NEANDC(E) 199 "L"

INDC(FR)-40/L

BIBLION, A PROGRAM SYSTEM FOR UPDATING AND EDITING A NUCLEAR DATA ORIENTED LIBRARY INDEX

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FEVRIER 1979

COMMISSARIAT A L'ENERGIE ATOMIQUE

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TABLE OF CONTENTS

ABSTRACT -

BIBLION is a program system for updating and editing a subject oriented library index. It is applied to a nuclear data library.

BIBLION : UN PROGRAMME DE MISE A JOUR ET D'EDITION D'UN FICHIER REPERTOIRE D'UNE BIBLIOTHEQUE NUCLEAIRE.

RESUME -

BIBLION est un programme général pour la mise à jour et l'édition du répertoire d'une bibliothèque traitant un sujet particulier. Il a été appliqué à la quastion d'une bibliothèque nucléaire.

1 - INTRODUCTION -

BIBLION is a program system for updating and editing a subject oriented library index. It is directly applicable to any atomic or nuclear data library. The entries which are made in a compiler oriented format contain data such as author, reference, year of publication, type of work, element and reaction treated, librarian codes, etc... They are analysed, checked for compatibility and added to the master file, which in turn is edited in different sorting orders as user oriented index, in order to allow a quicker access to the library and facilitate the task of the librarian.

2 - GENERAL CHARACTERISTICS OF THE SYSTEM

2a. General data

Language used : PLI-Optimizer.

Computer used : IBM - 370/168.

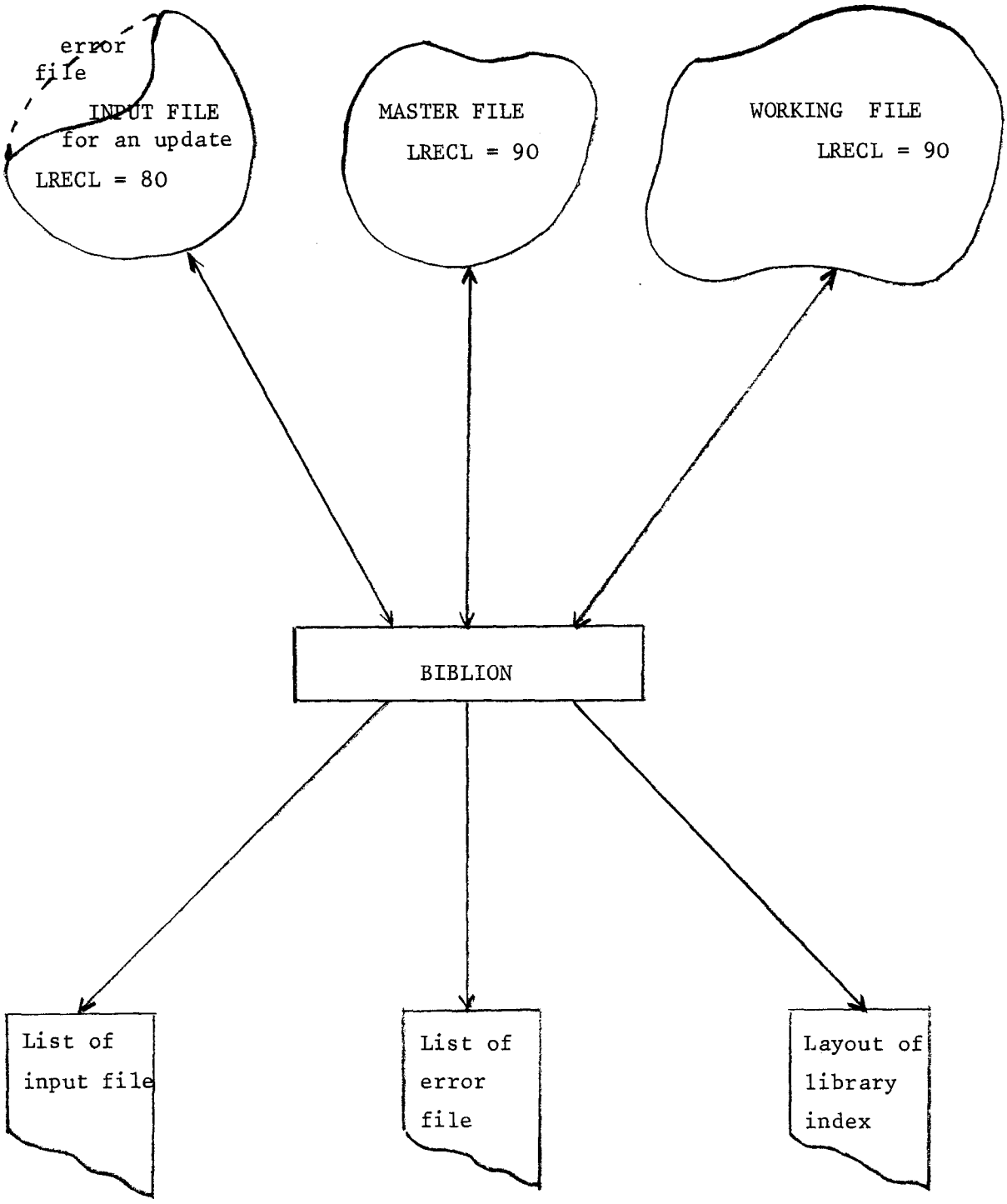
System : OS.

Size : $9A38_{16}$ static.

Compilation time : 16 sec CPU.

Exec-time : 20 sec CPU.

2b. Global flowchart



Devices and blocking desired for storing the files can be chosen at the level of the job control cards.

3 - FORMATS USED

An optimal representation of the file in the compilation-, storage-, and layout-phase requires appropriate record formats.

3a. Compilation format (= COMPFORM)

The unit of the input file is called an entry which consists of one record (= BIB - record) containing bibliographic data followed by records (= ZAR - records) containing data on elements and 'reactions'.

Format of BIB-record :

Col (1) - col (20) : first author of publication.
Col (21)- col (44) : reference (CINDA codes used).
Col (45)- col (48) : year of publication.
Col (49)- col (50) : free.
Col (51)- col (52) : code for type of work, see Appendix Ia.
Col (53)- col (54) : code for incident particle, see Appendix Ib.
Col (55) : ≡ M if publication in form of microfiche, otherwise blank.
Col (56)- col (80) : free.
LRECL = 80 bytes.

Format of ZAR-records :

$$\left[\prod_{i=1}^{n} (ZZZAAA)_i \cdot \prod_{s=1}^{m} (RRR)_s \cdot/\right]_K^{*} \quad K = 1, 2, \ldots, M$$

ZZ ou ZZZ element number
AAA mass number.
RRR code for reaction, see Appendix Ic.
ZZAAA = 00000 is used when a lot of elements are treated in a publication.
LRECL = 80 bytes.

Blanks are only permitted at the end of a record. ZZZAAA and RRR strings must be on one record.

A sample of the compilation format is given in Appendix IIa.

3b. Storage format (= STORFORM)

In order to save space we store the file in the compact compilation format. A record identification number (= RECID) is assigned to each record. Therefore, the format reads,

Col (1) - col (80) : in COMPFORM.
Col (81) - col (85) : RECID (right-adjusted).
Col (86) - col (90) : free.
LRECL = 90 bytes.

A sample of the storage format is given in **Appendix** IIb.

3c. Working format (= WORKFORM)

In order to produce library index layouts for different usages a representation of the file in different sorting orders is required. Such sortings can easily be done by means of the fast and powerful IBM sorting utilities provided that the file is represented in the following record format :

Col (1) - col (3) : element number.
Col (4) - col (5) : element symbol.
Col (6) : -
Col (7) - col (9) : mass number.
Col (10) - col (12) : reaction code.
Col (13) - col (20) : reaction text.
Col (21) - col (22) : code for type of work.
Col (23) - col (26) : text for type of work.
Col (27) - col (50) : reference.
Col (51) - col (54) : year of publication.
Col (55) - col (74) : author.
Col (75) - col (79) : RECID.
Col (80) - col (81) : incident particle code.
Col (82) - col (88) : form in which publication is kept in library (microfiche, e.g.).
Col (89) - col (90) : free.
LRECL = 90 bytes.

A sample of the working format is given in Appendix IIc.

4 - UPDATING AND CHECKING OF THE FILE

The library index master file will be updated regularly and modification of this file may be necessary. In order to avoid an accumulation of errors in the master file, several error checks on the input stream are performed.

4a. Update procedure

The update stream can contain data for modification or deletion of records in the master file or new entries.

The following record sequence must be observed :

- correction - (deletion -) records with RECID in ascending order followed by a dummy record (any data) indicating the end of the master-file-modification stream,
- additions to the master file,
- /* (end of file).

Record format for corrections :

1st record :

Col (1) : ≡ +

Col (2) - col (6) : RECID of record to be modified (right-adjusted).

Col (7) : blank.

Col (8) - col (80) : can contain any data, e.g., date of update or kind of modification ; this field will not be processed.

2nd record :

Contains the correct data in COMPFORM.

Record format for deletions :

Col (1) : ≡ +

Col (2) - col (6) : RECID of record to be deleted (right-adjusted).

Col (7) : ≡ D

Col (8) - col (80) : can contain any data, e.g., date of update or reason for deletion ; this field will not be processed.

A sample of an update stream is given in Appendix IIIa.

4b. Checking procedure

Extensive compatibility checks are made on the date of an input stream and incorrect records are put onto an error file where they can be corrected (by means of a display station, for example) and subsequently called up for an update.

Explicit checks are carried out to establish whether :

- Author field empty ?
- Reference field empty ?
- Year range correct ?
- Type of work range correct ?
- Element range correct ?
- Mass range correct ?
- Reaction code range correct ?

Implicit checks are made to see whether :

- Sequence of input records correct ?
- ZAR - field numeric ?
- ZAR - delimiters (: ≡ . or ./) correct ?
- Entry - delimiter (: ≡*) correct ?

If an error which is not severe is detected, then the corresponding record is further processed and printed together with the record identification number plus indications of error type detected and afterwards stored on the error-file. All program phases will be executed. If a severe error is found then the corresponding record will not be processed further ; it will be printed together with the record identification number and indication of error type detected and then put on the error-file. The remaining input stream will be checked for errors, but no further program phases will be executed.

A sample of an error file is given in Appendix IIIb.

5 - STORAGE AND SAFEGUARD OF THE FILES

The master file is stored permanently in the compact storage format and, after each update copied from disc onto tape, this in turn is stored together with the current input in order to permit regeneration of the latest up-to-date master file in case of its accidental destruction. All files in the working format are only stored temporarily, printed and then liberated with the exception of those which are sorted according to the hierarchies :

Z-A, reaction, year, type of work, author, reference

and

Author, Z-A, reaction, year, type of work, reference.

These are intended for more frequent use and can, therefore, be retrieved and eventually visualised by means of a display station.

6 - LAYOUT OF THE LIBRARY INDEX

The library index should be edited with a view to a variety of uses. In order to meet this requirement, we produce layouts with the following sorting hierarchies :

6a) Z-A, reaction, year of publication, type of work, author, reference.
6b) Author, Z-A, reaction, year of publication, type of work, reference.
6c) Year of publication, Z-A, reaction, type of work, author, reference.
6d) Reaction, Z-A, year of publication, type of work, author, reference.
6e) Reference, year of publication, Z-A, reaction, author, type of work.
6f) List of references in increasing sorting order.

Samples of different layouts are given in Appendix IV.

A C K N O W L E D G M E N T S

The authors would like to express their gratitude to all colleagues for their help and suggestions.

The contributions by Mrs. N. VERGES and Dr. G. SIMON are especially acknowledged.

One of the authors (A.S.) is much indebted to the Commissariat à l'Energie Atomique for its hospitality and to Dr. A. MICHAUDON for the opportunity of working at Bruyères-le-Châtel.

B I B L I O G R A P H Y

1. PL/I Optimizing Compiler, Programer's Guide, OS, IBM Program Product, SC 33-0006-4, File No.S360/S370-29.

2. PL/I Checkout and Optimizing Compilers, Language Reference Manual, OS, IBM Program Product, GC 33-0009-3, File No.S360/S370-29.

3. OS/VS Sort/Merge Programer's Guide, IBM Program Product, SC 33-4035-3, File No. S370/(OS/VS).

4. OS Utilities, IBM Systems Reference Library, GC 28-6586-15, File No. S360-32.

APPENDIX I : DICTIONARIES

Ia. Codes for type of work

Code	Meaning of code
01	Experiment
02	Theory
03	Evaluation
04	Theory and experiment
05	Compilation
06	Computer program.

Further codes up to 99 can be added. Codes together with explanatory text are incorporated into the program.

Ib. Codes for incident particles

Code	Meaning of code
	Neutron
A	Alpha
P	Proton
G	Gamma
E-	Electron
E+	Positron
D	Deuteron
T	Triton.

Further codes and element symbols can be added (unlimited).

These codes are not incorporated into the program and they appear unchanged in the layout.

Ic. Codes for 'reactions' (outgoing channels)

Code	Meaning of code
1	X, total
2	X, elastic
3	X, nonelastic
4	X, inelastic (total)
16	X, 2n
17	X, 3n
18	X, total fission
19	X, fission
20	X, n fission
21	X, 2n fission
22	X, nα
23	X, n3α
24	X, 2nα
25	X, 3nα
26	X, 2n isomer
27	X, absorption
28	X, np
29	X, n2α
30	X, 2n2α
31	X, γ-emission
32	X, nd
33	X, nt
34	X, n He-3
35	X, nd2α
36	X, nt2α
37	X, 4n
38	X, 3nf
102	X,γ
103	X, p
104	X, d
105	X, t
106	X, He-3
107	X,α
108	X, 2α
109	X, 3α

X indicates the incident particle

111	X, 2p
112	X, pα
113	X, t2α
114	X, d2α
151	X, resonance integral
452	X, ν_T
454	X, fission yield
455	X, ν_d
456	X, ν_p
457	X, decay
500	X, a lot of reactions treated.

Further codes in the range 1-999 can be added following the basic philosophy of ENDF reaction-codes.

These codes together with explanatory text are incorporated into the program.

APPENDIX II

IIa. Sample of the compilation format

```
KINSEY.B.B          PR          99      3311955  01
08016.06012.2./*
BROLLEY.J.E         PR          99      3301955  01
40090.45103.40094.107./*
ARMSTRONG.A.H       PR          99      3301955  01
40090.107.103./*
KAPCHIGASHEV.S.P    EAF         19       951965  01
40090.40091.40094.102./*
LEPPAMAKI.H         JU-RR                 31970  01
36080.36082.37085.37087.38086.38088.39089.40090.16.103./36078.38084.16./
36086.37085.37087.38088.39089.40090.41093.42092.42098.107./35081.36080.36082.
36084.37085.37087.38086.38088.39089.40090.40091.40092.40094.42092.42094.42096.
42097.42098.103./39089.41093.102./40090.42092.28./35081.37087.41093.22./*
BLOCK.R.C           WASH                10481964  04
40090.40091.40092.40094.40096.23050.28062.28064.50120.50122.102./*
GUENTHER.P          PR/C        12     17971975  01
40090.40092.1.2.4./*
LEVKOVSKII.V.N      SPJETP      18      2131964  01
16032.20042.20044.30064.30066.30067.30068.38086.38088.40090.40091.40092.40094.
47109.48106.48111.48112.48113.56138.103./17035.40092.40094.40096.48113.48114.
107./*
WEN.DEH LU          PR/C         1      3581970  01
40090.40091.40092.42092.42096.42097.42098.44096.45103.46105.46106.46108.48112.
50116.50117.56138.58140.103./40094.41093.42092.42098.46106.46108.55133.56138.
58142.107./*
MOSKALEV.S.S        NP          53      6671964  01
40090.40091.40092.40094.40096.40000.1./*
WALKER.W.H          INDC(CAN)              111969  03
00000.102.151./*
WALKER.W.H          AECL               3037-11969  03
00000.102.151./*
CSIKAI.J            AER        7-4         931969  01
00000.16.102.103.107./*
QAIM.S.M            NEANDC(E)             1621975  04
00000.16.103.107./28058.38084.40091.40094.42092.58142.74183.74184.74186.28.
104./
29065.30070.31071.32076.43099.22./26054.26056.28058.28060.29063.38088.40090.
53127.105.106./*
MICHAEL.H           NEANDC(E)             1621975  04
28063.102./*
ABAGYAN.L.P         INDC(CCP)              391974  03
00000.102./*
LEVKOVSKII.V.N      SPJETP      33     11741957  04
20042.20044.22048.22049.30064.30066.30067.31069.31071.32070.32072.32073.32074.
38086.38088.40090.40091.40092.40094.48106.48111.48112.48113.58140.58142.12024.
12025.16032.16034.14028.14029.26056.26057.103./17035.17037.32072.32074.37085.
37087.40094.40096.48112.48114.107./*
LEVKOVSKII.V.N      SPJETP      31      2911956  01
40090.40091.40092.40094.48106.48111.48112.48113.38086.38088.20042.20044.22047.
20048.20049.12024.12025.16032.16034.14028.14029.30064.30066.32070.32072.103./*
LEVKOVSKII.V.N      SPJETP      18      8131964  01
00000.103./*
CHATTERJEE.A        NUCS        23      1121965  01
00000.103.107.16.104.105./*
```

IIb. Sample of the storage format

```
KINSEY,B,B          PR            99  3311955      01                          45
08016,06012,2,/*                                                               46
BROLLEY,J,E         PR            99  3301955      01                          47
40090,45103,40094,107,/*                                                       48
ARMSTRONG,A,H       PR            99  3301955      01                          49
40090,107,103,/*                                                               50
KAPCHIGASHEV,S,P    EAF           19   951965      01                          51
40090,40091,40094,102,/*                                                       52
LEPPAMAKI,H         JU-RR                31970      01                          53
36080,36082,37085,37087,38086,38088,39089,40090,16,103,/36078,38084,16,/       54
36086,37085,37087,38088,39089,40090,41093,42092,42098,107,/35081,36080,36082, 55
36084,37085,37087,38086,38088,39089,40090,40091,40092,40094,42092,42094,42096,56
42097,42098,103,/39089,41093,102,/40090,42092,28,/35081,37087,41093,22,/*      57
BLOCK,R,C           WASH               10481964      04                          58
40090,40091,40092,40094,40096,23050,28062,28064,50120,50122,102,/*             59
GUENTHER,P          PR/C          12 17971975      01                          60
40090,40092,1,2,4,/*                                                           61
LEVKOVSKII,V,N      SPJETP        18  2131964      01                          62
16032,20042,20044,30064,30066,30067,30068,38086,38088,40090,40091,40092,40094,63
47109,48106,48111,48112,48113,56138,103,/17035,40092,40094,40096,48113,48114, 64
107,/*                                                                         65
WEN,DEH LU          PR/C           1  3581970      01                          66
40090,40091,40092,42092,42096,42097,42098,44096,45103,46105,46106,46108,48112,67
50116,50117,56138,58140,103,/40094,41093,42092,42098,46106,46108,55133,56138, 68
58142,107,/*                                                                   69
MOSKALEV,S,S        NP            53  6671964      01                          70
40090,40091,40092,40094,40096,40000,1,/*                                       71
WALKER,W,H          INDC(CAN)          111969      03                          72
00000,102,151,/*                                                               73
WALKER,W,H          AECL            3037-11969     03                          74
00000,102,151,/*                                                               75
CSIKAI,J            AER           7-4   931969      01                          76
00000,16,102,103,107,/*                                                        77
GAIM,S,H            NEANDC(E)          1621975      04                          78
00000,16,103,107,/28058,38084,40091,40094,42092,58142,74183,74184,74186,28,    79
104,/                                                                          80
29065,30070,31071,32076,43099,22,/26054,26056,28058,28060,29063,38088,40090,   81
53127,105,106,/*                                                               82
MICHAEL,H           NEANDC(E)          1621975      04                          83
28063,102,/*                                                                   84
ABAGYAN,L,P         INDC(CCP)           391974      03                          85
00000,102,/*                                                                   86
LEVKOVSKII,V,N      SPJETP        33 11741957      04                          87
20042,20044,22048,22049,30064,30066,30067,31069,31071,32070,32072,32073,32074,88
38086,38088,40090,40091,40092,40094,48106,48111,48112,48113,58140,58142,12024,89
12025,16032,16034,14028,14029,26056,26057,103,/17035,17037,32072,32074,37085, 90
37087,40094,40096,48112,48114,107,/*                                           91
LEVKOVSKII,V,N      SPJETP        31  2911956      01                          92
40090,40091,40092,40094,48106,48111,48112,48113,38086,38088,20042,20044,22047,93
20048,20049,12024,12025,16032,16034,14028,14029,30064,30066,32070,32072,103,/*94
LEVKOVSKII,V,N      SPJETP        18  8131964      01                          95
00000,103,/*                                                                   96
CHATTERJEE,A        NUCS          23  1121965      01                          97
00000,103,107,16,104,105,/*                                                    98
```

IIc. Sample of the working format

```
069TM-169151,RESINTG01EXP AERE-PR/NP                41963CORVI.F          00002
069TM-169151,RESINTG01EXP NP            62        6411965CEULEMANS.H      00004
066DY-163151,RESINTG01EXP NP            62        6411965CEULEMANS.H      00004
072HF-177151,RESINTG01EXP NP            62        6411965CEULEMANS.H      00004
069TM-169001,TOTAL  01EXP NP/A          91        6441967AL KITAL.R.A     00006
069TM-169151,RESINTG01EXP NP/A          91        6441967AL KITAL.R.A     00006
069TM-169001,TOTAL  01EXP PR/C           2       20301970BHAT.M.R         00008
069TM-169151,RESINTG01EXP PR/C           2       20301970BHAT.M.R         00008
069TM-169151,RESINTG01EXP PR            99        1011955HARVEY.J.A       00010
069TM-169151,RESINTG01EXP NP/A         131        3051969BARROS.S         00012
047AG-107151,RESINTG01EXP NP/A         131        3051969BARROS.S         00012
047AG-109151,RESINTG01EXP NP/A         131        3051969BARROS.S         00012
078PT-195151,RESINTG01EXP NP/A         131        3051969BARROS.S         00012
078PT-192151,RESINTG01EXP NP/A         131        3051969BARROS.S         00012
078PT-194151,RESINTG01EXP NP/A         131        3051969BARROS.S         00012
078PT-196151,RESINTG01EXP NP/A         131        3051969BARROS.S         00012
078PT-198151,RESINTG01EXP NP/A         131        3051969BARROS.S         00012
073TA-181151,RESINTG01EXP AERE-PR/NP                181971THOMAS.B.W      00014
068ER-167151,RESINTG01EXP AERE-PR/NP                181971THOMAS.B.W      00014
055CS-133151,RESINTG01EXP AERE-PR/NP                181971THOMAS.B.W      00014
069TM-169151,RESINTG01EXP AERE-PR/NP                181971THOMAS.B.W      00014
092U -236001,TOTAL  04REV 65ANVERS                    1965ADLER.F.T       00016
092U -236151,RESINTG04REV 65ANVERS                    1965ADLER.F.T       00016
047AG-107151,RESINTG01EXP 65ANVERS                    1965ASGHAR.M        00018
047AG-109151,RESINTG01EXP 65ANVERS                    1965ASGHAR.M        00018
069TM-169151,RESINTG01EXP 65ANVERS                    1965ASGHAR.M        00018
079AU-197151,RESINTG01EXP 65ANVERS                    1965ASGHAR.M        00018
065TB-159151,RESINTG01EXP 65ANVERS                    1965ASGHAR.M        00018
067HO-165151,RESINTG01EXP 65ANVERS                    1965ASGHAR.M        00018
069TM-169151,RESINTG01EXP CEA-R                   33851968JULIEN.J        00020
079AU-197151,RESINTG01EXP CEA-R                   33851968JULIEN.J        00020
033AS-075151,RESINTG01EXP CEA-R                   33851968JULIEN.J        00020
078PT-195151,RESINTG01EXP CEA-R                   33851968JULIEN.J        00020
080HG-199151,RESINTG01EXP CEA-R                   33851968JULIEN.J        00020
080HG-201151,RESINTG01EXP CEA-R                   33851968JULIEN.J        00020
080HG-198151,RESINTG01EXP CEA-R                   33851968JULIEN.J        00020
040ZR-091151,RESINTG01EXP CEA-R                   33851968JULIEN.J        00020
041NB-093151,RESINTG01EXP CEA-R                   33851968JULIEN.J        00020
069TM-169151,RESINTG01EXP CCO                  2176-201973ARBO.J         00022
045RH-103151,RESINTG01EXP COO                  2176-201973ARBO.J         00022
069TM-169151,RESINTG01EXP ORNL          4743       791971CHRIEN.R.E       00024
069TM-169001,TOTAL  01EXP 72BUDAPEST                  1972TELLIER.H       00026
069TM-169151,RESINTG01EXP 72BUDAPEST                  1972TELLIER.H       00026
067HO-165001,TOTAL  01EXP 72BUDAPEST                  1972TELLIER.H       00026
067HO-165151,RESINTG01EXP 72BUDAPEST                  1972TELLIER.H       00026
025MN-055151,RESINTG01EXP WASH                    11241968CHRIEN.R.E      00028
052TE-123151,RESINTG01EXP WASH                    11241968CHRIEN.R.E      00028
052TE-125151,RESINTG01EXP WASH                    11241968CHRIEN.R.E      00028
069TM-169151,RESINTG01EXP WASH                    11241968CHRIEN.R.E      00028
047AG-107102,GAMMA  01EXP 71KNOXVILLE                 1971HARKER.Y.D      00030
047AG-109102,GAMMA  01EXP 71KNOXVILLE                 1971HARKER.Y.D      00030
043TC-099102,GAMMA  01EXP 71KNOXVILLE                 1971HARKER.Y.D      00030
049IN-115102,GAMMA  01EXP 71KNOXVILLE                 1971HARKER.Y.D      00030
055CS-133102,GAMMA  01EXP 71KNOXVILLE                 1971HARKER.Y.D      00030
```

APPENDIX III

IIIa. Sample of input of update

```
+00580 WORK TYPE ERR
EAPEN.P.K            JIN          37      11211975  01
+00582 WORK TYPE ERR
BENVENISTE.J         58GENEVE                 1958  05
+00584 WORK TYPE ERR
SALNIKOV.O.A         70HELSINKI               1970  01
+00586 WORK TYPE ERR
ALTER.H              NAA-SR-MEMO          58611960  05
+00588 WORK TYPE ERR
MACGREGOR.M.H        58GENEVE                 1958  05
+00646
PANDEY.M.S           DA/B         36     5659R1975  01
+00648
HALE.G.M             LA-UR             75-12801975  02
+00649
03006.105./*
+00700
03006.2.107.105.1./05010.2.107.1./*
+00723
RAMSTROM.E           NP/A        272       2591976  01 A
+00724
06013.532./*
+00737D
+00738D
+00794 WORK TYPE ERR
CSIKAI.J             REA           7        931969  05
+00812
FLYNN.E.R            NP/A        279       3941977  03 T
+00813
82204.82206.82208.107./81203.81205.81207.457./*
```

This card follows 'modification-cards' and preceeds' new entry-cards'.

```
COATES.M.S           AERE-PR/NP             201974  01 P
01003.532./*
DODDER.D.C           LA-UR             74-7381974  03 P
02004.103./*
DODDER.D.C           LA-UR             74-7381974  03 A
03007.107./*
DODDER.D.C           LA-UR             74-7381974  03 T
02004.105./*
DODDER.D.C           LA-UR             74-7381974  03 D
02003.104.103./*
HABUAT.G             CEA-N                17391974  01 D
01003.532./*
HALE.G.M             LA-UR             75-3441975  03 A
03007.107./*
```

modifications of the master file

new entries

IIIb. Sample of error file

```
+00564 WØRK TYPE ERR
BRUNHART.G          EANDC(US)                 1431970   4
+00566 WØRK TYPE ERR
PØSTMA.H            EANDC(US)                 1431970   4
+00568 WØRK TYPE ERR
STAVISKY.DU.YA      EAF            15          591963   1
+00570 WØRK TYPE ERR
MUSGRØVE.E.I.A.R    AAEC/E                    2111970   5
+00572 WØRK TYPE ERR
LEIPUNSKY.A.I       INDSWG                   64-E1964   4
+00574 WØRK TYPE ERR
CØLLI.L             NC              7        4001958   1
+00576 WØRK TYPE ERR
ALLAN.D.L           NP             24        2741961   1
+00578 WØRK TYPE ERR
SE HEE AHN          PR            119       16671960   1
+00580 WØRK TYPE ERR
EAPEN.P.K           JIN            37       11211975   1
+00582 WØRK TYPE ERR
BENVENISTE.I        58GENEVE                     1958   5
+00584 WØRK TYPE ERR
SALNIKØV.Ø.A        70HELSINKI                   1970   1
+00586 WØRK TYPE ERR
ALTER.H             NAA-SR-MEMØ              58611960   5
+00588 WØRK TYPE ERR
MACGREGØR.M.H       58GENEVE                     1958   5
+00794 WØRK TYPE ERR
CSIKAI.J            REA             7         931969   5
+00937 WØRK TYPE ERR
HANKLA.A.K          BAP            13       14211968
+01555 ZAØ-FIELD EMPTY
```

APPENDIX IV

IVa. Layout with sorting hierarchy : ZA, reaction, year of publication, type of work, author, reference

Z-A	REACTION	YEAR	TYPE	AUTHOR	REFERENCE	RECID
NI-067	N,TOTAL	1970	EXP	CHO.M	KFK 1230	01031
CU-NAT	N,A	1975	EVAL	BENZI.V	NEANDC(E) 169	01496
CU-NAT	N,D	1975	EVAL	BENZI.V	NEANDC(E) 169	01496
CU-NAT	N,ELASTIC	1972	EXP	KORZH.I.A	BAS 35 757	00481
CU-NAT	N,ELASTIC	1975	EVAL	BENZI.V	NEANDC(E) 169	01496
CU-NAT	N,GAMMA	1963	EXP	STAVISKY.DU.YA	EAF 15 59	00569
CU-NAT	N,GAMMA	1969	REV	BRUNHART.G	WASH 1136	00553
CU-NAT	N,GAMMA	1970	EXP	MALIK.S.S	NIM 86 83	00992
CU-NAT	N,GAMMA	1970	REV	MALIK.S.S	EANDC(US) 143	00563
CU-NAT	N,GAMMA	1971	EXP	STAMATELATOS.M	71KNOXVILLE	00547
CU-NAT	N,GAMMA	1973	EXP	STAMATELATOS.M	NSE 51 113	00549
CU-NAT	N,GAMMA	1975	EXP	POENITZ.W.P	AERE-R 8082	00748
CU-NAT	N,GAMMA	1975	EVAL	BENZI.V	NEANDC(E) 169	01496
CU-NAT	N,HE-3	1975	EVAL	BENZI.V	NEANDC(E) 169	01496
CU-NAT	N,INEL	1975	EVAL	BENZI.V	NEANDC(E) 169	01496
CU-NAT	N,P	1975	EVAL	BENZI.V	NEANDC(E) 169	01496
CU-NAT	N,T	1975	EVAL	BENZI.V	NEANDC(E) 169	01496
CU-NAT	N,TOTAL	1963	EXP	NIKOLAEV.M.N	AE 15 68	00999
CU-NAT	N,TOTAL	1970	EXP	MALIK.S.S	NIM 86 83	00992
CU-NAT	N,TOTAL	1973	EXP	GOPAL.S	PR/C 8 2814	01381
CU-NAT	N,TOTAL	1976	EXP	HANSEN.H.H	NEANDC(E) 182	00936
CU-NAT	N,TOTAL	1976	EXP	KASHUKEEV.N.T	INDC(BUL) 4	00872
CU-NAT	N,TOTAL	1976	EXP	PANDEY.M.S	58PARIS	00512
CU-NAT	N,2N	1975	EVAL	BENZI.V	NEANDC(E) 169	01496
CU-063	N,A	1974	EXP	MASLOV.G.N	INDC(CCP) 42	01256
CU-063	N,A	1975	EVAL	BENZI.V	NEANDC(E) 169	01496
CU-063	N,A	1975	EVAL	LESCA.L	CCDN 16911	00685
CU-063	N,A	1976	EVAL	VLASOV.M.F	76LOWELL	00385
CU-063	N,D	1975	EVAL	BENZI.V	NEANDC(E) 169	01496
CU-063	N,ELASTIC	1975	EVAL	BENZI.V	NEANDC(E) 169	01496
CU-063	N,GAMMA	1969	EVAL	DOVBENKO.A.G	EAF 27 41	01582
CU-063	N,GAMMA	1975	EXP	PANDEY.M.S	DA/B 36 5659R	00647
CU-063	N,GAMMA	1975	EVAL	BENZI.V	NEANDC(E) 169	01496
CU-063	N,HE-3	1962	EXP	BRAMLITT.E.T.	PR 125 297	00214
CU-063	N,HE-3	1975	EVAL	BENZI.V	NEANDC(E) 169	01496
CU-063	N,INEL	1975	EVAL	BENZI.V	NEANDC(E) 169	01496
CU-063	N,P	1975	EVAL	BENZI.V	NEANDC(E) 169	01496
CU-063	N,RESINTG*	1966	REV	BARROS.S	BAP 11 337	00101
CU-063	N,RESINTG	1966	REV	BARROS.S	BAP 11 337	00101
CU-063	N,RESINTG	1973	EXP	STAMATELATOS.M	NSE 51 113	00549
CU-063	N,T	1975	EVAL	BENZI.V	NEANDC(E) 169	01496
CU-063	N,TOTAL	1959	REV	MILLER.P.D	BAP 4 42	01059
CU-063	N,TOTAL	1975	EXP	PANDEY.M.S	DA/B 36 5659R	00647
CU-063	N,2N	1962	EXP	BRAMLITT.E.T.	PR 125 297	00215
CU-063	N,2N	1970	EVAL	BERTRAM.W.K	AAEC/TM 542	00851
CU-063	N,2N	1971	EVAL	KANDA.Y	JAERI 1207	00861
CU-063	N,2N	1975	EVAL	BENZI.V	NEANDC(E) 169	01496
CU-063	N,2N	1975	EVAL	LESCA.L	CCDN 16911	00685
CU-063	N,2N	1976	EVAL	VLASOV.M.F	76LOWELL	00385
CU-063	P,N	1974	EXP	COLLE.R	PR/C 9 1819	01219
CU-065	N,A	1975	EVAL	BENZI.V	NEANDC(E) 169	01496
CU-065	N,D	1975	EVAL	BENZI.V	NEANDC(E) 169	01496
CU-065	N,ELASTIC	1975	EVAL	BENZI.V	NEANDC(E) 169	01496
CU-065	N,GAMMA	1975	EXP	PANDEY.M.S	DA/B 36 5659R	00647
CU-065	N,GAMMA	1975	EVAL	BENZI.V	NEANDC(E) 169	01496

*Resonance integral

IVb. Layout with sorting hierarchy : Author, ZA, reaction, year, type of work, reference

AUTHOR	Z-A	REACTION	YEAR	TYPE	REFERENCE	RECID
TEMPERLEY.J.K	RU-101	N,P	1970	EXP	AD 713404	01295
TEMPERLEY.J.K	RU-102	N,A	1970	EXP	AD 713404	01296
TEMPERLEY.J.K	RU-104	N,A	1970	EXP	AD 713404	01296
TEMPERLEY.J.K	RU-104	N,D	1970	EXP	AD 713404	01296
TEMPERLEY.J.K	PD-105	N,P	1970	EXP	AD 713404	01295
TEMPERLEY.J.K	PD-108	N,A	1970	EXP	AD 713404	01296
TEMPERLEY.J.K	PD-110	N,D	1970	EXP	AD 713404	01296
TEMPERLEY.J.K	IN-113	N,INEL	1970	EXP	AD 713404	01297
TEMPERLEY.J.K	IN-115	N,A	1970	EXP	AD 713404	01296
TEMPERLEY.J.K	IN-115	N,GAMMA	1970	EXP	AD 713404	01297
TEMPERLEY.J.K	IN-115	N,INEL	1970	EXP	AD 713404	01297
TEMPERLEY.J.K	IN-115	N,P	1970	EXP	AD 713404	01295
TEMPERLEY.J.K	SN-112	N,D	1970	EXP	AD 713404	01296
TEMPERLEY.J.K	SN-116	N,P	1970	EXP	AD 713404	01295
TEMPERLEY.J.K	SN-117	N,D	1970	EXP	AD 713404	01296
TEMPERLEY.J.K	SN-117	N,INEL	1970	EXP	AD 713404	01297
TEMPERLEY.J.K	SN-117	N,P	1970	EXP	AD 713404	01295
TEMPERLEY.J.K	SN-118	N,D	1970	EXP	AD 713404	01296
TEMPERLEY.J.K	SN-124	N,D	1970	EXP	AD 713404	01296
TEOH.W.	TH-231	N,DECAY	1974	EXP	NP/A 228 432	00608
TEOH.W.	U -235	N,DECAY	1974	EXP	NP/A 228 432	00608
TEUTSCH.H	ZR-NAT	N,TOTAL	1973	REV	INDC(SEC) 35	01010
THOMAS.B.W	CS-133	N,RESINTG	1971	EXP	AERE-PR/NP 18	00014
THOMAS.B.W	ER-167	N,RESINTG	1971	EXP	AERE-PR/NP 18	00014
THOMAS.B.W	TM-169	N,RESINTG	1971	EXP	AERE-PR/NP 18	00014
THOMAS.B.W	TA-181	N,RESINTG	1971	EXP	AERE-PR/NP 18	00014
THOMAS.G.E	TH-232	N,TOTAL	1963	REV	BAP 8 8	00143
THOMET.P	U -232	N,F TOTAL	1974	THEO	CEA-R 4631	01191
THOMET.P	U -232	N,GAMMA	1974	THEO	CEA-R 4631	01191
THOMET.P	U -232	N,INEL	1974	THEO	CEA-R 4631	01191
THOMET.P	U -236	N,F TOTAL	1974	THEO	CEA-R 4631	01191
THOMET.P	U -236	N,F TOTAL	1974	THEO	74TOKYO	01193
THOMET.P	U -236	N,GAMMA	1974	THEO	CEA-R 4631	01191
THOMET.P	U -236	N,GAMMA	1974	THEO	74TOKYO	01193
THOMET.P	U -236	N,INEL	1974	THEO	CEA-R 4631	01191
THOMET.P	PU-238	N,F TOTAL	1974	THEO	CEA-R 4631	01191
THOMET.P	PU-238	N,F TOTAL	1974	THEO	74TOKYO	01193
THOMET.P	PU-238	N,GAMMA	1974	THEO	CEA-R 4631	01191
THOMET.P	PU-238	N,GAMMA	1974	THEO	74TOKYO	01193
THOMET.P	PU-238	N,INEL	1974	THEO	CEA-R 4631	01191
THOMET.P	PU-240	N,F TOTAL	1974	THEO	CEA-R 4631	01191
THOMET.P	PU-240	N,F TOTAL	1974	THEO	74TOKYO	01193
THOMET.P	PU-240	N,GAMMA	1974	THEO	CEA-R 4631	01191
THOMET.P	PU-240	N,GAMMA	1974	THEO	74TOKYO	01193
THOMET.P	PU-240	N,INEL	1974	THEO	CEA-R 4631	01191
TIRSELL.K.G	MN-056	N,DECAY	1974	EXP	PR/C 10 785	01343
TIRSELL.K.G	MN-057	N,DECAY	1974	EXP	PR/C 10 785	01343
TIRSELL.K.G	MN-058	N,DECAY	1974	EXP	PR/C 10 785	01343
TIRSELL.K.G	FE-056	N,DECAY	1974	EXP	PR/C 10 785	01343
TIRSELL.K.G	FE-057	N,DECAY	1974	EXP	PR/C 10 785	01343
TIRSELL.K.G	FE-058	N,DECAY	1974	EXP	PR/C 10 785	01343
VALKONEN.M	MANY	N,A	1976	EVAL	JU-RR 1/1976	00379
VALKONEN.M	MANY	N,GAMMA	1976	EVAL	JU-RR 1/1976	00379
VALKONEN.M	MANY	N,P	1976	EVAL	JU-RR 1/1976	00379
VALKONEN.M	MANY	N,2N	1976	EVAL	JU-RR 1/1976	00379

IVc. Layout with sorting hierarchy : Year of publication, ZA, reaction, type of work, author, reference

YEAR	Z-A	REACTION	TYPE	AUTHOR	REFERENCE	RECID
1958	TE-130	N,GAMMA	EXP	PASECHNIK.M.V	58GENEVE	00468
1958	BA-138	N,GAMMA	EXP	PASECHNIK.M.V	58GENEVE	00468
1958	PR-141	N,GAMMA	EXP	PASECHNIK.M.V	58GENEVE	00468
1958	TA-NAT	N,P	EXP	COLLI.L	NC 7 400	00575
1958	W -NAT	N,INEL	EXP	MACGREGOR.M.H	58PARIS	00475
1958	W -NAT	N,INEL	EXP	MACGREGOR.M.H.	WADC-TN 59-107	00515
1958	W -186	N,GAMMA	EXP	PASECHNIK.M.V	58GENEVE	00468
1958	AU-NAT	N,INEL	EXP	MACGREGOR.M.H	58PARIS	00475
1958	AU-NAT	N,INEL	EXP	MACGREGOR.M.H.	WADC-TN 59-107	00515
1958	AU-NAT	N,P	EXP	COLLI.L	NC 7 400	00575
1958	HG-NAT	N,INEL	EXP	MACGREGOR.M.H	58PARIS	00475
1958	HG-NAT	N,INEL	EXP	MACGREGOR.M.H.	WADC-TN 59-107	00515
1958	TL-NAT	N,TOTAL	EXP	MAZARI.M	58GENEVE	01024
1958	TL-205	N,GAMMA	EXP	PASECHNIK.M.V	58GENEVE	00468
1958	PB-NAT	N,INEL	EXP	MACGREGOR.M.H	58PARIS	00475
1958	PB-NAT	N,INEL	EXP	MACGREGOR.M.H.	WADC-TN 59-107	00515
1958	PB-NAT	N,INEL	EXP	PASECHNIK.M.V	58GENEVE	00472
1958	BI-NAT	N,INEL	EXP	MACGREGOR.M.H	58PARIS	00475
1958	BI-NAT	N,INEL	EXP	MACGREGOR.M.H.	WADC-TN 59-107	00515
1958	BI-NAT	N,INEL	EXP	PASECHNIK.M.V	58GENEVE	00472
1959	LI-NAT	N,GAMMA	EXP	BOSTROM.N.A	NP 48 593	00517
1959	N -014	N,GAMMA	EXP	BOSTROM.N.A	NP 48 593	00518
1959	AL-027	N,GAMMA	EXP	BOSTROM.N.A	NP 48 593	00518
1959	AR-040	N,GAMMA	EXP	BOSTROM.N.A	NP 48 593	00518
1959	SC-045	N,TOTAL	REV	MILLER.P.D	BAP 4 42	01059
1959	V -051	N,TOTAL	REV	MILLER.P.D	BAP 4 42	01059
1959	MN-055	N,GAMMA	EXP	BOSTROM.N.A	NP 48 593	00518
1959	FE-057	N,TOTAL	REV	MILLER.P.D	BAP 4 42	01059
1959	CO-059	N,TOTAL	REV	MILLER.P.D	BAP 4 42	01059
1959	CU-063	N,TOTAL	REV	MILLER.P.D	BAP 4 42	01059
1959	ZN-066	N,TOTAL	REV	MILLER.P.D	BAP 4 42	01059
1959	ZN-068	N,TOTAL	REV	MILLER.P.D	BAP 4 42	01059
1959	GE-070	N,TOTAL	REV	MILLER.P.D	BAP 4 42	01059
1959	GE-072	N,TOTAL	REV	MILLER.P.D	BAP 4 42	01059
1959	GE-074	N,TOTAL	REV	MILLER.P.D	BAP 4 42	01059
1959	GE-076	N,TOTAL	REV	MILLER.P.D	BAP 4 42	01059
1959	Y -NAT	N,GAMMA	EXP	BOSTROM.N.A	NP 48 593	00517
1959	Y -NAT	N,INEL	EXP	BOSTROM.N.A	NP 48 593	00517
1959	Y -089	N,GAMMA	EXP	BOSTROM.N.A	NP 48 593	00518
1959	ZR-NAT	N,ELASTIC	EXP	BOSTROM.N.A	NP 48 593	00518
1959	ZR-NAT	N,GAMMA	EXP	BOSTROM.N.A	NP 48 593	00517
1959	ZR-NAT	N,INEL	EXP	BOSTROM.N.A	NP 48 593	00517
1959	SM-152	N,GAMMA	EXP	LYON.W.S	PR 114 1619	00444
1959	GD-158	N,GAMMA	EXP	LYON.W.S	PR 114 1619	00444
1959	W -186	N,GAMMA	EXP	LYON.W.S	PR 114 1619	00444
1959	OS-190	N,GAMMA	EXP	LYON.W.S	PR 114 1619	00444
1959	IR-191	N,A	EXP	COLEMAN.R.F	PPS 73 215	01543
1959	PT-196	N,A	EXP	COLEMAN.R.F	PPS 73 215	01543
1959	AU-196	N,DECAY	EXP	VAN LIESHOUT.R	PHY 25 703	00830
1959	AU-197	N,A	EXP	COLEMAN.R.F	PPS 73 215	01543
1959	AU-197	N,GAMMA	EXP	LYON.W.S	PR 114 1619	00444
1959	HG-200	N,A	EXP	COLEMAN.R.F	PPS 73 215	01543
1959	HG-202	N,A	EXP	COLEMAN.R.F	PPS 73 215	01543
1959	HG-202	N,GAMMA	EXP	LYON.W.S	PR 114 1619	00444
1959	TL-203	N,A	EXP	COLEMAN.R.F	PPS 73 215	01543

IVd. Layout with sorting hierarchy : Reaction, ZA, year of publication, type of work, author, reference

REACTION	Z-A	YEAR	TYPE	AUTHOR	REFERENCE	RECID
N,2N	U -238	1973	EXP	LANDRUM.J.H	PR/C 8 1938	01371
N,2N	U -238	1974	EXP	FREHAUT.J	CEA-R 4627	01359
N,2N	U -238	1974	EXP	FREHAUT.J	CEA-R 4627	01245
N,2N	U -238	1974	EVAL	AMSTER.H.J	WAPD-B 7-17	00811
N,2N	U -238	1976	EVAL	CANER.M	NSE 59 395	00612
N,2N	U -238	1976	EVAL	CANER.M	NSE 59 395	01477
N,2N	NP-237	1965	COMP	BORMAN.M	NP 65 257	00793
N,2N	NP-237	1973	EXP	LANDRUM.J.H	PR/C 8 1938	01371
N,2N	NP-237	1975	EXP	LINDEKE.K	PR/C 12 1507	00663
N,2N	PU-238	1977	EVAL	CANER.M	ATO 8 2090	00943
N,2N	PU-239	1973	EVAL	KONSHIN.V.A	73KIEV	01272
N,2N	PU-240	1976	EVAL	CANER.M	IA 1325	01465
N,2N	PU-240	1977	EVAL	CANER.M	ATO 8 2090	00943
N,2N	PU-241	1977	EVAL	CANER.M	ATO 8 2090	00943
N,2N	PU-242	1977	EVAL	CANER.M	ATO 8 2090	00943
N,2NISOMR	ZN-070	1976	EXP	HLAVAC.S	ASL 26 64	00591
N,2NISOMR	GE-076	1976	EXP	HLAVAC.S	ASL 26 64	00591
N,2NISOMR	AG-107	1973	EXP	MARCINKOWSKI.A	INR-NO 1464	00170
N,2NISOMR	AG-109	1973	EXP	MARCINKOWSKI.A	INR-NO 1464	00170
N,2NISOMR	PT-198	1976	EXP	HLAVAC.S	ASL 26 64	00591
N,2P	TB-159	1963	EXP	BRAMLITT.E.T	PR 131 2649	00220
N,3N	MANY	1965	EXP	PEARLSTEIN.S	NSE 23 238	00438
N,3N	MANY	1977	EVAL	STEWART.L	LA-UR 77-11981	01610
N,3N	MANY	1977	CODE	AUCHAMPAUGH.G.F	LA-UR 77-1028	00886
N,3N	Y -089	1975	EXP	BAYHURST.B.P	LA-UR 75-307	00705
N,3N	Y -089	1975	EXP	BAYHURST.B.P	PR/C 12 451	01572
N,3N	ZR-090	1975	EXP	BAYHURST.B.P	LA-UR 75-307	00705
N,3N	ZR-090	1975	EXP	BAYHURST.B.P	PR/C 12 451	01572
N,3N	AG-107	1975	EXP	BAYHURST.B.P	LA-UR 75-307	00705
N,3N	AG-107	1975	EXP	BAYHURST.B.P	PR/C 12 451	01572
N,3N	EU-151	1975	EXP	BAYHURST.B.P	LA-UR 75-307	00705
N,3N	EU-151	1975	EXP	BAYHURST.B.P	PR/C 12 451	01573
N,3N	EU-151	1975	EXP	BAYURST.B.P	PR/C 12 451	00369
N,3N	TM-169	1975	EXP	BAYHURST.B.P	LA-UR 75-307	00705
N,3N	LU-175	1975	EXP	BAYHURST.B.P	LA-UR 75-307	00705
N,3N	OS-192	1977	EXP	AUGUSTYNIAK.W	JP/G 3-3 421	00498
N,3N	IR-191	1975	EXP	BAYHURST.B.P	LA-UR 75-307	00705
N,3N	AU-197	1970	EXP	HANKLA.A.K	BAP 15 1372	00941
N,3N	AU-197	1971	EXP	HANKLA.A.K	DA/B 32 2930	00948
N,3N	AU-197	1972	EXP	HANKLA.A.K	NP/A 180 157	00842
N,3N	AU-197	1975	EXP	BAYHURST.B.P	LA-UR 75-307	00705
N,3N	TL-203	1963	EXP	BRAMLITT.E.T	PR 131 2649	00221
N,3N	TL-203	1975	EXP	BAYHURST.B.P	LA-UR 75-307	00705
N,3N	TL-203	1975	EXP	BAYHURST.B.P	PR/C 12 451	01573
N,3N	TL-205	1975	EXP	BAYURST.B.P	PR/C 12 451	00369
N,3N	U -237	1976	EVAL	CANER.M	IA 1325	01465
N,3N	U -238	1974	EXP	FREHAUT.J	CEA-R 4627	01245
N,3N	U -238	1976	EVAL	CANER.M	NSE 59 395	01477
N,3N	U -238	1976	EVAL	CANER.M	NSE 59 395	00612
N,3N	PU-238	1977	EVAL	CANER.M	ATO 8 2090	00943
N,3N	PU-239	1973	EVAL	KONSHIN.V.A	73KIEV	01272
N,3N	PU-240	1976	EVAL	CANER.M	IA 1325	01465
N,3N	PU-240	1977	EVAL	CANER.M	ATO 8 2090	00943
N,3N	PU-241	1977	EVAL	CANER.M	ATO 8 2090	00943
N,3N	PU-242	1977	EVAL	CANER.M	ATO 8 2090	00943

IVe. Layout with sorting hierarchy : Reference, year of publication, ZA, reaction, author, type of work

REFERENCE	YEAR	Z-A	REACTION	AUTHOR	TYPE	RECID	
BNL 50374	1973	XE-130	N,RESINTG	BHAT.M.R	EVAL	01397	
BNL 50374	1973	XE-130	N,2N	BHAT.M.R	EVAL	01397	
BNL 50374	1973	XE-131	N,DECAY	BHAT.M.R	EVAL	01397	
BNL 50374	1973	XE-131	N,ELASTIC	BHAT.M.R	EVAL	01397	
BNL 50374	1973	XE-131	N,GAMMA	BHAT.M.R	EVAL	01397	
BNL 50374	1973	XE-131	N,INEL	BHAT.M.R	EVAL	01397	
BNL 50374	1973	XE-131	N,RESINTG	BHAT.M.R	EVAL	01397	
BNL 50374	1973	XE-131	N,2N	BHAT.M.R	EVAL	01397	
BNL 50374	1973	XE-132	N,DECAY	BHAT.M.R	EVAL	01397	
BNL 50374	1973	XE-132	N,ELASTIC	BHAT.M.R	EVAL	01397	
BNL 50374	1973	XE-132	N,GAMMA	BHAT.M.R	EVAL	01397	
BNL 50374	1973	XE-132	N,INEL	BHAT.M.R	EVAL	01397	
BNL 50374	1973	XE-132	N,RESINTG	BHAT.M.R	EVAL	01397	
BNL 50374	1973	XE-132	N,2N	BHAT.M.R	EVAL	01397	
BNL 50374	1973	XE-134	N,DECAY	BHAT.M.R	EVAL	01397	
BNL 50374	1973	XE-134	N,ELASTIC	BHAT.M.R	EVAL	01397	
BNL 50374	1973	XE-134	N,GAMMA	BHAT.M.R	EVAL	01397	
BNL 50374	1973	XE-134	N,INEL	BHAT.M.R	EVAL	01397	
BNL 50374	1973	XE-134	N,RESINTG	BHAT.M.R	EVAL	01397	
BNL 50374	1973	XE-134	N,2N	BHAT.M.R	EVAL	01397	
BNL 50374	1973	XE-136	N,DECAY	BHAT.M.R	EVAL	01397	
BNL 50374	1973	XE-136	N,ELASTIC	BHAT.M.R	EVAL	01397	
BNL 50374	1973	XE-136	N,GAMMA	BHAT.M.R	EVAL	01397	
BNL 50374	1973	XE-136	N,INEL	BHAT.M.R	EVAL	01397	
BNL 50374	1973	XE-136	N,RESINTG	BHAT.M.R	EVAL	01397	
BNL 50374	1973	XE-136	N,2N	BHAT.M.R	EVAL	01397	
BNL 50387	1973	MANY	N,RESINTG	BHAT.M.R	THEO	01399	
BNL 50435	1974	ZR-090	D,T	GOMES.L.C	EXP	00821	
BNL 50435	1974	ZR-091	D,T	GOMES.L.C	EXP	00821	
BNL 50435	1974	ZR-092	D,T	GOMES.L.C	EXP	00821	
BNL 50435	1974	ZR-094	D,T	GOMES.L.C	EXP	00821	
BNL 50435	1974	ZR-096	D,T	GOMES.L.C	EXP	00821	
BNL-NCS 20406	1975	Y -089	N,GAMMA	MACDANIEL.F.D	EXP	00329	
BNL-NCS 20406	1975	Y -089	N,INEL	MACDANIEL.F.D	EXP	00329	
BNL-NCS 20406	1975	ZR-090	N,GAMMA	MACDANIEL.F.D	EXP	00329	
BNL-NCS 20406	1975	ZR-090	N,INEL	MACDANIEL.F.D	EXP	00329	
BNL-NCS 20406	1975	ZR-092	N,GAMMA	MACDANIEL.F.D	EXP	00329	
BNL-NCS 20406	1975	ZR-092	N,INEL	MACDANIEL.F.D	EXP	00329	
BNL-NCS 20406	1975	MO-092	N,GAMMA	MACDANIEL.F.D	EXP	00329	
BNL-NCS 20406	1975	MO-092	N,INEL	MACDANIEL.F.D	EXP	00329	
BNL-NCS 20406	1975	MO-094	N,GAMMA	MACDANIEL.F.D	EXP	00329	
BNL-NCS 20406	1975	MO-094	N,INEL	MACDANIEL.F.D	EXP	00329	
BNL-NCS 20406	1975	MO-096	N,GAMMA	MACDANIEL.F.D	EXP	00329	
BNL-NCS 20406	1975	MO-096	N,INEL	MACDANIEL.F.D	EXP	00329	
BNL-NCS 20406	1975	MO-098	N,GAMMA	MACDANIEL.F.D	EXP	00329	
BNL-NCS 20406	1975	MO-098	N,INEL	MACDANIEL.F.D	EXP	00329	
BNL-NCS 20406	1975	MO-100	N,GAMMA	MACDANIEL.F.D	EXP	00329	
BNL-NCS 20406	1975	MO-100	N,INEL	MACDANIEL.F.D	EXP	00329	
BNL-TR 545	1973	CR-NAT	N,INEL	SALNIKOV.O.A	EXP	01147	MICROF
BNL-TR 545	1973	NI-NAT	N,INEL	SALNIKOV.O.A	EXP	01147	MICROF
BNL-TR 545	1973	Y -NAT	N,INEL	SALNIKOV.O.A	EXP	01147	MICROF
BNL-TR 545	1973	ZR-NAT	N,INEL	SALNIKOV.O.A	EXP	01147	MICROF
BNL-TR 545	1973	W -NAT	N,INEL	SALNIKOV.O.A	EXP	01147	MICROF
BNWL 1312	1970	MANY	N,A	SIMONS.R.L	EVAL	00347	
BNWL 1312	1970	MANY	N,F	SIMONS.R.L	EVAL	00347	

IVf. Sample of list of references in increasing sorting order

NP/A	91	644	1967
NP/A	93	527	1967
NP/A	94	235	1967
NP/A	97	657	1967
NP/A	98	451	1967
NP/A	118	9	1968
NP/A	118	449	1968
NP/A	122	234	1968
NP/A	131	305	1969
NP/A	132	129	1969
NP/A	137	85	1969
NP/A	139	42	1969
NP/A	157	481	1970
NP/A	172	643	1971
NP/A	180	157	1972
NP/A	185	177	1972
NP/A	185	614	1972
NP/A	190	635	1972
NP/A	201	326	1973
NP/A	204	121	1973
NP/A	205	139	1973
NP/A	206	164	1973
NP/A	208	525	1973
NP/A	209	189	1973
NP/A	209	202	1973
NP/A	218	61	1974
NP/A	218	201	1974
NP/A	222	605	1974
NP/A	223	118	1974

APPENDIX V

List of the program.

```
PL/I OPTIMIZING COMPILER          PNLIBIX:PROCEDURE OPTIONS(MAIN);

                    SOURCE LISTING

  NUMBER LEV NT

     10       0   PNLIBIX:PROCEDURE OPTIONS(MAIN);
                  /*-------------------------------------------------------------*/
                  /*-------------------------------------------------------------*/
                  /*PNLIBIX:PROGRAM SYSTEM FOR:CREATION,UPDATE,CORRECTION,ANALYSIS*/
                  /*EDITION ACCORDING TO VARIOUS SORTING HIERARCHIES OF THE INDEX*/
                  /*OF THE LIBRARY OF THE NUCLEAR PHYSICS LABORATORY AT BRUYERES-LE-*/
                  /*CHATEL*/
                  /* PROGRAM WRITTEN BY ALOIS SCHETT, 1978 */
                  /* ORIGINAL VERSION IN  DOS  LATER ADOPTED FOR  OS  AND MODIFIED */
                  /* FOR TAKING INTO ACCOUNT A REFORMATTED BIB-RECORD AND NEWLY */
                  /* REQUESTED LAYOUTS  */
                  /*-------------------------------------------------------------*/
                  /*-------------------------------------------------------------*/
    140    1  0   DCL PCDFILE FILE RECORD OUTPUT SEQUENTIAL;
    150    1  0   DCL DFILEP FILE RECORD INPUT SEQUENTIAL;
    160    1  0   DCL DFILER FILE RECORD OUTPUT SEQUENTIAL;
    170    1  0   OPEN FILE(PCDFILE);
    180    1  0   DCL (PCN,PCER) CHAR(80),PCHREC CHAR(90),ERRTYPE CHAR(20);
    190    1  0   DCL MTITLE1 CHAR(54),MTITLE2 CHAR(51), RCSTR CHAR(5),
                  RCOUNT PIC'99999';
    210    1  0   DCL (SUBSTR,INDEX,PLISRTA,VERIFY) BUILTIN;
    220    1  0   DCL SBL CHAR(1) INIT(' ');
    230    1  0   DCL BS CHAR(15) INIT((15)' ');
    240    1  0   DCL (RC,RV,RP) FIXED;
    250    1  0   DCL PRINTF FILE STREAM OUTPUT PRINT;
    260    1  0   DCL PREC CHAR(90), R(53) CHAR(90), (N,NN,M) FIXED;
    270    1  0   DCL PAGEN FIXED;
    280    1  0   DCL REFED CHAR(18);
    290    1  0   DCL TRECLA CHAR(80);
    300    1  0   DCL RETIQ CHAR(23);
    310    1  0   DCL OPTR CHAR(80);
    320    1  0   DCL FATERR CHAR(1) INIT(' ');
    330    1  0   DCL BR CHAR(1);
                  /*-----------------------------------------------------------*/
                  /*                +++ INPUT FILE MERGE PHASE +++                 */
                  /*-----------------------------------------------------------*/
    370    1  0   UPDLBIX:PROCEDURE;
                  /*UPDLBIX: UPDATE LIBRARY INDEX */
                  /*THIS SUBROUTINE CREATES AN UPDATED FILE OF THE PN-LIBRARY INDEX*/
                  /*ON DISC, EACH RECORD IS NUMBERED*/
                  /*UPDATE:CORRECTIONS AND/OR DELETION AND/OR ADDITION OF RECORDS*/
    420    2  0   DCL CFILE FILE RECORD INPUT SEQUENTIAL,
                  TFILE FILE RECORD INPUT SEQUENTIAL,
                  DFILEA FILE RECORD OUTPUT SEQUENTIAL;
    450    2  0   DCL (TREC,CRECI) CHAR(90), CREC CHAR(80);
    460    2  0   OPEN FILE(CFILE),FILE(DFILEA),FILE(TFILE);
    470    2  0   ON ENDFILE(TFILE) GO TO COPYCF;
    480    2  0   ON ENDFILE(CFILE) GO TO EOCF;
    490    2  0   RCOUNT=0;  /*INIT FOR FIRST RECORD*/
    500    2  0   READ FILE(CFILE) INTO(OPTR);
                  /*PUT OPTION=1 IF PRINTING WANTED ELSE =0  */
```

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PL/I OPTIMIZING COMPILER          PNLIBIX:PROCEDURE OPTIONS(MAIN);

  NUMBER LEV NT

     520   2  0   IF SUBSTR(OPTR,1,8)¬='OPTIONS:' THEN DO;
     530   2  1   PUT SKIP EDIT('OPTION CARD FOR EDITIONS MISSING SHOULD BE 1ST CARD')
     540   2  1   (A);GO TO EOJ;END;
     550   2  0   READCF:READ FILE(CFILE) INTO(CREC);
     560   2  0   IF SUBSTR(CREC,1,13)='FIRSTCREATION' THEN DO;
     570   2  1   PUT SKIP EDIT('FIRST CREATION') (A);GO TO COPYCF;END;
     580   2  0   IF SUBSTR(CREC,1,1)='+' THEN GO TO READTF;
     590   2  0   IF SUBSTR(CREC,1,1)¬='+' THEN GO TO COPYTF;
     600   2  0   READTF:READ FILE(TFILE) INTO(TREC);
     610   2  0   PUT SKIP EDIT(TREC,' ANCIENT') (A(90),A);
     620   2  0   IF SUBSTR(TREC,81,5)<SUBSTR(CREC,2,5) THEN DO;
     630   2  1   WRITE FILE(DFILEA) FROM(TREC);GO TO READTF;END;
     640   2  0   IF SUBSTR(TREC,81,5)=SUBSTR(CREC,2,5) THEN DO;
     650   2  1   IF SUBSTR(CREC,7,1)='D' THEN DO;PUT EDIT(' SUPPRIME') (A);
     660   2  2   GO TO READCF;END;
     670   2  1   RCSTR =SUBSTR(CREC,2,5); CALL BLS;
     680   2  1   READ FILE(CFILE) INTO(CREC);CRECI=CREC||RCOUNT||'      ';
     690   2  1   WRITE FILE(DFILEA) FROM(CRECI);
     700   2  1   PUT SKIP EDIT(CRECI,' MODIFIE') (A(90),A);
     710   2  1   GO TO READCF;END;
     720   2  0   IF SUBSTR(TREC,81,5)>SUBSTR(CREC,2,5) THEN DO;
     730   2  1   PUT SKIP EDIT(CREC,'RECORDS FOR CORRECTIONS OUT OF SEQUENCE')
                  (A(80),A);
     750   2  1   FATERR='1'; END;
     760   2  0   COPYTF:READ FILE(TFILE) INTO(TREC);RCSTR =SUBSTR(TREC,81,5);CALL BLS;
     770   2  0   PUT SKIP EDIT(TREC,' ANCIEN') (A(90),A);
     780   2  0   WRITE FILE(DFILEA) FROM(TREC);GO TO COPYTF;
     790   2  0   COPYCF:READ FILE(CFILE) INTO(CREC);RCOUNT=RCOUNT+1;CRECI=
     800   2  0   CREC||RCOUNT||'      ';WRITE FILE(DFILEA) FROM(CRECI);
     810   2  0   PUT SKIP EDIT(CRECI ,'ADDITION') (A(90),A);
     820   2  0   GO TO COPYCF;
     830   2  0   EOCF:CLOSE FILE(TFILE),FILE(DFILEA);RETURN;END UPDLBIX;
     840   1  0   BLS:PROCEDURE;
     850   2  0   DCL (S,SS) FIXED;S=0;
     860   2  0   CSL:SS=INDEX(SUBSTR(RCSTR,1+S,5-S),SBL);
     870   2  0   IF SS>0 THEN DO;S=S+SS;GO TO CSL;END;
     880   2  0   IF SS<1 THEN RCOUNT=SUBSTR(RCSTR,1+S,5-S);RETURN;END BLS;
     890   1  0   UPDCF:PROCEDURE;
                  /*UPDCF: UPDATE PHASE COPY FILE*/
                  /*THIS SUBROUTINE COPIES THE UPDATED FILE ON DISC ONTO TAPE*/
                  /*=PACKUP USED AS INPUT FOR NEXT UPDATE*/
     930   2  0   DCL DFILEB FILE RECORD INPUT SEQUENTIAL;
     940   2  0   DCL TFILES FILE RECORD OUTPUT SEQUENTIAL;
     950   2  0   DCL DREC CHAR(90);
     960   2  0   OPEN FILE(DFILEB),FILE(TFILES);
     970   2  0   ON ENDFILE(DFILEB) GO TO EOCF;
     980   2  0   COPYDF:READ FILE(DFILEB) INTO(DREC);
     990   2  0   WRITE FILE(TFILES) FROM(DREC);GO TO COPYDF;
    1000   2  0   EOCF:CLOSE FILE(TFILES),FILE(DFILEB);RETURN;END UPDCF;
    1010   1  0   FFFCRCH:PROCEDURE;
                  /*-------------------------------------------------------------*/
                  /*                +++ FILE ANALYSIS PHASE +++                  */
                  /*-------------------------------------------------------------*/
                  /*FFFCRCH: FIXED FIELD FILE CREATION AND CHECK */
```

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PL/I OPTIMIZING COMPILER          PNLIBIX:PROCEDURE OPTIONS(MAIN);

  NUMBER LEV NT

                  /*THIS SUBROUTINE ASSIGNS TO EACH VARIABLE A FIXED FIELD AND MAKES*/
                  /*A SERIES OF CHECKS ON THE LOGIC AND THE CONTENT OF THE RECORDS*/
                  /* THE VARIABLES ARE STORED IN THE FOLLOWING SEQUENCE:Z,A,Q,*/
                  /*WORK TYPE,REFERENCE,YEAR,AUTHOR*/
   1100   2  0    DCL DFILEC FILE RECORD INPUT SEQUENTIAL,
                  DFILEFF FILE RECORD OUTPUT SEQUENTIAL;
   1120   2  0    DCL (I,J,KP,KCPO,H,K,KK,L) FIXED, (Q(30),Z(200),A(200)) PIC'999';
   1130   2  0    DCL ZQ CHAR(6), SCH CHAR(1) INIT('.'), (ZCH,QCH) CHAR(3);
   1140   2  0    DCL ZS(110) CHAR(6) INIT('001H -','002HE-','003LI-','004BE-','005B -',
                  '006C -','007N -','008O -','009F -','010NE-','011NA-','012MG-',
                  '013AL-','014SI-','015P -','016S -','017CL-','018AR-','019K -',
                  '020CA-','021SC-','022TI-','023V -','024CR-','025MN-','026FE-',
                  '027CO-','028NI-','029CU-','030ZN-','031GA-','032GE-','033AS-',
                  '034SE-','035BR-','036KR-','037RB-','038SR-','039Y -','040ZR-',
                  '041NB-','042MO-','043TC-','044RU-','045RH-','046PD-','047AG-',
                  '048CD-','049IN-','050SN-','051SB-','052TE-','053I -','054XE-',
                  '055CS-','056BA-','057LA-','058CE-','059PR-','060ND-','061PM-',
                  '062SM-','063EU-','064GD-','065TB-','066DY-','067HO-','068ER-',
                  '069TM-','070YB-','071LU-','072HF-','073TA-','074W -','075RE-',
                  '076OS-','077IR-','078PT-','079AU-','080HG-','081TL-','082PB-',
                  '083BI-','084PO-','085AT-','086RN-','087FR-','088RA-','089AC-',
                  '090TH-','091PA-','092U -','093NP-','094PU-','095AM-','096CM-',
                  '097BK-','098CF-','099ES-','100FM-','101MD-','102NO-','103LR-',
                  '104KU-','105105','106106','107107','108108','109109','110110');
   1300   2  0    DCL QS(999) CHAR(11);
   1310   2  0    OPEN FILE(DFILEC),FILE(DFILEFF);
   1320   2  0    ON ENDFILE(DFILEC) GO TO EOFFFCR;
   1330   2  0    ON CONVERSION GO TO CONVERR;
   1340   2  0    DCL DREC CHAR(90),1 DRECFF,2 P CHAR(6),2 W CHAR(3),2 F CHAR(11),
                  2 WT CHAR(6),2 REF CHAR(24),2 Y CHAR(4),2 AUTH CHAR(20),
                  2 RECID CHAR(5), 2 PID CHAR(2),2 RMOD CHAR(7),2 BLA CHAR(2);
   1370   2  0    DCL WTREC CHAR(36) INIT('01EXP 02THE03EVAL04EXTH05COMP06CODE');
                  /*TABLE OF QUANTITY CODES + EXPLANATORY TEXT*/
   1390   2  0    QS=(11)' ';
   1400   2  0    QS(1)='001,TOTAL  ';QS(2)='002,ELASTIC';QS(3)='003,NONEL  ';
   1410   2  0    QS(4)='004,INEL   ';QS(6)= '006,2N     ';QS(16)='016,2N     ';
   1420   2  0    QS(17)='017,3N     ';QS(18)='018,F TOTAL';QS(19)='019,F      ';
   1430   2  0    QS(20)='020,NF     ';QS(21)='021,2NF    ';QS(22)='022,NA     ';
   1440   2  0    QS(23)='023,N3A    ';QS(24)='024,2NA    ';QS(25)='025,3NA    ';
   1450   2  0                                             QS(26)='026,2NISOMR';
   1460   2  0    QS(27)='027,ABSORPN';QS(28)='028,NP     ';QS(29)='029,N2A    ';
   1470   2  0    QS(30)='030,2N2A   ';QS(31)='031,GAMMAS ';QS(32)='032,ND     ';
   1480   2  0    QS(33)='033,NT     ';QS(34)='034,NHE-3  ';QS(35)='035,ND2A   ';
   1490   2  0    QS(36)='036,NT2A   ';QS(37)='037,4N     ';QS(38)='038,3NF    ';
   1500   2  0    QS(39)='039,INTCONV';QS(40)='040,PAIRPRO';QS(51)='051,INEL   ';
   1510   2  0    QS(101)='101,DISAP  ';QS(102)='102,GAMMA  ';QS(103)='103,P      ';
   1520   2  0    QS(104)='104,D      ';QS(105)='105,T      ';QS(106)='106,HE-3   ';
   1530   2  0    QS(107)='107,A      ';QS(108)='108,2A     ';QS(109)='109,3A     ';
   1540   2  0    QS(111)='111,2P     ';QS(112)='112,PA     ';QS(113)='113,T2A    ';
   1550   2  0    QS(114)='114,D2A    ';QS(120)='120,NONEL- ';QS(151)='151,RESINTG';
   1560   2  0    QS(251)='251, <COS> ';QS(252)='252, XI    ';QS(452)='452,NU-TOT ';
   1570   2  0    QS(453)='453,NUC-PRO';QS(454)='454,FISYILD';QS(455)='455,NU-DLAY';
   1580   2  0    QS(456)='456,NUPROMP';QS(457)='457,DECAY  ';QS(501)='501,TOTAL  ';
   1590   2  0    QS(500)='500,SEVERAL';
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PL/I OPTIMIZING COMPILER          PNLIBIX:PROCEDURE OPTIONS(MAIN);

  NUMBER LEV NT

    1600   2  0   QS(502)='502,COHERNT';QS(504)='504,INCOHRT';QS(515)='515,PAIRPRO';
    1610   2  0   QS(516)='516,PAIRPRO';QS(517)='517,PAIRPRO';QS(518)='518,FISSION';
    1620   2  0   QS(532)='532,N       ';QS(533)='533,TOTAL  ';QS(602)='602,ELECTRC';
    1630   2  0   QS(10)='010,4<N     ';QS(11)='011,DOSIMET';QS(41)='041,INTMEAS';
    1640   2  0   QS(115)='115,NXGAMMA';QS(153)='153,GIANTRS' ;QS(458)='458,OPTMODL';
    1650   2  0   QS(460)='460,MONTECA';QS(459)='459,MULTIGR';QS(519)='519,CHARGED';
    1660   2  0   QS(520)='520,GAMMAPR';QS(521)='521,FUSION ';QS(522)='522,X-SECT ';
    1670   2  0   QS(523)='523,STANDRD';QS(524)='524,SPECTR ';
    1680   2  0   QS(110)='110,G FISS ';QS(800)='800,S-FUNCT';QS(801)='801,INSTRUM';
    1690   2  0   QS(802)='802,NUCDATA';QS(803)='803,LEVELS ';
    1700   2  0   QS(99)='099,*******';QS(804)='804,REACTOR';QS(805)='805,ANG DST';
    1710   2  0   QS(806)='806,HEAVION';QS(461)='461,EMTRANS';
                  /*NEW REFERENCE BLOCK */
    1730   2  0   READDFR:READ FILE(DFILEC) INTO(DREC);Q=0;Z=0;A=0;
    1740   2  0   RMOD=(7)' ';
    1750   2  0   RECID=SUBSTR(DREC,81,5);
    1760   2  0   AUTH=SUBSTR(DREC,1,20);REF=SUBSTR(DREC,21,24);Y=SUBSTR(DREC,45,4);
    1770   2  0   PID=SUBSTR(DREC,53,2);IF PID='  ' THEN PID=' N';
    1780   2  0   IF SUBSTR(DREC,55,1)='M' THEN RMOD='MICROFI';
                   /*BIBLIOGRAPHIC INFORMATION TEST*/
    1800   2  0   IF AUTH=(20)' ' THEN DO;PUT SKIP EDIT(DREC,' AUTHOR MISSING')
                  (A(90),A);
    1820   2  1   PCHREC=DREC;ERRTYPE='AUTHOR MISSING';CALL PUNCHER;END;
    1830   2  0   IF REF=(24)' ' THEN DO;PUT SKIP EDIT(DREC,' REFERENCE MISSING')
                  (A(90),A);
    1850   2  1   PCHREC=DREC;ERRTYPE='REFERENCE MISSING';CALL PUNCHER;END;
    1860   2  0   IF Y=(4)' ' THEN DO;PUT SKIP EDIT(DREC,' YEAR MISSING') (A(90),A);
    1870   2  1   PCHREC=DREC;ERRTYPE='YEAR MISSING';CALL PUNCHER;END;
    1880   2  0   WT=(6)' ';
    1890   2  0   IF INDEX(WTREC,SUBSTR(DREC,51,2))<1 THEN DO;
    1900   2  1                      PUT SKIP EDIT(DREC,' WORK TYPE MISS') (A(90),A);
    1910   2  1   PCHREC=DREC;ERRTYPE='WORK TYPE ERR ';CALL PUNCHER;GO TO READDFZ;END;
    1920   2  0   WT=SUBSTR(WTREC,INDEX(WTREC,SUBSTR(DREC,51,2)),6);
                    /*ZAQ-BLOCK*/
    1940   2  0   READDFZ:READ FILE(DFILEC) INTO(DREC);
    1950   2  0   KCPO=1;I=1;J=1;
    1960   2  0   ZAQFS:KP=INDEX(SUBSTR(DREC,KCPO,81-KCPO),SCH);
                    /*TEST:ZAQ-FIELD EMPTY?*/
    1980   2  0   IF KP<1 THEN DO;PUT SKIP EDIT(DREC,' ZAQ-FIELD EMPTY') (A(90),A);
    1990   2  1   PUT EDIT('***FATAL ERROR ?') (A);FATERR='1';
    2000   2  1   PCHREC=DREC;ERRTYPE='ZAQ-FIELD EMPTY';CALL PUNCHER;
    2010   2  1   GO TO READDFZ;END;
    2020   2  0   ZQ=SUBSTR(DREC,KCPO,KP-1);IF KP-1> 0 THEN IF KP-1<4 THEN DO;
    2030   2  1   Q(I)=ZQ;I=I+1;END;IF KP-1>4 THEN IF KP-1<6 THEN DO;
    2040   2  1   Z(J)=SUBSTR(ZQ,1,2); A(J)=SUBSTR(ZQ,3,3);J=J+1;END;
    2050   2  0   IF KP-1 >5 THEN IF KP-1<7 THEN DO;Z(J)=SUBSTR(ZQ,1,3);A(J)=
    2060   2  1   SUBSTR(ZQ,4,3);J=J+1;END;
                  /*TEST:ZAQ-FIELD LENGTH CORRECT?*/
    2080   2  0   IF KP-1>3 THEN IF KP-1<5 THEN DO;
    2090   2  1   PUT SKIP EDIT(DREC,' ZAQ-FIELD= 4 CHAR')
                  (A(90),A);
    2110   2  1   PUT EDIT('***FATAL ERROR ?') (A);FATERR='1';
    2120   2  1            PCHREC=DREC;ERRTYPE='ZAQ-FIELD=4 CHAR';CALL PUNCHER;END;
    2130   2  0   IF KP-1>6 THEN DO;PUT SKIP EDIT(DREC,' ZAQ-FIELD>6 CHAR') (A(90),A);
```

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PL/I OPTIMIZING COMPILER          PNLIBIX:PROCEDURE OPTIONS(MAIN);

  NUMBER LEV NT

    2140   2  1   PUT EDIT('***FATAL ERROR ?') (A);FATERR='1';
    2150   2  1   PCHREC=DREC;ERRTYPE='ZAQ-FIELD>6 CHAR';CALL PUNCHER;END;
    2160   2  0   KCPO=KCPO+KP;
                   /*TEST:TERMINATION OF ZAQ-GROUP*/
    2180   2  0   IF SUBSTR(DREC,KCPO,1)='/' THEN DO;
    2190   2  1   DO L=1 TO J-1;
    2200   2  2   KK=0;K=0;ZCH=Z(L);IF SUBSTR(ZCH,1,2)='  ' THEN
    2210   2  2   ZCH='00'||SUBSTR(ZCH,3,1);IF SUBSTR(ZCH,1,1)=' ' THEN
    2220   2  2   ZCH='0'||SUBSTR(ZCH,2,2);
    2230   2  2   ZSRL:IF Z(L)>KK THEN IF Z(L) <KK+11 THEN GO TO ZSL;
    2240   2  2   IF Z(L)=0 THEN GO TO ZSL;
    2250   2  2   KK=KK+10;K=KK;IF KK+10>110 THEN DO;PUT SKIP EDIT(DREC,' Z-ERROR')
                  (A(90),A);
    2270   2  3   PUT EDIT('***FATAL ERROR ?') (A);FATERR='1';
    2280   2  3                    PCHREC=DREC;ERRTYPE='Z-ERROR';CALL PUNCHER;
    2290   2  3   GO TO QTL;END;GO TO ZSRL;
    2300   2  2   ZSL:K=K+1;
    2310   2  2   IF Z(L)=0 THEN IF A(L)=999 THEN DO;P='******';W='***';GO TO QTL;END;
    2320   2  2   IF Z(L)=0 THEN IF A(L)=0 THEN DO;P='   MAN';W='Y  ';GO TO QTL;END;
    2330   2  2   IF Z(L)=0 THEN IF A(L)>0 THEN DO;P='   Z- ';W=A(L); GO TO QTL;END;
    2340   2  2             IF ZCH=SUBSTR(ZS(K),1,3) THEN DO;P=ZS(K); W=A(L);
    2350   2  3   IF W<'001' THEN W='NAT';
    2360   2  3   IF W>'280' THEN IF W¬='***' THEN DO;
    2370   2  4                     PUT SKIP EDIT(DREC,'A>280') (A(90),A);
    2380   2  4   PCHREC=DREC;ERRTYPE='A-ERROR?';CALL PUNCHER;END;
    2390   2  3   GO TO QTL;END;IF K>KK+11 THEN GO TO QTL;GO TO ZSL;
    2400   2  2   QTL:DO H=1 TO I-1;       KK=0;K=0;
    2410   2  3   QCH=Q(H);IF SUBSTR(QCH,1,2)='  ' THEN QCH='00'||SUBSTR(QCH,3,1);
    2420   2  3   IF SUBSTR(QCH,1,1)=' ' THEN QCH='0'||SUBSTR(QCH,2,2);
    2430   2  3   QSRL:IF Q(H)>KK THEN IF Q(H)<KK+11 THEN GO TO QSL;
    2440   2  3   KK=KK+10;K=KK;IF KK+10>999 THEN DO;
    2450   2  4   PUT SKIP EDIT(DREC,'Q-ERROR') (A(90),A);
    2460   2  4   PUT EDIT('***FATAL ERROR ?') (A);FATERR='1';
    2470   2  4   PCHREC=DREC;ERRTYPE='Q-ERROR';CALL PUNCHER;GO TO WFFR;END;
    2480   2  3   GO TO QSRL;
    2490   2  3   QSL:K=K+1;IF QCH=SUBSTR(QS(K),1,3) THEN DO;F=QS(K);
    2500   2  4   GO TO WFFR;END;
    2510   2  3   IF K>KK+11 THEN GO TO WFFR;GO TO QSL;
    2520   2  3   WFFR:
                  IF RECID<00060 THEN PUT SKIP
                  EDIT(P||W||F||WT||REF||Y||AUTH||RECID||PID||RMOD||BLA) (A(90));
    2550   2  3       WRITE FILE(DFILEFF) FROM(DRECFF);END;END;
                  /*END OF:L LOOP, H LOOP*/
    2570   2  1   I=1;J=1;KCPO=KCPO+1;END;
                  /*END OF SLASH LOOP*/
    2590   2  0   IF SUBSTR(DREC,KCPO-1,1)='.' THEN IF SUBSTR(DREC,KCPO,1)¬='*'
                  THEN IF SUBSTR(DREC,KCPO,1)¬=' ' THEN GO TO ZAQFS;
    2610   2  0   IF SUBSTR(DREC,KCPO-1,2)='. ' THEN DO;KCPO=1;READ FILE(DFILEC)
    2620   2  1   INTO(DREC);GO TO ZAQFS;END;
    2630   2  0   IF SUBSTR(DREC,KCPO,1)¬='*' THEN IF SUBSTR(DREC,KCPO-1,1)='/' THEN
    2640   2  1   IF SUBSTR(DREC,KCPO,1)¬=' ' THEN DO;I=1;J=1;GO TO ZAQFS;END;
    2650   2  0   IF SUBSTR(DREC,KCPO-2,3)='./ ' THEN GO TO READDFZ;
    2660   2  0   IF SUBSTR(DREC,KCPO-1,2)='/*' THEN GO TO READDFR;
                   /*TEST:INPUT RECORDS IN GOOD ORDER ?*/
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PL/I OPTIMIZING COMPILER          PNLIBIX:PROCEDURE OPTIONS(MAIN);

  NUMBER LEV NT

    2680   2  0   CONVERR:PUT SKIP EDIT(DREC,' CONVERSION ERROR') (A(90),A);
    2690   2  0   PUT EDIT('***FATAL ERROR ?') (A);FATERR='1';
    2700   2  0   GO TO READDFR;
    2710   2  0   EOFFFCR:CLOSE FILE(DFILEC),FILE(DFILEFF);RETURN;END FFFCRCH;
                  /*-------------------------------------------------------------*/
                  /*                +++ FILE LAYOUT PHASE +++                    */
                  /*-------------------------------------------------------------*/
    2750   1  0   PUNCHER:PROCEDURE;
                  /*PUNCHER: PUNCH INCORRECT RECORDS*/
                  /*THIS SUBROUTINE PUNCHES THE ACCESSION NUMBER WITH INDICATION*/
                  /*OF THE KIND OF THE ERROR (1-RST CARD PUNCHED) AND THE CONTENT*/
                  /*OF THE ERRONEOUS RECORD (2-ND CARD PUNCHED) */
    2800   2  0   PCN='+'||SUBSTR(PCHREC,81,5)||' '||ERRTYPE||(53)' ';
    2810   2  0   WRITE FILE(PCDFILE) FROM(PCN);
    2820   2  0   PCER=SUBSTR(PCHREC,1,80);
    2830   2  0   WRITE FILE(PCDFILE) FROM(PCER);
    2840   2  0   RETURN;END PUNCHER;
                  /*LAYOUT:LAYOUT OF THE PN-INDEX */
    2860   1  0   LAYOUT:PROCEDURE;
                  /*PRINT TITLE OF TABLE  */
    2880   2  0           PUT FILE(PRINTF) PAGE;
    2890   2  0   PUT FILE(PRINTF) SKIP EDIT(MTITLE1) (LINE(20),COLUMN(10),A(54));
    2900   2  0   PUT FILE(PRINTF) SKIP EDIT(MTITLE2) (COLUMN(10),A(51));
    2910   2  0   PUT FILE(PRINTF) SKIP EDIT((54)'*')  (COLUMN(10),A(54));
    2920   2  0   CLOSE FILE(PRINTF);
    2930   2  0   RETURN;END LAYOUT;
    2940   1  0   LAYZA:PROCEDURE;
                  /*PRINT ZAQ SORTED TABLE AND SAVE THIS FILE */
    2960   2  0   DCL TFILEZA FILE RECORD OUTPUT SEQUENTIAL;
    2970   2  0   OPEN FILE(PRINTF) LINESIZE(132) PAGESIZE(59);
    2980   2  0   OPEN FILE(DFILEP),FILE(TFILEZA);
    2990   2  0   ON ENDFILE(DFILEP) GO TO EOD;
    3000   2  0   ON ENDPAGE(PRINTF) GO TO BRZA;
    3010   2  0   PAGEN=0;
    3020   2  0   BR='0';
    3030   2  0   BRZA: IF PAGEN>0 THEN BR='1';
    3040   2  0   READDFP:
                          PUT FILE(PRINTF) PAGE;
    3060   2  0   PAGEN=PAGEN+1;
    3070   2  0   PUT FILE(PRINTF) EDIT('PAGE=',PAGEN) (COLUMN(65),A,F(3));
    3080   2  0   PUT FILE(PRINTF) SKIP(2) EDIT('Z-A' ,'REACTION','ANNEE','TYPE',
                  'AUTEUR','REFERENCE','BLKNO')
                  (A,X(4),A,X(3),A,X(1),A,X(1),A,X(14),A,X(9),A);
    3110   2  0   PUT FILE(PRINTF) SKIP;
    3120   2  0   IF BR='1' THEN DO;BR='0';GO TO BRZAA;END;
    3130   2  0   NEWTAB:
                              READ FILE(DFILEP) INTO(PREC);
    3150   2  0   RC=INDEX(SUBSTR(PREC,27,15),SBL);RP=VERIFY(SUBSTR(PREC,42,9),BS);
    3160   2  0   RV=VERIFY(SUBSTR(PREC,26+RC,16-RC),BS);
    3170   2  0   IF RV>0 THEN
                  REFED=SUBSTR(PREC,27,RC)||
                  ' '||SUBSTR(PREC,25+RC+RV,17-RC-RV)||' '||SUBSTR(PREC,41+RP,10-RP);
    3200   2  0   IF RV<1 THEN REFED=SUBSTR(PREC,27,RC)||' '||SUBSTR(PREC,41+RP,10-RP);
    3210   2  0   TRECLA =SUBSTR(PREC,4,6)||' '||SUBSTR(PREC,80,2)||SUBSTR(PREC,13,8)||
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PL/I OPTIMIZING COMPILER          PNLIBIX:PROCEDURE OPTIONS(MAIN);

  NUMBER LEV NT

                    ' '||
                    SUBSTR(PREC,51,4)||'  '||SUBSTR(PREC,23,4)||' '||SUBSTR(PREC,55,20)||
                    REFED||SUBSTR(PREC,75,5)||' '||SUBSTR(PREC,82,7);
   3250   2  0      BRZAA:
                    PUT FILE(PRINTF) SKIP EDIT(TRECLA) (A(80));
   3270   2  0      WRITE FILE(TFILEZA) FROM(TRECLA);
   3280   2  0      GO TO NEWTAB;
   3290   2  0      EOD:   CLOSE FILE(DFILEP),FILE(TFILEZA),FILE(PRINTF);
   3300   2  0      RETURN;END LAYZA;
   3310   1  0      LAYAU:PROCEDURE;
                    /*PRINT AUTHOR,ZAQ SORTED FILE AND SAVE THIS FILE */
   3330   2  0      DCL TFILEAU FILE RECORD OUTPUT SEQUENTIAL;
   3340   2  0      OPEN FILE(PRINTF) LINESIZE(132) PAGESIZE(59);
   3350   2  0      OPEN FILE(DFILEP),FILE(TFILEAU);
   3360   2  0      ON ENDFILE(DFILEP) GO TO EOD;
   3370   2  0      ON ENDPAGE(PRINTF) GO TO BRAU;
   3380   2  0      PAGEN=0;
   3390   2  0      BR='0';
   3400   2  0      BRAU: IF PAGEN>0 THEN BR='1';
   3410   2  0      READDFP:
                            PUT FILE(PRINTF) PAGE;
   3430   2  0      PAGEN=PAGEN+1;
   3440   2  0      PUT FILE(PRINTF) EDIT('PAGE=',PAGEN) (COLUMN(65),A,F(3));
   3450   2  0      PUT FILE(PRINTF) SKIP(2) EDIT('AUTEUR','Z-A','REACTION','ANNEE',
                    'TYPE','REFERENCE','BLKNO') (A,X(14),A,X(4),A,X(3),A,X(1),A,X(1),
                    A,X(9),A);
   3480   2  0      PUT FILE(PRINTF) SKIP;
   3490   2  0      IF BR='1' THEN DO;BR='0';GO TO BRAUT;END;
   3500   2  0      NEWTAB:
                            READ FILE(DFILEP) INTO(PREC);
   3520   2  0      RC=INDEX(SUBSTR(PREC,27,15),SBL);RP=VERIFY(SUBSTR(PREC,42,9),BS);
   3530   2  0      RV=VERIFY(SUBSTR(PREC,26+RC,16-RC),BS);
   3540   2  0      IF RV>0 THEN
                    REFED=SUBSTR(PREC,27,RC)||
                    ' '||SUBSTR(PREC,25+RC+RV,17-RC-RV)||' '||SUBSTR(PREC,41+RP,10-RP);
   3570   2  0      IF RV<1 THEN REFED=SUBSTR(PREC,27,RC)||' '||SUBSTR(PREC,41+RP,10-RP);
   3580   2  0      TRECLA=SUBSTR(PREC,55,20)||     SUBSTR(PREC,4,6)||' '||
                    SUBSTR(PREC,80,2)||SUBSTR(PREC,13,8)||' '||SUBSTR(PREC,51,4)||'  '||
                    SUBSTR(PREC,23,4)||' '||REFED||SUBSTR(PREC,75,5)||' '||
                    SUBSTR(PREC,82,7);
   3620   2  0      BRAUT:
                    PUT FILE(PRINTF) SKIP EDIT(TRECLA) (A(80));
   3640   2  0      WRITE FILE(TFILEAU) FROM(TRECLA);
   3650   2  0      GO TO NEWTAB;
   3660   2  0      EOD:   CLOSE FILE(DFILEP),FILE(TFILEAU),FILE(PRINTF);
   3670   2  0      RETURN;END LAYAU;
   3680   1  0      LAYY:PROCEDURE;
                    /*PRINT YEAR,ZAQ SORTED FILE  */
   3700   2  0      OPEN FILE(PRINTF) LINESIZE(132) PAGESIZE(59);
   3710   2  0      OPEN FILE(DFILEP);
   3720   2  0      ON ENDFILE(DFILEP) GO TO EOD;
   3730   2  0      ON ENDPAGE(PRINTF) GO TO BRYE;
   3740   2  0      PAGEN=0;
   3750   2  0      BR='0';
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PL/I OPTIMIZING COMPILER          PNLIBIX:PROCEDURE OPTIONS(MAIN);

  NUMBER LEV NT

    3760   2  0   BRYE: IF PAGEN>0 THEN BR='1';
    3770   2  0   READDFP:
                          PUT FILE(PRINTF) PAGE;
    3790   2  0   PAGEN=PAGEN+1;
    3800   2  0   PUT FILE(PRINTF) EDIT('PAGE=',PAGEN) (COLUMN(65),A,F(3));
    3810   2  0   PUT FILE(PRINTF) SKIP(2) EDIT('ANNEE','Z-A','REACTION','TYPE',
                  'AUTEUR','REFERENCE','BLKNO')
                  (A,X(1),A,X(4),A,X(3),A,X(1),A,X(14),A,X(9),A);
    3840   2  0   PUT FILE(PRINTF) SKIP;
    3850   2  0   IF BR='1' THEN DO;BR='0';GO TO BRYEA;END;
    3860   2  0   NEWTAB:
                            READ FILE(DFILEP) INTO(PREC);
    3880   2  0   RC=INDEX(SUBSTR(PREC,27,15),SBL);RP=VERIFY(SUBSTR(PREC,42,9),BS);
    3890   2  0   RV=VERIFY(SUBSTR(PREC,26+RC,16-RC),BS);
    3900   2  0   IF RV>0 THEN
                  REFED=SUBSTR(PREC,27,RC)||
                  ' '||SUBSTR(PREC,25+RC+RV,17-RC-RV)||' '||SUBSTR(PREC,41+RP,10-RP);
    3930   2  0   IF RV<1 THEN REFED=SUBSTR(PREC,27,RC)||' '||SUBSTR(PREC,41+RP,10-RP);
    3940   2  0   TRECLA=SUBSTR(PREC,51,4)||'  '||SUBSTR(PREC,4,6)||' '||
                  SUBSTR(PREC,80,2)||SUBSTR(PREC,13,8)||' '||SUBSTR(PREC,23,4)||' '||
                         SUBSTR(PREC,55,20)||REFED||     SUBSTR(PREC,75,5)||' '||
                  SUBSTR(PREC,82,7);
    3980   2  0   BRYEA:
                  PUT FILE(PRINTF) SKIP EDIT(TRECLA) (A(80));
    4000   2  0   GO TO NEWTAB;
    4010   2  0   EOD:CLOSE FILE(DFILEP),FILE(PRINTF);
    4020   2  0   RETURN;END LAYY;
    4030   1  0   LAYQ:PROCEDURE;
                  /*PRINT REACTION,ZA  SORTED FILE */
    4050   2  0   OPEN FILE(PRINTF) LINESIZE(132) PAGESIZE(59);
    4060   2  0   OPEN FILE(DFILEP);
    4070   2  0   OPEN FILE(DFILER);
    4080   2  0   ON ENDFILE(DFILEP) GO TO EOD;
    4090   2  0   ON ENDPAGE(PRINTF) GO TO BRQQ;
    4100   2  0   DCL RECQ CHAR(10) INIT((10)' ');
    4110   2  0   PAGEN=0;
    4120   2  0   BR='0';
    4130   2  0   BRQQ: IF PAGEN>0 THEN BR='1';
    4140   2  0   READDFP:
                  IF SUBSTR(OPTR,39,1)='1' THEN DO;
    4160   2  1          PUT FILE(PRINTF) PAGE;
    4170   2  1   PAGEN=PAGEN+1;
    4180   2  1   PUT FILE(PRINTF) EDIT('PAGE=',PAGEN) (COLUMN(65),A,F(3));
    4190   2  1   PUT FILE(PRINTF) SKIP(2) EDIT('REACTION','Z-A','ANNEE','TYPE',
                  'AUTEUR','REFERENCE','BLKNO')
                  (A,X(3),A,X(4),A,X(1),A,X(1),A,X(14),A,X(9),A);
    4220   2  1   PUT FILE(PRINTF) SKIP;
    4230   2  1   END;
    4240   2  0   IF BR='1' THEN DO;BR='0';GO TO BRQQQ;END;
    4250   2  0   NEWTAB:
                            READ FILE(DFILEP) INTO(PREC);
    4270   2  0   RC=INDEX(SUBSTR(PREC,27,15),SBL);RP=VERIFY(SUBSTR(PREC,42,9),BS);
    4280   2  0   RV=VERIFY(SUBSTR(PREC,26+RC,16-RC),BS);
    4290   2  0   IF RV>0 THEN
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PL/I OPTIMIZING COMPILER          PNLIBIX:PROCEDURE OPTIONS(MAIN);

  NUMBER LEV NT

                  REFED=SUBSTR(PREC,27,RC)||
                  ' '||SUBSTR(PREC,25+RC+RV,17-RC-RV)||' '||SUBSTR(PREC,41+RP,10-RP);
  4320   2  0     IF RV<1 THEN REFED=SUBSTR(PREC,27,RC)||' '||SUBSTR(PREC,41+RP,10-RP);
  4330   2  0     IF SUBSTR(OPTR,39,1)='1' THEN DO;
  4340   2  1     TRECLA=SUBSTR(PREC,80,2)||SUBSTR(PREC,13,8)||' '||SUBSTR(PREC,4,6)||
                  ' '||SUBSTR(PREC,51,4)||'  '||SUBSTR(PREC,23,4)||' '||
                  SUBSTR(PREC,55,20)||REFED||SUBSTR(PREC,75,5)||' '||SUBSTR(PREC,82,7);
  4370   2  1     BRQQQ:
                  PUT FILE(PRINTF) SKIP EDIT(TRECLA) (A(80));
  4390   2  1     END;
  4400   2  0     IF RECQ¬=SUBSTR(PREC,80,2)||SUBSTR(PREC,13,8) THEN DO;
  4410   2  1     RETIQ=SUBSTR(PREC,10,3)||' '||SUBSTR(PREC,80,2)||SUBSTR(PREC,13,8)||
  4420   2  1     (9)' '; WRITE FILE(DFILER) FROM(RETIQ);END;
  4430   2  0     RECQ=SUBSTR(PREC,80,2)||SUBSTR(PREC,13,8);
  4440   2  0     GO TO NEWTAB;
  4450   2  0     EOD:CLOSE FILE(DFILEP),FILE(PRINTF);
  4460   2  0     RETURN;END LAYQ;
  4470   1  0     LAYREF:PROCEDURE;
                  /*PRINT REFERENCE,YEAR,ZAQ SORTED FILE */
  4490   2  0     DCL REFQ CHAR(24) INIT((24)' ');
  4500   2  0     OPEN FILE(PRINTF) LINESIZE(132) PAGESIZE(59);
  4510   2  0     OPEN FILE(DFILEP);
  4520   2  0     ON ENDFILE(DFILEP) GO TO EOD;
  4530   2  0     ON ENDPAGE(PRINTF) GO TO BRRE;
  4540   2  0     PAGEN=0;
  4550   2  0     BR='0';
  4560   2  0     BRRE: IF PAGEN>0 THEN BR='1';
  4570   2  0     READDFP:
                  IF SUBSTR(OPTR,45,1)='1' THEN DO;
  4590   2  1             PUT FILE(PRINTF) PAGE;
  4600   2  1     PAGEN=PAGEN+1;
  4610   2  1     PUT FILE(PRINTF) EDIT('PAGE=',PAGEN) (COLUMN(65),A,F(3));
  4620   2  1     PUT FILE(PRINTF) SKIP(2) EDIT('REFERENCE','ANNEE','Z-A','REACTION',
                  'AUTEUR','TYPE','BLKNO')
                  (A,X(9),A,X(1),A,X(4),A,X(3),A,X(14),A,X(1),A);
  4650   2  1     PUT FILE(PRINTF) SKIP;
  4660   2  1     END;
  4670   2  0     IF BR='1' THEN DO;BR='0';GO TO BRREF;END;
  4680   2  0     NEWTAB:
                                 READ FILE(DFILEP) INTO(PREC);
  4700   2  0     RC=INDEX(SUBSTR(PREC,27,15),SBL);RP=VERIFY(SUBSTR(PREC,42,9),BS);
  4710   2  0     RV=VERIFY(SUBSTR(PREC,26+RC,16-RC),BS);
  4720   2  0     IF RV>0 THEN
                  REFED=SUBSTR(PREC,27,RC)||
                  ' '||SUBSTR(PREC,25+RC+RV,17-RC-RV)||' '||SUBSTR(PREC,41+RP,10-RP);
  4750   2  0     IF RV<1 THEN REFED=SUBSTR(PREC,27,RC)||' '||SUBSTR(PREC,41+RP,10-RP);
  4760   2  0     IF SUBSTR(OPTR,45,1)='1' THEN DO;
  4770   2  1     TRECLA=REFED||SUBSTR(PREC,51,4)||'  '||SUBSTR(PREC,4,6)||' '||
                  SUBSTR(PREC,80,2)||SUBSTR(PREC,13,8)||' '||SUBSTR(PREC,55,20)||
                  SUBSTR(PREC,23,4)||' '||SUBSTR(PREC,75,5)||' '||SUBSTR(PREC,82,7);
  4800   2  1     BRREF:
                  PUT FILE(PRINTF) SKIP EDIT(TRECLA) (A(80));
  4820   2  1     END;
  4830   2  0     IF REFQ¬=SUBSTR(PREC,27,24) THEN DO;
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PL/I OPTIMIZING COMPILER          PNLIBIX:PROCEDURE OPTIONS(MAIN);

  NUMBER LEV NT

    4840   2  1   RETIQ=REFED||' '||SUBSTR(PREC,51,4);
    4850   2  1   WRITE FILE(DFILER) FROM(RETIQ);END;
    4860   2  0   REFQ=SUBSTR(PREC,27,24);
    4870   2  0   GO TO NEWTAB;
    4880   2  0   EOD:CLOSE FILE(DFILEP),FILE(PRINTF);
    4890   2  0   CLOSE FILE(DFILER);
    4900   2  0   RETURN;END LAYREF;
    4910   1  0   LAYRQ:PROCEDURE;
                  /*PRINT LIST OF REFERENCES AND REACTIONS  */
    4930   2  0   DCL DFILERQ FILE RECORD  INPUT SEQUENTIAL;
    4940   2  0   OPEN FILE(DFILERQ);
    4950   2  0   ON ENDFILE(DFILERQ) GO TO EORQ;
    4960   2  0   PUT PAGE;
    4970   2  0   PUT SKIP EDIT('LISTE DE REACTIONS ET REFERENCES') (A);
    4980   2  0   PUT SKIP(2);
    4990   2  0   READ:READ FILE(DFILERQ) INTO(RETIQ);
    5000   2  0   PUT SKIP EDIT(RETIQ) (A(23));GO TO READ;
    5010   2  0   EORQ:CLOSE FILE(DFILERQ);RETURN;END LAYRQ;
    5020   1  0   START:
                  CALL UPDLBIX;
    5040   1  0   CALL UPDCF;
    5050   1  0   CALL FFFCRCH;
    5060   1  0   IF FATERR='1' THEN DO;
    5070   1  1   PUT SKIP(2) EDIT('****FATAL ERROR DETECTED IN INPUT FILE') (A);
    5080   1  1   PUT SKIP EDIT('CORRECT INPUT AND RESTART JOB   MERCI') (A);
    5090   1  1   GO TO EOJ;END;
    5100   1  0   IF FATERR=' ' THEN   DO;
    5110   1  1   PUT PAGE;
    5120   1  1   PUT SKIP(2) EDIT('+++ NO FATAL ERROR DETECTED IN INPUT') (A);
    5130   1  1   PUT SKIP EDIT('ENTIRE INPUT PROCESSED') (A);
    5140   1  1   PUT SKIP EDIT('CORRECT MINOR ERRORS IN NEXT UPDATE USING RECID NO')
    5150   1  1   (A); END;
                  /* SORTINGS:IBM STANDARD ROUTINE */
    5170   1  0   DCL RETCODE FIXED BINARY(31,0);
    5180   1  0   IF SUBSTR(OPTR,12,1)='0' THEN GO TO AUTHED;
                  /*ZAQ,YEAR SORT */
    5200   1  0   CALL PLISRTA ('SORT FIELDS=(1,3,CH,A,7,3,CH,A,80,2,CH,A,13,8,CH,A,51,4
                 ,CH,A,21,2,CH,A,55,20,CH,A,27,24,CH,A) ',
                   ' RECORD TYPE=F,LENGTH=(90) ',
                  60000,
                  RETCODE);
    5250   1  0   MTITLE1='INDEX DE LA BIBLIOTHEQUE DU LABORATOIRE PN CLASSE PAR ';
    5260   1  0   MTITLE2='Z,A,REACTION,ANNEE,TYPE DE TRAVAIL,AUTEUR,REFERENCE';
    5270   1  0   CALL LAYOUT;
    5280   1  0   CALL LAYZA;
    5290   1  0   AUTHED:
                  IF SUBSTR(OPTR,21,1)='0' THEN GO TO YEARED;
                  /*AUTHOR,ZAQ,YEAR-SORT */
    5320   1  0   CALL PLISRTA ('SORT FIELDS=(55,20,CH,A,1,3,CH,A,7,3,CH,A,80,2,CH,A,13,
                 8,CH,A,51,4,CH,A,21,2,CH,A,27,24,CH,A) ',
                   ' RECORD TYPE=F,LENGTH=(90) ',
                  60000,RETCODE);
                  /*PRINT TABLE AND SAVE FILE LAYOUT */
    5370   1  0   MTITLE2='AUTEUR,Z,A,REACTION,ANNEE,TYPE DE TRAVAIL,REFERENCE';
```

```
PL/I OPTIMIZING COMPILER          PNLIBIX:PROCEDURE OPTIONS(MAIN);

  NUMBER LEV NT

    5380   1  0   CALL LAYOUT;
    5390   1  0   CALL LAYAU;
    5400   1  0   YEARED:
                  IF SUBSTR(OPTR,28,1)='0' THEN GO TO QZAED;
                  /*YEAR,ZAQ,AUTHOR-SORT */
    5430   1  0   CALL PLISRTA ('SORT FIELDS=(51,4,CH,A,1,3,CH,A,7,3,CH,A,80,2,CH,A,13,8
                 ,CH,A,21,2,CH,A,55,20,CH,A,27,24,CH,A) ',
                   ' RECORD TYPE=F,LENGTH=(90) ',
                  60000,RETCODE);
    5470   1  0   MTITLE2='ANNEE,Z,A,REACTION,TYPE DE TRAVAIL,AUTEUR,REFERENCE';
    5480   1  0   CALL LAYOUT;
    5490   1  0   CALL LAYY;
    5500   1  0   QZAED:
                  /*Q,ZA,YEAR,AUTHOR-SORT */
                  IF SUBSTR(OPTR,39,1)='0' THEN IF SUBSTR(OPTR,56,1)='0' THEN IF
                  SUBSTR(OPTR,45,1)='0' THEN GO TO EOJ;
    5540   1  0  CALL PLISRTA ('SORT FIELDS=(80,2,CH,A,13,8,CH,A,1,3,CH,A,7,3,CH,A,51,4,
                 CH,A,21,2,CH,A,55,20,CH,A,27,24,CH,A) ',
                   ' RECORD TYPE=F,LENGTH=(90) ',
                  60000,RETCODE);
    5580   1  0   MTITLE2='REACTION,Z,A,ANNEE,TYPE DE TRAVAIL,AUTEUR,REFERENCE';
    5590   1  0   CALL LAYOUT;
    5600   1  0   CALL LAYQ;
                  /*REFERENCE,YEAR,ZAQ-SORT */
    5620   1  0   CALL PLISRTA ('SORT FIELDS=(27,24,CH,A,51,4,CH,A,1,3,CH,A,7,3,CH,A,80,
                 2,CH,A,13,8,CH,A,55,20,CH,A,21,2,CH,A) ',
                   ' RECORD TYPE=F,LENGTH=(90) ',
                  60000,RETCODE);
    5660   1  0   MTITLE2='REFERENCE,ANNEE,Z,A,REACTION,AUTEUR,TYPE DE TRAVAIL';
    5670   1  0   CALL LAYOUT;
    5680   1  0   CALL LAYREF;
    5690   1  0   CALL LAYRQ;
    5700   1  0   EOJ: END;
```

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