				M
PROGRAM	MIXER			M
=======				M
	-	(NOVEMBER 1976	•	M
		(APRIL 1981)		M
			*COMPUTER INDEPENDENT VERSION	N
VERSION	84-1	(JUNE 1984)	*SPECIAL I/O ROUTINES TO GUARANTEE	N
			ACCURACY OF ENERGY.	N
			*DOUBLE PRECISION TREATMENT OF ENERGY	Ņ
			(REQUIRED FOR NARROW RESONANCES).	N
			*FORTRAN-77/H VERSION	ľ
VERSION	88-1	(JULY 1988)	*OPTIONINTERNALLY DEFINE ALL I/O	ľ
			FILE NAMES (SEE, SUBROUTINE FILIO1	ľ
			AND FILIO2 FOR DETAILS).	ľ
			*IMPROVED BASED ON USER COMMENTS.	1
VERSION	89-1	(JANUARY 1989)	*PSYCHOANALYZED BY PROGRAM FREUD TO	1
			INSURE PROGRAM WILL NOT DO ANYTHING	1
			CRAZY.	1
			*UPDATED TO USE NEW PROGRAM CONVERT	1
			KEYWORDS.	1
			*ADDED LIVERMORE CIVIC COMPILER	1
	A.C		CONVENTIONS.	1
VERSION	92-1	(JANUARY 1992)	*UPDATED BASED ON USER COMMENTS	1
			*ADDED PHOTON CROSS SECTIONS	1
			*ADDED FORTRAN SAVE OPTION	1
			*OUTPUT IN ENDF/B-VI FORMAT	1
			*COMPLETELY CONSISTENT I/O ROUTINES -	
				1
			*NOTE, CHANGE IN INPUT PARAMETER	1
			FORMAT.	1
VERSION	94-1	(JANUARY 1994)	*VARIABLE ENDF/B DATA FILENAMES	1
			TO ALLOW ACCESS TO FILE STRUCTURES	1
			(WARNING - INPUT PARAMETER FORMAT	1
			HAS BEEN CHANGED)	1
			*CLOSE ALL FILES BEFORE TERMINATING	1
			(SEE, SUBROUTINE ENDIT) *INCREASED INCORE PAGE SIZE FROM	1
			1002 TO 4008.	1
VEDCION	06-1	(TANILADY 1006)	COMPLETE RE-WRITE	1
VERSION	90-1	(JANOARI 1990)		1
			*ALL DOUBLE PRECISION	1
			*ON SCREEN OUTPUT	1
			*UNIFORM TREATMENT OF ENDF/B I/O	1
			*IMPROVED OUTPUT PRECISION	1
			*DEFINED SCRATCH FILE NAMES	1
			*INCREASED INCORE PAGE SIZE FROM	1
			4008 TO 12000.	1
VERSION	99-1	(MARCH 1000)		1
	<u>-</u>			1
			*UPDATED TEST FOR ENDF/B FORMAT	1
			VERSION BASED ON RECENT FORMAT CHANGE	
			*GENERAL IMPROVEMENTS BASED ON	1
			USER FEEDBACK	1
VERSTON	99-2	(JUNE 1999)		1
. LIGION	<i>,, , ,</i>	(0011 1999)	MF=1, $MT-451$.	1
VERS 2	000-1	(FEBRIJARY 2000))*GENERAL IMPROVEMENTS BASED ON	1
			USER FEEDBACK	1
VERS 2	002-1	(MAY 2002)	*OPTIONAL INPUT PARAMETERS	1
		(MARCH 2002)		1
		(1
				1
			12000 TO 60000.	

*CHECKED AGAINST ALL ENDF/B-VII VERS. 2007-1 (JAN. 2007) Mixer *INCREASED INCORE PAGE SIZE FROM Mixer 60,000 TO 240,000. Mixer VERS. 2007-2 (DEC. 2007) *72 CHARACTER FILE NAMES. Mixer *ADDED GRAMS OR ATOMS INPUT VERS. 2008-1 (JUNE 2008) Mixer VERS. 2010-1 (Apr. 2010) *General update based on user feedback Mixer VERS. 2012-1 (Aug. 2012) *Added CODENAME Mixer *32 and 64 bit Compatible Mixer *Added ERROR stop Mixer VERS. 2015-1 (Jan. 2015) *Extended OUT9. Mixer *Replaced ALL 3 way IF Statements. Mixer VERS. 2017-1 (May 2017) *Increse max. points to 1,200,000 Mixer *updated based on user feedbsck. Mixer *All floating input parameters changed Mixer to character input + IN9 conversion. Mixer Mixer OWNED, MAINTAINED AND DISTRIBUTED BY Mixer _____ Mixer THE NUCLEAR DATA SECTION Mixer INTERNATIONAL ATOMIC ENERGY AGENCY Mixer P.O. BOX 100 Mixer A-1400, VIENNA, AUSTRIA Mixer EUROPE Mixer Mixer ORIGINALLY WRITTEN BY Mixer _____ Mixer Dermott E. Cullen Mixer Mixer PRESENT CONTACT INFORMATION Mixer Mixer Dermott E. Cullen Mixer 1466 Hudson Way Mixer Livermore, CA 94550 Mixer U.S.A. Mixer Telephone 925-443-1911 Mixer E. Mail RedCullen1@Comcast.net Mixer Website RedCullen1.net/HOMEPAGE.NEW Mixer Mixer PURPOSE Mixer ----Mixer THIS PROGRAM IS DESIGNED TO CALCULATE THE ENERGY DEPENDENT CROSS Mixer SECTION FOR A COMPOSITE MIXTURE OF UP TO 10 DIFFERENT MATERIALS. Mixer Mixer THE PRESENT VERSION WILL ONLY CALCULATE THE CROSS SECTION FOR ONE Mixer FINAL REACTION (ENDF/B SECTION), E.G. TOTAL CROSS SECTION, BUT NOT Mixer ANY OTHER REACTION. Mixer Mixer NOTE, THIS PROGRAM WILL NOT COMBINE ALL REACTIONS FOR A MIXTURE Mixer OF MATERIALS DURING A SINGLE RUN - ONLY ONE REACTION WILL BE Mixer CREATED PER RUN. Mixer Mixer EVALUATED DATA FORMAT Mixer Mixer THE CROSS SECTIONS ARE READ FROM THE ENDF/B FORMAT AND THE Mixer COMPOSITE CROSS SECTION IS CONVERTED TO AN EQUIVALENT BARNS/ATOM Mixer FORM AND OUTPUT IN THE ENDF/B FORMAT WITH AN EQUIVALENT ATOMIC Mixer WEIGHT. THE USER MUST SPECIFY THE COMPOSITION BY GIVING THE ZA, Mixer MT AND GRAMS OR ATOMS OF EACH CONSTITUENT. IN ADDITION THE USER Mixer IDENTIFY THE COMPOSITE CROSS SECTION BY SPECIFYING THE ZA, MAT Mixer AND MT TO BE USED IN THE ENDF/B FORMATTED OUTPUT. Mixer Mixer SINCE ONLY THE CROSS SECTIONS IN FILE 3 AND 23 ARE USED, AND THE Mixer FORMAT FOR FILE 3/23 IS THE SAME IN ALL VERSIONS ON ENDF/B, THIS Mixer

PROGRAM MAY BE USED WITH ANY VERSION OF ENDF/B DATA (I.E., Mixer ENDF/B-I, II, III, IV, V OR VI). DURING A SINGLE RUN IT MAY EVEN Mixer BE USED TO READ AND COMBINE EVALUATIONS WHICH ARE IN DIFFERENT Mixer VERSIONS OF THE ENDF/B FORMAT. Mixer Mixer ENDF/B FORMATTED OUTPUT WILL BE IN THE ENDF/B-VI FORMAT REGARDLESS Mixer OF THE FORMAT OF THE INPUT ENDF/B DATA. THIS WILL ONLY EFFECT THE Mixer HOLLERITH SECTION (MF=1, MT=451). THE FORMAT OF CROSS SECTIONS Mixer (MF=3) IS THE SAME IN ALL VERSION OF THE ENDF/B FORMAT. Mixer Mixer IN ORDER TO GUARANTEE PROPER OPERATION OF THIS PROGRAM THE DATA Mixer MUST BE PROPERLY CODED IN THE ENDF/B FORMAT. NO ERROR CHECKING IS Mixer PERFORMED. IT IS PARTICULARLY IMPORTANT THAT THE FOLLOWING DATA Mixer BE CORRECT Mixer Mixer (1) ZA, MF, MT - MUST BE CORRECT IN ORDER TO ALLOW PROGRAM TO Mixer SELECT THE APPROPRIATE SECTIONS TO BE COMBINED. Mixer (2) AWRE - ATOMIC WEIGHT RATIO MUST BE CORRECT TO ALLOW PROGRAM Mixer TO CONVERT THE USER SPECIFIED GRAMS INTO ATOMS FOR Mixer PROPER ATOM RATIO MIXING. Mixer (3) (ENERGIES, CROSS SECTIONS) - MUST BE CORRECT, LINEARLY Mixer _____ Mixer INTERPOLABLE, IN ASCENDING ENERGY ORDER OF (E, BARNS). Mixer _____ Mixer Mixer TO CONVERT ENDF/B FORMATTED DATA TO THE REQUIRED INPUT FORM Mixer THE FOLLOWING PROGRAMS MAY BE USED, Mixer LINEAR - CONVERT TABULATED CROSS SECTIONS TO LINEARLY Mixer INTERPOLABLE FORM. Mixer RECENT - RECONSTRUCT RESONANCE CONTRIBUTION, ADD TO BACKGROUND Mixer CROSS SECTION AND OUTPUT THE COMBINATION IN LINEARLY Mixer INTERPOLABLE FORM. Mixer SIGMA1 - DOPPLER BROADEN CROSS SECTIONS TO ANY TEMPERATURE AND Mixer OUTPUT THE RESULT IN LINEARLY INTERPOLABLE FORM. Mixer Mixer DOCUMENTATION Mixer Mixer THE FACT THAT THIS PROGRAM HAS COMBINED THE DATA IS DOCUMENTED Mixer IN THE OUTPUT ENDF/B FORMAT IN THE HOLLERITH SECTION BY FIRST Mixer IDENTIFYING THE VERSION OF THIS PROGRAM THAT WAS USED, IN THE FORM Mixer Mixer Mixer THIS IS FOLLOWED BY THE TWO LINE IDENTIFICATION INPUT BY THE USER. Mixer THIS IS FOLLOWED BY COMPOSITION INPUT BY THE USER. Mixer Mixer NEUTRON OR PHOTON DATA Mixer ------Mixer THIS PROGRAM WILL ALLOW YOU TO PROCESS EITHER NEUTRON OR PHOTON Mixer CROSS SECTIONS - BUT YOU CANNOT MIX THE TWO TYPES TOGETHER. BY Mixer INPUT YOU CAN SPECIFY THE OUTPUT MF = 3 (NEUTRONS) OR 23 (PHOTONS) Mixer WHATEVER TYPE YOU SPECIFIED FOR OUTPUT IS THE ONLY TYPE OF DATA Mixer WHICH WILL BE PROCESSED BY THIS PROGRAM. Mixer Mixer DEFINING THE COMPOSITION Mixer _____ Mixer THE USER MAY SPECIFY UP TO 10 DIFFERENT SECTIONS OF DATA TO BE Mixer COMBINED, EACH SECTION IDENTIFIED BY ZA AND MT NUMBER. THE Mixer AMOUNT OF EACH MATERIAL IS SPECIFIED BY DEFINING THE NUMBER OF Mixer GRAMS OF EACH MATERIAL IN THE COMPOSITE MIXTURE. THIS CAN BE Mixer DERIVED FROM THE VOLUME FRACTION SIMPLY BY MULTIPLYING THE STP Mixer DENSITY OF EACH MATERIAL BY ITS VOLUME FRACTION. NOTE, DO NOT Mixer INPUT ATOM FRACTIONS. Mixer

Mixer THE LIST OF SECTIONS TO BE COMBINED MAY BE SPECIFIED IN ANY Mixer ORDER, I.E. THEY NEED NOT BE IN ZA ORDER OR THE ORDER THAT THE Mixer EVALUATED DATA APPEARS ON THE ENDF/B FORMATTED TAPE. Mixer Mixer IF ANY REQUESTED SECTION OF DATA IS NOT FOUND ON THE ORIGINAL Mixer ENDF/B FORMATTED FILE, THE PROGRAM WILL PRINT A LIST OF THE Mixer MISSING SECTIONS AND TERMINATE. IF ALL REQUESTED SECTIONS ARE Mixer FOUND THE PROGRAM WILL PRODUCE A COMPOSITE SECTION USING THE Mixer UNION OF ALL ENERGIES FOUND IN ANY SECTION. THE COMPOSITE SECTION Mixer WILL NOT BE THINNED. Mixer Mixer PRIOR TO LATER USE IN ANY APPLICATION THE NUMBER OF ENERGY POINTS Mixer IN THE COMPOSITE CROSS SECTION MAY BE MINIMIZED BY USING PROGRAM Mixer LINEAR, UCRL-50400, VOL. 17, PART B TO THIN THE DATA. Mixer Mixer ONLY LINEARLY INTERPOLABLE DATA Mixer -----Mixer THE CROSS SECTIONS TO BE COMBINED MUST BE IN LINEARLY INTERPOLABLE Mixer TABULATED FORM (I. E., FILE 3 OR 23, INTERPOLATION LAW 2). Mixer Mixer TO CONVERT TABULATED CROSS SECTIONS TO LINEARLY INTERPOLABLE FORM Mixer SEE, PROGRAM LINEAR, UCRL-50400, VOL. 17, PART A. Mixer Mixer TO CONVERT RESONANCE PARAMETERS TO LINEARLY INTERPOLABLE FORM SEE, Mixer PROGRAM RECENT, UCRL-50400, VOL. 17, PART C. Mixer Mixer TO DOPPLER BROADEN LINEARLY INTERPOLABLE DATA TO ANY TEMPERATURE Mixer SEE PROGRAM SIGMA1, UCRL-50400, VOL. 17, PART B. Mixer Mixer PAGING SYSTEM Mixer _____ Mixer THERE IS NO LIMIT TO THE THE NUMBER OF DATA POINTS IN EACH OF THE Mixer SECTIONS TO BE COMBINED, NOR IS THERE A LIMIT TO THE NUMBER OF Mixer DATA POINTS IN THE COMPOSITE MIXTURE CROSS SECTION. Mixer Mixer ALL REQUIRED SECTIONS OF DATA ARE READ FROM THE ORIGINAL ENDF/B Mixer FORMATTED FILE. ANY SECTION OF 60000 OR FEWER POINTS WILL BE Mixer TOTALLY CORE RESIDENT. LARGER SECTIONS ARE LOADED INTO A PAGING Mixer SYSTEM USING A SCRATCH FILE WITH ONLY 60000 POINTS PER SECTION Mixer CORE RESIDENT AT ANY ONE TIME. SIMILARLY THE COMPOSITE SECTION Mixer WILL BE TOTALLY CORE RESIDENT IF IT CONTAINS 60000 OR FEWER POINTS Mixer AND LARGER COMPOSITE SECTIONS WILL BE LOADED INTO A PAGING Mixer SYSTEM WHERE ONLY 60000 POINTS ARE CORE RESIDENT AT ANY TIME. SINC Mixer A PAGING SYSTEM MAY BE USED BY ANY SECTION OF DATA THERE IS NO Mixer LIMIT TO THE SIZE OF EITHER THE ORIGINAL SECTIONS, NOR TO THE Mixer COMPOSITE SECTION, E.G. A SECTION MAY CONTAIN 100,000 ENERGIES Mixer AND CROSS SECTIONS TO DESCRIBE A GIVEN REACTION. Mixer Mixer PAGE SIZE Mixer Mixer THE PAGE SIZE USED IN THIS PROGRAM IS DEFINED BY THE PARAMETER Mixer NPAGE AND THE DIMENSIONS OF THE ARRAYS XTAB AND YTAB. IN ORDER Mixer TO ADAPT THIS PROGRAM FOR USE ON ANY COMPUTER THE PAGE SIZE MAY Mixer BE INCREASED OR DECREASED BUT THE FOLLOWING RULES MUST BE FOLLOWED Mixer ____ Mixer Mixer (1) NPAGE - MUST BE A MULTIPLE OF 3 IN ORDER TO ALLOW THE PROGRAM Mixer TO READ FULL CARDS OF ENDF/B DATA (3 POINTS PER LINE). FAILURE Mixer TO FOLLOW THIS RULE CAN LEAD TO LOSS OF DATA AND/OR PROGRAM Mixer ERRORS DURING EXECUTION. Mixer (3) YTAB - THE DIMENSION OF YTAB MUST BE (NPAGE, 11). Mixer (4) XTAB - THE DIMENSION OF XTAB MUST BE (NPAGE, 11). Mixer

Mixer DOPPLER BROADENING Mixer Mixer _____ THE COMPOSITE CROSS SECTION OUTPUT FROM THIS PROGRAM SHOULD NOT Mixer BE DOPPLER BROADENED USING PROGRAM SIGMA1, OR THE EQUIVALENT. THE Mixer ATOMIC WEIGHT USED TO IDENTIFY THE COMPOSITE MIXTURE IS BASED ON Mixer THE ATOM FRACTION OF EACH CONSTITUENT AND CANNOT BE USED TO Mixer CHARACTERIZE THE BROADENING OF ANY GIVEN RESONANCE IN THE MIXTURE Mixer DUE TO THE CONTRIBUTION OF ONE CONSTITUENT. IN ORDER TO CONSIDER Mixer DOPPLER BROADENING FIRST USE PROGRAM SIGMA1 TO BROADEN THE CROSS Mixer SECTION FOR EACH OF THE CONSTITUENTS AND THEN COMBINE THE Mixer BROADENED DATA USING PROGRAM MIXER. Mixer Mixer EXAMPLE USE Mixer -----Mixer THE OUTPUT FROM THIS PROGRAM HAS BEEN FOUND TO BE EXTREMELY Mixer USEFUL IN THE FOLLOWING APPLICATIONS... Mixer Mixer (1) CALCULATE A COMPOSITE TOTAL CROSS SECTON FOR LATER USE AS Mixer A WEIGHTING FUNCTION IN SELF-SHIELDING THE CROSS SECTIONS Mixer OF EACH CONSTITUENT OF THE MIXTURE SEPARATELY. Mixer Mixer PROGRAM GROUPIE CAN USE THE CALCULATED COMPOSITE TOTAL CROSS Mixer SECTION AS THE TOTAL CROSS SECTION FOR EACH CONSTITUENT OF Mixer THE MIXTURE IN ORDER TO CALCULATE SELF-SHIELDED CROSS SECTION Mixer FOR EACH CONSTITUENT OF THE MIXTURE. Mixer Mixer (2) CALCULATE COMPOSITE TOTAL AND FISSION CROSS SECTIONS IN Mixer ORDER TO CALCULATE THE TRANSMISSION AND SELF-INDICATION Mixer THROUGH COMPOSITE MATERIALS. GENERALLY IN THIS CASE THE Mixer TOTAL CROSS SECTION WILL BE CALCULATED FOR THE COMPOSITION Mixer OF THE SAMPLE AND THE FISSION CROSS SECTION WILL BE Mixer CALCULATED FOR THE COMPOSITION OF THE FISSION CHAMBER Mixer (WHICH GENERALLY WILL HAVE A DIFFERENT COMPOSITION THAN THE Mixer SAMPLE). Mixer Mixer PROGRAM VIRGIN CAN USE THE OUTPUT FROM THIS PROGRAM TO Mixer PERFORM TRANSMISSION AND SELF-INDICATION CALCULATIONS. Mixer PROGRAM VIRGIN WILL ANALYTICALLY CALCULATE THE UNCOLLIDED Mixer (I.E. VIRGIN) FLUX TRANSMITTED AND REACTION RATE DUE TO ANY Mixer TABULATED LINEARLY INTERPOLABLE INCIDENT SPECTRUM. RESULTS Mixer WILL BE PRESENTLY FOR UP TO 10 DIFFERENT SAMPLE THICKNESSES Mixer AND BINNED INTO ENERGY GROUPS IN ORDER TO SIMULATE AN Mixer EXPERIMENTAL MEASUREMENT. Mixer Mixer (3) THE OUTPUT FROM THIS PROGRAM IS VERY USEFUL TO PLOT IN ORDER Mixer TO SEE THE IMPORTANCE OF SPECIFIC CROSS SECTION FEATURES IN Mixer THE COMPOSITE CROSS SECTION. Mixer Mixer PROGRAM COMPLOT CAN BE USED TO PLOT THE OUTPUT FROM THIS Mixer PROGRAM AND IF REQUIRED EXAMINE ANY PARTICULAR ENERGY RANGE Mixer IN DETAIL. IN ORDER TO DO THIS THE (ZA, MT) EQUIVALENCE OPTION Mixer OF PROGRAM COMPLOT SHOULD BE USED. TO COMPARE ANY CONSTITUENT Mixer CROSS SECTION TO THE COMPOSITE CROSS SECTION THE INPUT TO Mixer COMPLOT SHOULD EQUATE THE (ZA, MT) OF THE COMPOSITE TO THE Mixer (ZA,MT) OF ONE CONSTITUENT AND THE MULTIPLIER INPUT TO Mixer COMPLOT SHOULD BE THE ATOM FRACTION FOR THE CONSTITUENT (THE Mixer ATOM FRACTIONS ARE DEFINED IN THE OUTPUT LISTING FROM PROGRAM Mixer MIXER). Mixer Mixer INPUT FILES Mixer Mixer _____ UNIT DESCRIPTION Mixer

2	TNIDIIM		ATED DAT		Mixe Mixe Mixe	
	INPUT CARDS (BCD - 80 CHARACTERS/RECORD) ORIGINAL EVALUATED DATA IN ENDF/B FORMAT					
10	ORIGIN			CHARACTERS/RECORD)	Mixei	
		(В	00			
		-			Mixe: Mixe:	
OUTPUT FILES						
	DESCRI				Mixer	
					Mixe	
			-	120 CHARACTERS/RECORD)	Mixe	
11	COMPOSITE EVALUATED DATA IN ENDF/B FORMAT					
		(BCD	- 80 CH	HARACTERS/RECORD)	Mixe	
					Mixe	
SCRATCH FILES						
UNIT	UNIT DESCRIPTION					
					Mixe	
12	SCRATC	H FILE F	OR EACH	OF THE 10 SECTIONS WHICH	Mixer	
13	WILL E	SE ADDED	TOGETHER	R TO DEFINE THE FINAL	Mixe	
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STAND	ARD FTT	E NAMES	(SEE SUB	ROUTINES FILIO1 AND FILIO2)	Mixe	
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2 3 10 11	 MIXER. MIXER. ENDFB.	INP LST IN OUT			Mixer Mixer Mixer Mixer Mixer Mixer	
2 3 10 11 12-22	MIXER. MIXER. ENDFB. ENDFB. (SCRAI	INP LST IN OUT			Mixen Mixen Mixen Mixen Mixen Mixen Mixen	
2 3 10 11 12-22 INPUT	MIXER. MIXER. ENDFB. ENDFB. (SCRAI	INP LST IN OUT			Mixed Mixed Mixed Mixed Mixed Mixed Mixed Mixed	
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2 3 10 11 2-22 INPUT LINE	MIXER. MIXER. ENDFB. ENDFB. (SCRAI CARDS COLS.	INP LST IN OUT CCH) FORMAT		DESCRIPTION	Mixed Mixed Mixed Mixed Mixed Mixed Mixed Mixed Mixed Mixed	
2 3 10 11 2-22 INPUT LINE	MIXER. MIXER. ENDFB. ENDFB. (SCRAI CARDS COLS.	INP LST IN OUT CCH) FORMAT			Mixed Mixed Mixed Mixed Mixed Mixed Mixed Mixed Mixed Mixed Mixed	
2 3 10 11 2-22 INPUT LINE	MIXER. MIXER. ENDFB. ENDFB. (SCRAI CARDS COLS.	INP LST IN OUT CCH) FORMAT		TWO LINE TITLE DESCRIBING PROBLEM	Mixen Mixen Mixen Mixen Mixen Mixen Mixen Mixen Mixen Mixen	
2 3 10 11 2-22 INPUT LINE	MIXER. MIXER. ENDFB. ENDFB. (SCRAI CARDS COLS.	INP LST IN OUT CCH) FORMAT			Mixed Mixed Mixed Mixed Mixed Mixed Mixed Mixed Mixed Mixed Mixed	
2 3 10 11 2-22 INPUT LINE	MIXER. MIXER. ENDFB. ENDFB. (SCRAI CARDS COLS.	INP LST IN OUT CCH) FORMAT		TWO LINE TITLE DESCRIBING PROBLEM	Mixen Mixen Mixen Mixen Mixen Mixen Mixen Mixen Mixen Mixen	
2 3 10 11 2-22 INPUT LINE	MIXER. MIXER. ENDFB. ENDFB. (SCRAI CARDS COLS.	INP LST IN OUT CCH) FORMAT		TWO LINE TITLE DESCRIBING PROBLEM (THIS TITLE IS USED TO IDENTIFY THE	Mixen Mixen Mixen Mixen Mixen Mixen Mixen Mixen Mixen Mixen	
2 3 10 11 2-22 INPUT LINE	MIXER. MIXER. ENDFB. ENDFB. (SCRAI CARDS COLS.	INP LST IN OUT CCH) FORMAT		TWO LINE TITLE DESCRIBING PROBLEM (THIS TITLE IS USED TO IDENTIFY THE OUTPUT LISTING AND IS ALSO WRITTEN	Mixed Mixed Mixed Mixed Mixed Mixed Mixed Mixed Mixed Mixed Mixed Mixed	
2 3 10 11 2-22 INPUT LINE	MIXER. MIXER. ENDFB. ENDFB. (SCRAI CARDS COLS.	INP LST IN OUT CCH) FORMAT		TWO LINE TITLE DESCRIBING PROBLEM (THIS TITLE IS USED TO IDENTIFY THE OUTPUT LISTING AND IS ALSO WRITTEN IN MF=1, MT=451 (HOLLERITH SECTION)	Mixed Mixed Mixed Mixed Mixed Mixed Mixed Mixed Mixed Mixed Mixed Mixed Mixed	
2 3 10 11 2-22 INPUT LINE	MIXER. MIXER. ENDFB. (SCRAT CARDS CARDS COLS. 1-66	INP LST IN OUT CCH) FORMAT		TWO LINE TITLE DESCRIBING PROBLEM (THIS TITLE IS USED TO IDENTIFY THE OUTPUT LISTING AND IS ALSO WRITTEN IN MF=1, MT=451 (HOLLERITH SECTION) OF THE ENDF/B FORMATTED OUTPUT TO	Mixed Mixed Mixed Mixed Mixed Mixed Mixed Mixed Mixed Mixed Mixed Mixed Mixed	
2 3 10 11 2-22 INPUT LINE 1-2	MIXER. MIXER. ENDFB. (SCRAT CARDS COLS. 1-66	INP LST IN OUT CCH) FORMAT		TWO LINE TITLE DESCRIBING PROBLEM (THIS TITLE IS USED TO IDENTIFY THE OUTPUT LISTING AND IS ALSO WRITTEN IN MF=1, MT=451 (HOLLERITH SECTION) OF THE ENDF/B FORMATTED OUTPUT TO IDENTIFY THE COMPOSITE MIXTURE). ENDF/B INPUT DATA FILENAME	Mixed Mixed Mixed Mixed Mixed Mixed Mixed Mixed Mixed Mixed Mixed Mixed Mixed Mixed Mixed	
2 3 10 11 2-22 INPUT LINE 1-2	MIXER. MIXER. ENDFB. (SCRAT CARDS COLS. 1-66	INP LST IN OUT CCH) FORMAT		TWO LINE TITLE DESCRIBING PROBLEM (THIS TITLE IS USED TO IDENTIFY THE OUTPUT LISTING AND IS ALSO WRITTEN IN MF=1, MT=451 (HOLLERITH SECTION) OF THE ENDF/B FORMATTED OUTPUT TO IDENTIFY THE COMPOSITE MIXTURE). ENDF/B INPUT DATA FILENAME (STANDARD OPTION = ENDFB.IN)	Mixed Mixed Mixed Mixed Mixed Mixed Mixed Mixed Mixed Mixed Mixed Mixed Mixed Mixed Mixed Mixed	
2 3 10 11 2-22 INPUT LINE 1-2	MIXER. MIXER. ENDFB. (SCRAT CARDS COLS. 1-66	INP LST IN OUT CCH) FORMAT		TWO LINE TITLE DESCRIBING PROBLEM (THIS TITLE IS USED TO IDENTIFY THE OUTPUT LISTING AND IS ALSO WRITTEN IN MF=1, MT=451 (HOLLERITH SECTION) OF THE ENDF/B FORMATTED OUTPUT TO IDENTIFY THE COMPOSITE MIXTURE). ENDF/B INPUT DATA FILENAME (STANDARD OPTION = ENDFB.IN) ENDF/B OUTPUT DATA FILENAME	Mixed Mixed Mixed Mixed Mixed Mixed Mixed Mixed Mixed Mixed Mixed Mixed Mixed Mixed Mixed Mixed	
2 3 10 11 12-22 INPUT LINE 1-2 3 4	MIXER. MIXER. ENDFB. (SCRAT CARDS COLS. 1-66	INP LST IN OUT CCH) FORMAT 16A4,A2	TITLE	TWO LINE TITLE DESCRIBING PROBLEM (THIS TITLE IS USED TO IDENTIFY THE OUTPUT LISTING AND IS ALSO WRITTEN IN MF=1, MT=451 (HOLLERITH SECTION) OF THE ENDF/B FORMATTED OUTPUT TO IDENTIFY THE COMPOSITE MIXTURE). ENDF/B INPUT DATA FILENAME (STANDARD OPTION = ENDFB.IN) ENDF/B OUTPUT DATA FILENAME (STANDARD OPTION = ENDFB.OUT)	Mixed Mixed Mixed Mixed Mixed Mixed Mixed Mixed Mixed Mixed Mixed Mixed Mixed Mixed Mixed Mixed Mixed	
2 3 10 11 12-22 INPUT LINE 1-2 3 4 5	MIXER. MIXER. ENDFB. (SCRAT CARDS COLS. 1-66 1-72 1-72 1-72 1-11	INP LST IN OUT CCH) FORMAT 16A4,A2	TITLE	TWO LINE TITLE DESCRIBING PROBLEM (THIS TITLE IS USED TO IDENTIFY THE OUTPUT LISTING AND IS ALSO WRITTEN IN MF=1, MT=451 (HOLLERITH SECTION) OF THE ENDF/B FORMATTED OUTPUT TO IDENTIFY THE COMPOSITE MIXTURE). ENDF/B INPUT DATA FILENAME (STANDARD OPTION = ENDFB.IN) ENDF/B OUTPUT DATA FILENAME (STANDARD OPTION = ENDFB.OUT) ZA IDENTIFICATION FOR COMBINATION	Mixed Mixed Mixed Mixed Mixed Mixed Mixed Mixed Mixed Mixed Mixed Mixed Mixed Mixed Mixed Mixed Mixed Mixed Mixed	
2 3 10 11 12-22 LINE 1-2 3 4 5 5	MIXER. MIXER. ENDFB. (SCRAT CARDS COLS. 1-66 1-72 1-72 1-72 1-11 12-17	INP LST IN OUT CCH) FORMAT 16A4,A2	TITLE IZAOUT MATOUT	TWO LINE TITLE DESCRIBING PROBLEM (THIS TITLE IS USED TO IDENTIFY THE OUTPUT LISTING AND IS ALSO WRITTEN IN MF=1, MT=451 (HOLLERITH SECTION) OF THE ENDF/B FORMATTED OUTPUT TO IDENTIFY THE COMPOSITE MIXTURE). ENDF/B INPUT DATA FILENAME (STANDARD OPTION = ENDFB.IN) ENDF/B OUTPUT DATA FILENAME (STANDARD OPTION = ENDFB.OUT) ZA IDENTIFICATION FOR COMBINATION MAT IDENTIFICATION FOR COMBINATION	Mixed Mixed Mixed Mixed Mixed Mixed Mixed Mixed Mixed Mixed Mixed Mixed Mixed Mixed Mixed Mixed Mixed Mixed Mixed	
2 3 10 11 12-22 LINE 1-2 3 4 5 5 5	MIXER. MIXER. ENDFB. (SCRAT CARDS COLS. 1-66 1-72 1-72 1-72 1-71 12-17 18-19	INP LST IN OUT CCH) FORMAT 16A4,A2	TITLE IZAOUT MATOUT MFOUT	TWO LINE TITLE DESCRIBING PROBLEM (THIS TITLE IS USED TO IDENTIFY THE OUTPUT LISTING AND IS ALSO WRITTEN IN MF=1, MT=451 (HOLLERITH SECTION) OF THE ENDF/B FORMATTED OUTPUT TO IDENTIFY THE COMPOSITE MIXTURE). ENDF/B INPUT DATA FILENAME (STANDARD OPTION = ENDFB.IN) ENDF/B OUTPUT DATA FILENAME (STANDARD OPTION = ENDFB.OUT) ZA IDENTIFICATION FOR COMBINATION MAT IDENTIFICATION FOR COMBINATION MF IDENTIFICATION FOR COMBINATION	Mixed Mixed	
2 3 10 11 12-22 LINE 1-2 3 4 5 5 5 5 5	MIXER. MIXER. ENDFB. (SCRAT CARDS COLS. 1-66 1-72 1-72 1-72 1-71 12-17 18-19 20-22	INP LST IN OUT CCH) FORMAT 16A4,A2	TITLE IZAOUT MATOUT MFOUT MTOUT	TWO LINE TITLE DESCRIBING PROBLEM (THIS TITLE IS USED TO IDENTIFY THE OUTPUT LISTING AND IS ALSO WRITTEN IN MF=1, MT=451 (HOLLERITH SECTION) OF THE ENDF/B FORMATTED OUTPUT TO IDENTIFY THE COMPOSITE MIXTURE). ENDF/B INPUT DATA FILENAME (STANDARD OPTION = ENDFB.IN) ENDF/B OUTPUT DATA FILENAME (STANDARD OPTION = ENDFB.OUT) ZA IDENTIFICATION FOR COMBINATION MAT IDENTIFICATION FOR COMBINATION MF IDENTIFICATION FOR COMBINATION MT IDENTIFICATION FOR COMBINATION	Mixed Mixed	
2 3 10 11 2-22 LINE 1-2 3 4 5 5 5 5 5	MIXER. MIXER. ENDFB. (SCRAT CARDS COLS. 1-66 1-72 1-72 1-72 1-71 12-17 18-19	INP LST IN OUT CCH) FORMAT 16A4,A2	TITLE IZAOUT MATOUT MFOUT MTOUT DEFINE	TWO LINE TITLE DESCRIBING PROBLEM (THIS TITLE IS USED TO IDENTIFY THE OUTPUT LISTING AND IS ALSO WRITTEN IN MF=1, MT=451 (HOLLERITH SECTION) OF THE ENDF/B FORMATTED OUTPUT TO IDENTIFY THE COMPOSITE MIXTURE). ENDF/B INPUT DATA FILENAME (STANDARD OPTION = ENDFB.IN) ENDF/B OUTPUT DATA FILENAME (STANDARD OPTION = ENDFB.OUT) ZA IDENTIFICATION FOR COMBINATION MAT IDENTIFICATION FOR COMBINATION MF IDENTIFICATION FOR COMBINATION MT IDENTIFICATION FOR COMBINATION INPUT DENSITY	Mixed Mixed	
2 3 10 11 12-22 LINE 1-2 3 4 5 5 5 5 5	MIXER. MIXER. ENDFB. (SCRAT CARDS COLS. 1-66 1-72 1-72 1-72 1-71 12-17 18-19 20-22	INP LST IN OUT CCH) FORMAT 16A4,A2	IZAOUT MATOUT MFOUT MTOUT DEFINE = 0 = G	TWO LINE TITLE DESCRIBING PROBLEM (THIS TITLE IS USED TO IDENTIFY THE OUTPUT LISTING AND IS ALSO WRITTEN IN MF=1, MT=451 (HOLLERITH SECTION) OF THE ENDF/B FORMATTED OUTPUT TO IDENTIFY THE COMPOSITE MIXTURE). ENDF/B INPUT DATA FILENAME (STANDARD OPTION = ENDFB.IN) ENDF/B OUTPUT DATA FILENAME (STANDARD OPTION = ENDFB.OUT) ZA IDENTIFICATION FOR COMBINATION MAT IDENTIFICATION FOR COMBINATION MF IDENTIFICATION FOR COMBINATION MT IDENTIFICATION FOR COMBINATION INPUT DENSITY GRAMS = BACKWARDS COMPATIBLE	Mixed Mixed	
2 3 10 11 2-22 INPUT 1-2 3 4 5 5 5 5 5	MIXER. MIXER. ENDFB. (SCRAT CARDS CARDS COLS. 1-66 1-72 1-72 1-72 1-72 1-72 1-72 2-23-33	INP LST IN OUT CCH) FORMAT 16A4,A2	TITLE IZAOUT MATOUT MFOUT MTOUT DEFINE = $0 = G$ > $0 = A$	TWO LINE TITLE DESCRIBING PROBLEM (THIS TITLE IS USED TO IDENTIFY THE OUTPUT LISTING AND IS ALSO WRITTEN IN MF=1, MT=451 (HOLLERITH SECTION) OF THE ENDF/B FORMATTED OUTPUT TO IDENTIFY THE COMPOSITE MIXTURE). ENDF/B INPUT DATA FILENAME (STANDARD OPTION = ENDFB.IN) ENDF/B OUTPUT DATA FILENAME (STANDARD OPTION = ENDFB.OUT) ZA IDENTIFICATION FOR COMBINATION MAT IDENTIFICATION FOR COMBINATION MF IDENTIFICATION FOR COMBINATION MT IDENTIFICATION FOR COMBINATION INPUT DENSITY GRAMS = BACKWARDS COMPATIBLE ATOMS = NEW IN 2008	Mixed Mixed	
2 3 10 11 12-22 LINE 1-2 3 4 5 5 5 5 5 5	MIXER. MIXER. ENDFB. (SCRAT CARDS COLS. 1-66 1-72 1-72 1-72 1-71 12-17 18-19 20-22	INP LST IN OUT CCH) FORMAT 16A4,A2 I11 I6 I2 I3 I11 I11 I11	IZAOUT MATOUT MFOUT MTOUT DEFINE = 0 = G > 0 = A IZAGET	TWO LINE TITLE DESCRIBING PROBLEM (THIS TITLE IS USED TO IDENTIFY THE OUTPUT LISTING AND IS ALSO WRITTEN IN MF=1, MT=451 (HOLLERITH SECTION) OF THE ENDF/B FORMATTED OUTPUT TO IDENTIFY THE COMPOSITE MIXTURE). ENDF/B INPUT DATA FILENAME (STANDARD OPTION = ENDFB.IN) ENDF/B OUTPUT DATA FILENAME (STANDARD OPTION = ENDFB.OUT) ZA IDENTIFICATION FOR COMBINATION MAT IDENTIFICATION FOR COMBINATION MF IDENTIFICATION FOR COMBINATION MT IDENTIFICATION FOR COMBINATION INPUT DENSITY GRAMS = BACKWARDS COMPATIBLE ATOMS = NEW IN 2008 ZA (1000*Z+A) OF MATERIAL	Mixed Mixed	
2 3 10 11 2-22 INPUT 1-2 3 4 5 5 5 5 5 5 5 5	MIXER. MIXER. ENDFB. (SCRAT CARDS CARDS COLS. 1-66 1-72 1-72 1-72 1-72 1-72 1-72 2-23-33	INP LST IN OUT CCH) FORMAT 16A4,A2 I11 I6 I2 I3 I11 I11 I11	IZAOUT MATOUT MFOUT MTOUT DEFINE = 0 = G > 0 = A IZAGET	TWO LINE TITLE DESCRIBING PROBLEM (THIS TITLE IS USED TO IDENTIFY THE OUTPUT LISTING AND IS ALSO WRITTEN IN MF=1, MT=451 (HOLLERITH SECTION) OF THE ENDF/B FORMATTED OUTPUT TO IDENTIFY THE COMPOSITE MIXTURE). ENDF/B INPUT DATA FILENAME (STANDARD OPTION = ENDFB.IN) ENDF/B OUTPUT DATA FILENAME (STANDARD OPTION = ENDFB.OUT) ZA IDENTIFICATION FOR COMBINATION MAT IDENTIFICATION FOR COMBINATION MF IDENTIFICATION FOR COMBINATION MT IDENTIFICATION FOR COMBINATION INPUT DENSITY GRAMS = BACKWARDS COMPATIBLE ATOMS = NEW IN 2008 ZA (1000*Z+A) OF MATERIAL MT OF REACTION	Mixed Mixed	
2 3 10 11 2-22 LINE 1-2 3 4 5 5 5 5 5 5 5 5 6-N 6-N	MIXER. MIXER. ENDFB. (SCRAT CARDS COLS. 1-66 1-72 1-72 1-72 1-72 1-72 1-72 23-33 1-11 12-22	INP LST IN OUT CCH) FORMAT 16A4,A2 I11 I6 I2 I3 I11 I11 I11	IZAOUT MATOUT MFOUT MTOUT DEFINE = 0 = G > 0 = A IZAGET	TWO LINE TITLE DESCRIBING PROBLEM (THIS TITLE IS USED TO IDENTIFY THE OUTPUT LISTING AND IS ALSO WRITTEN IN MF=1, MT=451 (HOLLERITH SECTION) OF THE ENDF/B FORMATTED OUTPUT TO IDENTIFY THE COMPOSITE MIXTURE). ENDF/B INPUT DATA FILENAME (STANDARD OPTION = ENDFB.IN) ENDF/B OUTPUT DATA FILENAME (STANDARD OPTION = ENDFB.OUT) ZA IDENTIFICATION FOR COMBINATION MAT IDENTIFICATION FOR COMBINATION MF IDENTIFICATION FOR COMBINATION MT IDENTIFICATION FOR COMBINATION INPUT DENSITY GRAMS = BACKWARDS COMPATIBLE ATOMS = NEW IN 2008 ZA (1000*Z+A) OF MATERIAL MT OF REACTION	Mixed Mixed	
2 3 10 11 2-22 LINE 1-2 3 4 5 5 5 5 5 5 5 5 6-N 6-N	MIXER. MIXER. ENDFB. (SCRAT CARDS COLS. 1-66 1-72 1-72 1-72 1-72 1-72 1-72 23-33 1-11 12-22	INP LST IN OUT CCH) FORMAT 16A4,A2 I11 I6 I2 I3 I11 I11 I11 I11	IZAOUT MATOUT MFOUT MTOUT DEFINE = 0 = G > 0 = A IZAGET MTGET	TWO LINE TITLE DESCRIBING PROBLEM (THIS TITLE IS USED TO IDENTIFY THE OUTPUT LISTING AND IS ALSO WRITTEN IN MF=1, MT=451 (HOLLERITH SECTION) OF THE ENDF/B FORMATTED OUTPUT TO IDENTIFY THE COMPOSITE MIXTURE). ENDF/B INPUT DATA FILENAME (STANDARD OPTION = ENDFB.IN) ENDF/B OUTPUT DATA FILENAME (STANDARD OPTION = ENDFB.OUT) ZA IDENTIFICATION FOR COMBINATION MAT IDENTIFICATION FOR COMBINATION MF IDENTIFICATION FOR COMBINATION MT IDENTIFICATION FOR COMBINATION INPUT DENSITY GRAMS = BACKWARDS COMPATIBLE ATOMS = NEW IN 2008 ZA (1000*Z+A) OF MATERIAL MT OF REACTION	Mixed Mixed	

SINCE THE ENDF/B FORMATTED OUTPUT IS IN BARNS/ATOM FORM A MINIMUM Mixer OF TWO SECTIONS MUST BE COMBINED (I.E., IF ONLY ONE SECTION IS Mixer SPECIFIED THE OUTPUT WOULD BE IDENTICAL TO THE INPUT AND AS SUCH Mixer THE PROGRAM WILL CONSIDER THIS TO BE AN ERROR AND NOT PERFORM THE Mixer CALCULATION). THE LIST OF SECTIONS IS TERMINATED BY A BLANK LINE. Mixer Mixer THE LIST OF SECTIONS TO BE COMBINED MAY BE SPECIFIED IN ANY Mixer ORDER, I.E. THEY NEED NOT BE IN ZA ORDER OR THE ORDER THAT THE Mixer EVALUATED DATA APPEARS ON THE ENDF/B FORMATTED TAPE. Mixer Mixer EXAMPLE INPUT NO. 1 Mixer _____ Mixer CREATE THE TOTAL CROSS SECTION (MT=1) FOR STAINLESS STEEL AND Mixer IDENTIFY THE COMBINED MATERIAL WITH ZA=26800 AND MAT=4000, Mixer THE COMPOSITION BY VOLUME OF THE STEEL WILL BE... Mixer Mixer THE DATA FROM \ENDFB6\K300\LIBRARY.DAT AND WRITE DATA TO Mixer \MIXER\STEEL.DAT Mixer Mixer - 74.8 PER-CENT IRON Mixer CHROMIUM - 16.0 Mixer NICKEL - 6.0 Mixer MANGANESE - 2.0 Mixer SILICON - 1.0 Mixer - 0.2 CARBON Mixer Mixer THE INPUT MUST SPECIFY THE COMPOSITION BY GRAMS OR ATOMS. THIS IS Mixer DEFINED AS THE PRODUCT OF THE STANDARD DENSITY (GRAMS) Mixer TIMES THE VOLUME FRACTION. FOR THIS EXAMPLE THE FOLLOWING 12 Mixer INPUT CARDS ARE REQUIRED.... Mixer Mixer STAINLESS STEEL. COMPOSITION BY PER-CENT VOLUME IS 74.8-IRON, Mixer 16-CHROME, 6-NICKEL, 2-MANGANESE, 1-SILICON, 0.2-CARBON Mixer \ENDFB6\K300\LIBRARY.DAT Mixer \MIXER\STEEL.DAT Mixer 26800 4000 3 1 0 Mixer 26000 1 5.88676 (NOTE, GRAMS INPUT FOR EACH Mixer CONSTITUENT, E.G. FOR IRON THE 24000 1 1.150448 Mixer 28000 1 0.533928 STP DENSITY IS 7.87 GRAMS. Mixer 1 0.1486 THE INPUT VALUE OF 5.88676 IS 25055 Mixer 0.748 X 7.87, I.E. VOLUME 14000 1 0.0233 Mixer 6012 1 0.0044958 FRACTION TIMES STP DENSITY). Mixer (BLANK LINE TERMINATES INPUT LIST) Mixer Mixer EXAMPLE INPUT NO. 2 Mixer -----Mixer THE SAME EXAMPLE AS THE ABOVE PROBLEM, ONLY USE THE STANDARD Mixer ENDF/B DATA FILENAMES - ENDFB.IN AND ENDFB.OUT (THIS CAN BE Mixer DONE BY LEAVING THE THIRD AND FOURTH INPUT LINES BLANK). Mixer FOR THIS EXAMPLE THE FOLLOWING 12 INPUT CARDS ARE REQUIRED.... Mixer Mixer STAINLESS STEEL. COMPOSITION BY PER-CENT VOLUME IS 74.8-IRON, Mixer 16-CHROME, 6-NICKEL, 2-MANGANESE, 1-SILICON, 0.2-CARBON Mixer (NOTE - THIS LINE IS REALLY BLANK) Mixer (NOTE - THIS LINE IS REALLY BLANK) Mixer 26800 4000 3 1 Mixer 1 5.88676 (NOTE, GRAMS INPUT FOR EACH 26000 Mixer 24000 1 1.150448 CONSTITUENT, E.G. FOR IRON THE Mixer 28000 1 0.533928 STP DENSITY IS 7.87 GRAMS. Mixer 25055 1 0.1486 THE INPUT VALUE OF 5.88676 IS Mixer 14000 1 0.0233 0.748 X 7.87, I.E. VOLUME Mixer 1 0.0044958 FRACTION TIMES STP DENSITY). 6012 Mixer (BLANK LINE TERMINATES INPUT LIST) Mixer

Mixer
Mixer