

ADAS Subroutine b8data

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C
SUBROUTINE B8DATA( IUNIT , NDLEV , NDTRN , NDMET ,
&                TITLED , IZ      , IZ0   , IZ1   , BWNO  ,
&                NPL   , BWNOA   , LBSETA, PRTWTA, CPRTA ,
&                IL    ,
&                IA    , CSTRGA  , ISA    , ILA    , XJA    , WA   ,
&                CPLA  , NPLA    , IPLA   , ZPLA   ,
&                NV    , SCEF    ,
&                ITRAN , MAXLEV  ,
&                TCODE , I1A     , I2A    , AVAL   , SCOM
&                )
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C
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C
***** FORTRAN77 SUBROUTINE: B8DATA *****
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C
PURPOSE:  TO FETCH DATA FROM INPUT COPASE DATA SET, INCLUDING
C
C          MULTIPLE PARENTS ON FREE-ELECTRON AND CHARGE EXCHANGE
C
C          ON RECOMBINATION, INCLUSION OF EXPLICIT CONTRIBUTIONS BY
C
C          IONISATION.
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C
          IMPROVEMENT OF AUTOMATIC IONISATION CALC. BY INCLUDING
C
C          ASSIGNMENT OF FINAL STATE PARENT.
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C
          This is a 208 specific version of badata which recognizes
C
C          S lines in the adf04 file.
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C
CALLING PROGRAM: ADAS208
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C
DATA:
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C
          THE 'REAL' DATA IN THE FILE IS REPRESENTED IN AN ABBREVIATED
C
C          FORM WHICH OMITTS THE "D" OR "E" EXPONENT SPECIFIER.
C
C          e.g. 1.23D-06 or 1.23E-06 IS REPRESENTED AS 1.23-06
C
C               6.75D+07 or 6.75E+07 IS REPRESENTED AS 6.75+07
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C
          THEREFORE THE FORM OF EACH 'REAL' NUMBER IN THE DATA SET IS:
C
C               N.NN+NN or N.NN-NN
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C
          THE UNITS USED IN THE DATA FILE ARE TAKEN AS FOLLOWS:
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C
          IONISATION POTENTIAL: WAVE NUMBER (CM-1)
C
C          INDEX LEVEL ENERGIES: WAVE NUMBER (CM-1)
C
C          TEMPERATURES          : KELVIN
C
C          A-VALUES              : SEC-1
C
C          GAMMA-VALUES          :
C
C          RATE COEFFT.          : CM3 SEC-1
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C
SUBROUTINE:
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C
INPUT : (I*4)  IUNIT   = UNIT TO WHICH INPUT FILE IS ALLOCATED
C
INPUT : (I*4)  NDLEV   = MAXIMUM NUMBER OF LEVELS THAT CAN BE READ
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C INPUT : (I*4) NDTRN = MAX. NUMBER OF TRANSITIONS THAT CAN BE READ
C INPUT : (I*4) NDMET = MAX. NUMBER OF METASTABLES ALLOWED
C
C OUTPUT: (C*3) TITLED = ELEMENT SYMBOL.
C OUTPUT: (I*4) IZ = RECOMBINED ION CHARGE READ
C OUTPUT: (I*4) IZ0 = NUCLEAR CHARGE READ
C OUTPUT: (I*4) IZ1 = RECOMBINING ION CHARGE READ
C (NOTE: IZ1 SHOULD EQUAL IZ+1)
C OUTPUT: (R*8) BWNO = IONISATION POTENTIAL (CM-1) OF LOWEST PARENT
C OUTPUT: (I*4) NPL = NUMBER OF PARENTS ON FIRST LINE AND USED
C IN LEVEL ASSIGNMENTS
C OUTPUT: (R*8) BWNOA() = IONISATION POTENTIAL (CM-1) OF PARENTS
C OUTPUT: (L*4) LBSETA() = .TRUE. - PARENT WEIGHT SET FOR BWNOA()
C .FALSE. - PARENT WEIGHT NOT SET FOR BWNOA()
C OUTPUT: (R*8) PRTWTA() = PARENT WEIGHT FOR BWNOA()
C OUTPUT: (C*9) CPRTA() = PARENT NAME IN BRACKETS
C
C OUTPUT: (I*4) IL = INPUT DATA FILE: NUMBER OF ENERGY LEVELS
C
C OUTPUT: (I*4) IA() = ENERGY LEVEL INDEX NUMBER
C OUTPUT: (C*18) CSTRGA() = NOMENCLATURE/CONFIGURATION FOR LEVEL 'IA()'
C OUTPUT: (I*4) ISA() = MULTIPLICITY FOR LEVEL 'IA()'
C NOTE: (ISA-1)/2 = QUANTUM NUMBER (S)
C OUTPUT: (I*4) ILA() = QUANTUM NUMBER (L) FOR LEVEL 'IA()'
C OUTPUT: (R*8) XJA() = QUANTUM NUMBER (J-VALUE) FOR LEVEL 'IA()'
C NOTE: (2*XJA)+1 = STATISTICAL WEIGHT
C OUTPUT: (R*8) WA() = ENERGY RELATIVE TO LEVEL 1 (CM-1) FOR LEVEL
C 'IA()'
C OUTPUT: (C*1) CPLA() = CHAR. SPECIFYING 1ST PARENT FOR LEVEL 'IA()'
C INTEGER - PARENT IN BWNOA() LIST
C 'BLANK' - PARENT BWNOA(1)
C 'X' - DO NOT ASSIGN A PARENT
C OUTPUT: (I*4) NPLA() = NO. OF PARENT/ZETA CONTRIBUTIONS TO IONIS.
C OF LEVEL
C OUTPUT: (I*4) IPLA(,) = PARENT INDEX FOR CONTRIBUTIONS TO IONIS.
C OF LEVEL
C 1ST DIMENSION: PARENT INDEX
C 2ND DIMENSION: LEVEL INDEX
C OUTPUT: (I*4) ZPLA(,) = EFF. ZETA PARAM. FOR CONTRIBUTIONS TO IONIS.
C OF LEVEL
C 1ST DIMENSION: PARENT INDEX
C 2ND DIMENSION: LEVEL INDEX
C
C OUTPUT: (I*4) NV = INPUT DATA FILE: NUMBER OF GAMMA/TEMPERATURE
C PAIRS FOR A GIVEN TRANSITION.
C OUTPUT: (R*8) SCEF() = INPUT DATA FILE: ELECTRON TEMPERATURES (K)
C (INITIALLY JUST THE MANTISSA. SEE 'ITPOW()')
C (NOTE: TE=TP=TH IS ASSUMED)
C
C OUTPUT: (I*4) ITRAN = INPUT DATA FILE: NUMBER OF TRANSITIONS
C OUTPUT: (I*4) MAXLEV = HIGHEST INDEX LEVEL IN READ TRANSITIONS
C
C OUTPUT: (C*1) TCODE() = TRANSITION: DATA TYPE POINTER:

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C          ' ' => Electron Impact Transition
C          'P' => Proton Impact Transition
C          'H' => Charge Exchange Recombination
C          'R' => Free Electron Recombination
C          'I' => Coll. ionisation from lower stage ion
C          'S' => Ionisation
C OUTPUT: (I*4) I1A() = TRANSITION:
C                   LOWER ENERGY LEVEL INDEX (CASE ' ' & 'P')
C                   SIGNED PARENT NDEX (CASE 'H','R','S' & 'I')
C OUTPUT: (I*4) I2A() = TRANSITION:
C                   UPPER ENERGY LEVEL INDEX (CASE ' ' & 'P')
C                   CAPTURING LEVEL INDEX (CASE 'H','R','S' & 'I')
C OUTPUT: (R*8) AVAL() = TRANSITION:
C                   A-VALUE (SEC-1) (CASE ' ')
C                   NEUTRAL BEAM ENERGY (CASE 'H')
C                   NOT USED (CASE 'P','R','S' & 'I')
C OUTPUT: (R*8) SCOM(,) = TRANSITION:
C                   GAMMA VALUES (CASE ' ' & 'P')
C                   RATE COEFFT.(CM3 SEC-1) (CASE 'H','R' & 'I')
C                   SCALED RATE COEFFT.(CM3 SEC-1) (CASE 'S')
C                   1ST DIMENSION - TEMPERATURE 'SCEF()'
C                   2ND DIMENSION - TRANSITION NUMBER
C
C          (I*4) NVMAX = PARAMETER = MAX. NUMBER OF TEMPERATURES
C                   THAT CAN BE READ IN.
C          (I*4) MTIED = PARAMETER = MUST BE GREATER THAN OR EQUAL TO
C                   THE MAX. NO. OF LEVELS.
C          (R*8) DZERO = PARAMETER = MINIMUM VALUE FOR 'AVAL()' AND
C                   'SCOM()' ARRAYS = 1.0D-30
C
C          (I*4) I4UNIT = FUNCTION (SEE ROUTINE SELECTION BELOW)
C          (I*4) IQS = X-SECT DATA FORMAT SELECTOR
C                   NOTE: IQS=3 ONLY ALLOWED IN THIS PROGRAM
C          (I*4) IFAIL = FAILURE NUMBER FROM B9PARS AND B9PRS1
C          (I*4) I = GENERAL USE.
C          (I*4) IABT = RETURN CODE FROM 'R(FCTN)' (0 => NO ERROR)
C                   OR FROM INTERROGATION OF 'C7'
C          (I*4) J = GENERAL USE.
C          (I*4) J1 = INPUT DATA FILE - SELECTED TRANSITION:
C                   LOWER ENERGY LEVEL INDEX (CASE ' ' & 'P')
C          (I*4) J2 = INPUT DATA FILE - SELECTED TRANSITION:
C                   UPPER ENERGY LEVEL INDEX (CASE ' ' & 'P')
C                   CAPTURING LEVEL INDEX (CASE 'H' & 'R')
C          (I*4) LENCST = BYTE LENGTH OF STRING CSTRGA()
C          (I*4) ILINE = ENERGY LEVEL INDEX FOR CURRENT LINE
C          (I*4) IRECL = RECORD LENGTH OF INPUT DATASET (<=128)
C          (I*4) IAPOW = EXPONENT OF 'AVALM'
C          (I*4) IGPOW() = EXPONENT OF 'GAMMA()'
C          (I*4) ITPOW() = TEMPERATURES - EXPONENT
C                   NOTE: MANTISSA INITIALLY KEPT IN 'SCEF()'
C
C          (R*4) ZF = SHOULD BE EQUIVALENT TO 'IZ1'
C

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C      (R*8)  AVALM   = INPUT DATA FILE - SELECTED TRANSITION:
C                MANTISSA OF: ('IAPOW' => EXPONENT)
C                A-VALUE (SEC-1)          (CASE ' ')
C                NEUTRAL BEAM ENERGY     (CASE 'H')
C                NOT USED                   (CASE 'P','R','S' & 'I')
C      (R*8)  GAMMA() = INPUT DATA FILE - SELECTED TRANSITION:
C                MANTISSA OF: ('IGPOW()' => EXPONENT)
C                GAMMA VALUES             (CASE ' ' & 'P')
C                RATE COEFFT.(CM3 SEC-1) (CASE 'H','R','S' & 'I')
C                DIMENSION => TEMPERATURE 'SCEF()'
C
C      (C*7)  C7      = USED TO PARSE VALUE FOR XJA()
C      (C*7)  CDELIM  = DELIMITERS FOR INPUT OF DATA FROM HEADERS
C      (C*18) C18     = USED TO PARSE VALUE TO CSTRGA()
C      (C*18) C18T    = COPY OF C18 : UNSATISFACTORY METHOD OF
C                AVOIDING COMPILER REFERENCE ERROR :
C                DHB 07.04.95
C      (C*80) CLINE   = CURRENT ENERGY LEVEL INDEX PARAMETER LINE
C      (C*75) STRING  = TAIL STRING OF 1ST DATA LINE FOR PARSING
C      (C*44) STRG1   = TAIL STRING OF LEVEL SPEC LINES FOR PARSING
C      (C*128) BUFFER = GENERAL STRING BUFFER STORAGE
C      (C*3)  CITPOW() = USED TO PARSE VALUES TO ITPOW()
C      (C*5)  CSCEF() = USED TO PARSE VALUES TO SCEF()
C
C      (L*4)  LDATA   = IDENTIFIES WHETHER THE END OF AN INPUT
C                SECTION IN THE DATA SET HAS BEEN LOCATED.
C                (.TRUE. => END OF SECTION REACHED)
C      (L*4)  LTCHR   = .TRUE. => CURRENT 'TCODE()' = 'H' OR 'R'
C                'S' OR 'I'
C                = .FALSE. => CURRENT 'TCODE()' .NE. 'H' OR 'R'
C                'S' OR 'I'
C      (L*4)  LTCPR   = .TRUE. => CURRENT 'TCODE()' = 'P' OR 'R'
C                OR 'I'
C                = .FALSE. => CURRENT 'TCODE()' .NE. 'P' OR 'R'
C                'S' OR 'I'
C      (L*4)  LERROR  = .TRUE. => UNTIED LEVEL FOUND
C                = .FALSE. => ALL LEVELS TIED
C      (L*4)  LTIED() = .TRUE. => SPECIFIED LEVEL TIED
C                = .FALSE. => SPECIFIED LEVEL IS UNTIED
C                DIMENSION => LEVEL INDEX

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C NOTE:

LTCHR	LTCPR	TCODE()
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.TRUE.	.TRUE.	=> 'R','I'
.TRUE.	.FALSE.	=> 'H'
.FALSE.	.TRUE.	=> 'P'
.FALSE.	.FALSE.	=> ' '

C FOR A-VALUES & GAMMA-VALUES ENTRIES LESS THAN 'DZERO' ARE TAKEN
C AS BEING EQUAL TO DZERO. THIS AFFECTS THE 'AVAL()' AND 'SCOM()'
C ARRAYS.
C

C ROUTINES:

C	ROUTINE	SOURCE	BRIEF DESCRIPTION
C	I4UNIT	ADAS	FETCH UNIT NUMBER FOR OUTPUT OF MESSAGES
C	R8FCTN	ADAS	CONVERTS FROM CHARACTER TO REAL VARIABLE
C	I4FCTN	ADAS	CONVERTS FROM CHAR. TO INTEGER VARIABLE
C	XXWORD	ADAS	PARSES A STRING INTO SEPARATE WORDS
C			FOR ' ()<>{}' DELIMITERS

C AUTHOR: HP SUMMERS (REVISION OF BXDATA BY PE BRIDEN)
C K1/1/57
C JET EXT. 4941

C DATE: 11/06/92

C UPDATE: 9/07/93 HPS - USE NEW VERSIONS OF PARSING ROUTINES
C B8PARS AND B8PRS1
C UPDATE: 12/07/93 HPS - REVISE TO CONSISTENCY WITH BXDATA
C AT 25/07/93.
C UPDATE: 11/05/95 HPS - ADDED CPRTA TO PARAMETER LIST.ALTERED
C 'READ()BUFFER' TO BE CONSISTENT WITH IDL-ADAS
C UPDATE: 13/11/95 DHB - INCREASED LENGTH OF CPRTA FROM 4 TO 9 &
C STRING FROM 55 TO 75 IN LINE WITH
C MODIFICATIONS TO ACCOMODATE J-RESOLVED
C PARENT METASTABLES IN THE DATASETS.
C UPDATE: 16/01/96 DHB - INCREASED LENGTH OF CLINE TO 92 & STRG1 TO
C 56. ALTERED FORMAT NO. 1003 & READING OF
C CLINE FORMAT TO ACCOMODATE CHANGES.

C UNIX-IDL PORT:

C VERSION: 1.1 DATE: 19-1-96
C MODIFIED: TIM HAMMOND (TESSELLA SUPPORT SERVICES PLC)
C - PUT UNDER SCCS CONTROL

C VERSION: 1.2 DATE: 03-07-97
C MODIFIED: RICHARD MARTIN
C - CHANGED I3 TO I4 IN FORMAT STATEMENT 1001

C VERSION: 1.3 DATE: 20-11-98
C MODIFIED: DAVID H. BROOKS
C - CHANGED MTIED TO 250.

C VERSION: 1.1 DATE: 26-10-99
C MODIFIED: Martin O'Mullane
C - First version.

C UPDATE: 1.2 DATE: 17/05/07
C MODIFIED: Allan Whiteford
C - Updated comments as part of subroutine documentation
C procedure.

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CHARACTER	CPLA (NDLEV)			
CHARACTER*9	CPRTA (NDMET)			
CHARACTER* (*)	CSTRGA (NDLEV)			
CHARACTER	TCODE (NDTRN)			
CHARACTER*3	TITLED			
INTEGER	I1A (NDTRN) ,	I2A (NDTRN) ,	IA (NDLEV) ,	IL
INTEGER	ILA (NDLEV) ,	IPLA (NDMET, NDLEV)		
INTEGER	ISA (NDLEV) ,	ITRAN,	IUNIT,	IZ
INTEGER	IZ0,	IZ1,	MAXLEV,	NDLEV
INTEGER	NDMET,	NDTRN,	NPL	
INTEGER	NPLA (NDLEV) ,	NV		
LOGICAL	LBSETA (NDMET)			
REAL*8	AVAL (NDTRN) ,	BWNO,	BWNOA (NDMET)	
REAL*8	PRTWTA (NDMET) ,		SCEF (NVMAX)	
REAL*8	SCOM (NVMAX, NDTRN) ,		WA (NDLEV)	
REAL*8	XJA (NDLEV) ,	ZPLA (NDMET, NDLEV)		