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===== Groupie
PROGRAM GROUPIE Groupie
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VERSION 76-1 (NOVEMBER 1976) Groupie
VERSION 79-1 (OCTOBER 1979) CDC-7600 AND CRAY-1 VERSION. Groupie
VERSION 80-1 (MAY 1980) IBM, CDC AND CRAY VERSION Groupie
VERSION 81-1 (JANUARY 1981) EXTENSION TO 3000 GROUPS Groupie
VERSION 81-2 (MARCH 1981) IMPROVED SPEED Groupie
VERSION 81-3 (AUGUST 1981) BUILT-IN 1/E WEIGHTING SPECTRUM Groupie
VERSION 82-1 (JANUARY 1982) IMPROVED COMPUTER COMPATIBILITY Groupie
VERSION 83-1 (JANUARY 1983) *MAJOR RE-DESIGN. Groupie
*ELIMINATED COMPUTER DEPENDENT CODING. Groupie
*NEW, MORE COMPATIBLE I/O UNIT NUMBERS. Groupie
*NEW MULTI-BAND LIBRARY BINARY FORMAT. Groupie
VERSION 83-2 (OCTOBER 1983) ADDED OPTION TO ALLOW SIGMA-0 TO BE Groupie
DEFINED EITHER AS MULTIPLES OF Groupie
UNSHIELDED TOTAL CROSS SECTION IN EACH Groupie
GROUP, OR POWERS OF 10 IN ALL GROUPS. Groupie
VERSION 84-1 (APRIL 1984) ADDED MORE BUILT IN MULTIGROUP ENERGY Groupie
STRUCTURES. Groupie
VERSION 85-1 (APRIL 1985) *UPDATED FOR ENDF/B-VI FORMATS. Groupie
*SPECIAL I/O ROUTINES TO GUARANTEE Groupie
ACCURACY OF ENERGY. Groupie
*DOUBLE PRECISION TREATMENT OF ENERGY Groupie
(REQUIRED FOR NARROW RESONANCES). Groupie
*MINIMUM TOTAL CROSS SECTION TREATMENT Groupie
VERSION 85-2 (AUGUST 1985) *FORTRAN-77/H VERSION Groupie
VERSION 86-1 (JANUARY 1986) *ENDF/B-VI FORMAT Groupie
VERSION 86-2 (JUNE 1986) *BUILT-IN MAXWELLIAN, 1/E AND FISSION Groupie
WEIGHTING SPECTRUM. Groupie
VERSION 88-1 (JULY 1988) *OPTION...INTERNALLY DEFINE ALL I/O Groupie
FILE NAMES (SEE, SUBROUTINES FILIO1 Groupie
FILIO2 FOR DETAILS). Groupie
*IMPROVED BASED ON USER COMMENTS. Groupie
VERSION 89-1 (JANUARY 1989) *PSYCHOANALYZED BY PROGRAM FREUD TO Groupie
INSURE PROGRAM WILL NOT DO ANYTHING Groupie
CRAZY. Groupie
*UPDATED TO USE NEW PROGRAM CONVERT Groupie
KEYWORDS. Groupie
*ADDED LIVERMORE CIVIC COMPILER Groupie
CONVENTIONS. Groupie
VERSION 91-1 (JUNE 1991) *INCREASED PAGE SIZE FROM 1002 TO 5010 Groupie
POINTS Groupie
*UPDATED BASED ON USER COMMENTS Groupie
*ADDED FORTRAN SAVE OPTION Groupie
*COMPLETELY CONSISTENT ROUTINE TO READ Groupie
FLOATING POINT NUMBERS. Groupie
VERSION 92-1 (JANUARY 1992) *ADDED RESONANCE INTEGRAL CALCULATION - Groupie
UNSHIELDED AND/OR SHIELDED - FOR Groupie
DETAILS SEE BELOW Groupie
*INCREASED NUMBER OF ENERGY POINTS Groupie
IN BUILT-IN SPECTRA - TO IMPROVE Groupie
ACCURACY. Groupie
*ALLOW SELECTION OF ZA/MF/MT OR Groupie
MAT/MF/MT RANGES - ALL DATA NOT Groupie
SELECTED IS SKIPPED ON INPUT AND Groupie
NOT WRITTEN AS OUTPUT. Groupie
*COMPLETELY CONSISTENT I/O ROUTINES - Groupie
TO MINIMIZE COMPUTER DEPENDENCE. Groupie
*NOTE, CHANGES IN INPUT PARAMETER Groupie
FORMAT - FOR ZA/MF/MT OR MAT/MF/MT Groupie
RANGES. Groupie

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VERSION 92-2 (JUNE 1992)	*MULTIBAND PARAMETERS OUTPUT AS CHARACTER (RATHER THAN BINARY) FILE.	Groupie
VERSION 93-1 (APRIL 1993)	*INCREASED PAGE SIZE FROM 5010 TO 30000 POINTS	Groupie
	*ELIMINATED COMPUTER DEPENDENCE.	Groupie
VERSION 94-1 (JANUARY 1994)	*VARIABLE ENDF/B DATA FILENAMES TO ALLOW ACCESS TO FILE STRUCTURES (WARNING - INPUT PARAMETER FORMAT HAS BEEN CHANGED)	Groupie
	*CLOSE ALL FILES BEFORE TERMINATING (SEE, SUBROUTINE ENDIT)	Groupie
VERSION 95-1 (JANUARY 1994)	*CORRECTED MAXWELLIAN WEIGHTING	Groupie
	*CHANGING WEIGHTING SPECTRUM FROM 0.1 TO 0.001 % UNCERTAINTY	Groupie
VERSION 96-1 (JANUARY 1996)	*COMPLETE RE-WRITE	Groupie
	*IMPROVED COMPUTER INDEPENDENCE	Groupie
	*ALL DOUBLE PRECISION	Groupie
	*ON SCREEN OUTPUT	Groupie
	*UNIFORM TREATMENT OF ENDF/B I/O	Groupie
	*IMPROVED OUTPUT PRECISION	Groupie
	*DEFINED SCRATCH FILE NAMES	Groupie
	*UP TO 1000 GROUP MULTI-BAND CALCULATION (PREVIOUSLY 175)	Groupie
	*MAXIMUM NUMBER OF GROUPS REDUCED FROM 3,000 TO 1,000	Groupie
	*UP TO 1000 MATERIALS (PREVIOUSLY 100)	Groupie
	*CORRECTED USE OF MAXWELLIAN + 1/E + FISSION SPECTRUM	Groupie
	*ONLY 2 BAND VERSION DISTRIBUTED (CONTACT AUTHOR FOR DETAILS)	Groupie
	*DEFINED SCRATCH FILE NAMES	Groupie
VERSION 99-1 (MARCH 1999)	*CORRECTED CHARACTER TO FLOATING POINT READ FOR MORE DIGITS	Groupie
	*UPDATED TEST FOR ENDF/B FORMAT VERSION BASED ON RECENT FORMAT CHANGE	Groupie
	*GENERAL IMPROVEMENTS BASED ON USER FEEDBACK	Groupie
VERSION 99-2 (JUNE 1999)	*ASSUME ENDF/B-VI, NOT V, IF MISSING MF=1, MT-451.	Groupie
VERS. 2000-1 (FEBRUARY 2000)	*ADDED MF=10, ACTIVATION CROSS SECTION PROCESSING.	Groupie
	*GENERAL IMPROVEMENTS BASED ON USER FEEDBACK	Groupie
VERS. 2002-1 (FEBRUARY 2002)	*ADDED TART 700 GROUP STRUCTURE	Groupie
(MAY 2002)	*ADDED VARIABLE SIGMA0 INPUT OPTION	Groupie
(NOV. 2002)	*OPTIONAL INPUT PARAMETERS	Groupie
	*ADDED SAND-II EXTENDED DOWN TO 1.0D-5 EV.	Groupie
(JUNE 2003)	*CORRECTED SAND-II 620 AND 640 GROUP ENERGY BOUNDARIES DEFINITIONS.	Groupie
VERS. 2004-1 (SEPT. 2004)	*INCREASED PAGE SIZE FROM 30000 TO 120000 POINTS	Groupie
	*ADDED "OTHER" AS ADDITIONAL REACTION TO IMPROVE MULTI-BAND FITTING	Groupie
	*ADDED ITERATION FOR "BEST" PARTIAL PARAMETERS.	Groupie
	*DO NOT SKIP LOW TOTAL ENERGY RANGES WHEN DEFINING AVERAGE CROSS SECTIONS - THIS MAKES OUTPUT COMPATIBLE WITH ANY STANDARD AVERAGING PROCEDURE	Groupie
VERS. 2005-1 (JAN. 2005)	*ADDED OPTION TO CHANGE TEMPERATURE OF BUILT-IN STANDARD SPECTRUM.	Groupie





















	35-55	D11.4	FISSION		Groupie
4	1-11	-----	BLANK		Groupie
	12-22	D11.4	TOTAL	(SECOND BAND)	Groupie
	23-33	D11.4	ELASTIC		Groupie
	34-44	D11.4	CAPTURE		Groupie
	35-55	D11.4	FISSION		Groupie

LINES 3 AND 4 ARE REPEATED FOR EACH GROUP. THE LAST LINE FOR EACH MATERIAL (ZA) IS,

N	1-11	D11.4	ENERGY (EV) - UPPER ENERGY LIMIT OF		Groupie
			LAST GROUP.		Groupie

FOR EXAMPLE, A 175 GROUP, 2 BAND FILE, FOR EACH MATERIAL WILL CONTAIN 352 LINES = 1 HEADER LINE, 175 \* 2 LINES OF PARAMETERS, AND 1 FINAL LINE WITH THE UPPER ENERGY LIMIT OF THE LAST GROUP.

INPUT FILES

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UNIT DESCRIPTION

2	INPUT DATA (BCD - 80 CHARACTERS/RECORD)	Groupie
10	ORIGINAL ENDF/B DATA (BCD - 80 CHARACTERS/RECORD)	Groupie

OUTPUT FILES

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UNIT DESCRIPTION

31	MULTI-BAND PARAMETERS CHARACTER FILE - OPTIONAL (BCD - 80 CHARACTERS/RECORD)	Groupie
32	SELF-SHIELDED CROSS SECTION LISTING - OPTIONAL (BCD - 120 CHARACTERS/RECORD)	Groupie
33	MULTI-BAND PARAMETER LISTING - OPTIONAL (BCD - 120 CHARACTERS/RECORD)	Groupie
34	UNSHIELDED CROSS SECTION LISTING - OPTION (BCD - 120 CHARACTERS/RECORD)	Groupie
3	OUTPUT REPORT (BCD - 80 CHARACTERS/RECORD)	Groupie
11	MULTI-GROUP ENDF/B DATA - OPTIONAL (BCD - 80 CHARACTERS/RECORD)	Groupie

SCRATCH FILES

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UNIT FILENAME DESCRIPTION

8	ENERGY DEPENDENT WEIGHTING SPECTRUM (BINARY - 40080 WORDS/BLOCK)	Groupie
9	TOTAL CROSS SECTION (BINARY - 40080 WORDS/BLOCK)	Groupie
12	ELASTIC CROSS SECTION - ONLY FOR SELF-SHIELDING CALCULATION (BINARY - 40080 WORDS/BLOCK)	Groupie
13	CAPTURE CROSS SECTION - ONLY FOR SELF-SHIELDING CALCULATION (BINARY - 40080 WORDS/BLOCK)	Groupie
14	FISSION CROSS SECTION - ONLY FOR SELF-SHIELDING CALCULATION (BINARY - 40080 WORDS/BLOCK)	Groupie

OPTIONAL STANDARD FILE NAMES (SEE SUBROUTINES FILIO1 AND FILIO2)

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UNIT FILE NAME

2	GROUPIE.INP	Groupie
3	GROUPIE.LST	Groupie
8	(SCRATCH)	Groupie

9	(SCRATCH)	Groupie
10	ENDFB.IN	Groupie
11	ENDFB.OUT	Groupie
12	(SCRATCH)	Groupie
13	(SCRATCH)	Groupie
14	(SCRATCH)	Groupie
31	MULTBAND.TAB	Groupie
32	SHIELD.LST	Groupie
33	MULTBAND.LST	Groupie
34	UNSHIELD.LST	Groupie

I/O UNITS USED  
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UNITS 2, 3 8, 9 AND 10 WILL ALWAYS BE USED. Groupie  
UNITS 31 THROUGH 34 AND 11 ARE OPTIONALLY USED DEPENDING ON THE Groupie  
OUTPUT REQUESTED. Groupie  
UNITS 12, 13 AND 14 WILL ONLY BE USED IF SELF-SHIELDED OR Groupie  
MULTIBAND OUTPUT IS REQUESTED. Groupie

INPUT CARDS  
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CARD	COLS.	FORMAT	DESCRIPTION	Groupie
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1	1-11	I11	SELECTION CRITERIA (0=MAT, 1=ZA)	Groupie
1	12-22	I11	NUMBER OF GROUPS.	Groupie
			=.GT.0 - ARBITRARY GROUP BOUNDARIES ARE READ	Groupie
			FROM INPUT FILE (N GROUPS REQUIRE	Groupie
			N+1 GROUP BOUNDARIES). CURRENT	Groupie
			PROGRAM MAXIMUM IS 1000 GROUPS.	Groupie
			BUILT-IN OPTIONS INCLUDE....	Groupie
			= 0 - TART 175 GROUPS	Groupie
			= -1 - ORNL 50 GROUPS	Groupie
			= -2 - ORNL 126 GROUPS	Groupie
			= -3 - ORNL 171 GROUPS	Groupie
			= -4 - SAND-II 620 (665) GROUPS TO 18 MEV	Groupie
			= -5 - SAND-II 640 (685) GROUPS TO 20 MEV	Groupie
			= -6 - WIMS 69 GROUPS	Groupie
			= -7 - GAM-I 68 GROUPS	Groupie
			= -8 - GAM-II 99 GROUPS	Groupie
			= -9 - MUFT 54 GROUPS	Groupie
			=-10 - ABBN 28 GROUPS	Groupie
			=-11 - TART 616 GROUPS TO 20 MEV	Groupie
			=-12 - TART 700 GROUPS TO 1 GEV	Groupie
			=-13 - SAND-II 665 GROUPS TO 18 MEV	Groupie
			=-14 - SAND-II 685 GROUPS TO 20 MEV	Groupie
			=-15 - TART 666 GROUPS TO 200 MEV	Groupie
			=-16 - SAND-II 725 GROUPS TO 60 MEV	Groupie
			=-17 - SAND-II 755 GROUPS TO 150 MEV	Groupie
			=-18 - SAND-II 765 GROUPS TO 200 MEV	Groupie
1	23-33	I11	MULTI-BAND SELECTOR	Groupie
			= 0 - NO MULTI-BAND CALCULATIONS	Groupie
			= 1 - 2 BAND. CONSERVE AV(TOT), AV(1/TOT)	Groupie
			AND AV(1/TOT**2)	Groupie
			= 2 - 2 BAND. CONSERVE AV(TOT), AV(1/TOT)	Groupie
			AND AV(1/(TOT+SIGMA0)) WHERE	Groupie
			SIGMA0 = AV(TOT) IN EACH GROUP	Groupie
			= 3-5- MULTI-BAND FIT. CONSERVE AV(TOT) AND	Groupie
			MINIMIZE FRACTIONAL ERROR FOR ENTIRE	Groupie
			SELF-SHIELDING CURVE (SIGMA0 = 0 TO	Groupie
			INFINITY)	Groupie
			IF THE SELECTOR IS POSITIVE (1 TO 5) THE	Groupie
			MINIMUM NUMBER OF BANDS WILL BE OUTPUT FOR	Groupie
			EACH ISOTOPE INDEPENDENTLY. IF THE SELECTOR	Groupie



			= 2 - RESONANCE INTEGRALS	Groupie
4	12-22	I11	MULTI-BAND PARAMETER LISTING	Groupie
4	23-33	I11	MULTI-BAND PARAMETERS COMPUTER READABLE	Groupie
4	34-44	I11	UNSHIELDED CROSS SECTIONS IN ENDF/B FORMAT	Groupie
			= 1 - HISTOGRAM FORMAT (INTERPOLATION LAW 1)	Groupie
			= 2 - LINEAR-LINEAR (INTERPOLATION LAW 2)	Groupie
4	45-55	I11	UNSHIELDED CROSS SECTIONS LISTING	Groupie
			= 1 - CROSS SECTIONS	Groupie
			= 2 - RESONANCE INTEGRALS	Groupie
05/01/20 - ADDED THE BELOW OPTION				
4	56-66	D11.4	IF THE STANDARD BUILT-IN SPECTRA IS USED,	Groupie
			INPUT LINE 1, COLUMNS 34-44 = 2, THIS FIELD	Groupie
			CAN BE USED TO OPTIONALLY CHANGE TEMPERATURE	Groupie
			OF THE MAXWELLIAN.	Groupie
			INPUT IS IN EV (0.0253 EV = ROOM TEMPERATURE)	Groupie
			= 0 - USE DEFAULT 0.0253 EV, ROOM TEMPERATURE	Groupie
			> 0 - USE THIS AS THE TEMPERATURE	Groupie
			RESTRICTION - TEMPERATURE CANNOT EXCEED	Groupie
			1000 EV.	Groupie
5	1-80	18A4	LIBRARY IDENTIFICATION. ANY TEXT THAT THE	Groupie
			USER WISHES TO IDENTIFY THE MULTI-BAND	Groupie
			PARAMETERS. THIS LIBRARY IDENTIFICATION IS	Groupie
			WRITTEN INTO THE COMPUTER READABLE MULTI-BAND	Groupie
			DATA FILE.	Groupie
6-N	1- 6	I6	LOWER MAT OR ZA LIMIT	Groupie
	7- 8	I2	LOWER MF LIMIT	Groupie
	9-11	I3	LOWER MT LIMIT	Groupie
	12-17	I11	UPPER MAT OR ZA LIMIT	Groupie
	18-19	I2	UPPER MF LIMIT	Groupie
	20-22	I3	UPPER MT LIMIT	Groupie
			UP TO 100 RANGES MAY BE SPECIFIED, ONE RANGE	Groupie
			PER LINE. THE LIST OF RANGES IS TERMINATED	Groupie
			BY A BLANK CARD. IF THE UPPER MAT OR ZA	Groupie
			LIMIT IS LESS THAN THE LOWER LIMIT THE UPPER	Groupie
			IS SET EQUAL TO THE LOWER LIMIT. IF THE UPPER	Groupie
			MF OR MT LIMIT IS ZERO IT WILL BE SET EQUAL	Groupie
			TO ITS MAXIMUM VALUE, 99 OR 999, RESPECTIVELY	Groupie
			IF THE FIRST REQUEST LINE IS BLANK IT WILL	Groupie
			TERMINATE THE LIST OF REQUESTS AND CAUSE ALL	Groupie
			DATA TO BE RETRIEVED (SEE EXAMPLE INPUT).	Groupie
VARY	1-66	6D11.4	ENERGY GROUP BOUNDARIES. ONLY REQUIRED IF	Groupie
			THE NUMBER OF GROUPS INDICATED ON THE FIRST	Groupie
			INPUT CARD IS POSITIVE. ALL ENERGIES MUST	Groupie
			BE IN ASCENDING ENERGY IN EV. THE PRESENT	Groupie
			LIMITS ARE 1 TO 1000 GROUPS. FOR N GROUPS	Groupie
			N+1 BOUNDARIES WILL BE READ FROM THE	Groupie
			INPUT FILE, E.G. IF THE FIRST INPUT CARD	Groupie
			INDICATES 20 GROUPS, 21 ENERGY BOUNDARIES	Groupie
			WILL BE READ FROM THE INPUT FILE.	Groupie
VARY	1-66	6D11.4	ENERGY DEPENDENT WEIGHTING SPECTRUM. ONLY	Groupie
			REQUIRED IF THE NUMBER OF POINTS INDICATED	Groupie
			ON FIRST CARD IS MORE THAN ONE. DATA IS	Groupie
			GIVEN IN (ENERGY, WEIGHT) PAIRS, UP TO 3	Groupie
			PAIRS PER CARD, USING ANY NUMBER OF CARDS	Groupie
			REQUIRED. ENERGIES MUST BE IN ASCENDING	Groupie
			ORDER IN EV. THE SPECTRUM VALUES MUST BE	Groupie
			NON-NEGATIVE. THE ENERGY RANGE OF SPECTRUM	Groupie
			MUST AT LEAST SPAN THE ENERGY RANGE OF THE	Groupie
			ENERGY GROUPS. SINCE SPECTRUM IS STORED IN	Groupie

