INTERNATIONAL ATOMIC ENERGY AGENCY

NUCLEAR DATA SERVICES

DOCUMENTATION SERIES OF THE IAEA NUCLEAR DATA SECTION

IAEA-NDS-78

REV.0

CODES CONV45 AND CONV56 FOR A PC.

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ABSTRACT.The codes CONV45 and CONV56 convert data files from ENDF/B-4 to ENDF/B-5 and from ENDF/B-5 to ENDF/B-6 format,respectivel The codes which were received from US National Nuclear Data Center, were implemented at the IAEA Nuclear Data Section for use on a personal computers.

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March 1988

CODES CONV45 AND CONV56 FOR A PC.

I.INTRODUCTION.CODE CONV45 AND CONV5 HAS BEEN RECEIVED FROM BNL[: TO IAEA NDS FOR A CONVERSION OF FILES LINE BY LINE FROM ENDF/B-4 TO AND FROM ENDF/B-5 TO ENDF/B-6 FORMAT WHICH WAS ADOPTED AS INTERNATIONAL FORMAT FOR NUCLEAR DATA.IT WAS IMPLEMENTED FOR PERSONAL IBM COMPARTIBLE COMPUTER USING DOS 3.2 AND PROFORT 1.0 COMPILER IN NDS.HERE SHORT DESCRIPTION OF CODES IS PRESENTED.

Two codes have been written to convert legal ENDF/B files in one version to a succeeding version. See Table I.

Table I

Code Name	Conversion
ENDF4_to_5	ENDF/B-IV to ENDF/B-V
ENDF5_to_6	ENDF/B-V to ENDF/B-VI

Both codes are written in Fortran 77 for the VAX and are used in interactive mode.

II. Code Operation

A. ENDF4_to_5

The Program prompts for the input data set name for the input ENDF/B-IV file and the output data set name for the ENDF/B-V output file.

The following information in Table II is also requested:

Table II

ENDF/B-IV to ENDF/B-V

Quantity	Description	Fixed or Floating Data
MATNEW	ENDF/B-V MAT Number	Fixed
NLIB	Library Number 0 - ENDF/B 1 - ENDF/A etc.	Fixed

Quantity	Description	Fixed or Floating Data
ELIS	Excitation energy for the ground state	Floating
STA	Target Stability flag STA = 0.0 stable STA = 1.0 unstable	Floating
LIS	State Numbers LIS = 0, ground state	Fixed
LISO	Isomeric State Number LISO = 0, ground state	Fixed

ENDF4_to_5 sets the dictionary card count to 0 so one must run the ENDF/B-V converted output through the STANEF code to build a new dictionary.

B. ENDF5_to_6

The Program prompts for the input data set name including an extension for the input ENDF/B-V file (the extension name must be alphanumeric in the form .XXX).

ENDF5_to_6 then inquires whether you wish to use a lookup table for the new ENDF/B-VI MAT number or use Z, A, and LIS from the ENDF/B-V file to determine the new ENDF/B-VI MAT number. The latter choice is preferred since it yields the standard ENDF/B-VI MAT set.

The output of ENDF5_to_6 consists of two or more files using the input file name and different extensions as outlined in Table III.

Table III

ENDF5_to_6 OUTPUT NAMES

Extension	Description
• GEN	Output Neutron Library (Sublibrary = 10)
• LOG	Listing of ENDF/B-V Cards converted to ENDF/B-VI
• DEC	Radioactive Decay Data Library (sublibrary = 4)
• YLD	Neutron-induced Fission Product Yields Library (sublibrary = 11)

ENDF5_to_6 sets the dictionary card count to 0 so one must run the ENDF/B-VI converted output through the STANEF Code to build a new dictionary.

III. Code Notes

ENDF4_to_5 converts file 1 MT = 451 in ENDF/B-IV format to ENDF/B-V format. The code also deletes sections 453, 454, and 457 from file 1 and a warning output message is given. These sections are not converted to ENDF/B-V formats in the present version of the code. All other files are unchanged in the conversion.

ENDF5_to_6 does separate out decay and yield data into their respective sublibraries. In file 1, the distribution date is blanked out and a new Master File Entry Date is entered. The temperature parameter is set to 0.0. The code should not be used for converting derived (Doppler broadened) data.

MT numbers are adjusted where necessary and mass difference Q values (QM) and reaction Q values (QI) are correctly inserted in all locations involving Q values.

Sections 251, 252, and 253 are deleted from file 3. Temperature dependent data is not converted. Also the transformation matrix is deleted from file 4 if it is present. In ENDF/B-V files 8, 31, and 33 sometimes have MAT numbers that must be converted to ENDF/B-VI. A data set must be supplied with the name NEWMAT.INP which contains a list of ENDF/B-V and ENDF/B-VI MAT pairs in (2I5) format. If an ENDF/B-V MAT is not on NEWMAT.INP, MAT is set equal to 0 on the ENDF/B-VI conversion. It is this data set that is used for overall MAT selection.

IV.CHANGES IN THE CODES WHILE IMPLEMENTING.

A. Operator CARRIAGE CONTROL for external devices opening was omitted.

B. Operators FORMAT were changed.

C. Codes are operating in non-interactive mode.

Compiling and linking were done in accordance with FORTRAN compiler manual [2].

IV.EXAMPLE OF BATCH FILE

```
SET FORT1 = BRCR00.DAT
SET FORT4 = NEWMAT.INP
CONV56 /K 41000 > CONV.LST < CONV.INP
```

where FORT1 - input data file.
NEWMAT.INP - looking table of old and new MAT number in th
2I5 format,
CONV.INP - input data for the code

V.EXAMPLE OF INPUT FILE CONV.INP

```
BRCR00.DAT
Y
```

VI.EXAMPLE OF NEWMAT.INP LOOKING TABLE

```
0240002400
```

VII.FEATURES.

Code converts the following MF: 1,3,4,8,33.
MF 2,5,6,12,13,14,15 should be copied as they are in the

old file.

References.

1.Dunford C.L. Private communication.1988.

2.IBM Personal Computer Professional FORTRAN.Installation and use. Ryan McFarland Corporation,1984.

APPENDIX EXAMPLE OF CONV LISTING FOR THE FILE 1.

```
  ENDF/B-V TO ENDF/B-VI CONVERSION CODE

 8.20000+04 2.05430+02          1          0          0          08202   1451    1
 0.00000+00 0.00000+00          0          0          0          68202   1451    2
 1.00000+ 0 0.00000+00          0          0         10          68202   1451    3
 0.00000+ 0 0.00000+ 0          0          0        283          08202   1451    4
 82-PB-  0  TUD/FEI  EVAL-MAY84  D.HERMSDORF,A.BLOKHIN,A.IGNATYUK  8202   1451    5
                                                              0    8202   1451    6
----ENDF/B-VI           MATERIAL 8202                              8202   1451    7
-----INCIDENT NEUTRON DATA                                         8202   1451    8
------ENDF-6 FORMAT                                               8202   1451    9
 ENDF/B-V MATERIAL CONVERTED TO ENDF-6 FORMAT BY IAEA              8202   1451   10
 *          *          *          *          *          *         *8202   1451   11
 HISTORY                                                          8202   1451   12
         84-05 NEW EVALUATION FOR THE CJD-LIBRARY                 8202   1451   13
         84-12  RE-EVALUATED CROSS SECTIONS FOR MT=2 AND MT=16,    8202   1451   14
                INCLUSION OF COVARIANCE MATRICES MF=33,           8202   1451   15
                CORRECTIONS OF NORMALIZATION OF MF=6 AND          8202   1451   16
                OTHER SMALL ERRORS OBTAINED BY CHECKING           8202   1451   17
                PROCEDURES ( CODES CHECKER AND FIZCON )           8202   1451   18
         85-05  INCLUSION OF RESOLVED RESONANCES PARAMETERS TAKEN 8202   1451   19
                FROM NEW EVALUATION BY PEI OBNINSK (REF. /18/)    8202   1451   20
         86-06  REVISION OF MF6 AND NEW DATA FOR 14-MEV-SPECTRUM  8202   1451   21
**************** INTRODUCTION ****************                   8202   1451   22
*** A *** PRINCIPLES OF EVALUATION                                8202   1451   23
               RE-EVALUATION OF THE LEAD FILE IS BASED ON         8202   1451   24
     I.  ------- ENDF/B - IV MAT 1288 , MOD 5 (NOV74)             8202   1451   25
     II.  -------- INTERCOMPARISON OF (N,2N) AND (N,3N) CROSS     8202   1451   26
                   SECTIONS /1/                                   8202   1451   27
     III. ------- MEASUREMENTS OF NEUTRON EMISSION CROSS          8202   1451   28
                   SECTIONS AT 14 MEV /2,3/                       8202   1451   29
     IV.  ------- CALCULATION OF ANGULAR DEPENDENCE OF NEUTRON    8202   1451   30
                   INELASTIC SCATTERING IN THE FRAME OF GENERA-   8202   1451   31
                   LIZED EXCITON MODEL /4/                        8202   1451   32
                IMPROVEMENTS OF THIS EVALUATION :                 8202   1451   33
     I.  ------- INCLUSION OF EXPERIMENTAL DATA MEASURED          8202   1451   34
                   RECENTLY (FROM 1973 TO 1983) FOR CAPTURE,      8202   1451   35
                   (N,P) ETC. AND NEWEST THEORETICAL ANALYSIS     8202   1451   36
                   OF DATA                                        8202   1451   37
     II.  ------- TAKING INTO ACCOUNT PREEQUILIBRIUM EFFECTS IN   8202   1451   38
                   NEUTRON EMISSION SPECTRA                       8202   1451   39
     III.  ------- TAKING INTO ACCOUNT ANISOTROPIC ANGULAR DI-    8202   1451   40
                   STRIBUTION OF NEUTRON INELASTIC SCATTERING     8202   1451   41
     IV.  ------- INCLUSION OF COVARIANCE MATRICES IN MF33        8202   1451   42
                THE PRESENT EVALUATION HAS BEEN CARRIED OUT TO    8202   1451   43
                MEET SPECIAL DATA DEMANDS FOR HYBRID REACTOR       8202   1451   44
                CALCULATIONS IN IAE MOSCOW.                       8202   1451   45
****************                                                  8202   1451   46
*** B ***          CONTENTS AND DESCRIPTION OF DATA FILES         8202   1451   47
***                                                               8202   1451   48
   MF=2           *** RESONANCE PARAMETERS                        8202   1451   49
        MT=151  PARAMETERS FOR RESOLVED RESONANCES TAKEN FROM     8202   1451   50
                REF. /18/ FOR ISOTOPES 204 , 206 , 207 AND 208-PB 8202   1451   51
   MF=3           *** NEUTRON CROSS SECTIONS                      8202   1451   52
```

```
 MT= 1 TOTAL CROSS SECTION                                          8202  1451  53
       TOTALLY TAKEN FROM MAT 1288                                  8202  1451  54
       0.00001 EV TO 1 KEV FROM BNL-325                             8202  1451  55
       1 KEV TO 0.47 MEV MOSTLY FROM W.M.GOOD ,ORNL                 8202  1451  56
       0.47 MEV TO 20 MEV FROM R.B.SCHWARTZ , NBS                   8202  1451  57
       THE 2200 M/S CROSS SECTION : 11.37 BARNS                     8202  1451  58
 MT= 2 ELASTIC SCATTERING CROSS SECTION                             8202  1451  59
       SHAPE-ELASTIC CROSS SECTION CALCULATED BY OPTICAL            8202  1451  60
       MODEL CODE ELISA /14/ USING OPTICAL PARAMETERS OF            8202  1451  61
       OLSSEN /12/ AND RAPAPORT /13/ IN THE ENERGY RANGE            8202  1451  62
       1 TO 6 MEV AND 6 TO 20 MEV RESPECTIVELY.                     8202  1451  63
       FINAL ADJUSTMENT FOR CONSISTENCY WITH TOTAL AND              8202  1451  64
       NON-ELASTIC CROSS SECTION WAS NECESSARY.                     8202  1451  65
       THE 2200 M/S CROSS SECTION : 11.20 BARNS                     8202  1451  66
 MT= 3 NON-ELASTIC CROSS SECTION                                    8202  1451  67
       EVALUATED BY USE OF OPTICAL MODEL CALCULATIONS               8202  1451  68
       WITH RAPAPORTS POTENTIAL /13/. SUM OF PARTIAL                8202  1451  69
       CROSS SECTIONS MT4,MT16,MT17,MT102,MT103,MT107               8202  1451  70
       HAS BEEN ADJUSTED.                                           8202  1451  71
 MT= 4 INELASTIC SCATTERING CROSS SECTION                           8202  1451  72
       CALCULATED BY COMPUTER CODES STAPRE /5/ AND                  8202  1451  73
       AMAPRE /4/ WITH PARAMETERS ADJUSTED AT 14-MEV                8202  1451  74
       EXPERIMENTS /2,3/.                                           8202  1451  75
       CONTRIBUTIONS OF DIRECT REACTIONS CALCULATED BY              8202  1451  76
       COUPLED CHANNEL THEORY TO BE 200 MBARNS /11/                 8202  1451  77
       IN THE ENERGY RANGE FROM 6 TO 20 MEV WERE ADDED.             8202  1451  78
 MT= 10 CROSS SECTION FOR PRIMARY NEUTRON EMISSION                  8202  1451  79
       MT10 IS THE SUM OF MT4,MT16 AND MT17 .                       8202  1451  80
       MT10 WAS DEFINED ACCORDING TO VERSION ENDF/B - VI            8202  1451  81
       FOR NORMALIZATION OF DIFFERENTIAL DATA IN MF5                8202  1451  82
       AND MF6. FOR DEFINITION SEE REF. /16/ .                      8202  1451  83
 MT= 16 (N,2N) CROSS SECTION                                        8202  1451  84
       EVALUATION BASED ON EXPERIMENTAL DATA BY FREHAUT             8202  1451  85
       /6/ AND CALCULATIONS WITH CODE STAPRE /5/ IN THE             8202  1451  86
       ENERGY RANGES FROM THRESHOLD TO 9 MEV AND 15 TO              8202  1451  87
       20 MEV RESPECTIVELY. RESULTS COMPARE FAVOURABLE              8202  1451  88
       WITH THOSE OBTAINED FOR JENDL-2 /1/.                         8202  1451  89
 MT= 17 (N,3N) CROSS SECTION                                        8202  1451  90
       NO EXPERIMENTS AVAILABLE. EVALUATION BASED                   8202  1451  91
       ON CALCULATIONS BY CODE STAPRE /5/ ENTIRLY.                  8202  1451  92
 MT= 91 INELASTIC SCATTERING TO THE CONTINUUM                       8202  1451  93
       INCLUDING ALSO EXCITATION OF DISCRETE LEVELS                 8202  1451  94
       SMEARED OVER AN ENERGY RANGE OF 150 KEV,                     8202  1451  95
       STRENGTHS FOR DISCRETE LEVEL EXCITATION TAKEN                8202  1451  96
       FROM ENDF/B-IV MAT 1288 MT51 TO MT85 AND CC-                 8202  1451  97
       CALCULATIONS /11/.                                           8202  1451  98
 MT=101 NEUTRON DISAPPEARANCE                                       8202  1451  99
       MT101 IS THE SUM OF MT102, MT103 AND MT107                   8202  1451 100
 MT=102 RADIATIVE CAPTURE CROSS SECTION                             8202  1451 101
       BELOW 1 MEV TAKEN FROM MAT 1288                              8202  1451 102
       ABOVE 1 MEV ACCORDING TO DATA BY CSIKAI /7/                  8202  1451 103
       AND BERGQVIST /8/ . DATA APPROVED BY CALCULATIONS            8202  1451 104
       WITH CODE FISPRO /15/ INCLUDING CONTRIBUTIONS                8202  1451 105
       0.00001 EV TO 10 EV : 1/V-LAW ASSUMED                        8202  1451 106
```

```
          THE 2200 M/S CROSS SECTION : 0.17 BARNS                    8202  1451  107
     MT=103 (N,P) CROSS SECTION                                      8202  1451  108
          EVALUATED FROM DATA OF BELOVITSKIJ /9/ AND                 8202  1451  109
          CALCULATIONS BY STAPRE /5/ AND AMAPRE /4/                  8202  1451  110
     MT=107 (N,A) CROSS SECTION                                      8202  1451  111
          EVALUATED BY ADJUSTMENT OF CALCULATIONS BY                 8202  1451  112
          STAPRE AND BY IVANOVA /10/ AT 14 MEV USING MASS 8202 1451 113
          SYSTEMATICS OF (N,A) VERSUS (N-Z)/A                        8202  1451  114
     MT=251 MU BAR                                                   8202  1451  115
          TAKEN FROM MAT 1288 WITH EXTENSION TO L=20                 8202  1451  116
          DERIVED FROM ELASTIC ANGULAR DISTRIBUTIONS AND 8202 1451 117
          KINEMATICS                                                 8202  1451  118
     MT=252 XI                                                       8202  1451  119
          SEE MT=251                                                 8202  1451  120
     MT=253 GAMMA                                                    8202  1451  121
          SEE MT=251                                                 8202  1451  122
     MT=719 (N,PN) CROSS SECTION                                     8202  1451  123
          CALCULATED BY STAPRE                                       8202  1451  124
     MT=799 (N,AN) CROSS SECTION                                     8202  1451  125
          CALCULATED BY STAPRE                                       8202  1451  126
MF=4      *** ANGULAR DISTRIBUTION OF NEUTRONS EMITTED               8202  1451  127
     MT= 2 ELASTIC NEUTRON SCATTERING                                8202  1451  128
          0.00001 EV TO 5 MEV LEGENDRE COEFFICIENTS OBTAINED8202 1451 129
                          BY DATA FITTING                            8202  1451  130
          1 MEV TO 6 MEV LEGENDRE COEFFICIENTS FROM                  8202  1451  131
                          OPTICAL MODEL CALCULATIONS                 8202  1451  132
                          USING  OLSSENS  POTENTIAL  /12/            8202  1451  133
          6 MEV TO 20 MEV OPTICAL MODEL CALCULATIONS WITH 8202 1451 134
                          RAPAPORTS POTENTIAL /13/                   8202  1451  135
     MT= 16 (N,2N) REACTION                                          8202  1451  136
          ISOTROPIC ANGULAR DISTRIBUTION ASSUMED                     8202  1451  137
     MT= 17 (N,3N) REACTION                                          8202  1451  138
          ISOTROPIC ANGULAR DISTRIBUTION ASSUMED                     8202  1451  139
     MT= 91 INELASTIC SCATTERING TO THE CONTINUUM                    8202  1451  140
          ISOTROPIC ANGULAR DISTRIBUTIONS ASSUMED                    8202  1451  141
          *****        ATTENTION       *****                         8202  1451  142
          DOUBLE-DIFFERENTIAL CROSS SECTIONS ARE GIVEN IN 8202 1451 143
          MF= 6 MT= 10                                               8202  1451  144
          ******************************************                 8202  1451  145
     MT=719 (N,PN) REACTION                                          8202  1451  146
          ISOTROPIC ANGULAR DISTRIBUTION ASSUMED                     8202  1451  147
     MT=799 (N,AN) REACTION                                          8202  1451  148
          ISOTROPIC ANGULAR DISTRIBUTION ASSUMED                     8202  1451  149
MF=5      *** ENERGY DISTRIBUTIONS OF NEUTRONS EMITTED               8202  1451  150
     MT= 10 INELASTIC NEUTRON SCATTERING                             8202  1451  151
          CALCULATED BY COMPUTER CODE AMAPRE /4/ BY                  8202  1451  152
          FITTING PARAMETERS OF EXCITON MODEL AT 14 MEV-DATA8202 1451 153
          OF /2,3/                                                   8202  1451  154
     MT= 16 (N,2N) REACTION                                          8202  1451  155
          CALCULATED BY COMPUTER CODES AMAPRE /4/ AND STAPRE8202 1451 156
          /5/. NORMALIZATION PROCEDURE                               8202  1451  157
          SIGMA(E0,E) = SIGMA(E0)*P(E0,E) TAKING                     8202  1451  158
          SIGMA FROM MF3 , MT16 (WITHOUT MULTIPLICITY M ) 8202 1451 159
     MT= 17 (N,3N) REACTION                                          8202  1451  160
```

```
                CALCULATED BY COMPUTER CODES AMAPRE /4/ AND          8202  1451  161
                STAPRE /5/ . NORMALIZATION ANALOG TO MT16.            8202  1451  162
        MT= 91 INELASTIC SCATTERING TO THE CONTINUUM                  8202  1451  163
                FICTIVE SPECTRA FOR NEUTRONS INELASTICALLY            8202  1451  164
                SCATTERED ONLY                                        8202  1451  165
                *****          ATTENTION *****                        8202  1451  166
                DON'T USE THIS SECTION , FOR REALISTIC NEUTRON 8202 1451 167
                SPECTRA SEE MT=10                                     8202  1451  168
                ******************************                        8202  1451  169
        MT=719 (N,PN) REACTION                                        8202  1451  170
                NEUTRON SPECTRA CALCULATED BY STAPRE                  8202  1451  171
        MT=799 (N,AN) REACTION                                        8202  1451  172
                NEUTRON SPECTRA CALCULATED BY STAPRE                  8202  1451  173
  MF=6          *** ENERGY-ANGULAR DISTRIBUTION OF NEUTRONS           8202  1451  174
        MT= 10 INELASTIC NEUTRON SCATTERING                           8202  1451  175
                LEGENDRE-POLYNOMIAL COEFFICIENTS ARE GIVEN            8202  1451  176
                FOR BOTH DISCRETE LEVELS AND LEVELS IN THE            8202  1451  177
                CONTINUUM ACCORDING TO ENDF/B - RULES OF VERSIONVI8202 1451 178
                NORMALIZATION PROCEDURE                               8202  1451  179
                SIGMA(E0,E,THETA) = SIGMA(E0)*NUE/2/PI*               8202  1451  180
                SUM ((2L+1)/2*AL(E0,E)*PL(COS(THETA)))                8202  1451  181
                TAKING SIGMA FROM MF3 , MT10 . /16/                   8202  1451  182
  MF=33         *** COVARIANCE MATRICES FOR INTEGRAL X-SECTIONS 8202 1451 183
                REPRESENTATION ACCORDING TO FORMAT MANUAL ENDF102 8202 1451 184
        MT= 1 TOTAL CROSS SECTION WERE EVALUATED OVER THE COM- 8202 1451 185
                PLETE ENERGY RANGE                                    8202  1451  186
                FRACTIONAL COMPONENTS CORRELATED WITHIN EACH ENER-8202 1451 187
                GY INTERVALL ONLY (LB=1)                              8202  1451  188
        MT= 2 ELASTIC CROSS SECTION WERE DERIVED TOTALLY FROM 8202 1451 189
                THE DIFFERENCE (LTY=0)                                8202  1451  190
                MT1 - MT4 - MT16 - MT17 - MT102 - MT103 - MT107 8202 1451 191
        MT= 4 INELASTIC SCATTERING CROSS SECTION WERE EVALUATED 8202 1451 192
                FROM THRESHOLD TO 20 MEV                              8202  1451  193
                FRACTIONAL COMPONENTS CORRELATED WITHIN EACH ENER-8202 1451 194
                GY INTERVALL ONLY (LB=1)                              8202  1451  195
        MT= 10 PRIMARY NEUTRON EMISSION CROSS SECTION FROM            8202  1451  196
                NON-ELASTIC PROCESSES                                 8202  1451  197
                TOTALLY DERIVED FROM THE SUM                          8202  1451  198
                MT4 + MT16 + MT17 (LTY=0)                             8202  1451  199
        MT= 16 (N,2N) REACTION WAS EVALUATED OVER THE COMPLETE 8202 1451 200
                ENERGY RANGE (LB=2)                                   8202  1451  201
        MT= 17 (N,3N) REACTION WAS EVALUATED OVER THE COMPLETE 8202 1451 202
                ENERGY RANGE (LB=2)                                   8202  1451  203
        MT= 91 INELASTIC SCATTERING TO THE CONTINUUM                  8202  1451  204
                CORRELATIONS ANALOGOUS TO MT4 (LB=1)                  8202  1451  205
        MT=102 NEUTRON CAPTURE CROSS SECTION WERE EVALUATED OVER 8202 1451 206
                THE COMPLETE ENERGY RANGE (LB=1)                      8202  1451  207
        MT=103 (N,P) CROSS SECTION EVALUATED FROM THRESHOLD TO 8202 1451 208
                20 MEV (LB=1)                                         8202  1451  209
        MT=107 (N,A) CROSS SECTION EVALUATED FROM THRESHOLD TO 8202 1451 210
                20 MEV (LB=1)                                         8202  1451  211
**************                                                        8202  1451  212
** C ***         REFERENCES                                           8202  1451  213
```

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***                                                                    8202  1451  214
      / 1/ S.IWASAKI ET AL. ,PROC. GAUSSIG SYMP. ,1983                 8202  1451  215
      / 2/ A.TAKAHASHI ET AL. ,REPORT A - 83 - 01 ,1983                8202  1451  216
      / 3/ K.SEIDEL ET AL. ,PROC. GAUSSIG. SYMPOSIUM ,1983             8202  1451  217
      / 4/ D.HERMSDORF ET AL. ,PROC. KIEV CONFERENCE ,1983             8202  1451  218
      / 5/ M.UHL ET AL. . REPORT IRK-76/01 , 1976                      8202  1451  219
      / 6/ J. FREHAUT ET AL. REPORT ZFK - 324 , P. 24 , 1976           8202  1451  220
      / 7/ J. CSIKAI ET AL. , NP A 95 (1067) 229                       8202  1451  221
      / 8/ N. BERGQVIST ET AL. , NP A 191 (1972) 641                   8202  1451  222
      / 9/ G.E. BELOVITSKIJ , REPORT ZFK - 376 , P. 37 , 19788202      1451  223
      /10/ S.P. IVANOVA ET AL., JINR-REPORT P4-82-766 , 1982           8202  1451  224
           S.P. IVANOVA ET AL. , YAD. FIZ. 38(1983) 1156               8202  1451  225
      /11/ V.P. LUNEV , PRIVATE COMMUNICATION , 1984                   8202  1451  226
      /12/ N. OLSSEN ET AL. , NP A 385 (1982) 285                      8202  1451  227
      /13/ J. RAPAPORT ET AL. , NP A 330 (1079) 15                     8202  1451  228
      /14/ G. KIESSIG , THESIS , TU DRESDEN 1975                       8202  1451  229
      /15/ V. BENZI ET AL. , REPORT DOC.CEC.(67)14 , 1067              8202  1451  230
      /16/ R.E.MACFARLANE ET AL. , REPORT LA-UR-1026 , 1984            8202  1451  231
           O. SCHWERER ET AL. , REPORT INDC (NDS) - 156,1984           8202  1451  232
      /17/ B.A. MAGURNO , REPORT ENDF-102 , REVISED ED. , 83           8202  1451  233
      /18/ A.I. BLOKHIN , PRIVATE COMMUNICATION , 1985                 8202  1451  234
**********                                                             8202  1451  235
*** D *** REACTION INDEX DICTIONARY                                    8202  1451  236
***                                                                    8202  1451  237
                                                                       8202  1451  238
     1        451        281                                          08202  1451  239
     2        151        669                                          08202  1451  240
     3          1         77                                          08202  1451  241
     3          2         72                                          08202  1451  242
     3          3         32                                          08202  1451  243
     3          4         12                                          08202  1451  244
     3         10         12                                          08202  1451  245
     3         16          8                                          08202  1451  246
     3         17          6                                          08202  1451  247
     3         91         12                                          08202  1451  248
     3        101         12                                          08202  1451  249
     3        102         12                                          08202  1451  250
     3        103          8                                          08202  1451  251
     3        107          7                                          08202  1451  252
     3        251         11                                          08202  1451  253
     3        252         11                                          08202  1451  254
     3        253         11                                          08202  1451  255
     3        719          6                                          08202  1451  256
     3        799          6                                          08202  1451  257
     4          2        160                                          08202  1451  258
     4         10          8                                          08202  1451  259
     4         16          8                                          08202  1451  260
     4         17          8                                          08202  1451  261
     4         91          8                                          08202  1451  262
     4        719          8                                          08202  1451  263
     4        799          8                                          08202  1451  264
     5         10        262                                          08202  1451  265
     5         16         64                                          08202  1451  266
     5         17         26                                          08202  1451  267
     5         91         12                                          08202  1451  268
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5	719	47	08202	1451	269
5	799	37	08202	1451	270
6	10	827	08202	1451	271
12	102	4	08202	1451	272
13	3	8	08202	1451	273
14	3	1	08202	1451	274
14	102	1	08202	1451	275
15	3	202	08202	1451	276
15	102	14	08202	1451	277
33	1	5	08202	1451	278
33	2	7	08202	1451	279
33	4	5	08202	1451	280
33	10	5	08202	1451	281
33	16	5	08202	1451	282
33	17	4	08202	1451	283
33	91	5	08202	1451	284
33	102	5	08202	1451	285
33	103	5	08202	1451	286
33	107	5	08202	1451	287