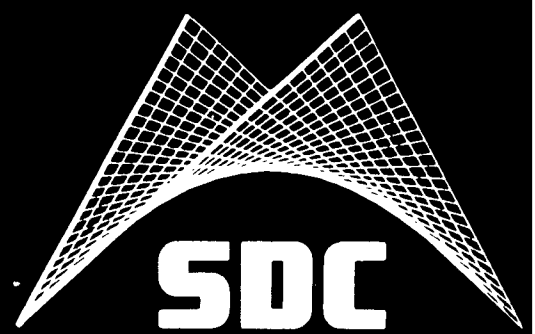
AD 410208



TM-1283/000/00

Combined Milestone 3 and 4 Remote Station Telemetry, Tracking and Commanding Utility Tape System

27 May 1963

TM-1283/000/00

TECHNICAL MEMORANDUM

(TM Series)

DDC AVAILABILITY NOTICE

Qualified requesters may obtain copies of this report from DDC.

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Combined Milestone 3 and 4
Remote Station Telemetry, Tracking and Commanding Utility Tape System

by

Remote Station Test Section

27 May 1963

Approved

W. C. Derango

SYSTEM DEVELOPMENT CORPORATION
2500 COLORADO AVE.
SANTA MONICA
CALIFORNIA

TABLE OF CONTENTS

INTRODUCTION

This document is a combined Milestone 3 and 4 for the Remote Tracking Station Utility Support System. The system consists of the following CDC 160-A computer programs:

A. Prepare Master Telemetry, Track and Command (TT & C) Tape (SPMTA)
B. Tracking Station Bootstrap (SBOOT)
C. Master TT & C Tape Read Subroutine (SREAD)

UTILITY SYSTEM SPECIFICATION

The utility system is designed to provide the user with the tools necessary to construct a master TT & C program tape, initiate telemetry, tracking and commanding operations and provide the capability of calling functions from the master program tape when needed.

MASTER TT & C TAPE FORMAT DESCRIPTION

The master TT & C magnetic tape is comprised of a variable number of files, where each file with the exception of the first file is designated a MODE number. A MODE shall be defined as a general class of related functions. For instance, one MODE shall consist of all those functions necessary to execute pre-pass, pass, and post-pass telemetry operations. A subset of a MODE is a function. A function shall consist of all those modules, submodules, subroutines, data, and tables, which will be called simultaneously from the master tape read subroutine. Finally, a subset of a function is an information record. An information record shall be bank specific and shall contain all information required for a single bank. Consequently, a function shall include up to four information records.

Operators will call for a specific MODE through the use of a mnemonic identification, via the on-line typewriter. The first record of the first file shall contain a variable length MODE directory. This directory shall contain a MODE

number (which in essence is the file number on the tape) for each mnemonic identification. In addition, the first three words of the MODE directory shall contain the alphanumeric date (month, day, year) of when the master tape was generated. This date will be listed on the printer and typewriter each time the bootstrap initiates processing (see Appendix A-1, Mode Directory Format).

The logic for processing a function within a MODE is handled in an identical fashion. A function is called from within a MODE through the use of a logical function number. This number serves as an index to a function directory found at the beginning of the MODE. An entry in the directory describes where a function is positioned within the MODE and the number of information records required to define it (see Appendix A-2, Function Directory Format).

Associated with each information record of each function is a four-word identification record. This record contains a load address and return address employed by the master tape read subroutine (see Appendix A-3, Identification Record Format).

There is no restriction to the number of MODE files which may be recorded on the tape (except for the physical capacity of the tape). Each function directory, however, is restricted to 64 entries. Consequently, a MODE can contain no more than 64 functions. (See Appendix A-4, Composite TT & C Tape Format.)

SUBSYSTEM DESCRIPTIONS

A. Prepare Master TT & C Tape (SPMTA)

1. Function

The Prepare Master TT & C Tape program will initially generate a master program tape from a specially formatted input source or subsequently edit any part of an existing master tape. The tape shall contain operational telemetry, operational tracking and commanding and non-operational programs necessary to support and execute the computer subsystems functions at the augmented remote tracking station.

The program shall be capable of accepting information from the following sources:

- cards
- magnetic tape
- paper tape
- Typewriter

As the program generates or modifies the master tape, it shall update each directory of those MODES affected, insuring that a directory is always current with its MODE. In this manner, the tape need not be generated in the same order each time, but may vary, allowing ease of operation, and considerable flexibility. A directory will be listed each time a tape is generated. This listing will identify each MODE and the contents of the MODE.

2. Description of Operation

SPMTA will operate in one of two ways: generate a new master tape; update an existing master tape. In the case of the former, a MODE directory deck of the new tape must be supplied (see Appendix B for MODE directory deck format). How SPMTA is to operate will be determined by a jump key setting; if the jump key is set, a new master tape will be generated, rather than updating an existing tape. When no existing master tape is used, the directory deck is read and formatted in core, and proper flags are set to indicate that there is no existing master. The use of an existing master will cause SPMTA to read the directory from the existing master and use it for reference in generating the new tape.

All coded control information, such as the directory deck, MODE cards, ID cards and octal correctors will be read from the 167 card reader unless Jump Key 2 is set, then the above mentioned information will be accepted from the typewriter. The input source of data

will be indicated on the ID cards (see Appendix B for ID card format). The two sources of binary data will be either OSAS binary cards or OSAS paper tape.

All references to inputs in the following discussion will be from cards. (Refer to Appendix B, Card Format.)

After the MODE directory has either been read into core from cards or the existing master tape, processing of the data decks commence. The data decks consist of a "DATE" card, "MODE" cards, "ID" cards, binary cards, octal correctors, and finally an END card.

The DATE card will contain month, day and year of when the new master TT & C tape was generated. The information will head the MODE directory for future references.

MODE cards will be used when a new MODE is to be added to the tape, an existing MODE is to be deleted, or programs within a MODE are desired to be modified. MODE cards must be ordered according to sequential position of the MODES on the tape. That is, if changes are to be made to MODES 2 and 7, MODE card 2 must precede MODE card 7. If a MODE is to be deleted from the tape, the next card following will be another MODE card or an END card.

The ID cards are used to indicate changes to functions within a MODE. Functions may be added, deleted, or modified. Also on the card will be control information as to the loading address of the first record, and the starting address of the program. If a function is to be deleted from the MODE, the next card following will be the next ID card, MODE card, or an END card.

ID cards must be numerically ordered according to function number. This is not saying that the physical order of these functions on the tape are fixed. Logical function number 5 could occupy the first

record positions of a MODE. But for the convenience of SPMTA, when compiling the data deck, the functions must appear in sequential order.

Standard OSAS binary cards will be accepted for binary input. This deck may contain data for more than one bank. The binary bank card will be the division card. The binary transfer card will terminate reading binary cards.

Octal Corrector cards will be used to modify existing data on the master tape or to modify adjoining binary decks. These cards do not have to be ordered.

An END card will terminate the processing of the input data deck and effect a merge of the old and new tapes for generating an updated master TT & C tape.

3. Input/Output Formats

a. Input Data Formats

- Card Format (See Appendix B)
- Typewriter Format (See Appendix C)
- Data Sequence (See Appendix D)

b. Output Data Formats

The only output from SPMTA is the TT & C master tape (see Master TT & C Tape Format Description).

c. Magnetic Tapes

TD #1 Old master tape
TD #2 New master tape
TD #3 Scratch tape
TD #4 Scratch tape

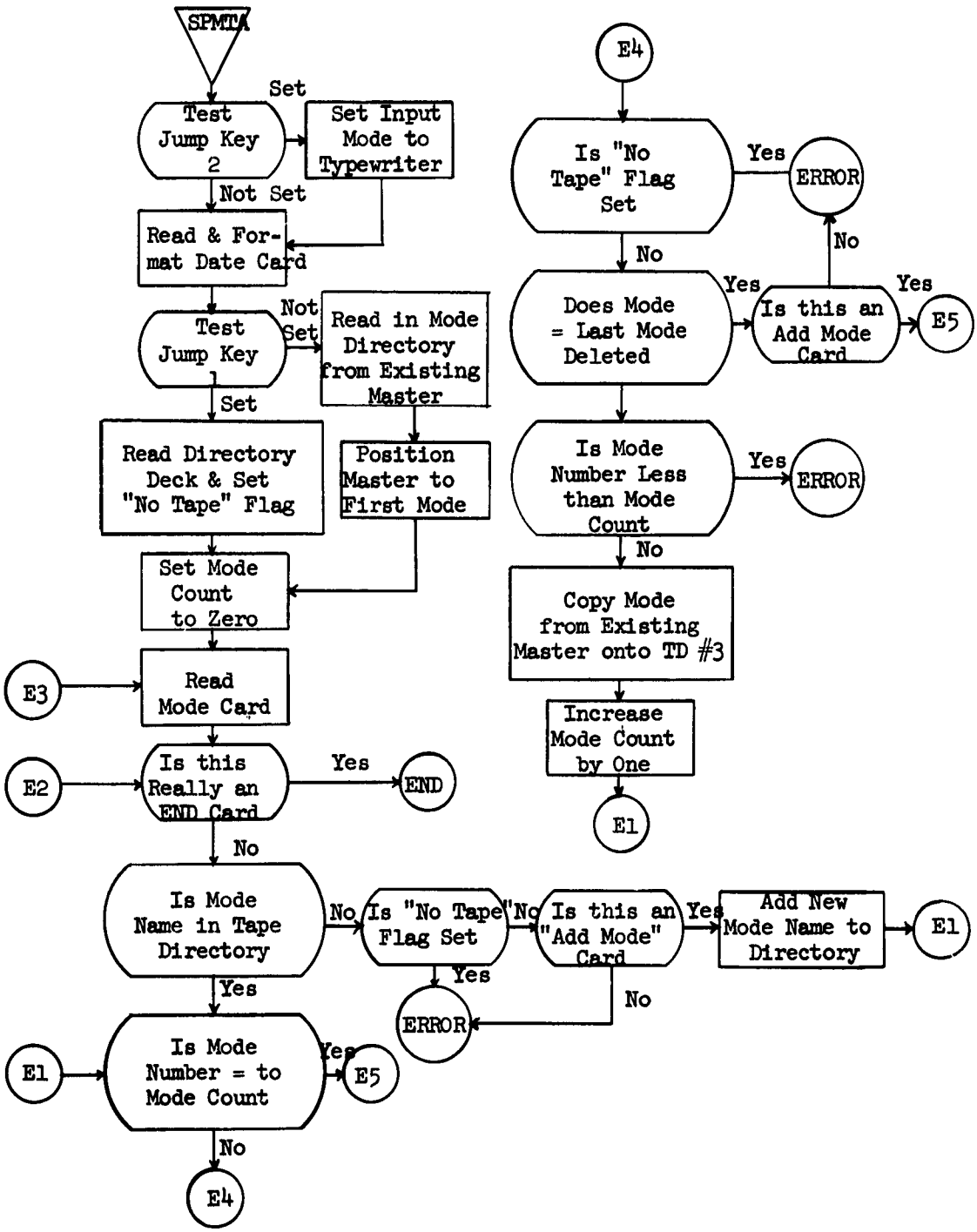
4. Restrictions

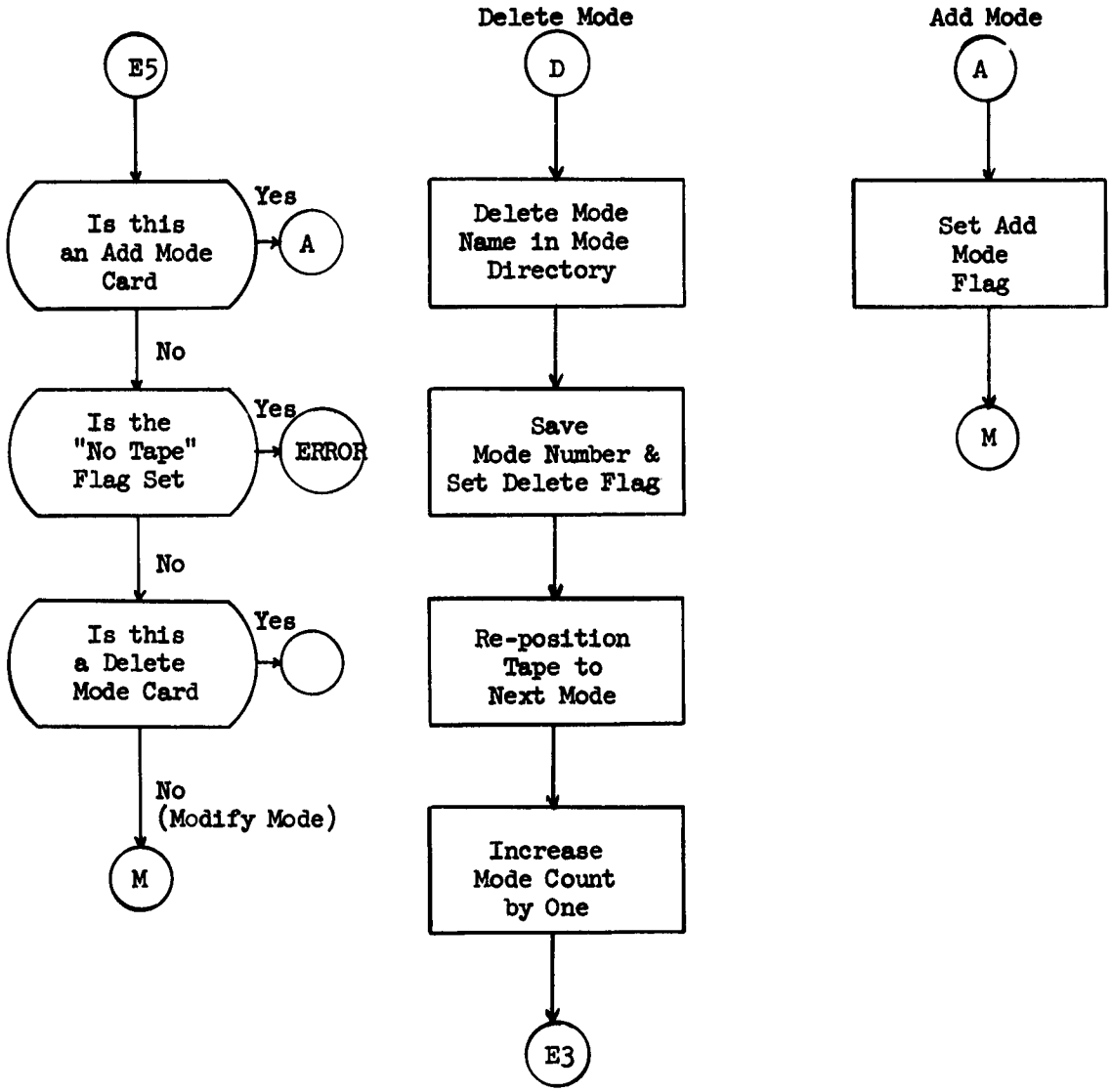
a. An OSAS binary deck cannot be shuffled or re-ordered in any way because of the bank cards that may be used. Starting and terminal loading address are obtained from the binary deck.

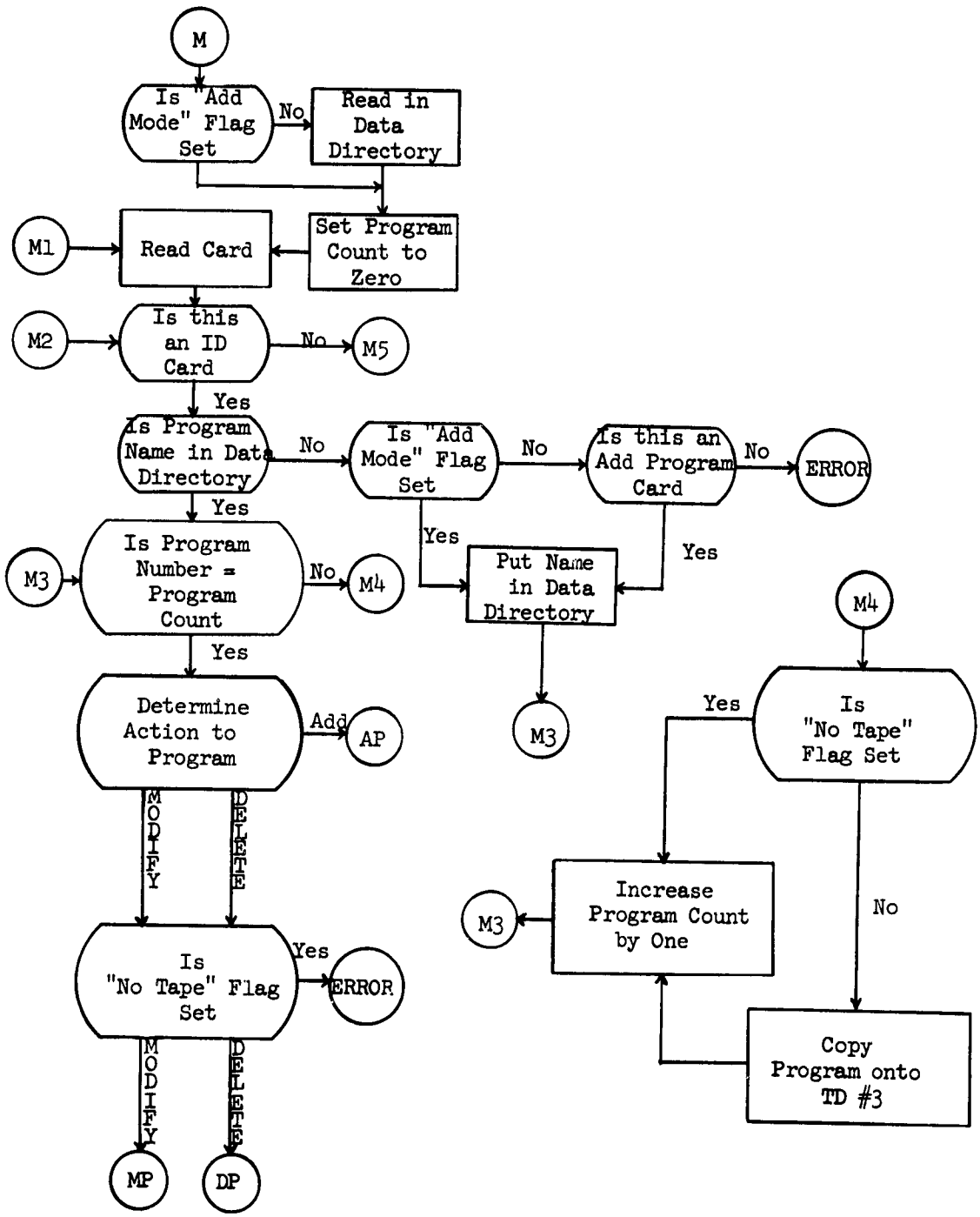
b. Only one record will be on tape for each bank that a program requires. If a program requires various parts of 4 banks, 4 records will be on the tape.

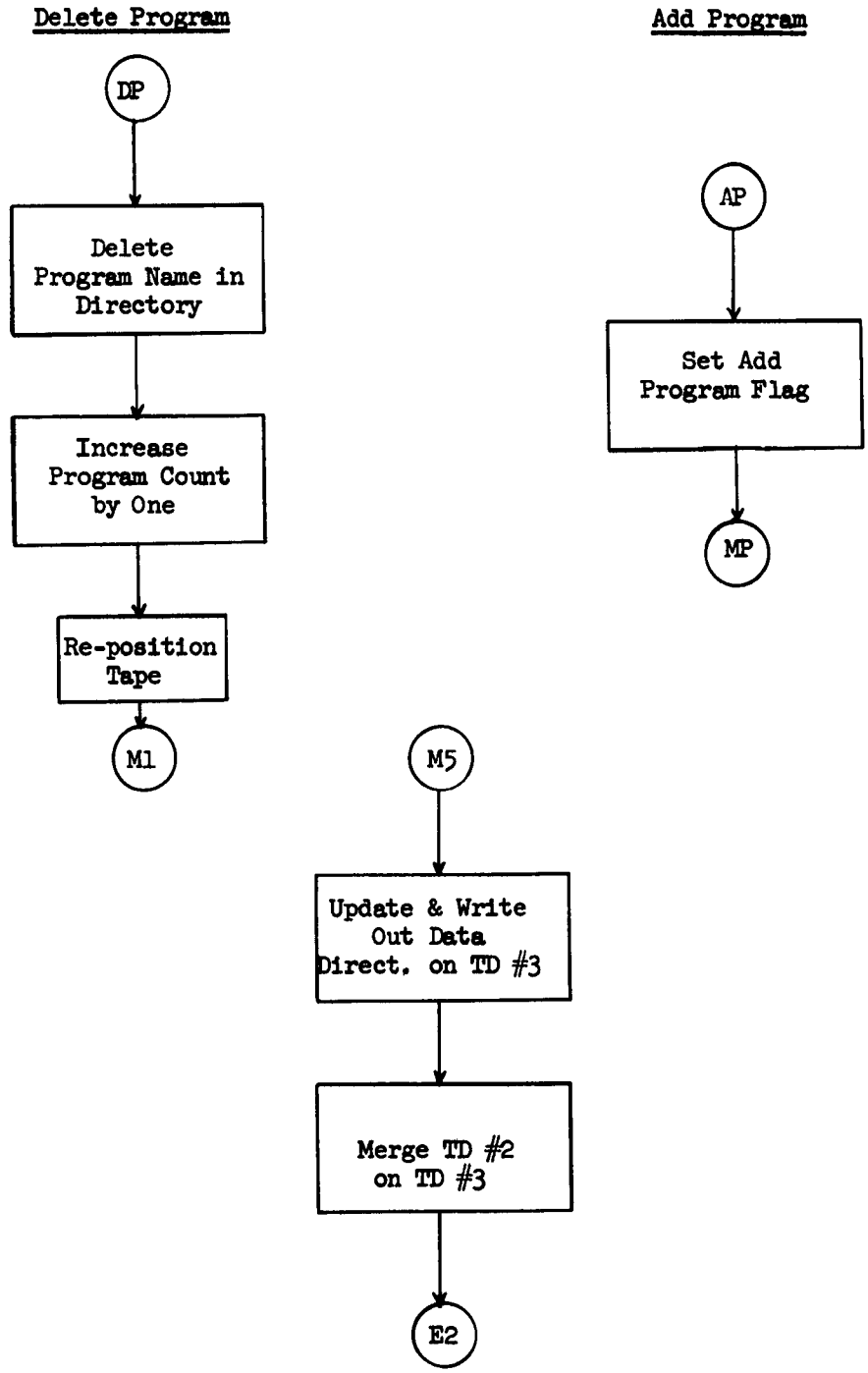
c. If a binary deck is used to modify a program on the existing master tape, that program on tape will be replaced by the binary deck.

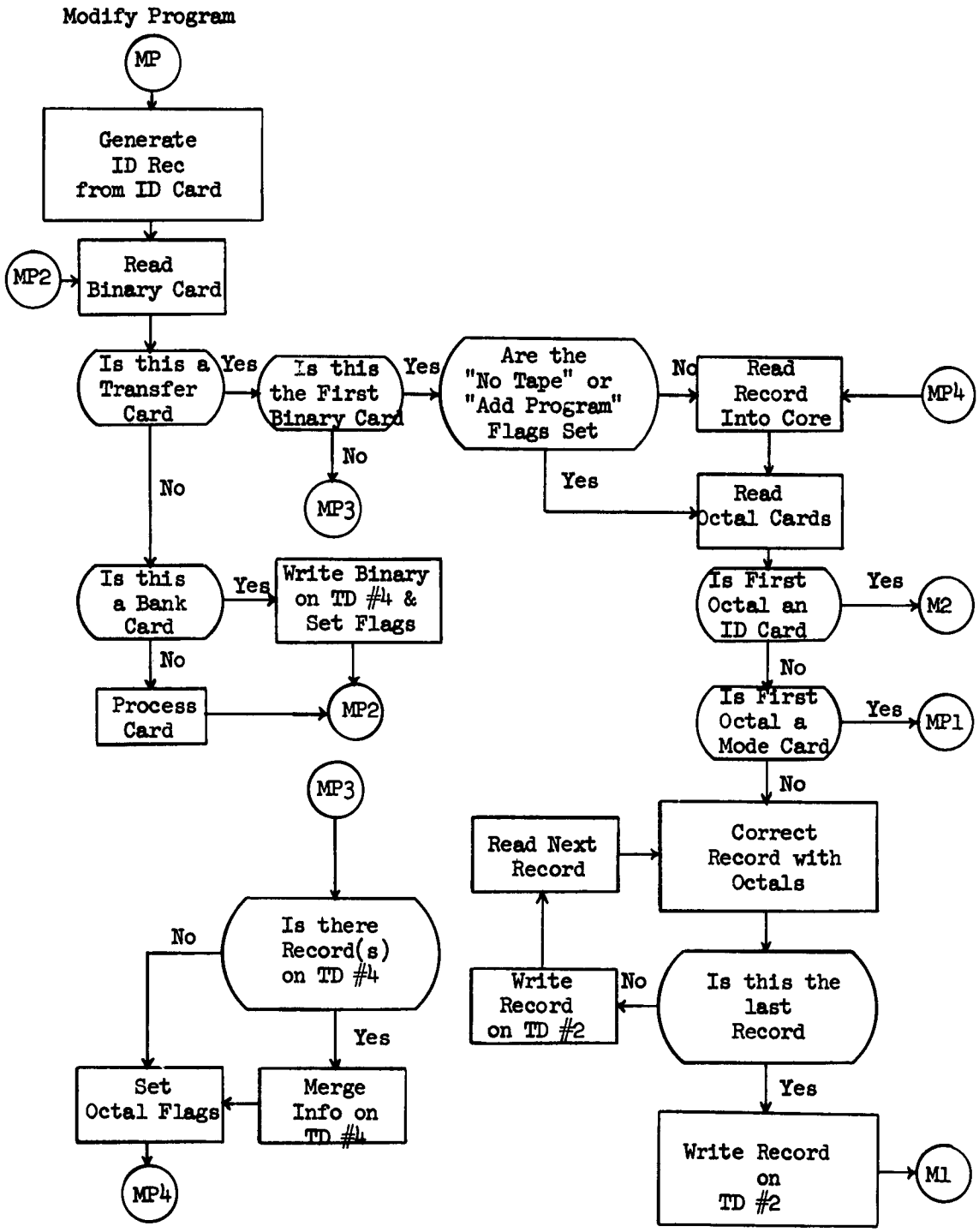
d. When just octal correctors are used to modify a program, the octal cards must be preceded with a binary transfer card.

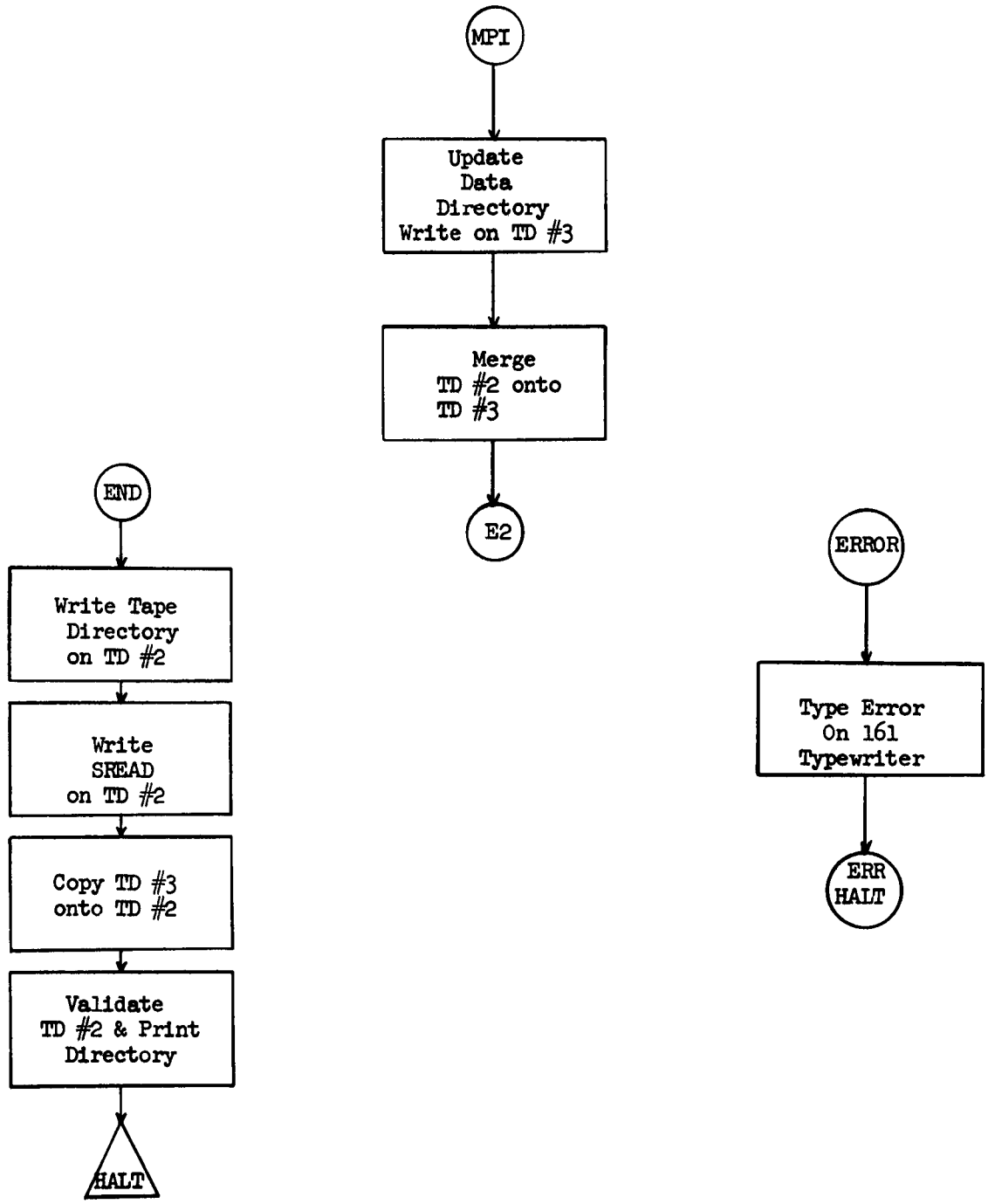

SPMTA
Test Jump Key 2
Set
Set Input Mode to Typewriter
Not Set
Read & Format Date Card
Test Jump Key
Not Set
Read in Mode Directory from Existing Master
Set
Read Directory Deck & Set "No Tape" Flag
Position Master to First Mode
Set Mode Count to Zero
E3
Read Mode Card
E2
Is this Really an END Card
Yes
END
No
Is Mode Name in Tape Directory
No
Is "No Tape" Flag Set
No
Is this an "Add Mode" Card
Yes
Add New Mode Name to Directory
E1
Yes
Yes
ERROR
No
E1
Is Mode Number = to Mode Count
Yes
E5
No
E4
E4
Is "No Tape" Flag Set
Yes
ERROR
No
Does Mode = Last Mode Deleted
Yes
Is this an Add Mode Card
Yes
E5
No
Is Mode Number Less than Mode Count
Yes
ERROR
No
Copy Mode from Existing Master onto TD #3
Increase Mode Count by One
E1


E5
Is this an Add Mode Card
Yes
A
No
Is the "No Tape" Flag Set
Yes
ERROR
No
Is this a Delete Mode Card
Yes
No
(Modify Mode)
M
Delete Mode
D
Delete Mode Name in Mode Directory
Save Mode Number & Set Delete Flag
Re-position Tape to Next Mode
Increase Mode Count by One
E3
Add Mode
A
Set Add Mode Flag
M


M
Is "Add Mode" Flag Set
No
Read in Data Directory
M1
Read Card
Set Program Count to Zero
M2
Is this an ID Card
No
M5
Yes
Is Program Name in Data Directory
No
Is "Add Mode" Flag Set
No
Is this an Add Program Card
No
ERROR
Yes
Yes
Yes
M3
Is Program Number = Program Count
No
M4
Put Name in Data Directory
Yes
Determine Action to Program
Add
AP
MODIFY
DELETE
M3
M4
Yes
Is "No Tape" Flag Set
Yes
ERROR
Increase Program Count by One
M3
No
MODIFY
DELETE
Copy Program onto TD #3
MP
DP


Delete Program
DP
Delete Program Name in Directory
Increase Program Count by One
Re-position Tape
M1
Add Program
AP
Set Add Program Flag
MP
M5
Update & Write Out Data Direct. on TD #3
Merge TD #2 on TD #3
E2


Modify Program
MP
Generate ID Rec from ID Card
MP2
Read Binary Card
Is this a Transfer Card
Yes
Is this the First Binary Card
Yes
No
MP3
Are the "No Tape" or "Add Program" Flags Set
No
Read Record Into Core
MP4
Yes
Read Octal Cards
No
Is this a Bank Card
Yes
Write Binary on TD #4 & Set Flags
No
Process Card
MP2
Is First Octal an ID Card
Yes
M2
No
Is First Octal a Mode Card
Yes
MP1
No
MP3
Read Next Record
Correct Record with Octals
No
Is there Record(s) on TD #4
Yes
Write Record on TD #2
No
Is this the last Record
Yes
Set Octal Flags
Merge Info on TD #4
Write Record on TD #2
M1
MP4


MPI
Update Data Directory Write on TD #3
Merge TD #2 onto TD #3
E2
END
Write Tape Directory on TD #2
Write SREAD on TD #2
Copy TD #3 onto TD #2
Validate TD #2 & Print Directory
HALT
ERROR
Type Error On 161 Typewriter
ERR HALT

B. Tracking Station Bootstrap (SBOOT)

1. Function

The bootstrap routine shall be loaded from paper tape and shall initiate all operational and non-operational functions located on the master TT & C tape (TD #1).

2. Description of Operation

The bootstrap object program shall be read from a seven level bi-octal paper tape. The tape shall be loaded at 7000_8 of bank 3. The operator commences operations by manually transferring to address 7000 bank 3. SBOOT immediately reads the MODE directory and SREAD records off the master tape and requests a MODE via the on-line typewriter. The operator shall respond with an alphanumeric identification of the MODE. The bootstrap matches the requested identification with the corresponding identification in the MODE directory. If there is no entry in the directory for the requested MODE, SBOOT shall request another MODE. After SBOOT has retrieved the corresponding MODE number of the alphanumeric identification, it requests a logical function number from the operator. The logical function number, which identifies a specific function within the MODE, corresponds to an entry in the function directory situated at the beginning of each MODE. SBOOT then calls on SREAD to position the master tape to the correct MODE, read the function directory into a fixed location of core and finally read the requested function into core. Depending on the call parameters, SBOOT will either exit to the called function via the return address found in the identification record or return to the typewriter for the entry address.

3. Input/Output Formats

SBOOT shall transmit to the on-line typewriter "MODE", whereupon the operator will respond with up to seven (7) alphanumeric

characters. Initially, the tape will contain three (3) modes:

TLM - telemetry
TRK - tracking and commanding
NONOP - non-operational programs

SBOOT will then type FUNCTION, whereupon the operator will respond with up to two (2) decimal numeric characters. Functions will be assigned logical function numbers in a subsequent paper. All inputs from the typewriter will be terminated by a period. A typical sequence of events would be:

(CR) MODE TRK.
(CR) FUNCTION 2.

4. Restrictions

The master tape can only be mounted on logical unit one.

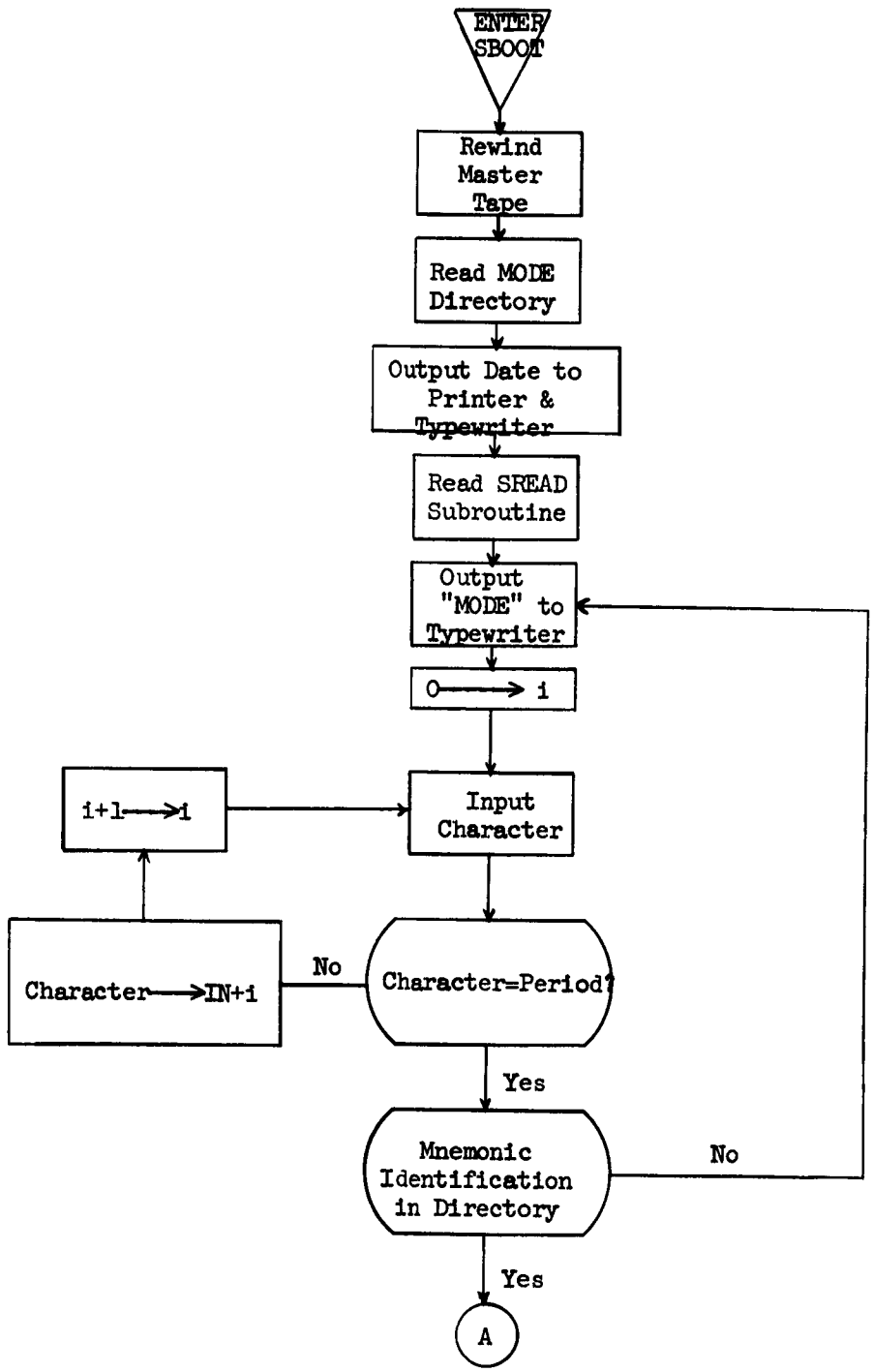
C. Master TT & C Tape Read Subroutine (SREAD)

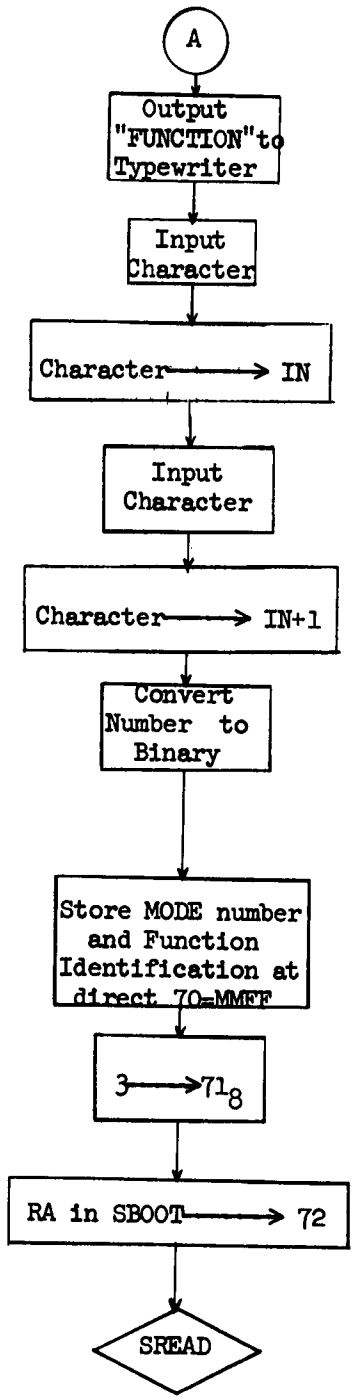
1. Function

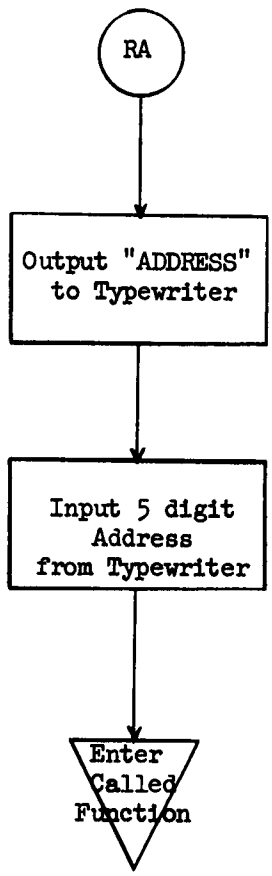
SREAD shall perform the following two functions:

- Read information records from the master TT & C program tape;
- Seek and position the master TT & C program tape for future references;

SREAD shall occupy a permanent position in core and shall provide operational and non-operational programs with the capability of calling programs, data and tables off the master program tape when needed.


ENTER SBOOT
Rewind Master Tape
Read MODE Directory
Output Date to Printer & Typewriter
Read SREAD Subroutine
Output "MODE" to Typewriter
0 → i
Input Character
i+1 → i
Character → IN+i
No
Character=Period?
Yes
Mnemonic Identification in Directory
No
Yes
A


A
Output "FUNCTION"to Typewriter
Input Character
Character → IN
Input Character
Character → IN+1
Convert Number to Binary
Store MODE number and Function Identification at direct 70=MMFF
3 → 71₈
RA in SBOOT → 72
SREAD


RA
Output "ADDRESS" to Typewriter
Input 5 digit Address from Typewriter
Enter Called Function

2. Description of Operation

There exists two entrances to SREAD: an initial entrance employed by SBOOT; an internal entrance, the normal entrance used by all operational and non-operational programs which call SREAD. The calling sequence is virtually the same for both entrances, except for the initial entrance, the function identification parameter contains the MODE number in the upper six-bits of the word. This causes SREAD to position the tape to the correct MODE and automatically read in the function directory from the front of the MODE. Also, certain position parameters are initialized so that SREAD shall confine its searching to within the requested MODE.

Following is the calling sequence for the internal entrance (normal entrance):

```
LDC     SREAD
SRJ1
```

where the following parameters have been previously stored in the direct bank ....

cell 70 = 000000ffffff

where the lower six-bits represent a binary logical function number

cell 71 = k_1 K_2 K_3 0000 b_1 b_1 o b_2 b_2

where K_1 = 0 Read Option
= 1 Seek Option

K_2 = 0 Non-relocatable
= 1 Relocate

K_3 = 0 Use RA (return address) in ID record
= 1 Use RA in call parameters

b_1b_1	=	Relocatable bank
b_2b_2	=	Return bank
cell 72	=	Return address
cell 73	=	Relocatable address

Under nominal operations, 70 and 71 are the only cells that need loading: logical function number in 70; zero in 71.

The logical function number is used as an index to the function directory. The contents of the associated entry in the directory describes where the first record is positioned within the MODE and how many records are to be read for this function. SREAD positions the tape to the correct information records and tests cell 71 to determine if this is merely a seek option. If so, SREAD exits to the bank and address given in cells 71 and 72. If not, the routine next interrogates whether or not the data records are to be relocated. If so, only the first record of a series of records will be relocated. This implies that if modules within a function are to be relocated, each module must be identified with its own logical function number and called individually from the master tape. SREAD then reads the information records into core. Finally, the routine determines which return address is to be employed: the return address off the identification record or the return address in the calling sequence. The routine then returns as requested.

Through its flexibility, SREAD is capable of reading whole phases of an operation (pre-pass, pass, post-pass) as well as subroutines such as the algorithms associated with the telemetry function.

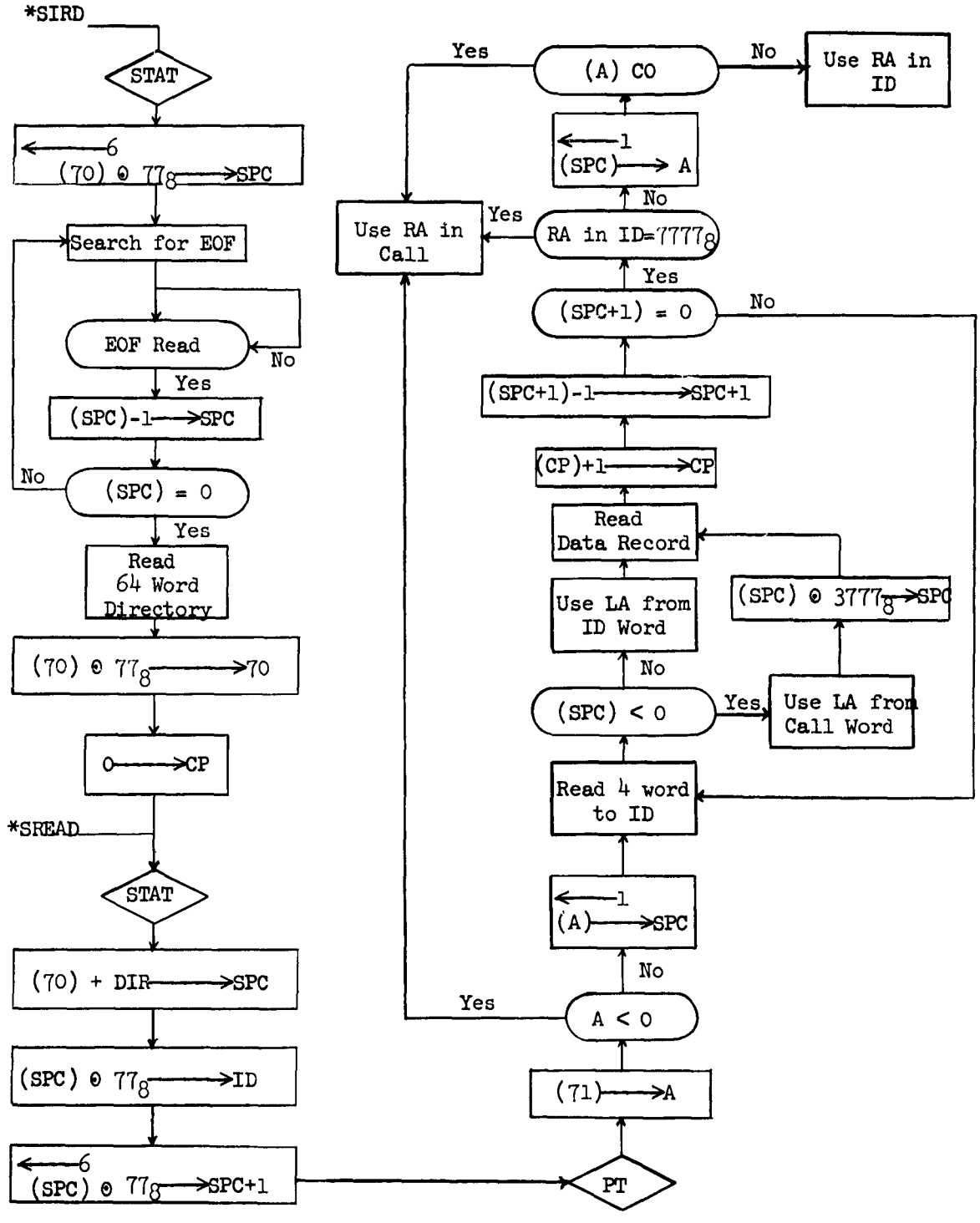
3. Input/Output Formats

The only input to SREAD other than the calling sequence described above is the master TT & C tape itself (see Master TT & C Tape Format Description). SREAD produces no output.

4. Restrictions

If because of its storage allocation a program destroys SREAD, the procedure will have to be reinitiated, using SBOOT. This should not be restrictive, since all operational programs will be modified to share core with the SREAD routine.

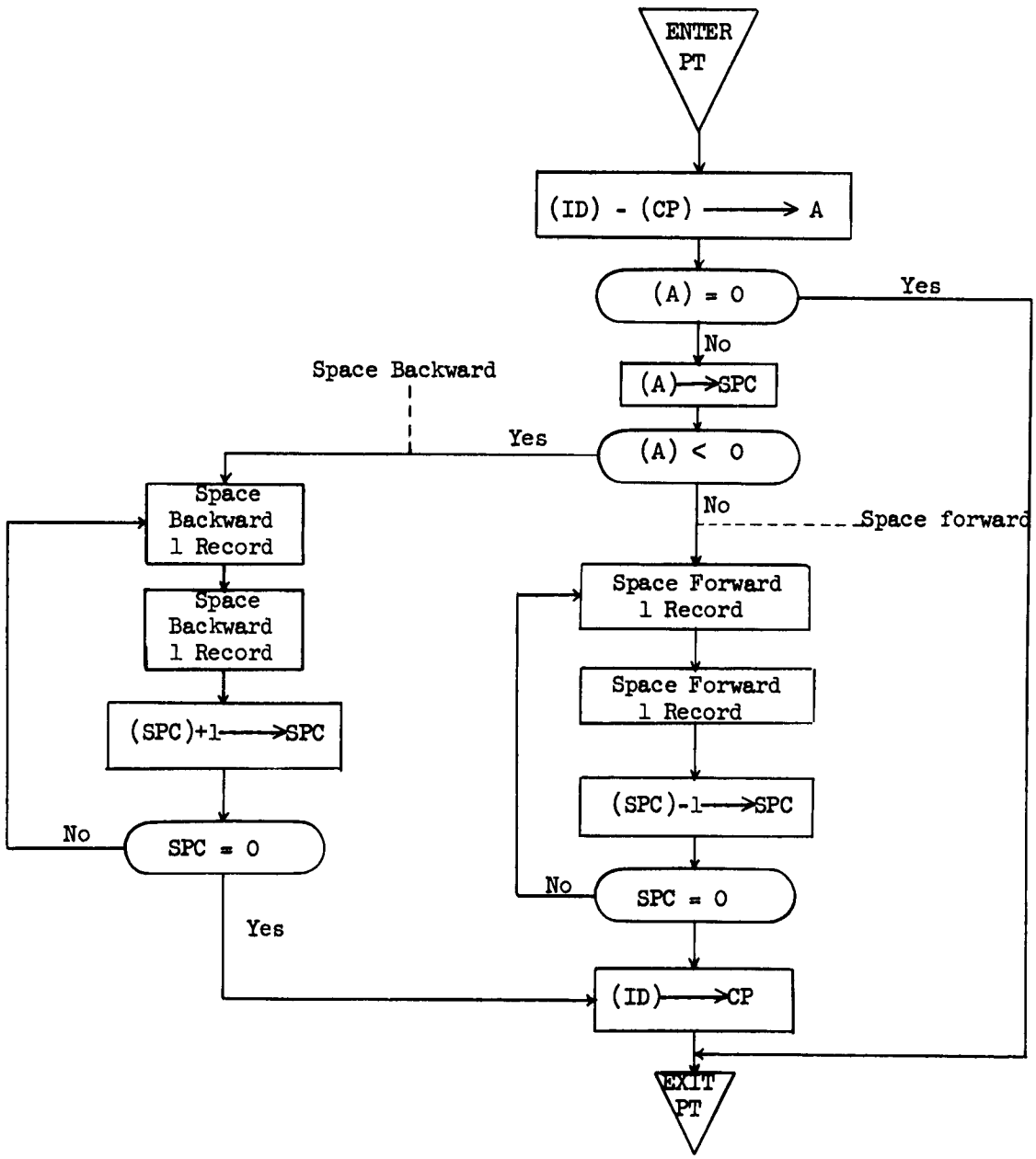
SREAD does not modify cells 70 through 73, of the direct bank. Consequently, future calls to SREAD with the same parameter or any portions thereof, need not require that the contents of those cells be reinitialized.


*SIRD
STAT
6
(70) ⊙ 77₈ → SPC
Search for EOF
EOF Read
No
Yes
(SPC)-1 → SPC
No
(SPC) = 0
Yes
Read 64 Word Directory
(70) ⊙ 77₈ → 70
0 → CP
*SREAD
STAT
(70) + DIR → SPC
(SPC) ⊙ 77₈ → ID
6
(SPC) ⊙ 77₈ → SPC+1
PT
(71) → A
A < 0
Yes
No
1
(A) → SPC
Read 4 word to ID
(SPC) < 0
Yes
No
Use LA from Call Word
Use LA from ID Word
(SPC) ⊙ 3777₈ → SPC
Read Data Record
(CP)+1 → CP
(SPC+1)-1 → SPC+1
(SPC+1) = 0
Yes
No
RA in ID=7777₈
Yes
No
1
(SPC) → A
(A) CO
Yes
No
Use RA in Call
Use RA in ID

Mag tape position subroutine

CP (Current position of tape) = 00XX

ID (Record identification) = 00YY



APPENDIX A-1 MODE DIRECTORY FORMAT

Word	Identification
1	Month (2 numeric characters)
2	Day (2 numeric characters)
3	Year (2 numeric characters)
4	C_1 C_2
5	C_3 C_4
6	C_5 C_6
7	C_7 M
8	
9	(similar to words 4 through 7)
10	
11	
.	.
.	.
.	.

where C_i are the alphanumeric characters of the MODE identification.

M is the corresponding six-bit binary MODE number.

The second record of the first file is the SREAD subroutine followed by an end-of-file.

APPENDIX A-2 FUNCTION DIRECTORY FORMAT

Word	Identification
1	$N_1 F_1$
2	$N_2 F_2$
3	$N_3 F_3$
.	.
.	.
.	.
63	$N_{63} F_{63}$
64	$N_{64} F_{64}$

where F_i are nine-bit binary numbers indicating relative position within a MODE.

N_i are three-bit binary numbers indicating the number of information records associated with the ith entry in the table.

APPENDIX A-3 IDENTIFICATION RECORD FORMAT

Records $\angle K$ ($1 \leq K \leq 512$) are four-word identification records indicating load address and return address for each associated information record.

Word	Identification
1	Load Address
2	Bank
3	Return Address
4	Return Address Bank

Records 2K + 1 are variable length information records containing modules, submodules, subroutines, parameters, and tables.

APPENDIX A-4 COMPOSITE TT & C TAPE FORMAT

Tape Format	Description
"load point"	
Record 1	MODE Directory
Record 2	SREAD Subroutine
"eof"	
Record 1	MODE 1 Function Directory
Record 2	Identification Record
Record 3	Information Record
.	
.	
.	
Record K-1	Identification Record
Record K	Information Record
"eof"	
.	
.	
.	
"eof"	
Record 1	MODE r Function Directory
Record 2	Identification Record
Record 3	Information Record
.	
.	
.	
"eof"	

APPENDIX B

CARD FORMAT

A. Date Card (Floating Field)

1. Entry 1 - month (two numeric characters)
2. Entry 2 - day (two numeric characters)
3. Entry 3 - year (last two numeric characters of the year)

B. Mode directory card (Floating Field)

1. Entry 1 - symbolic tag of mode
2. Entry 2 - physical mode number on tape

C. Mode card (Floating Field)

1. Entry 1 - * (asterisk)
2. Entry 2 - symbolic tag of mode
3. Entry 3 - physical mode number on tape
4. Entry 4 - control character

D = delete mode from tape
A = add new mode
M = modify data in mode

D. ID card (Floating Field)

1. Entry 1 - ** (double asterisk)
2. Entry 2 - logical function number
3. Entry 3 - control character

D = delete program from tape
A = add new program
M = modify existing program

4. Entry 4 - return address and bank BLLLL
5. Entry 5 - loading address and bank BLLLL
6. Entry 6 - source of data

P = paper tape
C = cards

E. Binary deck (Fixed Format) or Binary Paper Tape

1. Standard OSAS binary card

APPENDIX B (continued)

F. Binary transfer card (Fixed Format)

1. Standard OSAS binary card

G. Octal corrector card (Fixed Format)

1. Column 1 - 0
2. Column 2 - bank number
3. Columns 3- 6 - loading address
4. Columns 7-78 - data (four columns per word)

H. End card (Floating Field)

1. Entry 1 - END

APPENDIX C

TYPEWRITER FORMAT

A. Data input will be entered in the same format and sequence as cards.

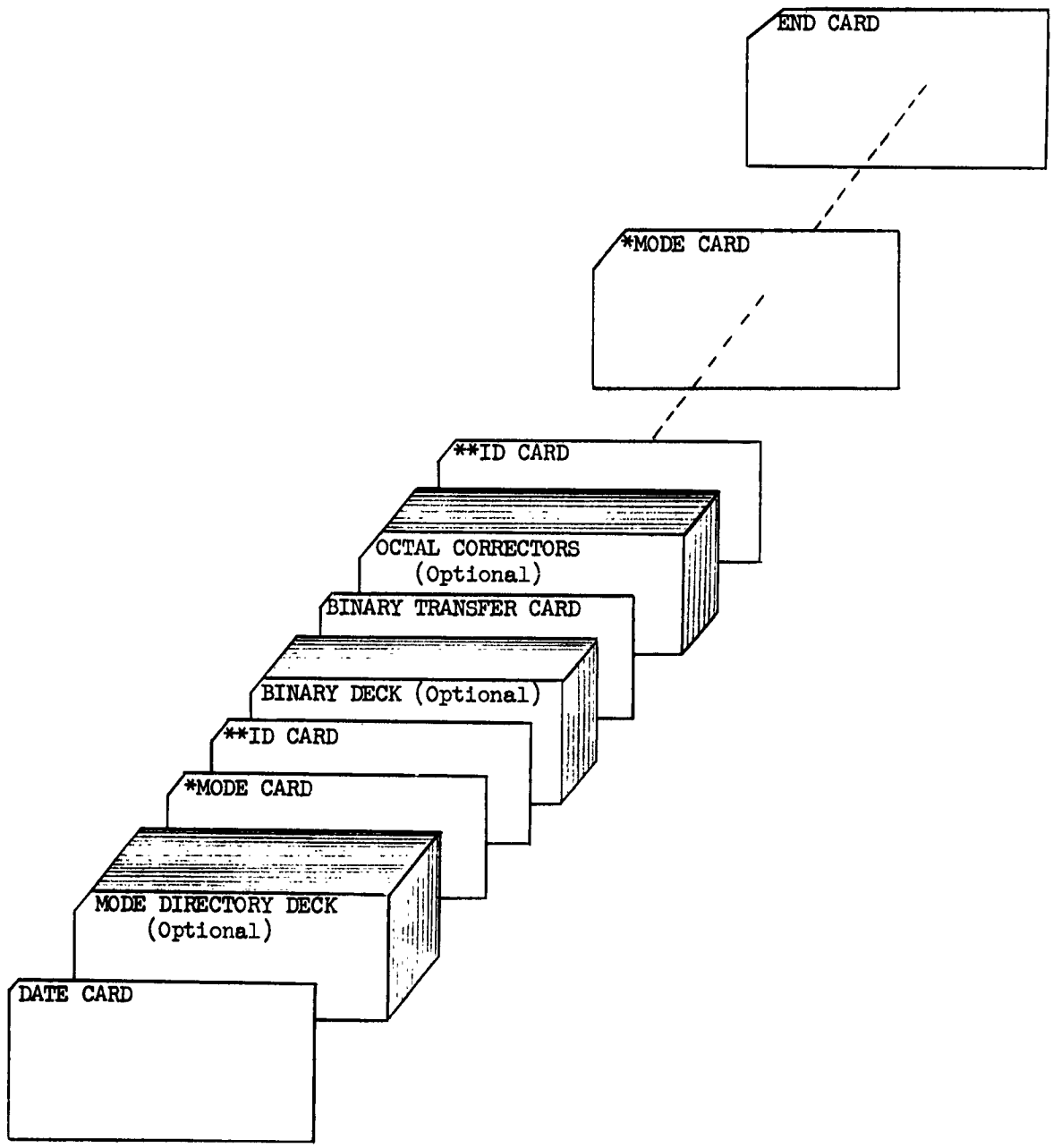
B. A period (.) will signify to SPMTA to process those words entered since the last period. This would be treated as having read 80 columns of a card.

C. A carriage return will allow the operator to retype the last line.

D. At least one space must be typed between entries.

E. SPMTA will give a carriage return on the typewriter when it is ready to accept a line (card) of data.

APPENDIX D


END CARD
*MODE CARD
**ID CARD
OCTAL CORRECTORS
(Optional)
BINARY TRANSFER CARD
BINARY DECK (Optional)
**ID CARD
*MODE CARD
MODE DIRECTORY DECK
(Optional)
DATE CARD

EXTERNAL DISTRIBUTION LIST

PIR-E5 (Aerospace)

V. White
E. E. Retzlaff
T. R. Parkin
L. Garcia
R. O. Brandsberg
G. Hansen
M. L. Luther
A. Bakst
D. Saadeh

6594th ATW

Col. A. W. Dill (TWRD)
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TWACS (20)

Space Systems Division
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Major N. D. LaVally (SSOX)
Technical Data Center

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C. F. Taylor
R. L. Vader
P. E. Williams

PIR-E2 (Philco)
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PIR-E3 (LFE)
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F. Druding
J. Sanford

PIR-E4 (GE-Sunnyvale)
D. Alexander

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J. B. Butler
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PIR-E4 (GE - Bethesda)
W. L. Massey

PIR-E4 (GE - Box 8661)
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ALDANA, J.	22131B	KNIGHT, R. D.	22119
ALEXANDER, L. B.	22134	KOLBO, L. A.	22079
ALLFREE, D.	24083	LAUGHLIN, J. L.	24073
ALPERIN, N. I.	22088B	LAVINE, J.	24091
ARMSTRONG, E.	24123	LEWIS, H. L.	22095
BIGGAR, D.	24118A	LITTLE, J. L.	24090A
BILEK, R. W.	22101	LONG, F.	22078
BRENTON, L. R.	24103B	MADRID, G. A.	23014
BURKE, B. F.	24086	MAHON, G. A.	24089
BURKE, R. F.	22082	MARIONI, J. D.	24076B
BUSCH, R. E.	22153B	MARSHALL, R. D.	22099
BUSTYA, C.	22134	MARTIN, W. P.	24127B
CHAMPAIGN, M. E.	22091A	MCKEOWN, J. C.	22083
CHIODINI, C. M.	24082B	MILANESE, J. J.	22078
CIACCIA, B. G.	24090B	MUNSON, J. B.	22096A
CLEMENTS, R. F.	22109	MYERS, G. L.	14056A
CLINE, B. J.	24127	NELSON, P. A.	24075
COGLEY, J. L.	22122	NGOU, L.	24127
CONGER, L.	24082	OLSON, A. H.	22131
COOLEY, P. R.	24081	OLSON, M. M.	22077
COURT, T. D.	24086B	PADGETT, L. A.	24110A
DECUIR, L. E.	24053A	PATIN, O. E.	SUNNYVALE
DERANGO, W. C.	24094A	PERSICO, D. J.	24083
DEXTER, G. W.	25026	POLK, T. W.	24113
DISSE, R. J.	22082	REILLY, D. F.	24121
DOBRUSKY, W. B.	22150	RESNICK, H.	22137
DUGAS, R. L.	22125	ROCKWELL, M. A.	24085
ELLIS, R. C.	22131A	SCHROEDER, J. B.	24124
FRICKSEN, S. R.	22113	SCOTT, R. J.	24110
FELDSTEIN, H. F.	24128	SEACAT, C. M.	SUNNYVALE
FRANCIS, C. W.	25013	SHAPIRO, R. S.	24110B
FRANKS, M. A.	24122	SHOEL, S. J.	22101
FRIEDMAN, L. A.	22130	SKELTON, R. H.	22087
GARDNER, S. A.	22160	SPEER, N. J.	24085
GERGEN, V. J.	25014	STONE, E. S.	24058B
GREENWALD, I. D.	22116B	SWEENEY, M. J.	25030
HAAKE, J. W.	22088A	TABER, W. E.	22155
HENLEY, D. E.	22094B	TENNANT, T. C.	27029
HILL, C. L.	22161	THOMPSON, J. W.	24082A
HILLHOUSE, J.	23110	TOCHE, C.	24121
HOLZMAN, H. J.	24065B	TOTSCHEK, R. A.	24120
HUDSON, G. R.	24126	TUCKER, A. E.	22109A
JOHNSON, R. E.	22125	VORHAUS, A. H.	24076A
KASTAMA, P. T.	23007	WEEMS, S.	22109A
KATZ, M.	25014	WEINSTOCK, M.	22131
KAYSER, F. M.	24109	WEST, G. D.	SUNNYVALE
KEDDY, J. R.	24105	WEST, G. P.	22116A
KEY, C. D.	22083	WILLIAMS, H. D.	22110
KEYES, R. A.	24073	WILSON, G. D.	24124
KNEEMEYER, J. A.	22153A	WINSOR, M. E.	22084

WINTER, J. E.	24117	ZACHTE, S. A.	24086
WISE, R. C.	22158	ZUBRIS, C. J.	24075
WONG, J. P.	SUNNYVALE		

UNCLASSIFIED

System Development Corporation,
Santa Monica, California
COMBINED MILESTONE 3 AND 4, REMOTE STATION TELEMETRY, TRACKING AND COMMANDING UTILITY TAPE SYSTEM. Scientific rept., TM-1283/000/00, by Remote Station Test Section. 27 May 1963, 31p.
(Contract AF 19(628)-1648, Space Systems Division Program, for Space Systems Division, AFSC)
Unclassified report

DESCRIPTORS: Satellite Networks.
Programming (Computers). UNCLASSIFIED

Describes the following CDC 160-A computer programs used for the Remote Tracking Station Utility Support System: 1) Prepare Master Telemetry, Track and Command (TT & C) Tape (SPMTA); 2) Tracking Station Bootstrap (SBOOT); and 3) Master TT & C Tape Read Subroutine (SREAD). UNCLASSIFIED