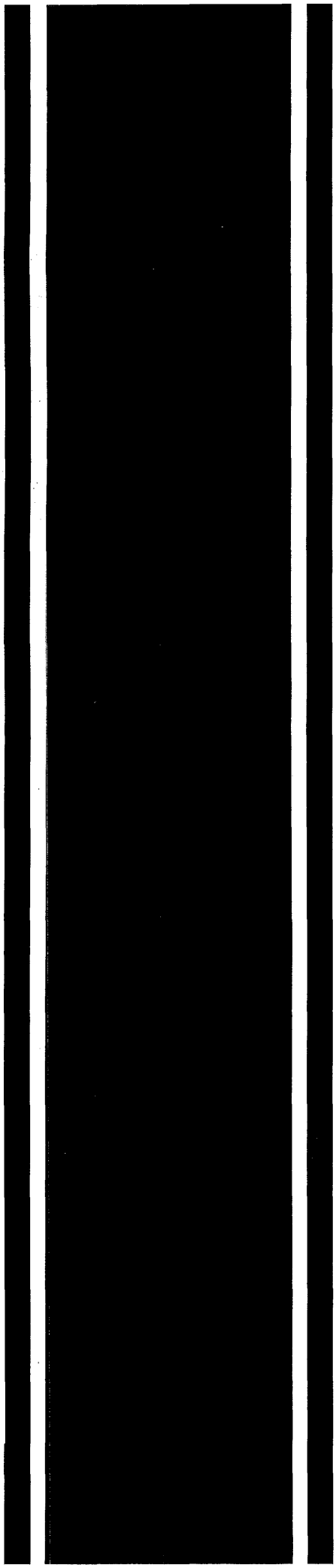

HEWLETT hp PACKARD

PREPARE TAPE SYSTEM

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HP 02116-91751

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PREFACE

The *Prepare Tape System* manual is the primary reference text for the Prepare Tape System (PTS), a program for creating mass storage files; it also covers configuration of MTS Bootstrap. This book should be used with *Magnetic System* (HP 02116-91749), *Disc Operating System* (HP 02116-91748), and *Real-Time Software* (HP 02116-9139) manuals. These manuals describe mass storage systems that use PTS to initiate mass storage files. Other manuals referenced in the *Prepare Tape System* manual are *Basic Control System* (HP 02116-9017) and *HP BASIC* (HP 02116-9077).

The Introduction of the *Prepare Tape System* manual lists the software and hardware requirements and restrictions of PTS. An overview of PTS organization is included in Section I. Section II lists the operating procedures for all the uses of PTS, while Sections III and IV cover the preparations necessary before using PTS to create DSGEN and RTGEN input files or to generate the Magnetic Tape System. Appendix A shows halts and error messages and Appendix B describes PTS processing of absolute binary tape records.

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ILLUSTRATIONS

INTRODUCTION

Prepare Tape System (PTS) is an SIO-environment support program that transfers absolute and/or relocatable object programs (especially HP software modules) from paper tape to magnetic tape or disc files. PTS must be used to create the Magnetic Tape System and is an optional convenience in the generation of the Real-Time Executive System and the Disc Operating System.

SOFTWARE MODULES

PTS operation and MTS Boostrap construction involves these software modules:

- Prepare Tape System
- MTS BOOT (8K or 16K)
- SIO System Dump
- SIO Drivers (8K or 16K):
  - SIO Teleprinter Driver
  - SIO Tape Reader Driver
  - SIO Tape Punch Driver
  - SIO Card Reader Driver
  - SIO Magnetic Tape Driver
  - SIO Disc/Drum Driver

HARDWARE ENVIRONMENT

PTS requires the following minimum hardware:

- HP 2116, 2115, or 2114 computer with 8K of memory.
- HP 2752A or HP 2754B Buffered Teleprinter.
- Mass Storage Device:
  1. Magnetic Tape Unit (HP 2020, HP 3030)
  2. Disc/Drum Unit

A Punched Tape Reader may be added to the PTS hardware configuration for convenience.

SECTION I

PTS ORGANIZATION

The Prepare Tape System creates one or two program files on a mass storage device. For absolute programs (if any), PTS communicates with the user to establish the order of program loading and to assign program identification names and program starting addresses. These absolute programs make up File 1 of the mass storage. Then the user supplies relocatable programs (if any) for File 2. At a later time, the user can use PTS to add more programs to File 1 and/or File 2. Figure 1-1 shows the general organization of PTS.

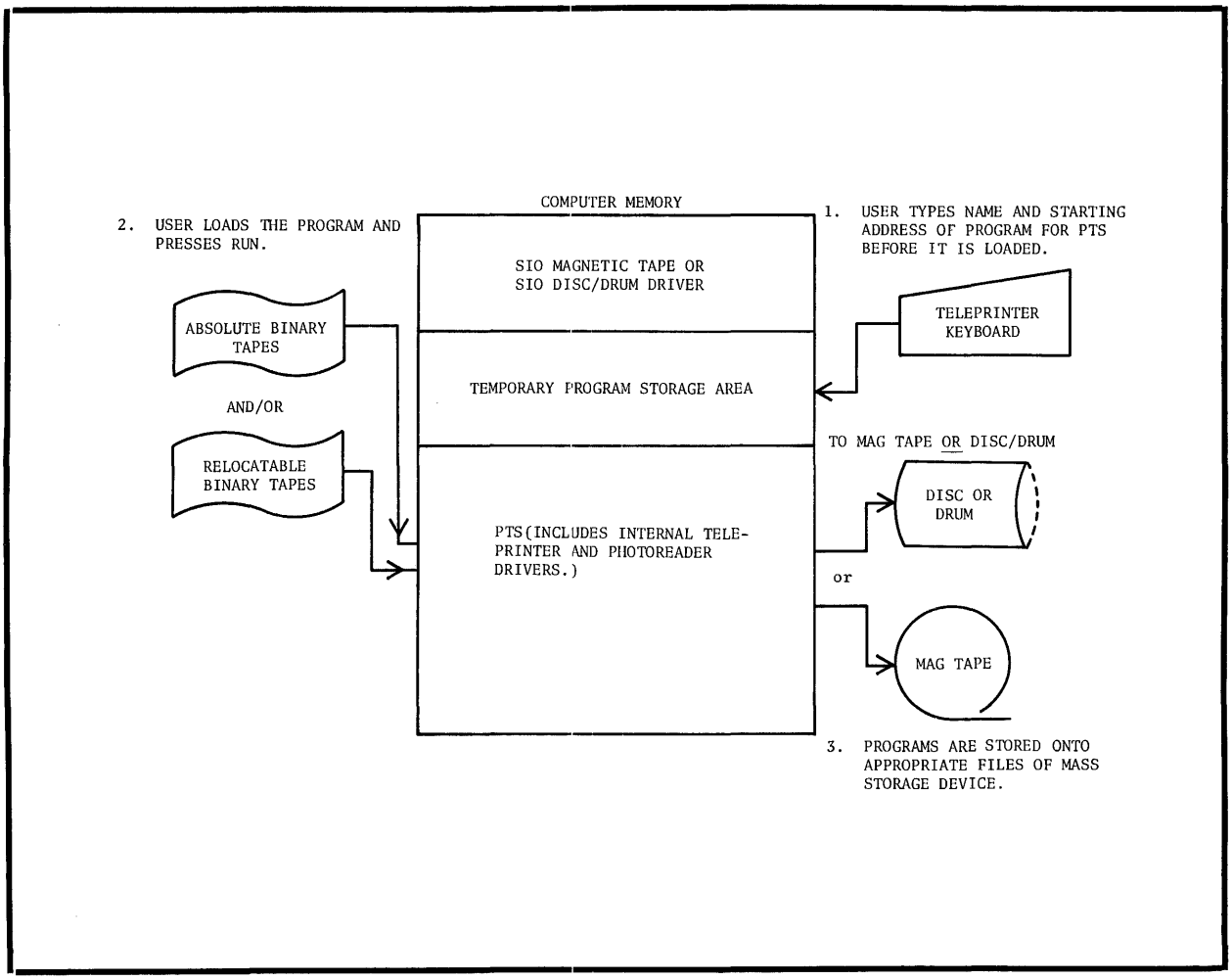

Figure 1-1. PTS Organization

PTS capabilities have several applications for HP software systems. PTS creates a Magnetic Tape System by loading absolute system and user programs (e.g., FORTRAN Compiler, Assembler, etc.) onto File 1 and the BCS Relocatable Program Library plus user subroutines onto File 2 of a magnetic tape. These programs are then loaded from the magnetic tape into core for execution.

PTS also stores the relocatable software modules of the Real-Time Executive or Disc Operating System on disc, drum, or magnetic tape files. RTGEN or DSGEN then uses these files to generate configured Real-Time Executive or Disc Operating Systems quickly and conveniently. In this application, File 1 contains no programs.

Finally, if PTS writes two EOFs on a magnetic tape (no programs), the magnetic tape can be used for intermediate storage by the FORTRAN Compiler and Assembler, and for I/O by the Cross-Reference Symbol Table Generator and Symbolic Editor when they are run in a stand-alone environment.

SECTION II

PTS OPERATION

The flowcharts in this section give the complete operating instructions for the five PTS options. If you are using PTS to create an input file for DSGEN or RTGEN, read Section III before proceding to the flowcharts. If you are using PTS to create a Magnetic Tape System, refer to Section IV. If you only want to write two EOF marks, turn directly to the flowcharts and select the fifth option.

There are three PTS flowcharts. The first (Figure 2-1) is an operating procedures flowchart giving specific operating instructions. Figure 2-2 is a driver configuration flowchart which shows the configuration procedures for drivers such as the High-Speed Tape Punch Driver. The third flowchart (Figure 2-3) shows the SIO Disc/Drum Driver configuration method required for PTS.

Within the flowchart, numbers inside "off-page connectors" (⬠) tell which page of this section to turn to next. Numbers above "off-page connectors" tell which page of this section the connector was referenced from. Thick lines in the flowchart mark the path of most common usage: MTS generation.

Abbreviations used in the flowcharts are:

PTS	=	Prepare Tape System.
B.B.L.	=	Basic Binary Loader (or Basic Binary Disc Loader).
M.T.	=	Magnetic Tape Unit.
S.A.	=	Starting Address.
S.R.	=	Switch Register.
TTY	=	Teleprinter.
S.C.	=	Select Code.
SOT	=	Start-Of-Tape marker (on magnetic tape), or specified first track (on D.F.).
PTR	=	Punched Tape Reader.
EOF	=	End-Of-File mark.

D.F. = Disc (or Drum) File device.

P.U. = Punch Unit.

SIO = Software Input/Output

NOTE 1

When PTS execution starts, two checks for the mass storage device are made. If the device is a magnetic tape unit, either one of two messages may be printed:

WRITE ENABLE RING MISSING!

TAPE UNIT BUSY OR IN LOCAL MODE!

The user must correct the condition, then return to the flowchart. (See Appendix A.)

NOTE 2

PTS may be used:

1. To create Files 1 and 2,
2. To add programs to File 1,
3. To expand File 2 (MTS or DSGEN/RTGEN uses),
4. To leave File 1 empty and create only File 2 for use with RTGEN or DSGEN (see *Disc Operating System* manual, 02116-91748), or
5. To write two End-Of-File marks (EOF) onto a magnetic tape so that the Assembler, FORTRAN Compiler, Cross-Reference Symbol Table Generator, and Symbolic Editor can use it outside of the MTS-environment.

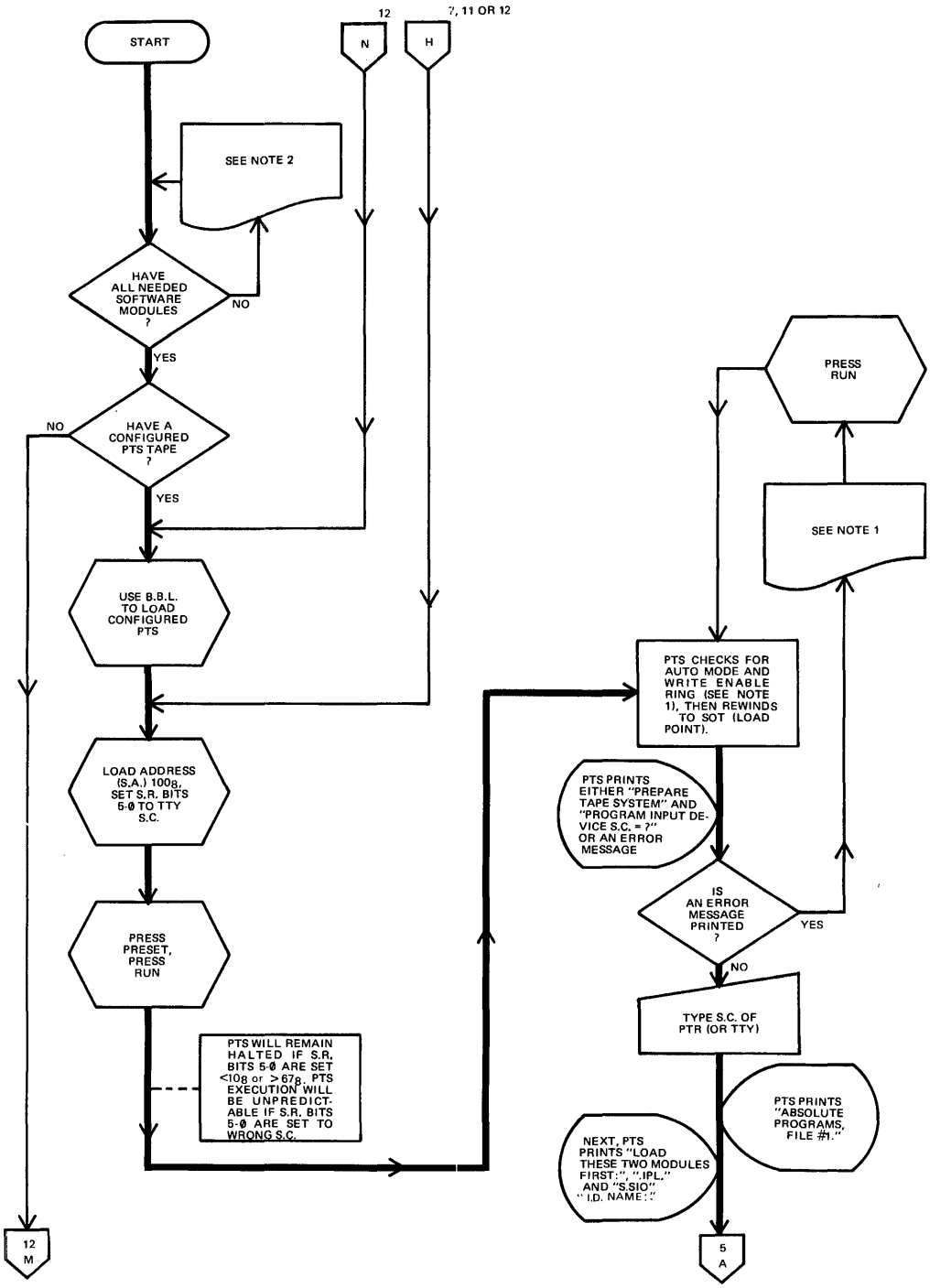

Figure 2-1. Operating Procedures Flowchart (Part 1 of 6)

NOTE 3

PTS may be used:

1. To create Files 1 and 2,
2. To add programs to File 1,
3. To expand File 2 (MTS or DSGEN/RTGEN uses),
4. To leave File 1 empty and create only File 2 for use with RTGEN or DSGEN (see *Disc Operating System* manual, 02116-91748), or
5. To write two End-of-File marks (EOF) onto a magnetic tape so that the Assembler, FORTRAN Compiler, Cross-Reference Symbol Table Generator, and Symbolic Editor can use it outside of the MTS-environment.

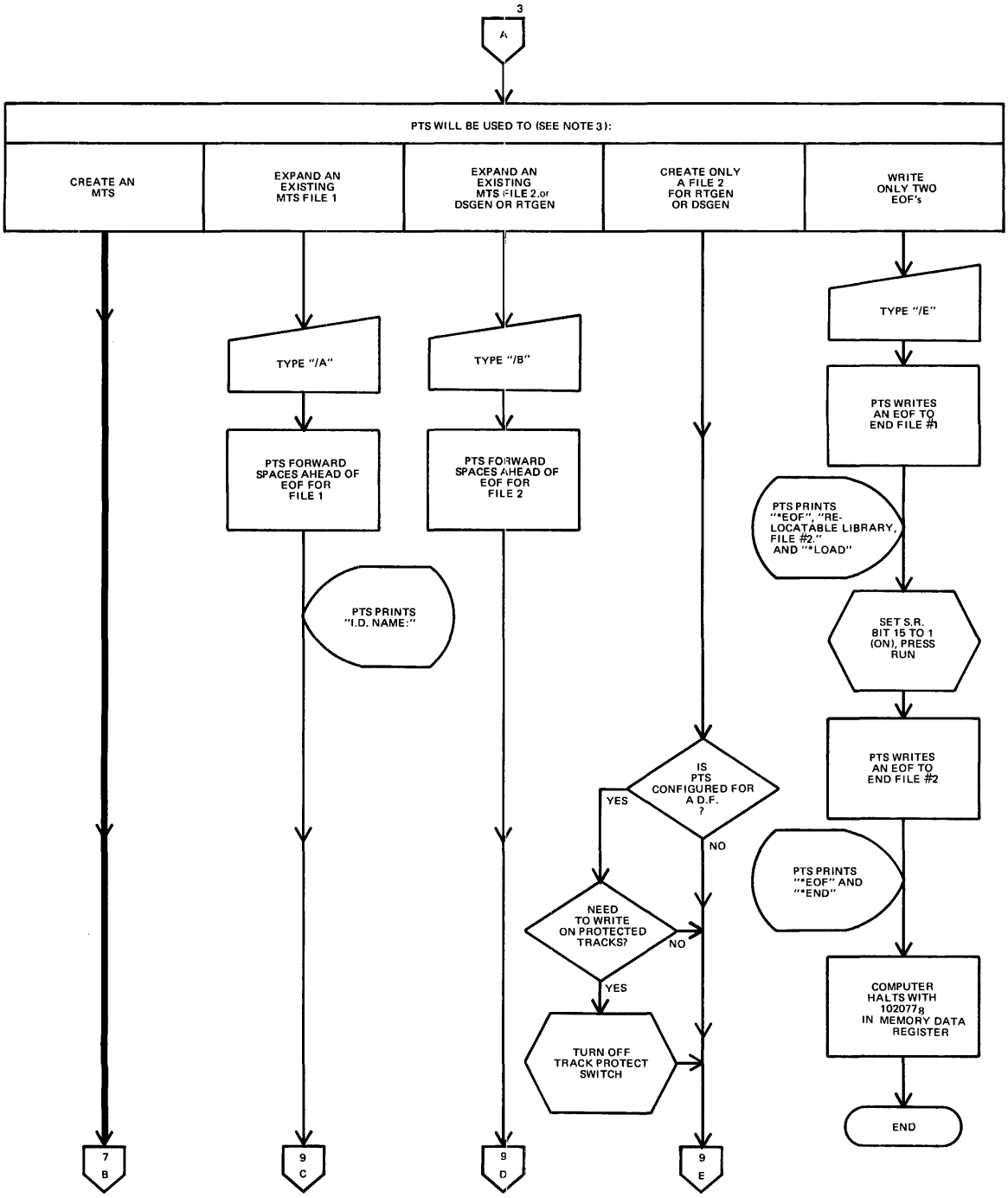

Figure 2-1. Operating Procedures Flowchart (Part 2 of 6)

NOTE 4

PTS should be restarted if a CHECKSUM ERROR occurs while reading a tape for .IPL. or S.SIO. This avoids later problems when the system being prepared is put into operation.

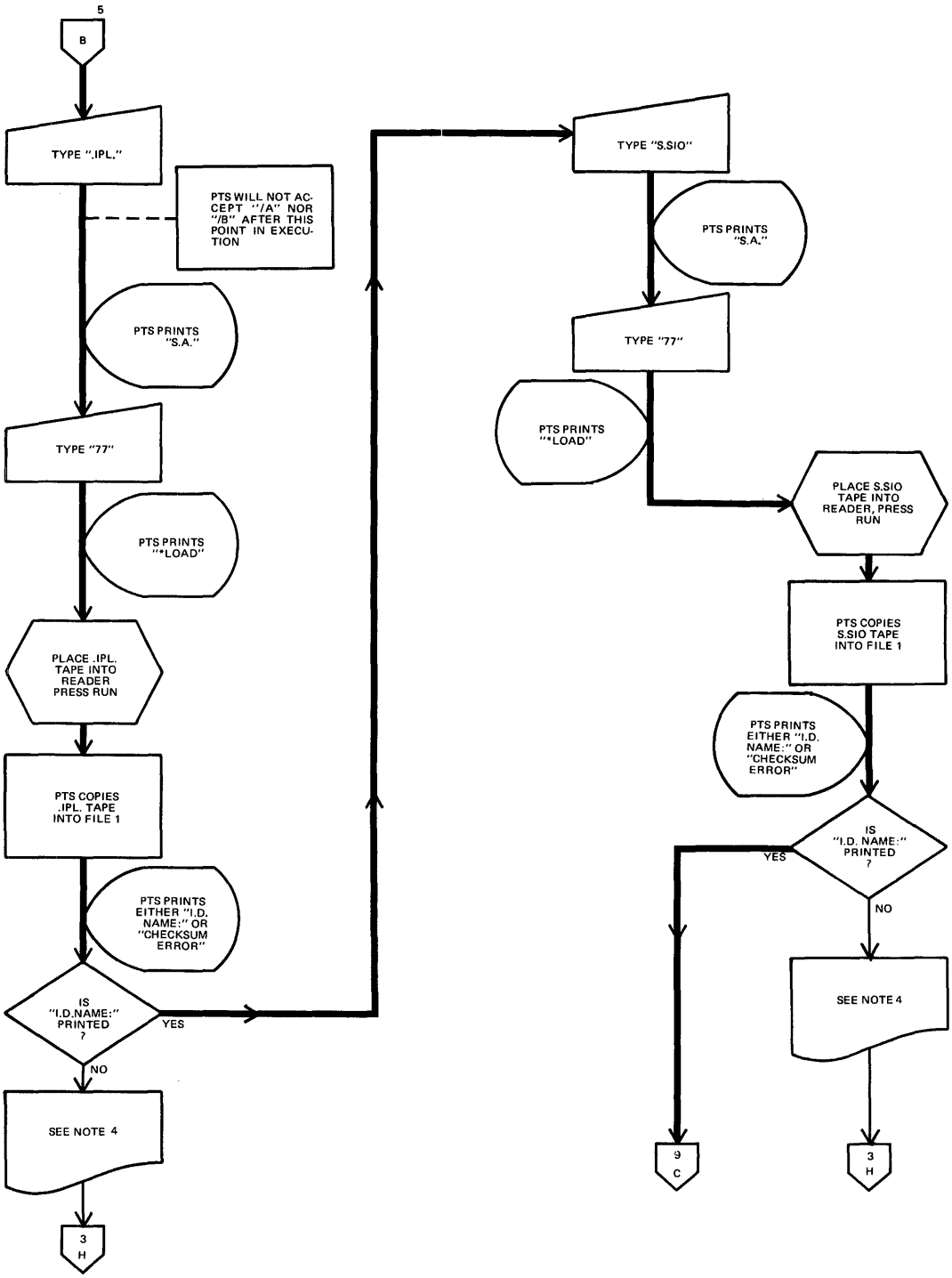

Figure 2-1. Operating Procedures Flowchart (Part 3 of 6)

NOTE 5

All I.D. names must conform to the rules for the specific system being prepared. Four special rules apply to MTS; the I.D. name "FTN2" must be assigned to the FORTRAN Pass 2, the I.D. name "X-REF" must be assigned for the Cross-Reference Symbol Table Generator, the I.D. name ".IPL." must be assigned to the Inter-Pass Loader, and the I.D. name "S.SIO" must be assigned to the standard SIO module. The following characters cannot be used for I.D. names:

: (colon) , (comma) / (slash) (blank) ; (semi-colon)

If the I.D. name contains more than ten characters, the eleventh characters and greater are regarded as comments. No error message is given. A blank character terminates the name before the eleventh character.

NOTE 6

The starting address entries for HP software modules must conform to the rules for the system being prepared. User's programs may use any S.A. greater than 5_8. The S.A. 77_8 should be used for any "non-controlling" program such as SIO modules, etc. See the *Magnetic Tape System* manual.

NOTE 7

Absolute programs copied into File 1 are normally read from a single tape, but may be appended from more than one, if necessary. SIO modules may be appended to software modules in this way. See the *Magnetic Tape System* manual. For each continuation tape, type "/C" in response to the "I.D. NAME:" request.

NOTE 8

Relocatable programs may be loaded into File 2 in any order. However, any programs that call other programs should be loaded first. See the *Program Library* manual.

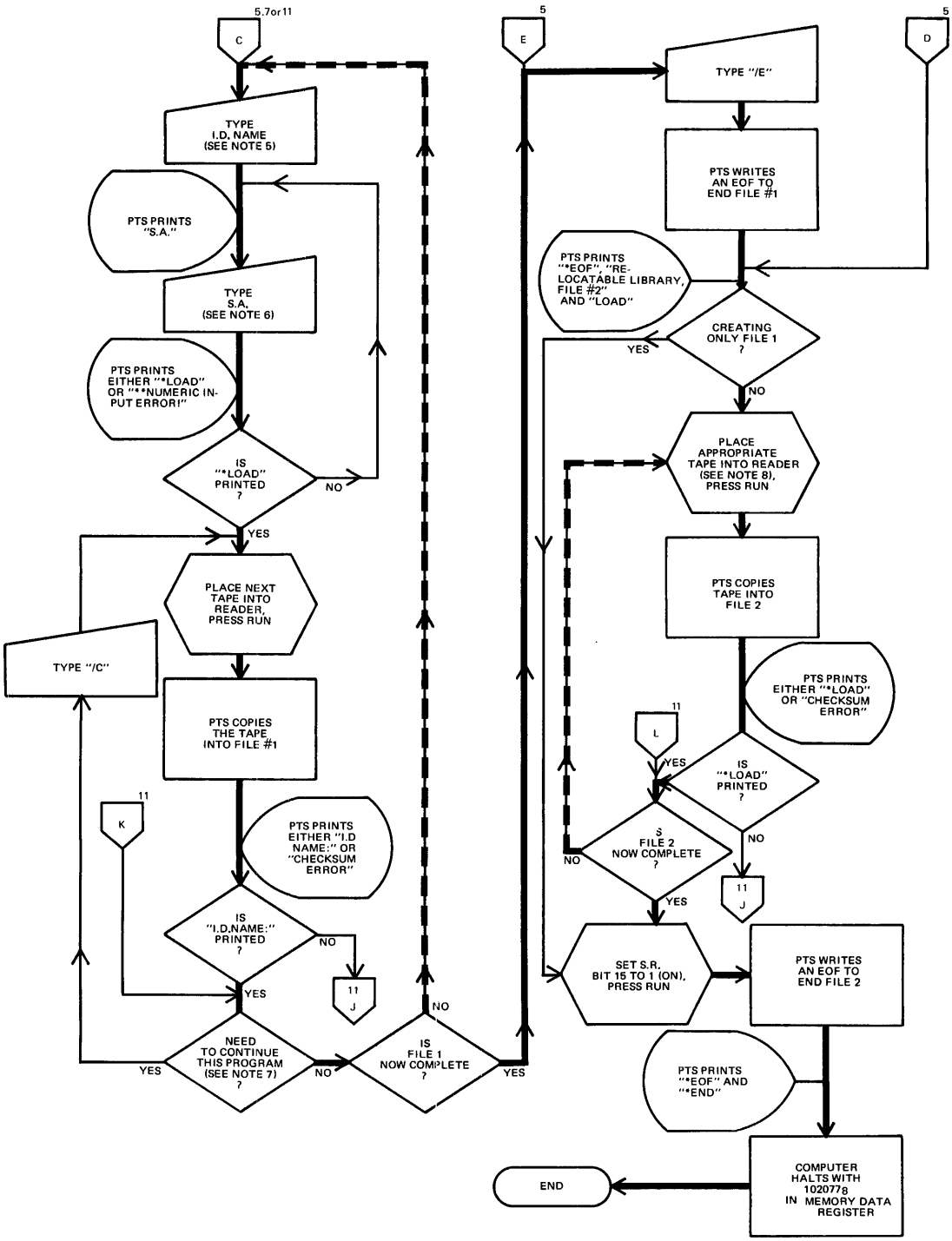

Figure 2-1. Operating Procedures Flowchart (Part 4 of 6)

NOTE 9

If the tape was assembled by the DOS Assembler, the user should restart PTS operation from the beginning because the DOS Assembler does not give feedframes as record separators.

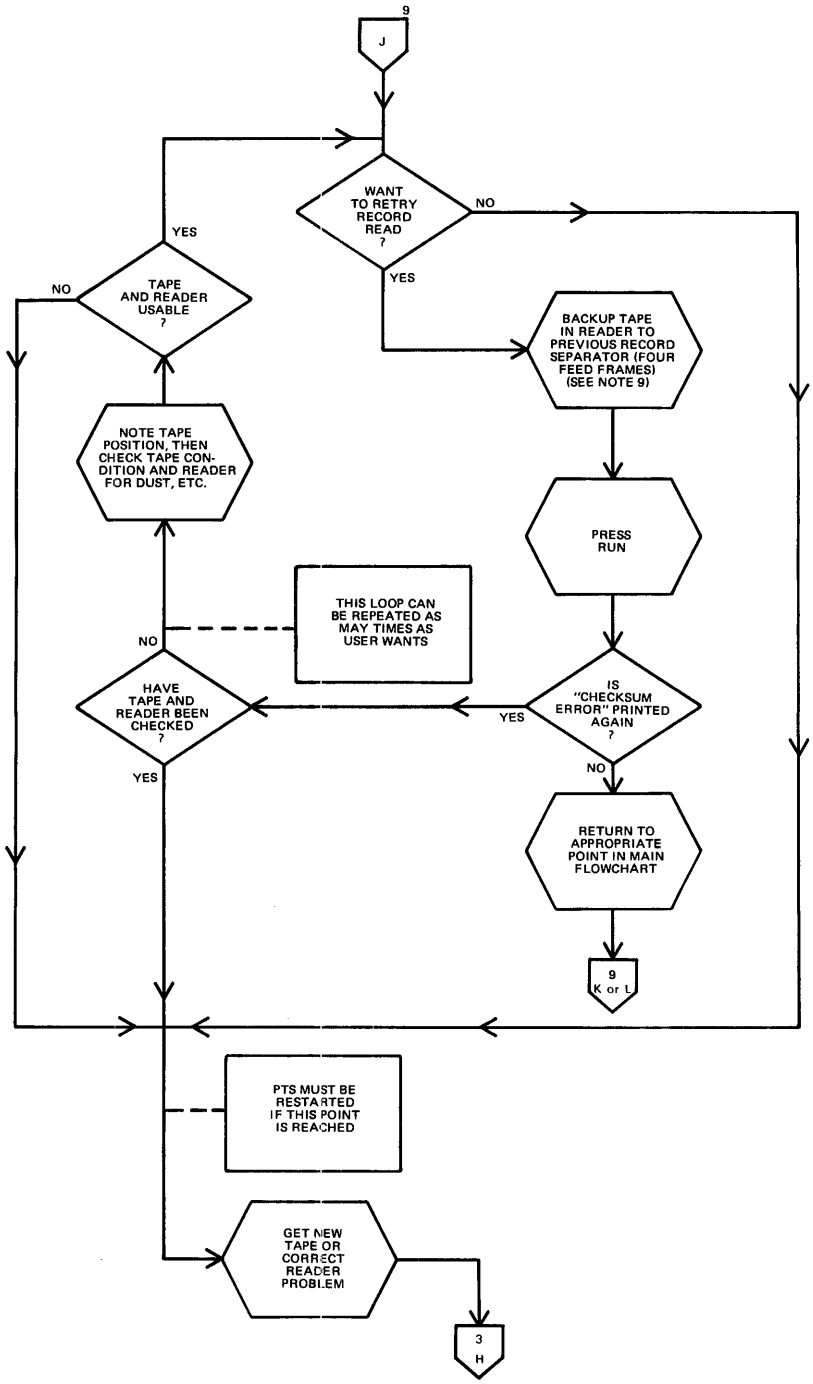

Figure 2-1. Operating Procedures Flowchart (Part 5 of 6)

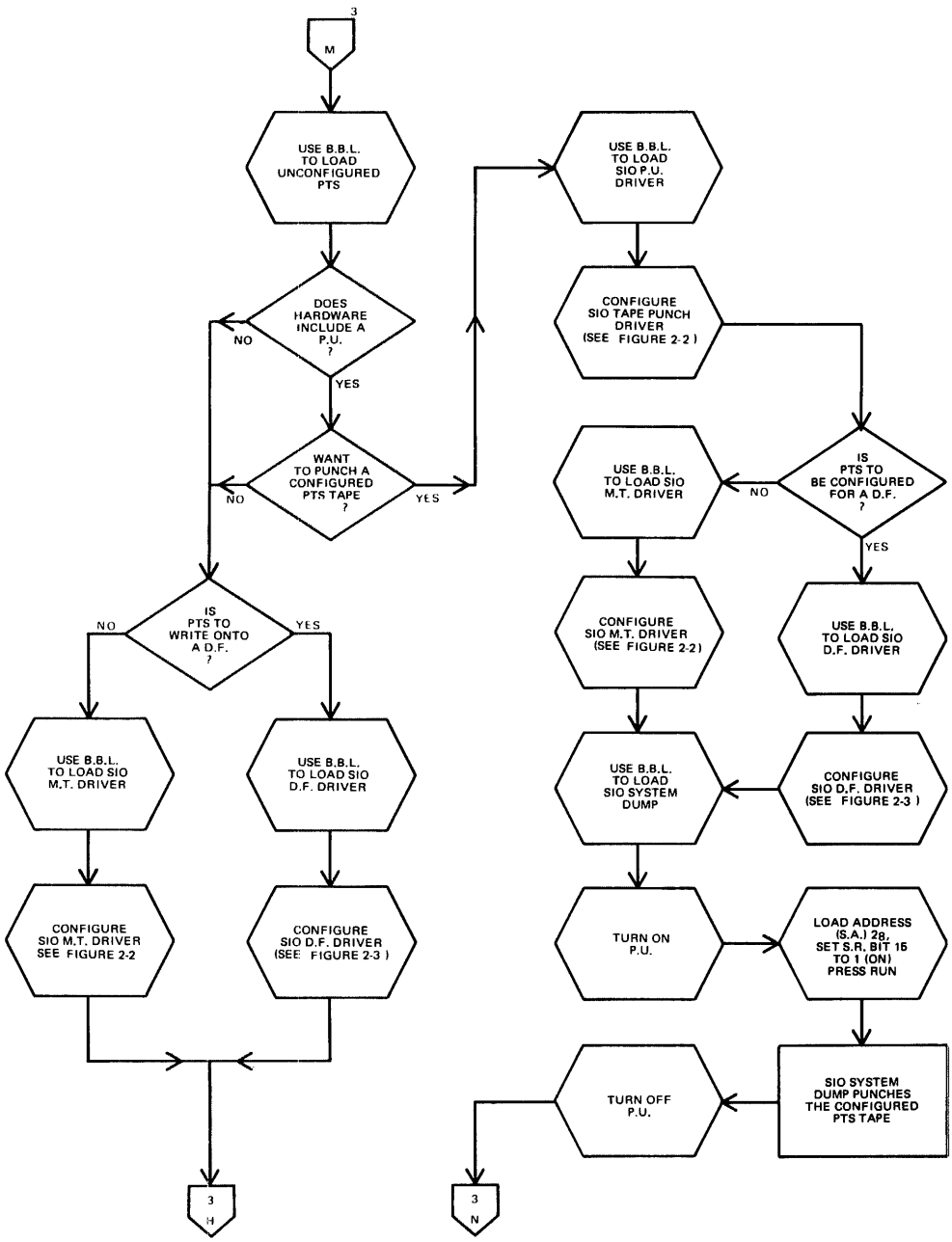

Figure 2-1. Operating Procedures Flowchart (Part 6 of 6)

Figure 2-2. Driver Configuration Flowchart

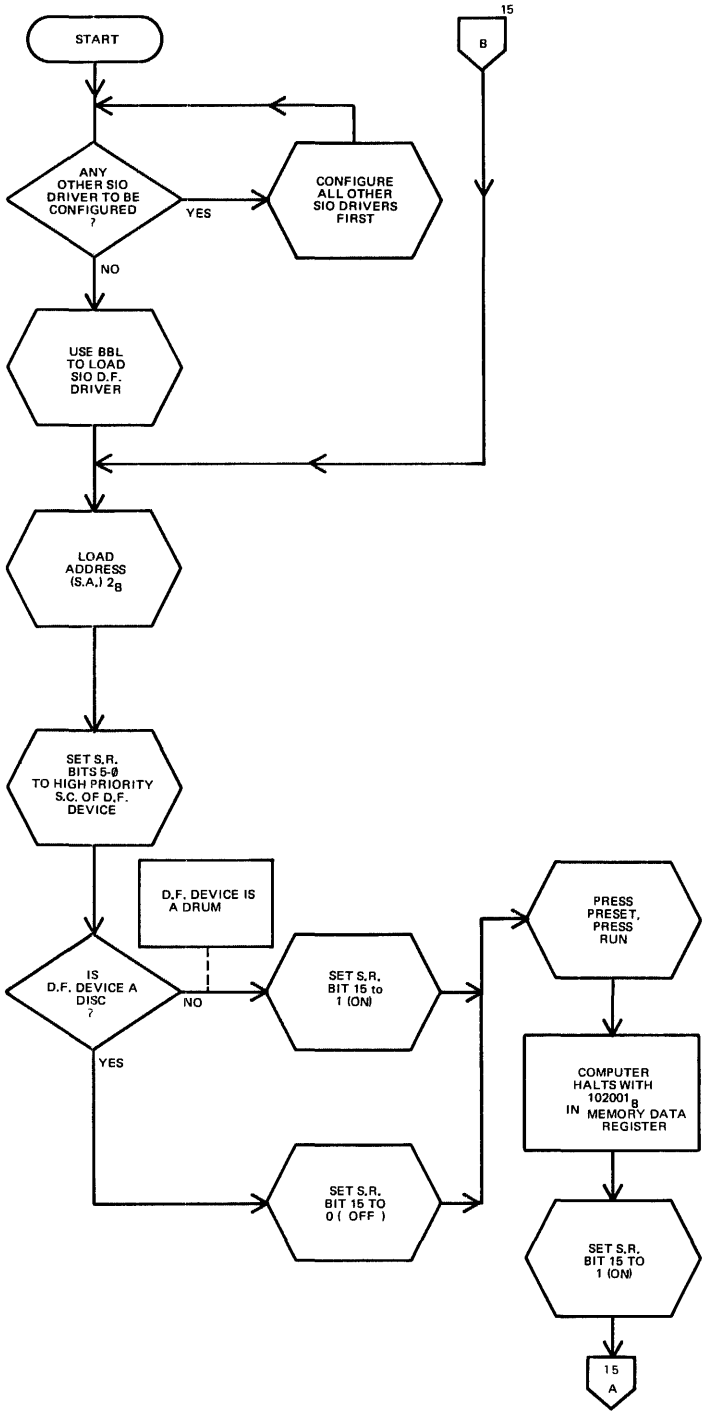

Figure 2-3. SIO Disc/Drum Driver Configuration Flowchart (Part 1 of 2)

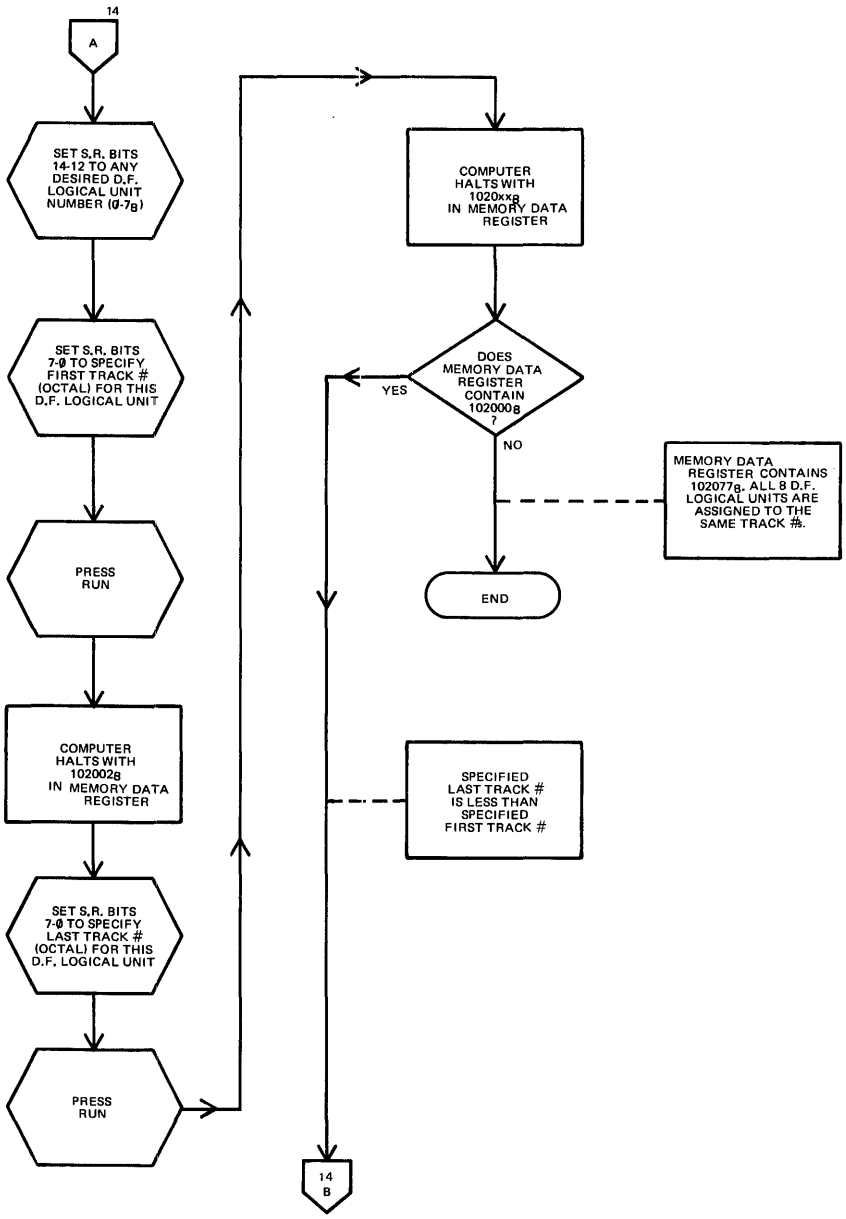

Figure 2-3. SIO Disc/Drum Driver Congiguration Flowchart (Part 2 Of 2)

SECTION III

DSGEN AND RTGEN APPLICATIONS

DSGEN and RTGEN are absolute support programs that generate the Disc Operating System and the Real-Time Executive System, respectively. One phase of DSGEN and RTGEN operation is the program input phase in which relocatable programs are loaded for system use. If these relocatable programs are stored on a magnetic tape or disc file unit rather than paper tape, then systems can be generated more quickly.

PTS loads the relocatable programs onto File 2 of the mass storage device before DSGEN or RTGEN is used. In this case File 1 is empty. Users wishing to create or expand a File 2 for relocatable programs should follow the operating instructions below and refer to the flowchart in Section II. (See Section VII, *Real-Time Software* Manual, 02116-9139, and Section VI, *Disc Operating System* Manual, 02116-91748.)

OPERATING INSTRUCTIONS

The steps listed below are all the necessary preparations for using DSGEN and RTGEN.

1. Gather all the relocatable system and user program tapes. The suggested order for loading onto the mass storage device is as follows:

DSGEN	RTGEN
CORE-RESIDENT SYSTEM	EXEC CONTROL
DISC-RESIDENT EXEC MODULES	SCHEDULER
$EX01	I/O CONTROL
.	I/O DRIVERS
.	
.	
.	
.	

DSGEN

$EX16
I/O DRIVERS (DVR00,DVR01,etc.)
JOB PROCESSOR/FILE MANAGER
RELOCATING LOADER
ASSEMBLER
    MAIN CONTROL (ASMB)
    SEGMENTD (ASMBD)
    SEGMENT 1 (ASMB1)
    ⋮ ⋮
    SEGMENT 5 (ASMB5)
FORTRAN
    MAIN CONTROL (FTN)
    PASS 1 (FTN01)
    PASS 2 (FTN02)
    PASS 3 (FTN03)
    PASS 4 (FTN04)
RELOCATABLE LIBRARY
USER PROGRAMS

RTGEN

DVR00 TELEPRINTER
DVR01 PUNCHED TAPE READER
DVR02 HIGH-SPEED PUNCH
DVR12 LINE PRINTER
DVR22 HP 3030 MAGNETIC TAPE
DVR30 DISC MEMORY
ASSEMBLER
    MAIN CONTROL
    SEGMENT D
    SEGMENT 1
    ⋮
    SEGMENT 5
FORTRAN
    MAIN CONTROL
    PASS 1
    ⋮
    PASS 4
RELOCATING LOADER
EDITOR
RELOCATABLE LIBRARY
USER PROGRAMS

2. Load the configured PTS tape using the Basic Binary Loader. When configuring the SIO Disc/Drum Driver for DSGEN or RTGEN, the last physical track of the disc should be specified as the last track of the disc file logical unit. Normally, a disc file device is configured for as many as eight separate logical units $(0\text{-}7)_8$, but PTS requires that only one distinct logical unit be configured (unit 0). However, when only one logical unit is defined during configuration, the driver automatically assigns the same track boundaries to the other seven logical units.

For future reference, the user should note how many disc tracks were allocated for the relocatable file (8 is the recommended minimum.)

3. Run PTS according to the operating instructions flowchart in Section II and select the fourth option (creating a relocatable file for DSGEN or RTGEN).

4. At this point, the user is ready to generate DOS or RTE. Load RTGEN or DSGEN into core using the Basic Binary Disc Loader. Load and configure all necessary SIO drivers such as the Disc Driver or Magnetic Tape Driver, etc.

5. Run DSGEN or RTGEN according to the instructions found in the *Disc Operating System* Manual or the *Real-Time Software* Manual. During the initialization phase, DSGEN or RTGEN requests the number of tracks (decimal) on the system disc or drum by typing, SYS DISC SIZE? If the operator has stored his relocatable file created by PTS on the last several tracks or the disc, he must subtract the number of tracks used from the overall size of the disc and type that answer as a response. Hence, if the disc/drum contains 64 tracks and the last 8 tracks are used by PTS to store the relocatable file, then the operator should respond, "56" (decimal). If the relocatable file was written on the auxiliary disc file device rather than the system disc, then the number of tracks used for the relocatable file should be subtracted from the total number of auxiliary disc tracks rather than from the system disc size.

SAMPLE PTS USAGE LISTING

The following is a sample listing of the Prepare Tape System as it is used to generate File 2 for RTGEN or DSGEN. This supplements the Operating Procedures Flowchart in Section II. User responses to PTS inquiries are italicized.

If the user makes a mistake while typing a PTS entry, he must strike the RUB OUT key. PTS immediately responds by printing a left arrow (←), then a carriage return and line feed. The operator retypes the entry correctly.

PREPARE TAPE SYSTEM

```
PROGRAM INPUT DEVICE S.C.=?
13
ABSOLUTE PROGRAMS, FILE #1.
LOAD THESE TWO (2) MODULES FIRST:
.IPL.                                  } (Ignore this information)
S.SIO                                  }
I.D. NAME:                 (Null File 1)
/E
*EOF

RELOCATABLE LIBRARY, FILE #2

*LOAD                      (Load software modules)
*LOAD
*LOAD                      (Set switch register bit 15 on to halt loading)
*EOF

*END
```

SECTION IV

MTS APPLICATIONS

MTS includes two files on magnetic tape, File 1 and File 2. File 1 contains such absolute programs as the Basic Control System, Assembler, FORTRAN and assorted SIO modules. File 2 normally contains relocatable user subroutines and the Relocatable Program Library.

Some programs (e.g., Basic Control System) require configuration to conform to the hardware operating environment. These programs are configured before using PTS to load them onto magnetic tape.

The order of loading programs onto magnetic tape is important. When the MTS directive ":PROG" is used, optional programs from File 1 may be loaded into memory in additon to the main program called. PTS loads absolute programs into File 1 in the same order as they appear in the :PROG statement. (See *Magnetic Tape System* Manual, 02116-91752.)

Relocatable programs which list external references are loaded before the referenced programs.

Before running PTS to create MTS, the following processes must be completed in this order:

a. Gather the tapes listed below.
b. Configure Basic Control System
c. Prepare SIO Modules
d. Configure BASIC Interpreter
e. Construct MTS Bootstrap

ESSENTIAL TAPES

The tape necessary for MTS include subsystems such as:

- FORTRAN Compiler (Pass 1 and Pass 2)
- ALGOL Compiler
- Symbolic Editor
- BASIC Interpreter

- Prepare BASIC System
- Extended Assembler
- Cross-Reference Symbol Table Generator
- Basic Control System
  - Relocating Loader
  - .IOC. (non-buffered for HP 2020)
  - BCS Drivers
- Prepare Control System
- Relocatable Program Library
- SIO Drivers
- MTS BOOT (8K or 16K)
- MTS Utility Tape (ONLINE,BYLIST,BYPUNCH, 8K or 16K)
- PTS
- MTS .IPL. (8K or 16K)
- SIO Magnetic Tape Driver
- SIO System Dump

BASIC CONTROL SYSTEM

If MTS contains a Basic Control System (BCS), the operator configures BCS according to the MTS hardware environment by using a program called Prepare Control System (PCS). Complete instructions are contained in the *Basic Control System* Manual (02116-9017).

The following requirements apply to configuration of BCS for MTS:

- The First Word Address of available memory (FWA) must be specified as 110_8.
- The Last Word Address of available memory (LWA) must be specified as 15777_8 for 8K memory or 35777_8 for a 16K memory.
- The BCS HP 2020 Driver D.21 or the BCS HP 3030 Driver D.22 may be used in a file protect mode to protect against accidentally writing on File 1 and File 2. File Protect Mode is indicated during the construction of BCS by PCS. For complete details, consult the *Magnetic Tape System* Manual and *Basic Control System* Manual.
- HP 3030 requires 2-channel DMA; see sample in MTS manual.

PREPARATION OF SIO MODULES

SIO modules are created by configuring from one to four SIO drivers and punching the configured drivers onto paper tape using a program called the SIO System Dump. SIO modules never contain an SIO Magnetic Tape or Disc/Drum Driver; this belongs in MTS Bootstrap only.

MTS uses a standard SIO module called, S.SIO, and optional non-standard SIO modules. S.SIO consists of the SIO Teleprinter Driver and a maximum of two other drivers at the user's option (line printer not allowed). S.SIO remains in core until a non-standard SIO module is loaded into core from magnetic tape. The Inter-Pass Loader always loads S.SIO from magnetic tape into core after program execution is terminated.

The choice of SIO drivers for standard and non-standard SIO modules depends upon the periphial devices available. In general, S.SIO controls keyboard communication and batch operation. (See *Magnetic Tape System* Manual, 02116-91752.)

Non-standard SIO modules contain any combination of the teleprinter and up to three other optional drivers. If the line printer is used, the tape punch driver must also be used as the line printer driver coding overlays the teleprinter's tape punch function.

No matter what combination of SIO Drivers is used to construct an SIO module, the first driver loaded is always the SIO Teleprinter Driver. This holds true for modules that do not use the teleprinter functions (e.g., a module made up of the SIO drivers for a card reader, line printer, and high-speed tape punch). Any SIO module must contain the initial coding that controls the teleprinter keyboard.

Teleprinter driver reading and punching functions may be overlayed by other drivers during module construction, but the keyboard coding always remains intact. Hence, it is necessary to load and configure up to four drivers (the teleprinter and three others) for certain SIO modules.

HP subsystems such as FORTRAN Pass 1, ALGOL or Assembler may be configured with SIO drivers and dumped onto paper tape using the SIO System Dump. This is then loaded onto File 1 by PTS as a part of the Magnetic Tape System.

Configuring subsystems has several advantages. The SIO System Dump punches the SIO drivers and HP subsystem onto paper tape as one continuous series of records. When this tape is loaded onto File 1 by PTS, it is loaded as a minimum number of records of maximum length instead of a series of small records. This speeds up the loading time from magnetic tape during MTS operation and reduces the amount of magnetic tape used.

SIO modules used for configuration are either S.SIO or non-standard. If the non-standard module is Used, then S.SIO is replaced in core when the sub-system is loaded.

Construct S.SIO, each non-standard SIO module, and each configured sub-system as follows:

a. Optional: Use BBL to load a sub-system module if desired.

b. Use the Basic Binary Loader (BBL) to load the SIO Teleprinter Driver.

c. Set the Switch Register to 000002_8 and press the LOAD ADDRESS button. (LOAD ADDRESS 000002_8.)

d. Set the I/O Address (High Priority Select Code) of the device whose driver is being configured into Switch Register bits 5 through 0. (For the Teleprinter Driver, set bit 15 of the Switch Register to 0 if the Teleprinter is a Model 2752A or to 1 if it is a Model 2754B. Bits 14 through 6 should be set to 0.) For any other driver, bits 15-6 should be set to 0.

e. Press PRESET. Press RUN.

f. Repeat steps b through e for a maximum of three more I/O device drivers. Load the drivers in this order:

    1. Teleprinter
    2. Line Printer (for non-standard SIO modules only)
    3. Card Reader or Photoreader
    4. High-Speed Tape Punch

If the line printer is loaded, the High-Speed Tape Punch Driver must also be loaded.

g. Use the BBL to Load the SIO System Dump.

h. LOAD ADDRESS 000002_8. Then set Switch Register bit 15 to 0 (off) unless a subsystem is included (then 1, on).

i. Turn on Paper Tape Punch Unit.

j. Press RUN. The SIO module is punched on paper tape. If a HALT occurs while the module is being punched (the T-register contains 102066_8), then the tape supply is low. Install a new supply, and return to step h.

k. Computer halts (102077) when completed. Press RUN if an additional copy is desired.

BASIC INTERPRETER

If the MTS is to include a BASIC Interpreter, a stand-alone software module called Prepare BASIC System (PBS) must be run prior to using PTS.

PBS is used in two ways: 1) it configures BASIC I/O drivers and dumps them onto paper tape, or 2) it dumps both the configured I/O drivers and the BASIC Interpreter as one complete package.

If the I/O driver are dumped separately from the Interpreter, they are loaded onto File 1 before the Interpreter. Then the BASIC Interpreter is loaded onto File 1 by the /C command. If the second option is selected during PBS operation, then BASIC is loaded by PTS as one complete package. The PTS operation example in this section shows the BASIC I/O drivers dumped separately from the BASIC interpreter. Complete operating instructions for the use of PBS are found in the *HP BASIC* Manual (02116-9077).

MTS BOOTSTRAP CONSTRUCTION

The MTS Bootstrap is necessary for initiating MTS. Bootstrap construction requires the standard SIO module, S.SIO, so the SIO modules must be configured before MTS Bootstrap is created. If S.SIO changes, then a new Bootstrap and MTS magnetic tape must be constructed using the new S.SIO. MTS Bootstrap is created as follows:

a. Use the BBL to load S.SIO, the standard SIO module.

b. Load the SIO driver for the magnetic tape unit HP 2020 or HP 3030).

c. LOAD ADDRESS 000002_8, then set bits 5 through 0 of the Switch Register to the magnetic tape unit's high-priority I/O address.

d. Press PRESET. Press RUN.

e. Load the software module labeled "MTS BOOT" using the BBL.

f. LOAD ADDRESS 000002_8. Set all switches to 0 (off). Press PRESET and RUN. The computer halts with 102077_8 in the T-register.

g. Load the software module labeled "SIO SYSTEM DUMP" using the BBL.

h. LOAD ADDRESS 000002_8. Set the Switch Register to 100000_8.

i. Turn on the Paper Tape Punch Unit.

j. Press RUN.

k. The MTS Bootstrap for this particular standard SIO module (S.SIO) and MTS is punched on paper tape.

After preparing modules as indicated above, the user is ready to use PTS to create File 1 and 2 on magnetic tape. Refer to the flowchart in Section II.

SAMPLE MTS GENERATION LISTING

The following is a sample listing of the Prepare Tape System used to generate MTS. This supplements the operating instructions flowchart in Section II and *Magnetic Tape System* Manual (02116-91752). User responses to PTS inquiries are italicized.

If the user makes a mistake while typing a PTS entry, he strikes the RUB OUT key. PTS immediately responds by printing a left arrow (←), then a carriage return and line feed. The operator retypes the entry correctly.

PREPARE TAPE SYSTEM

```
PROGRAM INPUT DEVICE S.C.=?
13

ABSOLUTE PROGRAMS, FILE #1
LOAD THESE TWO (2) MODULES FIRST:

.IPL.
S.SIO

I.D. NAME:              (Inter-Pass Loader:  tape-resident segment)
.IPL.                   (required name)
S.A.
77
* LOAD

I.D. NAME:              (Standard SIO module:  TY-CR-PU)
S.SIO                   (required name)
S.A.
77
* LOAD

I.D. NAME               (Cross-Reference Symbol Table Generator)
X-REF                   (required name)
S.A.
100
* LOAD

I.D. NAME:              (Option to enter Assembler control statement
ASMB-CS                 through keyboard)
S.A.
120
* LOAD
```

I.D. NAME: *(Extended Assembler: non-EAU)*
ASMB
S.A.
100
* LOAD

I.D. NAME: *(ALGOL compiler)*
ALGOL
S.A.
100
* LOAD

I.D. NAME: *(Symbolic Editor: paper tape and magnetic tape)*
EDIT
S.A.
100
*LOAD

I.D. NAME: *(Extended Assembler: EAU)*
ASMB-EAU
S.A.
100
* LOAD

I.D. NAME: *(Option to enter FORTRAN Control Statement through keyboard)*
FTN-CS
S.A.
50
* LOAD

I.D. NAME: *(Fortran Compiler)*
FTN
S.A.
100
* LOAD

```
I.D. NAME:              (Non-standard SIO module:  LP-CR-PU)
CR-LP
S.A.
77
* LOAD
I.D. NAME:              (Non-standard SIO module: LP-PR-PU)
PR-LP
S.A.
77
* LOAD
I.D. NAME:              (Non-standard SIO module:  TY-PR-PU)
PR-TY
S.A.
77
* LOAD
I.D. NAME:              (Option to input source program through keyboard)
ONLINE
S.A.
77
* LOAD
I.D. NAME               (Option to bypass list output)
BYLIST
S.A.
77
*LOAD
I.D. NAME               (Option to bypass punch output)
BYPUNCH
S.A.
77
* LOAD
```

```
I.D. NAME:              (FORTRAN Compiler:  pass 2)
FTN2                    (required name)
S.A.
100
* LOAD
I.D. NAME:              (Basic Control System (BCS))
LOADR
S.A.
2
* LOAD
I.D. NAME:              (BASIC I/O drivers)
BASIC
S.A.
100
*LOAD
I.D. NAME:              (BASIC Interpreter)
/C
*LOAD
I.D. NAME:
/E
*EOF
RELOCATABLE LIBRARY, FILE #2.
*LOAD
*LOAD
*EOF
*END
```

APPENDIX A

ERROR MESSAGES AND HALTS

The following error messages may occur during PTS operation. The notes and instructions in Section II of this manual as well as the instructions below list corrective action.

HALT CODE	MESSAGE	CORRECTION
NO HALT	**Numeric Input Error!	Non-octal, ØØ or Ø1 value has been typed.
$1Ø2Ø11_8$	Write Enable Ring Missing!	Install "Write-Ring" and push RUN.
$1Ø2Ø11_8$	*EOT	Irrecoverable. Use a longer magnetic tape.
$1Ø2Ø44_8$	Tape Unit Busy or in Local Mode!	Set Tape Unit in "Auto" - mode and push RUN.
$1Ø2Ø11_8$	Checksum Error	If .IPL. or S.SIO are being loaded, restart PTS. Otherwise, reread tape from start of record, if possible (non-DOS tape).
Input by Operator:		
NO HALT	← *(Arrow)*	PTS types "←" in response to the RUB OUT key. It then performs a line feed (LF) and carriage return (CR) and deletes the last line typed.

APPENDIX B

PROCESSING ABSOLUTE BINARY TAPES

Absolute binary tapes are produced by either the Assembler or the Basic Control System (BCS). They contain a series of records for a program; each record is written in a format used by a Basic Binary Loader (BBL), a Basic Binary Disc Loader (BBDL) or an Inter-Pass Loader (IPL) to load the record into core for execution.

The Prepare Tape System copies absolute binary tapes onto mass storage. Then the Inter-Pass Loader accesses absolute binary records from mass storage and loads them into core for execution.

ABSOLUTE BINARY TAPE RECORDS

PTS does not load absolute binary tape records for execution; however, it stores all words of each record into available core in preparation for copying the complete absolute binary tape into mass storage:

a. PTS reads each record into available core and computes a checksum value from each word read. Then it compares that value against the checksum value contained in the last word of the record. If the values are equal, it reads the next record. Each word of each successfully read record is stored in consecutive locations in available core until one of three conditions is encountered:

   1. An EOT (End-Of-Tape, 10 feed-frames) condition on the punched tape reader; or

   2. The absolute address read from the second word of the record being processed is not equal to the value of the previous records starting address (second word) plus its record length (first word) plus one. For example, if the starting address of the first record is 20_8 and the length is 20_8, then the starting address (second word) of the next record must be $41_8 = (20+20+1)_8$. The two records will

be loaded into consecutive areas of core prior to execution time; or

3. The number of locations left in available core is less than the record length read from the first word of the current record.

b. If one of the above three conditions is met, then the combined set of records currently stored in available core is copied onto mass storage as one continuous record.

c. PTS prints "CHECKSUM ERROR" if, in a given record, any word from the second through the last is read incorrectly. The tape stops in the reader at the end of the record. Recovery from this type of checksum error is possible; back up the tape in the reader to the record separator (4 feed-frames), then press RUN. Binary tapes produced by the DOS Assembler do not have record seperators, so if a checksum error occurs while reading one of these tapes, PTS operation must be completely restarted.

d. If PTS misreads the first word (record length) of a given record, a CHECKSUM ERROR also results. For example, if the actual value of the record length is 20 and PTS misreads this as 23, then PTS will read 23 words of the tape. PTS then checks the twenty-fourth word for the checksum value which in this case is indeterminate. The actual checksum value of the 20-word record is contained in the twenty-first word read by PTS. Recovery from this type of checksum error is not possible because the operator does not know which seperator begins the incorrect field; PTS must be restarted.

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