using LEP):

```
LEP RDS J94800:ECSILPRGM:ECSPLT / 1 1
```

To compile Subroutine Library ECSSUB:

```
CHAF ECSSUB,ECSSUB,HSP,162,M,M / 1 2
```

To compile and load the program ECSPLE:

```
CHAF / 1 2
```

```
CREATE,PLTLIB,ECSLIB,ORDERLIB,ECSPLE,SAVPLT,BLL,HSP,162,M,N
```

The order in which Subroutine Libraries are specified must be exactly that indicated in Table 13. ORDERLIB must always be last. The photostore currently supports reading-to-execute programs under J94800:ECSIL.

Extended ECSH Conventions

Extended ECSH conventions allow the ECSH system to handle the neutron plus other incident and outgoing particles. These conventions still describe experimentally measured cross sections by target, interaction, interaction property, and interaction modifier. However, the interaction and the interaction property, formerly the basic-C and C-increment-numbers, are now referred to as C and I and are separate fields. Data is further described by indicating the incident and outgoing particles.

INCIDENT PARTICLE

A numeric equivalent (referred to as Y_1) is assigned for each incident particle of interest (Table 14). This allows the system to handle incident charged particles, photons, etc.

Table 14. Designators of incident or outgoing particles.

Particle designator	Particle
1	Neutron [†]
2	Neutron
3	Proton
4	Deuteron
5	α particle
6	β_{-}
7	β_{+}
8	Photon
9	Electron

[†] A secondary particle is designated only if a property of the secondary particle is being described [e.g., $\sigma(p,p')$ cross section has $Y_1 = 3$, while the $\sigma(p,p')$ angular distribution of the proton has $Y_1 = 2$].

OUTGOING PARTICLE

A numeric equivalent (referred to as Y_{α}^0) is assigned for each outgoing particle of interest^a (Table 4) to allow the system to describe angular distributions, energy distributions, etc., for charged particles, photons, etc.,

^a Not necessarily the experimentally measured particle [e.g., by experimentally measuring photons from n, n' , one may derive information that describes either the inelastically scattered neutron ($Y_0^0 = 1$) or the photon production ($Y_0^0 = 7$)].

Extended ECSIL Data-Card Format

The extended ECSIL system uses a completely new numeric data-card image format, but requires minimum changes to the binary library and no changes to the bibliographic format. The new numeric data-card image format uses the same conventions for continuation on to a second card (to allow up to 10 measured quantities) and the same conventions for all fields defined in the original ECSIL numeric data-card image format. The new format (cards 1 and 2) appears in Figs. 55 and 56.

FORMAT FOR CARD 1

Field 1: Atomic Number (Z)

Identical to original ECSIL conventions. By convention, target ZA is the heavier of the targets and the incident projectile.

Field 2: Atomic Weight (A)

Identical to original ECSIL conventions.

Fig. 55. New numeric data-card image format for extended ECSIL system: Card 1.

Fig. 56. New numeric data-card image format for extended ECSIL system: Card 2: continuation only.

Field 3: Incident Particle (Y_i)

Table 14 presents conventions for Y_i . More will be defined as required. By convention, the incident particle is lighter of target and incident particle.

Field 4: Interaction Property (I)

Similar to C-increment in original ECSIL conventions (Table 3). Presently, directly derivable from the C-increment as $I = (C \text{ increment})/50$.

Field 5: Interaction (C)

Identical to basic-C-number in original ECSIL (Table 3) with neutron replaced by incident particle Y_i .

Field 6: Interaction Modifier (S)

Identical to interaction modifier in original ECSIL (Table 7).

Field 7: Outgoing Particle (Y_o)

Uses same conventions as Y_i , field 3 above, and Table 14. More will be defined as required. Outgoing particle is defined as $Y_o = 0$ for $I = 0$ or 1 (energy-dependent or energy-average cross sections) where the interaction, not the outgoing particle, is being described.

Field 8: Status

Identical to status in original ECSIL, including use for continuation.

Field 9: Year

Identical to year in original ECSIL.

Field 10: Reference Number

Identical in content to original ECSIL, except now five digits long. The subreference number is no longer used.

Fields 11-15

Similar to D_1 through D_5 of original ECSIL, only now in E11.4 format. (The new format contains only five measured quantities on the first card compared with six in the old format. However, over 97% of the data points in the library are described by five or fewer measured quantities. Therefore, the new format will not appreciably increase the number of cards for inputting or retrieving data.)

FORMAT FOR CARD 2

Card 2 is present only if over five measured quantities are required to describe the data point. The presence of card 2 (the continuation card) is indicated as in the original ECSIL system by a status of 5 or greater. Columns 1 to 17 are blank on the second card. The status, year, and reference must be identical on both first and second cards. As before, the status will be stored in the library as 0, 1, or 2 and reconstituted on output as required.

Fields 16-18

The status, year, and reference number on the continuation card must be identical to the corresponding fields on the first card.

Fields 19-23

Similar to D_6 through D_{12} of original ECSIL, only D_6 is now on second card and all are in E11.4 format.

Extended ECSIL Data-Library Organization and Format

The organization of the extended ECSIL binary library resembles that of the original ECSIL, except that instead of sorting each ZA into C, S, X, etc. order it is sorted into Y_1 , 1, C, S, X_1 , Y_0 , etc. order. For a given ZA, all data due to incident neutrons precedes that for incident protons, etc. For a given ZA, the angular distributions for a (n,n'p) interaction will have the angular distributions for the neutron and proton grouped together (with the neutron angular distribution preceding the proton angular distribution).

The library file structure of the extended ECSIL system matches the file structure of the original ECSIL system down to the data-point level (Fig. 1). The only differences between the original data-point format and the extended data-point format are in the second and seventh words of each data point. The second word, which contained the combined C and S in the form $C \cdot 10^2 + S$, now contains the combined Y_1 , C, S, and Y_0 in the form

$$Y_1 \cdot 10^9 + 1 \cdot 10^7 + C \cdot 10^4 + S \cdot 10^2 + Y_0.$$

The seventh word has been adjusted to drop the subreference number and to allow for a five-digit reference number. It stores the combined reference in the form $Status \cdot 10^7 + year \cdot 10^5 + (reference\ number)$.

Adoption of these conventions allows the current library size to be maintained. Conversion to the new system only requires the data points within each ZA to be converted to the new format where, for all present points, $Y_1 = 1$ and $Y_0 = 1$ or 0 (1 = 0 or 1). The library need not be re-sorted; the present neutron data is already in the correct sort order for the extended ECSIL system.

References

1. D. E. Cullen, R. J. Howerton, M. H. MacGregor, and S. T. Perkins, *Neutron-Induced Fission Product Yields, Experimental Data*, Lawrence Livermore Laboratory, Rept. UCRL-50400 Vol. 7 (1976).
2. D. E. Cullen, R. J. Howerton, M. H. MacGregor, and S. T. Perkins, *Neutron-Induced Fission Product Yields, Experimental Data*, Lawrence Livermore Laboratory, Rept. UCRL-50400 Vol. 8 (1976).
3. M. H. MacGregor, D. E. Cullen, R. J. Howerton, and S. T. Perkins, *Neutron-Induced Fission Product Yields, Experimental Data*, Lawrence Livermore Laboratory, Rept. UCRL-50400, Vol. 10 (1976).
4. M. H. MacGregor, D. E. Cullen, R. J. Howerton, and S. T. Perkins, *Neutron-Induced Fission Product Yields, Experimental Data*, Lawrence Livermore Laboratory, Rept. UCRL-50400 Vol. 3 (1976).
5. M. H. MacGregor, D. E. Cullen, R. J. Howerton, and S. T. Perkins, *Neutron-Induced Fission Product Yields, Experimental Data*, Lawrence Livermore Laboratory, Rept. UCRL-50400 Vol. 2 (1976).
6. C. R. Hunt, 1967, Lawrence Livermore Laboratory, Internal Document DC-606 (1973). Readers outside the Laboratory who desire further information on LLL internal documents should address their inquiries to the Technical Information Department, Lawrence Livermore Laboratory, Livermore, California 94550.
7. R. J. Howerton, R. J. Doyas, T. C. Michels, and S. T. Perkins, *Neutron-Induced Fission Product Yields, Experimental Data*, Lawrence Livermore Laboratory, Rept. UCRL-50400, Vol. 4 (1971).
8. M. K. Drake, *Neutron-Induced Fission Product Yields, Experimental Data*, Brookhaven National Laboratory, Rept. BNL-50274 (T-601), ENDF-102 (1970).
9. E. F. Plechaty and J. R. Kimlinger, *Neutron-Induced Fission Product Yields, Experimental Data*, Lawrence Livermore Laboratory, Rept. UCRL-50400, Vol. 15 (1976).

Appendix Typical Treatment of an ECSIL Reference

The following figures illustrate a typical reference, how it is prepared for inclusion in ECSIL, and how it appears in the listings, plots, and indexes normally obtained after each library update.

For illustrative purposes consider the ^{232}Th and ^{238}U prompt γ measurements of B. D. Kuz'minov, published in *Phys. Rev. C*, 17, 177 (1978).

Figure 57 illustrates the data transcribed onto the standard data-plotting sheet. The reference has been assigned Ref. No. 1079 and the prompt γ numerical equivalent $\gamma = 0$ has been defined.

Figure 58 illustrates the bibliographic information transcribed onto the standard bibliographic code sheet. The bibliographic information and the data (Fig. 57) are now linked through the use of Ref. No. 1079.

After the data and bibliographic information have been checked, they are merged into the ECSIL system. The reference will appear in subsequent listings and indexes to the libraries. These listings and indexes are prepared after each library update and are periodically published. The following figures illustrate where Ref. No. 1079 appears within the various publications associated with ECSIL.

Figure 59 illustrates how the data appear in *ECRL-50400 Vol. 7*. The ^{232}Th and ^{238}U data now appear separately under the correct isotope and are energy-ordered with all other prompt γ data for the respective isotopes.

Figure 60 illustrates how the ordered reaction index to Ref. No. 1079 appears in the first section of *ECRL-50400 Vol. 3*. The reaction index is here in alphabetical order (i.e., all prompt γ data for ^{232}Th together, in energy order).

Figure 61 illustrates how the reaction-number (0)-ordered reaction index to Ref. No. 1079 appears in the second section of *ECRL-50400 Vol. 3*. The reaction index is here in alphabetical order (i.e., all prompt γ data together, in alphabetical order).

Figure 62 illustrates how the author citation to "Kuz'minov, B. D." for Ref. No. 1079 appears in the first section of *ECRL-50400 Vol. 3*. "Kuz'minov, B. D." is the first author; the entries following the reference number (i.e., $\gamma = 0$)

EXPERIMENTAL NEUTRON CROSS SECTION LIBRARY

CODED BY

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EXPERIMENTAL CROSS SECTION BIBLIOGRAPHY INPUT

Coded by _____ Page _____

Bibliographic Information

Operation Reference No.	Sub- reference No.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80
		OVIIT PROGRESS, N. N. ATOM. PHYSICS, PAGE 177. (1961)																																																																															
		E. I. UZ'MINOV.																																																																															
		(RUSSIAN TEXT PUBLISHED BY GOSATOMIZDAT, MOSCOW, 1961)																																																																															
		TRANSLATION PUBLISHED BY CONSULTANTS BUREAU, NEW YORK, 1962																																																																															
		NORMALIZED TO NU-BAR THER M-235 2.47 +/- 0.3																																																																															

Fig. 58. Bibliographic data for Ref. 1079 transcribed onto an input coding sheet.

Figure 63 illustrates how the alphabetically ordered reference to Ref. No. 1079 appears in the second section of UCRL-50400 Vol. 2. Following a sort on the alphabetic portion of the reference, the references are sorted into volume, section, page, etc. order.

Fig. 59. Data from Ref. 1079 as it appears in UCRJ-50400 Vol. 7.

07-04-76

CRANKS (CONT.)

07-04-76

REFERENCE	ENERGY MEV	DELTA MEV	K-FACT BARMS	DELTA BARMS	REFERENCE	ENERGY MEV	DELTA MEV	K-FACT BARMS	DELTA BARMS
54	1621.1 9000	1.2 1000	1.1 2000	1.1 1000	59	1644.9 0000	1.2 1000	1.1 2000	1.1 1000
58	1644.9 0000	1.2 1000	1.1 2000	1.1 1000	63	1644.9 0000	1.2 1000	1.1 2000	1.1 1000
60	1651.2 0000	1.2 1000	1.1 2000	1.1 1000	65	1651.2 0000	1.2 1000	1.1 2000	1.1 1000
62	1651.2 0000	1.2 1000	1.1 2000	1.1 1000	67	1651.2 0000	1.2 1000	1.1 2000	1.1 1000
64	1651.2 0000	1.2 1000	1.1 2000	1.1 1000	69	1651.2 0000	1.2 1000	1.1 2000	1.1 1000
71	1661.4 0000	1.2 1000	1.1 2000	1.1 1000	73	1661.4 0000	1.2 1000	1.1 2000	1.1 1000
71	1661.4 0000	1.2 1000	1.1 2000	1.1 1000	75	1661.4 0000	1.2 1000	1.1 2000	1.1 1000
71	1661.4 0000	1.2 1000	1.1 2000	1.1 1000	77	1661.4 0000	1.2 1000	1.1 2000	1.1 1000
69	1644.9 0000	1.2 1000	1.1 2000	1.1 1000	79	1644.9 0000	1.2 1000	1.1 2000	1.1 1000
65	1651.2 0000	1.2 1000	1.1 2000	1.1 1000	81	1651.2 0000	1.2 1000	1.1 2000	1.1 1000
60	1651.2 0000	1.2 1000	1.1 2000	1.1 1000	83	1651.2 0000	1.2 1000	1.1 2000	1.1 1000

07-04-76

Prompt Neutrons Fission

07-04-76

REFERENCE	ENERGY MEV	DELTA MEV	K-FACT BARMS	DELTA BARMS	REFERENCE	ENERGY MEV	DELTA MEV	K-FACT BARMS	DELTA BARMS
71	1651.2 0000	1.2 1000	1.1 2000	1.1 1000	61	1679.2 0000	1.2 1000	1.1 2000	1.1 1000
56	1666.6 1400	1.2 1000	1.1 2000	1.1 1000	56	1679.2 0000	1.2 1000	1.1 2000	1.1 1000
57	1670.6 1400	1.2 1000	1.1 2000	1.1 1000	65	1679.2 0000	1.2 1000	1.1 2000	1.1 1000
60	1670.6 1400	1.2 1000	1.1 2000	1.1 1000	61	1679.2 0000	1.2 1000	1.1 2000	1.1 1000
59	1670.6 1400	1.2 1000	1.1 2000	1.1 1000	65	1679.2 0000	1.2 1000	1.1 2000	1.1 1000
60	1670.6 1400	1.2 1000	1.1 2000	1.1 1000	55	1681.4 0000	1.2 1000	1.1 2000	1.1 1000
54	1670.6 1400	1.2 1000	1.1 2000	1.1 1000	58	1681.4 0000	1.2 1000	1.1 2000	1.1 1000
63	1670.6 1400	1.2 1000	1.1 2000	1.1 1000	63	1681.4 0000	1.2 1000	1.1 2000	1.1 1000
70	1670.6 1400	1.2 1000	1.1 2000	1.1 1000	56	1679.2 0000	1.2 1000	1.1 2000	1.1 1000
65	1670.6 1400	1.2 1000	1.1 2000	1.1 1000	58	1681.4 0000	1.2 1000	1.1 2000	1.1 1000
67	1670.6 1400	1.2 1000	1.1 2000	1.1 1000	58	1681.4 0000	1.2 1000	1.1 2000	1.1 1000
61	1679.2 0000	1.2 1000	1.1 2000	1.1 1000	61	1679.2 0000	1.2 1000	1.1 2000	1.1 1000
65	1679.2 0000	1.2 1000	1.1 2000	1.1 1000	60	1670.6 1400	1.2 1000	1.1 2000	1.1 1000

11-02

Fig. 59 (cont.)

STATION		EVAL. 7600 REACTION INDEX 12A JRGHEG				2A - 1979			
TARGET	ISER	E	MIN	MAX	REFERENCE	POINTS	REACTION DESCRIPTION		
90	1A	250	5	800	1	2 974	66 1522	85	N.F.
90	1A	250	5	800	1	2 985	71 1619	90	N.F.
90	1A	250	5	800	1	3 000	70 5738	95	N.F.
90	1A	250	5	800	1	3 010	61 634	1	N.F.
90	1A	250	5	800	1	3 020	68 2192	2	N.F.
90	1A	250	5	800	1	3 030	59 5415	3	N.F.
90	1A	250	5	800	1	3 040	58 1234	4	N.F.
90	1A	250	5	800	1	3 050	53 983	5	N.F.
90	1A	250	5	800	1	3 060	66 790	6	N.F.
90	1A	250	5	800	1	3 070	67 1506	7	N.F.
90	1A	250	5	800	1	3 080	62 1088	8	N.F.
90	1A	250	5	800	1	3 090	61 8746	9	N.F.
90	1A	250	5	800	1	3 100	50 1413	10	N.F.
90	1A	250	5	800	1	3 110	48 771	11	N.F.
90	1A	250	5	800	1	3 120	1867	12	N.F.
90	1A	250	5	800	1	3 130	58 528	13	N.F.
90	1A	250	5	800	1	3 140	58 608	14	N.F.
90	1A	250	5	800	1	3 150	60 237	15	N.F.
90	1A	250	5	800	1	3 160	55 461	16	N.F.
90	1A	250	5	800	1	3 170	55 191	17	N.GAMMA
90	1A	250	5	800	1	3 180	57 837	18	N.GAMMA
90	1A	250	5	800	1	3 190	60 208	19	N.GAMMA
90	1A	250	5	800	1	3 200	70 3315	20	N.GAMMA
90	1A	250	5	800	1	3 210	62 4096	21	N.GAMMA
90	1A	250	5	800	1	3 220	44 318	22	N.GAMMA
90	1A	250	5	800	1	3 230	63 1430	23	N.GAMMA
90	1A	250	5	800	1	3 240	63 1512	24	N.GAMMA
90	1A	250	5	800	1	3 250	64 454	25	N.GAMMA
90	1A	250	5	800	1	3 260	57 236	26	N.GAMMA
90	1A	250	5	800	1	3 270	57 105	27	N.GAMMA
90	1A	250	5	800	1	3 280	65 467	28	N.GAMMA
90	1A	250	5	800	1	3 290	61 718	29	N.GAMMA
90	1A	250	5	800	1	3 300	62 703	30	N.GAMMA
90	1A	250	5	800	1	3 310	59 1402	31	N.GAMMA
90	1A	250	5	800	1	3 320	71 3498	32	N.GAMMA
90	1A	250	5	800	1	3 330	74 8498	33	N.GAMMA
90	1A	250	5	800	1	3 340	63 774	34	N.GAMMA
90	1A	250	5	800	1	3 350	58 381	35	N.GAMMA
90	1A	250	5	800	1	3 360	63 633	36	N.GAMMA
90	1A	250	5	800	1	3 370	64 847	37	N.GAMMA
90	1A	250	5	800	1	3 380	67 871	38	N.GAMMA
90	1A	250	5	800	1	3 390	67 11	39	N.F. GAMMA
90	1A	250	5	800	1	3 400	62 1474	40	LOCUMENT STATION 1
90	1A	250	5	800	1	3 410	74 8923	41	LOCUMENT STATION 2
90	1A	250	5	800	1	3 420	67 1074	42	N. BAD ENOUGH
90	1A	250	5	800	1	3 430	64 1141	43	N. BAD ENOUGH
90	1A	250	5	800	1	3 440	67 1374	44	N. BAD ENOUGH
90	1A	250	5	800	1	3 450	67 1374	45	N. BAD ENOUGH
90	1A	250	5	800	1	3 460	67 1374	46	N. BAD ENOUGH
90	1A	250	5	800	1	3 470	67 1374	47	N. BAD ENOUGH
90	1A	250	5	800	1	3 480	67 1374	48	N. BAD ENOUGH
 

FIG. 60. Reaction Index to Ref. 1079 as it appears in (High-Speed Vol. 5, Sec. 1).

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100-100000 (other citation to see 100-100000 as it appears in 100-100000 Vol. 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100)

REF NO = 1677

TARGET	FN	RANGE	HEI	PTS	DESCRIPTION
1	1	1	1	1	1
2	2	2	2	2	2
3	3	3	3	3	3
4	4	4	4	4	4
5	5	5	5	5	5
6	6	6	6	6	6
7	7	7	7	7	7
8	8	8	8	8	8
9	9	9	9	9	9
10	10	10	10	10	10
11	11	11	11	11	11
12	12	12	12	12	12
13	13	13	13	13	13
14	14	14	14	14	14
15	15	15	15	15	15
16	16	16	16	16	16
17	17	17	17	17	17
18	18	18	18	18	18
19	19	19	19	19	19
20	20	20	20	20	20
21	21	21	21	21	21
22	22	22	22	22	22
 
69	69	69	69	69	69
70	70	70	70	70	70
71	71	71	71	71	71
72	72	72	72	72	72
73	73	73	73	73	73
74	74	74	74	74	74
75	7				

92-234-55-08 2:30:00 1 ALPHA SPEC1, A

4-PU-820 1 6/11/00 1 52:01 2 NY-PPT

90-14-232-2 30-60 1 57-01 3 N. PBM
90-14-238-2 30-00 3 75-00 2 N. PBM

94-PU-239	1 00-04	2 95-02	5209	N.F. 50	
94-PU-239	1 00-04	9 08-04	5762	ITA	
94-PU-239	1 50-04	2 50-02	19	N.F. 15	SPEC 1 A
94-PU-239	1 50-04	2 50-02	20	N.F.	SPEC 1 A
94-PU-239	1 50-04	1 51-03	10	N.F.	SPEC 1 A

9-00 23H²: 4H³H⁺, 4H³H⁻, 4H³H⁰

54 PU 241 2 50 OH 3 HB 24 194 1 TA
 54 PU 241 2 60 OH 4 CC 24 2 40 MI 1 1 ADAM
 54 PU 242 1 60 OH 3 HB 24 1 60 MI 1 1 ADAM

94-01 23H 2 09 02 2 18 02 2 27 02 2 36 02 2 45 02 2 54 02 3 03 02 3 12 02 3 21 02 3 30 02 3 39 02 3 48 02 3 57 02 40 02 41 02 42 02 43 02 44 02 45 02 46 02 47 02 48 02 49 02 50 02 51 02 52 02 53 02 54 02 55 02 56 02 57 02 58 02 59 03 00 03 01 03 02 03 03 03 04 03 05 03 06 03 07 03 08 03 09 03 10 03 11 03 12 03 13 03 14 03 15 03 16 03 17 03 18 03 19 03 20 03 21 03 22 03 23 03 24 03 25 03 26 03 27 03 28 03 29 03 30 03 31 03 32 03 33 03 34 03 35 03 36 03 37 03 38 03 39 03 40 03 41 03 42 03 43 03 44 03 45 03 46 03 47 03 48 03 49 03 50 03 51 03 52 03 53 03 54 03 55 03 56 03 57 03 58 03 59 04 00 04 01 04 02 04 03 04 04 04 05 04 06 04 07 04 08 04 09 04 10 04 11 04 12 04 13 04 14 04 15 04 16 04 17 04 18 04 19 04 20 04 21 04 22 04 23 04 24 04 25 04 26 04 27 04 28 04 29 04 30 04 31 04 32 04 33 04 34 04 35 04 36 04 37 04 38 04 39 04 40 04 41 04 42 04 43 04 44 04 45 04 46 04 47 04 48 04 49 04 50 04 51 04 52 04 53 04 54 04 55 04 56 04 57 04 58 04 59 05 00 05 01 05 02 05 03 05 04 05 05 05 06 05 07 05 08 05 09 05 10 05 11 05 12 05 13 05 14 05 15 05 16 05 17 05 18 05 19 05 20 05 21 05 22 05 23 05 24 05 25 05 26 05 27 05 28 05 29 05 30 05 31 05 32 05 33 05 34 05 35 05 36 05 37 05 38 05 39 05 40 05 41 05 42 05 43 05 44 05 45 05 46 05 47 05 48 05 49 05 50 05 51 05 52 05 53 05 54 05 55 05 56 05 57 05 58 05 59 06 00 06 01 06 02 06 03 06 04 06 05 06 06 06 07 06 08 06 09 06 10 06 11 06 12 06 13 06 14 06 15 06 16 06 17 06 18 06 19 06 20 06 21 06 22 06 23 06 24 06 25 06 26 06 27 06 28 06 29 06 30 06 31 06 32 06 33 06 34 06 35 06 36 06 37 06 38 06 39 06 40 06 41 06 42 06 43 06 44 06 45 06 46 06 47 06 48 06 49 06 50 06 51 06 52 06 53 06 54 06 55 06 56 06 57 06 58 06 59 07 00 07 01 07 02 07 03 07 04 07 05 07 06 07 07 07 08 07 09 07 10 07 11 07 12 07 13 07 14 07 15 07 16 07 17 07 18 07 19 07 20 07 21 07 22 07 23 07 24 07 25 07 26 07 27 07 28 07 29 07 30 07 31 07 32 07 33 07 34 07 35 07 36 07 37 07 38 07 39 07 40 07 41 07 42 07 43 07 44 07 45 07 46 07 47 07 48 07 49 07 50 07 51 07 52 07 53 07 54 07 55 07 56 07 57 07 58 07 59 08 00 08 01 08 02 08 03 08 04 08 05 08 06 08 07 08 08 08 09 08 10 08 11 08 12 08 13 08 14 08 15 08 16 08 17 08 18 08 19 08 20 08 21 08 22 08 23 08 24 08 25 08 26 08 27 08 28 08 29 08 30 08 31 08 32 08 33 08 34 08 35 08 36 08 37 08 38 08 39 08 40 08 41 08 42 08 43 08 44 08 45 08 46 08 47 08 48 08 49 08 50 08 51 08 52 08 53 08 54 08 55 08 56 08 57 08 58 08 59 09 00 09 01 09 02 09 03 09 04 09 05 09 06 09 07 09 08 09 09 09 10 09 11 09 12 09 13 09 14 09 15 09 16 09 17 09 18 09 19 09 20 09 21 09 22 09 23 09 24 09 25 09 26 09 27 09 28 09 29 09 30 09 31 09 32 09 33 09 34 09 35 09 36 09 37 09 38 09 39 09 40 09 41 09 42 09 43 09 44 09 45 09 46 09 47 09 48 09 49 09 50 09 51 09 52 09 53 09 54 09 55 09 56 09 57 09 58 09 59 10 00 10 01 10 02 10 03 10 04 10 05 10 06 10 07 10 08 10 09 10 10 10 11 10 12 10 13 10 14 10 15 10 16 10 17 10 18 10 19 10 20 10 21 10 22 10 23 10 24 10 25 10 26 10 27 10 28 10 29 10 30 10 31 10 32 10 33 10 34 10 35 10 36 10 37 10 38 10 39 10 40 10 41 10 42 10 43 10 44 10 45 10 46 10 47 10 48 10 49 10 50 10 51 10 52 10 53 10 54 10 55 10 56 10 57 10 58 10 59 11 00 11 01 11 02 11 03 11 04 11 05 11 06 11 07 11 08 11 09 11 10 11 11 11 12 11 13 11 14 11 15 11 16 11 17 11 18 11 19 11 20 11 21 11 22 11 23 11 24 11 25 11 26 11 27 11 28 11 29 11 30 11 31 11 32 11 33 11 34 11 35 11 36 11 37 11 38 11 39 11 40 11 41 11 42 11 43 11 44 11 45 11 46 11 47 11 48 11 49 11 50 11 51 11 52 11 53 11 54 11 55 11 56 11 57 11 58 11 59 12 00 12 01 12 02 12 03 12 04 12 05 12 06 12 07 12 08 12 09 12 10 12 11 12 12 12 13 12 14 12 15 12 16 12 17 12 18 12 19 12 20 12 21 12 22 12 23 12 24 12 25 12 26 12 27 12 28 12 29 12 30 12 31 12 32 12 33 12 34 12 35 12 36 12 37 12 38 12 39 12 40 12 41 12 42 12 43 12 44 12 45 12 46 12 47 12 48 12 49 12 50 12 51 12 52 12 53 12 54 12 55 12 56 12 57 12 58 12 59 13 00 13 01 13 02 13 03 13 04 13 05 13 06 13 07 13 08 13 09 13 10 13 11 13 12 13 13 13 14 13 15 13 16 13 17 13 18 13 19 13 20 13 21 13 22 13 23 13 24 13 25 13 26 13 27 13 28 13 29 13 30 13 31 13 32 13 33 13 34 13 35 13 36 13 37 13 38 13 39 13 40 13 41 13 42 13 43

1970. 1971. 1972. 1973. 1974. 1975. 1976. 1977. 1978. 1979. 1980. 1981. 1982. 1983. 1984. 1985. 1986. 1987. 1988. 1989. 1990. 1991. 1992. 1993. 1994. 1995. 1996. 1997. 1998. 1999. 2000. 2001. 2002. 2003. 2004. 2005. 2006. 2007. 2008. 2009. 2010. 2011. 2012. 2013. 2014. 2015. 2016. 2017. 2018. 2019. 2020. 2021. 2022. 2023. 2024. 2025. 2026. 2027. 2028. 2029. 2030. 2031. 2032. 2033. 2034. 2035. 2036. 2037. 2038. 2039. 2040. 2041. 2042. 2043. 2044. 2045. 2046. 2047. 2048. 2049. 2050. 2051. 2052. 2053. 2054. 2055. 2056. 2057. 2058. 2059. 2060. 2061. 2062. 2063. 2064. 2065. 2066. 2067. 2068. 2069. 2070. 2071. 2072. 2073. 2074. 2075. 2076. 2077. 2078. 2079. 2080. 2081. 2082. 2083. 2084. 2085. 2086. 2087. 2088. 2089. 2090. 2091. 2092. 2093. 2094. 2095. 2096. 2097. 2098. 2099. 2100. 2101. 2102. 2103. 2104. 2105. 2106. 2107. 2108. 2109. 2110. 2111. 2112. 2113. 2114. 2115. 2116. 2117. 2118. 2119. 2120. 2121. 2122. 2123. 2124. 2125. 2126. 2127. 2128. 2129. 2130. 2131. 2132. 2133. 2134. 2135. 2136. 2137. 2138. 2139. 2140. 2141. 2142. 2143. 2144. 2145. 2146. 2147. 2148. 2149. 2150. 2151. 2152. 2153. 2154. 2155. 2156. 2157. 2158. 2159. 2160. 2161. 2162. 2163. 2164. 2165. 2166. 2167. 2168. 2169. 2170. 2171. 2172. 2173. 2174. 2175. 2176. 2177. 2178. 2179. 2180. 2181. 2182. 2183. 2184. 2185. 2186. 2187. 2188. 2189. 2190. 2191. 2192. 2193. 2194. 2195. 2196. 2197. 2198. 2199. 2200. 2201. 2202. 2203. 2204. 2205. 2206. 2207. 2208. 2209. 2210. 2211. 2212. 2213. 2214. 2215. 2216. 2217. 2218. 2219. 2220. 2221. 2222. 2223. 2224. 2225. 2226. 2227. 2228. 2229. 2230. 2231. 2232. 2233. 2234. 2235. 2236. 2237. 2238. 2239. 2240. 2241. 2242. 2243. 2244. 2245. 2246. 2247. 2248. 2249. 2250. 2251. 2252. 2253. 2254. 2255. 2256. 2257. 2258. 2259. 2260. 2261. 2262. 2263. 2264. 2265. 2266. 2267. 2268. 2269. 2270. 2271. 2272. 2273. 2274. 2275. 2276. 2277. 2278. 2279. 2280. 2281. 2282. 2283. 2284. 2285. 2286. 2287. 2288. 2289. 2290. 2291. 2292. 2293. 2294. 2295. 2296. 2297. 2298. 2299. 2300. 2301. 2302. 2303. 2304. 2305. 2306. 2307. 2308. 2309. 2310. 2311. 2312. 2313. 2314. 2315. 2316. 2317. 2318. 2319. 2320. 2321. 2322. 2323. 2324. 2325. 2326. 2327. 2328. 2329. 2330. 2331. 2332. 2333. 2334. 2335. 2336. 2337. 2338. 2339. 2340. 2341. 2342. 2343. 2344. 2345. 2346. 2347. 2348. 2349. 2350. 2351. 2352. 2353. 2354. 2355. 2356. 2357. 2358. 2359. 2360. 2361. 2362. 2363. 2364. 2365. 2366. 2367. 2368. 2369. 2370. 2371. 2372. 2373. 2374. 2375. 2376. 2377. 2378. 2379. 2380. 2381. 2382. 2383. 2384. 2385. 2386. 2387. 2388. 2389. 2390. 2391. 2392. 2393. 2394. 2395. 2396. 2397. 2398. 2399. 2400. 2401. 2402. 2403. 2404. 2405. 2406. 2407. 2408. 2409. 2410. 2411. 2412. 2413. 2414. 2415. 2416. 2417. 2418. 2419. 2420. 2421. 2422. 2423. 2424. 2425. 2426. 2427. 2428. 2429. 2430. 2431. 2432. 2433. 2434. 2435. 2436. 2437. 2438. 2439. 2440. 2441. 2442. 2443. 2444. 2445. 2446. 2447. 2448. 2449. 2450. 2451. 2452. 2453. 2454. 2455. 2456. 2457. 2458. 2459. 2460. 2461. 2462. 2463. 2464. 2465. 2466. 2467. 2468. 2469. 2470. 2471. 2472. 2473. 2474. 2475. 2476. 2477. 2478. 2479. 2480. 2481. 2482. 2483. 2484. 2485. 2486. 2487. 2488. 2489. 2490. 2491. 2492. 2493. 2494. 2495. 2496. 2497. 2498. 2499. 2500. 2501. 2502. 2503. 2504. 2505. 2506. 2507. 2508. 2509. 2510. 2511. 2512. 2513. 2514. 2515. 2516. 2517. 2518. 2519. 2520. 2521. 2522. 2523. 2524. 2525. 2526. 2527. 2528. 2529. 2530. 2531. 2532. 2533. 2534. 2535. 2536. 2537. 2538. 2539. 2540. 2541. 2542. 2543. 2544. 2545. 2546. 2547. 2548. 2549. 2550. 2551. 2552. 2553. 2554. 2555. 2556. 2557. 2558. 2559. 2560. 2561. 2562. 2563. 2564. 2565. 2566. 2567. 2568. 2569. 2570. 2571. 2572. 2573. 2574. 2575. 2576. 2577. 2578. 2579. 2580. 2581. 2582. 2583. 2584. 2585. 2586. 2587. 2588. 2589. 2590. 2591. 2592. 2593. 2594. 2595. 2596. 2597. 2598. 2599. 2600. 2601. 2602. 2603. 2604. 2605. 2606. 2607. 2608. 2609. 2610. 2611. 2612. 2613. 2614. 2615. 2616. 2617. 2618. 2619. 2620. 2621. 2622. 2623. 2624. 2625. 2626. 2627. 2628. 2629. 2630. 2631. 2632. 2633. 2634. 2635. 2636. 2637. 2638. 2639. 2640. 2641. 2642. 2643. 2644. 2645. 2646. 2647. 2648. 2649. 2650. 2651. 26

$$E_{\text{eff}} = E_0 + \frac{1}{2} \frac{E_0^2}{E_0 + E_0} = E_0 + \frac{1}{4} E_0 = \frac{5}{4} E_0$$
 