MASTER

HEAVY WATER ORGANIC COOLED REACTOR

CLIP
A PROGRAM TO
CONSTRUCT, UPDATE, AND LIST
THE FORM OR THREDES
MASTER DATA TAPE

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ABSTRACT

CLIP is the library tape manipulation program for THREDES and the FORTRAN 4 version of FORM. This program performs the following tasks:

1. Convert a FORTRAN 2 FORM tape to FORTRAN 4 and construct a new FORM or THREDES tape.
2. Create a master FORM or THREDES tape from cards.
3. Update the FORM cross-sections on either a FORM or THREDES tape.
4. List the FORM or THREDES tape.
5. Duplicate the FORM or THREDES tape.

The TEMPEST cross-sections (for a THREDES tape) may come from the Decimal or Binary library cards or from an existing THREDES tape.

The FORM cross-sections may come from cards, an existing FORTRAN 2 or 4 FORM tape, or an existing THREDES tape.

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I INTRODUCTION

CLIP combines the FORM tape programs, the TEMPEST library programs² and a routine to convert a FORM tape from FORTRAN 2 to FORTRAN 4. It is now possible to perform in one day what previously required many computer runs. The program was intended primarily for THREDES³, which requires both TEMPEST and FORM libraries, but in addition can be used to maintain a FORTRAN 4 FORM tape.

The following tasks can be performed:

1. Convert a FORTRAN 2 FORM tape to FORTRAN 4 and construct a new FORM or THREDES tape.
2. Create a master FORM or THREDES tape from cards.
3. Update the FORM cross-sections on either FORM or THREDES tape.
4. List the FORM or THREDES tape.
5. Duplicate the FORM or THREDES tape.

The TEMPEST cross-sections (for a THREDES tape) may come from the Decimal or Binary library cards or from an existing THREDES tape.

The FORM cross-sections may come from cards, an existing FORTRAN 2 or 4 FORM tape, or an existing THREDES tape.

In addition, an option has been added to allow the use of FORTRAN (scientific) notation for floating point numbers in place of "excess 50" notation.

The remainder of this document describes data input and operation of the program.

II INPUT PREPARATION

A. Control Card

1. Discussion of Options

a. MASTER

1) FORM

A FORM tape can be made from decimal cards, another FORM tape, or a THREDES tape.

2) THREDES

A THREDES tape can be made from FORM data on cards, or from a FORM tape, or from another THREDES tape and from TEMPEST data on binary or decimal cards, or from another THREDES tape.

b. UPDATE

1) FORM

A FORM tape can be updated from a FORM or a THREDES tape.

2) THREDES

The FORM data from FORM or a THREDES tape can be updated and the TEMPEST data may come from binary or decimal cards, or from another THREDES tape.

c. LIST

1) FORM

FORM data can be listed from a FORM or a THREDES tape.

2) THREDES

A THREDES tape may be listed.

d. CONVERT

1) FORM

A FORTRAN 4 FORM tape can be made from a FORTRAN 2 FORM tape.

2) THREDES

A THREDES tape can be produced from a FORTRAN 2 FORM tape and from TEMPEST data on binary or decimal cards, or from another THREDES tape.

e. The combinations of the above options are limited to those resulting in either a FORM tape, a THREDES tape, or both, and listing thereof, consistent with tape mounting requirements (see Section III).

For example it is not possible to update a FORM and then use the latter to produce a new THREDES tape.

2. Card Format (3(A6,6X))

Control word must begin in the first column of the field (see Section 3).

SymbolOptions

TASK1	MASTER - makes a Master tape (THREDES or FORM)
	UPDATE - updates a Master tape (THREDES or FORM)
	LIST - lists a Master tape (THREDES or FORM)
	CONVERT - converts a FORTRAN 2 FORM Master tape for making a THREDES or FORM tape

The following symbol tells from what source the FORM data will be input.

TASK2	CARDS - decimal cards in either excess 50 or standard E notation. (see Sections D and E)
	FTAPE - a FORM Master tape
	TTAPE - a THREDES Master tape

The following symbol tells from what source the TEMPEST data will be input, if a THREDES tape is to be created, or if left blank, indicates that a FORM tape is to be created.

TASK3

DECIMAL - decimal cards (see Section B)
BINARY - binary cards (see Section C)
TTAPE - a THREDES Master tape
(blank) - a FORM tape is being made, there
is no TEMPEST data

NOTE: An illegal combination of control words or an incorrect control word will cause a normal machine exit with an error message.

3. Sample Control Cards

Cards 1 and 2 of the sample data sheets illustrate making a THREDES tape from a FORTRAN 2 FORM tape and TEMPEST decimal cards, and then listing the resulting tape. Note that card 2 must be placed at the end of the input deck since listing takes place after the tape is made.

Card 3 illustrates making a THREDES tape with the FORM data coming from another THREDES tape and the TEMPEST data coming from binary cards. Putting card 2 at the end of the input deck would list the resulting tape.

Card 4 illustrates updating a THREDES tape. Note only the FORM data may be updated (see Section E). Card 2 at the end of the input deck would list the resulting tape.

FORTRAN FIXED 10 DIGIT DECIMAL DATA

DECK NO. _____ PROGRAMMER _____ DATE _____ PAGE _____ of _____ JOB NO. _____

NUMBER		IDENTIFICATION	DESCRIPTION DO NOT KEY PUNCH
1	C	ONVERT	TASK1
13	F	T A P E	TASK2
25	D	E C I M A L	TASK3
37			
49		73 80	
61		1	
1	L	I S T	
13	T	T A P E	
25	T	T A P E	
37			
49		73 80	
61		2	
1	M	A S T E R	
13	T	T A P E	
25	B	I N A R Y	
37			
49		73 80	
61		3	
1	U	P D A T E	
13	T	T A P E	
25	T	T A P E	
37			
49		73 80	
61		4	

B. TEMPEST Decimal Library

The TEMPEST library format for each element is the following: (See sample data sheets in this section)

1. First Card Format (A6, 3X, I3, 57X, I3)

a. Columns 1 through 6 contain the element name.

b. Columns 10, 11, and 12 contain the element identification number (hundreds, tens, and units in columns 10, 11, and 12, respectively).

c. Columns 70, 71, and 72 contain the number of tabulated entries in the library (hundreds, tens, and units in columns 70, 71, and 72, respectively).

2. Second Card Format (5E10.4)

R_{10} , R_{11} , R_{12} , R_{13} , R_{14} are the terms for the power series which is used to compute cross-sections from 0(0.0001) 0.0009 ev. when the cross-sections are tabulated (see 4 below). For example,

$$[\sqrt{E} \sigma_i(E)] = \sum_{j=0}^4 R_{ij} E^{j/2}$$

3. Third Card Format (5E10.4)

m_i , γ_i , K_i , E_i and γ_i' are the terms for the Breit-Wigner resonance formula and a spare variable. For example,

$$[\sqrt{E} \sigma_i(E)] = \frac{K_i \gamma_i}{(\gamma_i + m_i \sqrt{E})^2 + 4(E - E_i)^2}$$

4. Fourth and Subsequent Card Format (7E10.4)

If it is necessary to tabulate cross-sections as a function of energy (e.g., non- $1/v$ or non-constant cross-sections), it is done here. The program requires that the cross-sections be tabulated at the energy points 0(0.001) 0.05 (0.01) $E_{\max} \leq 2.0$.

There are four sets of cross-section data which are necessary for each element, these are denoted by Set I, Set II, Set III, and Set IV, respectively.

Set I contains the tables or associated power series for $\sqrt{E} \sigma_a(E)$. In this set the element identification numbers must be between 0 and 99. If σ_a is a $1/v$ absorber, then $\sqrt{E} \sigma_a(E)$ is a constant and is entered as R_{10} (see 2nd card format), otherwise $\sqrt{E} \sigma_a(E)$ must be tabulated. If resonance parameters are entered, then any tabulated values will be added to the resonance contributions. Likewise, a $1/v$ absorber with a resonance must have R_{10} and the resonance parameters specified. ν_i is not used.

Set II contains the tables or associated power series for $\sqrt{E} \sigma_f(E)$. In this set the element identification numbers must be between 100 and 199. Remarks concerning resonance parameters, $1/v$ absorbers, and tabulated cross-sections are analogous to those given for Set I. ν_i must be set equal to the number of neutrons per fission.

Set III contains the tables or associated power series for $(1-\bar{\mu}) \bar{\sigma}_S$. In this set the element identification numbers must be between 200 and 299. For elements with constant $\bar{\sigma}_S$ and constant $(1-\bar{\mu})$, $\bar{\sigma}_S$ must be entered as R_{10} and $(1-\bar{\mu})$ must be entered as ν' . If $(1-\bar{\mu}) \bar{\sigma}_S$ is not constant, then this quantity must be tabulated and the power series entered. Also, ν'_i must be set equal to 1.0.

Set IV contains the tables or associated power series for $\xi \bar{\sigma}_S$. In this set the element identification numbers must be between 300 and 399. If $\bar{\sigma}_S$ and ξ are constant, then $\bar{\sigma}_S$ must be entered as R_{10} and ξ must be entered as ν'_i . If $\xi \bar{\sigma}_S$ is not constant, then $\xi \bar{\sigma}_S$ must be tabulated and ν'_i must be set equal to 1.0.

Set V is not necessary for the flux determinations, but it can contain any additional elements which are required for averaging. In this set the element identification numbers can be between 400 and 999. TEMPEST assumes that the entries in this table include a factor of $\sqrt{E}$ so that the averages will have meaning.

Every decimal library must follow a DECIMAL LIBRARY card on which the word DECIMAL is punched in columns 1 through 7. In addition, the DECIMAL LIBRARY card must contain no punches in column 72.

The last card of the decimal library must contain the word X-LAST punched in columns 1 through 6. This card is a signal to the computer that the library has ended.

The following nomenclature is used in the current TEMPEST Library:

<u>Symbol</u>	<u>Element No.</u>	<u>Type of Cross-section</u>
A	000 to 099	$\sqrt{E} \sigma_a$
F	100 to 199	$\sqrt{E} \sigma_f$
X	200 to 299	$(1-\beta) \sigma_s$
M	300 to 299	$\xi \sigma_s$

FORTRAN FIXED 10 DIGIT DECIMAL DATA

DECK NO. _____ PROGRAMMER _____ DATE _____ PAGE 1 of _____ JOB NO. _____

NUMBER		IDENTIFICATION	DESCRIPTION DO NOT KEY PUNCH
1	D	E.C.I.M.A.L. L.I.B.R	
13	A	R Y	
25			
37			
49			
61			
1	H	1 A 1	ELEMENT NAME - ID
13			
25			
37			
49			
61		0	1 0 0 1
1		. 5 2 8 1 E - 0 1	R ₁₀ , R ₁₁ , R ₁₂ , R ₁₃ , R ₁₄
13			
25			
37			
49			
61			1 0 0 2
1		0 . 0	
13			
25			
37			
49			
61			1 0 0 3

FORTRAN FIXED TO DIGIT DECIMAL DATA

DECK NO. _____ PROGRAMMER _____ DATE _____ PAGE 2 of _____ JOB NO. _____

NUMBER		IDENTIFICATION	DESCRIPTION DO NOT KEY PUNCH
1	H F 1 4		ELEMENT NAME - ID
13			
25			
37			
49			
61		73 80	
	 1 1 1	 1 4 0 0 1	NUMBER OF TABULATED ENTRIES
1	. 1 0 2 5 E + 0 2		R ₁₀ , R ₁₁ , R ₁₂ , R ₁₃ , R ₁₄
13			
25			
37	0 0 E + 0 3		
49			
61		73 80	
		 1 4 0 0 2	
1	0 . 0		
13			
25			
37			
49			
61		73 80	
		 1 4 0 0 3	
1	. 1 0 2 5 E + 0 2 + .		
13	1 1 2 3 E + 0 2 + . 1 2		
25	2 1 E + 0 2 + . 1 2 8 7		
37	E + 0 2 + . 1 3 4 1 E +		continue for 111 values
49	0 2 + . 1 3 7 9 E + 0 2		
61	+ . 1 4 1 8 E + 0 2	73 80	
		 1 4 0 0 4	

C. TEMPEST Binary Library

If the user so chooses, the TEMPEST Binary Library may be used. This must be produced using Deck Number 4W-062, which converts the Decimal Library (as described in Section II B) to column binary. This binary deck is compatible with the FORTRAN IV TEMPEST code.

D. FORM Decimal Library

The format is basically the same as that for the MUFT-4 code⁴. An option has been added such that the entire library may be in either excess-50 notation or normal FORTRAN (scientific) notation.

The arrangements of the cards is as follows:

1. Table of Contents (MUFT file number 2)
2. Microscopic Cross-sections (MUFT file number 3)
3. Resonance Parameters (MUFT file number 4)
 - a. Absorption
 - b. Fission-to-absorption ratios
4. Source Spectra (MUFT file number 6)
5. Inelastic Scattering Matrix (MUFT file number 5)

The first columns of each card are used for identification. Column 1 is a "+," column 2 contains the MUFT file number and column 3 is a "+." Unless otherwise indicated, all data are floating point information expressed in excess-50 or FORTRAN notation according to the option, IEX50.

The contents of each deck follows:

1. Table of Contents

a. First Card (I2, 2I3, 4I4)

This card contains integer control information

<u>Column</u>	<u>Contents</u>
2	The number "2".
4,5	S = Total Number of Source Spectra on the tape ≤ 99 .
7,8	I = Total Number of elements on the tape ≤ 99 .
11,12	N = Total Number of groups - Must be 54.
15,16	U = Upper Bound of inelastic matrix - Must be 25.
19,20	L = Lower Bound of resonances - Must be 25.
24	$\text{IEX50} = \begin{cases} 0 & \text{FORTRAN Notation} \\ 1 & \text{Excess-50 Notation} \end{cases}$

b. Second and succeeding cards (I2, 2I3, 16I4)

Use as many cards as required (16 elements per card)

<u>Column</u>	<u>Contents</u>
2	The number "2".
4,5	00
6	+
7,8	00
9,10-12	$\pm (r+i)$
13,14-16	.
.	.
.	.
69,70-72	$\pm (r+i)$

If the element i has an inelastic matrix, its sign is "-".
 If the element i has no resonance parameter data, $r = 0$; if it has absorption parameters, $r = 100$; if it also has fission-to-absorption ratios, $r = 200$.

One blank card follows the table of contents.

2. Microscopic Cross-Sections (I2, 2I3, 8F8.5)

For each element, 54 cards of this type are required as follows:

<u>Column</u>	<u>Contents</u>
2	The number "3".
4,5	i = element number ≤ 99 .
7,8	n = group number ($1 \leq n \leq 54$)
10-16	$(\bar{\sigma}_0^s)_m^i$ symmetric scattering.
18-24	$(\bar{\sigma}_c^s)_m^i$ smooth capture.
26-32	$(\bar{\sigma}_{in}^s)_m^i$ total inelastic.
34-40	$(\bar{\sigma}_f)_m^i$ fission.
42-48	$(\bar{\sigma}_v)_m^i$ age numbers.
50-56	$(\bar{\sigma}_0^s)_m^i$ sigma 1
58-64	$(\bar{\sigma}_v)_m^i$ number of neutrons per fission.
66-72	$(\bar{\sigma}_0^s)_m^i$ microscopic slowing down power (must be Zero for $i = 1$, hydrogen)

One blank card follows each element.

3. Resonance Parameters

For each resonance element, 60 cards of absorption parameters are required alternating between "R" parameters and "M" parameters. If the element has, in addition, fission-to-absorption ratios, these follow the R and M cards, element-by-element.

a. Absorption Parameters (I2, 2I3, 8F8.5)
(60 cards)

Odd Numbered Cards (1,3,5,...59)

<u>Column</u>	<u>Contents</u>
2	The number "4".
4,5	i = element number.
7,8	j = number of parameters on card ≤ 8 .
10-16	$(r_1)_m^i$
18-24	$(r_2)_m^i$
.	
.	
.	
- - -	$(r_j)_m^i$

Even Numbered Cards (2,4,6,...60)

<u>Column</u>	<u>Contents</u>
2	The number "4".
4,5	i = element number.
7,8	j = number of parameters on card ≤ 8 (must agree with j on preceding card)
10-16	$(m_1)_m^i$
18-24	$(m_2)_m^i$
.	
.	
.	
- - -	$(m_j)_m^i$

One blank card follows each element.

b. Fission-to-Absorption Ratios (I2, 2I3, 8F8.5)

If these are present 30 cards are required as

follows:

<u>Column</u>	<u>Contents</u>
2	The number "4".
4,5	i = element number.
7,8	j = number of parameters on ≤ 8 (must agree with j for corresponding group of absorption parameters).
10-16	$(\alpha_1)_n^i$
18-24	$(\alpha_2)_n^i$
.	.
.	.
.	.
- - -	$(\alpha_j)_n^i$

One blank card follows each element.

4. Source Spectra (I2, 2I3, 8F8.5)

7 cards for each spectrum

<u>Column</u>	<u>Contents</u>
2	The number "6".
4,5	S = Source Spectrum Number
7,8	00
10-16	$(\bar{\chi}_0)_1^S$
18-24	$(\bar{\chi}_0)_2^S$
.	.
.	.
.	.
66-72	$(\bar{\chi}_0)_{54}^S$

One blank card follows each source spectrum.

5. Inelastic Matrix

For each element seven cards are required containing the total inelastic cross-section followed by 48 cards containing the scattering probability matrix (I2, 2I3, 8F8.5).

Inelastic Cross-Sections (I2, 2I3, 8F8.5)

<u>Column</u>	<u>Contents</u>
2	The number "5".
4,5	i = element number.
7,8	m = group number of first data on card (m = 1,9,17,...49).
10-16	$(\bar{\sigma}_i^s)_{m,i}^i$ inelastic scattering cross-section.
18-24	.
.	.
66-72	$(\bar{\sigma}_i^s)_{m,i}^i$

Inelastic Scattering Probability Matrix (I2, 2I3, 8F8.5)

<u>Column</u>	<u>Contents</u>
2	The number "5".
4,5	i = element number.
7,8	n = receptor group (n = 1,25)
10-16	$(\pi_{m \rightarrow n})^i$ probability of scattering from m th group to n th group
.	
.	
.	

Note that groups 2-9 have one card each, 10-17 have two cards each and 18-25 have three cards each.

One blank card follows each element.

Sample formats (cards 1 and 2) for the table of contents follows. Since the format for all subsequent cards is the same for all groups and elements, one card is illustrated (card 3).

FORTRAN FIXED TO DIGIT DECIMAL DATA

DECK NO. _____ PROGRAMMER _____ DATE _____ PAGE _____ of _____ JOB NO. _____

	NUMBER	IDENTIFICATION	DESCRIPTION DO NOT KEY PUNCH
1	+ 2 + 1 2 + 5 4 + 0 5 4		F,S,I,N,U,L,IEX50
13	+ 0 2 5 + 0 2 5 + 0 0 0		
25			Table of Contents
37			Card 1
49		73	80
61			1
1	+ 2 + 0 0 + 0 0 + 0 0 1		Table of Contents
13	+ 0 0 2 - 1 0 3 + 0 0 4		Card 2
25	- 1 0 5 + 0 0 6 + 0 1 0		
37	- 2 1 8		
49		73	80
61			2
1	+ 3 + 0 1 + 0 1 + 1 . 0		Microscopic Cross-Sections
13	2 5 . + . 1 8 . - 0 4		Element 1, Group 1
25	+ 0 . 0 . + 0 .		
37	0 . + 0 . 0		
49	+ . 6 8 3 3 3 . + 0 .	73	80
61	0 . + 0 . 0		3
1			
13			
25			
37			
49		73	80
61			

E. Update Card Format

1. Deck Set-Up

- a. First card(s) - Control Cards (FORTRAN Fixed 10 Digit Decimal Data) - See Sample Control Cards in this section.

Column 1 - Number of control parameters on card (≤ 5).

Column 2 - Contains a zero unless this is the last control card, in which case it contains a 1.

Columns 11-12 - Address of first piece of information on control card. First control card has a 1, second a 6, third an 11, etc.

The next five lines on the card are used to supply control information as follows. The first three columns on each line contain a three-digit integer, N. The last two columns contain a two-digit integer, M. These numbers are determined as follows:

N: N is of the form L --

If L = 3, line refers to microscopic cross-sections.

If L = 4, line refers to r and m resonance factors.

If L = 5, line refers to alpha factors.

If L = 6, line refers to sources.

If L = 7, line refers to inelastic scattering matrices.

The last two digits of N are made up of the number of elements one wishes copied from the old tape before the particular addition or correction is made. For example, if 12 elements are to be copied exactly from the old tape File 3 (microscopic cross-sections), then N = 312.

M: M is the number of new elements to be inserted after having read the correct number of elements from the old tape. If M = 0, the next element from the old tape will be deleted and its data replaced with the appropriate new data. If M > 0, M new elements will be inserted before the next element is copied from the old tape.

If no changes are to be made in a file, no data need be listed for that file. After the last correction for a file, no further data is needed for that file. The remaining elements in that file will be copied from the old to the new tape.

Several examples of control cards are shown on the following pages.

- b. Following the control cards should be the table of contents for the new tape. See Section II D for the format.

Note that either excess-50 or scientific notation is used for the following data cards according to IEX50.

- d. The data cards should be punched according to the format in Section II D. No blanks are used. The data cards should then be stacked behind the table of contents in the following order:

- (i) - Microscopic cross-section decks (54 cards) for each new element, or element to be changed.
- (ii) - r and m factor decks (60 cards) for each new set of resonance parameters.
- (iii) - Alpha factor decks (30 cards) for each new set of alpha factors. It is important to note that the alpha factors are stacked together after all the r and m decks, contrary to the Westinghouse format of having the alpha factors immediately after their associated r - m deck.
- (iiii) - Source decks (7 cards) for each new source.
- (iiiii) - Inelastic matrix decks (55 cards) for each new set of inelastic scattering parameters.

FORTRAN FIXED 10 DIGIT DECIMAL DATA

DECK NO. _____ PROGRAMMER RA BLAINE DATE _____ PAGE 1 of _____ JOB NO. _____

NUMBER	IDENTIFICATION	DESCRIPTION DO NOT KEY PUNCH
1 3 1 1		Sample Control Card for Update (1)
13 3 1 3 0		The first 13 elements will be copied exactly.
25 3 0 2 0		The 14 th will be replaced by new values.
37 3 0 0 2		The 15 th and 16 th will be copied and the 17 th replaced.
49	73 80	Two new elements will be inserted.
61		The remainder of the tape will be copied.
1 2 1 1		Sample Control Card for Update (2)
13 4 0 3 1		The microscopic data will be copied.
25 7 0 5 0		The first 3 resonance elements will be copied
37		and a new one inserted.
49	73 80	The rest of the tape will be copied, up to and
61		including the 5 th inelastic scatterer.
1		The 6 th matrix will be replaced and the rest of the
13		tape will be copied.
25		
37		
49	73 80	
61		
1		
13		
25		
37		
49	73 80	
61		

III OPERATING INSTRUCTIONS

A. Deck Number

CLIP is written in the FORTRAN IV language for the IBM 7090/7094 Stand-alone or Direct-Couple operating under the IBSYS monitor system.

The deck is on file in Department 792 as 4W061.

B. Stand-alone IBM 7094

Submit a short form No. 114A-8 and check the "SPEC.INSTR.ATTACHED" box.

On the special instruction form (EDPM job request supplement Form 727-N) request tape mounting as follows:

1. To make a FØRM tape -

Mount a blank tape on unit A5.

If another FØRM tape is to be used in making the new tape, mount it on unit B1. If a THREDES tape is used, mount it on unit A8.

2. To list a FØRM tape -

It must be on unit A5.

3. To make a THREDES tape -

Mount a blank tape on unit A6.

If another THREDES tape is to be used in making the new tape, mount it on unit A8.

If a FØRM tape is to be used in making the THREDES tape, mount it on unit B1.

4. To list a THREDES tape -

It must be on unit A6.

For all options other than LIST -

TAPE	Must be mounted if on any control card
B1	TASK2 = FTAPE
A5	TASK3 is blank
A6	TASK3 is not blank
A8	TASK2 or TASK3 = TTAPE

For LIST option -

A5 if existing FØRM tape is to be listed.

A6 if existing THREDES tape is to be listed.

Tape labeling and filing should be in accordance with Section 95.13 of the Engineer's Computing Manual.

NOTE: A new FØRM tape is always generated on A5.

A new THREDES tape is always generated on A6.

Generating and listing a THREDES or FØRM tape requires about four minutes and 6,500 lines of output.

C. Direct-Couple

Submit a short form No. 114A-8 and check the "SPEC.INSTR.ATTACHED" box and write "\$SETUP CARD".

On the "Tape Setup Instructions" card (Form 610-D-22) fill out as follows:

1. To make a FØRM tape -

"8 DISK, (- - - - - "

If another FØRM tape is to be used in making the new tape,

"7 - - - , DISK".

If a THREDES tape is used,

"10 - - - , DISK,,2".

2. To list an existing FØRM tape -
"8 - - - , DISK".

3. To make a THREDES tape -
"9 DISK, (- - - - - ,,,2".

If another THREDES tape is to be used in making
the new tape,
"10 - - - , DISK,,,2".

If a FØRM tape is to be used in making the
THREDES tape,
"7 - - - , DISK".

4. To list an existing THREDES tape -
"9 - - - , DISK,,,2".

For all options other than LIST -

TAPE	Must be mounted if on any control card
7	TASK2 = FTAPE
8	TASK3 is blank
9	TASK3 is not blank
10	TASK2 or TASK3 = TTAPE

For LIST option -

8 if existing FØRM tape is to be listed.

9 if existing THREDES tape is to be listed.

Tape labeling and filing should be in accordance with Section 95.13
of the Engineer's Computing Manual.

NOTE: A new FØRM tape is always generated on unit 8.

A new THREDES tape is always generated on unit 9.

Generating and listing a THREDES or FØRM tape requires
about two minutes and 6,500 lines of output.

IV. REFERENCES

1. D. J. McGoff, "FORM, A Fourier Transform Fast Spectrum Code for the IBM-709," NAA-SR-Memo-5766 (September 1960)
2. R. H. Shudde and J. Dyer, "TEMPEST II, A Neutron Thermalization Code," AI-64-Memo-186 (August 1964)
3. R. A. Blaine, "THREDES, Atomics International Thermal Reactor Design System," AI-CE-Memo 11. (March 1966)
4. H. Bohl, E. M. Gelbard, and G. H. Ryan, "MUFT-4, Fast Neutron Spectrum Code for the IBM-704," WAPD-JM-72 (July 1957)