Title
OVERVIEW OF IRATE - INTERACTIVE RETRIEVAL and TEXT EDITOR

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Publication Date
1975-09-01

LBL-4607 c.1
UC-32
TID-4500-R63

OVERVIEW OF IRATE - INTERACTIVE RETRIEVAL AND TEXT EDITOR

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September 1975

Prepared for the U. S. Energy Research and
Development Administration under Contract W-7405-ENG-48

DISCLAIMER

OVERVIEW OF IRATE - INTERACTIVE RETRIEVAL AND TEXT EDITOR†‡

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Abstract

A remote-terminal entry/editing system for complex, technical text or structured data has been developed at this laboratory. The system has been tested in varied applications. IRATE hardware and software are discussed in brief, and its operational features are described. Some examples of IRATE-produced documents are shown, and potential future development of the system is discussed.

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† Work performed under the auspices of the US Energy Research and Development Administration and the US National Bureau of Standards, Office of Standard Reference Data.

‡ This report was entered on the IRATE system and printed by OPTIK, one of several output programs available for general-purpose applications. Final reporduction was done by photo-offset from enlargements of the computer-produced microfilm.

OVERVIEW OF IRATE - INTERACTIVE RETRIEVAL AND TEXT EDITOR

I. Historical background

IRATE, a remote-terminal system for entry and editing of text or data, was developed at the Lawrence Berkeley Laboratory in the early 1970's. The present system is actually the third in a series of such systems, whose development was motivated by the need for an input-editing device that could routinely handle complex technical text as well as highly structured data.

The original prototype system[1], developed in 1968, consisted of a specially designed keyboard interfaced to an IBM-526 keypunch. Cards produced by the system (each key punched 2 columns) could be read into a computer in order to generate printed output on various devices (ink-pen plotters, CRT plotter, or a Linofilm Photo-Composer). This system verified the basic design concepts; in particular, the keyboard design incorporated most of the features utilized in later systems. The prototype also received limited use for entry of bibliographic data, which was included in several reports published by the laboratory. Its most serious deficiency, the lack of a suitable display for provision of immediate feedback to the typist, led directly to the construction of a second prototype, incorporating a storage-oscillosope display screen.

The second system[2] consisted of a single terminal (keyboard plus display screen) interfaced to a small computer (PDP8/I). The data were stored on a magnetic disk during use, and then transferred to or from magnetic tape for permanent storage or editing. The second prototype received somewhat more use and generated interest in a broader range of applications.

The decision to develop the third (current) system was based on several factors:

1) There was a need for multiple terminals that could be operated simultaneously. This requirement was impractical to implement on the existing system.
2) Editing was extremely awkward on the existing system. The required improvements in the editing procedure could be implemented only at the cost of a complete redesign.
3) For reasons described below, it was deemed desirable to have the system coupled to the LBL central computers.

These requirements led to the development of the IRATE system. The keyboard design, display screen, and small computer were retained, but additional computing power was secured via a high-speed data link to the laboratory's central computing facilities. This link provides for easy adaptation to multiple-terminal use for different purposes, and gives access to the full capabilities of the large computers from each of the terminals. Access to the large computer's disks and tape drives replaces the most expensive parts of a small-computer system. Special features desired by any particular IRATE application can be programmed in FORTRAN (or any other high-level language), thus simplifying the programming task. In addition, each console can function in a non-IRATE (RECC) mode as a standard LBL computer terminal.

II. A brief description of the IRATE system

The current IRATE configuration (fig. 1) includes four remote terminals, each equipped with a Tektronix 611 storage scope and an extended-character keyboard (developed at LBL). The terminals are connected to a DEC PDP8/e computer, which is interfaced with the central computing facility via an I/O channel on the CDC 6400 computer.

The PDP8 operates in a time-sharing mode; it generates the display and handles input and editing within a buffer-load (1 buffer-load ≈ 1/4 of a screenfull of text) for each terminal. During entry or editing, the PDP8 accesses the 6400 either on demand (when the typist strikes a control key, such as *redisplay* or *next page*), or automatically, whenever a buffer boundary is crossed. The 6400 then scans the current text buffer for control instructions and removes them, restores the data on disk, and executes the instructions.

Functions performed by the large computers include temporary disk storage, indexed retrieval, complex data manipulation (eg. context editing), longer-term storage to and retrieval from an IBM data cell, an IBM photo-digital mass storage system, or magnetic tapes, and further processing of the data (printing, checking, etc.).

Use of the IRATE system is effected by submission of an IRATE job to the 6400 from one of the terminals. Access to a specific data library is controlled by the jobcard identification and a pass code. An executive monitor program in the 6400 (which interacts with the terminal in RECC mode) initiates retrieval of stored data (if desired) and execution of the data entry/editing program. Upon termination of the editor, the monitor returns; the user can then store the data and/or request another data set for entry or editing. Further processing (most commonly printing) of a completed data set can be specified; the monitor then creates an independent batch job which may execute in any of the large computers (CDC 6400, 6600, or 7600).

A separate monitor program, normally run in the 6600 from a teletype, permits transfer of data between the data cell and the mass storage system for long-term storage. (The mass-storage system is not accessible from the 6400). An inventory of the user's data library, maintained by both monitors, provides information on the storage locations and dates of each data set, and permits access by set name.

Since its inception, utilization of the IRATE system has grown rapidly. The system has been in routine operation since 1973; the 4^{th} terminal was attached early in 1975. Fig. 2 shows one of the terminals in use.

0 0 0 0 4 4 0 8 2 8 6

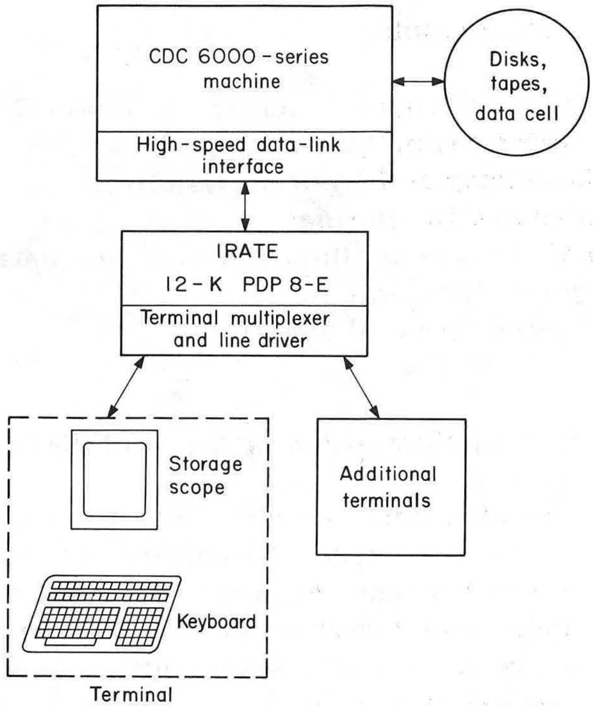
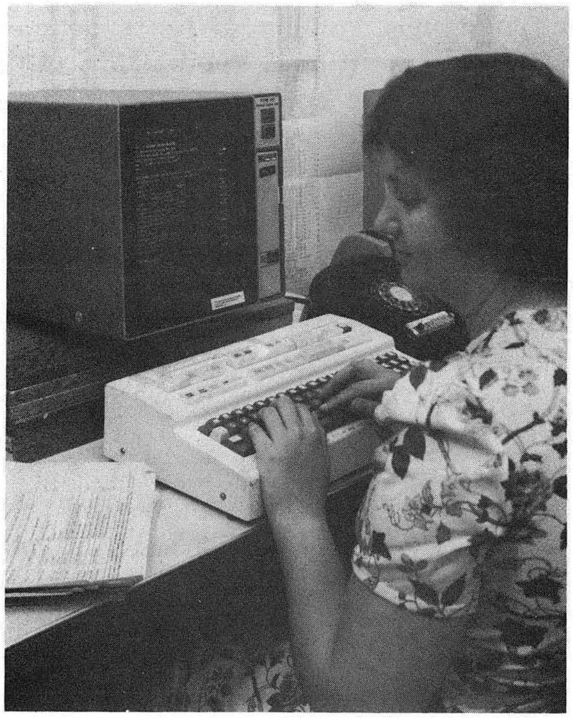


Fig. 1. IRATE system configuration



XBB 757-5201

Fig. 2. An IRATE console in use

Current users at LBL include:

Table of Isotopes Project (Nuclear Chemistry Division)
Technical Information Division
Particle Data Project (Physics Division)
Mathematics and Computing
Geothermal Resources Information and Data Project (Energy and Environment Division)
Group A Physics (several users)

III. Operational features of IRATE

The variety of applications implied by the list of users suggests the versatility of IRATE. Not only may straightford running text may be entered easily and rapidly, but the special demands of technical text or structured data are satisfied. The display and cursor editor allow a typist to enter or edit text or data rapidly, with a low error rate. Rearrangement of the text as a result of reformatting (eg. changes in the tab stops), or as a result of corrections and additions, can be accomplished in a matter of seconds.

The character set (Fig. 3) includes several hundred different characters upper and lower case Roman letters, print and script Greek letters, numerals, linguistic compound symbols (eg. ñ, ä, é), puntuation, mathematical, and special purpose symbols. (The internal system of character representation permits additional expansion of the character set to meet new requirements.) Each symbol can be typed in a variety of fonts or positions--normal, italics, bold, subscript, superscript. Additional special fonting (e.g. serif or sans-serif, script), not displayed at the input console, can be specified by the insertion of special instructions for a printing program. Additional keys at the top of the keyboard are used for various control functions--cursor positioning, character deletion, redisplay, retrieval of a specified portion of the text, etc.

Data entry is done in a manner similar to ordinary typing. "Hold-down" and/or double-action (on/off) font keys (or foot pedals) are used, together with character keys, to enter upper case, superscript, subscript, italic, bold, or Greek characters. Tabs can be set and used in normal typewriter fashion. Lines are broken automatically, or may be ended by a *line feed* (eg. at the end of a paragraph). Correction of mistakes in the last character(s) typed is done simply by striking the *delete left* key and retyping. (The last 5 characters typed are displayed in "refresh" mode on the display scope.)

Editing is accomplished by positioning a moving cursor at the desired point in the text and deleting (left or right) and/or inserting new characters. Insertions appear at the bottom of the screen and appear properly within the text when the *redisplay* key is pressed. Context editing may also be done by specifiying a group of characters to be replaced by another, once or several times throughout a specified region of the text.

0 0 0 0 4 4 0 8 2 8 7

Roman alphabet, upper and lower case

A B C D E F G H I J K L M N O P Q R S T U V W X Y Z
a b c d e f g h i j k l m n o p q r s t u v w x y z

Greek alphabet, print and script

Α Β Γ Δ Ε Ζ Η Θ Ι Κ Λ Μ Ν Ξ Ο Π Ρ Σ Τ Υ Φ Χ Ψ Ω
α β γ δ ϵ ζ η θ ι κ λ μ ν ξ ο π ρ σ τ υ ϕ χ ψ ω

Digits and normal typewriter punctuation

1 2 3 4 5 6 7 8 9 0 , . ; : ' " ! ? / = * + - ( ) $ %

Additional special characters

· × ÷ ± ≈ ≃ ≠ ≡ < > ≤ ≥ ≲ ≳ ~ ∝ ∞ ¬ . √
∂ ∫ ℓ ∨ ∧ ↑ ↓ ← → # § † ‡ ℵ ° { } [ ] ⟨ ⟩

Superimposition marks

ü ø é è ê ī ñ ç x v̇ y

Single and multiple font capability

italic **bold** sub_1 super^{*} ***bolditalic***

Fig. 3. Standard IRATE character set

A variety of special features are available. Tabs and line feeds can be used in a special column mode for the construction of tables or for the input of structured data to a data bank. Keys can be redefined for a given application so that a single key can be used to input a complex symbol or group of characters. The typist can actually redefine any key while typing. A template (question-and-answer or "prompting") format can be used to ensure the entry of specific data quantities; for example: authors, reference citation, title, and abstract for a bibliographic data file.

For convenience in retrieval, each IRATE user's data is divided into labelled *data sets* and subdivided into labelled or numbered *items*. Each *item* is in turn divided into numbered pages. A page can contain up to one screenful of text (or may be delimited by a *new page* character); there is no limit to the size of an *item* or *data set*. At the user's option, each *item* may include one page of "template" questions and answers. Data in a specified *data set*, *item*, or page can be accessed by the label name or number. Although these divisions are not necessarily related to the content of the data, they often provide useful subdivisions of the data by context -

book/chapter
document/section/subsection
data file/record/data element
etc.

IV. Future development

A major redesign of the IRATE system is now highly desirable for several reasons. The unique ability of the IRATE system to handle multi-font text, and its editing capabilities, (IRATE is much more rapid and error-free than the widely used "line editors", even when the data to be edited consists of a limited FORTRAN character set) have resulted in a rapid growth in the use of the system. The current level of usage causes frequent saturation of the PDP8 computer, resulting in serious degradation of the response time.

Although the present IRATE editor is a vast improvement over the earlier prototypes, there is substantial room for further improvement. In particular, the editor too often requires the typist to redisplay the text between successive corrections on the same page. These undesirable redisplay operations slow the editing process, and are disconcerting to the typist. Elimination of superfluous redisplay (and overall speedup of the editing procedure) constitute a second problem requiring further, extensive redesign.

Such problems could, to some extent, be alleviated by software modifications plus the addition of more memory to the small computer. However, the availability of low-cost hardware-generated display units and microprocessors suggests a more fundamental redesign of the entire system. The use of such "state of the art" technology would permit a better, more economical redesign, and would provide several additional advantages:

1) The system would be expandable to include many more terminals without saturation problems.
2) Many of the functions currently performed by the large computer could be done within the small computer(s). Some degradation of the IRATE system response that presently occurs due to saturation and failure problems in the large computer could thus be avoided.
3) The system could be redesigned in such a way that it could be used easily by persons at other installations.

Acknowledgements

The success of the IRATE system is the result of contributions from a number of people. The initial code was written by E. Romascan (PDP8/e programs), W. Grieman (CDC 6400 programs), and C. M. Lederer (6400 executive monitor program). Maintainance and further improvement of the system has been provided by A. Allen and M. Leavitt. L. P. Meissner and E. Romascan are largely responsible for basic design concepts incorporated in the prototypes and the current IRATE system. M. L. Clinnick, R.A. Belshe, and A. Habegger contributed to the implementation of the prototype systems.

References

1. C. M. Lederer, J. M. Hollander, and L. P. Meissner, University of California Lawrence Berkeley Laboratory Report UCRL-18530, October 1968 (unpublished).

2. L. P. Meissner, M. L. Clinnick, and R. A. Belshe, University of California Lawrence Radiation Laboratory Report UCRL-19390, February, 1970 (unpublished).

APPENDIX - Some examples of IRATE-produced documents

A-1 *Atomic and Nuclear Properties of Materials*--Particle Data Group

A-2 Sample sections (introduction, table, reference-code index) from the *Table of Nuclear Moments*--Table of Isotopes Project

A-3 Programmer Primer *Rolling In and Out of the Data Cell*--Mathematics and Computing

A-4 Portions of the April 1973 and January 1975 *Index of LBL Reports Issued*--Technical Information Division

Atomic and Nuclear Properties of Materials*

Material	Z	A	Nuclear cross section σ[a] [barns]	Nuclear collision length L_{coll}[b] [g/cm²]	[cm]	Absorption length λ[b] [cm]	dE/dx min[c] [MeV/g/cm²]	[MeV/cm]	Radiation length L_{rad}[d] [g/cm²]	[cm]	Density[e] [g/cm³] () is for gas [g/ℓ]	Refractive index n;[e] () is (n−1)×10⁶ for gas
H_2	1	1.01	0.039	43.0	607	790	4.12	0.292	63.05	890	0.0708 (0.090)	1.112 (140)
D_2	1	2.01	0.074	45.1	273	342	2.07	0.342	126.1	764	0.165	1.128
He	2	4.00	0.134	49.6	397	478	1.94	0.243	94.32	755	0.125 (0.178)	1.024 (35)
Li	3	6.94	0.215	53.6	100.4	120.6	1.65	0.902	82.76	155	0.534	-
Be	4	9.01	0.270	55.4	30.0	36.7	1.61	2.97	65.19	35.3	1.848	-
C	6	12.01	0.340	58.7	≈37.8	49.9	1.78	≈2.76	42.70	≈27.5	≈1.55[f]	-
N_2	7	14.01	0.390	59.7	73.8	99.4	1.82	1.47	37.99	47.0	0.808 (1.25)	1.205 (300)
Ne	10	20.18	0.520	64.4	53.7	74.9	1.73	2.08	28.94	24.0	1.207 (0.90)	1.092 (67)
Al	13	26.98	0.650	68.9	25.5	37.2	1.62	4.37	24.01	8.9	2.70	-
A	18	39.95	0.890	74.5	53.2	80.9	1.51	2.11	19.55	14.0	1.40 (1.78)	1.233 (283)
Fe	26	55.85	1.160	79.9	10.2	17.1	1.48	11.6	13.84	1.76	7.87	-
Cu	29	63.54	1.270	83.1	9.3	14.8	1.44	12.9	12.86	1.43	8.96	-
Sn	50	118.69	2.040	96.6	13.2	22.8	1.28	9.4	8.82	1.21	7.31	-
W	74	183.85	2.810	108.6	5.6	10.3	1.17	22.6	6.76	0.35	19.3	-
Pb	82	207.19	3.080	111.7	9.8	18.5	1.13	12.8	6.37	0.56	11.35	-
U	92	238.03	3.380	116.9	≈6.2	12.0	1.09	≈20.7	6.00	≈0.32	≈18.95	-
Air				60.2	50000[g]	67500[g]	1.82	0.0022[g]	36.66	30050[g]	0.001205[g] (1.29)	1.000273[g] (293)
H_2O				58.3	58.3	78.8	2.03	2.03	36.08	36.1	1.00	1.33
H_2 (bubble chamber 26°K)[h]				43.0	≈683	887	4.12	≈0.26	63.05	≈1000	≈0.063[h]	1.112
D_2 (bubble chamber 31°K)[h]				45.1	≈322	403	2.07	≈0.29	126.1	≈900	≈0.140[h]	1.110
H-Ne mixture (50 mole percent)[i]				62.9	154.5	215	1.84	0.75	29.70	73.0	0.407	1.092
Propane (C_3H_8)[j]				55.0	134	176	2.28	0.98	45.38	111	0.41[j] (2.0)	1.25[j] (1005)
Freon 13B1 (CF_3Br)[j]				74.3	≈49.5	73.5	1.52	≈2.3	16.53	≈11	≈1.50[j] (8.71)	1.238[j] (750)
Ilford emulsion				79.5	23.6	39.1	1.44	5.49	11.02	2.94	3.815	-
NaI				91.9	25.0	41.3	1.32	4.84	9.49	2.59	3.67	1.775
LiF				61.1	23.1	30.7	1.69	4.46	39.25	14.9	2.64	1.394
Polyethylene (CH_2)				55.7	≈59.6	78.4	2.09	≈1.95	44.78	≈48	0.92–0.95	-
Mylar ($C_5H_4O_2$)				58.5	42.1	56.1	1.91	2.65	39.95	28.7	1.39	-
Polystyrene, scintillator (CH)[k]				57.0	55.2	68.5	2.03	1.97	43.8	42.9	1.032	1.581
Lucite, Plexiglas ($C_5H_8O_2$)				57.7	≈48.9	65.0	1.95	≈1.65	40.55	≈34.5	1.16–1.20	≈1.49
Spark or proportional chamber[ℓ]				0.05%		0.03%	-	0.073	2.7%		0.046	-
Shielding concrete[m]				64.9	26.0	32.2	1.70	4.25	26.7	10.7	2.5	-
CO_2[n]				60.4	33800	46000	1.82	0.0033	36.2	20210	(1.79)[n]	(410)[n]
Freon 12 (CCl_2F_2)[n]				68.1	13800	20200	1.64	0.0081	23.7	4810	(4.93)[n]	(1080)[n]
Freon 13 ($CClF_3$)[n]				66.0	15000	21400	1.70	0.0072	27.15	6380	(4.26)[n]	(720)[n]

*) Table revised January 1975 by J. Engler and F. Mönnig. For details and references, see CERN NP Internal Report 74-1.

a) σ of neutrons (≈ σ of protons) at 20 GeV from Landolt-Bornstein, New Series I, Vol. 5. Energy dependence for all nuclei ≈ 1/2 percent/GeV (from 5–25 GeV).

b) $L_{coll} = A/(N.\sigma)$. In the absorption length the elastic scattering is subtracted.

c) From W.H. Barkas and M.J. Berger, Tables of Energy Losses and Ranges of Heavy Charged Particles, NASA-SP-3013 (1964).

d) From Y.S. Tsai, Pair Production and Bremsstrahlung of Charged Leptons, SLAC-PUB-1365 (1974), Table III.6.

e) Values for solids, or the liquid phase at boiling point, except where noted. Values in parentheses for gaseous phase STP (0°C, 1 atm.), except where noted.

f) Density variable.

g) Gas at 20°C.

h) Density may vary about ±3%, depending on operating conditions.

i) Values for typical working condition with H_2 target: 50 mole percent, 29°K, 7 atm.

j) Values for typical chamber working conditions: Propane ~ 57°C, 8–10 atm. Freon 13B1 ~ 28°C, 8–10 atm.

k) Typical scintillator; e.g. PILOT B and NE 102A have an atomic ratio H/C = 1.10.

ℓ) Values for typical construction: 2 layers 50 μm Cu/Be wires, 8 mm gap, 60% argon, 40% isobutane or CO_2; 2 layers 50 μm Mylar/Aclar foils.

m) Standard shielding blocks, typical composition O_2 52%, Si 32.5%, Ca 6%, Na 1.5%, Fe 2%, Al 4% plus reinforcing iron bars. Attenuation length ℓ = 115 ± 5 g/cm², also valid for earth (typical ρ = 2.15) from CERN-LRL-RHEL Shielding exp. UCRL 17841 (1968).

n) Used in Čerenkov counters, value at 26°C and 1 atm. Indices of refraction from E.R. Hayes, R.A. Schluter, and A. Tamosaitis, ANL-6916 (1964).

TABLE OF NUCLEAR MOMENTS†

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Table of Isotopes Project
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This table contains nuclear magnetic and quadrupole moments reported as of September, 1974. It supersedes the *Table of Nuclear Moments* published in the proceedings of the 1970 Rehovot Conference [Cf70 HypInt 1255], and is similar to that table, except for changes described below.

The major innovation concerns a changeover from standard typing and printing methods to direct computer input and typography. The systems used for this purpose were developed in Berkeley, and are currently being used for several LBL projects, including production of the 7th edition of the *Table of Isotopes*. The systems' features include direct generation of final output on film, thorough checking of input data according to specified guidelines, and performance of certain calculations. For the *Table of Nuclear Moments*, the computer checked all data and references for correct syntax, calculated some of the moments from measured frequency or moment ratios, and applied diamagnetic corrections where appropriate.

Nuclear species for which moments are reported are identified in the first four columns of the table. The level-energ ... blank for ground state ... ins energies (in units of ke ... ost excited ... tates. Seve ... s are identi ... ce energy [=E−BE(... V. Level ... ndent o ... the

TABLE OF NUCLEAR MOMENTS

Nucleus Z El A		Level energy	Half-life	Spin	μ [Standard] (nm)	Method (μ)	Reference (μ)	Q [Standard] (b)	Method (Q)	Reference (Q)
0 n	1		11.7 2 m	1/2	−1.913210 47 [a]	N	PR 104 283(56)			
1 H	1			1/2	+2.7928456 11	R	JPCR 2 663(73)			
	2			1	+0.8574376 1 [¹H]	N	PC74 Fuller, PR 78 204(50)	+0.002875 20 [st]	MB,R	PRL 29 494(72), PR 57 677(40)
	3		12.262 4 y	1/2	+2.97896014 6 [¹H]	N	PR 115 1012(59), PR 71 551(47)			
2 He	3			1/2	−2.1276243 2 [a,i] [¹H]	N	PR 185 1251(69)			
3 Li	6			1	+0.8220561 3 [²H]	N	ZNat 23a 1202(68), PL 25A 440(67), ORNL−1775(54)	−0.000644 7 [f,st] [⁷Li]	MB	PR 133 B270(64)
	7			3/2	+3.2564604 6 [²H]	N	ZNat 23a 1202(68), PL 25A 440(67), ORNL−1775(54)	−0.0366 3 [st]	MB,R	PR A4 251(71)
								−0.043 3 [st]	MB,R	PR B1 2025(70)
	8		849 7 ms	2	1.65335 35 [a]	N/RD	PR C7 1277(73)			
					+1.6532 8	N/RD	YadF 6 657(67)			
					+1.6532 8	N/RD	PR 126 1506(62)			
4 Be	9			3/2	−1.17749 2 [¹H]	N		+0.053 3 [st]	AB	PR 153 164(67)
								...032	N,R	PR 119 7...
5 B...				...2	1.0355 3 [h]					
					...1.80065 1 [¹¹B]			...[¹¹B]	AB,R	

Journal−Code List

AdNP	Advan. Nucl. Phys. (Ed: M. Baranger and E. Vogt, Plenum Press, New York)
AKyo	Annu. Rep. Res. Reactor Inst., Kyoto Univ.
AnP	Ann. Phys. (Paris)
APAu	Acta Phys. Austr.
APLz	Ann. Phys. (Leipzig)
APPo	Acta Phys. Pol.
ArkF	Ark. Fys. (superseded by Phys. Scr.)
AR67 HahMt	Hahn−Meitner−Inst. fuer Kernforschung, Berlin, Annual report (1967)
AR69 HahMt	Hahn−Meitner−Inst. fuer Kernforschung, Berlin, Annual report (1969)
AR71 HahMt	Hahn−Meitner−Inst. fuer Kernforschung, Berlin, Annual report (1971)
BAPS	Bull. Am. Phys. Soc., Ser. II
Bk64 PAC	E. Karlsson, E. Matthias, and K. Siegbahn (editors), Perturbed Angular Correlations; North−Holland Pu... (1964)
BMBW−FB	...dung und Wissenschaft,
BM...	...ssenschaftliche
JPCR	J. Phys. Chem. Ref. Data
JPJa	J. Phys. Soc. Jap.
JPJS	J. Phys. Soc. Jap., Suppl.
JPPa	J. Phys. (Paris) (name changed from J. Phys. Radium, 1963)
ND	Nucl. Data (Section A: Nuclear Data Tables − superseded by At. Data and Nucl. Data Tables; Section B: Nuclear Data Sheets − supersedes looseleaf Nucl. Data Sheets)
NIM	Nucl. Instrum. Methods (name changed from Nucl. Instrum. as of volume 4, 1959)
NInd	Nucl. Phys. and Solid St. Phys. (India), Section B, Nucl. Phys.
NP	Nucl. Phys.
Nwis	Naturwissenschaften
ORNL−	Oak Ridge National Lab., Oak Ridge, Tenn., Report
OSpk	...rosk. (Trans.: Optics and Spectroscopy
PC...	...munication to G.H. Fuller ...ed in ND A5 433
	...tion to G.H. Fuller ...in ND A5 43...

XBL 755-1221

ROLLING IN AND OUT OF THE DATA CELL

An MHPSS Program Primer

By Mike Raugh, March 1971
Updated, October 1974

INTRODUCTION

MHPSS is an easily operated 6600 program for creating PSS backups or for rolling libraries off of (and back onto) the Program Storage System. Storage areas include both library tapes and chipstore. MHPSS is equipped with (optional) verification procedures to assure that a library may be correctly recovered from storage.

MHPSS is useful in two ways: 1) It increases the effective capacity of the PSS by permitting idle libraries to be safely retired while making space for new or active libraries, 2) It provides a simple procedure for creating PSS library backups on tape and chipstore.

The program operates in three basic command modes and employs a control language roughly similar to that used by COPYPSS. These are:

1) ROLL OUT LIBRARY	(To create backup without destroying library)
2) ROLL OUT AND DESTROY LIBRARY	(To create backup then destroy library)
3) ROLL IN LIBRARY	(To retrieve library from storage).

Examples of program usage follow, with explanations. First, examples involving library tapes. Then chipstore. Finally an abstract of the MHPSS control language, and a description of the storage file.

Note that MHPSS requires in all cases a correct specification of PSS group and library ownername. An option is provided whereby changes may be made in PSS group, library name, or owner name.

THREE EXAMPLES (LIBRARY TAPES)

Note: the MHPSS control word must be left-justified to Column 1 of the IBM card. The names and destination occupying the second field must be left-justified to Column 11.

1. Roll out library TRIALRUN to library tape 08542, where owner is Tex Medley, and his PSS group is 99,ALLSTARS, then VERIFY the storage:

```
ROLL, 7, 40, 20000. 413987, MEDLEY
*6, PSS
LIBCOPY( MHPSS, LGO, ROLLPSS)
LGO.
7-8-9
PGR       99, ALLSTARS
OWN       TEX MEDLEY
RO VFY    TRIALRUN
TLT       08542
END
6-7-8-9
```

Here, as is typical, an account number is required, and the given PSS group and ownername will be checked against entries on the Program Storage System for the given library. If there is a mismatch or a syntactic error in the MHPSS command set, your library tape will not be requested and no further action will be taken.

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Berkeley, California

Technical Information Division
Reports Issued
April 1973

PHYSICS

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January 1975

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