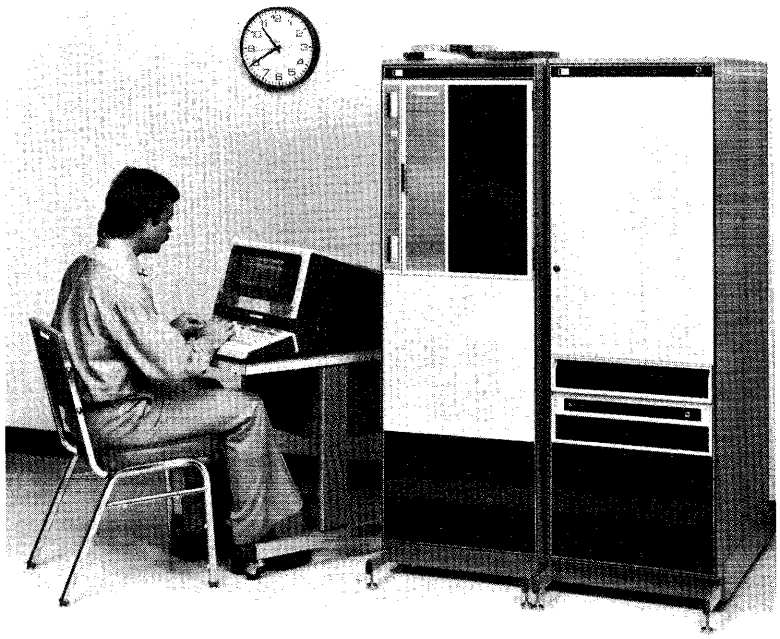
HEWLETT hp PACKARD

RTE-II/RTE-III On-Line Generator

Reference Manual



RTE-II/RTE-III On-Line Generator

Reference Manual

(This manual reflects information that is compatible with software revision code 1726.)

HEWLETT-PACKARD COMPANY
11000 WOLFE ROAD, CUPERTINO, CALIFORNIA, 95014

Library Index Number
2RTE.320.92060-90020

PART NO. 92060-90020

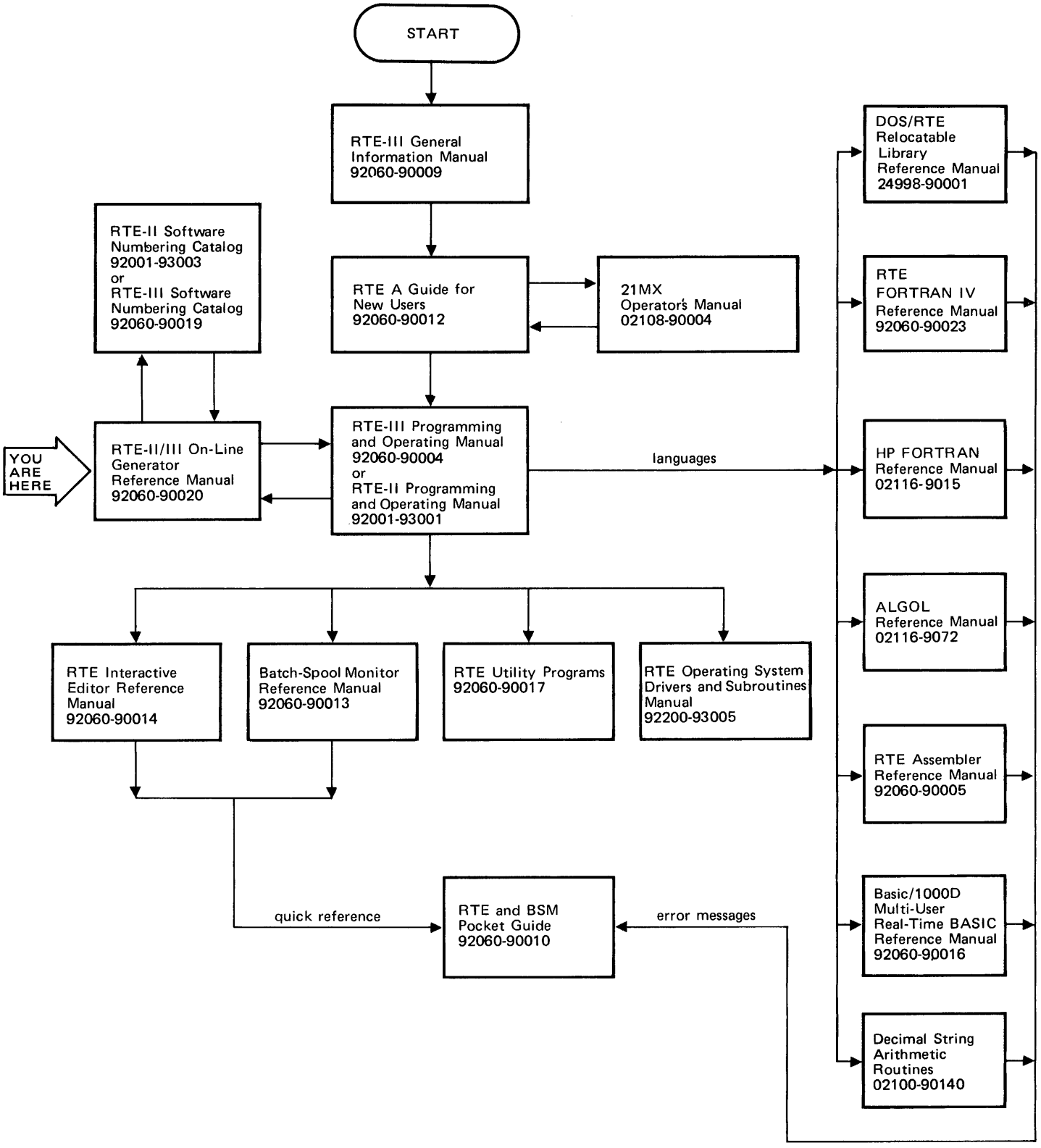
Printed in U.S.A. 7/77

LIST OF EFFECTIVE PAGES

Changed pages are identified by a change number adjacent to the page number. Changed information is indicated by a vertical line in the outer margin of the page. Original pages do not include a change number and are indicated as change number 0 on this page. Insert latest changed pages and destroy superseded pages.

Revision ..... Jul 1977

DOCUMENTATION MAP



7700-23

PREFACE

This manual describes RT2GN, the RTE-II On-Line Generator program and RT3GN, the RTE-III On-Line Generator program. These On-Line Generators allow you to generate a new RTE Operating System, on-line, without shutting down your current RTE Operating system. The programs execute in the background disc resident program area.

This manual is intended for a system programmer or system manager who has some experience using the HP RTE Operating Systems. Before using the On-Line Generators you should be familiar with the RTE-II and/or RTE-III Operating Systems. The Documentation Map shown on the page preceding this Preface gives the titles and manual part numbers for the RTE-II and RTE-III System Software Programming and Operating Manuals. The titles and manual part numbers for other RTE manuals which may be of assistance to you are also included in the Documentation Map.

The sections within this manual describe the operating specifications for the On-Line Generators, as follows:

Section I - An introduction to the On-Line Generators, including features and the operating environment. Also included are general descriptions of the RTE-II and RTE-III Operating Systems and typical systems that are used as a basis for examples and sample generations within this manual.

Section II - Describes RTE-II and RTE-III System planning and layout. Information is given for disc structure planning, input/output planning, and memory configuration.

Section III - Describes how you prepare your responses to the generator questions. Worksheets are included on which you may record the responses required to generate your operating system.

Generator error codes are listed together with definitions of their meaning and, if recovery is possible, corrective action required.

Section IV - Describes system generation using the On-Line Generators. Included are instructions on how you schedule the generator for execution, and how to enter your responses. Multiple terminal operation, error handling, number systems and the generator scratch file are discussed.

Step-by-step sample system generations based on typical system definitions are presented for both RTE-II and RTE-III.

Section V - Describes the operating procedures for running the SWTCH program to transfer your new operating system.

Appendix
Section - Seven appendices are included in this section:

A. Real-Time Disc Usage

B. Error Summary

C. Sample Generation Worksheets

D. Sample Answer Files

E. Sample Generation Listings

F. HP Character Set

NOTICE

Except where specified in text, all references to 7905 discs pertain equally to the 7920 disc.

CONTENTS

CONTENTS (continued)

ILLUSTRATIONS

TABLES

GLOSSARY OF TERMS USED IN THIS MANUAL

ABSOLUTE SYSTEM — The binary image of the Real-Time Executive (RTE-II or RTE-III) Operating System (stored on logical unit 2).

ANSWER FILE — A file which contains a list of the responses to On-Line Generator queries. These responses must be ordered in the same sequence as the generator queries. This may be a disc file or a logical unit such as a Mini Cartridge, magnetic tape, or paper tape device.

AUXILIARY SUBCHANNEL — The subchannel is optional and when used is assigned to logical unit 3. (The binary memory image of RTE does not reside on the auxiliary subchannel.) The auxiliary subchannel has the same status as the system subchannel in that it is treated as a logical extension of the system subchannel.

BOOT EXTENSION — Control is transferred to the Boot Extension after it is loaded into memory at location BBL−200 (octal) using the Bootstrap Loader or ROM Loader. Then, the Boot Extension loads in the RTE System and transfers control to the system.

BOOT FILE — A file to which the Bootstrap Loader produced by the On-Line Generator is directed. This may be a disc file or logical unit such as a paper tape punch.

BOOTSTRAP LOADER — A loader produced by the Generator. The Bootstrap Loader loads in (off-line) the Boot Extension and transfers control to the Boot Extension.

BOOT-UP — The process of bringing the Bootstrap Loader or ROM Loader into memory.

CLASS I/O — A method of communication between a set of programs or devices that may be synchronous or asynchronous with respect to each other, in order to provide parallel processing of information. Class I/O allows a program to continue processing after initiating the operation, without requiring that it wait for completion (I/O without wait).

CURRENT SYSTEM — Also called Host System in SWTCH program. This is the RTE System configuration within which the On-Line Generator and SWTCH are executed.

DCPC — Dual Channel Port Controller. A printed circuit assembly used to perform direct transfers of data between external I/O devices and CPU main memory. (See "DMA".)

DESTINATION SYSTEM — The disc configuration (channel and subchannel/unit) defined during on-line system generation.

DEVICE DOWN — Relates to the state of a peripheral I/O controller or device. When the controller or device is down, it is no longer operable.

DEVICE UP — Relates to the state of a peripheral I/O controller or device. When the controller or device is up, it is operable.

DISC UNIT — A hardware number associated with a single HP 7905 disc drive. This number is selected by a switch located behind the perforated front panel on the drive device. When configuring your system using the On-Line Generator worksheets, set the unit switch to the appropriate number and record the unit number on the HP 7905 Disc Worksheet.

DMA — The process by which main memory is accessed directly (the RTE interrupt system is bypassed) to perform high speed I/O processing.

EQT (EQUIPMENT TABLE) — A table in memory associating each I/O interrupt location (I/O controller) with a particular software processing routine (driver). The status of the I/O controller and information about any current request is also stored in its EQT.

GLOBAL TRACKS — Global tracks are a subset of system tracks and are accounted for in the track assignment table. Any program can read/write or release a global track (i.e., programs can share global tracks).

HOST SYSTEM — Also called Current System. This is the RTE System configuration within which the On-Line Generator and SWTCH are executed.

I/O CONTROLLER — A combination of I/O card, cable, and (for some devices) controller box used to control one or more I/O devices on a channel.

I/O DEVICE — A physical unit defined by an EQT entry (I/O controller) and subchannel.

LG AREA — A group of tracks used to temporarily store the relocatable output of an assembler, compiler, or file manager prior to relocation by the loader.

LIST FILE — A file to which the On-Line Generator listed output is directed. This may be a disc file or a logical unit such as a line printer.

LOGICAL MEMORY (RTE-III only) — Logical memory is the 32K (maximum) address space described by the currently enabled memory map. If the System Map is enabled, it describes those areas of physical memory necessary for the operation of the operating system and does not change during system operation. When the User Map is enabled, it is updated to describe those areas needed by programs when it is to be executed. DMA Maps describe buffers during DMA transfers.

LU (LOGICAL UNIT) NUMBER — A number used by a program to refer to an I/O device. Programs do not refer directly to the physical I/O device channel number, but through the LU number which has a cross reference to the device. This allows I/O devices to be changed without having to change the programs.

MOVING HEAD DISC DRIVE — Consists of a mechanism to rotate one or two discs, one permanently mounted and the other removable. There is one head per recording surface that is attached to a movable arm. The head is moved to the addressed track by means of an actuator driving the arm and head.

OPERATOR CONSOLE — Any interactive I/O device associated with logical unit number 1 (System Console) or a logical unit number greater than 6.

OUTPUT FILE — A disc file to which the On-Line Generator directs the absolute code of the new RTE System.

PARTITION (RTE-III only) — A block of memory with a fixed size (in pages) and identification number located in the disc resident program area. The user may divide up the disc resident program area into as many as 64 partitions classified as a mixture of Real-Time and Background, all Real-Time, or all Background. Disc resident programs run in partitions.

PERIPHERAL SUBCHANNEL — Peripheral subchannel is a subchannel that is available to the user for read/write operations but for which RTE does not manage the subchannel nor maintain a track assignment table. (The file manager can, however, use peripheral subchannel tracks.) A peripheral subchannel must have a logical unit number assignment greater than 6.

PHYSICAL MEMORY — Physical memory is all memory available to the user. Physical memory includes the operating system, libraries, common, system available memory, and all partitions.

PROGRAM SWAPPING — Where disc resident program A is removed from main memory and stored on the disc in its current state of execution, and program B is placed (for execution) in the memory space formerly occupied by program A. Program A is eventually returned to either the same or different memory space to continue.

REAL-TIME EXECUTIVE — The total operating system comprised of the memory resident modules (e.g., EXEC, SCHED, RTIOC), plus I/O drivers, and various tables. Abbreviated RTE-II or RTE-III.

RESOURCE MANAGEMENT — Resource management, or numbering, is a feature that allows the user to manage a specific resource shared by a particular set of programs, so that no two of these programs use the resource at the same time.

ROM BOOT — A loader residing in Read-Only Memory which loads the Boot Extension from disc storage (on-line) and transfers control to the Boot Extension (the Boot Extension must reside on the disc physical track 0, sector 0.)

SCRATCH AREA — A number of disc tracks used during on-line system generation for temporary table storage.

STARTUP — A process initiated by the Boot Extension by which the RTE System initializes itself. During the startup process, tables, registers, and pointers required by the system are established.

SUBCHANNEL — One of a group of I/O devices connected to a single I/O controller. For example, RTE driver DVRxx can operate more than one magnetic tape drive through subchannel assignments. In the case of moving head discs, contiguous groups of tracks are treated as separated subchannels. For example, a 7905 disc platter may be divided into four subchannels.

SYSTEM CONSOLE — An interactive I/O device associated with logical unit number 1. (See "Operator Console".)

SYSTEM SUBCHANNEL — The disc subchannel assigned to logical unit 2 that contains the binary memory image of the Real-Time Executive System.

SYSTEM TRACKS — All those subchannel tracks assigned to RTE for which a contiguous track assignment table is maintained. These tracks are located on logical unit 2 (system), and 3 (auxiliary).

TARGET DISC — The disc type (either HP 7900 or 7905) of the new RTE System to be generated by the On-Line Generator.

TARGET SYSTEM — The disc configuration defined by the channel and subchannel/unit where the new RTE System is to be stored by SWTCH.

TBG — Time Base Generator. A printed circuit assembly that provides the CPU with a timing reference. Timing references are available in 10 microsecond intervals within a range from 100 microseconds to 1000 seconds.

TIME-OUT — Relating to the state of a peripheral device. When the device has timed-out, it is no longer operable. Also (noun), the parameter itself. Amount of time RTE will wait for the device to respond to an I/O transfer command before RTE makes the device inoperable.

INTRODUCING RTE-II/RTE-III ON-LINE SYSTEM GENERATION

SECTION I

1-1. THE RTE-II AND RTE-III ON-LINE GENERATORS

RT2GN, the RTE-II On-Line Generator, is included in the software modules distributed with the HP 92001B RTE-II Software System.

RT3GN, the RTE-III On-Line Generator, is included in the software modules distributed with the HP 92060B RTE-III Software System.

SWTCH, the RTE system transfer program, is included in the software modules distributed with both HP 92001B and 92060B.

In the remainder of this section and in the following sections of this manual, both program packages will be referred to as "the On-Line Generator" unless a specific feature requires that a distinction be made between them. In this case, the term RT2GN or RT3GN will be used.

Using the On-Line Generator program, you can configure a new operating system on-line, under the control of your current operating system. The On-Line Generator accepts the relocatable programs that make up the operating system from disc files.

The relocatable programs must exist as FMP disc files (these files cannot be Type 0 files). The On-Line Generator uses these files to build the new system. The resultant operating system is stored in a Type 1 FMP file created by the generator.

The utility program, SWTCH, transfers the new operating system from the file created by the On-Line Generator to a disc subchannel. You can cause the current, or another operating system to be replaced with the new operating system. See Section V for detailed information about the use of SWTCH.

1-2. ON-LINE GENERATOR FEATURES

The On-Line Generator has the following features:

- The generation process can be directed from an answer file, logical input unit, or operator console.
- Either an HP 7900 or 7905 disc-based system can be generated.
- Mapping and linkage options may be set for the individual relocation of modules.
- The TR command can be used at any time to change modes between interactive (operator) and direct (answer file or logical input unit).
- The bootstrap loader that is produced by the generator can be transmitted to either a logical unit or an FMP disc file created by the generator.

- Relocatable programs for loading during the Program Input Phase must exist as FMP disc files (that is, relocatable input from logical units or Type 0 files is not permitted).
- To abort the generator, enter two exclamation points, !!. This abort request can be entered when in either the interactive mode (by you, the operator) or the direct mode (from an answer file).
- The generator listed output can be echoed to the operator console as well as to the standard list file.

1-3. SOFTWARE ENVIRONMENT

RTE-II	RTE-III
RTE-II Minimum System (24K), plus:	RTE-III Minimum System (32K), plus:
Minimum 10K Background Area	Minimum 11K Partition (includes a 1K Base Page Area)
Approximately 1000 octal Base Page locations (when in Base Page Linkage mode)	Approximately 1000 octal Base Page locations (when in Base Page Linkage mode)
Sufficient FMGR disc tracks to contain the generates system file, and (optionally) the list file and boot file.	Sufficient FMGR disc tracks to contain the generated system file, and (optionally) the list file and boot file.
A scratch area of 6 tracks	A scratch area of 6 tracks
SWTCH Utility Program	SWTCH Utility Program

NOTE

The page requirements for the On-Line Generator must be increased to allow for dynamic table space (a minimum 13K partition is recommended; see Section II, Table 2-4).

NOTE

Both the generator program and the SWTCH program are segmented. When you use the on-line relocating loader (LOADR) to relocate one of them, you must specify the "segmented load" parameter in the RUN command for LOADR. Otherwise, you will get an SC05 error when you later attempt to use the RUN command to execute the on-line generator or SWTCH programs. SWTCH requires that a BG core lock be permitted in the RTE system under which it is executing.

1-4. GENERAL SYSTEM DESCRIPTION

You structure your RTE-II or RTE-III System from a set of software and hardware modules. Above minimum restrictions (see "Software Environment"), the combination of software and hardware modules is flexible. This flexibility allows you to create a system designed specifically to handle your requirements. Refer to the RTE-II or RTE-III Software System Programming and Operating manuals for a detailed description of these HP products.

With the On-Line Generator program, you have the capability of using your current RTE system to create, on-line, a different RTE system.

The structure of the RTE-II System and RTE-III System differs. The basic difference is in their use of main memory for the execution of programs.

The RTE-II maximum main memory size is 32K words. Within the main memory not occupied or reserved by system requirements, RTE-II provides an area for the execution of "real-time" programs and a separate area for the execution of "background" programs. This real-time/ background program area structure is created from information that you provide to the On-Line Generator.

The RTE-III maximum main memory size is 1024K words. However, current hardware restrictions limit the amount of accessible main memory to 256K words. The main memory area not occupied or reserved by system requirements and memory resident programs is divided into partitions. Up to 64 partitions can be declared, which permits up to 64 disc resident programs to be resident in main memory at a time. The partitioned structure is created from information you provide to the On-Line Generator.

You use the On-Line Generator to configure an RTE-II or RTE-III System. You accomplish the configuration by entering information in response to query prompts displayed by the On-Line Generator.

1-5. RTE-II SYSTEM DESCRIPTION

The RTE-II System is a multiprogramming system that allows several programs to operate concurrently, each program executing during the unused central processor time of the others. All input/output and interrupt processing is controlled by RTE-II, except for special privileged interrupts which circumvent RTE-II for quicker response. When a program requests a non-buffered I/O transfer, RTE-II places the program in an I/O suspend state, initiates the I/O operation, and starts executing the next highest priority scheduled program. When the I/O transfer is completed, RTE-II reschedules the suspended program for execution. Operating programs can be written in Real-Time Assembler, ALGOL, FORTRAN, or Multi-User Real-Time BASIC languages. Programs are scheduled by time intervals, an external device, an operator request, or by another program. RTE-II has a dispatching module which decides when to execute the competing programs.

The RTE-II system has up to four user defined program areas for execution of these programs.

- Real-Time memory resident
- Real-Time disc resident
- Background memory resident
- Background disc resident

Figure 1-1 shows the main memory layout for the memory resident and disc resident programs.

1-6. RTE-III SYSTEM DESCRIPTION

RTE-III is a multiprogramming system using partitions which are numbered contiguous blocks of memory the size and number of which are fixed during system generation. RTE-III has all of the features of RTE-II except that main memory in the RTE-III System is divided into an area for memory resident programs and a series of partitions for execution of disc resident programs. The basic purpose of the generation is to build a system structured as

shown in figure 1-2. During the generation, various program modules are loaded and questions answered. The memory resident parts of the system are constructed and stored on the disc. The remainder of memory is divided into partitions for disc resident programs and these programs are relocated and saved on the disc to be swapped into memory when needed. The relocatable subroutine library is saved on disc for use by programs relocated during normal system operation.

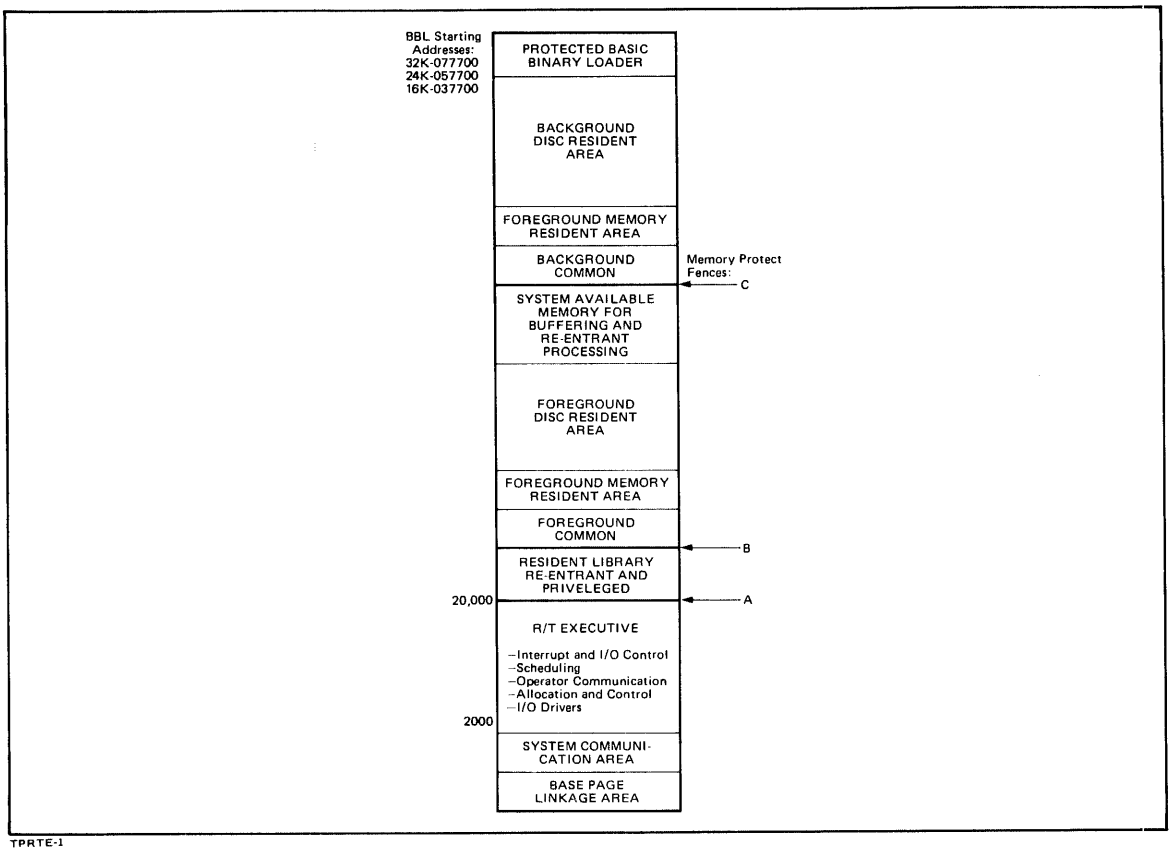


Figure 1-1. Memory Allocation, RTE-II System

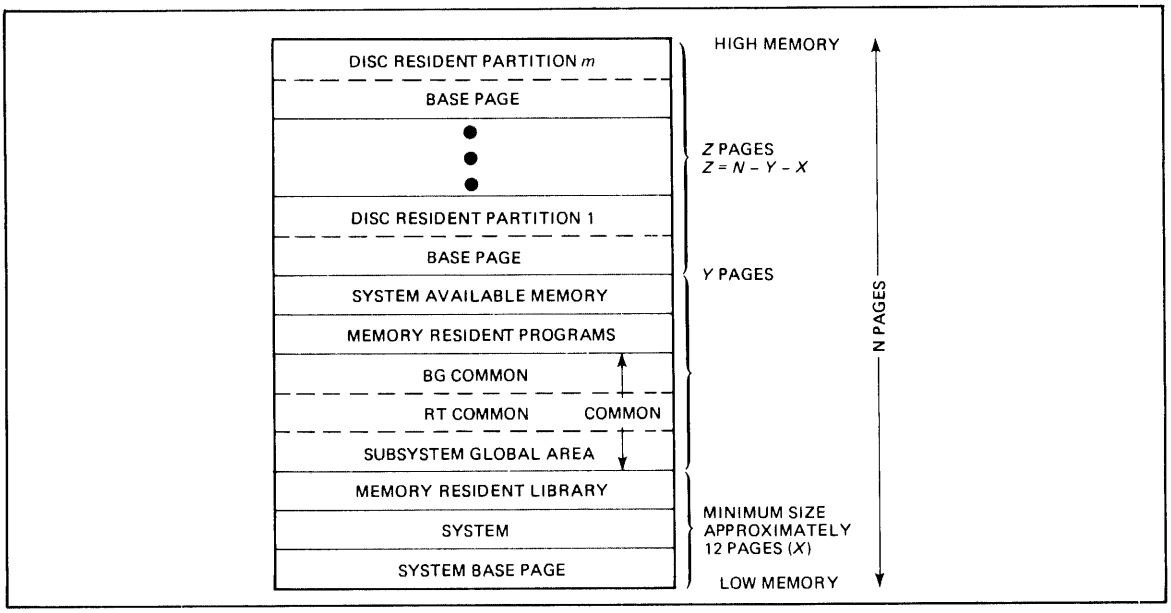


Figure 1-2. Physical Memory Allocation, RTE-III System

CAUTION

Be aware that certain software subsystems may have specific requirements when included in the system generation. Options in areas such as spooling, measurements, communications, and multiple terminal operation may place specific requirements on I/O configuration, buffer space, and so forth. For example, you need to refer to the HP Batch-Spool Monitor Reference manual when you plan for that subsystem.

1-7. THE SYSTEM TO BE GENERATED

Because both RTE-II and RTE-III Operating Systems can be generated on-line, a typical system for RTE-II and RTE-III will be defined for discussion within subsequent portions of this manual. These typical systems will be used for examples and descriptive material. Your system may differ from the typical systems defined here but you need only to add or delete the appropriate modules in your generation process.

1-8. A TYPICAL RTE-II SYSTEM

Hardware Modules

HP 2108 Computer
32K Main Memory
Memory Protect
Time Base Generator
Direct Memory Access
HP 7900 Disc Subsystem
HP 2600 System Console
Paper Tape Reader
Paper Tape Punch
Line Printer
Magnetic Tape Device

Software Modules

RTE-II Memory Resident System
RTE-II System Library
RTE Compiler Library
Power Fail Driver, DVP43
EDITR (Interactive Editor)
RTE-II LOADR (Relocating Loader)
MTM (Multi-Terminal Monitor)
RT2GN (RTE-II On-Line Generator)
HP 7900 Disc Drive, DVR31
RTE-II WHZAT Inquiry Program
HP Assembler and XREF
HP ALGOL Compiler
DOS/RTE Relocatable Library
RTE FORTRAN IV Compiler
RTE FORTRAN IV Formatter
Multi-Terminal Driver, DVR00
Line Printer Driver, DVR12
Magnetic Tape Driver, DVR23
RTE-II Spool Program
Batch Monitor Program
Batch Monitor Library
Memory Resident Programs
Disc Resident Programs
User Written Programs
Utility Programs

1-9. A TYPICAL RTE-III SYSTEM

Hardware Modules

HP 2112 Computer
64K Main Memory
Memory Protect
Time Base Generator
DCPC (Dual Channel Port Controller)
Dynamic Mapping System
HP 7905 Disc Subsystem
HP 2644 System Console
Line Printer
Magnetic Tape Device

Software Modules

RTE-III Memory Resident System
RTE-III System Library
RTE Compiler Library
Power Fail Driver, DVP43
EDITR (Interactive Editor)
RTE-III LOADR (Relocating Loader)
MTM (Multi-Terminal Generator)
RT3GN (RTE-III On-Line Generator)
HP 7905 Disc Driver, DVR32
RTE-III WHZAT Inquiry Program
HP Assembler and XREF
HP ALGOL Compiler
RTE FORTRAN IV Compiler
RTE FORTRAN IV Formatter
DOS/RTE Relocatable Library
Multi-Terminal Driver, DVR05
Line Printer Driver, DVR12
Magnetic Tape Driver, DVR23
RTE-III Spool Program
Batch Monitor Program
Batch Monitor Library
Memory Resident Programs
Disc Resident Programs
User Written Programs
Utility Programs

NOTE

RT2GN and RT3GN both cannot be included in an RTE-II or RTE-III System at generation time. One can be included and the other must be loaded into the running system via the on-line Relocating Loader, LOADR.

RTE-II/RTE-III SYSTEM PLANNING AND LAYOUT

SECTION II

2-1. INSTRUCTIONS FOR PLANNING AN RTE SYSTEM

This planning section has been divided into three major areas, as follows:

- Disc Planning — Disc tracks are grouped together to form subchannels. Tables 2-1, 2-2, and 2-2A provide the necessary worksheets to plan the subchannel structure.
- I/O Planning — I/O interface cards for peripheral devices are assigned priorities, logical unit numbers are assigned, and tables are planned that effect communication between the devices and the system. Table 2-3 provides the I/O configuration worksheet.
- RTE-II Memory Configuration — The organization of RTE-II system memory is discussed and planned.
- RTE-III Memory Configuration — The physical and logical organization of RTE-III system memory is discussed and planned. Memory protection options are presented.

It is recommended that all of the worksheets be duplicated. The copies then can be used for planning the system which leaves the blank original worksheets in the manual for future use.

2-2. DISC PLANNING

RTE-II and RTE-III are disc-based operating systems where the disc provides the primary storage area for the following items:

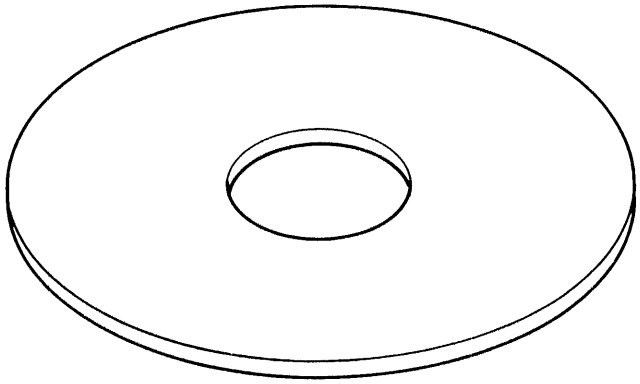
- The configured operating system.
- Relocated disc resident programs.
- Relocatable library modules.
- Temporary storage for programs (source programs for editing, relocatable output for the assembler, and so forth).
- User files.

Disc storage is managed in terms of contiguous groups of tracks called subchannels (after generation, subchannels are normally referenced through logical unit numbers which are assigned in the I/O planning section). The primary purpose of the disc planning section is to configure available disc storage into one or more subchannels. RTE further distinguishes between these as system, auxiliary, and peripheral subchannels. The generator will interact with you to define a group of subchannels on a single disc controller. Multiple controllers and mixed disc types are discussed here under the heading "Multiple Disc Controllers."

Table 2-1. HP 7900/7901 Disc Worksheet

SUBCHANNEL 1

REMOVABLE



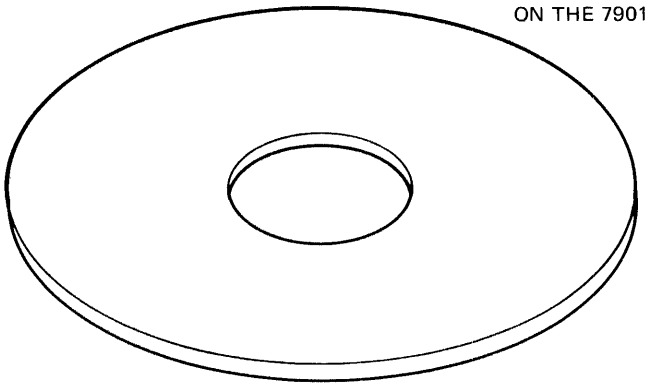
NO. OF TRACKS AVAILABLE _____

FIRST TRACK _____

NOTE:
THE FIXED PLATTER
DOES NOT EXIST
ON THE 7901.

SUBCHANNEL 0

FIXED



NO. OF TRACKS AVAILABLE _____

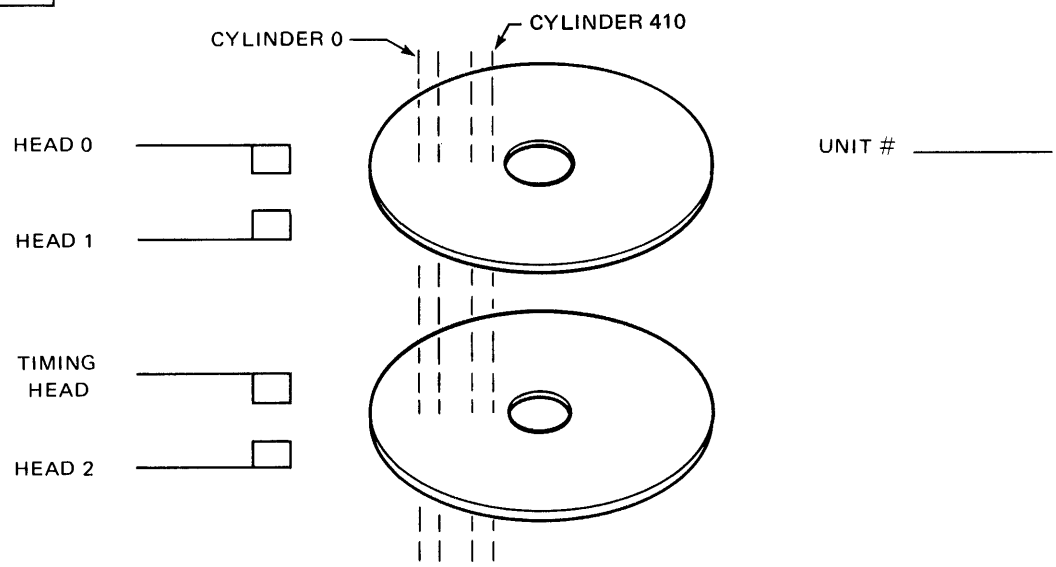
FIRST TRACK _____

SYSTEM SUBCHANNEL NUMBER _____ (LOGICAL UNIT 2)

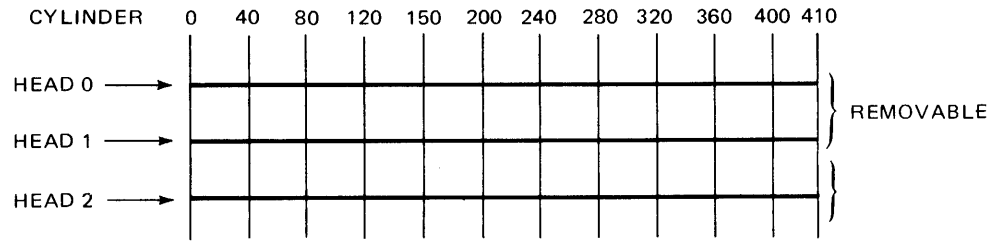
AUXILIARY SUBCHANNEL NUMBER _____ (LOGICAL UNIT 3)

Table 2-2. HP 7905 Disc Worksheet

STEP 1 **FILL IN UNIT NUMBER:**



STEP 2 **TRACKS SHOWN END-TO-END ON THREE SURFACES. USE PENCIL TO CIRCLE YOUR SUBCHANNELS:**



STEP 3 **TRANSLATE STEP 2 TO NUMBERS:**

SUBCHANNEL						
NUMBER OF TRACKS						
STARTING CYLINDER						
STARTING HEAD						
NUMBER OF SURFACES						
NUMBER OF SPARES						
SYSTEM ? (✓)						
AUXILIARY (✓)						

2-3. SYSTEM/AUXILIARY SUBCHANNELS. The RTE system disc tracks are those for which RTE controls and maintains a track usage table. Programs may obtain and release tracks from this area using calls to EXEC. System tracks include all tracks on the system subchannel (logical unit 2) and the optional auxiliary subchannel (logical unit 3). The system disc tracks are used for swapping, and by the generator, editor, assembler, and compilers for source, load-and-go, and a scratch area. They may also be used by user programs for storage. The difference between a system and an auxiliary subchannel is that the configured system (including the memory resident system, the relocated disc resident programs, and the relocatable library) is stored on the system subchannel. The size of a system or auxiliary subchannel is limited to 256 tracks. This size may be further reduced depending on the type of disc used (for example, 203 tracks on a 7900 disc).

NOTE

More than one system or type of system can be located on, and/or share a disc, and those systems may share tracks on one or more discs. In designating tracks, those that are shared would be included and declared during each system's generation. The restriction is that any tracks of an RTE system that are assigned to logical unit 2 or 3 (the system and auxiliary subchannels) must be unique to that RTE system. Remaining tracks on the disc can be assigned to more than one system.

2-4. PERIPHERAL SUBCHANNELS. Disc subchannels other than system and auxiliary are classified as peripheral and must be assigned logical unit numbers greater than 6. Tracks on the peripheral subchannels are not subject to the RTE assignment and release mechanism. Management of these areas can be accomplished directly by user supplied programs or by the File Manager Package. Peripheral subchannels to be used by the File Manager must be defined with no more than 203 tracks for the model 7900 Disc and with no more than 1,024 tracks for the model 7905 Disc.

2-5. HP 7900 DISC CONFIGURATION. The HP 7900 Disc Drive is a single unit that contains two discs; one permanently mounted and designated subchannel 0, and the other housed in a removable cartridge and designated subchannel 1. The drive is interfaced to the computer through a single plug-in controller occupying two I/O slots. It is possible to daisy-chain up to four drives to the same controller providing up to eight discs. Each disc platter is a subchannel, and is accessed through a logical unit reference number that is referenced back to the equipment table (EQT) entry number of the controller. Therefore, one controller, containing eight subchannels linked to eight logical unit numbers, can control up to eight discs. Refer to table 2-1 and fill in the blanks according to the following instructions.

Determine the number of tracks available and starting track number for each subchannel, and fill in the blanks on the worksheet. Note that the maximum number of tracks available per subchannel for the 7900 is 203. The moving head Basic Binary Disc Loader (BBDL) will boot a system on a 7900 disc only if it starts at physical track 0 on subchannel 0 or 1. Locating the system tracks anywhere else will require that the bootstrap loader produced during generation be used each time the system is booted up.

Determine which subchannel will be the system and which subchannel the auxiliary (if any). Fill in the appropriate blanks on the worksheet.

Refer to the heading, "Multiple Disc Controllers," for instructions which cover special action required if the auxiliary subchannel is on a different controller than the system subchannel.

2-6. HP 7905 DISC CONFIGURATION. The HP 7905 Disc Drive is a single unit that contains two disc platters; one permanently mounted, and the other housed in a removable cartridge. Up to 8 drives may be connected to a single controller. The controller is interfaced to the computer through an interface card occupying one I/O slot. Each disc has two surfaces; however, one surface of the fixed disc is used for timing purposes and is not available for data recording. Therefore, a single HP 7905 Disc Drive contains three surfaces (3 heads) and 411 cylinders, giving 1,233 tracks. Refer to table 2-2 for a pictorial diagram of the drive showing heads and cylinders.

NOTE

HP 7905/7920 disc drives may share one controller in any combination, as long as the total number of drives does not exceed eight.

The purpose of the following discussion is to configure each disc into subchannels. Each subchannel will consist of a contiguous group of tracks on a single drive, and one drive may contain several subchannels. Up to 32 subchannels may be defined on one controller. There is no fixed relationship between a subchannel and a given disc area (as on 7900 discs); it is the user's responsibility to define these relationships.

The completed disc worksheet describes each subchannel on a drive in terms of the drive's unit number, size of the subchannel in tracks, starting head and cylinder numbers, surface organization, and number of tracks. In dividing up the HP 7905 disc tracks, bear in mind that the ultimate goal is a logical unit number referencing a group of disc tracks.

When filling in the worksheet on table 2-2 there are several important rules and guidelines to remember.

- Surface organization. Tracks on a subchannel must be contiguous. Head movement should be kept to a minimum for fastest response time to sequential tracks. This means that track assignment should alternate between surfaces. For example, if track 0 (of the first subchannel) is accessed by head 0, cylinder 0, and track 1 is accessed by head 1, cylinder 0, physical head movement (changing cylinders) is kept to a minimum.

  If a subchannel involves both fixed and removable platters, some flexibility is lost because removal of one platter invalidates all data on the subchannel.

  Also, the rotational alignment between two platters depends on drive orientation when the cartridge is inserted. This makes track-to-track access time across platters unpredictable. It may, in fact, be better or worse than on one platter depending on alignment and the time required for software processing between tracks.

  If more than one surface is to be used, tracks are cyclically allocated downward and back to the original surface when necessary. For example, a subchannel beginning with head 1 and using 2 surfaces will use head 1, head 2 and head 1 repeatedly, and in that order. Note that any subchannel using three surfaces must start on head 0.

- Spare tracks. Some tracks on a disc surface may be unusable. When such a track is encountered, another track is assigned by the system transfer program SWTCH in its place, and the disc controller will automatically switch to that track on future references. During generation, spare tracks are assigned to each subchannel for this purpose. When a bad track is encountered during the system transfer process (see Section V), a subchannel may draw from its spares. Note that spare tracks are allocated on a subchannel basis and belong to that subchannel. That is, one subchannel cannot take spare tracks from another

subchannel. The user should plan on about 1200 usable tracks per drive, dividing the remaining 33 tracks as spares among the subchannels in proportion to their size. Spares immediately follow the main tracks for the associated subchannel, and use the same surface organization. Spares are recommended even though they may not be used on a given disc. A subchannel or complete disc might later be copied to another disc where bad tracks are encountered, and all data would not "fit" without sufficient spares.

- Subchannel size. A subchannel to be used as the system or auxiliary subchannel (LU2 or 3) must not exceed 256 tracks, excluding spares. Similarly, a peripheral subchannel to be used by the File Manager Package must not exceed 1024 tracks, again, excluding spares. Larger subchannels may be defined for access by user-developed programs.

- Subchannel numbering. Subchannels on a given disc controller are numbered sequentially from 0. Do not skip or duplicate any numbers.

- System Subchannel. The moving head Basic Binary Disc Loader will boot a system on a 7905 disc only if it starts at cylinder 0, head 0, 1, or 2. Locating the system subchannel anywhere else will require that the bootstrap loader produced during generation be used each time the system is booted up.

With the aid of table 2-2, 7905 subchannels are defined in a manner directly translatable for input to the generator.

Follow the instructions below for each HP 7905 drive.

STEP 1 — A hardware unit number is associated with each drive and is selected by a switch located behind the perforated front panel. Set the switch to the appropriate number and then write the number on the worksheet.

STEP 2 — The second part of the worksheet represents the three surfaces of the disc drive and is provided as an aid in dividing up the surfaces into subchannels. For example, on subchannel 0, you could allocate 256 tracks for data and 8 tracks for spares, encompassing two surfaces. This makes a total of 264 tracks which is 132 cylinders. The first cylinder contains the first and second addressable track:

— first track = head #0, cylinder #0
— second track = head #1, cylinder #0

Divide up the surfaces, grouping the tracks into subchannels. Allow approximately 6 spare tracks for each 200 data tracks allocated. The number for the first cylinder of succeeding subchannels is found by adding the number of cylinders used by preceding subchannels. (Add tracks and spares then divide by the number of surfaces to count cylinders). In the example above, 132 cylinders were assigned to subchannel 0 (256 tracks plus 8 spares). Therefore, the "First Cyl" for subchannel 1 would be cylinder 132, Head #0 or 1, or cylinder 0, Head #2. It depends on how you assign the tracks.

STEP 3— The third part of the worksheet answers all the questions the generator will ask about each subchannel. For the most part, the numbers are filled in from Step 2.

Fill in the blanks for all subchannels created in Step 2.

Determine which subchannel will be the system and which subchannel the auxiliary (if any) and check the appropriate boxes.

CAUTION

Care must be exercised when defining 7905 and 7920 subchannels to avoid including tracks in more than one subchannel. The generator assumes that the disc subchannel organization is valid and performs no checks on the definition. Remember that when a subchannel covers more than one surface, the starting head is incremented to determine the surfaces covered by that subchannel. If the second part of the worksheet in table 2-2or 2-2.A is filled in correctly during Step 2, the subchannel definitions will be correct.

2-6.A HP 7920 DISC CONFIGURATION. The HP 7920 Disc Drive is a single unit that contains three data disc platters. Up to 8 drives may be connected to a single controller. The controller is interfaced to the computer through an interface card occupying one I/O slot. Each data disc has two surfaces; however, one surface of the middle disc is used for timing purposes and is not available for data recording. Therefore, a single HP 7920 Disc Drive contains five surfaces (5 heads) and 823 cylinders, giving 4,115 tracks. Refer to table 2-2.A for a pictorial diagram of the drive showing heads and cylinders.

NOTE

HP 7905/7920 disc drives may share one controller in any combination, as long as the total number of drives does not exceed eight.

The purpose of the following discussion is to configure each disc into subchannels. Each subchannel will consist of a contiguous group of tracks on a single drive, and one drive may contain several subchannels. Up to 32 subchannels may be defined on one controller. There is no fixed relationship between a subchannel and a given disc area (as on 7900 discs); it is the user's responsibility to define these relationships.

The completed disc worksheet describes each subchannel on a drive in terms of the drive's unit number, size of the subchannel in tracks, starting head and cylinder numbers, surface organization, and number of tracks. In dividing up the HP 7920 disc tracks, bear in mind that the ultimate goal is a logical unit number referencing a group of disc tracks.

When filling in the worksheet on table 2-2.A there are several important rules and guidelines to remember.

- Surface organization. Tracks on a subchannel must be contiguous. head movement should be kept to a minimum for fastest reponse time to sequential tracks. This means that track assignment should alternate between surfaces. For example, if track 0 (of the first subchannel) is accessed by head 0, cylinder 0, and track 1 is accessed by head 1, cylinder 0, physical head movement (changing cylinders) is kept to a minimum.

  If more than one surface is to be used, tracks are cyclically allocated downward and back to the original surface when necessary. For example, a subchannel beginning with head 1 and using 2 surfaces will use head 1, head 2 and head 1 repeatedly, and in that order. Note that any subchannel using five surfaces must start on head 0.

- Spare tracks. Some tracks on a disc surface may be unusable. When such a track is encountered, another track is assigned by the system transfer program SWTCH in its place, and the disc controller will automatically switch to that track on future references. During generation, spare tracks are assigned to each subchannel for this purpose. When a bad track is encountered during the system transfer process (see Section V), a subchannel may draw from its spares. Note that spare tracks are allocated on a subchannel basis and belong to that subchannel. That is, one subchannel cannot take spare tracks from another subchannel. The user should plan on about 4075 usable tracks per drive, dividing the remaining 40 tracks as spares among the subchannels in proprotion to their size. Spares immediately folow the main tracks for the associated subchannel, and use the same surface organization. Spares are recommended even though they may not be used on a given dics. A subchannel or complete disc might later be copied to another disc where bad tracks are encountered, and all data would not "fit" without sufficient spares.

- Subchannel size. A subchannel to be used a the system or auxiliary subchannel (LU2 or 3) must not exceed 256 tracks, excluding spares. Similarly, a peripheral subchannel to be used by the File Manager Package must not exceed 1024 tracks, again, excluding spares. Larger suchannels may be defined for access by user-developed programs.

- Subchannel numbering. Subchannels on a given disc controller are numbered sequentially from 0. Do not skip or duplicate any numbers.

- System Subchannel. The moving head Basic binary Disc Loader will boot a system on a 7920 disc only if it starts at cylinder 0, (head 0, 1, 2, 3, or 4). Locating the system subchannel anywhere else will require that the bootstrap loader produced during generation be used each time the system is booted up.

With the aid of table 2-2.A, 7920 subchannels are defined in a manner directly translatable for input to the generator.

Follow the instructions below for each HP 7920 drive.

STEP 1 — A hardware unit number is associated with each drive and is selected by a switch located behind the perforated front panel. Set the switch to the appropriate number and then write the number on the worksheet.

STEP 2 — The second part of the worksheet represents the five surfaces of the disc drive and is provided as an aid in dividing up the surfaces into subchannels. For example, on subchannel 0, you could allocate 256 tracks for data and 8 tracks for spares, encompassing two surfaces. This makes a total of 264 tracks which is 132 cylinders. The first cylinder contains the first and second addressable track:

— first track = head #0, cylinder #0
— second track = head #1, cylinder #0

Divide up the surfaces, grouping the tracks into subchannels. Allow approximately 6 spare tracks for each 200 data tracks allocated. The number for the first cylinder of succeeding subchannels is found by adding the number of cylinders used by preceding subchannels. (Add tracks and spares then divide by the number of surfaces to count cylinders). In the example above, 132 cylinders were assigned to subchannel 0 (256 tracks plus 8 spares). Therefore, the "First Cyl" for subchannel 1 would be cylinder 132, Head #0 or 1, or cylinder 0, Head #2. It depends on how you assign the tracks.

STEP 3 — The third part of the worksheet answers all the questions the generator will ask about each subchannel. For the most part, the numbers are filled in from Step 2.

Fill in the blanks for all subchannels created in Step 2.

Determine which subchannel will be the system and which subchannel the auxiliary (if any) and check the appropriate boxes.

Table 2-2.A HP 7920 Disc Worksheet

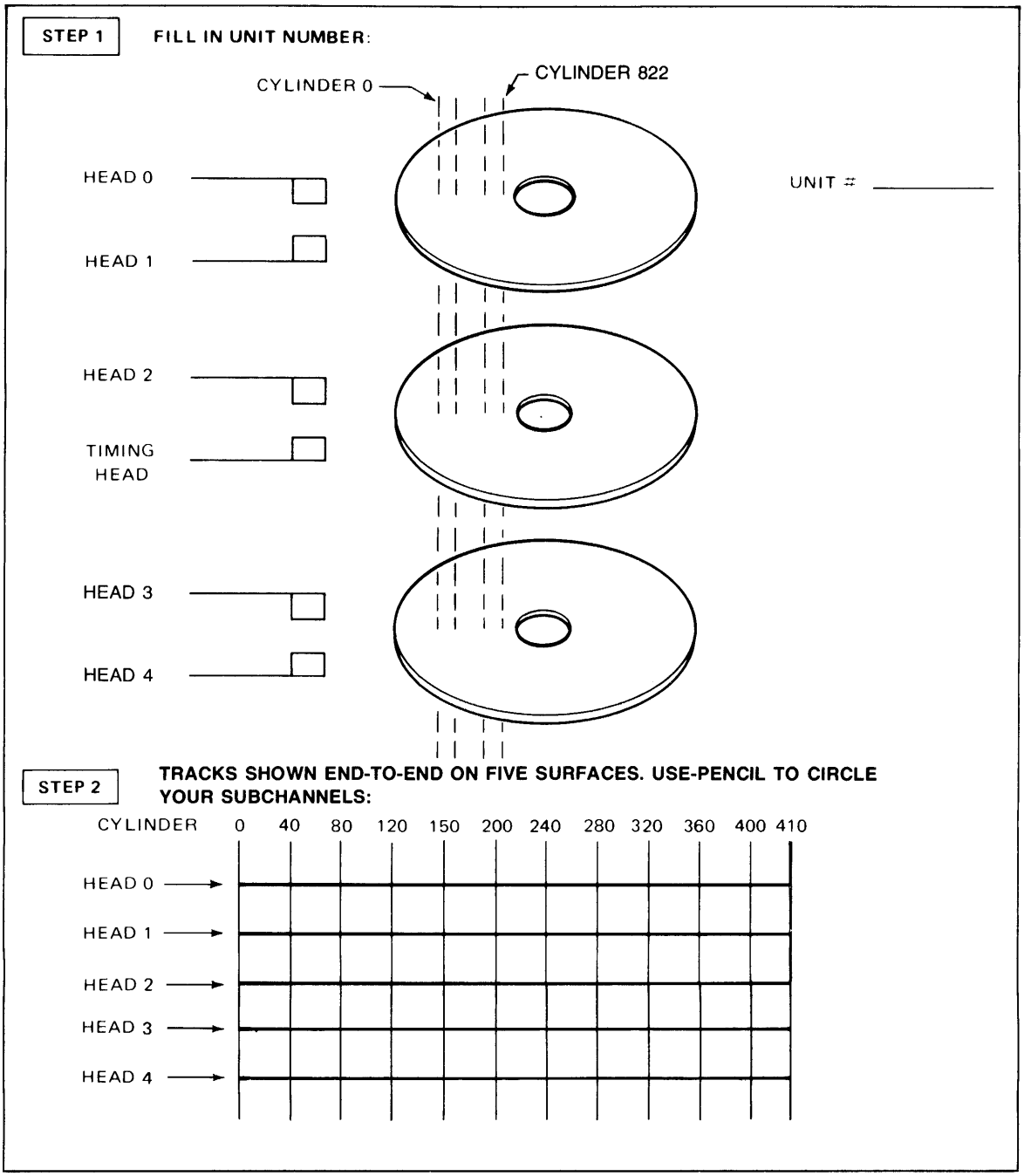
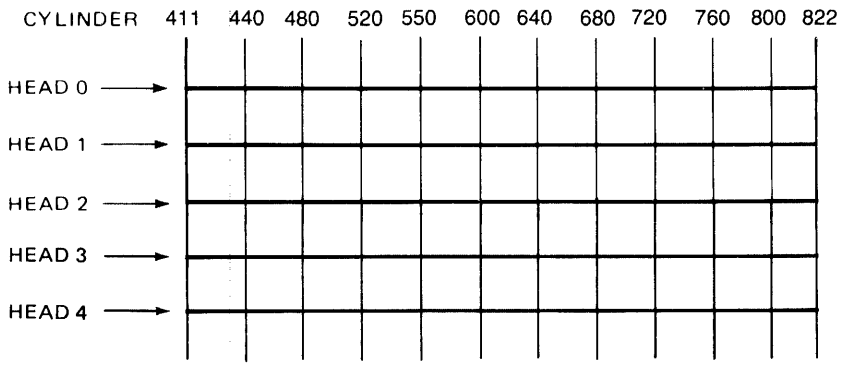


Table 2-2.A. HP 7920 Disc Worksheet (Cont.)

STEP 2 **(CONTINUED)**



STEP 3 **TRANSLATE STEP 2 TO NUMBERS:**

SUBCHANNEL						
NUMBER OF TRACKS						
STARTING CYLINDER						
STARTING HEAD						
NUMBER OF SURFACES						
NUMBER OF SPARES						
SYSTEM ? (✓)						
AUXILIARY (✓)						

2-7. MULTIPLE DISC CONTROLLERS. The generator assumes a single disc controller for purposes of interactively defining subchannels. If a system is to have more than one controller (same or different disc types), the user must construct a table, according to the directions in Appendix A, describing the subchannels of the controller before beginning generation. The user must include the appropriate disc driver and define an equipment table entry and the logical unit numbers for the subchannels (described in I/O configuration planning).

The optional auxiliary subchannel may be placed on a different controller than the system subchannel. The preceding discussion applies in this case with the added requirement that the user specify the number of tracks in the subchannel when the generator inquires about the auxiliary option (see Section III).

2-8. MULTIPLE CPU/7905 SYSTEMS. The HP 7905 versions of the generator, the bootstrap loader, and the on-line driver support multiple CPU operation. More than one CPU can share one or more disc drives under the following conditions:

- The system area (that is, LU2 and LU3) for one CPU cannot occupy the same system disc tracks as that of another CPU.
- Systems may map tracks in the same peripheral disc area. However, they should share access to these areas only as described in Appendix A under Multiple CPU/7905 System Operation.

As an aid to using a multiple CPU system, it is recommended that the disc track map be identical for each CPU. Further, logical unit numbers should not be assigned to subchannels already assigned to another CPU.

2-9. INPUT/OUTPUT PLANNING

Input/output locations in all HP 2100 series computers have the same sequence of priority addresses: the highest priority address is the lowest numbered select code (I/O location). The octal select codes start at octal 10 and continue upward toward octal 77, limited by the I/O capacity of the particular computer and any attached extenders.

Interface cards are assigned to priority addresses according to the speed of interrupt response required by the I/O device. Interface cards for high-speed devices are assigned higher priority addresses than low-speed devices. Devices requiring privileged interrupt are always assigned to the highest priority addresses, while direct memory access devices are assigned the lowest. The one exception to the direct memory access rule is in regard to the moving head system disc controller. For the fastest interrupt response, assign moving head disc controller to the next available I/O slots after the Time Base Generator (TBG).

The following instructions are keyed by step numbers to the I/O Configuration Worksheet in table 2-3. Fill in the blanks as you plan your system.

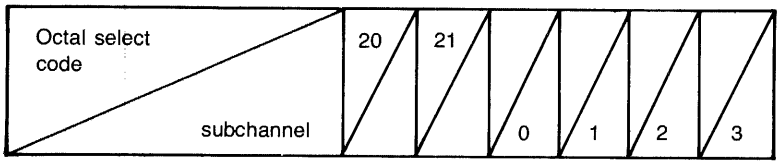
STEP 1: I/O Locations

Considering the factors given in the preceding paragraphs and the instructions given below, select the priority addresses for each I/O card, and fill in the top portion of the Input/Output

Configuration Worksheet table with the I/O card name, and the appropriate select code (I/O slot).

NOTE

The top portion of the table is used for either the select code or the subchannel number. For example, if two HP 7900 moving head disc drives (four subchannels) are connected to a controller in select codes 20 and 21, the top portion of the table would be completed as follows:



This method of noting subchannel numbers will facilitate assigning logical unit numbers later in the Device Reference Table. Refer to the HP 7905 Disc Worksheet (table 2-2) for applicable HP 7905 Disc drive subchannel numbers.

The following detailed steps show how to assign select codes to devices starting at the highest priority address, octal select code 10. In addition to these steps, make certain that any peripheral devices or subsystems that use multiple I/O slots have their I/O cards together and in the relative order required by that device or subsystem.

a. Assign all devices that require privileged interrupt in order of decreasing response time requirements (i.e., time from interrupt to service).

b. After the privileged devices, assign the privileged interrupt I/O card.

c. Assign the TBG I/O card.

d. Assign the moving head disc controller I/O card(s).

e. Assign all devices that do not use direct memory access in order of decreasing interrupt rate.

NOTE

If a device uses direct memory access for data transfer and still generates an interrupt for end-of-record (EOR) processing, the hardware priority of the device should be treated as a non-DMA device, with the interrupt rate of the EOR condition determining its priority location. Some consideration should be given to the priority of a data transfer vs. the priority of a record termination. Data transfers would normally be given priority over EOR interrupts of equivalent or even slightly slower interrupt rates.

f. Assign all devices that do use direct memory access in order of decreasing interrupt rate.

g. If an I/O extender is required and the extender does not have DMA capability, the order of steps "e" and "f" can be reversed so that all DMA devices are in the computer mainframe. If this step is necessary, maintain the same relative order of interrupt rate assignment among the DMA and non-DMA devices.

STEP 2: Standard Logical Unit Assignments

Make the standard logical unit number (LU) assignments (1 through 6) to I/O devices by placing an X at the intersection of the standard logical unit number and the I/O card select code. Place an X under one of the disc subchannels for LU2; include LU3 if applicable. Any remaining disc subchannels can be assigned logical unit numbers above six (i.e., they become peripheral subchannels, if desired).

STEP 3: Additional Logical Unit Assignments

Starting with decimal 7, write in the logical unit numbers sequentially for each device or subchannel number as applicable. These numbers can be arbitrarily assigned to I/O devices, and do not have to be written in left to right order on this table. However, if a magnetic tape unit is being configured into the system it is recommended that it be made LU8. The power fail routine should be the last (or highest numbered) logical unit.

NOTE

If a device has two I/O cards use only the highest priority (lowest select code) I/O card for steps 2 and 3.

STEP 4: Driver Identification

Write in the driver identification number for each device; e.g., a teleprinter driver is DVR00. For the 7900 disc drive, in addition to placing DVR31 under the high-priority card, place a large "I" under the low priority card. For other devices or subsystems that have more than one I/O card, refer to the I/O card or subsystem documentation covering that device and driver. Place an "I" under the select code number of all I/O cards (i.e., every I/O card must have an entry in the interrupt tables). Place a dash under subchannel numbers. If there is more than one driver with the same DVR number, refer to the paragraph under Equipment Table Entries in Section III.

STEP 5: Direct Memory Access

Write in a large "D" for direct memory access required on each device that will use this capability. Note that some drivers, such as DVR62 for the HP 2313 subsystem, are capable of dynamically assigning a DCPC channel to themselves when required. In those cases, do not assign direct memory access. Refer to individual driver documentation for more information on this capability.

STEP 6: EQT Table

Starting with decimal 1, write in the Equipment Table Entry (EQT) numbers sequentially for each device. The system disc should be EQT number 1 to permit special priority assignment to an available DCPC channel. Other DMA devices should then be assigned EQT numbers in order of their DMA priority. A device that has subchannels is assigned the same EQT number for each subchannel. It is recommended that whenever possible, the EQT number be the same

as the LU number. This will aid the user in operating the system after it is running. It is also recommended to make the power fail routine the last (highest numbered) EQT.

STEP 7: Buffering

Write in a large "B" for devices that will use output buffering. Buffering means that the computer will copy into a system buffer data that is to be output to a device (e.g., line printer). The system will allow a program to continue processing after issuing a WRITE request to such a device, rather than suspending the program while it waits for a buffer (in the program) to be emptied.

STEP 8: Time-Out

Write in a large "T" for devices that will use the time-out parameter. Values will be assigned later on the configuration worksheet.

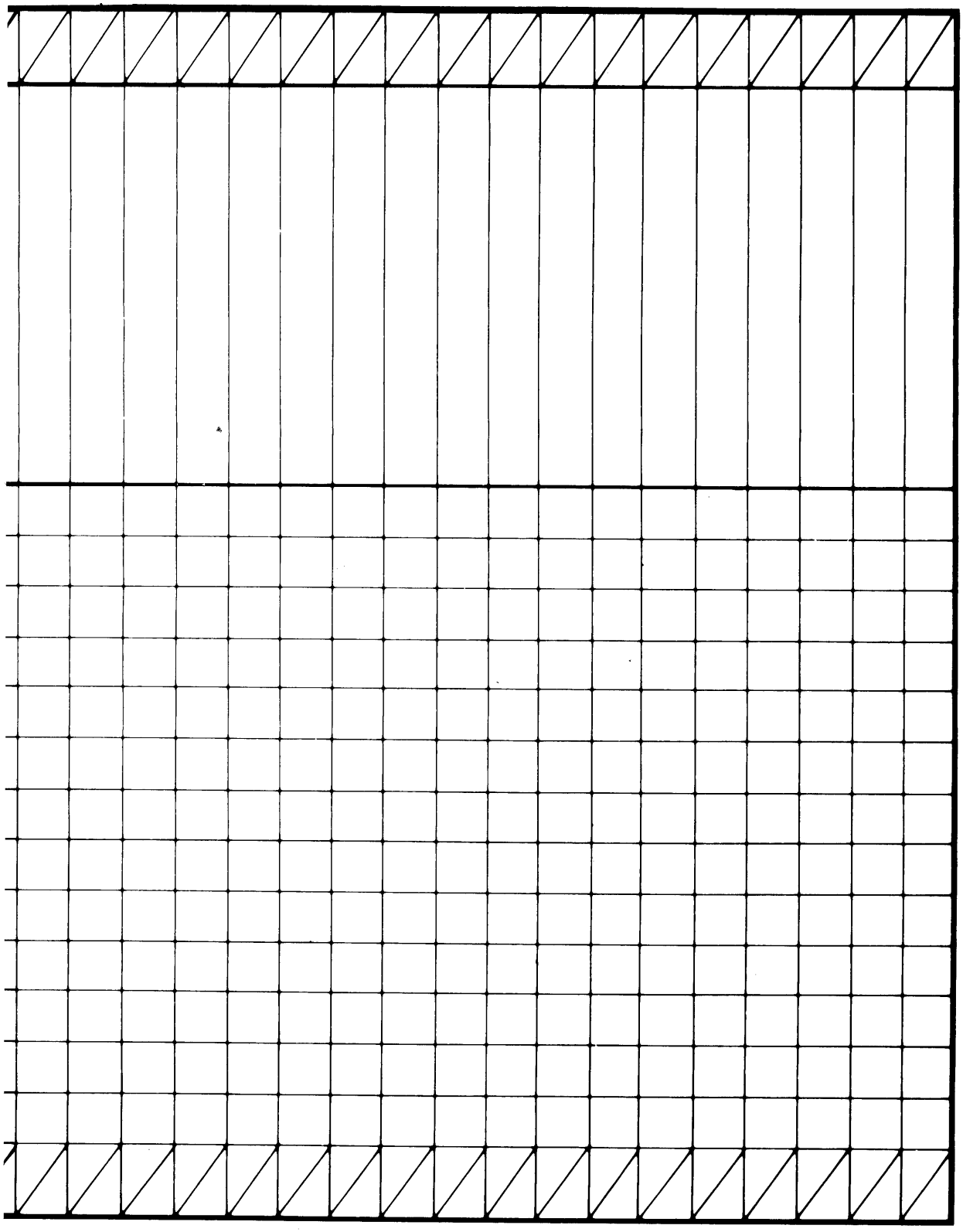
STEP 9: Extended EQT

Write in a large "X" for drivers that will use the extended EQT feature. For example, each entry for Spool Monitor Driver DVS43 will use the EQT extension. Values will be assigned later on the configuration worksheet.

Table 2-3. I/O Configuration Worksheet

ΞT

PREPARED BY _____



2-10. RTE-II MEMORY CONFIGURATION

The RTE-II System, as described in Section I, is capable of addressing a physical memory configuration of up to 32K words. This portion of system planning describes some points you must consider when dividing up the physical memory available to your system. Included in these points are the establishment of foreground and background memory areas, memory protection, and the actual loading of programs. The material presented here is provided both for reference and for planning your system.

RTE-II physical memory is organized as shown in figure 2-1. In figure 2-1, common areas and boundary addresses are shown as lettered pointers (A through I, and X).

During this phase of RTE-II System generation, the generator (RT2GN) begins loading the system and reports the actual size of the common areas in decimal number of words and the octal boundary addresses as loading continues. As each area size or boundary address is reported, you have the opportunity to increase the size or address, or leave it as it is. Your responses to RT2GN depend on your analysis of the data reported to you by RT2GN.

Some of the boundary address changes are for the convenience of your RTE-II System. That is, you change the boundary to allow that area to begin at the start of a memory page. In these cases, any gaps in memory are collected and used as System Available Memory (SAM). If there is to be no change, you enter a 0 (zero). Refer to figure 2-1 in locating the areas referenced in the following paragraphs.

The first boundary is *A* and concerns the library. Increase the address, if desired.

The next area is *B* and is the foreground common area. The decimal number of words allocated for foreground common is reported and then RT2GN asks if you wish to increase the number of words for this area.

The next boundary is *C* which is the foreground memory resident program area address. Increase this address, if desired.

The next boundary is *D* which is the foreground disc resident program area address. Increase this address, if desired.

The next boundary reported is *X*. This boundary concerns base page linkages and requires some explanation. After the foreground disc resident programs are loaded, RT2GN reports the address of the next base page link available above the links already used. The linkage area for foreground disc resident programs is initially established by the program loaded that requires the most base page links. If programs requiring more links are to be loaded on-line into the foreground disc resident program area using the RTE relocating loader, the foreground base page linkage area will have to be expanded by increasing the boundary address (it cannot be decreased). However, enough links must be reserved in the background disc resident program area for the background programs yet to be loaded by RT2GN.

A recommended boundary address of octal 1100 will usually optimize the system if it is to include the usual background programs ASMB, FTN, FTN4, LOADR, EDITR, and so forth. The ideal boundary is one which allows RT2GN to allocate as near to 1647 links as possible. For example, if boundary *X* is established at 1100, and after loading the background disc resident programs, RT2GN reported the next base page linkage address available as 1647, then the linkage area is as optimized as possible.

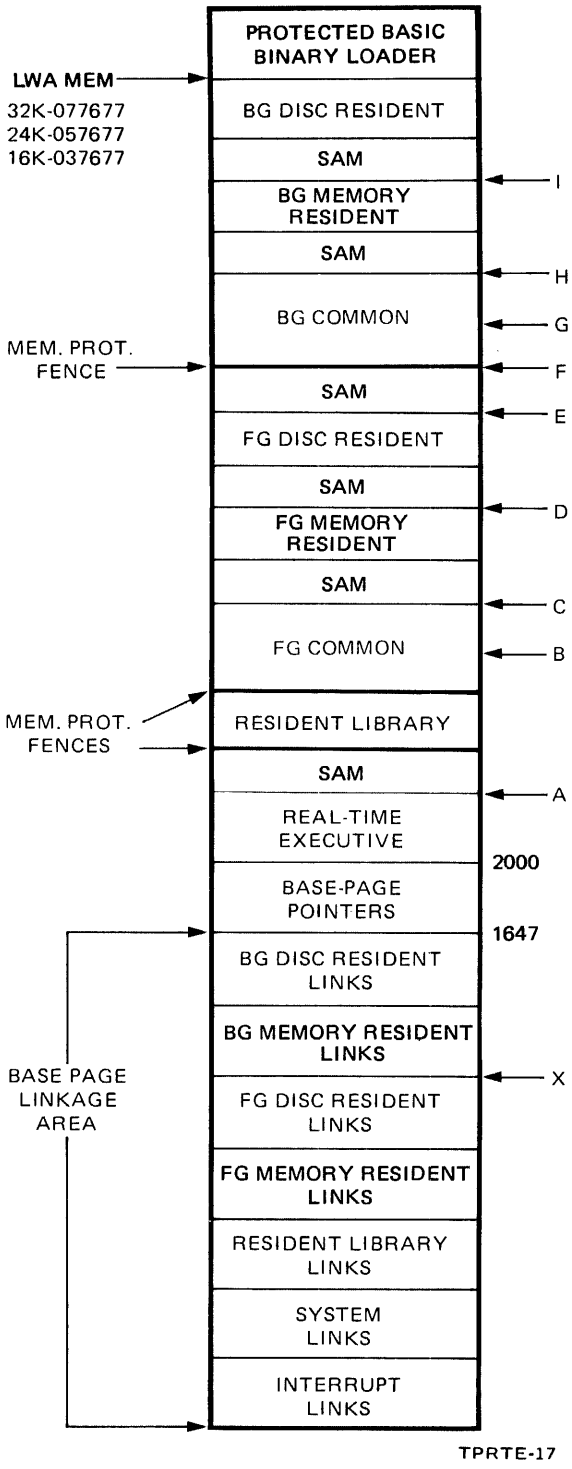


Figure 2-1. Memory Allocation in a Configured RTE-II System

If the On-Line Generator is to be included in the system loaded during generation, the boundary *X* address must be set to octal 720.

If the On-line Generator is to be added to the system subsequent to generation and boot-up (via the RTE Relocating Loader, LOADR), the boundary *X* address must be set to octal 640.

CAUTION

If RT2GN reports that more than 1647 links were used, the generation is void, and must be restarted.

The next boundary, *E*, defines the foreground disc resident program area for on-line loading of programs using the RTE relocating loader. The size of this area is initially established by the largest program loaded into that area during generation. If a larger program will be loaded into the system on-line, this area must be made larger now. This boundary also affects the area reserved for re-entrant processing, buffered transfers, and for background; that is, the more area given to foreground, the less there is available for these other areas.

Boundary *F* establishes the background area used for disc resident and memory resident programs, plus the common area used by both. A recommended procedure for determining the boundaries of *E* and *F* follows:

1. Calculate the area needed for the largest background disc resident program that will be used.

2. Add to this the area needed for the background memory resident programs.

3. Add to this the area needed for background common.

4. Subtract the result of 1, 2, and 3 from the last word of available memory (LWAM).

   Example:

   Assume J = size of largest background disc resident program.
   K = size of total memory resident background area.
   L = size of background common area.
   M = J+K+L

   If M = 17677, and LWAM = 57677, then:
   57677 − 17677 = 40000 (octal)

This (40000) is boundary *F* (BG BOUNDARY).

5. To determine boundary *E*, subtract from boundary *F* the area required for SAM. The amount recommended for SAM is 2000 (octal) words.

   Example:

   40000 − 2000 = 36000 (octal)

This is boundary *E* (response to CHANGE SYS AVMEM?).

The next area is *G* and is the background common area. The decimal number of words allocated for background common is reported and then RT2GN asks if you wish to increase the number of words in this area.

The next boundary is *H* which is the background memory resident program area address. Increase the address to the beginning of a page.

The next boundary is *I* which is the background disc resident program area address. Increase the address to the beginning of a page.

2-11. RTE-III MEMORY CONFIGURATION

RTE-III, as described in Section I, provides the capability of addressing physical memory configurations of up to 256K words. This portion of the planning part describes most of the considerations you must make when dividing up physical memory, setting up partitions, establishing memory protection, and actually loading programs. This material is provided for both reference and planning purposes to help the user. Some actual inputs to the generator will depend on the user analyzing the data printed out by the generator to that point, and making his decision based on that hard data with the aid of the considerations presented here.

2-12. PHYSICAL MEMORY. Physical memory is organized as shown in figure 2-2. The organization is fixed although relative sizes of the areas will depend on installation needs. Some areas (e.g., common) will not exist in all systems. The user determines the size of system available memory, size of each partition, the size of common, and the size and composition of the resident library and memory resident program area.

MEMORY SIZE — The size of physical memory depends on the hardware supplied. RT3GN can configure a system from 32 to 256 pages long.

SYSTEM BASE PAGE — The system base page contains the system communication area and is used by the system to define request parameters, I/O tables, scheduling lists, operating parameters, memory bounds, etc. System and library links, memory resident program links, and trap cells are also located on the system base page. The base page links for memory resident programs and trap cells are not accessible by disc resident programs. System and library links and the system communication area are available to all programs for read-only access.

The system communication area is fixed. The size of the system links area varies with the number of page crossings which cause indirect links to be generated on base page. The LINKS IN CURRENT command can be specified during generation to reduce the number of base page links used.

After the assignment of I/O interrupt locations (see Input/Output Planning), the user has no direct control over the allocation of the base page area. Linkages are allocated as needed during the generation. If the base page linkage area overflows an error message is given and the user must delete one or more programs from the memory resident area of the system and restart the generator. As an aid in generation, RT3GN will optionally trace the allocation of links, program by program via the MAP LINKS command.

SYSTEM AND LIBRARY AREAS — These two areas are a part of every program's logical 32K address space (see figure 2-3).

The system area contains Type 0 system modules (e.g., RTIOC, SCHED, EXEC) and drivers plus tables. The size of the system area is directly influenced by the number of I/O devices configured (i.e., table sizes and drivers).

The memory resident library area contains those re-entrant or privileged library routines which are used by the memory resident programs (Type 6) or which are force loaded (Type 14) at generation time. Placing a module in this area means it doesn't need to be appended to programs that call it, but it is subject to special design constraints so that two programs will not inadvertently gain concurrent access.

COMMON AREA — This area is divided into three subareas: The Subsystem Global Area (SSGA), the Real-Time Common Area, and the Background Common Area. Common is included in the 32K address space for memory resident programs and the 32K address space for disc resident programs using one of the common subareas.

The Subsystem Global Area is used by HP subsystems and contains Type 30 modules loaded sequentially. The modules are accessed by their entry point and not through common declarations.

The Real-Time Common Area and the Background Common Area defaults to the maximum size common declared by any main program which uses them.

If a program (memory or disc resident) is to use common, the maximum size to be used must be declared in the main module. Subroutines and segments used by the program will access the same common as the main.

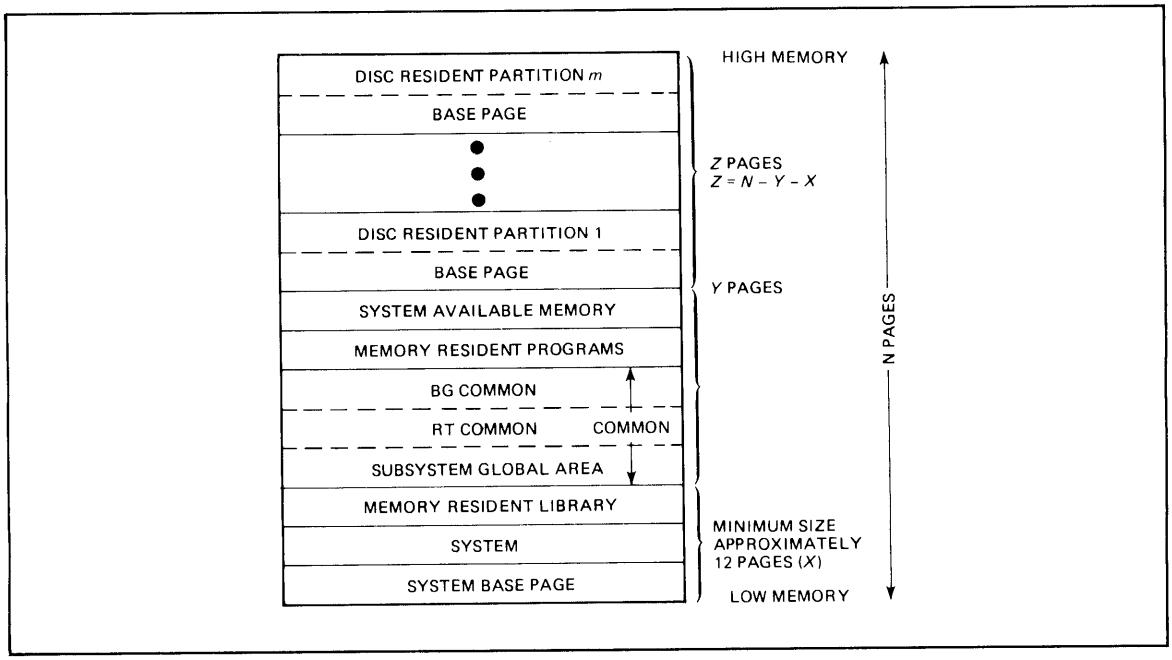


Figure 2-2. Physical Memory Allocation; RTE-III System

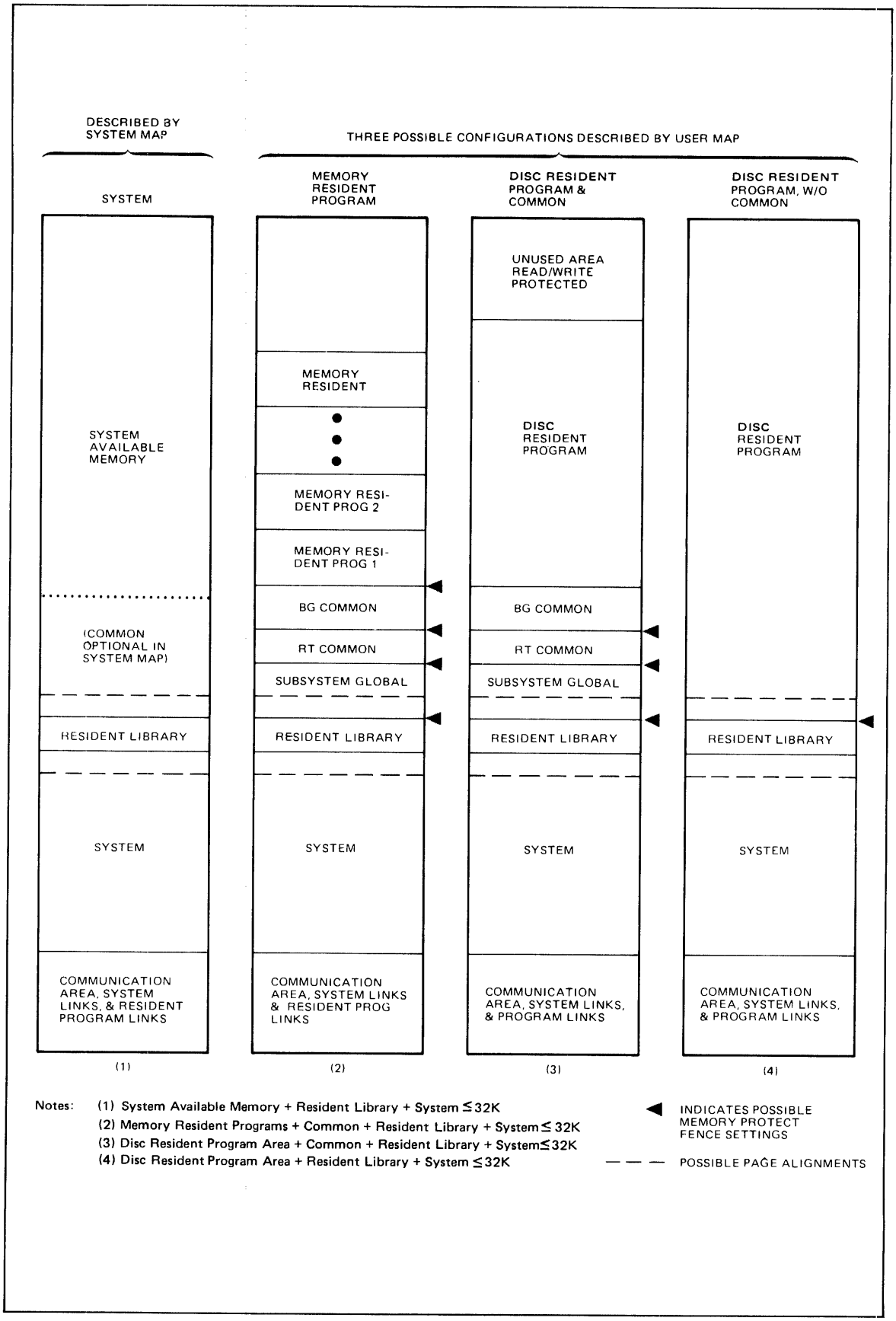


Figure 2-3. 32K Logical Memory Configurations in RTE-III

If desired, the size of the Real-Time and Background Commons may be increased during generation to accommodate future programs loaded on-line.

CAUTION

Do not confuse these system-wide common areas with the local common area which may be specified for a program loaded on-line.

The local common area is appended to the program (i.e., it will be in the program's partition), and is accessible only to that program, its subroutines, and its segments.

The common area may optionally be included in the System Map to aid privileged drivers. This makes common immediately accessible at interrupt.

MEMORY RESIDENT PROGRAM AREA — This area contains all Type 1 programs and is loaded sequentially following common. If maximum memory protection is more important than maximum memory usage, the first word of this area should be aligned on the first page boundary following common. The area skipped is then appended to Background Common. Refer to the heading, "Memory Protection" for more information. All memory resident programs must fall within the first 32K of physical memory. The last word of the last Resident Program must fall at or before 77677 (octal), leaving 64 words for operation of the loader. If this address is violated, a GEN ERR 18 is issued by the generator.

SYSTEM AVAILABLE MEMORY (SAM) — This is a temporary storage area used by the system for Class I/O, re-entrant I/O and automatic buffering. The amount of SAM depends on specific applications. Subsystem (communications, spooling, etc.) may place additional requirements on this area; refer to the appropriate manuals.

SAM may start immediately after the memory resident programs or be aligned at the next page. Alignment prevents accidental destruction of critical data by a memory resident program accessing the same page. Any words skipped due to alignment are wasted.

SAM always ends at a page boundary where the first disc program partition starts. Therefore, its size defaults to the number of words between its starting address and the next page (between 1 and 1024 words). The recommended minimum is 1024 words. The size limit is:

$$\text{System} + \text{Library} + \text{SAM} + \text{Common (optional)} \leqslant 32 \text{ pages}$$

System Available Memory size can be increased in 1024 (1K) word increments by increasing the page number where the disc partitions start.

PARTITIONING — The number of pages remaining after SAM must be divided into partitions (maximum of 64). Each partition should be at least two pages long, one page to be used as a base page and the remainder for the program.

The size of a given partition depends on program needs. A Disc Resident program, out of its 32K of address space, usually has 13 to 16 pages taken up by the system and library area. Some programs use a common area which must be mapped. This may result in less address space for the programs depending on the size and location of the common area. Therefore, a useful partition will normally be between 2 and 19 pages long.

The generator reports the largest useful partition sizes for programs with and without common (including a base page for the program) to aid the user in determining partition sizes.

Partition size requirements for each program relocated are also reported; however, some programs may require additional pages for buffer area as discussed under the heading "Disc Program Size Considerations." It may not be possible to completely plan partition sizes until this information is reported by generator.

A program cannot be dispatched for execution unless a partition of sufficient size is defined and available (not reserved for the exclusive use of other programs).

The user must determine the mix of Real-Time and Background partitions of appropriate sizes to suit his particular application and subject to available main memory. Two classes of partitions prevents competition for main memory between background programs (typically involved in program development of other non-time critical applications) and Real-Time programs. Note that the class of a partition does not imply any special attributes, but merely that programs of the same type may use that partition subject to exceptions noted below.

In some situations, placing all partitions in a single class may be best. This allows free competition for main memory between all disc programs, subject to program priority and size requirements.

Undesired competition for partitions can be prevented by assigning programs to specific partitions. This could, for example, keep a very small program out of a large partition. Assignment can cross class boundaries; a Real-Time program can run in a Background partition, and vice-versa. (Such a program would still have all the attributes of a Real-Time program).

2-13. DISC PROGRAM SIZE CONSIDERATIONS. The generator reports the partition size required for each disc program loaded. This size includes a base page and is based on the length of the main program, subroutines loaded with the main, and the largest overlayable segment (if any).

Program size can be overriden during the generation, thus increasing the minimum size partition required. When the program is run, it may be given a partition larger than this minimum. To the program however, the "apparent" size of the partition (determined from the System Communication Area during execution) is still the minimum.

Some programs require additional space to dynamically construct buffer areas or symbol tables. The On-Line Generator is one of these programs. Standard RTE programs needing this additional space are shown with their requirements in table 2-4. During generation the user must modify the page requirements of any of these programs to be used. Size requirements for user-supplied programs may be overriden if necessary.

2-14. MEMORY PROTECTION. Memory protection between disc resident program partitions and between disc and memory resident programs is provided by RTE-III. A program cannot access a page not included in its logical memory either directly or through a DMA transfer. Since many programs will not use all of the possible partition area, unused logical pages above the program are READ/WRITE protected and do not necessarily have counterparts in physical memory.

Table 2-4. Programs Requiring Buffer Space in Partitions

PROGRAM NAME	MINIMUM RECOMMENDED OVERRIDE (pages)	SUGGESTED OVERRIDE (pages)
EDITR	6	7 (Note 2)
ASMB	7 (Note 1)	10 (Note 3)
XREF	6 (Note 1)	10 (Note 3)
LOADR	8 (Note 1)	10 (Note 3)
ALGOL	9 (Note 1)	13 (Note 3)
FTN	6 (Note 1)	8 (Note 3)
FTN4	11 (Note 1)	13 (Note 3)
FMGR	7	7 (Note 4)
RT2GN	11	≥ 13 (Note 5)
RT3GN	11	≥ 13 (Note 5)

Note 1: Running this program with this size partition will limit the size of the programs it can process. In some cases, however, experience may show that even small partitions will suffice.

Note 2: Limited to "Largest Addressable Partition" size printed during generation. Extra space increases size of two disc buffers thereby improving performance.

Note 3: Limited to "Largest Addressable Partition" size printed during generation. Extra space increases symbol table space thereby allowing larger programs to be processed.

Note 4: Extra space is used during a disc packing operation.

Note 5: Limited to "Largest Addressable Partition" size printed during generation. Extra space for the generator virtual symbol tables increases the generator's speed; i.e., each page you can allow above the minimum override will increase the execution speed of the generator.

A different form of protection is required for the system, library, and (optionally), common. The memory protect fence provides this protection by preventing stores and jumps to locations below a specified address. All possible fence positions are shown in figure 2-4.

The memory protect fence applies to the logical address space and addresses are compared to the fence before translation. If a disc resident program does not use any of the common areas, the memory protect fence is set at the bottom of the program area. Similarly, for a memory resident program not using common, the memory protect fence is set at the base of the entire memory resident area.

For programs using common, all of common is mapped and the fence is set at one of three possible locations, depending on the portion of common being used. Figure 2-4 expands the common area and shows these three fence settings (A), (B), and (C).

Figure 2-4 also shows a potential problem area marked "?" which includes those words from the top of common to the next page boundary. This area could includes one or more memory resident programs and/or part of System Available Memory. Any program using common could potentially destroy the contents of this area. Aligning the top of common at the next page boundary is a generation option that expands the size of background common while eliminating this problem. A similar option is available for the boundary between memory resident programs and system available memory.

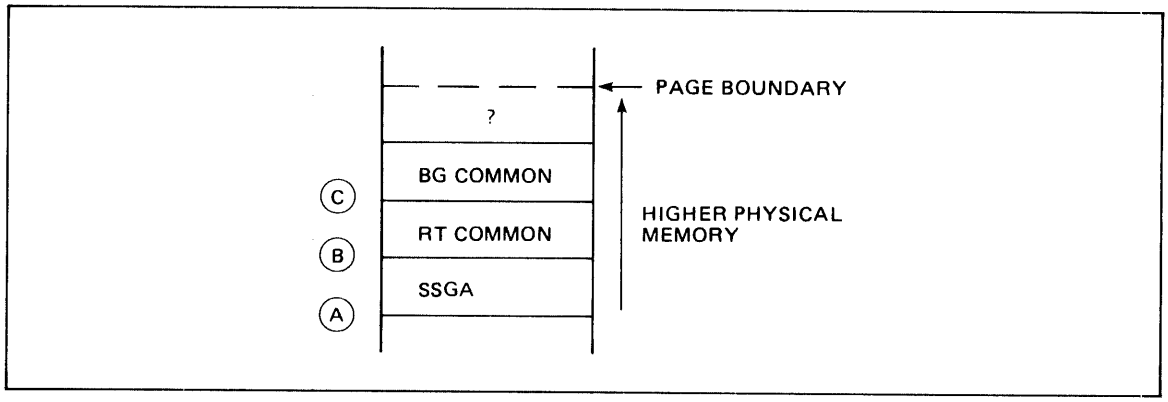


Figure 2-4. Memory Protect Fence Locations for Programs Using Common.

2-15. PROGRAM LOADING. Program loading refers to the generator reading the relocatable modules from the FMGR files, relocating them to absolute addresses in physical or logical memory, and storing them in the generation output file.

SYSTEM MODULES — These are Type 0 modules (EXEC, RTIOC, SCHED, etc.) and are loaded sequentially above the system base page. Base page links for these modules are allocated downward in the system base page below the system communication area.

LIBRARY MODULES — These are Type 6 and 14 (re-entrant, privileged, and force-loaded) and are loaded sequentially above the system and tables. Base page links for these modules are allocated downward in the system base page below the system links.

MEMORY RESIDENT PROGRAMS — These programs are sequentially loaded above the common areas. Base page links for these programs are allocated upward in the system base page starting at FWA BP LINKAGE (established by the user) above the I/O interrupt locations.

DISC RESIDENT PROGRAMS WITHOUT COMMON — These programs are relocated into logical memory and stored on the disc. Each program starts at word 2 of the next available logical page after the end of the system and memory resident library. The first two words of the page are reserved to save index registers in the event the program is interrupted. Base page links are allocated upward from location 2 of the logical base page. The highest available link address is the word before the lowest system/library link. These links are written on the disc

and are referred to as the user base page. This user base page is swapped with the program into memory and placed into the first page of the selected partition.

DISC RESIDENT PROGRAMS WITH COMMON — These programs are treated the same as the disc resident programs without common. The only difference is that the program starts at word 2 of the logical page following the common area.

2-16. PRIVILEGED DRIVERS. Privileged drivers must be considered when doing the generation. If the driver was written to use the common area then the generator question about privileged drivers accessing common will have to be answered YES, causing common to be included in the System Map. Otherwise, it is assumed that driver is performing its own mapping functions.

ON-LINE GENERATOR PROGRAM RESPONSE PREPARATION

SECTION III

The plans and procedures described in Section II aid you in preparing responses to the On-Line Generator questions. You write these responses on the worksheets located at the end of this section. You then use the completed worksheets to enter the correct responses to the generator as the generation proceeds as described in Section IV.

The worksheets are keyed to the text in this section by step numbers for easy cross reference between them.

As you become more familiar with the RTE System and the On-Line Generator procedure, you can create an answer file which contains all the parameter input responses from the worksheets. Sample answer files for an RTE-II and an RTE-III generation are included in Appendix D. The generator will read such a file automatically and operate at a much higher speed than if the responses are entered interactively through an operator console.

3-1. ON-LINE GENERATOR DIALOG

The On-Line Generator dialog is described in this section. The section is organized in parallel with the "phases" executed by the generator during operation. Some phases do not require user responses, but have been listed for completeness. The phases include:

- Initialization — The list and output files are established. The target system disc type and its subchannels are defined. The bootstrap loader is produced. Various system parameters are entered.

- Program Input — All relocatable file names are entered together with information which directs their relocation. The generator uses these entries for later relocation of the file contents.

- Parameter Input — The default characteristics of programs just entered can be overridden. Entry point values can be modified. Additional system parameters are entered.

- System Loading — System executive routines, drivers and user written system routines are relocated by the system to absolute memory addresses.

- Table Generation — Tables describing the I/O configuration are constructed.

- System Boundaries (RTE-II Generation Only) — Program loading begins. First, the memory resident library and memory resident programs are relocated and common areas are constructed. This is followed by the relocation of disc resident programs.

  While the program relocation process is being performed, the generator reports base page linkage information, common boundaries and program area boundaries. You are given the opportunity to change boundary addresses upward to a page boundary, if you wish.

- System Boundaries and Partition Definition (RTE-III Generation Only) — Program loading begins. The memory resident library and Subsystem Global Area (SSGA) are relocated first (SSGA is considered part of common for mapping purposes). Common sizes and boundaries are reported and you may change the size and boundary address of these areas. Program relocation continues with memory resident, real-time disc resident, and background disc resident programs.

  The partition definition portion of this phase begins with a listing of real-time and background program partition size requirements (in pages). This is followed by a report giving the largest partition size which can be addressed by any program. Next you establish the size and boundaries of System Available Memory. The generator reports the number of pages remaining for partitioning. At this point, you define the partitions and you may modify program page requirements for programs needing dynamic buffer space. Finally, you may assign specific programs to execute only in specific partitions.

  At the end of the generation, the On-Line Generator reports that the new system is stored on disc and the size of the system (in tracks/sectors).

3-2. ERROR REPORTING

Error conditions encountered during On-Line Generator execution result in the display of numbered error codes. In this section, the error codes that may result during a specific phase of system generation are listed at the end of the description of that phase. General error codes, those that may be produced during any phase of On-Line Generator execution, are listed at the end of this section. A summary of error codes and messages is included in Appendix B.

3-3. OPERATOR COMMANDS

3-4. TR COMMAND

You may provide responses to the On-Line Generator using two modes of operation — interactive or direct. The interactive mode is a two-way dialog between you and the generator. The generator displays messages at your console to prompt you for the information it needs to generate an RTE system. You answer the prompts by supplying the required information via your keyboard.

The direct mode is when the answers are supplied to the generator from disc file or logical input unit; that is, from an answer file.

You can alternate between these operating modes at any point the generator is waiting for input. That is, you may enter the TR command from the operator console to transfer to an answer file or logical input unit. Conversely, you may include a TR command within your answer file to transfer to another file or device for input. Transfers can be nested to a level of 10. Any transfer request beyond this limit results in a GEN ERR 19 (see Appendix B). The command format is:

TR { ,*lu* / ,*filename* }

where:

lu is the logical unit number of a non-disc device which contains an answer file.

filename is the name of a disc file that contains answers to the generator prompts. The *filename* format is:

filename,security code,cartridge label

Once you transfer to a device or file, you may transfer back to the originating device or file simply by entering TR with no parameter.

Transferring to an illegal command input logical unit results in a GEN ERR 20 (see Appendix B).

When an answer file end-of-file is encountered, an automatic TR to the originating device or file is generated. Also, when an error is detected, a transfer to the operator console occurs. You can then enter the TR command to transfer back to a device or file.

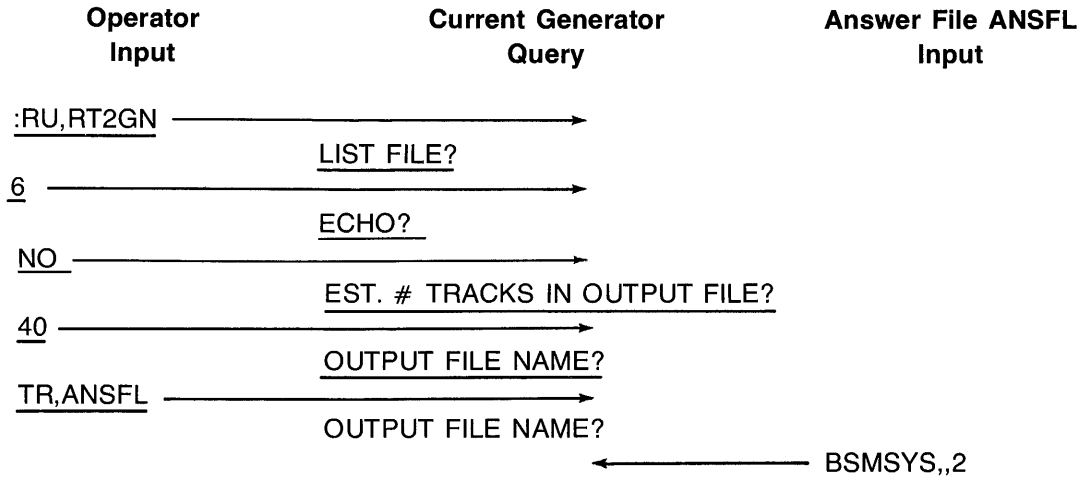
You may include a TR command within your answer file in the form TR,1 which results in a transfer of control to the operator console (logical unit 1). When the TR,1 command is encountered in the answer file, the generator redisplays the current prompt (that for the answer it is expecting) on the operator console and waits for input from the console. You may enter appropriate responses, followed by a TR command. This will result in a transfer of control back to the answer file record which follows the original answer file TR,1 command. This is a useful feature if some answer is not known until that point in the generation process is reached.

Alternate versions of the TR command also can be used. For example:

TR,1
:1
,1 } each produces an identical result.

Examples:

1. In the following example, console entries and displays are underscored.



```
                    TARGET DISC?
                                  <-------------- 7900
                    MH DISC CHNL?
                                  <-------------- 21
                    #TRKS, FIRST TRK ON SUBCHNL:
                      0?
                                  <-------------- TR
                      0?
203,0 ------------------------------>
                    .
                    .
```

2. In the following example, console entries and displays are underscored:

Operator Input	Current Generator Query	Answer File ANSFL Input
:RU,RT3GN,AN,SF,L --->		
	LIST FILE?	
	<----------	LISTFL,AB,17
	ECHO?	
	<----------	NO
	EST. # TRACKS IN OUTPUT FILE?	
	<----------	40
	OUTPUT FILE NAME?	
	<----------	OUTFL,AB,17
	TARGET DISC?	
	<----------	TR,1
	TARGET DISC?	
7905 --->		
	CONTROLLER CHNL?	
27 --->		
	#TRKS, FIRST CYL#,HEAD#, ...	
	00?	
203,0,0,203 --->		
	01?	
600,104,0,2,0,10 --->		
	02?	
203,0,2,1,0,3 --->		
	03?	
203,206,2,1,0,2 --->		
	04?	
/E --->		
	# 128 WORD SECTORS/TRACK?	
TR --->		
	# 128 WORD SECTORS/TRACK?	
	<----------	48
	SYSTEM SUBCHNL?	
	<----------	0
	.	
	.	
	.	
	.	

3-5. * COMMAND (COMMENTS)

You may include comments, for documentation purposes, both for answer file preparation and for list file reading.

Comment lines must begin with the comment declaration, asterisk (*). When the generator is waiting for input, it simply skips over any comment line and gets the next response line without re-issuing the prompt.

NOTE

Any comments entered (via either the operator or an answer file) prior to your response to the LIST FILE? query will not appear in the list file.

Comments may be included on the same line as a generator response. In this case, the comment must follow the response and at least one blank character must separate the response from the comment.

Additional restrictions exist when the response refers to a file name or logical unit number. In these cases, a comma followed by at least one blank character must delimit the last parameter entered. Further, null parameters must be specified where either a security code or a cartridge reference label is not present. For example:

```
OUTFL,,2,              * ABSOLUTE OUTPUT FILE
LISTF,,,               * LIST FILE
4,                     * PUNCH THE BOOTSTRAP
TR,5,                  * TRANSFER TO PAPER TAPE READER
TR,ANSFIL,-1, 17,      * TRANSFER TO DISC FILE
REL,NCRSYS,,,          * SYSTEM MODULE
TR,,                   * TRANSFER BACK TO ANSWER FILE OR LU
```

The commands affected by these restrictions are:

TR
RELOCATE

Responses affected by these restrictions are:

LIST FILE NAME? response

OUTPUT FILE NAME? response

BOOT FILE NAME? response

3-6. !! COMMAND (ABORT)

This is the abort command. You enter this command to direct the generator to close all files and terminate itself. The command format is:

!!

This command may be entered at any time the generator is waiting for input.

CAUTION

If a name has two exclamation points as its first and second characters (for example, a file named !!ABC) and is to be entered as the first input parameter in response to a generator prompt, you must insert a space in front of the file name. Otherwise, the generator will interpret the entry as an abort command.

3-7. INITIALIZATION PHASE

During this phase, the On-Line Generator first requests information necessary to create the list and output files and to determine the target system disc type. The target disc is the model of disc (either 7900 or 7905) that will exist in the system to be generated. Then, the generator requests information to set up the track map table defining disc subchannels. Once the track map table is established, the generator requests additional information necessary to begin generation of the system.

Fill in the generation worksheets in the back of this section with the information you will need when you execute the On-Line Generator program. The worksheets are keyed to the Step numbers that follow:

STEP 1 — LIST FILE NAME?

Enter either the name of a file, or the logical unit number of a device which will receive the generator listed output. The file name format is:

filename,security code,cartridge label

STEP 1A — ECHO?

Enter YES to enable echoing of all listed output to the operator console as well as to the file or logical unit number specified in Step 1.

Enter NO to prevent echoing of the listed output.

STEP 2 — EST. # OF TRACKS IN OUTPUT FILE?

Enter the estimated number of disc tracks (decimal) required to contain the absolute output file created by the On-Line Generator. The value entered must be greater than 9. Estimate a high value. The generator will return unused tracks to the system when generation is completed.

The output file is Type 1. Because Type 1 files cannot be extended, a sufficient number of tracks to contain the generated system must be specified. Otherwise, the generator will be aborted upon track overflow.

Generally, generation of the minimum RTE system should require less than 35 tracks. The actual number of tracks used will be reported at the completion of on-line generation.

STEP 3 — OUTPUT FILE NAME?

Enter the name of the file to be created for generator output. The system to be generated will reside in this file. The entry is in the form:

filename,security code, cartridge label

STEP 4 — TARGET DISK?

Enter the model number of disc in the target system (e.g., 7920).

STEP 5a — If the response to TARGET DISK? was 7900 the following dialog occurs:

```
MH DISC CHNL?
```

Enter the lower numbered (highest priority) octal select code (I/O channel number) for the system disc controller.

```
# TRKS, FIRST TRK ON SUBCHNL:
  0?
```

Enter the number of tracks and the beginning track number (decimal) for subchannel 0. Enter these values separated by a comma. The values are obtained from the HP 7900 Disc Worksheet (table 2-1) filled out during the planning stage.

The generator will continue to display a subchannel number following each entry up to subchannel 7 or until terminated by the entry of the input data terminator, /E.

The even numbered subchannels are the fixed platters and the odd numbered subchannels are the removable platters (that is, subchannel 0 is the fixed platter and subchannel 1 is the removable platter of the first disc drive).

STEP 5b — If the response to TARGET DISK? was 7905 or 7920 the following dialog occurs:

```
CONTROLLER CHNL?
```

Enter the lower numbered (highest priority) octal select code (I/O channel number) for the system disc controller.

```
# TRKS,FIRST CYL #,HEAD,# SURFACES,UNIT,# SPARES FOR SUBCHANNEL:
  00?
```

Enter (in decimal notation) the number of tracks, starting cylinder number, starting head number, number of surfaces, unit number, and number of spare tracks for subchannel 0. Enter these values separated by commas. The values are obtained from the HP 7905 Disc Worksheet (table 2-2) or the 7920 Worksheet (table 2-2A) filled out during the planning stage.

The generator will continue to display a subchannel number following each entry up to subchannel 31 or until terminated by the entry of the input data terminator, /E.

STEP 6 — # 128 WORD SECTORS/TRACK?

Enter 48. This is the number of 128-word sectors per logical track on the system disc and is the number of sectors for two surfaces of a platter on the 7900 disc; one surface of a platter on the 7905 or 7920 disc.

STEP 7 — SYSTEM SUBCHNL?

Enter the system disc (logical unit 2) subchannel number. This is the subchannel on which the absolute code will be executed. The entry can be any one of the subchannel numbers available to the system.

STEP 8 — AUX DISC (YES OR NO OR # OF TRKS)?

Enter YES to indicate that an auxiliary disc is to exist on the same controller channel as the system disc. Then, the generator will request the subchannel number for the auxiliary disc.

Enter NO to indicate that there is no auxiliary disc.

Enter a numeric value (decimal) to indicate that an auxiliary disc with a track count of the specified value is to exist on a controller channel other than the system disc controller channel. In this case, the generator will request the number of sectors per logical track.

STEP 9 — TBG CHNL?

Enter the octal select code (I/O channel number) of the Time Base Generator card.

STEP 10 — PRIV. INT. CARD ADDR?

Enter the octal select code (I/O channel number) of the Privileged Interrupt card. Enter a zero if there is no such card.

For RTE-II generation only, the following dialog occurs:

STEP 11a — FG SWAPPING?

Enter YES to allow program swapping between the foreground program area of main memory and disc storage.

Enter NO to deny program swapping from within this area.

STEP 11b — BG SWAPPING?

Enter YES to allow program swapping between the background program area of main memory and disc storage.

Enter NO to deny program swapping from within this area.

For RTE-III generation only, the following dialog occurs:

STEP 11c — PRIV. DRIVERS ACCESS COMMON?

Enter YES if the common area is to be included in the system map for access by privileged drivers.

Enter NO to deny privileged driver access to the common area through the system map.

At this point, the generator dialog for either RTE-II or RTE-III continues.

STEP 12 — FG CORE LOCK?

Enter YES to permit any foreground program to lock itself into memory (disallows swapping of that program).

Enter NO to deny foreground core locking.

STEP 13 — BG CORE LOCK?

Enter YES to permit any background program to lock itself into memory (disallows swapping that program). Note that the SWTCH program requires the BG core lock capability.

Enter NO to deny background core locking.

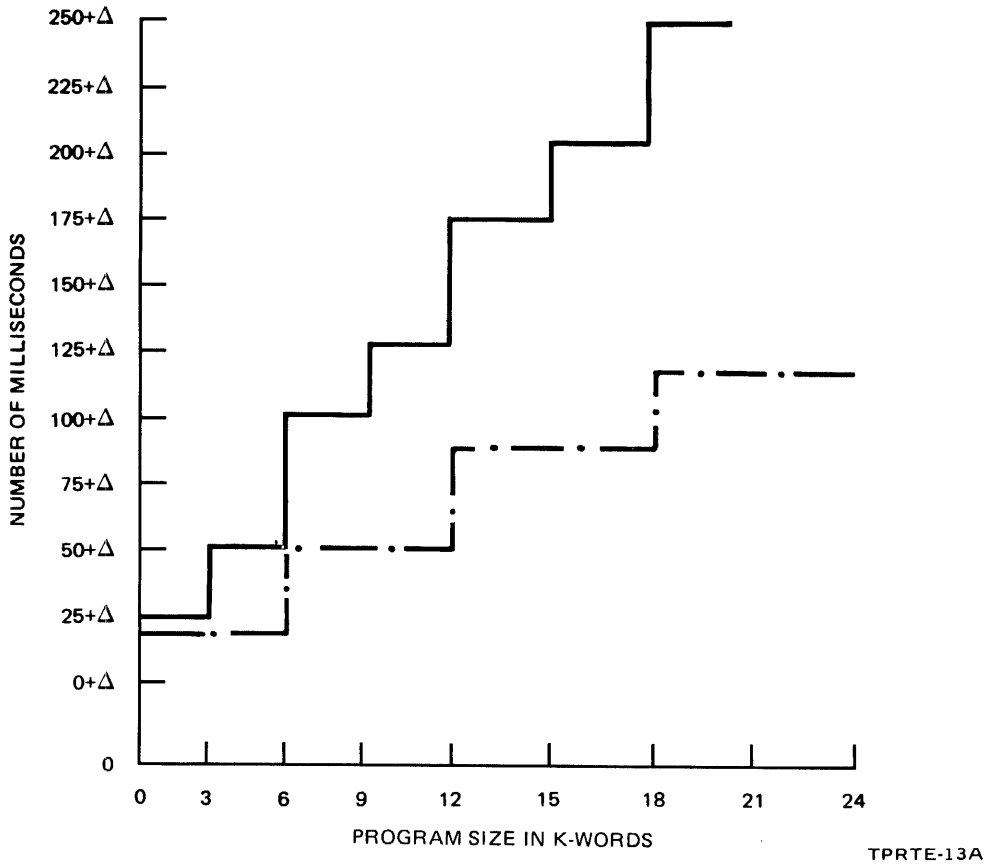
STEP 14 — SWAP DELAY?

Enter a decimal value between 0 and 255. This value represents tens-of-milliseconds; that is, 0 to 2550 milliseconds. The swap delay value specified is applicable to all swappable programs.

The amount of time required for a program to swap depends on several factors: type of disc drive, program length, and whether or not the program is segmented. For the HP 7900 disc drive, the transfer time is 25 milliseconds for each 3K words. For the HP 7905 or 7920 disc drive, the transfer time is 16.7 milliseconds for each 6K words. To calculate a swap delay value tailored to memory size, program size, and disc type, refer to figure 3-1. Note that the graph in this figure takes track switching into account.

For example, if the value 100 is entered here, a program will not be swapped if:

1. it resides in a disc resident area,
2. it is in the time list,
3. it has priority over its competitor for that memory area, and
4. it is to run within 1000 milliseconds of the current time.



THIS GRAPH REPRESENTS THE TIME IT TAKES TO READ OR WRITE A PROGRAM TO THE DISC. THE TIMES SHOULD BE DOUBLED TO GET TOTAL SWAP TIME.

A. THE ROTATIONAL DELAY. THIS DELAY RANGES FROM 0 TO ONE ROTATION TIME (RT) WITH EQUAL PROBABILITY, THUS THE AVERAGE ROTATIONAL DELAY IS RT/2.

B. THE SEEK TIME (ST) FOR MOVING HEAD DISCS RANGES FROM 0 TO SOME MAXIMUM WITH A NON-EQUAL PROBABILITY. THE SEEK TIME DEPENDS ON THE LAST ACCESSED TRACK NUMBER.

——— HP 7900/7901
——— · ——— HP 7905

EXAMPLE:

USING THE ABOVE PRINCIPLES AND GIVEN THE FOLLOWING DATA FOR AN HP **7900** DISC, WE CAN PLOT THE LOAD/SWAP TIME AS A FUNCTION OF THE NUMBER OF WORDS. NOTE THAT THE NUMBER OF WORDS IS AFFECTED BY THE "ALL OF CORE BIT."

FOR AN HP **7900**: RT = MS
#RT'S/TRACK = 2
#WORD/RT = 3K

Figure 3-1. Swap Delay Graph

STEP 15a — For RTE-II generation only, the following dialog occurs:

LWA MEM?

Enter the octal address of the last word of available memory depending on the size of main memory; that is, 57677 for 24K, or 77677 for 32K.

STEP 15b — For RTE-III generation only, the following dialog occurs:

MEM SIZE?

Enter a decimal value indicating the total number of memory pages in your system; that is, 32 for 32K, 64 for 64K, and so forth.

STEP 16 — BOOT FILE NAME?

Enter the name of a file to be created by the generator, or the logical unit number of a device which will receive the bootstrap loader produced by the generator. The file name entry format is:

filename,security code,cartridge label

Enter a zero if no bootstrap loader is to be produced.

3-8. INITIALIZATION PHASE ERROR MESSAGES

GEN ERR 01

Meaning: Invalid response to initialization request.

Action: Request is redisplayed. Enter valid response.

GEN ERR 02

Meaning: Insufficient amount of available memory for internal generator tables.

Action: Irrecoverable error. Increase the size of background for generator to run in, or the partition size requirements.

GEN ERR 38

Meaning: ID segment for one of the generator's segments cannot be found.

Action: Ensure that the generator and it's program segments are properly loaded.

3-9. PROGRAM INPUT PHASE

STEP 17 — PROGRAM INPUT PHASE

The generator displays this message to announce the beginning of the Program Input Phase. During this phase you enter commands which direct the entry of modules into the system.

The commands accepted in this phase are used to control mapping reports, linkage, symbol table listings, and to inform the generator which program files to relocate.

You terminate the Program Input Phase by entering the input data terminator, /E.

3-10. PROGRAM INPUT PHASE COMMANDS

For all of the following commands, a space (blank character) must delimit the command word from its first parameter. Parameters entered in string format must be separated with a comma.

MAP Command

You use the MAP command to obtain memory mapping information during the relocation process. Maps describing module names and/or entry points, and their boundary addresses may be displayed. In addition, base page linkage information can be included in the map displayed. The command format is:

```
        { MODULES }
        { GLOBALS }
MAP     { LINKS   }
        { OFF     }
        { ALL     }
```

where:

MODULES requests a map of the relocated modules by name.

GLOBALS requests a map of each relocated module's entry points.

LINKS requests a map that reports base page linkage addresses.

OFF disables memory mapping (turns mapping options off).

ALL requests a report of Modules, Globals, and Links.

If the MAP command is omitted, MAP OFF is assumed by the On-Line Generator.

If you enter the MAP command, you must specify at least one of the mapping options. You may specify any combination of options in any order, separated by commas. For example:

```
MAP MODULES,LINKS
MAP OFF
MAP LINKS,GLOBALS
MAP MODULES
MAP ALL
```

Once invoked, the MAP option remains in effect for all relocatable modules declared in subsequent RELOCATE commands until disabled (MAP OFF). This command may be re-entered at any time during the Program Input Phase to change options as desired.

Because the MAP command may be entered at any time during the Program Input Phase to change mapping options, a module appended to another module during relocation may have different mapping options.

LINKS IN Command

You use this command to inform the generator whether linkages are to be via the base page or current page. If the LINKS IN command is not entered, the generator assumes base page linkage. The command format is:

```
LINKS IN { BASE
         { CURRENT
```

Once invoked, the LINKS IN command remains in effect for modules relocated through subsequent RELOCATE commands. The LINKS IN command may be re-entered at any time during the Program Input Phase to change the linkage mode.

DISPLAY Command

You can invoke the DISPLAY command to obtain a list, on the operators console and the list file, of the contents of the symbol table, the names of undefined external symbols, or the value of a specific symbol. The DISPLAY command format is:

```
DISPLAY { TABLE
        { UNDEFS
        { symbol name
```

where:

TABLE	requests a list of the symbol table contents.
UNDEFS	requests a list of any undefined symbols (unresolved external references).
symbol name	requests a list of the value of a specific symbol.

RELOCATE Command

You enter the RELOCATE command to inform the generator which modules are to be included in the generation. The command format is:

RELOCATE [*(name)*],*filename*

or,

REL [*(name)*],*filename*

where:

(name) is the name of a module to be relocated. The name must be enclosed in parentheses. This is an optional parameter.

filename is the name of the file which contains the module or modules to be relocated. The *filename* entry format is:

filename,security code,cartridge label

The RELOCATE command directs the generator to read and unconditionally relocate program modules (during the Program Loading Phase).

If *(name)* is omitted, all modules in the file specified by filename are relocated.

If *(name)* is specified, all other modules in the named file are ignored. That is, preceding modules in the file are skipped and the module scan terminates following relocation of the named module.

Note that when you use the RELOCATE command, the relocation of a main program module must precede that of the program's segments.

3-11. PROGRAM INPUT PHASE ERROR MESSAGES

GEN ERR 03
name

Meaning: Record out of sequence (*name* is the module in which the record exists).

Action: Module is skipped. Message printed on list device only; control is not transferred to the operator console.

GEN ERR 04
name

Meaning: Illegal record type (*name* is the module name in which the record exists).

Action: Module is skipped. Message printed on list device only; control is not transferred to the operator console.

GEN ERR 05

Meaning: Duplicate entry point.

Action: Revise program by re-labeling the entry points (the current entry point replaces the previous entry point). Message printed on list device only; control is not transferred to the operator console.

GEN ERR 06

Meaning: Command error during Program Input Phase.

Action: Re-enter valid command.

GEN ERR 07

Meaning: Program name or entry point table overflow.

Action: Irrecoverable error. Revise or delete programs.

GEN ERR 08

Meaning: Duplicate program name.

Action: The current program replaces the previous program. Message printed on list device only; control is not transferred to the operator console.

GEN ERR 13
name

Meaning: Background segment precedes background main disc-resident program (*name* is the segment's name).

Action Module is skipped. Either revise module or re-order RELOCATE command entries.

3-12. PARAMETER INPUT PHASE

STEP 18 — PARAMETERS

This message announces the beginning of the Parameter Input Phase.

During this phase, you can modify the type, priority, and execution interval, or the ENT (entry) record of any of the programs specified for relocation during the Program Input Phase.

CAUTION

The primary type code of a background main program and its segments must not be changed because the relationship between the program and its segments would be lost.

Enter the parameter string in the following general form:

name,type[*,priority*][*,execution interval*]

where:

name is the name of the program.

type

0 system program or driver

1 memory resident

2 real-time disc resident

3 background disc resident

4 not used

5 background segment

6 library, re-entrant or privileged (note that these routines are relocated into the memory resident library if called by a memory resident program. If not called by a memory resident program, they become Type 7).

7 library, utility

8 if program is a main, it is deleted from the system,

or,

if program is a subroutine, then it is used to satisfy any external references during generation. However, it is not loaded in the relocatable library area of the disc.

9 Foreground memory-resident; background common.

10 Foreground disc-resident; background common.

11 Background disc-resident; foreground common.

12 RTE-II Only. Background memory-resident; foreground common.

13 RTE-II Only. Background segment; foreground common.

14 Same as Type 6 but automatically included in the memory resident library.

For RTE-III, the primary type may be expanded in some cases by adding 8, 16, or 24 to the number. These expanded types allow such features as access to real-time common by background programs and access to SSGA. See table 3-1 for a summary of RTE-III program types.

priority is the program priority in the range 1 through 32767 (1 is the highest priority).

execution interval is a list of six parameters specifying the times the program should be scheduled for execution once it is turned on. The first two values specify the execution interval, and the last four specify an initial absolute starting time. The parameters are:

[*rest*[,*mult*[,*hour,min,sec,10msec*]]]

res resolution code (0 to 4):

0 — no execution interval
1 — tens of milliseconds
2 — seconds
3 — minutes
4 — hours

mult execution multiple (0 to 4095); the resolution code gives the units for the execution multiple.

initial absolute starting time (four values):

hour, hours (0 to 23)
min, minutes (0 to 59)
sec, seconds (0 to 59)
10msec tens of milliseconds (0 to 99)

The generator has an additional feature that applies to memory and disc resident programs. During the Parameter Input Phase, one program can be scheduled to execute automatically whenever the RTE system is loaded from the system disc. This is accomplished by adding the value 80 to the program's type code. For example, if PROG is originally a Type 2 program (real-time disc resident), it can be changed to:

```
PROG,82
```

This entry will cause PROG to be scheduled automatically each time the system is loaded into main memory from the disc and after the file manager has been scheduled. If more than one program is assigned for automatic scheduling, only the last one entered will be recognized.

Terminate the parameter entry list using the input data terminator, /E.

Table 3-1. Summary of RTE-III Program Types

PROGRAM CATEGORY / EXECUTABLE PROGRAMS	PROGRAM TYPE	COMMON ACCESS: REAL TIME COMMON	COMMON ACCESS: BACKGROUND COMMON	COMMON ACCESS: SSGA	COMMON ACCESS: RT COMMON & SSGA	COMMON ACCESS: BG COMMON & SSGA	LOAD POINT: NO COMMON DECLARED	LOAD POINT: SOME COMMON DECLARED	MEMORY PROTECT FENCE: NO COMMON DECLARED	MEMORY PROTECT FENCE: SOME COMMON DECLARED
MEMORY RESIDENT*	1	✓					L_1	L_1	F_5	F_3
	9		✓				L_1	L_1	F_5	F_4
	17			✓			L_1	L_1	F_1	F_1
	17				✓		L_1	L_1	F_1	F_1
	25					✓	L_1	L_1	F_1	F_1
REAL TIME DISC RESIDENT*	2	✓					L_3	L_2	F_2	F_3
	10		✓				L_3	L_2	F_2	F_4
	18			✓			L_2	L_2	F_1	F_1
	18				✓		L_2	L_2	F_1	F_1
	26					✓	L_2	L_2	F_1	F_1
BACKGROUND DISC RESIDENT*	3		✓				L_3	L_2	F_2	F_4
	11	✓					L_3	L_2	F_2	F_3
	19			✓			L_2	L_2	F_1	F_1
	19					✓	L_2	L_2	F_1	F_1
	27				✓		L_2	L_2	F_1	F_1

SPECIAL PROGRAMS	TYPE	DESCRIPTION
SYSTEM MODULE	0	MODULE TO BE LOADED WITH RESIDENT SYSTEM. PART OF HP SUPPLIED SYSTEM, USER-WRITTEN DRIVER, ETC.
BACKGROUND SEGMENT	5	OVERLAYABLE PROGRAM USED WITH BG DISK RESIDENT MAIN. COMMON TYPE, FENCE ADDR, AND LOAD PT. DETERMINED BY MAIN.
SUBROUTINE	6	RELOCATED INTO RESIDENT LIBRARY IF CALLED BY ANY MEMORY RESIDENT PROGRAM. (UNCALLED 6'S BECOME 7'S)
SUBROUTINE	7	STORED ON DISK IN RELOCATABLE FORM. ANY PROGRAM CALLING A TYPE 7 HAS A COPY APPENDED TO IT.
SUBROUTINE	8	APPENDED TO CALLING PROGRAM. ALL TYPE 8 RELOCATABLES ARE DISCARDED AFTER GENERATION.
SUBROUTINE	14	RELOCATED INTO RESIDENT LIBRARY, WHETHER CALLED OR NOT. (FORCE LOADED)
SSGA MODULE	30	RELOCATED INTO SUBSYSTEM GLOBAL AREA OF SYSTEM. ACCESSIBLE ONLY TO PROGRAMS OF PROPER TYPE (ABOVE)
(OBSOLETE)	4	CONVERTED TO TYPE 9 WHEN ENCOUNTERED. (DEFINED AS BG CORE RESIDENT W/BG COMMON IN RTE-II)
(OBSOLETE)	12	CONVERTED TO TYPE 1 WHEN ENCOUNTERED. (DEFINED AS BG CORE RESIDENT W/RT COMMON IN RTE-II
(OBSOLETE)	13	CONVERTED TO TYPE 5 WHEN ENCOUNTERED. (SEE TYPE 5) (DEFINED AS BG SEGMENT USING RT COMMON IN RTE-II)

LOAD POINT & FENCE DEFINITIONS (SEE FIGURE 2-4)

L_1 – NEXT AVAILABLE LOCATION DURING LOADING OF RESIDENTS.
L_2 – 3RD WORD OF NEXT PAGE AFTER COMMON AREAS.
L_3 – 3RD WORD OF NEXT PAGE AFTER RESIDENT LIBRARY.

F_1 – FIRST WORD OF SSGA.
F_2 – FIRST WORD OF PAGE FOLLOWING RESIDENT LIBRARY.
F_3 – FIRST WORD OF RT COMMON
F_4 – FIRST WORD OF BG COMMON
F_5 – FIRST WORD OF RESIDENT PROGRAM AREA.

* ADD 80 TO ANY OF THESE TYPES TO SPECIFY AUTOMATIC SCHEDULING AT SYSTEM STARTUP.

STEP 19 — CHANGE ENTS?

Enter your changes to the ENT records. Type 3 (absolute) and Type 4 (replace) ENT records can be created and/or modified. Enter your changes in the following form:

entry,type,value

where:

entry is the entry point name.

type is the entry point type; AB = absolute, RP = replace.

value is the entry point instruction value. Octal numbers are assumed unless the letter "D" (denotes decimal) follows the number.

When an entry point is declared absolute (type = AB) its value is added to the referencing instruction to obtain the final instruction value. For example, you may wish to protect FMP peripheral cartridges from alteration by user programs so that, after the generated RTE system is booted-up and running, these programs can read information from protected cartridges, but cannot alter files residing on them except via FMP calls. To protect FMP peripheral cartridges, specify:

```
$PDSK,AB,1
```

to declare entry point $PDSK absolute with a value of 1.

When an entry point is declared as replace (type = RP) the loader will replace each reference to it with the number declared in the *value* parameter. This provides you with the capability of creating Type 4 entry records which are code replacement values. This means that a JSB instruction referencing an external entry point is intercepted by the RTE Loader and changed to a value which has been defined by the RP command. This allows you to eliminate software subroutines by replacing their entry points with microcode instructions. For example:

```
.FMP,RP,105040
```

causes each JSB .FMP instruction (floating point multiply) to be changed to the microcode floating point multiply instruction (105040). Other floating point (or fixed point EAU) type instructions that could be entered are:

Floating Point		Fixed Point
.FAD,RP,105000	— Add	.MPY,RP,100200
.FSB,RP,105020	— Subtract	.DIV,RP,100400
FMP,RP,105040	— Multiply	.DLD,RP,104200
.FDV,RP,105060	— Divide	.DST,RP,104400
IFIX,RP,105100	— Fix	
FLOAT,RP,105120	— Float	

If your CPU is an HP 21MX, you should take advantage of the move words microcode by making the entry point change:

```
.MVW,RP,105777
```

Other uses include I/O configuration at load time, and configuring tables that are assembled as DEF statements to external references.

STEP 20 — # OF BLANK ID SEGMENTS?

Enter the number of ID segments required, 1 or 2 decimal digits (note that 0 is changed to 1 to allow on-line loading of at least one program). The total number of program ID segments, including memory resident and disc resident programs must be equal to or less than 256. One blank ID segment is required for each program that will be loaded permanently into the system on-line by the RTE Relocating Loader (LOADR). If five ID segments are allocated, then only five additional programs can be loaded at any one time into the system on-line. If a temporary program is deleted from the system by an OF,name,8 operator command, or a permanent program is deleted from the system by the ON,LOADR,,,4 command, the program's ID segment is returned to the system for use by another on-line load. Each disc resident program ID segment requires 29 words in the system memory resident area (28-word ID plus one key word).

STEP 21 — # OF BLANK BG SEG ID SEGMENTS?

Enter the number of "short" ID segments required. These ID segments have 10 words (9-word ID plus one key word) and are used only for background program segments. One short ID segment is required for each program segment. If an on-line load is done, and there are no blank short ID segments available, a regular 29-word ID segment will be used.

STEP 21.5 — (RTE-III Only) — MAX NUMBER OF PARTITIONS?

Enter the maximum number of partitions (up to 64) to be allowed in this system. The number of partitions is determined by dividing up the pages of memory remaining following System Available Memory (SAM).

STEP 22 — FWA BP LINKAGE?

Enter the address of the first base page word available for memory resident program links. This address must be greater than the last used I/O select code.

3-13. PARAMETER INPUT PHASE ERROR MESSAGES

GEN ERR 07	
Meaning:	Program name or entry point table overflow.
Action:	Irrecoverable error. Revise or delete programs.

GEN ERR 09

Meaning: Parameter name error (no such program).

Action: Enter valid parameter statement.

GEN ERR 10

Meaning: Parameter type error.

Action: Enter valid parameter statement.

GEN ERR 11

Meaning: Parameter priority error.

Action: Enter valid parameter statement.

GEN ERR 12

Meaning: Execution interval error.

Action: Enter valid parameter statement

3-14. SYSTEM LOADING PHASE

This phase requires no input. During this phase, the generator relocates the system programs specified during the Program Input Phase and maps them according to the options specified during the Program Input Phase.

3-15. TABLE GENERATION PHASE

This phase builds required system tables, including the Equipment (EQT) Table, Device Reference (DRT) Table, and the Interrupt (INT) Table.

STEP 23 — *# OF I/O CLASSES?

Enter the number of classes required for Class I/O. Multiple terminal operation requires one Class number, spooling requires two, and there must be one Class number for each Class GET call simultaneously outstanding. For example, if you specify ten Class numbers here, ten programs can simultaneously process Class requests. Enter a number between 1 and 255 (note that 0 is changed to 1).

STEP 24 — *# OF LU MAPPINGS

This entry specifies the size of the LU Switch table (configured by the generator) which cross-references real, or spool, logical unit numbers to user-specified logical unit numbers within the Batch System. The number entered here is the table size which determines the maximum number of LU commands allowed in a job running under control of the Batch-Spool Monitor. A typical entry would be 10 (note that 0 is changed to 1).

STEP 25 — *# OF RESOURCE NUMBERS?

Enter the required amount of Resource Numbers (RN). Spooling requires four RN's. In addition, there must be one RN for each resource to be controlled. For example, if you specify ten RN numbers here, ten resources (for example, I/O device or file) can be managed and used by cooperating programs. Enter a number between 1 and 255 (note that 0 is changed to 1).

STEP 26 — *BUFFER LIMITS (LOW,HIGH)?

Enter the lower and upper buffer limits for your system. Setting these limits here can prevent an inoperative or slow I/O device from monopolizing System Available Memory. Each time a buffered I/O request is made (Class I/O requests are buffered), the system totals the lengths of all buffers for I/O requests queued to that EQT entry and compares the number to the upper limit set here (or by the on-line system BL command). If the sum is less than the upper limit, the new buffered request is added to the queue. If the sum is larger than the upper limit, the requesting program is suspended in the general wait (Status= 3) list.

When a buffered I/O request completes, the system adds up the remaining words in I/O requests queued to that EQT entry and compares the number to the lower limit set here (or by the BL command). When the sum is less than the lower limit, any programs suspended for exceeding the buffer limits on this EQT are rescheduled and may reattempt their request.

A suggested entry of 100 and 400 can be entered and later changed on-line with the BL command, if desired.

STEP 27 — *EQUIPMENT TABLE ENTRY

This message begins the Table Generation Phase. It is followed by a prompt which requests input for the first EQT entry:

```
EQT 01?
```

Respond with EQT entry number one in the form:

channel,driver [,*B*] [,*D*] [,*T=ttttt*] [*X=xxx*]

where:

channel	is the octal select code number (I/O slot)
driver	is the driver name and number, e.g., DVR32
B	may be specified to request output buffering
D	may be specified to request direct memory access
T=ttttt	may be specified to declare a time-out interval for device interrupts (*ttttt* represents tens of milliseconds in the range 1 32767)
X=xxx	may be specified to declare an extended EQT table (*xxx* represents the number of words to extend the table in the range 1-999)

EQT entry 01 should be the system disc and is either DVR31 for the HP 7900 Disc or DVR32 for the HP 7905 Disc and HP 7920 Disc. For example, a typical EQT entry 01 for the HP 7900 is:

```
21,DVR31,D
```

Once you respond to the request for EQT entry 01, the prompt is incremented by one and repeated:

```
EQT 02?
```

Each time you respond, the prompt is incremented by one and redisplayed.

Terminate the EQT Table Entry using the input data terminator, /E.

If the Power Fail driver (DVP43) is included in your system, you should specify an EQT entry as follows:

```
4,DVP43
```

Note that on the worksheet each EQT entry contains a blank for the driver name which contains five characters, starts with the characters "DV", and ends with a two-digit octal number (e.g., DVynn). The entry point names are four characters in length and start with either "I" (e.g., I*xnn* for Initiation section), or "C" (e.g., C*xnn* for Completion section), and usually end with the same two-digit octal number used in the driver name. However, because the On-Line Generator does not examine the driver's NAM record, the driver may in fact be renamed to support more than one device type. The rules for the choice of "*x*" and "*y*" above are as follows:

If *y* is not "R" then *x* = *y*

If *y* is "R" then *x* = "."

Using the above rules, more than one driver with the same name can be configured into the system by changing the third character in the driver name. For example, assume the system has two line printers of different types. Each line printer uses a different driver but the drivers have the same common name (i.e., DVR12). Both drivers could be configured into the system by changing the name of one to DVA12. Its entry points for the Interrupt Table would then become IA12 and CA12. The other driver would be DVR12 with entry points I.12 and C.12. The remaining blanks on the EQT entry line are for D (DMA required), B (buffered output), T (time-out), and X (extended EQT). The blanks are filled in as shown in the example in figure 3-2.

If T is specified, a value for T must be entered in the T= blank. The value must be a positive decimal number up to 32767. This is then the number of Time Base Generator interrupts (10 msec. intervals), starting at I/O initiation for the device before which the device should have interrupted. (Note that for privileged drivers, T must be long enough to cover the period from I/O initiation to I/O completion.) If the device has not interrupted by this time, it is considered to have timed out and is set down, except in the case of the system console and devices controlled by drivers handling their own time-out. For a device controlled by DVR00 or DVR05, T should not be less than 500. Also, devices controlled by DVR00 require special subchannel assignments to make the time-out feature effective (see the *HP DVR00 Small Programs Manual,* Part Number 29029-95001 for more information).

If X is specified, a value for X must be entered in the X= blank. This value must be a positive decimal number up to three digits. This declares a number of words for buffer space and is appended to the EQT for the driver's use, and is called an EQT extension. The result of this entry is recorded in the driver's EQT Table, words 12 and 13. EQT word 12 contains the number of words of buffer space, and word 13 contains a pointer to the buffer. One use of the EQT extension is for the Batch and Spool driver DVS43. An entry must be made for each spool file that will be active, or currently performing I/O operations. For example, assume six files can be active at one time. The entries (referencing unused I/O slots) might be:

```
30,DVS43,X=18
31,DVS43,X=18
32,DVS43,X=18
33,DVS43,X=18
34,DVS43,X=18
35,DVS43,X=18
```

Refer to the I/O Configuration Worksheet (Section II, Table 2-3) and write in the octal select code number, DVR number, and the D, B, T, and X options (if applicable) for each EQT number in sequential order. Note that the driver's identifying suffix letter is not included. An EQT entry specifying a non-existent (not loaded) driver results in GEN ERR 25 (see Appendix B).

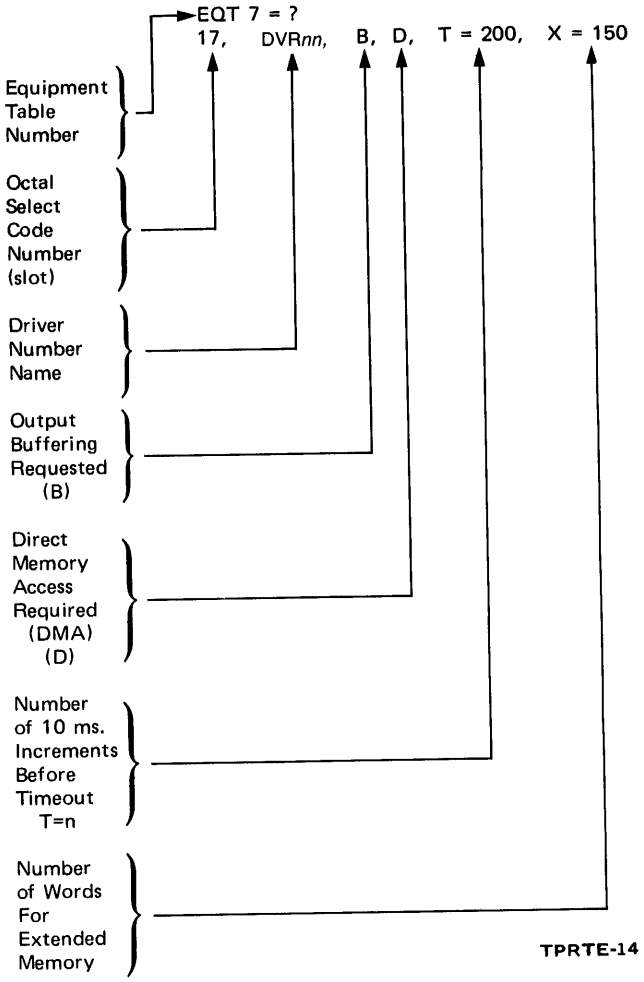


Figure 3-2. EQT Table Example

STEP 28 — *DEVICE REFERENCE TABLE

This message is issued prior to requests for logical unit assignments. The Device Reference Table, which specifies the logical unit (LU) numbers, is cross-referenced to the EQT entry numbers. The logical unit request then follows:

```
1 = EQT #?
```

Enter the Equipment Table entry number associated with logical unit number 1.

Following this entry, the logical unit number is incremented by 1 and the prompt is redisplayed:

```
2 = EQT #?
```

Entries to the Device Reference Table are in the form:

eqt entry,subchannel

where:

eqt entry is the EQT entry number to be associated with the displayed logical unit number.

subchannel is the subchannel number of the device referenced by this entry.

The first seven logical unit numbers are reserved for system devices, as follows:

LU0 — bit bucket (no entry required)
LU1 — system console
LU2 — system disc
LU3 — auxiliary disc
LU4 — standard output device
LU5 — standard input device
LU6 — standard list device
⋮
LU8 — recommended for magnetic tape.

LU0 (bit bucket) is a system mechanism that allows immediate I/O completion (that is, the data buffer is written to or read from a non-existent device).

Extra logical unit numbers can be assigned EQT entry number zero during generation. These assignments may then be changed on-line to reference other EQT entry numbers as desired.

Terminate the Device Reference Table entries using the input data terminator, /E.

STEP 29 — *INTERRUPT TABLE

Following display of this message you may enter interrupt data that tie octal select codes (I/O channel slot numbers) to EQT entry numbers. Each select code, in ascending order, is referenced back to its EQT entry number in the Equipment Table.

If dummy select codes were used to reference EQT entry numbers for the Batch-Spool Monitor driver DVS43, interrupt ties for those entries are necessary.

For example, assume that EQT entry number one (the first EQT entry) was assigned select code 21,DVR31. Then, in the Interrupt Table, select code 21 must be tied to EQT entry number one which has the address of DVR31. Upon interrupt, DVR31 will be entered. The format for this Interrupt Table entry is shown in figure 3-3. The HP 7900 disc controller I/O cards both require an interrupt tie to their EQT number. Thus, the Interrupt Table entries would be:

```
21,EQT,1
22,EQT,1
```

The Interrupt Table entries have the following form:

select code,option,destination

where:

select code,EQT,*n*	relates select code to EQT entry number *n*.
select code,PRG,*name*	causes program *name* to be scheduled upon interrupt.
select code,ENT,*entry*	causes control to transfer to the specified entry point of a user-written system program upon interrupt.
select code,ABS,*xxxxxx*	places the absolute octal value *xxxxxx* (instruction code) in the interrupt location. This may be a NOP, CLC, etc., for RTE-II; but for RTE-III do not place anything other than a JMP or JSB in this trap cell.

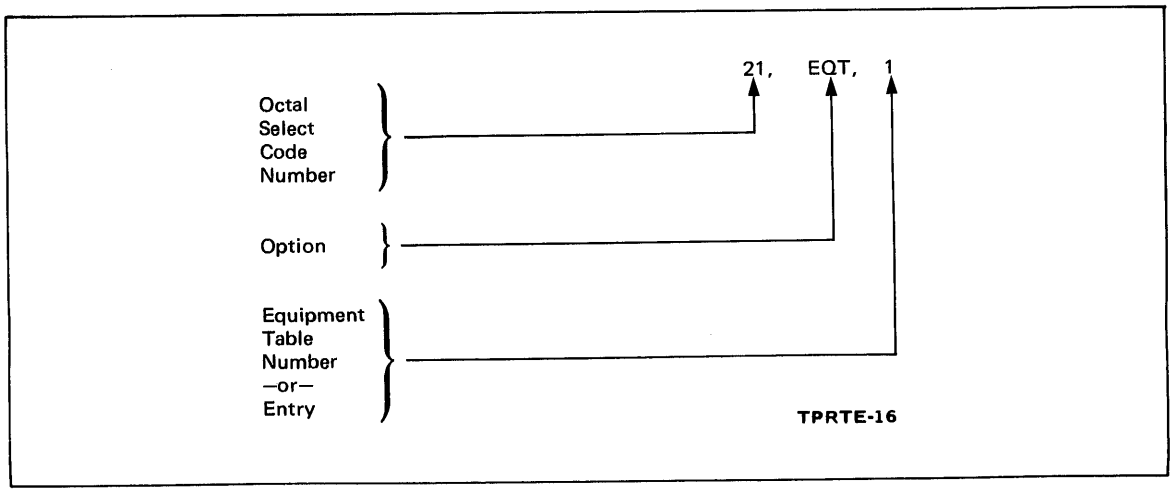


Figure 3-3. Interrupt Table Example

For devices or subsystems that have more than one I/O card, refer to the I/O card or subsystem documentation covering that device or driver. In any case, each I/O card must have an Interrupt Table entry. Note that interrupt location 4 (power fail) may be changed from its present HLT4 to an ENT entry if a power fail routine is included in your system. For example:

```
4,ENT,$POWR
```

($POWR is the entry point in the power fail routine)

Terminate the Interrupt Table entries using the input data terminator, /E.

3-16. TABLE GENERATION PHASE ERROR MESSAGES

GEN ERR 21

Meaning: Module containing entry point $CIC not loaded.

Action: Irrecoverable error.

GEN ERR 24

Meaning: Invalid channel number.

Action: Enter valid EQT statement.

GEN ERR 25

Meaning: Invalid driver name or no driver entry points.

Action: Enter valid EQT statement.

GEN ERR 26

Meaning: Invalid or duplicate D, B, T operands.

Action: Enter valid EQT statement.

GEN ERR 27

Meaning: Invalid logical unit number.

Action: Enter valid DRT statement.

GEN ERR 28

Meaning: Invalid channel number.

Action: Enter valid INT statement.

GEN ERR 29

Meaning: Channel number decreasing

Action: Enter valid INT statement

GEN ERR 30

Meaning: Invalid mnemonic.

Action: Enter valid INT statement.

GEN ERR 31

Meaning: Invalid EQT number.

Action: Enter valid INT statement.

GEN ERR 32

Meaning: Invalid program name.

Action: Enter valid INT statement.

GEN ERR 33

Meaning: Invalid entry point.

Action: Enter valid INT statement.

GEN ERR 34

Meaning: Invalid absolute value.

Action: Enter valid INT statement.

GEN ERR 35

Meaning: Base page interrupt locations overflow into linkage area.

Action: Re-enter response to FWA BP LINKAGE query.

GEN ERR 36

Meaning: Invalid number of characters in final operand.

Action: Enter valid INT statement.

3-17. RTE-II PROGRAM LOADING PHASE

During this phase, the generator continues relocating the system. The generator pauses at specific boundaries and reports the boundary address. Then, it issues a prompt which allows you to change the reported address to a page boundary address, if desired.

3-18. RTE-II SYSTEM BOUNDARIES PHASE

When the Interrupt Table is completed, RT2GN prints the new first word of available memory in base page:

BP LINKAGE *xxxxx*

3-19. SYSTEM AVAILABLE MEMORY

In the following steps, the generator provides you with six opportunities to increase the size of System Available Memory (SAM), although no messages are given to indicate that this occurs. The system uses SAM for automatic output buffering, Class I/O, and re-entrant temporary I/O subroutines.

The size of SAM may be increased by your response to the following messages:

1. Step 30a
   LIB ADDRS *xxxxx*
   CHANGE LIB ADDRS?

2. Step 30c
   FG RES ADD *xxxxx*
   CHANGE FG RES ADD?

3. Step 30d
   FG DSC ADD *xxxxx*
   CHANGE FG DSC ADD?

4. Step 30g
   BG BOUNDRY *xxxxx*
   CHANGE BG BOUNDRY?

5. Step 30i
   BG RES ADD *xxxxx*
   CHANGE BG RES ADD?

6. Step 30j
   BG DSC ADD *xxxxx*
   CHANGE BG DSC ADD?

For any of these steps, if you increase the address, the block of memory words skipped over is added to SAM

STEP 30a — LIB ADDRS *xxxxx*
CHANGE LIB ADDRS?

The generator reports the starting address of the library and asks for any change.

To change the library starting address, enter the new octal address. Otherwise, enter 0.

Increasing this address adds to SAM any block of memory words skipped over.

The generator prints LIBRARY, and, depending on the mapping options, may be followed by names, entry point, and link addresses of all routines that are referenced by foreground and background programs. After this, the generator reports the first word of available memory in Base Page:

BP LINKAGE *xxxxx*

STEP 30b — FG COMMON *xxxxx*
CHANGE FG COMMON?

The generator reports the total number of words allocated to foreground common and asks for any change.

To change the size of the foreground common area, enter the new size in octal number of words. Otherwise, enter 0.

STEP 30c — FG RES ADD *xxxxx*
CHANGE FG RES ADD?

The generator reports the starting address of the foreground memory resident area and asks for any change.

To increase the size of the foreground memory resident program area, enter the new octal address. Otherwise, enter 0.

Increasing this address adds to SAM any block of memory words skipped over.

At this point, if any Type 9 (foreground memory resident program that uses background common) or Type 10 (foreground disc resident program that uses background common) programs are in the system, the generator reports the starting address of the background common area. Then, the generator asks if you wish to change this boundary:

BG BOUNDARY *xxxxx*
CHANGE BG BOUNDARY?

See Section II, "RTE-II Memory Configuration" for guidelines in determining this entry.

Next, the generator prints FG RESIDENTS, loads the foreground memory resident programs, and reports the new first word of available memory in Base Page:

BP LINKAGE *xxxxx*

Note that if there are no library programs or foreground memory resident programs, the generator prints NONE and does not report the Base Page linkage address because it has not changed.

STEP 30d — FG DSC ADD *xxxxx*
CHANGE FG DSC ADD?

The generator reports the starting address of the foreground disc resident program area and asks for any change.

To increase the size of the foreground disc resident program area, enter the new octal address. Otherwise, enter 0.

Increasing this address adds to SAM any block of memory words skipped over.

The generator prints FG DISC RESIDENTS and loads the foreground disc resident programs.

STEP 30e — BP LINKAGE *xxxxx*
CHANGE BP LINKAGE?

The generator reports the new first word of available memory in Base Page and asks for any change.

To increase the size of the Base Page linkage area, enter an octal value greater than the reported value. Otherwise, enter 0.

Increasing the Base Page linkage area here allows for future additions of larger foreground disc resident program on-line using the Relocating Loader (LOADR).

STEP 30f — SYS AVMEM *xxxxx*
CHANGE SYS AVMEM?

The generator reports the last word (ending) address of the foreground disc resident program area and asks for any change.

To increase the size of the foreground disc resident program area, enter an octal value greater than the reported value. Otherwise, enter 0.

Increasing the size of this area allows more room for on-line real-time program additions using LOADR.

Note that your response to this message does not increase the size of SAM (see "System Available Memory" at the beginning of this phase description).

STEP 30g — BG BOUNDRY *xxxxx*
CHANGE BG BOUNDRY?

If there are no Type 9 or Type 10 programs in the system, the generator reports the first word address of the background area.

To increase the starting address of the background area, enter the new octal address. Otherwise, enter 0.

Increasing this address adds to SAM any block of memory words skipped over. The SAM area created here (the memory space between the end of the foreground area and the start of the background area) is the major portion of SAM. It should be large enough to handle the largest anticipated I/O transfer.

See Section II, "RTE-II Memory Configuration" for information to determine this entry.

If there are Type 9 or Type 10 programs in the system, this query was displayed earlier (following Step 30c) and is not repeated here.

STEP 30h — BG COMMON *xxxxx*
CHANGE BG COMMON?

The generator reports the total number of words allocated to background common and asks for any change.

To change the size of the background common area, enter the new size in decimal number of words. Otherwise, enter 0.

The generator reports the new background common size (unless it is 0):

BG COM *xxxxx*

STEP 30i — BG RES ADD *xxxxx*
CHANGE BG RES ADD?

The generator reports the starting address of the background memory resident program area and asks for any change.

To increase the starting address of the background memory resident program area, enter the new octal address. Otherwise, enter 0.

Increasing this address adds to SAM any block of memory words skipped over.

Next, the generator prints BG RESIDENTS, loads the background memory resident programs, and reports the new Base Page linkage information:

BP LINKAGE *xxxxx*

If there are no background memory resident programs in the system, the generator prints NONE and does not report the Base Page linkage information because it has not changed.

STEP 30j — BG DSC ADD *xxxxx*
CHANGE BG DSC ADD?

The generator reports the starting address of the background disc resident program area and asks for any change.

To increase the starting address of the background disc resident program area, enter the new octal address. Otherwise, enter 0.

NOTE

The background disc resident program area should begin at the start of a page to reduce the number of required links.

Increasing this address adds to SAM any block of memory words skipped over.

The generator prints BG DISC RESIDENTS, loads the background disc resident programs, and the names and entry points for main programs and subroutines. When the generator completes the loading, it prints the Base Page links used:

BP LINKAGE *xxxxx*

STEP 30k — SYSTEM STORED ON DISC
SYS SIZE *xx* TRKS, *xxx* SECS(10)

RT2GN FINISHED

The generator reports that the system is stored on disc followed by a report of the system size in decimal number of tracks and sectors used.

3-20. RTE-II LOADING AND SYSTEM BOUNDARIES PHASE ERROR MESSAGES

GEN ERR 14

Meaning: Invalid background bounds or illegal response to CHANGE FWA SYS MEM? or to CHANGE BP LINKAGE? query.

Action: Message is repeated. Enter valid reply.

GEN ERR 15

Meaning: Type 6, 14, or 30 module illegally calling a module that is not Type 0, 6, 14, or 30.

Action: Revise the calling module.

GEN ERR 16

Meaning: Base page linkage overflow into system communication area.

Action: Diagnostic printed for each word required (communication area is used). Revise order of program loading or CHANGE BP LINKAGE? query answers to reduce linkage requirements.

GEN ERR 18

Meaning: Memory overflow (absolute code exceeds LWA memory).

Action: Diagnostic printed for each word required (absolute code is generated beyond LWA). Revise program or answer to CHANGE BG BOUNDRY? query.

GEN ERR 23

Meaning: Invalid response to FWA BP LINKAGE? query.

Action: Query repeated. Enter a valid response.

GEN ERR 37
name

Meaning: Invalid declaration of common in system or library program (*name* is the program's name).

Action: Revise the program.

GEN ERR 39
name

Meaning: System illegally referenced a Type 6 program (*name* is the Type 6 program name).

Action: Revise the program.

3-21. RTE-III PROGRAM LOADING PHASE

As system relocation continues, boundary addresses are reported, and you are asked if you wish to change these addresses. Then, information about program page requirements and partitioning is reported and you are asked to configure system memory.

3-22. RTE-III SYSTEM BOUNDARIES PHASE

The planning of generation responses may be difficult beyond this point because some of the responses are based on information not yet known. See Section II, "RTE-III Memory Configuration" for information concerning this phase of system generation.

STEP 31a — RT COMMON *xxxxx*
CHANGE RT COMMON?

The library and SSGA modules are relocated. The generator reports the default size of real-time common in decimal number of words and asks for any change.

To change the size of real-time common, enter a decimal value greater than the reported value. Otherwise, enter 0.

Then, the generator reports the first word address of the real-time common area:

RT COM *xxxxx*

STEP 31b — BG COMMON *xxxxx*
CHANGE BG COMMON?

The generator reports the default size of background common in decimal number of words and asks for any change.

To change the size of background common, enter a decimal value greater than the reported value. Otherwise, enter 0.

Then, the generator reports the first word address of the background common area:

BG COM *xxxxx*

STEP 31c — LWA BG COMMON *xxxxx*
ALIGN AT NEXT PAGE?

The generator reports the last word address of the background common area. Then it asks if you wish to align the end of the background common area at the next page boundary (to protect memory resident programs).

To align the end of background common at the next page boundary, enter YES. Otherwise, enter NO.

Next, the generator reports the updated last word address of background common:

LWA BG COMMON *xxxxx*

3-23. RTE-III PARTITION DEFINITION PHASE

Following the LWA BG COMMON report, the generator relocates the memory resident programs and prints MEMORY RESIDENTS followed by the appropriate mapping of these programs.

Then, the generator relocates the real-time resident programs and prints RT DISC RESIDENTS followed by the appropriate mapping of these programs.

Next, the generator relocates the background disc resident programs and prints BG DISC RESIDENTS followed by the appropriate mapping of these programs.

When the relocation is completed, the generator prints a report of partition requirements for the real-time and background disc resident programs. These reports are in the form:

RT PARTITION REQUIREMENTS
program name xx PAGES
program name xx PAGES
•
•
•
program name xx PAGES

```
BG PARTITION REQUIREMENTS
   program name xx PAGES
   program name xx PAGES
     .
     .
     .
   program name xx PAGES
```

The page count reported for each program is the number of pages they occupy in memory (including Base Page).

Next, the generator reports the largest addressable partition available, both without common and with common. This report is in the form:

```
LARGEST ADDRESSABLE PARTITION
W/O COM xx PAGES
W/  COM xx PAGES
```

You can declare partitions larger than the reported number of pages, but the extra pages will not be accessible.

STEP 31d — LWA MEM RESIDENT PROGRAM AREA *xxxxx* ALIGN AT NEXT PAGE?

The generator reports the last word address of the memory resident program area and asks if you wish to align the end of this area with the next page boundary (to protect System Available Memory).

To align the end of the memory resident program area at the next page boundary, enter YES. Otherwise, enter NO.

If you respond YES, the generator automatically allocates one page of memory to System Available Memory (SAM).

Note that any block of memory words skipped over is wasted; that block cannot be accessed by the system.

The generator reports the new last word address of the memory resident program area:

```
LWA MEM RESIDENT PROGRAM AREA xxxxx
```

If you respond NO, the generator allocates to SAM the block of memory words between the originally reported last word address of the memory resident program area and the next page boundary.

STEP 31e — SYS AV MEM: *xxxxx* WORDS

The generator reports the total number of words in SAM.

If you responded YES at Step 31d, this value is 1024 (one page of memory).

If you responded NO at Step 31d, this value will be the number of words between the last word address of the memory resident program area and the next page boundary (between 1 and 1024).

STEP 31f — 1ST DSK PG *xxxxx* CHANGE 1ST DSK PG?

The generator reports the page number of the first memory page available for partitions and asks if you wish to change (increment) this page number.

To change the first page available for partitions, enter a decimal page number value greater than the reported value. Otherwise, enter 0.

Any pages of memory skipped over are allocated to SAM and the new size of SAM (in words) is reported:

SYS AV MEM: *xxxxx* WORDS

STEP 31g — PAGES REMAINING: *xxxxx*

The decimal number of pages of physical memory remaining for partitioning is reported.

STEP 31h — DEFINE PARTITIONS

Following the printing of this heading, the generator waits for you to define the partitions for your system.

The number of remaining memory pages reported in Step 31g must be divided into real-time and/or background partitions. The sum of the partition sizes (in pages) must be equal to the number of remaining pages reported. Enter the partition definitions in the following form:

partition #,size,class[*,R*]

where:

partition # is a number between 1 and the maximum number of partitions allowed in this system (declared in Step 21.5). This number represents the "name" of the partition.

size is the partition size in number of pages (decimal). A partition must include enough pages for the program plus one page for the program's Base Page.

class is RT for a real-time partition, or BG for a background partition.

R is the "reserve" flag. If specified, the partition may be used only by programs specifically assigned to it (see Step 31j).

The order in which partition definitions are entered is up to you. Partition numbers may be skipped if desired; however, pages are assigned in order by partition number (that is, lower numbered partitions get lower numbered pages). An example of defining the partitions follows:

1,15,BG	partition #1, 15 pages, background
2,2,RT,R	partition #2, 2 pages, real-time, reserved

Terminate the partition definition list using /E.

STEP 31i — MODIFY PROGRAM PAGE REQUIREMENTS?

At this point, you can modify disc resident program page requirements. The default size of each program is reported at the end of the RTE-III Program Loading Phase after the generator relocates the programs.

This Step allows you to override the page requirements for those programs needing dynamic memory space allocation for symbol tables and buffers. Refer to Section 2, table 2-4 for the standard RTE programs that require a size override. Enter each disc resident program override using the following form:

program name,pages

where:

program name	is the name of the program requiring a size override.
pages	is the decimal number of pages required to run this program (include one page for the Base Page).

An example of entering the program size override follows:

RT3GN,14	The RTE-III On-Line Generator is assigned 14 pages and will not run in a partition smaller than that size.

Terminate the page requirements list using /E.

STEP 31j — ASSIGN PROGRAM PARTITIONS?

The last step in the generation procedure is that of assigning a program to run in a specific partition. Enter only those programs you wish to assign to a partition using the following form:

program name, partition #

where:

program name	is the name of the program to be assigned to a partition.
partition #	is a number between 1 and the maximum number of partitions in your system (declared in Step 21.5).

An example of program assignment to a partition follows:

HENRY,1 Program HENRY will execute only in partition 1.

Terminate the program assignment list using /E.

STEP 31k — SYSTEM STORED ON DISC
SYSTEM SIZE: *xx* TRKS, *xxx* SECS(10)

RT3GN FINISHED

The generator reports that the system is stored on disc, followed by a report of the system size in decimal number of tracks and sectors.

3-24. RTE-III LOADING, SYSTEM BOUNDARIES, AND PARTITION DEFINITION PHASE ERROR MESSAGES

GEN ERR 14

Meaning: Invalid background bounds or illegal response to CHANGE FWA SYS MEM? or to CHANGE BP LINKAGE?

Action: Message is repeated. Enter valid reply.

GEN ERR 15

Meaning: Type 6, 14, or 30 module illegally calling a module that is not Type 0, 6, 14, or 30.

Action: Revise the calling module.

GEN ERR 16

Meaning: Base page linkage overflow into system communication area.

Action: Diagnostic printed for each word required (communication area is used). Revise order of program loading or CHANGE BP LINKAGE query answers to reduce linkage requirements.

GEN ERR 18

Meaning: Memory overflow (absolute code exceeds LWA memory).

Action: Diagnostic printed for each word required (absolute code is generated beyond LWA). Revise program or answer to CHANGE EG BOUNDRY query.

GEN ERR 23

Meaning: Invalid response to FWA BP LINKAGE query.

Action: Query repeated. Enter a valid response.

GEN ERR 37
name

Meaning: Invalid declaration of common in system or library program (*name* is the program's name).

Action: Revise the program.

GEN ERR 39
name

Meaning: System illegally referenced a Type 6 program (*name* is the Type 6 program name).

Action: Revise the program.

GEN ERR 44

Meaning: Invalid partition number entered.

Action: Re-enter partition description with valid decimal number, between 1 and maximum defined during Initialization Phase.

GEN ERR 45

Meaning: Invalid partition size.

Action: Re-enter partition description with valid decimal size, between 1 and 1024 pages. Note that you are still limited to a 32K address space, regardless of the partition size.

GEN ERR 46

Meaning: Invalid partition type.

Action: Re-enter partition description with valid type, BG or RT.

GEN ERR 47

Meaning: Invalid reservation parameter.

Action: Re-enter partition description. Fourth parameter must be "R" to reserve a partition.

GEN ERR 48

Meaning: Invalid or unknown program name.

Action: Re-enter response with corrected name or enter /E to end this sequence.

GEN ERR 49

Meaning: Invalid partition number.

Action: Re-enter response with corrected number or enter /E to end this sequence.

GEN ERR 50

Meaning: Program specified is too large for partition assigned.

Action: Assign program to a larger partition or continue without assigning this program.

GEN ERR 51

Meaning: Invalid page size. Either smaller than the program size, or larger than maximum addressable partition size.

Action: Re-enter response with valid size or continue without overriding this program's page requirements.

GEN ERR 52

Meaning: Module being relocated references an SSGA entry point but does not have the proper program type to allow SSGA access.

Action: Re-run On-Line Generator program. During Parameter Input Phase, change the main program involved to a type that allows SSGA access or to a Type 8 to delete it from the generation.

GEN ERR 53

Meaning: The sum of all partition sizes does not equal the number of pages remaining after System Available Memory.

Action: Redefine all partitions.

GEN ERR 54

Meaning: A subroutine or segment has declared more common than the associated main program.

Action: Recompile the main program declaring the maximum common needed by any segment or subroutine to be used. Restart system generation with new relocatable modules.

3-25. GENERAL ERROR MESSAGES

The following messages may result from error conditions encountered during any phase of on-line system generation.

GEN ERR 00

Meaning: Irrecoverable error. On-Line Generator problem.

Action: If the error is accompanied by an FMP ERR, then check the cause of the problem. The problem may be hardware-oriented, symptomatic of disc transfer/DMA problems, in which case the appropriate diagnostics should be run.

If the error is not accompanied by an FMP ERR, an actual generator problem (relating to its internal table structures) may exist, so send your generation listing and answer file to your local HP Field Service Office for analysis.

GEN ERR 01

Meaning: Invalid response to initialization request.

Action: Request is redisplayed. Enter valid response.

GEN ERR 17

Meaning: Type 1 output file overflow.

Action: Irrecoverable error. Re-run On-Line Generator program; estimate more tracks for the EST. # OF TRACKS IN OUTPUT FILE query.

GEN ERR 19

Meaning: Transfer (TR) request nesting level greater than 10; or empty stack.

Action: Revise and re-enter response.

GEN ERR 20

Meaning: Transfer (TR) request was to an illegal command input logical unit.

Action: Revise and re-enter response.

GEN ERR 22

Meaning: List file error. An FMP ERR-6 usually occurs when a list file extent cannot be created (due to lack of disc space on the same subchannel).

Action: Respond YES or NO to the query OK TO CONTINUE?

A NO response terminates the generation.

A YES response causes listed output to be sent to the console only. If command input was being received from an answer file, you do not need to issue a TR command to continue answer file input.

3-26. ON-LINE GENERATOR INPUT WORKSHEETS

Initialization Phase

(1) LIST FILE NAME?

_____

(1A) ECHO?

_____

(2) EST # OF TRACKS IN OUTPUT FILE?

_____

(3) OUTPUT FILE NAME?

_____

(4) TARGET DISK?

_____

(5a) HP 7900/7901 Disc Only

MH DISC CHNL?

_____

TRKS, FIRST TRK ON SUBCHNL?

0?

_____ , _____

1?

_____ , _____

2?

_____ , _____

3?

_____ , _____

4?

_____ , _____

5?

_____ , _____

6?

_____ , _____

7?

_____ , _____

(5b) HP 7905 Disc Only

CONTROLLER CHNL?

_____

TRKS, FIRST CYL #, HEAD, # SURFACES, UNIT, # SPARES FOR SUBCHNL:

00?

_____ , _____ , _____ , _____ , _____ , _____

01?

_____ , _____ , _____ , _____ , _____ , _____

02?

_____ , _____ , _____ , _____ , _____ , _____

03?

_____ , _____ , _____ , _____ , _____ , _____

04?

_____ , _____ , _____ , _____ , _____ , _____

05?

_____ , _____ , _____ , _____ , _____ , _____

06?

_____ , _____ , _____ , _____ , _____ , _____

07?

_____ , _____ , _____ , _____ , _____ , _____

08?

_____ , _____ , _____ , _____ , _____ , _____

09?

_____ , _____ , _____ , _____ , _____ , _____

10?

_____ , _____ , _____ , _____ , _____ , _____

11?

_____ , _____ , _____ , _____ , _____ , _____

12?

_____ , _____ , _____ , _____ , _____ , _____

13?

_____ , _____ , _____ , _____ , _____ , _____

14?

_____ , _____ , _____ , _____ , _____ , _____

(5b) HP 7905 Disc Only (Continued)

15?

_____ , _____ , _____ , _____ , _____ , _____

16?

_____ , _____ , _____ , _____ , _____ , _____

17?

_____ , _____ , _____ , _____ , _____ , _____

18?

_____ , _____ , _____ , _____ , _____ , _____

19?

_____ , _____ , _____ , _____ , _____ , _____

20?

_____ , _____ , _____ , _____ , _____ , _____

21?

_____ , _____ , _____ , _____ , _____ , _____

22?

_____ , _____ , _____ , _____ , _____ , _____

23?

_____ , _____ , _____ , _____ , _____ , _____

24?

_____ , _____ , _____ , _____ , _____ , _____

25?

_____ , _____ , _____ , _____ , _____ , _____

26?

_____ , _____ , _____ , _____ , _____ , _____

27?

_____ , _____ , _____ , _____ , _____ , _____

28?

_____ , _____ , _____ , _____ , _____ , _____

29?

_____ , _____ , _____ , _____ , _____ , _____

30?

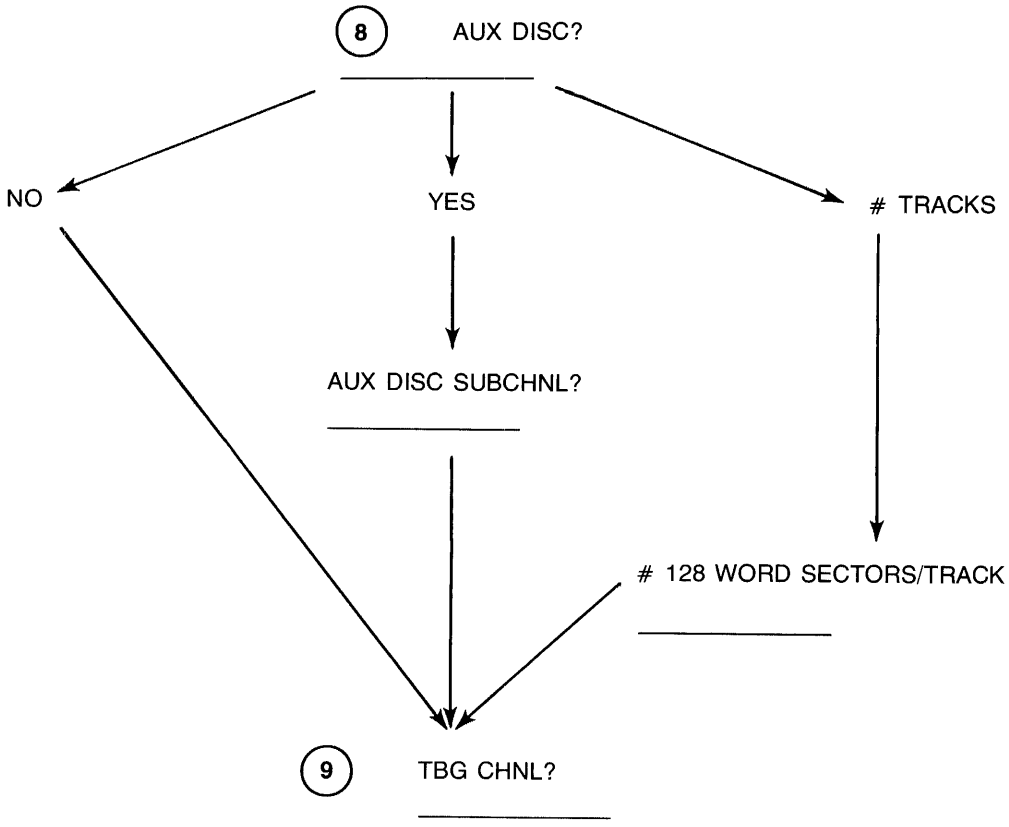
_____ , _____ , _____ , _____ , _____ , _____

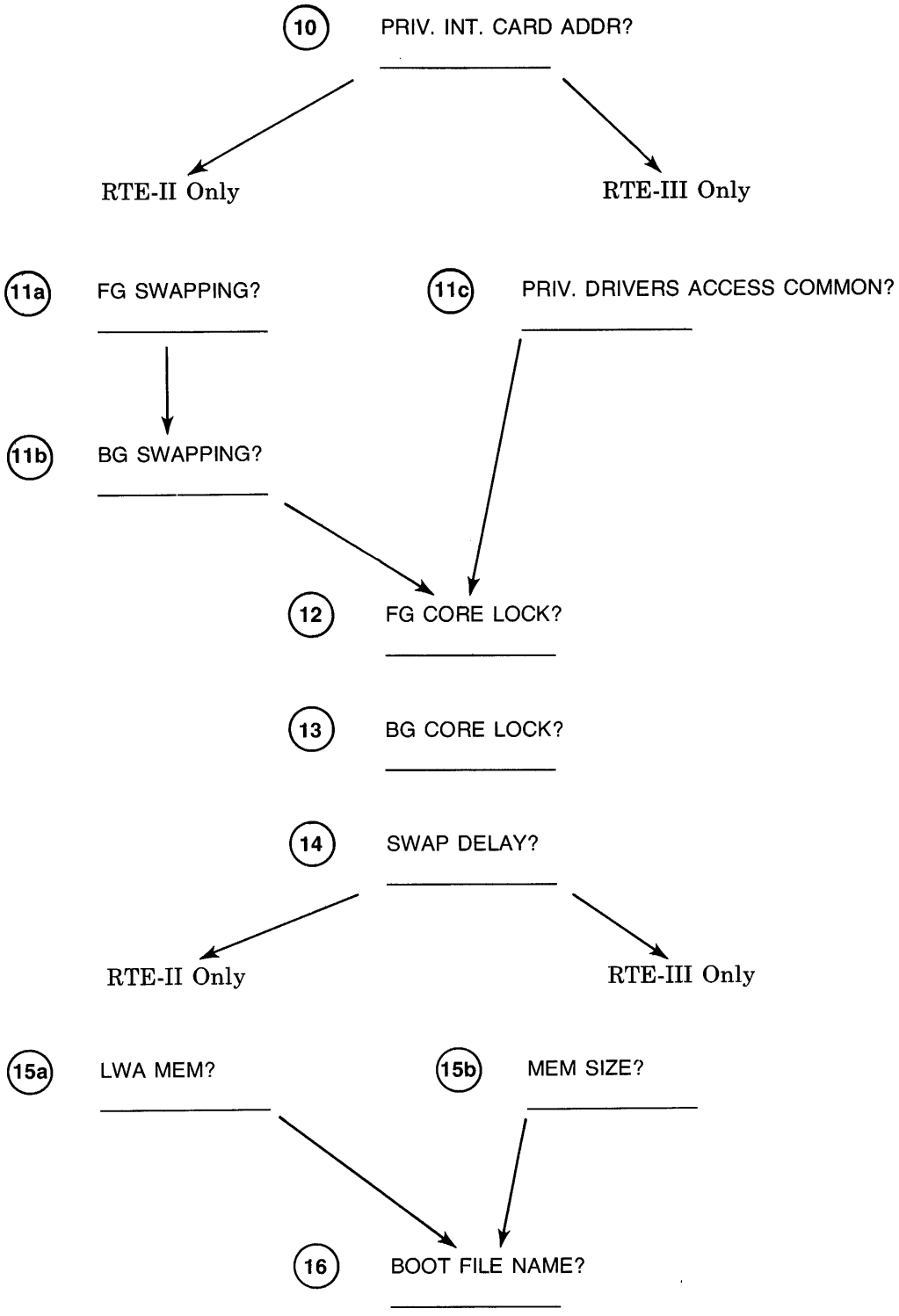
31?

_____ , _____ , _____ , _____ , _____ , _____

(6) # 128 WORD SECTORS/TRACK

(7) SYSTEM SUBCHNL?




10
PRIV. INT. CARD ADDR?
RTE-II Only
RTE-III Only
11a
FG SWAPPING?
11c
PRIV. DRIVERS ACCESS COMMON?
11b
BG SWAPPING?
12
FG CORE LOCK?
13
BG CORE LOCK?
14
SWAP DELAY?
RTE-II Only
RTE-III Only
15a
LWA MEM?
15b
MEM SIZE?
16
BOOT FILE NAME?

(17a) Enter mapping options using the MAP command. This command may be re-entered at any time during this phase to change mapping options.

(17b) Enter linkage control options using the LINKS IN command. The LINKS IN command may be re-entered at any time during this phase to change linkage options.

(17c) Enter the RELOCATE commands (with optional MAP, LINKS IN, and DISPLAY commands).

REL ____________ , ____________
REL ____________ , ____________
REL ____________ , ____________
REL ____________ , ____________
REL ____________ , ____________
REL ____________ , ____________
REL ____________ , ____________
REL ____________ , ____________
REL ____________ , ____________
REL ____________ , ____________
REL ____________ , ____________
REL ____________ , ____________
REL ____________ , ____________
REL ____________ , ____________
REL ____________ , ____________
REL ____________ , ____________
REL ____________ , ____________
REL ____________ , ____________
REL ____________ , ____________
REL ____________ , ____________
REL ____________ , ____________
REL ____________ , ____________
REL ____________ , ____________
REL ____________ , ____________
REL ____________ , ____________
REL ____________ , ____________
REL ____________ , ____________
REL ____________ , ____________
REL ____________ , ____________
REL ____________ , ____________
REL ____________ , ____________
REL ____________ , ____________
REL ____________ , ____________
REL ____________ , ____________
REL ____________ , ____________
REL ____________ , ____________
REL ____________ , ____________
REL ____________ , ____________
REL ____________ , ____________
REL ____________ , ____________
REL ____________ , ____________
REL ____________ , ____________
REL ____________ , ____________

REL ____________ , ____________
REL ____________ , ____________
REL ____________ , ____________
REL ____________ , ____________
REL ____________ , ____________
REL ____________ , ____________
REL ____________ , ____________
REL ____________ , ____________
REL ____________ , ____________
REL ____________ , ____________
REL ____________ , ____________
REL ____________ , ____________
REL ____________ , ____________
REL ____________ , ____________
REL ____________ , ____________
REL ____________ , ____________
REL ____________ , ____________
REL ____________ , ____________
REL ____________ , ____________
REL ____________ , ____________
REL ____________ , ____________
REL ____________ , ____________
REL ____________ , ____________
REL ____________ , ____________
REL ____________ , ____________
REL ____________ , ____________
REL ____________ , ____________
REL ____________ , ____________
REL ____________ , ____________
REL ____________ , ____________
REL ____________ , ____________
REL ____________ , ____________
REL ____________ , ____________
REL ____________ , ____________
REL ____________ , ____________
REL ____________ , ____________
REL ____________ , ____________
REL ____________ , ____________
REL ____________ , ____________
REL ____________ , ____________
REL ____________ , ____________
REL ____________ , ____________
REL ____________ , ____________

(17d) Enter DISPLAY command options, to obtain symbol table information, if necessary.

(17e) Enter /E to terminate this phase.

(18) PARAMETERS

(19) CHANGE ENTS?

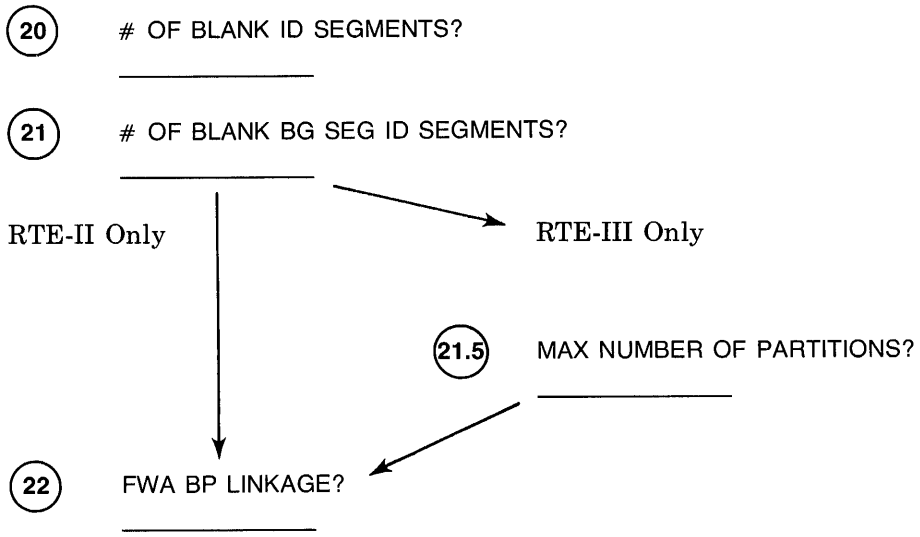


Table Generation Phase

23 *# OF I/O CLASSES?

24 *# OF LU MAPPINGS?

25 *# OF RESOURCE NUMBERS?

26 *BUFFER LIMITS (LOW,HIGH)

_____ , _____

(27) *EQUIPMENT TABLE ENTRY

EQT 01?

_____ , _____ , _____ , _____ , _____ , _____

EQT 02?

_____ , _____ , _____ , _____ , _____ , _____

EQT 03?

_____ , _____ , _____ , _____ , _____ , _____

EQT 04?

_____ , _____ , _____ , _____ , _____ , _____

EQT 05?

_____ , _____ , _____ , _____ , _____ , _____

EQT 06?

_____ , _____ , _____ , _____ , _____ , _____

EQT 07?

_____ , _____ , _____ , _____ , _____ , _____

EQT 08?

_____ , _____ , _____ , _____ , _____ , _____

EQT 09?

_____ , _____ , _____ , _____ , _____ , _____

EQT 10?

_____ , _____ , _____ , _____ , _____ , _____

EQT 11?

_____ , _____ , _____ , _____ , _____ , _____

EQT 12?

_____ , _____ , _____ , _____ , _____ , _____

EQT 13?

_____ , _____ , _____ , _____ , _____ , _____

EQT 14?

_____ , _____ , _____ , _____ , _____ , _____

EQT 15?

_____ , _____ , _____ , _____ , _____ , _____

EQT 16?

_____ , _____ , _____ , _____ , _____ , _____

EQT 17?

_____ , _____ , _____ , _____ , _____ , _____

EQT 18?

_____ , _____ , _____ , _____ , _____ , _____

EQT 19?

_____ , _____ , _____ , _____ , _____ , _____

EQT 20?

_____ , _____ , _____ , _____ , _____ , _____

EQT 21?

_____ , _____ , _____ , _____ , _____ , _____

EQT 22?

_____ , _____ , _____ , _____ , _____ , _____

EQT 23?

_____ , _____ , _____ , _____ , _____ , _____

EQT 24?

_____ , _____ , _____ , _____ , _____ , _____

EQT 25?

_____ , _____ , _____ , _____ , _____ , _____

EQT 26?

_____ , _____ , _____ , _____ , _____ , _____

EQT 27?

_____ , _____ , _____ , _____ , _____ , _____

EQT 28?

_____ , _____ , _____ , _____ , _____ , _____

EQT 29?

_____ , _____ , _____ , _____ , _____ , _____

EQT 30?

_____ , _____ , _____ , _____ , _____ , _____

EQT 31?

_____ , _____ , _____ , _____ , _____ , _____

EQT 32?

_____ , _____ , _____ , _____ , _____ , _____

EQT 33?

_____ , _____ , _____ , _____ , _____ , _____

EQT 34?

_____ , _____ , _____ , _____ , _____ , _____

EQT 35?

_____ , _____ , _____ , _____ , _____ , _____

EQT 36?

_____ , _____ , _____ , _____ , _____ , _____

EQT 37?

_____ , _____ , _____ , _____ , _____ , _____

EQT 38?

_____ , _____ , _____ , _____ , _____ , _____

EQT 39?

_____ , _____ , _____ , _____ , _____ , _____

EQT 40?

_____ , _____ , _____ , _____ , _____ , _____

EQT 41?

_____ , _____ , _____ , _____ , _____ , _____

EQT 42?

_____ , _____ , _____ , _____ , _____ , _____

EQT 43?

_____ , _____ , _____ , _____ , _____ , _____

EQT 44?

_____ , _____ , _____ , _____ , _____ , _____

EQT 45?

_____ , _____ , _____ , _____ , _____ , _____

EQT 46?

_____ , _____ , _____ , _____ , _____ , _____

EQT 47?

_____ , _____ , _____ , _____ , _____ , _____

EQT 48?

_____ , _____ , _____ , _____ , _____ , _____

EQT 49?

_____ , _____ , _____ , _____ , _____ , _____

EQT 50?

_____ , _____ , _____ , _____ , _____ , _____

EQT 51?

_____ , _____ , _____ , _____ , _____ , _____

EQT 52?

_____ , _____ , _____ , _____ , _____ , _____

EQT 53?

_____ , _____ , _____ , _____ , _____ , _____

EQT 54?

_____ , _____ , _____ , _____ , _____ , _____

EQT 55?

_____ , _____ , _____ , _____ , _____ , _____

EQT 56?

_____ , _____ , _____ , _____ , _____ , _____

EQT 57?

_____ , _____ , _____ , _____ , _____ , _____

EQT 58?

_____ , _____ , _____ , _____ , _____ , _____

EQT 59?

_____ , _____ , _____ , _____ , _____ , _____

EQT 60?

_____ , _____ , _____ , _____ , _____ , _____

EQT 61?

_____ , _____ , _____ , _____ , _____ , _____

EQT 62?

_____ , _____ , _____ , _____ , _____ , _____

EQT 63?

_____ , _____ , _____ , _____ , _____ , _____

(28) *DEVICE REFERENCE TABLE

1 = EQT #?
_____ , _____

2 = EQT #?
_____ , _____

3 = EQT #?
_____ , _____

4 = EQT #?
_____ , _____

5 = EQT #?
_____ , _____

6 = EQT #?
_____ , _____

7 = EQT #?
_____ , _____

8 = EQT #?
_____ , _____

9 = EQT #?
_____ , _____

10 = EQT #?
_____ , _____

11 = EQT #?
_____ , _____

12 = EQT #?
_____ , _____

13 = EQT #?
_____ , _____

14 = EQT #?
_____ , _____

15 = EQT #?
_____ , _____

16 = EQT #?
_____ , _____

17 = EQT #?
_____ , _____

18 = EQT #?
_____ , _____

19 = EQT #?
_____ , _____

20 = EQT #?
_____ , _____

21 = EQT #?
_____ , _____

22 = EQT #?
_____ , _____

23 = EQT #?
_____ , _____

24 = EQT #?
_____ , _____

25 = EQT #?
_____ , _____

26 = EQT #?
_____ , _____

27 = EQT #?
_____ , _____

28 = EQT #?
_____ , _____

29 = EQT #?
_____ , _____

30 = EQT #?
_____ , _____

31 = EQT #?
_____ , _____

32 = EQT #?
_____ , _____

33 = EQT #?
_____ , _____

34 = EQT #?
_____ , _____

35 = EQT #?

_____ , _____

36 = EQT #?

_____ , _____

37 = EQT #?

_____ , _____

38 = EQT #?

_____ , _____

39 = EQT #?

_____ , _____

40 = EQT #?

_____ , _____

41 = EQT #?

_____ , _____

42 = EQT #?

_____ , _____

43 = EQT #?

_____ , _____

44 = EQT #?

_____ , _____

45 = EQT #?

_____ , _____

46 = EQT #?

_____ , _____

47 = EQT #?

_____ , _____

48 = EQT #?

_____ , _____

49 = EQT #?

_____ , _____

50 = EQT #?

_____ , _____

51 = EQT #?

_____ , _____

52 = EQT #?

_____ , _____

53 = EQT #?

_____ , _____

54 = EQT #?

_____ , _____

55 = EQT #?

_____ , _____

56 = EQT #?

_____ , _____

57 = EQT #?

_____ , _____

58 = EQT #?

_____ , _____

59 = EQT #?

_____ , _____

60 = EQT #?

_____ , _____

61 = EQT #?

_____ , _____

62 = EQT #?

_____ , _____

63 = EQT #?

_____ , _____

29 *INTERRUPT TABLE

4 , ENT , $POWR

System Boundaries Phase

(30a) LIB ADDRS *xxxxx*
CHANGE LIB ADDRS?

_____

(30b) FG COMMON *xxxxx*
CHANGE FG COMMON?

_____

(30c) FG RES ADD *xxxxx*
CHANGE FG RES ADD?

_____

BG BOUNDRY *xxxxx*
CHANGE BG BOUNDRY?

_____

(30d) FG DSC ADD *xxxxx*
CHANGE FG DSC ADD?

_____

(30e) BP LINKAGE *xxxxx*
CHANGE BP LINKAGE?

_____

(30f) SYS AV MEM *xxxxx*
CHANGE SYS AV MEM?

_____

(30g) BG BOUNDRY *xxxxx*
CHANGE BG BOUNDRY?

_____

(30h) BG COMMON *xxxxx*
CHANGE BG COMMON?

_____

(30i) BG RES ADD *xxxxx*
CHANGE BG RES ADD?

_____

(30j) BG DSC ADD *xxxxx*
CHANGE BG DSC ADD?

_____

(30k) SYSTEM STORED ON DISC
SYS SIZE: *tt* TRKS, *sss* SECS(10)

RT2GN FINISHED

RTE-III SYSTEM GENERATION ONLY

Partition Definition Phase

(31a) RT COMMON *xxxxx*
CHANGE RT COMMON?

_____

RT COM *xxxxx*

(31b) BG COMMON *xxxxx*
CHANGE BG COMMON?

_____

BG COM *xxxxx*

(31c) LWA BG COMMON *xxxxx*
ALIGN AT NEXT PAGE?

_____

LWA BG COMMON *xxxxx*

(31d) LWA MEM RESIDENT PROG AREA *xxxxx*
ALIGN AT NEXT PAGE?

_____

LWA MEM RESIDENT PROG AREA *xxxxx*

(31e) SYS AV MEM: *xxxxx* WORDS

(31f) 1ST DSK PG *xxxxx*
CHANGE 1ST DSK PG?

_____

(31g) SYS AV MEM: *xxxxx* WORDS
PAGES REMAINING: *xxxxx*

(31h) DEFINE PARTITIONS

_____ , _____ , _____ , _____

_____ , _____ , _____ , _____

_____ , _____ , _____ , _____

_____ , _____ , _____ , _____

_____ , _____ , _____ , _____

_____ , _____ , _____ , _____

_____ , _____ , _____ , _____

_____ , _____ , _____ , _____

_____ , _____ , _____ , _____

_____ , _____ , _____ , _____

_____ , _____ , _____ , _____

_____ , _____ , _____ , _____

_____ , _____ , _____ , _____

_____ , _____ , _____ , _____

_____ , _____ , _____ , _____

RTE-III SYSTEM GENERATION ONLY

Partition Definition Phase (Continued)

(31i) MODIFY PROGRAM PAGE REQUIREMENTS?

EDITR , _____
ASMB , _____
XREF , _____
LOADR , _____
FTN4 , _____
RT3GN , _____
ALGOL , _____
_____ , _____
_____ , _____
_____ , _____
_____ , _____
_____ , _____
_____ , _____
_____ , _____
_____ , _____

(31j) ASSIGN PROGRAM PARTITIONS?

_____ , _____
_____ , _____
_____ , _____
_____ , _____
_____ , _____
_____ , _____
_____ , _____
_____ , _____
_____ , _____
_____ , _____
_____ , _____
_____ , _____
_____ , _____
_____ , _____
_____ , _____
_____ , _____

(31k) SYSTEM STORED ON DISC
SYS SIZE: *tt* TRKS, *sss* SECS(10)

RT3GN FINISHED

SYSTEM GENERATION

SECTION IV

The ON-Line Generator executes in the minimum software environment defined for either RTE-II or RTE-III in Section I.

This section provides directions on running the RTE On-Line Generator program to configure your RTE system. The operation of the generator is presented for RTE-II and RTE-III system generation.

It is assumed that you have planned your configuration and prepared your responses to generator queries with the aid of the instructions and worksheets contained in Sections II and III. Most of the responses required during generation will be taken directly from your worksheets.

4-1. RESPONSES AND COMMENTS

Normal responses are entered as a line, followed by a carriage return. Whenever a response is expected, one or more comments may be entered followed by the response line. A comment begins with an asterisk (*) and terminates with a carriage return. A comment may also follow a response on the same line. Restrictions in the use of comments are given in Section III. Comments are useful for documentation purposes and when transferring response input from the console to an answer file.

4-2. MULTIPLE TERMINAL OPERATION

The RTE Multiple Terminal Monitor (MTM) allows more than one user to access the RTE system at the same time from different terminals. Each terminal is associated with a unique logical unit number. The terminal associated with logical unit number 1 is called the system console. Terminals associated with any other logical unit number are called operator consoles. The RTE system prompt at the system console is an asterisk (*). The system prompt at an operator console is the logical unit number of the operator console followed by the "greater than" symbol (>).

If you execute the On-Line Generator under control of the File Manager program, the FMGR prompt at all consoles is the colon character (:).

When you enter the system or FMGR command, RU, to execute the generator, you must be aware of the following:

- The command message processor places the logical unit number of your console into parameter 1 if you did not enter it. Thus, if you do not specify a file name or logical unit in the RU command entry, the logical unit number of your console is obtained from parameter 1.

  If you specify a file name, the system console (logical unit 1) is assumed.

- For input expected from an interactive device, the appropriate logical unit number is obtained from parameter 1. If an error condition is encountered, resulting messages are sent to the console identified by the logical unit number in parameter 1. In addition, control is transferred to that console.

- If input, as specified by the RU command parameters, is from a non-interactive device (such as a disc file) and an error condition is encountered, resulting messages are sent to the system console and control is transferred to the system console.

For detailed information about the Multiple Terminal Monitor, refer to the *RTE-II* or *RTE-III Software System Programming and Operating Manual.*

4-3. ERROR HANDLING

Error conditions encountered during on-line system generation result in two types of numbered error messages.

1. File reference errors result in an FMP error code, in the form:

   FMP ERR–*nn*

   where $-nn$ is a negative decimal number equivalent to the FMP error codes defined in the *HP Batch-Spool Monitor Reference Manual.* An FMP error may result from incorrect references to the list file, absolute output file, answer file, bootstrap file, or a file specified in a RELOCATE command.

2. An error condition encountered by the On-Line Generator results in a generator error code, in the form:

   GEN ERR *nn*

   where *nn* is a positive decimal number.

Messages which apply to a specific phase of generation are listed at the end of the description for that phase within Section III. General error messages (those that might result during any phase of generation) are listed at the end of Section III. All of the numbered error messages are summarized in Appendix B.

Note that after most errors, control is transferred to the appropriate console for action on your part (see Multiple Terminal Operation).

When an error occurs on the list file during generation — such as the inability to create an extent due to lack of subchannel disc space — the proper FMP ERR is reported as well as a GEN ERR 22. In this case, the generator prompts the operator with an:

OK TO CONTINUE?

A NO response will terminate the generation. On a YES response the generation will proceed with the listed output going to the operator console only. Note that a TR need not be done, even if command input was being received from an answer file or LU.

The following messages are unnumbered. The generator is suspended when conditions are encountered that result in these unnumbered messages:

GENERATOR WAITING FOR TRACKS

This message is displayed when the generator cannot obtain the necessary scratch tracks. Operation continues when tracks become available.

GENERATOR WAITING ON LIST LU LOCK

This message is displayed when the generator attempts a logical unit lock of the list file (only if the list device is non-interactive). Operation continues when the logical unit lock can be accomplished.

4-4. NUMBER SYSTEMS

The On-Line Generator uses octal numbers when listing word addresses (including interrupt trap cell locations and device select codes). Your responses which specify word addresses must be entered in octal notation. All other quantities, including page references are expressed in decimal notation.

4-5. GENERATOR SCRATCH FILE

The generator creates a temporary scratch file named either @.NM.@ for RT2GN, or @.MN.@ for RT3GN that it used for storing the modified NAM records of either compiled programs or those having their priority/execution interval changed during the Parameter Input Phase. Do not use a file with this name because the generator will purge it from the system and create a new one.

The generator automatically purges this file during clean-up operations before generator program termination.

4-6. EXECUTING THE ON-LINE GENERATOR

You execute the RTE On-Line Generator program using either the system or FMGR command, RU. Specify either RT2GN or RT3GN depending on which operating system you intend to generate. You can provide an answer file (disc transfer file or logical unit) which contains the information required by the generator or you can provide this information yourself, interactively, via the operator console.

The syntax of the RU command used to execute the RTE On-Line Generator is:

```
:RU  { ,RT2GN }  { ,fi,le,nm [,sc[,cr]] }
     { ,RT3GN }  { ,lu                  }
```

where:

fi,le,nm is the name of a file that contains a generation answer file.

sc is the security code of the file.

cr is the cartridge reference number for the file.

lu is the logical unit number of the input device (for example, a paper tape reader) prepared to enter a generation answer file.

If no input parameters are specified, the generator assumes the interactive mode and displays prompt messages on your console. You respond to these messages by entering information to direct the generator.

Example:

```
:RU,RT2GN
```

When you enter the RU command in this form, the RTE-II On-Line Generator program is scheduled for execution in the interactive mode.

```
:RU,RT2GN,AN,SF,IL,-1
```

When you enter the RU command in this form, the RTE-II On-Line Generator program is scheduled. Generator responses are supplied to RT2GN from a disc answer file named ANSFIL. A security code, −1, is specified.

```
:RU,RT3GN,5
```

When you enter this form of the RU command, the RTE-III On-Line Generator program is scheduled. Generator responses are supplied from paper tape (logical unit 5).

4-7. SAMPLE GENERATIONS

The following pages discuss actual RTE System generations in a step-by-step procedure. Sample worksheets, prepared for these RTE System generations are included in Appendix C. Sample answer file formats for the generations are given in Appendix D, and the listed output, or printout, produced during the generation process is included in Appendix E.

4-8. RTE-II SYSTEM GENERATION EXAMPLE

Following entry of the RU command, RT2GN execution begins. In this example, assume the interactive mode. The generator queries are shown followed by the user's response. Note that in this example, the user's responses are shown in a bold typeface to distinguish them from the generator prompts.

4-9. INITIALIZATION PHASE. When execution begins, the generator requests the name of the list file, or the logical unit number of the device which will receive the listed output from the generator. In this case, logical unit 6 (line printer) is specified:

```
LIST FILE NAME?
6
```

The generator asks if the listed output is to be echoed to the operator console:

```
ECHO?
YES
```

The generator requests the estimated number of tracks required to contain the file produced by this generation:

```
EST. # OF TRACKS IN OUTPUT FILE?
35
```

Next, the generator requests a name for the output file:

```
OUTPUT FILE NAME?
RTEII,,2
```

The generator requests the type of disc on the system for which this generation is produced (the target system):

```
TARGET DISK?
7900
```

The generator requests the higher priority select code (octal) of the system disc controller:

```
MH DISC CHNL?
21
```

The generator requests the number of tracks and the starting track (decimal) of each subchannel that will be assigned to the system. Up to eight track assignments can be entered, one for each existing subchannel. The even numbered subchannels are the fixed platters and the odd numbered subchannels are the removable platters (that is, subchannel 0 is the fixed platter and subchannel 1 is the removable platter of the first disc drive). The generator begins it's prompting with subchannel 0 and continues to request track assignments for each subchannel up to 7 or until terminated by the entry of a slash character followed by the character E (/E). The example given in Appendix C is entered as follows:

```
# TRKS, FIRST TRK ON SUBCHNL?
  0?
203,0

  1?
203,0

  2?
203,0

  3?
203,0

  4?
203,0

  5?
203,0

  6?
203,0

  7?
203,0
```

The next prompt asks for the number (decimal) of 128-word sectors per logical track on the system disc:

```
# 128 WORD SECTORS/TRACK?
48
```

The next request is for the subchannel number of the system disc (logical unit number 2). This is the disc on which the absolute code will be stored when the new system is transferred (see Section V). The response can be any one of the subchannel numbers assigned in the previous step. In this example, it is zero:

```
SYSTEM SUBCHNL?
0
```

The generator asks if there is to be an auxiliary disc (logical unit number 3). You may respond YES, NO, or a decimal value indicating the number of tracks to be allocated to the auxiliary disc. A YES response indicates that the auxiliary disc is on the same disc drive as the system disc. A NO response indicates that there is no auxiliary disc. A track count response indicates that the auxiliary disc is to consist of that number of tracks on a disc drive other than the one supporting the system disc. Further requests will be made for sectors per logical track and the subchannel number information. For this generation:

```
AUX DISC (YES OR NO OR # OF TRKS)?
YES
```

Then, the generator asks for the auxiliary disc subchannel:

```
AUX DISC SUBCHNL?
1
```

Next, the generator requests the octal select code for the Time Base Generator:

```
TBG CHNL?
13
```

The next prompt asks for the octal select code for the Privileged Interrupt I/O card. In this case, there is no card:

```
PRIV. INT. CARD ADDR?
0
```

The generator asks if swapping is to be allowed in the foreground area and then asks if it is to be allowed in the background area:

```
FG SWAPPING?
YES

BG SWAPPING?
YES
```

Next, the generator asks if any program is allowed to be locked into the foreground area and into the background area:

```
FG CORE LOCK?
YES

BG CORE LOCK?
YES
```

Next, the amount of swap delay time is requested. This requires entry of a decimal value representing tens of milliseconds in the range 0 through 255. In this case:

```
SWAP DELAY?
50
```

The generator requests the memory size (the address of the last word of available main memory) of the system to be generated:

```
LWA MEM?
77677
```

The last prompt in this phase requests the name of the file, or the logical unit number of the device which will receive the bootstrap loader:

```
BOOT FILE NAME?
RT2BOT,,2
```

4-10. PROGRAM INPUT PHASE. During this phase, the generator accepts commands that direct it to the files containing the relocatable modules to be included in the new system. The generator issues a heading which announces the beginning of this phase. The heading is followed by a hyphen character (-) to prompt the entry of an operator command. The hyphen prompt is repeated after acceptance of each command until you enter /E to terminate the Program Input Phase. For this example, the entries appear as follows:

```
PROGRAM INPUT PHASE <-------- Introductory heading
- <-------------------------- Command prompt
LINKS IN CURRENT
-
MAP ALL
-
REL,%CR2SY,,19
-
REL,%$CMD2,,19              } On-Line Generator commands
-
  .                           (see the RT2GN listed output in Appendix
  .                           E for a complete list of command entries)
  .
-
REL,%DBKLB,,19
/E <-------------------------- Terminate this phase
NO UNDEFS <------------------- Generator message; no undefined refer-
                               ences exist
```

CAUTION

The value of all undefined externals will be set to zero. Results are unpredictable if programs loaded during generation or on-line via the Relocating Loader (LOADR) reference these externals.

4-11. PARAMETER INPUT PHASE. During this phase, you can modify the program type, priority, or execution interval, or you can modify the ENT record for any of the programs entered during the Program Input Phase. The generator displays the appropriate heading after which you enter your changes. The heading is followed by a hyphen character (-) to prompt the entry of the parameter modifications. The hyphen prompt is repeated after acceptance of each command until you enter /E to terminate the parameter entry list.

First, the generator requests any parameter changes:

```
PARAMETERS <-------- Introductory heading
- <-------------------- Command prompt
D.RTR,1,1
-
WHZAT,2,1
-
SYSON,82
-
ASMB,3,95
-
XREF,3,96
-
LOADR,3,97          Parameter changes
-
EDITR,3,50
-
AUTOR,3,1
-
PRMPT,2
-
SPOUT,2
-
R$PN$,2,50
-
/E <-------------------- Terminate this list
```

Next, the generator asks if there are any entry (ENT) records you wish to change:

```
CHANGE ENTS? <-------- Introductory heading
- <-------------------- Command prompt
.MPY,RP,100200
-
.DIV,RP,100400
-
.DLD,RP,104200
-
.DST,RP,104400
-
.FAD,RP,105000
-                      ENT record changes
.FSB,RP,105020
-
.FMP,RP,105040
-
.FDV,RP,105060
-
IFIX,RP,105100
-
FLOAT,RP,105120
-
/E <------------------- Terminate this phase
```

Now, the generator asks that you enter the number of standard (28-word) ID segments to be allocated in the memory resident table area for on-line program loading:

```
# OF BLANK ID SEGMENTS?
10
```

Then, the generator asks you to enter the number of short (9-word) ID segments to be allocated in the memory resident table area for on-line background segment loading:

```
# OF BLANK BG SEG. ID SEGMENTS?
20
```

Next, the generator requests the address of the first word of available memory in the system base page:

```
FWA BP LINKAGE?
72
```

At this point, the heading, SYSTEM, is displayed and the generator loads the system modules. Depending on your MAP command entries during the Program Input Phase, the heading may be followed by memory mapping and linkage information. The modules are relocated in the linkage mode specified during the Program Input Phase by the LINKS IN command entries. See the RT2GN listed output in Appendix E for the map produced for this generation example.

4-12. TABLE GENERATION PHASE. After the system modules are loaded, the generator asks you to enter the number of Class I/O numbers to be allocated:

```
*# OF I/O CLASSES?
12
```

The generator then asks you for the maximum number of LU commands (+ 2) you will allow to be referenced in a single job within the Batch-Spool Monitor:

```
*# OF LU MAPPINGS?
12
```

Next, the generator requests the number of Resource Numbers you will allow to be allocated:

```
*# OF RESOURCE NUMBERS?
12
```

Your response to the next question determines the upper and lower limits (in words) for I/O buffering:

```
BUFFER LIMITS (LOW,HIGH)?
100,400
```

The generator displays a heading to open up the equipment table entry portion of this phase. The heading is followed by a prompt asking for the first entry. This prompt is incremented and re-issued following each of your entries until you terminate the entry list with /E:

```
* EQUIPMENT TABLE ENTRY
EQT 01?
21,DVR31,D

EQT 02?
15,DVR00,B
  •
  •
  •
EQT 28?
4,DVP43

EQT 29?
/E
```

(see the RT2GN listed output in Appendix E for a complete list of EQT entries)

The next table is the device reference table which determines logical unit number assignments. The generator displays an introductory heading followed by a prompt for the equipment table entry number (and optional subchannel specifications) to be associated with logical unit number 1. This prompt is incremented and re-issued for each logical unit number until you terminate the entry list with /E. For this example:

```
* DEVICE REFERENCE TABLE
 1 = EQT #?
2,0
 2 = EQT #?
1,0
  .                          (see the RT2GN listed output in Appendix
  .                          E for a complete list of entries)
  .

 61 = EQT #?
28,0
 62 = EQT #?
/E
```

The final portion of this phase asks you for the interrupt table entries for each I/O card. The generator displays an introductory heading after which you enter the interrupt table information. The heading is followed by a hyphen character (-) to prompt the interrupt table entries. Except for I/O location 4 (The Power Fail card), the table entries must be in ascending order. The interrupt table entry list is terminated with /E.

```
*INTERRUPT TABLE
—
4,ENT,$POWR
—
14,EQT,3
—
15,PRG,PRMPT
—
.                            (see the RT2GN listed output in Appendix
.                            E for a complete list of entries)
.
—
66,PRG,PRMPT
—
67,PRG,PRMPT
—
/E
```

4-13. SYSTEM BOUNDARIES PHASE. When you have completed the entry of the interrupt table, the generator reports the current first available word in the system base page:

```
BP LINKAGE 00370
```

Next, the starting address of the system library is reported and the generator asks if you want to change it:

```
LIB ADDRS 34137
CHANGE LIB ADDRS?
36000
```

The generator prints a list of library routine names followed by a report of the current first available word in the system base page:

```
BP LINKAGE 00372
```

Next, the generator reports the total number of words allocated to foreground common and asks if you want to change this value:

```
FG COMMON 00000
CHANGE FG COMMON?
0
```

The next report is the starting address of the foreground memory resident program area. Then, you are asked if you want to change this address:

```
FG RES ADD 36103
CHANGE FG RES ADD?
0
```

Now, the generator lists foreground memory resident program information followed by a report of the current first available word in the system base page:

```
BP LINKAGE 00402
```

The generator reports the starting address of the foreground disc resident area and asks if you want to change this address:

```
FG DSC ADD 40415
CHANGE FG DSC ADD?
42000
```

The foreground disc resident programs are loaded, and a report of the current first available word in the system base page is reported. The generator asks if you want to increase the size of the foreground disc resident program base page linkage area, allowing for future additions of larger foreground disc resident programs on-line using the RTE On-Line Loader (LOADR):

```
BP LINKAGE 00441
CHANGE BP LINKAGE?
720
```

Next, the first word address of the system available memory area is reported. Increasing this number allows more memory space for on-line additions using LOADR. You are asked if you want to change this address:

```
SYS AVMEM 47652
CHANG SYS AVMEM?
0
```

The next report is the starting address of the background program area. You are asked if you want to change this address:

```
BG BOUNDRY 47652
CHANGE BG BOUNDRY?
50000
```

The size (in words) of the background common area is reported and you are asked if you want to change this value:

```
BG COMMON 00000
CHANGE BG COMMON?
0
```

The generator reports the starting address of the background memory resident area and asks if you want to change this address:

```
BG RES ADD 50000
CHANGE BG RES ADD?
0
```

The generator displays a heading, BG RESIDENTS. In this example, this heading is followed by the report (NONE) because there are no background memory resident programs to load.

Next, the generator reports the starting address of the background disc resident area and asks if you want to change this address:

```
BG DSC ADD 50000
CHANGE BG DSC ADD?
0
```

The generator displays the heading, BG DISC RESIDENTS, loads the appropriate programs and reports program names, entry points, and linkage information.

When this report is completed, the generator reports the number of base page links used:

```
BP LINKAGE 1557
```

The final generator report is that your system is stored on disc. This is followed by the system size in tracks and sectors (in decimal) and a completion message:

```
SYSTEM STORED ON DISC
SYS SIZE: 34 TRKS, 009 SECS(10)

RT2GN FINISHED
```

4-14. RTE-III SYSTEM GENERATION EXAMPLE

Following entry of the RU command, RT3GN execution begins. In this example, assume the interactive mode. The generator queries are shown followed by the user's responses. Note that in this example, the user's responses are shown in a bold typeface to distinguish them from the generator prompts.

4-15. INITIALIZATION PHASE. When execution begins, the generator requests the name of the list file, or the logical unit number of the device which will receive the listed output from the generator. In this case, logical unit number 6 (line printer) is specified:

```
LIST FILE NAME?
6
```

The generator asks if the listed output is to be echoed to the operator console:

```
ECHO?
YES
```

The generator requests the estimated number of tracks required to contain the file produced by this generation:

```
EST. # OF TRACKS IN OUTPUT FILE?
35
```

Next, the generator requests a name for the output file:

```
OUTPUT FILE NAME?
RTEIII,,2
```

The generator requests the type of disc on the system for which this generation is produced (target system):

```
TARGET DISK?
7905
```

The generator requests the select code (octal) of the system disc controller:

```
CONTROLLER CHNL?
27
```

The generator requests the number of tracks, starting cylinder number, starting head number, number of surfaces, unit number, and number of spare tracks (all decimal) for subchannel 0. Enter these decimal values separated by commas.

The generator will continue to display a subchannel number following each entry up to subchannel 31, or until terminated by the entry of the input data terminator, /E. For this example:

```
# TRKS,FIRST CYL #,HEAD,# SURFACES,UNIT,# SPARES FOR SUBCHANNEL:
  00?
203,0,0,2,0,3
  01?
203,104,0,2,0,3
  02?
400,208,0,2,0,4
  03?
203,0,2,1,0,3
  04?
203,206,2,1,0,2
  05?
203,0,0,2,1,3
  06?
600,104,0,2,1,10
```

```
  07?
203,0,2,1,1,3
  08?
203,206,2,1,1,2
  09?
/E
```

The next prompt asks for the number (decimal) of 128-word sectors per logical track on the system disc:

```
# 128 WORD SECTORS/TRACK?
48
```

The next request is for the subchannel number of the system disc (logical unit number 2). This is the disc on which the absolute code will be stored. The response can be any one of the subchannel numbers assigned to the system. In this case, it is subchannel number 0, as follows:

```
SYSTEM SUBCHNL?
0
```

The generator asks if there is to be an auxiliary disc (logical unit number 3). You may respond with YES, NO, or a decimal value indicating the number of tracks to be allocated to the auxiliary disc. A YES response indicates that the auxiliary disc is on the same disc drive as the system disc. A NO response indicates that there is no auxiliary disc. A track count response indicates that the auxiliary disc is to consist of that number of tracks on a disc drive other than the one supporting the system disc. Further requests will be made for sectors per logical track and subchannel number information. For this generation:

```
AUX DISC (YES OR NO OR # OF TRKS)?
YES
```

The generator asks for the auxiliary subchannel number:

```
AUX DISC SUBCHNL?
1
```

Next, the generator requests the octal select code for the Time Base Generator:

```
TBG CHNL?
13
```

The next prompt asks for the octal select code for the Privileged Interrupt I/O card. In this case, there is no card:

```
PRIV. INT. CARD ADDR?
0
```

The generator asks if the common area should be included in the System Map for access by privileged drivers:

```
PRIV. DRIVERS ACCESS COMMON?
NO
```

Next, the generator asks if any program is allowed to be locked into the foreground area and into the background area:

```
FG CORE LOCK?
YES
BG CORE LOCK?
YES
```

Next, the amount of swap delay time is requested. This requires entry of a decimal value representing tens of milliseconds in the range 0 through 255. In this case:

```
SWAP DELAY?
50
```

The generator asks for the physical memory size in pages (decimal):

```
MEM SIZE?
64
```

The last prompt in this phase requests the name of the file, or the logical unit number of the device which will receive the bootstrap loader:

```
BOOT FILE NAME?
RT3BOT,,2
```

4-16. PROGRAM INPUT PHASE. During this phase, the generator accepts commands that direct it to the files containing the relocatable modules to be included in the new system. The generator issues a heading which announces the beginning of this phase. The heading is followed by a hyphen character (-) to prompt the entry of an operator command. The hyphen prompt is repeated after acceptance of each command until you enter /E to terminate the Program Input Phase. For this example, the entries appear as follows:

```
PROGRAM INPUT PHASE <-------- Introductory heading
- <------------------------- Command prompt
LINKS IN CURRENT
-
MAP ALL
-
REL,%CR3SY,,19                On-Line Generator commands
-
REL,%$CMD3,,19                (see the RT3GN listed output in Appendix
-                             E for a complete list of command entries)
 .
 .
 .
-
REL,%DBKLB,,19
-
/E <-------------------------- Terminate this phase
NO UNDEFS <------------------- Generator message; no undefined refer-
                              ences exist
```

CAUTION

The value of all undefined externals will be set to zero. Results are unpredictable if programs loaded during generation or on-line via the Relocating Loader (LOADR) reference these externals.

4-17. PARAMETER INPUT PHASE. During this phase, you can modify the program type, priority, or execution interval, or you can modify the ENT record for any of the programs entered during the previous phase. The generator displays the appropriate heading after which you enter your changes. The heading is followed by a hyphen character (-) to prompt the entry of the parameter changes. The hyphen prompt is repeated after acceptance of each command until you enter /E to terminate the parameter entry list. Terminate the parameter entry lists by entering /E.

First, the generator requests any parameter changes:

```
PARAMETERS <-------------------- Introductory heading
- <---------------------------- Command prompt
D.RTR,1,1
-
WHZAT,2,1
-
SYSON,82
-
ASMB,3,95
-
XREF,3,96
-
LOADR,3,97                      Parameter changes
-
EDITR,3,50
-
AUTOR,3,1
-
SPOUT,2
-
PRMPT,2
-
R$PN$,2,50
-
/E <---------------------------- Terminate this list
```

Next, the generator asks if there are any entry (ENT) records you wish to change:

```
CHANGE ENTS? <-------------------- Introductory heading
- <-------------------------------- Command prompt
.MPY,RP,100200
-
.DIV,RP,100400
-
.DLD,RP,104200
-
.DST,RP,104400
-
.FAD,RP,105000
-
.FSB,RP,105020                     ENT record changes
-
.FMP,RP,105040
-
.FDV,RP,105060
-
IFIX,RP,105100
-
FLOAT,RP,105120
-
.MVW,RP,105777
-
/E <---------------------------------- Terminate this phase
```

Now, the generator asks that you enter the number of standard (28-word) ID segments to be allocated in the memory resident table area for on-line program loading:

```
# OF BLANK ID SEGMENTS?
10
```

Then, the generator asks you to enter the number of short (9-word) ID segments to be allocated in the memory resident table area for on-line background segment loading:

```
# OF BLANK BG SEG. ID SEGMENTS?
20
```

The generator requests that you specify the maximum number of partitions to be defined for this generation:

```
MAX NUMBER OF PARTITIONS?
10
```

Next, the generator requests the address of the first word of available memory in the system base page:

```
FWA BP LINKAGE?
72
```

At this point, the heading, SYSTEM, is displayed and the generator loads the system modules. Depending on your MAP command entries during the Program Input Phase, the heading may be followed by memory mapping and linkage information. The modules are relocated in the linkage mode specified during the Program Input Phase by the LINKS IN command entries.

4-18. TABLE GENERATION PHASE. After the system modules are loaded, the generator asks you to enter the number of Class I/O numbers to be allocated:

```
*# OF I/O CLASSES?
12
```

The generator then asks you for the maximum number of LU commands (+ 2) you will allow to be referenced in a single job within the Batch-Spool Monitor:

```
*# OF LU MAPPINGS?
12
```

Next, the generator requests the number of Resource Numbers you will allow to be allocated:

```
*# OF RESOURCE NUMBERS?
12
```

Your response to the next question determines the lower and upper limits (in words) for I/O buffering:

```
BUFFER LIMITS (LOW,HIGH)?
100,400
```

The generator displays a heading to open up the equipment table entry portion of this phase. The heading is followed by a prompt asking for the first entry. This prompt is re-issued following each of your entries until you terminate the entry list with /E:

```
* EQUIPMENT TABLE ENTRY
EQT 01?
27,DVR32,D
EQT 02?
15,DVR05,B,X=13
  :
  :
```

(see the RT3GN listed output in Appendix E for a complete EQT entry list)

```
EQT 27?
41,DVS43,X=18
EQT 28?
4,DVP43
EQT 29?
/E
```

The next table is the device reference table which determines logical unit number assignments. The generator displays an introductory heading followed by a prompt for the equip-

ment table entry number (and optional subchannel specifications) to be associated with logical unit number 1. This prompt is re-issued for each logical unit number until you terminate the entry list with /E:

```
* DEVICE REFERENCE TABLE
  1 = EQT #?
2,0
  2 = EQT #?
1,0
   .
   .
   .
 61 = EQT #?
28,0
 62 = EQT #?
/E
```

(see the RT3GN listed output in Appendix E for a complete list of entries)

The final portion of this phase asks you for the interrupt table entries for each I/O card. The generator displays an introductory heading after which you enter the interrupt table information. The heading is followed by a hyphen character (-) to prompt the interrupt table entries. Except for I/O location 4 (the Power Fail card), the table entries must be in ascending order. The interrupt table entry list is terminated with /E:

```
*INTERRUPT TABLE
—
4,ENT,4POWR
—
14,EQT,3
—
15,PRG,PRMPT
—
.
.
.
—
67,PRG,PRMPT
—
/E
```

(see the RT3GN listed output in Appendix E for a complete list of entries)

4-19. PROGRAM LOADING PHASE. When you have completed the entry of the interrupt table, the generator reports the current first available word in the system base page:

```
BP LINKAGE 01260
```

The memory resident library and the subsystem global area (SSGA) modules are loaded. Then, the generator reports the size of the real-time common area and asks if you want to change the size:

```
RT COMMON 00000
CHANGE RT COMMON?
0
```

Next, the generator reports the starting address of the real-time common area:

```
RT COM 42640
```

The generator reports the size of the background common area and asks if you want to change the size:

```
BG COMMON 42640
CHANGE BG COMMON?
0
```

Next, the generator reports the starting address of the background common area:

```
BG COM 42640
```

Now, the generator reports the last word address of the common area and asks if you want to align the common area with the next page boundary:

```
LWA BG COMMON 42637
ALIGN AT NEXT PAGE?
YES
LWA BG COMMON 43777
```

Program loading continues. Memory resident programs are loaded followed by real-time disc resident and background disc resident programs. Names, entry points, and linkage information is listed.

4-20. PARTITION DEFINITION PHASE. This phase starts with a list of real-time partition size requirements:

```
RT PARTITION REQMTS:
  $$CMD  02 PAGES
  PRMPT  02 PAGES
  R$PN$  02 PAGES
  WHZAT  03 PAGES
  SYSON  02 PAGES
  JOB    04 PAGES
  SPOUT  02 PAGES
```

Then, the generator lists the background partition size requirements:

```
BG PARTITION REQMTS:
  AUTOR  05 PAGES
  EDITR  05 PAGES
  ASMB   06 PAGES
  XREF   05 PAGES
  LOADR  06 PAGES
  FMGR   07 PAGES
  GASP   06 PAGES
  FTN4   11 PAGES
  ALGOL  08 PAGES
  RT3GN  11 PAGES
  SWTCH  11 PAGES
  SAVE   05 PAGES
  RSTOR  05 PAGES
  COPY   05 PAGES
  VERFY  03 PAGES
```

The next report defines the largest partition size which can be addressed by any program (including base page):

```
LARGEST ADDRESSABLE PARTITION:
W/O COM 15 PAGES
W/  COM 15 PAGES
```

The System Available Memory (SAM) area is defined in the following sequence of reports and prompts. First, the last word address of the memory resident program area is reported. Then, you are asked if you want to align the reported address at the next page boundary:

```
LWA MEM RESIDENT PROG AREA 46256
ALIGN AT NEXT PAGE?
YES

LWA MEM RESIDENT PROG AREA 47777
```

The generator reports the size of SAM (in this case, the generator automatically allocates one page of memory to SAM because of the above alignment):

```
SYS AV MEM: 1024 WORDS
```

Next, the generator reports the number of the first memory page available for partitioning and you are asked if want to change this page number (in this example, the page number is not changed which results in no increase in the size of SAM):

```
1ST DSK PG 00021
CHANGE 1ST DSK PG?
21

SYS AV MEM: 01024 WORDS
```

The generator reports the number (decimal) of pages remaining for partitioning. This report is followed by a message telling you to define your partitions. The message is followed by a hyphen character (-) to prompt the entry of the partition definitions. The hyphen prompt is repeated after acceptance of each entry until you enter /E to terminate the list.

```
PAGES REMAINING: 00043
DEFINE PARTITIONS
-
1,4,RT
-
2,3,RT
-
3,3,RT,R
-
4,15,BG
-
5,7,BG
-
6,11,BG
-
/E
```

Next, you are asked if you want to modify page requirements. The query is followed by a hyphen character to prompt the entry of page requirement modifications. The hyphen prompt is repeated after acceptance of each entry until you enter /E to terminate the list.

```
MODIFY PROGRAM PAGE REQUIREMENTS?
-
LOADR,15
-
ASMB,15
-
RT3GN,15
-
XREF,11
-
ALGOL,11
-
FTN4,15
-
EDITR,11
-
SAVE,15
-
RSTOR,15
-
COPY,15
-
VERFY,15
-
/E
```

The next prompt asks if you want to assign any programs to a partition. The query is followed by a hyphen character (-) to prompt the entry of partition assignments. The hyphen prompt is repeated after acceptance of each entry until you enter /E to terminate the list.

```
ASSIGN PROGRAM PARTITIONS?
-
WHZAT,3
-
/E
```

The final generator report is that your system is stored on disc. This is followed by the system size in tracks and sectors (decimal) and a completion message:

```
SYSTEM STORED ON DISC
SYS SIZE: 34 TRKS, 027 SECS(10)

RT3GN FINISHED
```

TRANSFERRING THE NEW OPERATING SYSTEM

SECTION V

5-1. SWTCH PROGRAM

Once you have completed the on-line generation of your RTE Operating System, the system resides on disc in a Type I FMP file. To transfer your generated system from the file to a specific channel and subchannel (7900 Disc), or unit (7905 Disc), you use the program SWTCH.

You need to be familiar with the following nomenclature which will be used in describing SWTCH:

destination system	The I/O configuration defined during system generation.
target system	The temporary system disc I/O configuration (channel and subchannel/unit specifications only) that you define when you run SWTCH.
host system	The I/O configuration of the current RTE Operating System under which SWTCH is executing.

Because you may transfer your new RTE System to an I/O configuration that differs from the current I/O configuration, and optionally to a temporary disc configuration different from the generation-defined configuration, many transfer modes exist. Among these modes are:

- Transferring the new system to the destination channel and subchannel/unit.
- Transferring the new system to a temporary target channel and subchannel/unit.
- Transferring the new system to either the destination or target disc configuration, and preserving the file structure contained on the system disc existing there.
- Transferring the new system to a temporary channel and subchannel/unit to facilitate system distribution; for example, in a manufacturing environment.
- Further, the transfer of the new system may be to the channel and subchannel/unit of the currently running host system — thus replacing it and saving its file structure. This is accomplished by the specification of a target channel and subchannel/unit. (See "SWTCH Operating Instructions" for further details.)

NOTE

A system can be booted-up only on the channel and subchannel/unit for which it was generated. Therefore, when a system is temporarily placed at a target by SWTCH, the system must be moved to the appropriate channel and subchannel/unit before the system is booted-up (for example, you may physically move a cartridge from one 7900, 7905, or 7920 disc drive to another).

The actual system transfer is performed via disc drivers within SWTCH. Thus, you may transfer a 7905-based RTE System from a file in a 7900-based RTE system, and vice versa. In either case, only the system subchannel is initialized, and only for the 7905-based system subchannel is spare track assignment done.

Using SWTCH, you may replace an RTE Operating System with your new system, with the option of saving the file structure already existing there. Certain conditions must be met in order to save a file structure, and they are discussed in detail under "Filename Specification".

You have the option of either saving or purging the Type 6 files (memory image program files) existing in the target system's file structure.

You may also specify whether or not you want SWTCH to automatically boot-up your new system on completion of the transfer. Certain I/O configurations restrict automatic boot-up and this is discussed under "Autoboot Specification".

If the bootstrap loader was sent to a file during the generation process, it should be punched or written out before running SWTCH.

CAUTION

The interrupt system is turned off during the transfer process; you must be careful to terminate all system activity.

NOTE

When the host system is executing in a 21MX hardware configuration, SWTCH removes the HALT 77 instruction from the boot extension of the system it has transferred. (Normally this instruction would be executed during the disc bootup process.)

If the resulting system is brought up on a 2100A hardware configuration, the Basic Binary Disc Loader (BBDL) will be left unprotected. The BBDL may be protected by halting the computer and pushing RUN.

5-1.A SUBCHANNEL INITIALIZATION

SWTCH reformats the disc track area defined for logical unit 2 by writing the physical track and sector addresses in the preamble of each sector. For the system code area the preambles are set to indicate write-protected tracks. When a defective track is encountered during the initialization of a 7905/7920 disc subchannel, a spare track is assigned to it. The preamble of the defective track indicates that it is defective and gives the address of the spare track that is replacing it so the disc controller will automatically switch to that track in future references. The preamble of the spare track indicates that it is acting as a spare, and gives the address of the defective track it is replacing. For 7900 disc subchannels, any bad tracks encountered outside the system area are flagged defective; bad tracks within the absolute code of the system are not allowed.

5-2. SWTCH OPERATING INSTRUCTIONS

When you schedule SWTCH for execution, parameters may be used to specify a target channel and subchannel/unit different from the destination channel and subchannel/unit. These parameters and other parameters used to specify various transfer options are discussed in the following paragraphs. See page 1-2 of this manual for LOADR considerations.

To schedule SWTCH for execution, you may use the RU command in the following form:

:RU,SWTCH,*filename,channel,subchannel/unit,autoboot,filesave,type-6*

where:

filename — The name of the FMP file which contains your generated system. This may be specified in the form:

filename:security code:cartridge label

This file must exist on a standard system subchannel (defined in track map table $TB31 or $TB32).

channel — The target system disc channel number (octal value with B as the terminating character). This target channel need not be configured into either the host or destination RTE system because it is used as a means of temporary storage, requiring only the correct controller I/O card.

subchannel/unit — The logical subchannel number (0, 2, 4, or 6 for the fixed platter; 1, 3, 5, or 7 for the removable platter) for a model 7900 Disc, or the unit number for a model 7905 Disc. If this subchannel/unit is a peripheral to the host system, dismount it from the system (DC command). The 7905 system will go to the subchannel defined during system generation.

autoboot — Specify Y (yes) to attempt an automatic boot-up of the system following the transfer. The host configuration must match the destination configuration; specifically, the system disc channel and subchannel/unit, and the Time Base Generator, Privileged Interrupt, and system console I/O channels.

Specify N (no) to deny automatic boot-up.

filesave — Specify Y (yes) to save the target system's current file structure during the transfer.

Specify N (no) to deny saving the target system's current file structure.

type-6 — Specify Y (yes) to purge the current Type 6 files during the transfer.

Specify N (no) to deny purging the current Type 6 files.

NOTE

Remember, a Type 6 file can be executed only by the operating system within which it was created.

You can omit any of the parameters from the command entry string. You must specify a comma as a placeholder for omitted leading parameters. Trailing parameters do not require a placeholder. Once in execution, SWTCH displays a prompt message for any omitted or illegally specified parameters.

Examples:

:RU,SWTCH,NEWGEN::17 — Only the file name with a cartridge label is specified. SWTCH will request the omitted information.

:RU,SWTCH — No parameters are specified. SWTCH will request all information.

:RU,SWTCH, , , ,Y — Only automatic system boot-up is specified. SWTCH will request the omitted information.

If you specify all of the parameters, "batch" mode is implied. That is, SWTCH executes without requiring your intervention. However, if FMP files within the new system will be destroyed at the target subchannel, you will be warned and asked for permission to continue.

When not in batch mode, SWTCH displays the following message at the beginning of execution:

```
***WARNING***

ALL ACTIVITY MUST BE TERMINATED BEFORE SYSTEM TRANSFER PROCESS.
```

5-3. FILENAME SPECIFICATION

SWTCH performs a validity check on the file name specified by the *filename* parameter. The file name must exist as a FMP file in the host system. It must be a Type 1 file beginning with the track 0, sector 0 boot extension. If this validity check fails, SWTCH displays:

```
ILLEGAL FILENAME
FILE NAME OF NEW RTE SYSTEM?
```

You enter a valid file name.

Also, the file named must exist on a subchannel defined on track map table $TB31 or $TB32. If not, SWTCH displays:

```
SOURCE SUBCHANNEL NOT FOUND ON A SYSTEM TRACK MAP TABLE.
TRANSFER CANCELLED AND SWTCH TERMINATED.
```

If the *filename* parameter is omitted from the RU command entry string, SWTCH requests:

```
FILE NAME OF NEW RTE SYSTEM?
```

You enter the name of the file that contains your new system in the form:

filename:security code:cartridge label

NOTE

> At this point only, when SWTCH is asking for a new file name, can SWTCH be aborted using the !! command. Similar to the On-Line Generator requirements, if a file name begins with the characters !!, precede the file name with a blank character.

Then SWTCH displays the I/O configuration of the new system:

```
NEW SYSTEM I/O CONFIGURATION:
CHANNEL cc PRIVILEGED INTERRUPT      if present
CHANNEL cc TBG
CHANNEL cc TYPE= ee
    :          :                     in order of channel numbers
CHANNEL cc TYPE= ee
```

where *cc* is the I/O select code and *ee* is the equipment type code.

SWTCH derives the destination channel and subchannel from the file and displays the following message:

NEW SYSTEM (LU2) CHANNEL = *cc* SUBCHANNEL = *ss*

where *cc* and *ss* are the actual channel and subchannel numbers.

Depending on the disc model at the target system, SWTCH reports the system subchannel definition:

7900 LOGICAL SUBCHANNEL *ss* FIRST TRACK *ttt* #TRACKS *nnn*

or,

7905, 7920 HEAD# *n* #TRACKS *nnn* #SURFACES *s*
UNIT# *u* FIRST CYL# *ccc* #SPARES *pp*

5-4. CHANNEL AND SUBCHANNEL/UNIT SPECIFICATION

If the *channel* (select code) parameter is omitted from the RU command entry string, SWTCH prompts:

TARGET CHANNEL FOR NEW SYSTEM? (XX OR SPACE,CR)

You respond with the octal number of a channel which contains the correct controller I/O card, or a space followed by a carriage return (*space,CR*). The channel number specified may be in the host system, the destination system, or it may be a channel not configured into either system. Entry of *space,CR* results in a default to the destination channel defined during the generation of the new system.

If the *subchannel/unit* parameter is omitted from the RU command entry string, SWTCH asks:

TARGET SUBCHANNEL(LOGICAL)/UNIT FOR NEW SYSTEM? (X OR SPACE,CR)

You respond with a logical subchannel number or a unit number where the new system will be stored, or a space followed by a carriage return (*space,CR*). The target subchannel or unit number specified is in the range 0 through 7. Entry of *space,CR* results in a default to the destination subchannel or unit defined during generation of the new system.

The flexibility provided by the channel and subchannel/unit specifications permits temporary storage for your new system. Note that you can boot-up your new system only on the destination channel and subchannel/unit specified during the generation process.

If the physical location of the target subchannel will result in an overwrite of the Type 1 file containing your new system, the following message is displayed:

NEW SYSTEM WILL OVERWRITE FILE *filename.*
TRANSFER CANCELLED AND SWTCH TERMINATED.

SWTCH is terminated and control is returned to the host system.

Except in batch mode, SWTCH reminds you that the correct disc cartridge must be in place at the proper subchannel/unit number. The following message is displayed:

```
NOW IS THE TIME TO INSERT CARTRIDGE IN TARGET SUBCHANNEL/UNIT.
(SPACE,CR TO CONTINUE)
```

Perform the appropriate action and signal SWTCH to continue by typing a space followed by a carriage return (*space,CR*).

5-5. FILESAVE SPECIFICATION

If the *filesave* parameter is omitted from the RU command entry string, SWTCH requests:

```
SAVE FILES AT TARGET? (Y OR N)
```

You respond Y (yes) to save files (subject to the match conditions described in the following paragraphs), or N (no).

A "match" must exist between the target system subchannel and the destination subchannel definitions, and a cartridge directory must exist on the target subchannel in order to save the existing file structure.

For a model 7900 Disc, the match condition is based on the physical starting and ending tracks of the system. The ending (last) track must contain the FMP file and cartridge directories.

For a model 7905 Disc, the match condition is based on the physical starting and ending tracks of the system, as well as the number of surfaces and the starting cylinder number. The last track must contain the FMP file and cartridge directories.

Both a file directory and a cartridge directory are required at the target subchannel. A new FMP setup control word is computed and written into the FMP cartridge directory. When boot-up of the new system occurs, FMP remains intact (initialized).

If the match conditions fail, a warning followed by a request for your permission to continue is displayed:

```
INFORMATION STORED ON SUBCHANNEL/UNIT X OF TARGET CHANNEL YY WILL BE
DESTROYED.

OK TO PROCEED? (Y OR N)
```

You respond Y (yes) if the information on subchannel/unit *x* of target channel *yy* may be destroyed, or N (no) to prevent the destruction of this information.

CAUTION

SWTCH dismounts all cartridges when saving the target file structure. Note that the files contained on the auxiliary subchannel (LU3) are not preserved. Therefore, it is your responsibility to save any of these files before the transfer.

If the new system will overlay any of the existing FMP files on the target subchannel, a warning message followed by a request for your permission to continue is displayed:

```
NEW SYSTEM WILL DESTROY SOME FMP FILES.

OK TO PROCEED? (Y OR N)
```

5-6. TYPE-6 SPECIFICATION

You have a choice of saving or purging the target subchannel's Type 6 files in the new system during the transfer. To save Type 6 files, the match conditions described under "Filesave Specification" must be true.

If the target file structure is to be saved and the *type-6* parameter is omitted from the RU command entry string, SWTCH displays:

```
PURGE TYPE 6 FILES? (Y OR N)
```

You respond Y (yes) to purge the Type 6 files, or N (no) to save them.

Type 6 files contain a program in memory-image format (resulting from running the on-line LOADR) that the system assumes is ready to execute. Type 6 files are created by the FMGR Save Program (SP) command, and the first two sectors of the file contain ID segment information.

When a Type 6 file is restored with the Restore Program (RP) command, an ID segment is set up for the program in memory. Note that such a program can execute only in the system within which it was created because the base page linkages and FMP setup word will not be the same.

You may want to save Type 6 files in those situations where you switch (using the SWTCH program) back and forth between RTE systems and do not wish to reload your programs after each change. Care must still be exercised, however, to RP only the Type 6 files created in that particular system.

5-7. AUTOBOOT SPECIFICATION

Automatic boot-up of the new system may occur following the transfer operation if all of the following conditions (if present) are true:

1. Target Disc Channel = Destination Disc Channel
2. Target Disc Subchannel/Unit = Destination Disc Subchannel/Unit
3. Host TBG Channel = Destination TBG Channel
4. Host Privileged Interrupt Channel = Destination Privileged Interrupt Channel
5. Host System Console Channel = Destination System Console Channel

If the automatic boot-up conditions are true and the *autoboot* parameter is not specified in the RU command entry string, SWTCH prompts:

AUTO BOOTUP? (Y OR N)

If any of the automatic boot-up conditions are false, SWTCH displays the following message:

PRESENT CONFIGURATION DOESN'T PERMIT AUTO BOOT-UP.

If it is not possible to return to the current system following the transfer operation, or if a transfer was done to the same subchannel/unit, and automatic boot-up is not to be done, SWTCH displays the message:

SYSTEM WILL HALT AFTER TRANSFER COMPLETION.

When not in batch mode, SWTCH requests final permission to proceed with the system transfer. The following message is displayed:

READY TO TRANSFER. OK TO PROCEED? (Y OR N)

You respond Y (yes) to proceed with the system transfer, or N (no) to deny the transfer.

Then, the current system is shut down and the transfer begins. The new system subchannel is initialized. Track sparing is done for the 7905-based system subchannel. If appropriate, SWTCH reports the names of any files which are overlaid or purged under the following headings:

OVERLAID FMP FILES:
file list

or

TYPE 6 FILES PURGED:
file list

When SWTCH completes the system transfer process, the following message is displayed:

SWTCH FINISHED

5-8. BAD TRACK INFORMATION

For 7900 Discs, up to 10 bad tracks are allowed before SWTCH aborts. Bad tracks in the area where the absolute system and relocatable library are stored will prevent operation of the system.

Defective tracks are reported as follows:

BAD TRACK SUBCHANNEL *x*
000yyy

where *x* is the subchannel number and *000yyy* is the logical track number needed when initializing the File Manager on the reported subchannel.

For 7905 Discs, bad tracks are automatically spared to tracks set aside for that purpose. Bad tracks reported and spared will not prevent operation of the system and should not be specified during File Manager initialization on the subchannel.

Defective tracks are reported as follows:

BAD TRACKS SUBCHANNEL *xx*

	LOGICAL	CYL	HD	UNIT
BAD TRACK	*yyyy*	*yyyy*	*y*	*y*
SPARED TO	*yyyy*	*yyyy*	*y*	*y*

5-9. SWTCH ERROR CONDITIONS

You will receive an appropriate message for any errors encountered during execution of SWTCH. If SWTCH is aborted because of a disc error, the system on the disc may not be a workable system.

Error conditions which result in an error message may be encountered because of the following conditions:

1. While SWTCH is testing for a target system file structure.
2. While SWTCH is writing out the new system to the disc.
3. While SWTCH is initializing the remainder of the new system subchannel.

Table 5-1 lists possible SWTCH error messages, their meaning, and suggested action to be taken.

Table 5-1. SWTCH Error Messages

MESSAGE	MEANING AND ACTION
INVALID DISC SPECIFICATIONS	Disc specifications do not conform to system disc type, track areas too large, or not enough spare tracks (7905 Disc only). SWTCH is aborted. Redefine track areas of generated system and regenerate.
PARITY OR DATA ERROR TRACK *yyy*	Read parity/decode error. Ten attempts have been made to read or write to disc track *yyy*. SWTCH is aborted. Recovery is not possible.
TURN OFF DISC PROTECT — PRESS RUN	The disc protect switch is in the PROTECT position. The system executes a HALT 32B. Turn off the switch and press RUN on the CPU control panel.
TURN ON FORMAT SWITCH — PRESS RUN	The Format switch is not in the ON position. The system executes a HALT 32B. Set the Format switch ON and press RUN on the CPU control panel.
READY DISC AND PRESS RUN	The disc device is not ready. The system executes a HALT 33B. Insure that the disc drive is ready and press RUN on the CPU control panel.
DEFECTIVE CYLINDER — TRACK *yyy*	Disc error. SWTCH is aborted. Recovery is not possible.
(7900 Disc Only) LIMIT OF 10 BAD TRACKS EXCEEDED	More than ten bad tracks exist on system subchannel. SWTCH is aborted. Redefine the track area and regenerate, or get a new disc.

REAL-TIME DISC USAGE

APPENDIX A

This appendix covers the following subjects:

Track Configuration
Multiple CPU/7905 Operation

A-1. TRACK CONFIGURATION

The configuration of disc tracks is normally done through the interactive generation process described in Section III. However, when more than one disc controller is needed, the generator dialogue cannot be used and a track map table must be defined in a user program. Because they differ, this process is described separately for the 7900 and 7905 discs.

For both the 7900 and 7905, when a program tries to access a track by a track number greater than the number of tracks assigned to a given subchannel, the driver sets bit 5 in the status word (end-of-disc) and exits with the transmission log set to the number of tracks assigned to the subchannel. To obtain this information, a program can request an impossible track number once and thereafter stay within the bounds on the subchannel.

If a parity error occurs during disc transfer, a special error message is printed:

TR *nnn* EQT *eqt*,
U*pp* S (or U)

where:

nnn is the track number
eqt is the EQT entry number
pp is the subchannel or unit number

This is an irrecoverable disc transfer parity error. If the transfer is to a system or auxiliary disc, the following results apply:

a. If user request (U), then program is abnormally terminated and track is made unavailable for further operations. If the user request was an on-line modification with the RTE loader, the parity error could be the result of failing to turn off the hardware disc protect switch. The loader should be executed again with the protect switch off.

b. If system request (S), the program transfer terminates.

For peripheral disc transfers, a parity error causes the transmission log to be returned to the calling program as −1.

A-2. 7900 EXTRA CONTROLLER TRACK CONFIGURATION

The track map table used for a 7900 disc system must contain the following:

- Number of sectors per logical track
- First track number on subchannels 0 through 7
- Number of tracks on subchannels 0 through 7

The information needed to properly configure a disc is fully described in Section II. The most necessary information is recapitulated here.

The 7900 Disc Drive has a maximum of 203 tracks per platter. The two platters on each drive are divided as follows:

128 words per sector
48 sectors per track
203 tracks per platter

The RTE 7900 Disc Driver treats a logical track as:

64 words per sector
96 sectors per track

A-3. SUBCHANNELS. The moving head driver for an HP 7900 disc system can have four drives chained to a single controller. There may be two platters per drive, and each disc platter is a subchannel accessed through a logical unit number that is referenced back to the equipment table (EQT) entry number of the controller. Thus, the disc system can control a maximum of eight subchannels, numbered 0 through 7.

Subchannels are numbered so that even-numbered subchannels are fixed platters and odd numbered subchannels are removable platters.

A-4. SECTORS. READ DATA — The drivers divide each track into 64-word sectors. Whenever more than 64 words are transmitted, the READ request is fastest when begun on an even sector.

WRITE DATA — WRITE requests starting on an odd sector or ending in an even sector require more time; thus, the fastest transfers are WRITE requests that start on an even sector and end in an odd sector. The system always organizes programs and swaps them out in such a way that transfers start on an even and end on an odd sector, thereby minimizing program load and swap times. The WRITE request data can be checked for recoverability by setting bit 10 in the control word (ICNWD). This check on all data written slows the WRITE process.

A-5. TRACKS. Each subchannel may contain from 0 to 203 tracks. 203 tracks are the maximum available on the 7900 physical disc. The first track may be any track on the platter. Tracks available to the driver are numbered relative to the first track assigned to the system on each subchannel; thus, if the first available physical track on a subchannel is 10, access by the user to this track must specify logical track number 0.

A-6. DEFINING 7900 TRACK MAP TABLE. When an extra controller is used, tracks can only be mapped by defining a table in the user program as follows:

```
ASMB,R,B,L
        NAM   $TB31,0
        ENT   $TB31
$TB31   DEC   -n
        DEC   ft0,ft1,ft2,ft3,ft4,ft5,ft6,ft7
        DEC   no0,no1,no2,no3,no4,no5,no6,no7
        END
```

where:

n	is the number of 64-word sectors per track
ft0 – ft7	are the first track numbers for each subchannel 0 through 7
no0 – no7	are the number of tracks on subchannels 0 through 7

Example:

Assume a 7900 disc with two subchannels, 0 and 1. Place tracks 0 through 100 on subchannel 0 and tracks 20 through 80 on subchannel 1.

```
ASMB,R,B,L
        NAM   $TB31,0
        ENT   $TB31
$TB31   DEC   -96       96 sectors per track
        DEC   0,20,0,0,0,0,0,0
        DEC   101,61,0,0,0,0,0,0
        END
```

A-7. 7905/7920 EXTRA CONTROLLER TRACK CONFIGURATION

The table used to map the 7905 contains the following information:

- Number of sectors per track
- Total number of subchannels on drive

And for each subchannel, the following must be specified:

- Cylinder number of track 0
- Number of surfaces per cylinder
- Head number of track 0
- Unit number of disc drive
- Number of tracks on subchannel

To properly configure a track on the 7905, certain information is given here; a full description of track configuration can be found in Section II.

The HP 7905 Disc Drive provides three surfaces per disc drive; the 7920, five surfaces. Each surface is divided as follows:

7905	7920
128 words per sector	128 words per sector
48 sectors per track	48 sectors per track
411 tracks per surface	823 tracks per surface

The RTE Disc Drive (DVR32) treats a logical track as:

64 words per sector
96 sectors per track

A-8. SUBCHANNELS. The system can control up to eight 7905/7920 disc drives connected to one controller. Any combination of drives can be used. Unlike the 7900, subchannels are not directly related, one per platter, to the disc drive and are not restricted to eight subchannels.

Each subchannel is a contiguous group of tracks on a single drive. There may be more than one subchannel per drive, but subchannels cannot cross drive boundaries. The exact number of subchannels is specified by the user. There may be as many as 32 subchannels per drive. Subchannels are numbered sequentially from zero; no numbers may be skipped.

A-9. SECTORS. The discussion of sectors for the 7900 is also true for the 7905/7920.

A-10. TRACKS. Each 7905 disc drive has 411 cylinders (or head positions) resulting in a maximum of 1,233 tracks (411 head positions times the 3 disc surfaces). Each 7920 disc drive has 823 cylinders, resulting in a maximum of 4115 tracks (823 head positions times the 5 disc surfaces). Theoretically, the number of tracks could all be assigned to one subchannel, however, there are program limitations. Peripheral disc subchannels used by the Batch-Spool Monitor must not have more than 1024 tracks, excluding spares, per subchannel. On system or auxiliary disc (logical units 2 or 3), each subchannel is limited to 256 tracks excluding spares.

7905 head positions (cylinders) are numbered from 0 through 410. There is one head for each surface, numbered 0, 1, 2.

7920 head positions (cylinders) are numbered from 0-822. There are 5 heads, numbered 0-4 (one for each disc surface).

A-11. SURFACE ORGANIZATION. 7905 subchannels may be on one, two, or three surfaces. 7920 subchannels may be on 1-5 surfaces. It is best to alternate surfaces when more than one surface is used. This minimizes head movement. For example, if track 0 is at cylinder (head position) 10 on head 0, then track 1 should be at cylinder 10 on head 1 and track 2 at cylinder 11 on head 0. The implications of splitting a subchannel between 7905 fixed and removable platters are discussed in Section II under Disc Planning.

A-12. UNIT NUMBER. The unit number is a number associated with each 7905/7920 disc drive. It may be set by the user behind the front panel of the drive, and is always displayed on the front panel. There may be eight units, numbered 0 through 7.

A-13. DEFINING THE 7905/7920 TRACK MAP TABLE. When an extra controller is needed, tracks are mapped in a table defined as follows:

```
ASMB,R,B,L
        NAM   $TB32,0
        ENT   $TB32
$TB32   DEC   96        number of 64-word sectors must be 96
        DEC   -n        n is the total number of subchannels
SC0     DEC   x         cylinder number of track 0 for subchannel 0 (SC0)
        OCT   a         a is defined below
        DEC   t         t is the number of tracks for subchannel 0
SC1
          .
          .             repeat for next subchannel
          .
SCn-1
          .
          .             until all subchannels are defined
          .
        END
```

Where:

a is defined as:

bits 15 - 12 = number of surfaces per cylinder
bits 11 - 8 = head number of track 0
bits 3 - 0 = unit number of the disc

Spare tracks can be specified by skipping tracks after each subchannel when constructing the table. To skip tracks, set the cylinder number of track 0 for each subchannel to a number greater than the cylinder number of the last track of the next lower subchannel on that surface.

Example:

Define 10 HP 7905 subchannels using two surfaces of the removable disc cartridge. The number of tracks on each subchannel is 76 plus 4 spare tracks per subchannel. Each subchannel starts at head 0. Only the first three subchannel definitions are fully shown in the following code:

```
ASMB,R,B,L
        NAM   $TB32,0
        ENT   $TB32
$TB32   DEC   96
        DEC   -10       total of 10 subchannels
SC0     DEC   0         first subchannel (subchannel 0) starts at cylinder 0
        OCT   20005     two surfaces, head 0, unit 5
        DEC   76        76 tracks for subchannel 0
SC1     DEC   40        Second subchannel starts at cylinder 40 (4 spare tracks)
        OCT   20005
        DEC   76
SC2     DEC   80        third subchannel starts at cylinder 80 (4 spare tracks)
        OCT   20005
        DEC   76
```

```
SC3     DEC     120
 .       .       .
 .       .       .          continue for remaining subchannels through SC9
 .       .       .
SC9     DEC     360
        OCT     20005
        DEC     76
        END
```

A-14. MULTIPLE CPU/7905 SYSTEM OPERATION

In a multiple CPU/7905 System environment, the 7905 disc drivers and the controller prevent destructive interference during transfers of data to and from the disc. If a CPU is not to share access to the same physical disc addresses with any other CPU, this is adequate protection.

If a file or set of files is to be shared by more than one CPU, a procedure is needed to prevent the following possible events:

a. CPU A reads a sector to update it.

b. CPU B reads the same sector to update it.

c. CPU A writes its updated sector back to the disc.

d. CPU B writes its updated sector back to the disc, destroying the effect of CPU A access.

To allow software to be written to effect multiple CPU/7905 System operation without destructive interference, the HP 7905 driver (DVR32) services a lock/unlock function call. This call can be issued from one CPU to lock the disc during an I/O operation or set of I/O operations. No other CPU can access the disc until an unlock function call is issued by the original CPU.

A-15. DVR32 LOCK/UNLOCK FUNCTION CALL

The I/O Control request is used to hold a Resource Number (RN) and, subsequently, to release the RN. The RN must be allocated and set as a global RN prior to issuing the I/O Control request. For a description of the I/O Control request and Resource Numbering, see the appropriate *RTE Software System Programming and Operating Manual.*

The RTE FORTRAN IV calling sequence for an I/O Control request containing a lock/unlock function call is:

```
ICODE=3
ICNWD=control word
IRNUM=resource number
CALL EXEC(ICODE,ICNWD,IRNUM)
```

ICNWD defines a one-word octal value containing control information. For DVR32, control word bits 12-6 contain a function code for the following control states:

Function Code (bits 12-6)	Meaning
15	Lock
00	Unlock

IRNUM is specified only for function code 15. IRNUM contains the RN to be cleared when the lock function call is executed. If a lock is currently in effect from another CPU, the calling program is suspended until the disc is available. If the lock is obtained immediately, the I/O Control request completes immediately. If a lock is already in force by this disc controller, the request completes with the RN cleared.

The lock/unlock function codes are provided to alleviate any CPU contention problem. If a CPU wishes to modify the same disc area as another CPU, the following code sequence could be executed from both units to prevent their interfering with each other:

```
ICODE=12B                              Allocate and set global RN
CALL RNRQ(ICODE,IRNUM,ISTAT)

CALL EXEC(3,IDLU+1500B,IRNUM)          Issue lock call, function code = 15

CALL RNRQ(5,IRNUM,ISTAT)               Set/clear the RN
  .                                    Lock is granted by this point
  .
  .

CALL EXEC(1,IDLU,....)                 Next, read the disc and modify data
  .
  .
  .

CALL EXEC(2,IDLU,....)                 Then, write it back.

CALL EXEC(3,IDLU)                      Now, issue unlock call, function code = 0
  .
  .
  .
```

To use the lock/unlock function, each CPU operating system must support it.

The sequence described previously for CPU A and CPU B using the lock/unlock function would now be:

a_1. CPU A requests a lock from the driver and it is granted (no other CPU has a lock in force).

a_2. CPU A reads a sector to update it.

b_1. CPU B requests a lock from its driver. Because CPU A has a lock, CPU B must wait.

c_1. CPU A writes its updated sector back to the disc.

c_2. CPU A releases its lock.

b_2. CPU B disc driver gets an interrupt from the disc controller informing it that the lock is now available and completes the lock requested by B at step b_1.

b_3. CPU B reads the same sector to update it.

d_1. CPU B writes its updated sector back to the disc. The sector now has both updates.

d_2. CPU B releases its lock.

ERROR SUMMARY

APPENDIX B

This appendix includes descriptions of error codes and messages produced by both the On-Line Generator and the SWTCH program.

B-1. ON-LINE GENERATOR ERROR CODES

The On-Line Generator issues two types of error codes:

1. An error resulting from a file reference causes an FMP error code to be issued in the form:

   FMP ERR–*nn*

   where $-nn$ is a negative number equivalent to the FMP error codes defined in the *HP Batch-Spool Monitor Reference Manual.* An FMP error may result from references to the list file, absolute output file, answer file, bootstrap file, or files specified in RELOCATE commands.

2. An error resulting from on-line generation processing causes a generator error to be issued in the form:

   GEN ERR *nn*

   where *nn* is a positive number representing the generator error codes defined below.

B-2. GEN ERR CODES

If an error condition is encountered during execution of the On-Line Generator program, the appropriate error code is printed on the list device and operator console.

GEN ERR 00

Meaning: Irrecoverable error. On-Line Generator problem.

Action: If the error is accompanied by an FMP ERR, then check the cause of the problem. The problem may be hardware-oriented, symptomatic of disc transfer /DMA problems, in which case the appropriate diagnostics should be run.

If the error is not accompanied by an FMP ERR, an actual generator problem (relating to its internal table structures) may exist, so send your generation listing and answer file to your local HP Field Service Office for analysis.

GEN ERR 01

Meaning: Invalid response to initialization request.

Action: Request is redisplayed. Enter valid response.

GEN ERR 02

Meaning: Insufficient amount of available memory for internal generator tables.

Action: Irrecoverable error. Increase the size of background for generator to run in, or the partition size requirements.

GEN ERR 03
name

Meaning: Record out of sequence (*name* is the module in which the record exists).

Action: Module is skipped.
Message printed on list device only; control is not transferred to the operator console.

GEN ERR 04
name

Meaning: Illegal record type (*name* is the module name in which the record exists).

Action: Module is skipped.
Message printed on list device only; control is not transferred to the operator console.

GEN ERR 05

Meaning: Duplicate entry point.

Action: Revise program by re-labeling the entry points (the current entry point replaces the previous entry point).
Message printed on list device only; control is not transferred to the operator console.

GEN ERR 06

Meaning: Command error during Program Input Phase.

Action: Re-enter valid command.

GEN ERR 07

Meaning: Program name or entry point table overflow.

Action: Irrecoverable error. Revise or delete programs.

GEN ERR 08

Meaning: Duplicate program name.

Action: The current program replaces the previous program.
Message printed on list device only; control is not transferred to the operator console.

GEN ERR 09

Meaning: Parameter name error (no such program).

Action: Enter valid parameter statement.

GEN ERR 10

Meaning: Parameter type error.

Action: Enter valid parameter statement.

GEN ERR 11

Meaning: Parameter priority error.

Action: Enter valid parameter statement.

GEN ERR 12

Meaning: Execution interval error.

Action: Enter valid parameter statement.

GEN ERR 13
name

Meaning: Background segment precedes background main disc-resident program (*name* is the segment's name).

Action: Module is skipped. Either revise module or re-order RELOCATE command entries.

GEN ERR 14

Meaning: Invalid background bounds or illegal response to CHANGE FWA SYS MEM? or to CHANGE BP LINKAGE?

Action: Message is repeated. Enter valid reply.

GEN ERR 15

Meaning: Type 6, 14, or 30 module illegally calling a module that is not Type 0, 6, 14, or 30.

Action: Revise the calling module.

GEN ERR 16

Meaning: Base page linkage overflow into system communication area.

Action: Diagnostic printed for each word required (communication area is used). Revise order of program loading or CHANGE BP LINKAGE query answers to reduce linkage requirements.

GEN ERR 17

Meaning: Type 1 output file overflow.

Action: Irrecoverable error. Re-run On-Line Generator program; estimate more tracks for the EST. # OF TRACKS IN OUTPUT FILE query.

GEN ERR 18

Meaning: Memory overflow (absolute code exceeds LWA memory).

Action: Diagnostic printed for each word required (absolute code is generated beyond LWA). Revise program or answer to CHANGE BG BOUNDRY query.

GEN ERR 19

Meaning: Transfer (TR) request nesting level greater than 10; or empty stack.

Action: Revise and re-enter response.

GEN ERR 20

Meaning: Transfer (TR) request was to be illegal command input logical unit.

Action: Revise and re-enter your response.

GEN ERR 21

Meaning: Module containing entry point $CIC not loaded.

Action: Irrecoverable error.

GEN ERR 22

Meaning: List file error. An FMP ERR-6 usually occurs when a list file extend cannot be created (due to lack of disc space on the same subchannel).

Action: Respond YES or NO to the query OK TO CONTINUE?

A NO response terminates the generation.

A YES response causes listed output to be sent to the console only. If command input was being received from an answer file, you do not need to issue a TR command to continue answer file input.

GEN ERR 23

Meaning: Invalid response to FWA BP LINKAGE query.

Action: Query repeated. Enter a valid response.

GEN ERR 24

Meaning: Invalid channel number.

Action: Enter valid EQT statement.

GEN ERR 25

Meaning: Invalid driver name or no driver entry points.

Action: Enter valid EQT statement.

GEN ERR 26

Meaning: Invalid or duplicate D, B, T operands.

Action: Enter valid EQT statement.

GEN ERR 27

Meaning: Invalid logical unit number.

Action: Enter valid DRT statement.

GEN ERR 28

Meaning: Invalid channel number.

Action: Enter valid INT statement.

GEN ERR 29

Meaning: Channel number decreasing.

Action: Enter valid INT statement.

GEN ERR 30

Meaning: Invalid mnemonic.

Action: Enter valid INT statement.

GEN ERR 31

Meaning: Invalid EQT number.

Action: Enter valid INT statement.

GEN ERR 32

Meaning: Invalid program name.

Action: Enter valid INT statement.

GEN ERR 33

Meaning: Invalid entry point.

Action: Enter valid INT statement.

GEN ERR 34

Meaning: Invalid absolute value.

Action: Enter valid INT statement.

GEN ERR 35

Meaning: Base page interrupt locations overflow into linkage area.

Action: Re-enter response to FWA BP LINKAGE query.

GEN ERR 36

Meaning: Invalid number of characters in final operand.

Action: Enter valid INT statement.

GEN ERR 37
name

Meaning: Invalid declaration of common in system or library program (*name* is the program's name).

Action: Revise the program.

GEN ERR 38

Meaning: ID segment for one of the generator's segments cannot be found.

Action: Ensure that the generator and its program segments are properly loaded.

GEN ERR 39
name

Meaning: System illegally referenced a Type 6 program (*name* is the Type 6 program name).

Action: Revise the program.

GEN ERR 40

NOT USED

GEN ERR 41

NOT USED

GEN ERR 42

NOT USED

GEN ERR 43

NOT USED

GEN ERR 44

Meaning: Invalid partition number entered.

Action: Re-enter partition description with valid decimal number, between 1 and maximum defined during Initialization Phase.

GEN ERR 45

Meaning: Invalid partition size.

Action: Re-enter partition description with valid decimal size, between 1 and 1024 pages.
Note that you are still limited to a 32K address space, regardless of the partition size.

GEN ERR 46

Meaning: Invalid partition type.

Action: Re-enter partition description with valid type, BG or RT.

GEN ERR 47

Meaning: Invalid reservation parameter.

Action: Re-enter partition description. Fourth parameter must be "R" to reserve a partition.

GEN ERR 48

Meaning: Invalid or unknown program name.

Action: Re-enter response with corrected name or enter /E to end this sequence.

GEN ERR 49

Meaning: Invalid partition number.

Action: Re-enter response with corrected number or enter /E to end this sequence.

GEN ERR 50

Meaning: Program specified is too large for partition assigned.

Action: Assign program to a larger partition or continue without assigning this program.

GEN ERR 51

Meaning: Invalid page size. Either smaller than the program size, or larger than maximum addressable partition size.

Action: Re-enter response with valid size or continue without overriding this program's page requirements.

GEN ERR 52

Meaning: Module being relocated references an SSGA entry point but does not have the proper program type to allow SSGA access.

Action: Re-run On-Line Generator program. During Parameter Input Phase, change the main program involved to a type that allows SSGA access or to a type 8 to delete it from the generation.

GEN ERR 53

Meaning: The sum of all partition sizes does not equal the number of pages remaining after System Available Memory.

Action: Redefine all partitions.

GEN ERR 54

Meaning: A subroutine or segment has declared more common than the associated main program.

Action: Recompile the main program declaring the maximum common needed by any segment or subroutine to be used.
Restart system generation with new relocatable modules.

B-3. SWTCH PROGRAM ERROR MESSAGES

MESSAGE	MEANING AND ACTION
INVALID DISC SPECIFICATIONS	Disc specifications do not conform to system disc type, track areas too large, or not enough spare tracks (7905 Disc only). SWTCH is aborted. Redefine track areas of generated system and regenerate.
PARITY OR DATA ERROR TRACK *yyy*	Read parity/decode error. Ten attempts have been made to read or write to disc track *yyy*. SWTCH is aborted. Recovery is not possible.
TURN OFF DISC PROTECT — PRESS RUN	The disc protect switch is in the PROTECT position. The system executes a HALT 32B. Turn off the switch and press RUN on the CPU control panel.
TURN ON FORMAT SWITCH — PRESS RUN	The Format switch is not in the ON position. The system executes a HALT 32B. Set the Format switch ON and press RUN on the CPU control panel.
READY DISC AND PRESS RUN	The disc device is not ready. The system executes a HALT 33B. Insure that the disc drive is ready and press RUN on the CPU control panel.
DEFECTIVE CYLINDER — TRACK *yyy*	Disc error. SWTCH is aborted. Recovery is not possible.
(7900 Disc Only) LIMIT OF 10 BAD TRACKS EXCEEDED	More than ten bad tracks exist on system subchannel. SWTCH is aborted. Redefine the track area and regenerate, or get a new disc.

SAMPLE GENERATION WORKSHEETS

APPENDIX C

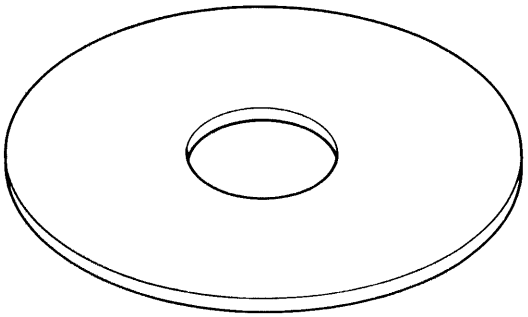
C-1. RTE-II SAMPLE WORKSHEETS

The following pages contain reproductions of the worksheets used for the generation of the typical RTE-II System described in Section I. A step-by-step description of this generation is given in Section IV. Appendix D shows an answer file and Appendix E shows the listed output for the sample RTE-II System generation.

Table 2-1. HP 7900/7901 Disc Worksheet

SUBCHANNEL 1

REMOVABLE



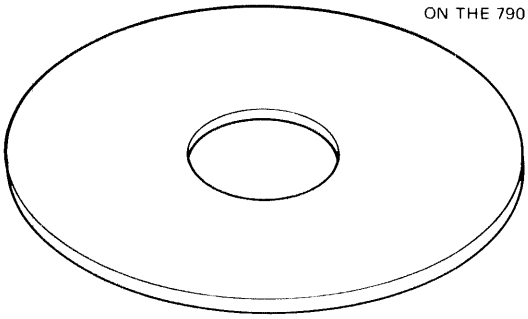
NO. OF TRACKS AVAILABLE 203

FIRST TRACK 0

SUBCHANNEL 0

NOTE:
THE FIXED PLATTER
DOES NOT EXIST
ON THE 7901.

FIXED



NO. OF TRACKS AVAILABLE 203

FIRST TRACK 0

SYSTEM SUBCHANNEL NUMBER 0 (LOGICAL UNIT 2)

AUXILIARY SUBCHANNEL NUMBER 1 (LOGICAL UNIT 3)

2-2

Table 2-3. I/O Configuration Worksheet

INPUT/OUTPUT CONFIGURATION WORKSHEET

GENERATION NUMBER RTE II DATE 7-21-76 PREPARED BY J.G./KH

	SC	14	15	16	17	20	21	22							23	24				25	26	30	31	32	33	34	35	36	37	40	41	60	61	62	63	64	65	66	67
	SUB	0	0	0	4	0		0	1	2	3	4	5	6	7	0	1	2	3	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
STEP 1	I/O INTERFACE CARD NAME																																						
	STD. LOGICAL UNIT NOS.																																						
STEP 2	1 SYS. CONSOLE DEVICE		✓																																				
	2 SYS. MASS STORAGE DEVICE							✓																															
	3 AUX. MASS STORAGE DEVICE								✓																														
	4 OUTPUT DEVICE				✓																																		
	5 INPUT DEVICE			✓																																			
	6 LIST OUTPUT DEVICE					✓																																	
STEP 3 →	7_{10} to 63_{10}	12	1	5	4	6		2	3	14	15	16	17	18	19		8	9	10	11	7	28	51	52	53	54	55	56	57	58	59	60	20	21	22	23	24	25	26	27
STEP 4 →	DVR IDENT. (DVrxx)	11	00	01	02	12	31								23						00	12	43	43	43	43	43	43	43	43	43	43	00	00	00	00	00	00	00	00
STEP 5 →	DMA REQUIRED (D)	D					D								D																								
STEP 6 →	EQT ENTRY NO.	3	2	5	4	6	1								8					7	9	18	19	20	21	22	23	24	25	26	27	10	11	12	13	14	15	16	17
STEP 7 →	BUFFERED OUTPUT (B)		B		B	B									B					B	B										B	B	B	B	B	B	B	B
STEP 8 →	TIME OUT (T)			50	50	100									9999					2000	100																		
STEP 9 →	EXTENDED EQT (NUMBER)																					18	18	18	18	18	18	18	18	18	18	5000	5000	5000	5000	5000	5000	5000	5000
	OCTAL SELECT CODE / SUBCHANNEL	14	15	16	17	20	21	22							23	24				25	26	30	31	32	33	34	35	36	37	40	41	60	61	62	63	64	65	66	67
		0	0	0	4	0		0	1	2	3	4	5	6	7	0	1	2	3	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

TPRTE-10

2-11/2-12

3-26. ON-LINE GENERATOR INPUT WORKSHEETS

Initialization Phase

(1) LIST FILE NAME?
6

(1A) ECHO?
YES

(2) EST # OF TRACKS IN OUTPUT FILE?
35

(3) OUTPUT FILE NAME?
RTE II,,2

(4) TARGET SYSTEM DISC?
7900

(5a) HP 7900/7901 Disc Only

MH DISC CHNL?
21

TRKS, FIRST TRK ON SUBCHNL?

0?
203, 0

1?
203, 0

2?
203, 0

3?
203, 0

4?
203, 0

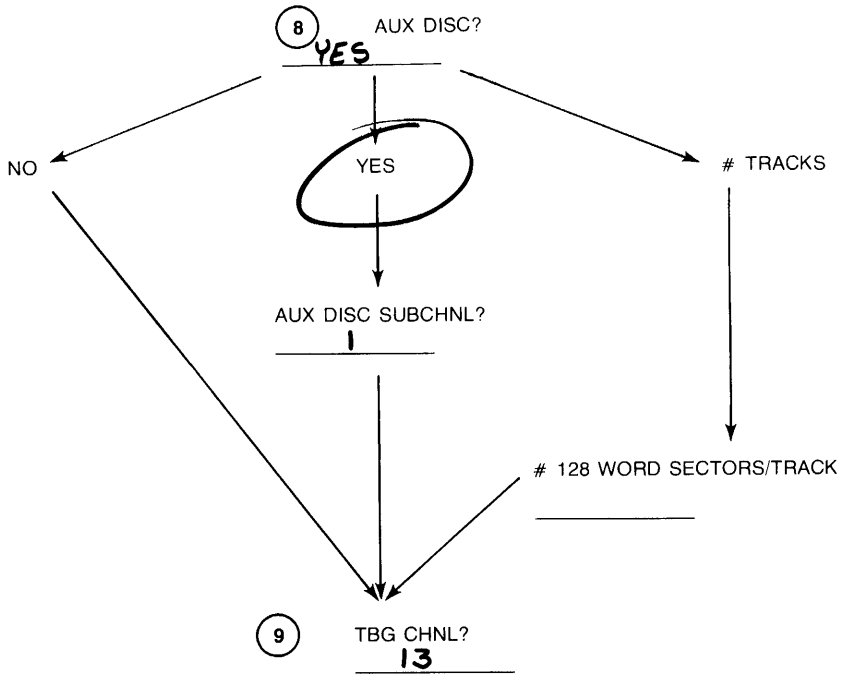
5?
203, 0

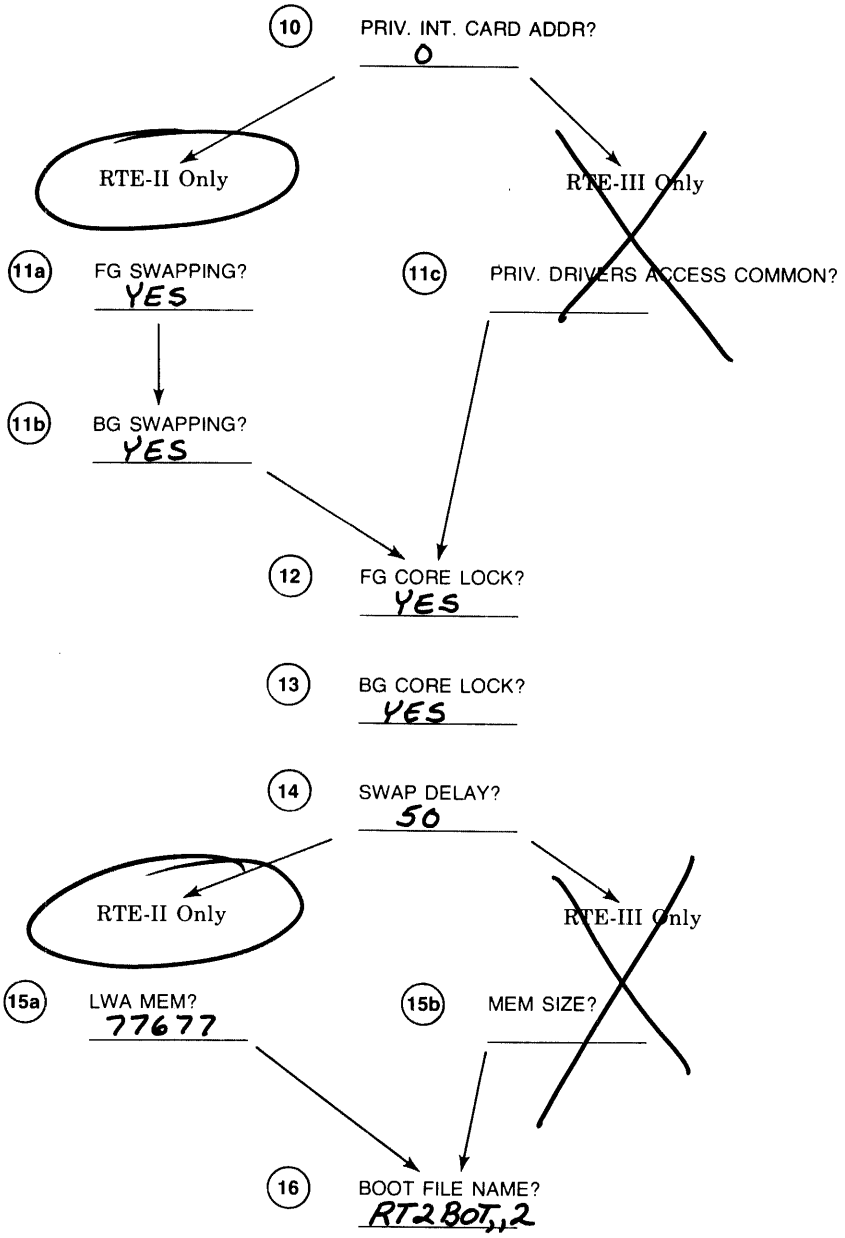
6?
203, 0

7?
203, 0

(6) # 128 WORD SECTORS/TRACK
48

(7) SYSTEM SUBCHNL?
0




10
PRIV. INT. CARD ADDR?
0
RTE-II Only
RTE-III Only
11a
FG SWAPPING?
YES
11c
PRIV. DRIVERS ACCESS COMMON?
11b
BG SWAPPING?
YES
12
FG CORE LOCK?
YES
13
BG CORE LOCK?
YES
14
SWAP DELAY?
50
RTE-II Only
RTE-III Only
15a
LWA MEM?
77677
15b
MEM SIZE?
16
BOOT FILE NAME?
RT2BOT,,2

Program Input Phase

(17a) Enter mapping options using the MAP command. This command may be re-entered at any time during this phase to change mapping options.

```
MAP ALL
```

(17b) Enter linkage control options using the LINKS IN command. The LINKS IN command may be re-entered at any time during this phase to change linkage options.

```
LINKS IN CURRENT
```

(17c) Enter the RELOCATE commands (with optional MAP, LINKS IN, and DISPLAY commands).

REL ________ , %CR2SY,,19
REL ________ , %$CMD2,,19
REL ________ , %MTM ,,19
REL ________ , %2DP43 ,,19
REL ________ , %DVRØØ,,19
REL ________ , %DVR11 ,,19
REL ________ , %DVR12 ,,19
REL ________ , %DVA12,,19
REL ________ , %DVR23,,19
REL ________ , %DVR31,,19
REL ________ , %AUTOR,,19
REL ________ , %EDITR,,19
REL ________ , %ASMB,,19
REL ________ , %XREF ,,19
REL ________ , %LDR2 ,,19
REL ________ , %WHZT2,,19
REL ________ , SYSONR ,,19
REL ________ , %BMPG1 ,,19
REL ________ , %BMPG2,,19
REL ________ , %BMPG3,,19
REL ________ , %2SP01 ,,19
REL ________ , %2SP02 ,,19
REL ________ , %SYLIB ,,19
REL ________ , %CLIB ,,19
REL ________ , %RLIB1,,19
REL ________ , %RLIB2,,19
REL ________ , %BMLIB ,,19
REL ________ , %FF4.N ,,19
REL ________ , %FTN4,,19
REL ________ , %FFTN4,,19
REL ________ , %ØFTN4,,19
REL ________ , %1FTN4,,19
REL ________ , %2FTN4,,19
REL ________ , %3FTN4,,19
REL ________ , %4FTN4,,19
REL ________ , %ALGOL,,19
REL ________ , %ALGL1 ,,19
REL ________ , %RT2G1 ,,19
REL ________ , %RT2G2 ,,19
REL ________ , %SWTCH ,,19
REL ________ , %SAVE ,,19
REL ________ , %RESTR ,,19
REL ________ , %COPY ,,19

REL ________ , %VERFY,,19
REL ________ , %DBKLB ,,19
REL ________ , ________
REL ________ , ________
REL ________ , ________
REL ________ , ________
REL ________ , ________
REL ________ , ________
REL ________ , ________
REL ________ , ________
REL ________ , ________
REL ________ , ________
REL ________ , ________
REL ________ , ________
REL ________ , ________
REL ________ , ________
REL ________ , ________
REL ________ , ________
REL ________ , ________
REL ________ , ________
REL ________ , ________
REL ________ , ________
REL ________ , ________
REL ________ , ________
REL ________ , ________
REL ________ , ________
REL ________ , ________
REL ________ , ________
REL ________ , ________
REL ________ , ________
REL ________ , ________
REL ________ , ________
REL ________ , ________
REL ________ , ________
REL ________ , ________
REL ________ , ________
REL ________ , ________
REL ________ , ________
REL ________ , ________
REL ________ , ________
REL ________ , ________
REL ________ , ________
REL ________ , ________

(17d) Enter DISPLAY command options, to obtain symbol table information, if necessary.

(17e) Enter /E to terminate this phase.

```
/E
```

(18) PARAMETERS

D.RTR	1	1	
WHZAT	2	1	
SYSON	82		
ASMB	3	95	
XREF	3	96	
LOADR	3	97	
EDITR	3	50	
AUTOR	3	1	
PRMPT	2		
SPOUT	2		
RPN	2	50	
/E			

(19) CHANGE ENTS?

.MPY	RP	100200
.DIV	RP	100400
.DLD	RP	104200
.DST	RP	104400
.FAD	RP	105000
.FSB	RP	105020
.FMP	RP	105040
.FDV	RP	105060
IFIX	RP	105100
FLOAT	RP	105120
/E		

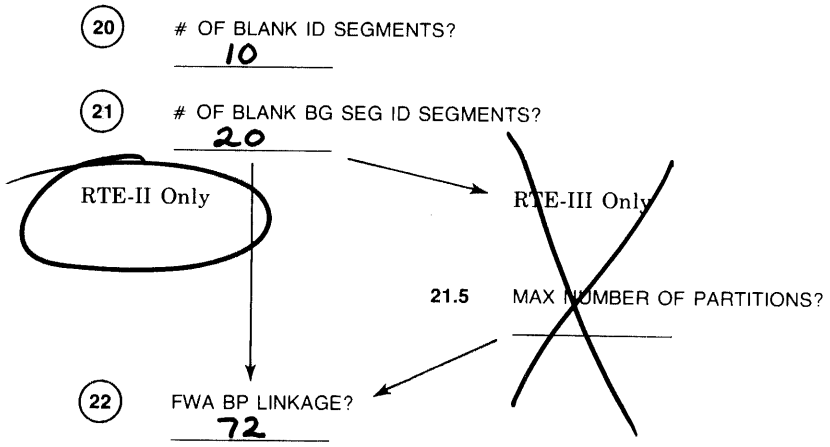


Table Generation Phase

23 *# OF I/O CLASSES?
12

24 *# OF LU MAPPINGS?
12

25 *# OF RESOURCE NUMBERS?
12

26 *BUFFER LIMITS (LOW,HIGH)
100 , 400

(27) *EQUIPMENT TABLE ENTRY

EQT 01?
21 , DVR31 , D , _____ , _____ , _____

EQT 02?
15 , DVRØØ , B , _____ , _____ , _____

EQT 03?
14 , DVR11 , D , _____ , _____ , _____

EQT 04?
17 , DVRØ2 , B , T=5Ø , _____ , _____

EQT 05?
16 , DVRØ1 , T=5Ø , _____ , _____ , _____

EQT 06?
20 , DVR12 , B , T=1ØØ , _____ , _____

EQT 07?
25 , DVRØØ , B , T=2ØØØ , _____ , _____

EQT 08?
23 , DVR23 , D , B , T=9999 , _____

EQT 09?
26 , DVA12 , B , T=1ØØ , _____ , _____

EQT 10?
60 , DVRØØ , B , T=5ØØØ , _____ , _____

EQT 11?
61 , DVRØØ , B , T=5ØØØ , _____ , _____

EQT 12?
62 , DVRØØ , B , T=5ØØØ , _____ , _____

EQT 13?
63 , DVRØØ , B , T=5ØØØ , _____ , _____

EQT 14?
64 , DVRØØ , B , T=5ØØØ , _____ , _____

EQT 15?
65 , DVRØØ , B , T=5ØØØ , _____ , _____

EQT 16?
66 , DVRØØ , B , T=5ØØØ , _____ , _____

EQT 17?
67 , DVRØØ , B , T=5ØØØ , _____ , _____

EQT 18?
30 , DVS43 , X=18 , _____ , _____ , _____

EQT 19?
31 , DVS43 , X=18 , _____ , _____ , _____

EQT 20?
32 , DVS43 , X=18 , _____ , _____ , _____

EQT 21?
33 , DVS43 , X=18 , _____ , _____ , _____

EQT 22?
34 , DVS43 , X=18 , _____ , _____ , _____

EQT 23?
35 , DVS43 , X=18 , _____ , _____ , _____

EQT 24?
36 , DVS43 , X=18 , _____ , _____ , _____

EQT 25?
37 , DVS43 , X=18 , _____ , _____ , _____

EQT 26?
40 , DVS43 , X=18 , _____ , _____ , _____

EQT 27?
41 , DVS43 , X=18 , _____ , _____ , _____

EQT 28?
4 , DVP43 , _____ , _____ , _____ , _____

EQT 29?
/E , _____ , _____ , _____ , _____ , _____

EQT 30?
_____ , _____ , _____ , _____ , _____ , _____

EQT 31?
_____ , _____ , _____ , _____ , _____ , _____

EQT 32?
_____ , _____ , _____ , _____ , _____ , _____

EQT 33?
_____ , _____ , _____ , _____ , _____ , _____

EQT 34?
_____ , _____ , _____ , _____ , _____ , _____

EQT 35?
_____ , _____ , _____ , _____ , _____ , _____

(28) *DEVICE REFERENCE TABLE

1 = EQT #?	2 , Ø	18 = EQT #?	1 , 6
2 = EQT #?	1 , Ø	19 = EQT #?	1 , 7
3 = EQT #?	1 , 1	20 = EQT #?	10 , Ø
4 = EQT #?	4 , 4	21 = EQT #?	11 , Ø
5 = EQT #?	5 , Ø	22 = EQT #?	12 , Ø
6 = EQT #?	6 , Ø	23 = EQT #?	13 , Ø
7 = EQT #?	7 , 1	24 = EQT #?	14 , Ø
8 = EQT #?	8 , Ø	25 = EQT #?	15 , Ø
9 = EQT #?	8 , 1	26 = EQT #?	16 , Ø
10 = EQT #?	8 , 2	27 = EQT #?	17 , Ø
11 = EQT #?	8 , 3	28 = EQT #?	9 , Ø
12 = EQT #?	3 , Ø	29 = EQT #?	Ø ,
13 = EQT #?	Ø ,	30 = EQT #?	Ø ,
14 = EQT #?	1 , 2	31 = EQT #?	Ø ,
15 = EQT #?	1 , 3	32 = EQT #?	Ø ,
16 = EQT #?	1 , 4	33 = EQT #?	Ø ,
17 = EQT #?	1 , 5	34 = EQT #?	Ø ,

35 = EQT #?
Ø , _____

36 = EQT #?
Ø , _____

37 = EQT #?
Ø , _____

38 = EQT #?
Ø , _____

39 = EQT #?
Ø , _____

40 = EQT #?
Ø , _____

41 = EQT #?
Ø , _____

42 = EQT #?
Ø , _____

43 = EQT #?
Ø , _____

44 = EQT #?
Ø , _____

45 = EQT #?
Ø , _____

46 = EQT #?
Ø , _____

47 = EQT #?
Ø , _____

48 = EQT #?
Ø , _____

49 = EQT #?
Ø , _____

50 = EQT #?
Ø , _____

51 = EQT #?
18 , Ø

52 = EQT #?
19 , Ø

53 = EQT #?
20 , Ø

54 = EQT #?
21 , Ø

55 = EQT #?
22 , Ø

56 = EQT #?
23 , Ø

57 = EQT #?
24 , Ø

58 = EQT #?
25 , Ø

59 = EQT #?
26 , Ø

60 = EQT #?
27 , Ø

61 = EQT #?
28 , Ø

62 = EQT #?
1E , _____

63 = EQT #?
_____ , _____

(29) *INTERRUPT TABLE

4	ENT	$POWR
14	EQT	3
15	PRG	PRMPT
16	EQT	5
17	EQT	4
20	EQT	6
21	EQT	1
22	EQT	1
23	EQT	8
24	EQT	8
25	PRG	PRMPT
26	EQT	9
30	EQT	18
31	EQT	19
32	EQT	20
33	EQT	21
34	EQT	22
35	EQT	23
36	EQT	24
37	EQT	25
40	EQT	26
41	EQT	27
60	PRG	PRMPT
61	PRG	PRMPT
62	PRG	PRMPT
63	PRG	PRMPT
64	PRG	PRMPT
65	PRG	PRMPT
66	PRG	PRMPT
67	PRG	PRMPT
/E		

RTE-II SYSTEM GENERATION

System Boundaries Phase

(30a) LIB ADDRS ~~xxxxx~~ 34137
CHANGE LIB ADDRS?
36000

(30b) FG COMMON ~~xxxxx~~ 00000
CHANGE FG COMMON?
0

(30c) FG RES ADD ~~xxxxx~~ 36103
CHANGE FG RES ADD?
0

BG BOUNDRY *xxxxx*
CHANGE BG BOUNDRY?

(30d) FG DSC ADD ~~xxxxx~~ 40415
CHANGE FG DSC ADD?
42000

(30e) BP LINKAGE ~~xxxxx~~ 00441
CHANGE BP LINKAGE?
720

(30f) SYS AV MEM ~~xxxxx~~ 47652
CHANGE SYS AV MEM?
0

(30g) BG BOUNDRY ~~xxxxx~~ 47652
CHANGE BG BOUNDRY?
50000

(30h) BG COMMON ~~xxxxx~~ 00000
CHANGE BG COMMON?
0

(30i) BG RES ADD ~~xxxxx~~ 50000
CHANGE BG RES ADD?
0

(30j) BG DSC ADD ~~xxxxx~~ 50000
CHANGE BG DSC ADD?
0

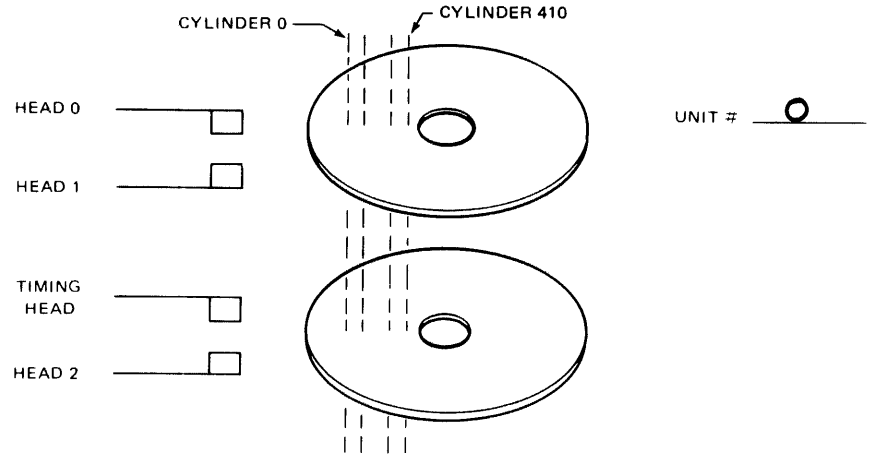
(30k) SYSTEM STORED ON DISC
SYS SIZE: ~~xx~~ TRKS, ~~xxx~~ SECS(10)
34 009
RT2GN FINISHED

C-2. RTE-III SAMPLE WORKSHEETS

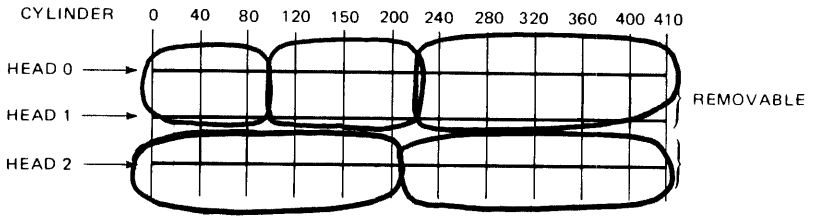
The pages that follow contain reproductions of the worksheets used for the generation of the typical RTE-III System described in Section I. A step-by-step description of this generation is given in Section IV. Appendix D shows an answer file and Appendix E shows the listed output for the sample RTE-III System generation.

Table 2-2. HP 7905 Disc Worksheet

STEP 1 FILL IN UNIT NUMBER:



STEP 2 TRACKS SHOWN END-TO-END ON THREE SURFACES. USE PENCIL TO CIRCLE YOUR SUBCHANNELS:



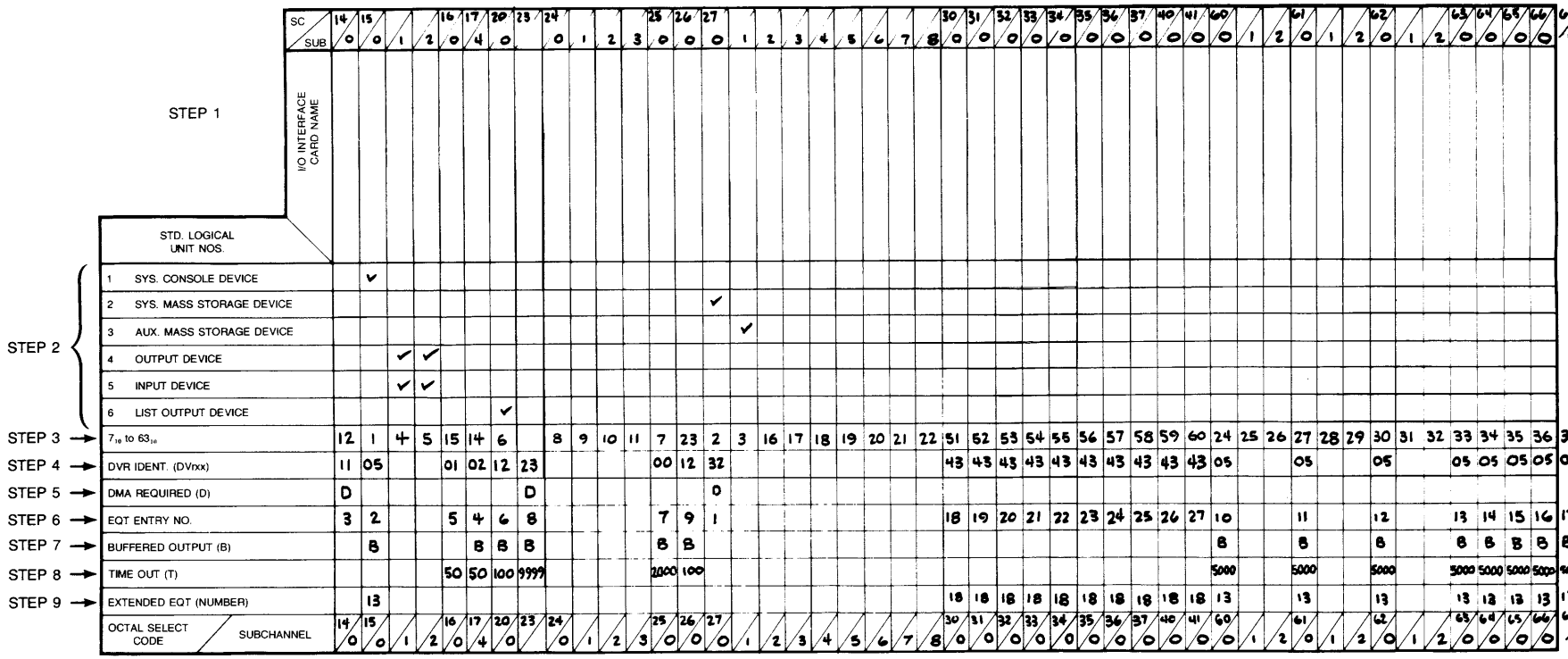
STEP 3 TRANSLATE STEP 2 TO NUMBERS:

SUBCHANNEL	0	1	2	3	4	
NUMBER OF TRACKS	203	203	400	203	203	
STARTING CYLINDER	0	104	208	0	206	
STARTING HEAD	0	0	0	2	2	
NUMBER OF SURFACES	2	2	2	1	1	
NUMBER OF SPARES	3	3	4	3	2	
SYSTEM ? (✓)	✓					
AUXILIARY (✓)		✓				

Table 2-3. I/O Configuration Worksheet

INPUT/OUTPUT CONFIGURATION WORKSHEET

GENERATION NUMBER RTE III DATE 7/21/76 PREPARED BY J.G./K.H



2-11/2-12

3-26. ON-LINE GENERATOR INPUT WORKSHEETS

Initialization Phase

(1) LIST FILE NAME?
6

(1A) ECHO?
YES

(2) EST # OF TRACKS IN OUTPUT FILE?
35

(3) OUTPUT FILE NAME?
RTE III,,2

(4) TARGET SYSTEM DISC?
7905

(5a) HP 7900/7901 Disc Only

MH DISC CHNL?

TRKS, FIRST TRK ON SUBCHNL?

0? _____ , _____

1? _____ , _____

2? _____ , _____

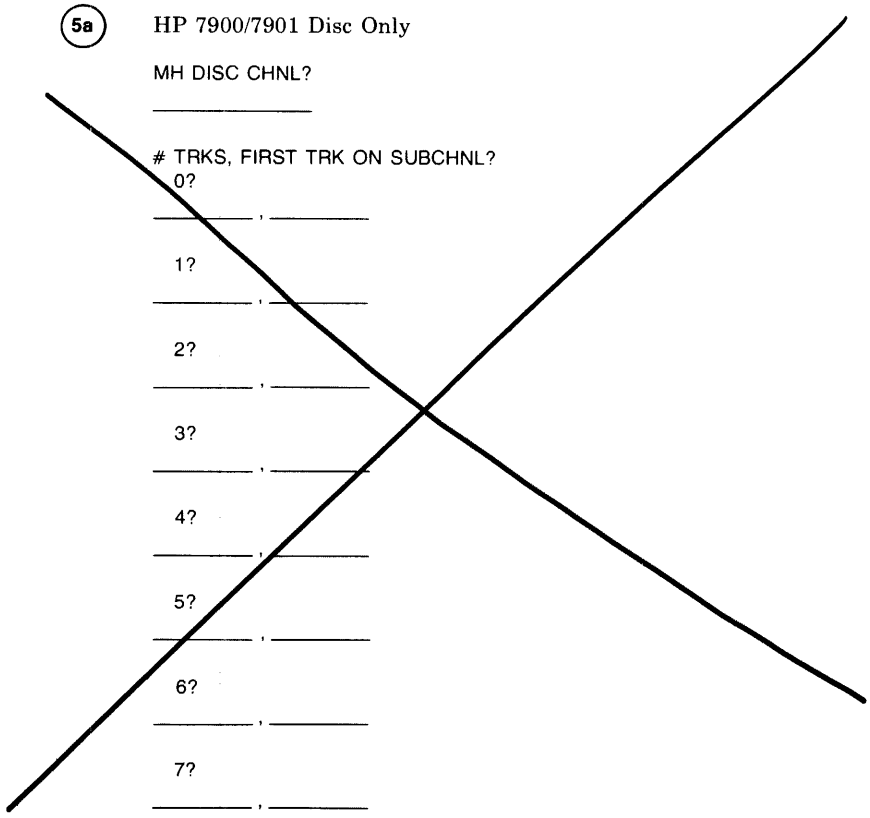
3? _____ , _____

4? _____ , _____

5? _____ , _____

6? _____ , _____

7? _____ , _____



(5b) HP 7905 Disc Only

CONTROLLER CHNL?
27

TRKS, FIRST CYL #, HEAD, # SURFACES, UNIT, # SPARES FOR SUBCHNL:

00?
203 , 0 , 0 , 2 , 0 , 3

01?
203 , 104 , 0 , 2 , 0 , 3

02?
400 , 208 , 0 , 2 , 0 , 4

03?
203 , 0 , 2 , 1 , 0 , 3

04?
203 , 206 , 2 , 1 , 0 , 2

05?
203 , 0 , 0 , 2 , 1 , 3

06?
600 , 104 , 0 , 2 , 1 , 10

07?
203 , 0 , 2 , 1 , 1 , 3

08?
203 , 206 , 2 , 1 , 1 , 2

09?
/E , , , , , ,

10? , , , , , ,

11? , , , , , ,

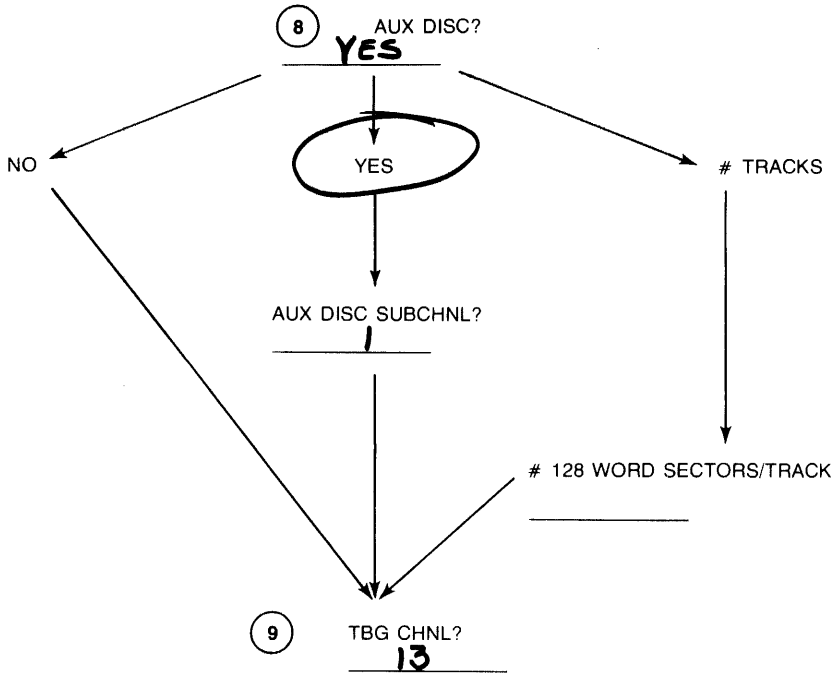
12? , , , , , ,

13? , , , , , ,

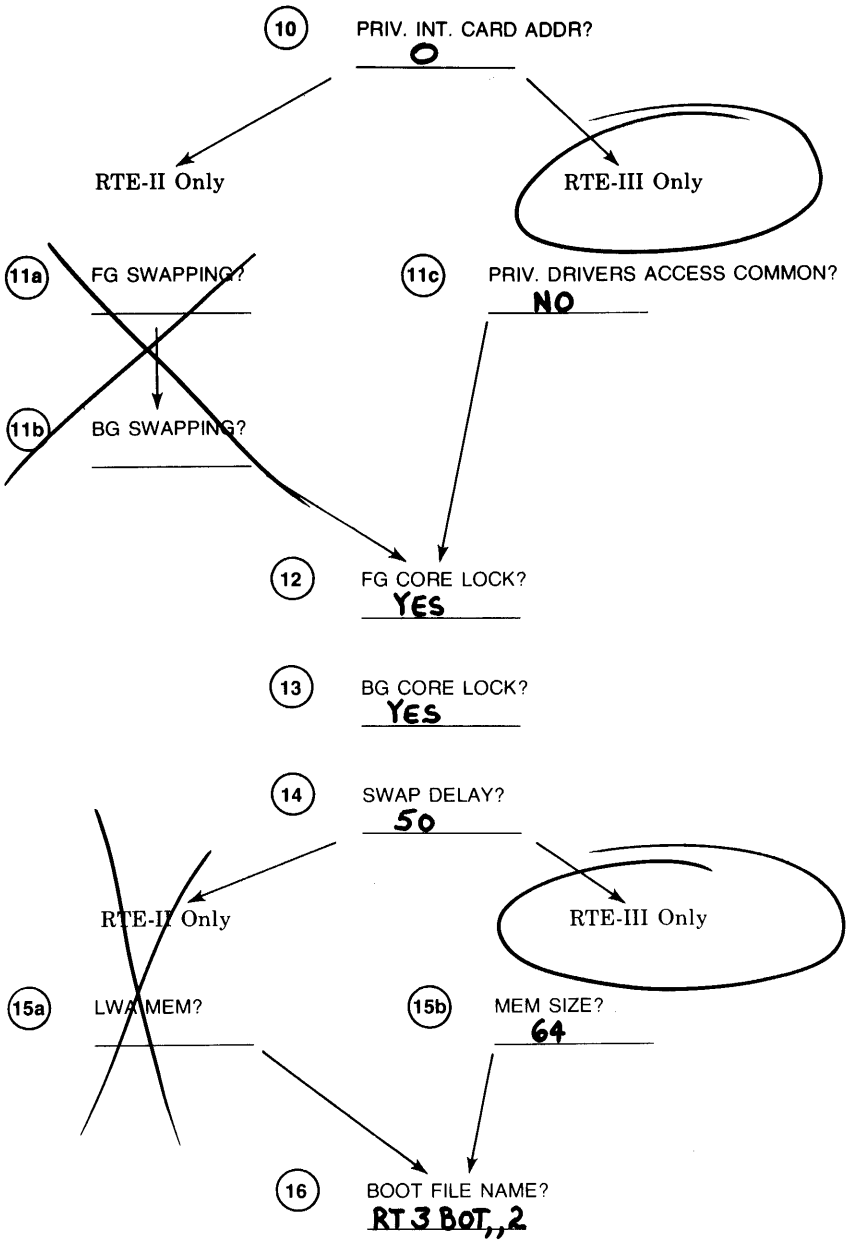
14? , , , , , ,

(6) # 128 WORD SECTORS/TRACK
48

(7) SYSTEM SUBCHNL?
0



3-48


10
PRIV. INT. CARD ADDR?
0
RTE-II Only
RTE-III Only
11a
FG SWAPPING?
11c
PRIV. DRIVERS ACCESS COMMON?
NO
11b
BG SWAPPING?
12
FG CORE LOCK?
YES
13
BG CORE LOCK?
YES
14
SWAP DELAY?
50
RTE-II Only
RTE-III Only
15a
LWA MEM?
15b
MEM SIZE?
64
16
BOOT FILE NAME?
RT3 BOT,,2

Program Input Phase

(17a) Enter mapping options using the MAP command. This command may be re-entered at any time during this phase to change mapping options.

```
MAP ALL
```

(17b) Enter linkage control options using the LINKS IN command. The LINKS IN command may be re-entered at any time during this phase to change linkage options.

```
LINKS IN CURRENT
```

(17c) Enter the RELOCATE commands (with optional MAP, LINKS IN, and DISPLAY commands).

REL ______, %CR3SY,,19	REL ______, %COPY,,19
REL ______, %$CMD3,,19	REL ______, %VERFY,,19
REL ______, %MTM,,19	REL ______, %DBKLB,,19
REL ______, %3DP43,,19	REL ______, ______
REL ______, %DVR00,,19	REL ______, ______
REL ______, %4DV05,,19	REL ______, ______
REL ______, %DVR11,,19	REL ______, ______
REL ______, %DVR12,,19	REL ______, ______
REL ______, %DVA12,,19	REL ______, ______
REL ______, %DVR23,,19	REL ______, ______
REL ______, %DVR32,,19	REL ______, ______
REL ______, %AUTOR,,19	REL ______, ______
REL ______, %EDITR,,19	REL ______, ______
REL ______, %ASMB,,19	REL ______, ______
REL ______, %XREF,,19	REL ______, ______
REL ______, %LDR3,,19	REL ______, ______
REL ______, %WHZT3,,19	REL ______, ______
REL ______, SYSONR,,19	REL ______, ______
REL ______, %BMPG1,,19	REL ______, ______
REL ______, %BMPG2,,19	REL ______, ______
REL ______, %BMPG3,,19	REL ______, ______
REL ______, %3SP01,,19	REL ______, ______
REL ______, %3SP02,,19	REL ______, ______
REL ______, %SYLIB,,19	REL ______, ______
REL ______, %CLIB,,19	REL ______, ______
REL ______, %RLIB1,,19	REL ______, ______
REL ______, %RLIB2,,19	REL ______, ______
REL ______, %BMLIB,,19	REL ______, ______
REL ______, %FF4.N,,19	REL ______, ______
REL ______, %FTN4,,19	REL ______, ______
REL ______, %FFTN4,,19	REL ______, ______
REL ______, %0FTN4,,19	REL ______, ______
REL ______, %1FTN4,,19	REL ______, ______
REL ______, %2FTN4,,19	REL ______, ______
REL ______, %3FTN4,,19	REL ______, ______
REL ______, %4FTN4,,19	REL ______, ______
REL ______, %ALGOL,,19	REL ______, ______
REL ______, %ALGL1,,19	REL ______, ______
REL ______, %RT3G1,,19	REL ______, ______
REL ______, %RT3G2,,19	REL ______, ______
REL ______, %SWTCH,,19	REL ______, ______
REL ______, %SAVE,,19	REL ______, ______
REL ______, %RESTR,,19	REL ______, ______

3-51

(17d) Enter DISPLAY command options, to obtain symbol table information, if necessary.

(17e) Enter /E to terminate this phase.

/E

(18) PARAMETERS

```
DRTR , 1  , 1  ,
WHZAT, 2  , 1  ,
SYSON, 82 ,    ,
ASMB , 3  , 95 ,
XREF , 3  , 96 ,
LOADR, 3  , 97 ,
EDITR, 3  , 50 ,
AUTOR, 3  , 1  ,
SPOUT, 2  ,    ,
PRMPT, 2  ,    ,
R$PN$, 2  , 50 ,
/E   ,    ,    ,
```

3-53

(19) CHANGE ENTS?

```
.MPY , RP , 100200
.DIV , RP , 100400
.DLD , RP , 104200
.DST , RP , 104400
.FAD , RP , 105000
.FSB , RP , 105020
.FMP , RP , 105040
.FDV , RP , 105060
IFIX , RP , 105100
FLOAT, RP , 105120
.MVW , RP , 105777
/E
```

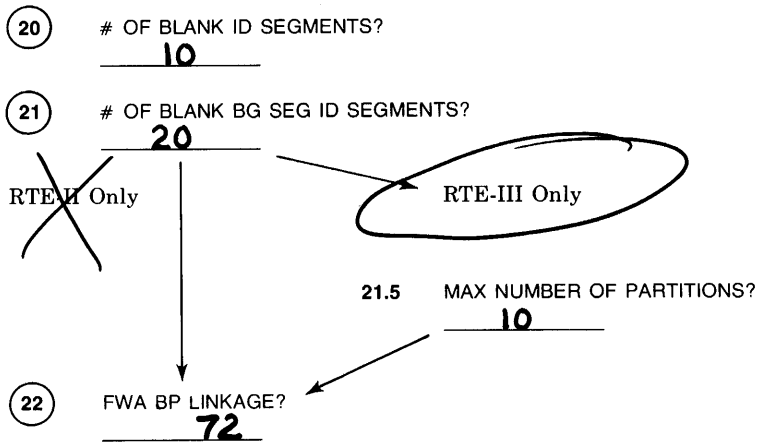


Table Generation Phase

23 *# OF I/O CLASSES?
12

24 *# OF LU MAPPINGS?
12

25 *# OF RESOURCE NUMBERS?
12

26 *BUFFER LIMITS (LOW,HIGH)
100 , 400

(27) *EQUIPMENT TABLE ENTRY

EQT 01?
27 , DVR32 , D , _____ , _____ , _____

EQT 02?
15 , DVRØ5 , B , X=13 , _____ , _____

EQT 03?
14 , DVR11 , D , _____ , _____ , _____

EQT 04?
17 , DVRØ2 , B , T=5Ø , _____ , _____

EQT 05?
16 , DURØ1 , T=5Ø , _____ , _____ , _____

EQT 06?
2Ø , DUR12 , B , T=1ØØ , _____ , _____

EQT 07?
25 , DURØØ , B , T=2ØØØ , _____ , _____

EQT 08?
23 , DVR23 , D , B , T=9999 , _____

EQT 09?
26 , DVA12 , B , T=1ØØ , _____ , _____

EQT 10?
6Ø , DURØ5 , B , T=5ØØØ , X=13 , _____

EQT 11?
61 , DURØ5 , B , T=5ØØØ , X=13 , _____

EQT 12?
62 , DURØ5 , B , T=5ØØØ , X=13 , _____

EQT 13?
63 , DURØ5 , B , T=5ØØØ , X=13 , _____

EQT 14?
64 , DURØ5 , B , T=5ØØØ , X=13 , _____

EQT 15?
65 , DURØ5 , B , T=5ØØØ , X=13 , _____

EQT 16?
66 , DURØ5 , B , T=5ØØØ , X=13 , _____

EQT 17?
67 , DURØ5 , B , T=5ØØØ , X=13 , _____

3-56

EQT 18?
3ϕ , DUS43 , X=18 , _____ , _____ , _____

EQT 19?
31 , DUS43 , X=18 , _____ , _____ , _____

EQT 20?
32 , DUS43 , X=18 , _____ , _____ , _____

EQT 21?
33 , DUS43 , X=18 , _____ , _____ , _____

EQT 22?
34 , DUS43 , X=18 , _____ , _____ , _____

EQT 23?
35 , DUS43 , X=18 , _____ , _____ , _____

EQT 24?
36 , DUS43 , X=18 , _____ , _____ , _____

EQT 25?
37 , DUS43 , X=18 , _____ , _____ , _____

EQT 26?
40 , DUS43 , X=18 , _____ , _____ , _____

EQT 27?
41 , DUS43 , X=18 , _____ , _____ , _____

EQT 28?
4 , DUP43 , _____ , _____ , _____ , _____

EQT 29?
1E , _____ , _____ , _____ , _____ , _____

EQT 30?
_____ , _____ , _____ , _____ , _____ , _____

EQT 31?
_____ , _____ , _____ , _____ , _____ , _____

EQT 32?
_____ , _____ , _____ , _____ , _____ , _____

EQT 33?
_____ , _____ , _____ , _____ , _____ , _____

EQT 34?
_____ , _____ , _____ , _____ , _____ , _____

EQT 35?
_____ , _____ , _____ , _____ , _____ , _____

35 = EQT #?
15 , Ø

36 = EQT #?
16 , Ø

37 = EQT #?
17 , Ø

38 = EQT #?
Ø , _____

39 = EQT #?
Ø , _____

40 = EQT #?
Ø , _____

41 = EQT #?
Ø , _____

42 = EQT #?
Ø , _____

43 = EQT #?
Ø , _____

44 = EQT #?
Ø , _____

45 = EQT #?
Ø , _____

46 = EQT #?
Ø , _____

47 = EQT #?
Ø , _____

48 = EQT #?
Ø , _____

49 = EQT #?
Ø , _____

50 = EQT #?
Ø , _____

51 = EQT #?
18 , Ø

52 = EQT #?
19 , Ø

53 = EQT #?
20 , Ø

54 = EQT #?
21 , Ø

55 = EQT #?
22 , Ø

56 = EQT #?
23 , Ø

57 = EQT #?
24 , Ø

58 = EQT #?
25 , Ø

59 = EQT #?
26 , Ø

60 = EQT #?
27 , Ø

61 = EQT #?
28 , Ø

62 = EQT #?
/E , _____

63 = EQT #?
_____ , _____

(29) *INTERRUPT TABLE

4	ENT	$POWR
14	EQT	3
15	PRG	PRMPT
16	EQT	5
17	EQT	4
20	EQT	6
23	EQT	8
24	EQT	8
25	PRG	PRMPT
26	EQT	9
27	EQT	1
30	EQT	18
31	EQT	19
32	EQT	20
33	EQT	21
34	EQT	22
35	EQT	23
36	EQT	24
37	EQT	25
40	EQT	26
41	EQT	27
60	PRG	PRMPT
61	PRG	PRMPT
62	PRG	PRMPT
63	PRG	PRMPT
64	PRG	PRMPT
65	PRG	PRMPT
66	PRG	PRMPT
67	PRG	PRMPT
/E		

(28) *DEVICE REFERENCE TABLE

1 = EQT #? 2 , 0
2 = EQT #? 1 , 0
3 = EQT #? 1 , 1
4 = EQT #? 2 , 1
5 = EQT #? 2 , 2
6 = EQT #? 6 , 0
7 = EQT #? 7 , 0
8 = EQT #? 8 , 0
9 = EQT #? 8 , 1
10 = EQT #? 8 , 2
11 = EQT #? 8 , 3
12 = EQT #? 3 , 0
13 = EQT #? 0 ,
14 = EQT #? 4 , 4
15 = EQT #? 5 , 0
16 = EQT #? 1 , 2
17 = EQT #? 1 , 3
18 = EQT #? 1 , 4
19 = EQT #? 1 , 5
20 = EQT #? 1 , 6
21 = EQT #? 1 , 7
22 = EQT #? 1 , 8
23 = EQT #? 9 , 0
24 = EQT #? 10 , 0
25 = EQT #? 10 , 1
26 = EQT #? 10 , 2
27 = EQT #? 11 , 0
28 = EQT #? 11 , 1
29 = EQT #? 11 , 2
30 = EQT #? 12 , 0
31 = EQT #? 12 , 1
32 = EQT #? 12 , 2
33 = EQT #? 13 , 0
34 = EQT #? 14 , 0

RTE-III SYSTEM GENERATION ONLY

Partition Definition Phase

(31a) RT COMMON 00000
CHANGE RT COMMON?
0
RT COMMON 42640

(31b) BG COMMON 00000
CHANGE BG COMMON?
0
BG COMMON 42640

(31c) LWA BG COMMON 42637
ALIGN AT NEXT PAGE?
YES
LWA BG COMMON 43777

(31d) LWA MEM RESIDENT PROG AREA 46256
ALIGN AT NEXT PAGE?
YES
LWA MEM RESIDENT PROG AREA 47777

(31e) SYS AV MEM: 01024 WORDS

(31f) 1ST DSK PG 00021
CHANGE 1ST DSK PG?
21

(31g) SYS AV MEM: 01024 WORDS
PAGES REMAINING: *xxxxx*

(31h) DEFINE PARTITIONS

1	4	RT	
2	3	RT	
3	3	RT	R
4	15	BG	
5	7	BG	
6	11	BG	
/E			

RTE-III SYSTEM GENERATION ONLY

Partition Definition Phase (Continued)

(31i) MODIFY PROGRAM PAGE REQUIREMENTS?

EDITR , 11
ASMB , 15
XREF , 11
LOADR , 15
FTN4 , 16
RT3GN , 15
ALGOL , 11
SAVE , 15
RSTOR , 15
COPY , 15
VERFY , 15
/E ,
,
,
,

(31j) ASSIGN PROGRAM PARTITIONS?

WHZAT , 3
/E ,
,
,
,
,
,
,
,
,
,
,
,
,
,
,

(31k) SYSTEM STORED ON DISC
SYS SIZE: 34 TRKS, 027 SECS(10)
RT3GN FINISHED

3-65/3-66

SAMPLE ANSWER FILE FORMATS

APPENDIX D

D-1. RT2GN SAMPLE ANSWER FILE

The following listing shows the annotated contents of the answer file for the typical RTE-II System used in the examples in this manual. The file is annotated using the * (comments) command.

```
6,                                  * LIST FILE
YES                                 * ECHO
35                                  * EST # TRACKS
RTEII,,2,                           * OUTPUT FILE
7900                                * SYSTEM DISC
21
203,0                               * SUBCHANNEL 0
203,0                               * SUBCHANNEL 1
203,0                               * SUBCHANNEL 2
203,0                               * SUBCHANNEL 3
203,0                               * SUBCHANNEL 4
203,0                               * SUBCHANNEL 5
203,0                               * SUBCHANNEL 6
203,0                               * SUBCHANNEL 7
48
0                                   * SYSTEM SUBCHANNEL
YES                                 * AUX DISC
1                                   * AUX SUBCHANNEL
13                                  * TBG
0                                   * PRIV INT
YE                                  * FG SWAPPING
YE                                  * BG SWAPPING
YE                                  * FG CORE LOCK
YE                                  * BG CORE LOCK
50                                  * SWAP DELAY
77677                               * LWAM
RT2BOT,,2,                          * BOOT FILE
LINKS IN CURRENT                    * PROGRAM INPUT PHASE
MAP ALL
REL,%CR2SY,,19
REL,%$CMD2,,19
REL,%MTM  ,,19
REL,%2DP43,,19
REL,%DVR00,,19
REL,%DVR11,,19
REL,%DVR12,,19
REL,%DVA12,,19
REL,%DVR23,,19
REL,%DVR31,,19
REL,%AUTOR,,19
REL,%EDITR,,19
REL,%ASMB ,,19
REL,%XREF ,,19
REL,%LDR2 ,,19
REL,%WHZT2,,19
REL,SYSONR,,19
REL,%EMPG1,,19
REL,%EMPG2,,19
REL,%EMPG3,,19
REL,%2SP01,,19
REL,%2SP02,,19
REL,%SYLIB,,19
REL,%CLIB,,19
REL,%RLIB1,,19
REL,%RLIB2,,19
REL,%BMLIB,,19
REL,%FF4.N,,19
REL,%FTN4,,19
REL,%FFTN4,,19
REL,%0FTN4,,19
REL,%1FTN4,,19
REL,%2FTN4,,19
REL,%3FTN4,,19
REL,%4FTN4,,19
REL,%ALGOL,,19
REL,%ALGL1,,19
REL,%RT2G1,,19
REL,%RT2G2,,19
REL,%SWTCH,,19
REL,%SAVE ,,19
```

```
REL,%RESTR,,19
REL,%COPY ,,19
REL,%VERFY,,19
REL,%DBKLB,,19
/E
D,RTR,1,1                       * PARAMETERS
WHZAT,2,1
SYSON,82
ASMB,3,95
XREF,3,96
LOADR,3,97
EDITR,3,50
AUTOR,3,1
PRMPT,2
SPOUT,2
RSPNS,2,50
/E
.MPY,RP,100200                  * EAU MACROS
.DIV,RP,100400
.DLD,RP,104200
.DST,RP,104400
.FAD,RP,105000                  * HFP MACROS
.FSB,RP,105020
.FMP,RP,105040
.FDV,RP,105060
IFIX,RP,105100
FLOAT,RP,105120
* .MVW,RP,105777                * 21MX EXTENSION MACRO
/E
10                              * BLANK ID SEGMENTS
20                              * BLANK BG ID SEGMENTS
72                              * FWABP
12                              * I/O CLASSES
12                              * LU MAPPINGS
12                              * RESOURCE NUMBERS
100,400                         * BUFFER LIMITS
21,DVR31,D                      * EQT 1  = 7900 DISC
15,DVR00,B                      * EQT 2  = 2600 CONSOLE
14,DVR11,D                      * EQT 3  = 2892 CARD READER
17,DVR02,B,T=50                 * EQT 4  = 2895 TAPE PUNCH
16,DVR01,T=50                   * EQT 5  = 2748 PHOTOREADER
20,DVR12,B,T=100                * EQT 6  = 2767 LINE PRINTER
25,DVR00,B,T=2000               * EQT 7  = 2640 CONSOLE
23,DVR23,D,B,T=9999             * EQT 8  = 7970 MAG TAPE
26,DVA12,B,T=100                * EQT 9  = 2607 LINE PRINTER
60,DVR00,B,T=5000               * EQT 10 = AUX TERMINAL
61,DVR00,B,T=5000               * EQT 11 = AUX TERMINAL
62,DVR00,B,T=5000               * EQT 12 = AUX TERMINAL
63,DVR00,B,T=5000               * EQT 13 = AUX TERMINAL
64,DVR00,B,T=5000               * EQT 14 = AUX TERMINAL
65,DVR00,B,T=5000               * EQT 15 = AUX TERMINAL
66,DVR00,B,T=5000               * EQT 16 = AUX TERMINAL
67,DVR00,B,T=5000               * EQT 17 = AUX TERMINAL
30,DVS43,X=18                   * EQT 18 = SPOOL EQT
31,DVS43,X=18                   * EQT 19 = SPOOL EQT
32,DVS43,X=18                   * EQT 20 = SPOOL EQT
33,DVS43,X=18                   * EQT 21 = SPOOL EQT
34,DVS43,X=18                   * EQT 22 = SPOOL EQT
35,DVS43,X=18                   * EQT 23 = SPOOL EQT
36,DVS43,X=18                   * EQT 24 = SPOOL EQT
37,DVS43,X=18                   * EQT 25 = SPOOL EQT
40,DVS43,X=18                   * EQT 26 = SPOOL EQT
```

```
41,DVS43,X=18                  * EQT 27 = SPOOL EQT
4,DVP43                        * EQT 28 = POWER FAIL
/E
2,0                            * LU 1  = SYSTEM CONSOLE
1,0                            * LU 2  = SYSTEM DISC, SUBCHANNEL 0
1,1                            * LU 3  = AUX DISC, SUBCHANNEL 1
4,4                            * LU 4  = PUNCH
5,0                            * LU 5  = PHOTOREADER
6,0                            * LU 6  = LINE PRINTER
7,1                            * LU 7  = TERMINAL
8,0                            * LU 8  = MAG TAPE, UNIT 0
8,1                            * LU 9  = MAG TAPE, UNIT 1
8,2                            * LU 10 = MAG TAPE, UNIT 2
8,3                            * LU 11 = MAG TAPE, UNIT 3
3,0                            * LU 12 = CARD READER
0                              * LU 13 = BIT BUCKET
1,2                            * LU 14 = PERIPHERAL DISC
1,3                            * LU 15 = PERIPHERAL DISC
1,4                            * LU 16 = PERIPHERAL DISC
1,5                            * LU 17 = PERIPHERAL DISC
1,6                            * LU 18 = PERIPHERAL DISC
1,7                            * LU 19 = PERIPHERAL DISC
10,0                           * LU 20 = TERMINAL
11,0                           * LU 21 = TERMINAL
12,0                           * LU 22 = TERMINAL
13,0                           * LU 23 = TERMINAL
14,0                           * LU 24 = TERMINAL
15,0                           * LU 25 = TERMINAL
16,0                           * LU 26 = TERMINAL
17,0                           * LU 27 = TERMINAL
9,0                            * LU 28 = LINE PRINTER
0                              * LU 29
0                              * LU 30
0                              * LU 31
0                              * LU 32
0                              * LU 33
0                              * LU 34
0                              * LU 35
0                              * LU 36
0                              * LU 37
0                              * LU 38
0                              * LU 39
0                              * LU 40
0                              * LU 41
0                              * LU 42
0                              * LU 43
0                              * LU 44
0                              * LU 45
0                              * LU 46
0                              * LU 47
0                              * LU 48
0                              * LU 49
0                              * LU 50
18,0                           * LU 51 = SPOOL LU
19,0                           * LU 52 = SPOOL LU
20,0                           * LU 53 = SPOOL LU
21,0                           * LU 54 = SPOOL LU
22,0                           * LU 55 = SPOOL LU
23,0                           * LU 56 = SPOOL LU
24,0                           * LU 57 = SPOOL LU
```

```
25,0                                    * LU 58 - SPOOL LU
26,0                                    * LU 59 - SPOOL LU
27,0                                    * LU 60 - SPOOL LU
28,0                                    * LU 61 - POWER FAIL
/E
4,ENT,$POWR                             * INTERRUPT TABLE
14,EQT,3
15,PRG,PRMPT
16,EQT,5
17,EQT,4
20,EQT,6
21,EQT,1
22,EQT,1
23,EQT,8
24,EQT,8
25,PRG,PRMPT
26,EQT,9
30,EQT,18
31,EQT,19
32,EQT,20
33,EQT,21
34,EQT,22
35,EQT,23
36,EQT,24
37,EQT,25
40,EQT,26
41,EQT,27
60,PRG,PRMPT
61,PRG,PRMPT
62,PRG,PRMPT
63,PRG,PRMPT
64,PRG,PRMPT
65,PRG,PRMPT
66,PRG,PRMPT
67,PRG,PRMPT
/E
36000                                   * LIBRARY ADDRESS
0                                       * FG COMMON
0                                       * FG RES ADDRESS
42000                                   * FG DISC RES ADDRESS
720                                     * BP ADDRESS
0                                       * SYS AVMEM
50000                                   * BG ADDRESS
0                                       * BG COMMON
0                                       * BG RES ADDRESS
0                                       * BG DISC RES ADDRESS
```

D-2. RT3GN SAMPLE ANSWER FILE

The following listing shows the annotated contents of the answer file for the typical RTE-III System used in the examples in this manual. The file is annotated using the * (comments) command.

```
6,                                  * LIST FILE
YES                                 * ECHO
35                                  * EST # TRACKS
RTEIII,,2,                          * OUTPUT FILE
7905                                * SYSTEM DISC
27
203,0,0,2,0,3                       * SUBCHANNEL 0
203,104,0,2,0,3                     * SUBCHANNEL 1
400,208,0,2,0,4                     * SUBCHANNEL 2
203,0,2,1,0,3                       * SUBCHANNEL 3
203,206,2,1,0,2                     * SUBCHANNEL 4
203,0,0,2,1,3                       * SUBCHANNEL 5
600,104,0,2,1,10                    * SUBCHANNEL 6
203,0,2,1,1,3                       * SUBCHANNEL 7
203,206,2,1,1,2                     * SUBCHANNEL 8
/E
48
0                                   * SYSTEM SUBCHANNEL
YES                                 * AUX DISC
1                                   * AUX SUBCHANNEL
13                                  * TBG
0                                   * PRIV INT
NO                                  * ACCESS COMMON
YE                                  * FG CORE LOCK
YE                                  * BG CORE LOCK
50                                  * SWAP DELAY
64                                  * MEM SIZE
RT3BOT,,2,                          * BOOT FILE
LINKS IN CURRENT                    * PROGRAM INPUT PHASE
MAP ALL
REL,%CR3SY,,19
REL,%$CMD3,,19
REL,%MTM  ,,19
REL,%3DP43,,19
REL,%DVR00,,19
REL,%4DV05,,19
REL,%DVR11,,19
REL,%DVR12,,19
REL,%DVA12,,19
REL,%DVR23,,19
REL,%DVR32,,19
REL,%AUTOR,,19
REL,%EDITR,,19
REL,%ASMB ,,19
REL,%XREF ,,19
REL,%LDR3 ,,19
REL,%WHZT3,,19
REL,SYSONR,,19
REL,%RMPG1,,19
REL,%RMPG2,,19
REL,%RMPG3,,19
REL,%3SP01,,19
REL,%3SP02,,19
REL,%SYLIB,,19
REL,%CLIB,,19
REL,%RLIB1,,19
REL,%RLIB2,,19
REL,%BMLIB,,19
REL,%FF4.N,,19
REL,%FTN4,,19
REL,%FFTN4,,19
REL,%0FTN4,,19
REL,%1FTN4,,19
REL,%2FTN4,,19
REL,%3FTN4,,19
```

```
REL,%4FTN4,,19
REL,%ALGOL,,19
REL,%ALGL1,,19
REL,%RT3G1,,19
REL,%RT3G2,,19
REL,%SWTCH,,19
REL,%SAVE ,,19
REL,%RESTR,,19
REL,%COPY ,,19
REL,%VERFY,,19
REL,%DBKLB,,19
/E
D.RTR,1,1                          * PARAMETERS
WHZAT,2,1
SYSON,82
ASMB,3,95
XREF,3,96
LOADR,3,97
EDITR,3,50
AUTOR,3,1
SPOUT,2
PRMPT,2
R$PN$,2,50
/E
.MPY,RP,100200                     * EAU MACROS
.DIV,RP,100400
.DLD,RP,104200
.DST,RP,104400
.FAD,RP,105000                     * HFP MACROS
.FSB,RP,105020
.FMP,RP,105040
.FDV,RP,105060
IFIX,RP,105100
FLOAT,RP,105120
.MVW,RP,105777                     * 21MX EXTENSION MACRO
/E
10                                 * BLANK ID SEGMENTS
20                                 * BLANK BG ID SEGMENTS
10                                 * MAX PARTITIONS
72                                 * FWABP
12                                 * I/O CLASSES
12                                 * LU MAPPINGS
12                                 * RESOURCE NUMBERS
100,400                            * BUFFER LIMITS
27,DVR32,D                         * EQT 1  = 7905 DISC
15,DVR05,B,X=13                    * EQT 2  = 2644 CONSOLE
14,DVR11,D                         * EQT 3  = 2892 CARD READER
17,DVR02,B,T=50                    * EQT 4  = 2895 TAPE PUNCH
16,DVR01,T=50                      * EQT 5  = 2748 PHOTOREADER
20,DVR12,B,T=100                   * EQT 6  = 2767 LINE PRINTER
25,DVR00,B,T=2000                  * EQT 7  = 2600 CONSOLE
23,DVR23,D,B,T=9999                * EQT 8  = 7970 MAG TAPE
26,DVA12,B,T=100                   * EQT 9  = 2607 LINE PRINTER
60,DVR05,B,T=5000,X=13             * EQT 10 = 2644 AUX TERMINAL
61,DVR05,B,T=5000,X=13             * EQT 11 = 2644 AUX TERMINAL
62,DVR05,B,T=5000,X=13             * EQT 12 = 2644 AUX TERMINAL
63,DVR05,B,T=5000,X=13             * EQT 13 = 2640 AUX TERMINAL
64,DVR05,B,T=5000,X=13             * EQT 14 = 2640 AUX TERMINAL
65,DVR05,B,T=5000,X=13             * EQT 15 = 2640 AUX TERMINAL
66,DVR05,B,T=5000,X=13             * EQT 16 = 2640 AUX TERMINAL
67,DVR05,B,T=5000,X=13             * EQT 17 = 2640 AUX TERMINAL
30,DVS43,X=18                      * EQT 18 = SPOOL EQT
31,DVS43,X=18                      * EQT 19 = SPOOL EQT
32,DVS43,X=18                      * EQT 20 = SPOOL EQT
33,DVS43,X=18                      * EQT 21 = SPOOL EQT
34,DVS43,X=18                      * EQT 22 = SPOOL EQT
35,DVS43,X=18                      * EQT 23 = SPOOL EQT
```

```
36,DVS43,X=18                  * EQT 24 = SPOOL EQT
37,DVS43,X=18                  * EQT 25 = SPOOL EQT
40,DVS43,X=18                  * EQT 26 = SPOOL EQT
41,DVS43,X=18                  * EQT 27 = SPOOL EQT
4,DVP43                        * EQT 28 = POWER FAIL
/E
2,0                            * LU 1  = SYSTEM CONSOLE
1,0                            * LU 2  = SYSTEM DISC, SUBCHANNEL 0
1,1                            * LU 3  = AUX DISC, SUBCHANNEL 1
2,1                            * LU 4  = CTU, LEFT
2,2                            * LU 5  = CTU, RIGHT
6,0                            * LU 6  = LINE PRINTER
7,0                            * LU 7  = TERMINAL
8,0                            * LU 8  = MAG TAPE, UNIT 0
8,1                            * LU 9  = MAG TAPE, UNIT 1
8,2                            * LU 10 = MAG TAPE, UNIT 2
8,3                            * LU 11 = MAG TAPE, UNIT 3
3,0                            * LU 12 = CARD READER
0                              * LU 13 = BIT BUCKET
4,4                            * LU 14 = PUNCH
5,0                            * LU 15 = PHOTOREADER
1,2                            * LU 16 = PERIPHERAL SUBCHANNEL 2
1,3                            * LU 17 = PERIPHERAL SUBCHANNEL 3
1,4                            * LU 18 = PERIPHERAL SUBCHANNEL 4
1,5                            * LU 19 = PERIPHERAL SUBCHANNEL 5
1,6                            * LU 20 = PERIPHERAL SUBCHANNEL 6
1,7                            * LU 21 = PERIPHERAL SUBCHANNEL 7
1,8                            * LU 22 = PERIPHERAL SUBCHANNEL 8
9,0                            * LU 23 = LINE PRINTER
10,0                           * LU 24 = TERMINAL
10,1                           * LU 25 = CTU, LEFT
10,2                           * LU 26 = CTU, RIGHT
11,0                           * LU 27 = TERMINAL
11,1                           * LU 28 = CTU, LEFT
11,2                           * LU 29 = CTU, RIGHT
12,0                           * LU 30 = TERMINAL
12,1                           * LU 31 = CTU, LEFT
12,2                           * LU 32 = CTU, RIGHT
13,0                           * LU 33 = TERMINAL
14,0                           * LU 34 = TERMINAL
15,0                           * LU 35 = TERMINAL
16,0                           * LU 36 = TERMINAL
17,0                           * LU 37 = TERMINAL
0                              * LU 38
0                              * LU 39
0                              * LU 40
0                              * LU 41
0                              * LU 42
0                              * LU 43
0                              * LU 44
0                              * LU 45
0                              * LU 46
0                              * LU 47
0                              * LU 48
0                              * LU 49
0                              * LU 50
18,0                           * LU 51 = SPOOL LU
19,0                           * LU 52 = SPOOL LU
20,0                           * LU 53 = SPOOL LU
21,0                           * LU 54 = SPOOL LU
```

```
22,0                            * LU 55 - SPOOL LU
23,0                            * LU 56 - SPOOL LU
24,0                            * LU 57 - SPOOL LU
25,0                            * LU 58 - SPOOL LU
26,0                            * LU 59 - SPOOL LU
27,0                            * LU 60 - SPOOL LU
28,0                            * LU 61 - POWER FAIL
/E
4,ENT,$POWR                     * INTERRUPT TABLE
14,EQT,3
15,PRG,PRMPT
16,EQT,5
17,EQT,4
20,EQT,6
23,EQT,8
24,EQT,8
25,PRG,PRMPT
26,EQT,9
27,EQT,1
30,EQT,18
31,EQT,19
32,EQT,20
33,EQT,21
34,EQT,22
35,EQT,23
36,EQT,24
37,EQT,25
40,EQT,26
41,EQT,27
60,PRG,PRMPT
61,PRG,PRMPT
62,PRG,PRMPT
63,PRG,PRMPT
64,PRG,PRMPT
65,PRG,PRMPT
66,PRG,PRMPT
67,PRG,PRMPT
/E
0                               * RT COMMON
0                               * BG COMMON
YES                             * ALIGN
YES                             * ALIGN
21                              * FIRST DISC PAGE
1,4,RT                          * DEFINE PARTITIONS
2,3,RT
3,3,RT,R
4,15,BG
5,7,BG
6,11,BG
/E
LOADR,15                        * MODIFY PAGE REQ
ASMB,15
RT3GN,15
XREF,11
ALGOL,11
FTN4,15
EDITR,11
SAVE,15
RSTOR,15
COPY,15
VERFY,15
/E
WHZAT,3                         * ASSIGN PARTITIONS
/E
```

SAMPLE GENERATION LISTINGS

APPENDIX

E

The following sample generations are reproductions of the actual listed output produced by the On-Line Generators for the typical RTE Systems used for the examples in this manual.

Note that these listings are examples only and do not necessarily reflect the most recent software revisions.

E-1. RT2GN LISTED OUTPUT

```
ECHO?
YES                                 * ECHO
EST. # TRACKS IN OUTPUT FILE?
35                                  * EST # TRACKS

OUTPUT FILE NAME?
RTEII,,2,                           * OUTPUT FILE

TARGET DISK?
7900                                * SYSTEM DISC

MH DISC CHNL?
21

# TRKS, FIRST TRK ON SUBCHNL:
  0?
203,0                               * SUBCHANNEL 0
  1?
203,0                               * SUBCHANNEL 1
  2?
203,0                               * SUBCHANNEL 2
  3?
203,0                               * SUBCHANNEL 3
  4?
203,0                               * SUBCHANNEL 4
  5?
203,0                               * SUBCHANNEL 5
  6?
203,0                               * SUBCHANNEL 6
  7?
203,0                               * SUBCHANNEL 7

# 128 WORD SECTORS/TRACK?
48

SYSTEM SUBCHNL?
0                                   * SYSTEM SUBCHANNEL

AUX DISC (YES OR NO OR # TRKS)?
YES                                 * AUX DISC

AUX DISC SUBCHNL?
1                                   * AUX SUBCHANNEL

TBG CHNL?
13                                  * TBG

PRIV. INT. CARD ADDR?
0                                   * PRIV INT

FG SWAPPING?
YE                                  * FG SWAPPING

BG SWAPPING?
YE                                  * BG SWAPPING

FG CORE LOCK?
YE                                  * FG CORE LOCK

BG CORE LOCK?
YE                                  * BG CORE LOCK

SWAP DELAY?
50                                  * SWAP DELAY
```

```
LWA MEM?
77677                                   * LWAM

BOOT FILE NAME?
RT2BOT,,2,                              * BOOT FILE

PROG INPUT PHASE:
-
LINKS IN CURRENT                        * PROGRAM INPUT PHASE
-
MAP ALL
-
REL,%CR2SY,,19
-
REL,%$CMD2,,19
-
REL,%MTM  ,,19
-
REL,%2DP43,,19
-
REL,%DVR00,,19
-
REL,%DVR11,,19
-
REL,%DVR12,,19
-
REL,%DVA12,,19
-
REL,%DVR23,,19
-
REL,%DVR31,,19
-
REL,%AUTOR,,19
-
REL,%EDITR,,19
-
REL,%ASMB ,,19
-
REL,%XREF ,,19
-
REL,%LDR2 ,,19
-
REL,%WHZ12,,19
-
REL,SYSONR,,19
-
REL,%BMPG1,,19
-
REL,%BMPG2,,19
-
REL,%BMPG3,,19
-
REL,%2SP01,,19
-
REL,%2SP02,,19
-
REL,%SYLIB,,19
-
```

```
REL,%RLIB1,,19
REL,%RLIB2,,19
REL,%BMLIB,,19
REL,%FF4.N,,19
REL,%1FFT4,,19
REL,%2FFT4,,19
REL,%ALGOL,,19
REL,%ALGL1,,19
REL,%RT2G1,,19
REL,%RT2G2,,19
REL,%SWTCH,,19
REL,%SAVE ,,19
REL,%RESTR,,19
REL,%COPY ,,19
REL,%VERFY,,19
REL,%DBKLB,,19
/E
NO UNDEFS

PARAMETERS

D.RTR,1,1                    * PARAMETERS
WHZAT,2,1
SYSON,8?
ASMB,3,95
XREF,3,96
LOADR,3,97
EDITR,3,50
AUTOR,3,1
PRMPT,2
```

```
-
SPOUT,2
-
R$PN$,2,50
-
/E

CHANGE ENTS?

-
.MPY,RP,100200                    * EAU MACROS
-
.DIV,RP,100400
-
.DLD,RP,104200
-
.DST,RP,104400
-
.FAD,RP,105000                    * HFP MACROS
-
.FSB,RP,105020
-
.FMP,RP,105040
-
.FDV,RP,105060
-
IFIX,RP,105100
-
FLOAT,RP,105120
-
* .MVW,RP,105777                  * 21MX EXTENSION MACRO
/E


# OF BLANK ID SEGMENTS?
10                                * BLANK ID SEGMENTS

# OF BLANK BG SEG. ID SEGMENTS?
20                                * BLANK BG ID SEGMENTS

FWA BP LINKAGE?
72                                * FWABP


SYSTEM

$CSYS(0099)02000 01777  92001-16012 REV.1631 760622
BP LINKAGE 00072

DISPA(0099)02000 03203  92001-16012 760622
   *$RENT  02173
   *$BRED  03075
   *$ZZZZ  03133
   *$XEQ   02043
BP LINKAGE 00072

RTIME(0099)03204 03755  92001-16012 751203
   *$TADD  03655
   *$CLCK  03204
   *$TREM  03677
   *$TIME  03406
   *$TIMV  03454
   *$ETTM  03622
```

```
   *$TIMR  03550
   *$ONTM  03521
   *$TMRQ  03725
   *$SCLK  03425
   *$BATM  03403
BP LINKAGE 00074

$ASCM(0099)03756 04050  92001-16012 760622
   *$OPER  04006
   *$ERIN  04026
   *$NOPG  04016
   *$ILST  03756
   *$NULG  03767
   *$LGBS  03777
   *$NMEM  04036
BP LINKAGE 00074

RTIOC(0099)04122 10320  92001-16012 760622
   *$CIC   04122
   *$XSIO  06103
   *$SYMG  07673
   *$IORQ  04327
   *$IOUP  07552
   *$IODN  07442
   *$ETEQ  07776
   *$IRT   04252
   *$XCIC  04140
   *$DEVT  07356
   *$GTIO  05372
   *$UPIO  07553
   *$CVEQ  07755
   *$YCIC  04141
   *$BITB  06521
   *$UNLK  07214
   *$XXUP  07614
   *$DLAY  07340
   *$DMEQ  04626
   *$CKLO  06312
   *$BLLO  00074
   *$BLUP  00075
   *$IOCL  10035
BP LINKAGE 00147
  .MVW     10334 10356  92001-16005 751021 MICROCODE = 105777B
   *.MVW   10334
BP LINKAGE 00150

$ALC (0099)10357 10564  92001-16012 741120
   *$ALC   10357
   *$RTN   10450
BP LINKAGE 00152

EXEC (0099)10603 12355  92001-16012 760622
   *EXEC   10603
   *$ERMG  12204
   *$RQST  10605
   *$QTRL  12014
   *$LIBR  11015
   *$LIBX  11501
   *$DREQ  12046
   *$DREL  12143
   *$SDRL  12021
   *$SDSK  12161
   *$ERAB  12007
```

```
   *$PVCN  11136
   *$REID  11276
   *$CREL  11707
   *$RSRE  11345
   *$ABRE  11425
   *$PWR5  10672
BP LINKAGE 00167

$TRRN(0099)12373 12536  92001-16012 750326
   *$TRRN  12373
   *$CGRN  12437
   *$ULLU  12461
BP LINKAGE 00171

SCHED(0099)12572 16171  92001-16012 760622
   *$LIST  12634
   *$MESS  13133
   *$CVT3  15002
   *$CVT1  15046
   *$ABRT  15133
   *$TYPE  15052
   *$MPT1  15176
   *$MPT2  15344
   *$MPT3  15355
   *$MPT4  15445
   *$MPT5  15465
   *$MPT6  15507
   *$PARS  13240
   *$STRT  14073
   *$SCD3  15423
   *$INER  14474
   *$MPT7  15541
   *$ASTM  13171
   *$MPT8  15701
   *$IDNO  15526
   *$WORK  12602
   *$WATR  15334
   *$IDSM  14546
   *$MPT9  15735
   *$RTST  16117
   *$CVWD  16165
   *$STRG  16113
 BP LINKAGE 00346

 DVP43(0099)16175 16566  92001-16004 REV.1631 760622
   *$POWR  16175
   *IP43   16534
   *CP43   16433
 BP LINKAGE 00351

 DVR00(0099)16567 17656  29029-60001 REV 1602 750115
   *I.00   16567
   *C.00   17127
   *I.01   16567
   *C.01   17127
   *I.02   16567
   *C.02   17127
 BP LINKAGE 00351

 DVR11(0099)17671 21020
   *C.11   20453
   *I.11   17671
 BP LINKAGE 00360
```

```
DVR12(0099)21037 21366
   *I.12   21037
   *C.12   21177
BP LINKAGE 00360

DVA12(0099)21410 22340
   *IA12   21410
   *CA12   21673
BP LINKAGE 00360

DVR23(0099)22347 23212      92202-16001  REV. A
   *I.23   22347
   *C.23   23164
BP LINKAGE 00360

DVR31(0099)23232 24430  29013-60001 REV.1631 760622
   *I.31   24075
   *C.31   23446
BP LINKAGE 00362

$BMON(0099)24516 24515  92002-12001 REV.1631 760622
BP LINKAGE 00362

$SPOL(0099)24516 24515  92002-16001 REV. 1631 760622
BP LINKAGE 00362

DVS43(0099)24532 26601  92002-16003 REV. 1631 760622
   *IS43   24532
   *CS43   26102
   *$MPID  24721
   *N.SEQ  26170
BP LINKAGE 00363

$YSLB(0099)26625 26624  92001-16005 REV 1545 751020
BP LINKAGE 00363

FF4.A(0099)26625 26624         24998-16002   751101
BP LINKAGE 00363

$BALB(0099)26625 26624  92002-16006 REV.1631 760622
BP LINKAGE 00363

RLIB (0099)26625 26624   24998-16001 REV. 1610  760301
BP LINKAGE 00363

DBKLB(0099)26625 26624  92060-16043 REV.1631 760622
   *DBKLB  26625
BP LINKAGE 00363

BP LINKAGE 00363

*# OF I/O CLASSES?
12                                  * I/O CLASSES

*# OF LU MAPPINGS?
12                                  * LU MAPPINGS

*# OF RESOURCE NUMBERS?
12                                  * RESOURCE NUMBERS

BUFFER LIMITS (LOW, HIGH)?
100,400                             * BUFFER LIMITS
```

```
* EQUIPMENT TABLE ENTRY

EQT 01?
21,DVR31,D                      * EQT 1  - 7900 DISC

EQT 02?
15,DVR00,B                      * EQT 2  - 2600 CONSOLE

EQT 03?
14,DVR11,D                      * EQT 3  - 2892 CARD READER

EQT 04?
17,DVR02,B,T=50                 * EQT 4  - 2895 TAPE PUNCH

EQT 05?
16,DVR01,T=50                   * EQT 5  - 2748 PHOTOREADER

EQT 06?
20,DVR12,B,T=100                * EQT 6  - 2607 LINE PRINTER

EQT 07?
25,DVR00,B,T=2000               * EQT 7  - 2640 CONSOLE

EQT 08?
23,DVR23,D,B,T=9999             * EQT 8  - 7970 MAG TAPE

EQT 09?
26,DVA12,B,T=100                * EQT 9  - 2607 LINE PRINTER

EQT 10?
60,DVR00,B,T=5000               * EQT 10 - AUX TERMINAL

EQT 11?
61,DVR00,B,T=5000               * EQT 11 - AUX TERMINAL

EQT 12?
62,DVR00,B,T=5000               * EQT 12 - AUX TERMINAL

EQT 13?
63,DVR00,B,T=5000               * EQT 13 - AUX TERMINAL

EQT 14?
64,DVR00,B,T=5000               * EQT 14 - AUX TERMINAL

EQT 15?
65,DVR00,B,T=5000               * EQT 15 - AUX TERMINAL

EQT 16?
66,DVR00,B,T=5000               * EQT 16 - AUX TERMINAL

EQT 17?
67,DVR00,B,T=5000               * EQT 17 - AUX TERMINAL

EQT 18?
30,DVS43,X=18                   * EQT 18 - SPOOL EQT

EQT 19?
31,DVS43,X=18                   * EQT 19 - SPOOL EQT

EQT 20?
32,DVS43,X=18                   * EQT 20 - SPOOL EQT
```

```
EQT 21?
33,DVS43,X=18                    * EQT 21 - SPOOL EQT

EQT 22?
34,DVS43,X=18                    * EQT 22 - SPOOL EQT

EQT 23?
35,DVS43,X=18                    * EQT 23 - SPOOL EQT

EQT 24?
36,DVS43,X=18                    * EQT 24 - SPOOL EQT

EQT 25?
37,DVS43,X=18                    * EQT 25 - SPOOL EQT

EQT 26?
40,DVS43,X=18                    * EQT 26 - SPOOL EQT

EQT 27?
41,DVS43,X=18                    * EQT 27 - SPOOL EQT

EQT 28?
4,DVP43                          * EQT 28 - POWER FAIL

EQT 29?
/E


* DEVICE REFERENCE TABLE

 1 = EQT #?
2,0                              * LU 1  - SYSTEM CONSOLE

 2 = EQT #?
1,0                              * LU 2  - SYSTEM DISC, SUBCHANNEL 0

 3 = EQT #?
1,1                              * LU 3  - AUX DISC, SUBCHANNEL 1

 4 = EQT #?
4,4                              * LU 4  - PUNCH

 5 = EQT #?
5,0                              * LU 5  - PHOTOREADER

 6 = EQT #?
6,0                              * LU 6  - LINE PRINTER

 7 = EQT #?
7,1                              * LU 7  - TERMINAL

 8 = EQT #?
8,0                              * LU 8  - MAG TAPE, UNIT 0

 9 = EQT #?
8,1                              * LU 9  - MAG TAPE, UNIT 1

10 = EQT #?
8,2                              * LU 10 - MAG TAPE, UNIT 2

11 = EQT #?
8,3                              * LU 11 - MAG TAPE, UNIT 3
```

```
12 = EQT #?
3,0                          * LU 12 - CARD READER

13 = EQT #?
0                            * LU 13 - BIT BUCKET

14 = EQT #?
1,2                          * LU 14 - PERIPHERAL DISC

15 = EQT #?
1,3                          * LU 15 - PERIPHERAL DISC

16 = EQT #?
1,4                          * LU 16 - PERIPHERAL DISC

17 = EQT #?
1,5                          * LU 17 - PERIPHERAL DISC

18 = EQT #?
1,6                          * LU 18 - PERIPHERAL DISC

19 = EQT #?
1,7                          * LU 19 - PERIPHERAL DISC

20 = EQT #?
10,0                         * LU 20 - TERMINAL

21 = EQT #?
11,0                         * LU 21 - TERMINAL

22 = EQT #?
12,0                         * LU 22 - TERMINAL

23 = EQT #?
13,0                         * LU 23 - TERMINAL

24 = EQT #?
14,0                         * LU 24 - TERMINAL

25 = EQT #?
15,0                         * LU 25 - TERMINAL

26 = EQT #?
16,0                         * LU 26 - TERMINAL

27 = EQT #?
17,0                         * LU 27 - TERMINAL

28 = EQT #?
9,0                          * LU 28 - LINE PRINTER

29 = EQT #?
0                            * LU 29

30 = EQT #?
0                            * LU 30

31 = EQT #?
0                            * LU 31

32 = EQT #?
0                            * LU 32
```

```
33 = EQT #?
0                                   * LU 33

34 = EQT #?
0                                   * LU 34

35 = EQT #?
0                                   * LU 35

36 = EQT #?
0                                   * LU 36

37 = EQT #?
0                                   * LU 37

38 = EQT #?
0                                   * LU 38

39 = EQT #?
0                                   * LU 39

40 = EQT #?
0                                   * LU 40

41 = EQT #?
0                                   * LU 41

42 = EQT #?
0                                   * LU 42

43 = EQT #?
0                                   * LU 43

44 = EQT #?
0                                   * LU 44

45 = EQT #?
0                                   * LU 45

46 = EQT #?
0                                   * LU 46

47 = EQT #?
0                                   * LU 47

48 = EQT #?
0                                   * LU 48

49 = EQT #?
0                                   * LU 49

50 = EQT #?
0                                   * LU 50

51 = EQT #?
18,0                                * LU 51 = SPOOL LU

52 = EQT #?
19,0                                * LU 52 = SPOOL LU

53 = EQT #?
20,0                                * LU 53 = SPOOL LU
```

```
54 = EQT #?
21,0                                * LU 54 - SPOOL LU

55 = EQT #?
22,0                                * LU 55 - SPOOL LU

56 = EQT #?
23,0                                * LU 56 - SPOOL LU

57 = EQT #?
24,0                                * LU 57 - SPOOL LU

58 = EQT #?
25,0                                * LU 58 - SPOOL LU

59 = EQT #?
26,0                                * LU 59 - SPOOL LU

60 = EQT #?
27,0                                * LU 60 - SPOOL LU

61 = EQT #?
28,0                                * LU 61 - POWER FAIL

62 = EQT #?
/E

* INTERRUPT TABLE
-
4,ENT,$POWR                         * INTERRUPT TABLE
-
14,EQT,3
-
15,PRG,PRMPT
-
16,EQT,5
-
17,EQT,4
-
20,EQT,6
-
21,EQT,1
-
22,EQT,1
-
23,EQT,8
-
24,EQT,8
-
25,PRG,PRMPT
-
26,EQT,9
-
30,EQT,18
-
31,EQT,19
-
32,EQT,20
-
33,EQT,21
-
34,EQT,22
-
```

```
35,EQT,23
-
36,EQT,24
-
37,EQT,25
-
40,EQT,26
-
41,EQT,27
-
60,PRG,PRMPT
-
61,PRG,PRMPT
-
62,PRG,PRMPT
-
63,PRG,PRMPT
-
64,PRG,PRMPT
-
65,PRG,PRMPT
-
66,PRG,PRMPT
-
67,PRG,PRMPT
-
/E

BP LINKAGE 00370

 LIB ADDRS 34137
 CHANGE  LIB ADDRS?
36000                                  * LIBRARY ADDRESS

LIBRARY

  PRTN      36000 36102  92001-16005  741120
   *PRTM    36073
   *PRTN    36000
BP LINKAGE 00372

BP LINKAGE 00372


 FG COMMON 00000
 CHANGE  FG COMMON?
0                                      * FG COMMON

FG RES ADD 36103
 CHANGE FG RES ADD?
0                                      * FG RES ADDRESS

FG RESIDENTS

D.RTR(0001)36111 40121  92002-16007 760528
BP LINKAGE 00376
  P.PAS     40160 40206  92002-16006 740801
   *P.PAS   40160
BP LINKAGE 00377

EXTND(0010)40207 40370  92002-16004 REV. 1631 760622
```

```
   *SP.CL  40207
BP LINKAGE 00401
  RMPAR    40371 40414  750701  24998-16001
   *RMPAR  40371
BP LINKAGE 00402

BP LINKAGE 00402


FG DSC ADD 40415
 CHANGE FG DSC ADD?
42000                              * FG DISC RES ADDRESS

FG DISC RESIDENTS

$$CMD(0001)42002 43125  92001-16029 REV.1631 760620
   *$$CMD  42007
BP LINKAGE 00407
  RMPAR    43126 43151  750701  24998-16001
   *RMPAR  43126
BP LINKAGE 00410

PRMPT(0010)42002 42112  92001-16003 REV.B  741216
BP LINKAGE 00402
  EQLU     42113 42170  92001-16005 741120
   *EQLU   42113
BP LINKAGE 00403

R$PN$(0050)42002 42150  92001-16003 REV.B  741002
BP LINKAGE 00402
  EQLU     42151 42226  92001-16005 741120
   *EQLU   42151
BP LINKAGE 00403
  MESSS    42227 42337  92001-16005 760622
   *MESSS  42232
BP LINKAGE 00404
  .ENTR    42340 42427  750701  24998-16001
   *.ENTR  42347
   *.ENTP  42340
BP LINKAGE 00405

WHZAT(0001)42002 43505  92001-16030 REV.1631 760617
BP LINKAGE 00402
  TMVAL    43506 43525   92001-16005 741120
   *TMVAL  43510
BP LINKAGE 00403
  .ENTR    43526 43615  750701  24998-16001
   *.ENTR  43535
   *.ENTP  43526
BP LINKAGE 00404

SYSON(0090)42002 42036     10 JUL 74 EJW
   *SYSON  42002
BP LINKAGE 00402

SMP  (0030)42056 45342  92002-16002 REV. 1631 760622
BP LINKAGE 00405
  RNRQ     45437 45664  92001-16005 741120
   *RNRQ   45437
BP LINKAGE 00406
  $ALRN    45665 45772  92001-16005  741106
   *$ALRN  45665
   *$RNSU  45721
```

```
    *$RNEX   45731
    *$LUEX   45745
    *$LUSU   45724
    *$DRAD   45755
 BP LINKAGE 00412
   .DRCT     45773 46001  92001-16005 741120
    *.DRCT   45773
 BP LINKAGE 00413
   REIO      46003 46105  92001-16005 741120
    *REIO    46007
 BP LINKAGE 00414
   .MVW      46106 46130  92001-16005 751021 MICROCODE = 105777B
    *.MVW    46106
 BP LINKAGE 00415
   READF     46131 46666  92002-16006 760607
    *READF   46143
    *WRITF   46131
 BP LINKAGE 00417
   POST      46667 46715  92002-16006  740801
    *POST    46671
 BP LINKAGE 00420
   P.PAS     46716 46744  92002-16006 740801
    *P.PAS   46716
 BP LINKAGE 00421
   RW$UB     46745 47216  92002-16006 750422
    *RW$UB   46745
    *NX$EC   47120
    *$KIP    47040
 BP LINKAGE 00423
   RWND$     47217 47327  92002-16006  740801
    *RWND$   47221
    *RFLG$   47324
 BP LINKAGE 00425
   R/W$      47330 47463  92002-16006  740801
    *R/W$    47330
    *D$XFR   47372
    *D.R     47461
 BP LINKAGE 00427
   RMPAR     47464 47507  750701  24998-16001
    *RMPAR   47464
 BP LINKAGE 00430
   .DFER     47510 47561  750701  24998-16001
    *.DFER   47510
 BP LINKAGE 00431
   .ENTR     47562 47651  750701  24998-16001
    *.ENTR   47571
    *.ENTP   47562
 BP LINKAGE 00432

 JOB  (0030)42002 43741  92002-16005 REV. 1631 760621
 BP LINKAGE 00404
   RNRQ      43745 44172  92001-16005 741120
    *RNRQ    43745
 BP LINKAGE 00405
   $ALRN     44174 44301  92001-16005  741106
    *$ALRN   44174
    *$RNSU   44230
    *$RNEX   44240
    *$LUEX   44254
    *$LUSU   44233
    *$DRAD   44264
 BP LINKAGE 00411
   LURQ      44302 44626  92001-16005 751023
```

```
   *LURQ    44302
BP LINKAGE  00415
  .DRCT     44627 44635  92001-16005 741120
   *.DRCT   44627
BP LINKAGE  00416
  REIO      44636 44740  92001-16005 741120
   *REIO    44642
BP LINKAGE  00417
  OPEN      44741 45126  92002-16006 741205
   *OPEN    44750
BP LINKAGE  00420
  READF     45127 45664  92002-16006 760607
   *READF   45141
   *WRITF   45127
BP LINKAGE  00422
  CLOSE     45665 45773  92002-16006  740801
   *CLOSE   45670
BP LINKAGE  00423
  POST      45774 46022  92002-16006  740801
   *POST    45776
BP LINKAGE  00424
  $OPEN     46027 46235  92002-16006   740801
   *$OPEN   46027
BP LINKAGE  00425
  P.PAS     46236 46264  92002-16006 740801
   *P.PAS   46236
BP LINKAGE  00426
  RW$UB     46265 46536  92002-16006 750422
   *RW$UB   46265
   *NX$EC   46440
   *$KIP    46360
BP LINKAGE  00430
  RWND$     46537 46647  92002-16006  740801
   *RWND$   46541
   *RFLG$   46644
BP LINKAGE  00432
  R/W$      46650 47003  92002-16006  740801
   *R/W$    46650
   *D$XFR   46712
   *D.R     47001
BP LINKAGE  00435
  SPOPN     47004 47054  92002-16006  741025
   *SPOPN   47006
BP LINKAGE  00436
  RMPAR     47055 47100  750701  24998-16001
   *RMPAR   47055
BP LINKAGE  00437
  .DFER     47101 47152  750701  24998-16001
   *.DFER   47101
BP LINKAGE  00440
  .ENTR     47153 47242  750701  24998-16001
   *.ENTR   47162
   *.ENTP   47153
BP LINKAGE  00441

SPOUT(0011)42002 42750  92002-16009 REV. 1631 760618
BP LINKAGE  00404
  LURQ      42751 43275  92001-16005 751023
   *LURQ    42751
BP LINKAGE  00406
  $ALRN     43276 43403  92001-16005  741106
   *$ALRN   43276
   *$RNSU   43332
```

```
   *$RNEX  43342
   *$LUEX  43356
   *$LUSU  43335
   *$DRAD  43366
BP LINKAGE 00412
  .DRCT    43404 43412  92001-16005 741120
   *.DRCT  43404
BP LINKAGE 00413

BP LINKAGE 00441


BP LINKAGE 00441
 CHANGE BP LINKAGE?
720                                 * BP ADDRESS

 SYS AVMEM 47652
 CHANGE  SYS AVMEM?
0                                   * SYS AVMEM

BG BOUNDRY 47652
 CHANGE BG BOUNDRY?
50000                               * BG ADDRESS

BG COMMON  00000
 CHANGE BG COMMON ?
0                                   * BG COMMON

BG RES ADD 50000
 CHANGE BG RES ADD?
0                                   * BG RES ADDRESS

BG RESIDENTS

(NONE)


BG DSC ADD 50000
 CHANGE BG DSC ADD?
0                                   * BG DISC RES ADDRESS

BG DISC RESIDENTS

AUTOR(0001)50002 50440
   *AUTOR  50002
BP LINKAGE 00720
  TMVAL    50441 50460   92001-16005 741120
   *TMVAL  50443
BP LINKAGE 00721
  FMTIO    50465 52074         24998-16002
   *.RIO.  50727
   *.IIO.  50715
   *.XIO.  50744
   *.XAY.  51105
   *.RAY.  51137
   *.IAY.  51150
   *.DIO.  51317
   *.BIO.  51426
   *.IOI.  51055
   *.IOR.  51014
   *.IAR.  51203
   *.RAR.  51161
   *.DTA.  51514
```

```
   *NEWIO  51444
   *OLDIO  51461
   *CODE   51256
   *ACODE  51256
   *ITLOG  51726
   *ISTAT  51733
BP LINKAGE 00726
  REIO     52100 52202  92001-16005 741120
   *REIO   52104
BP LINKAGE 00727
  FMT.E    52203 52203          24998-16002
   *FMT.E  52203
BP LINKAGE 00730
  FRMTR    52224 55025          24998-16002
   *.FRMN  52544
   *.LS2F  52536
   *.INPN  52566
   *.DTAN  52560
BP LINKAGE 00734
  CLRIO    55173 55201  750701  24998-16001
   *CLRIO  55173
BP LINKAGE 00735
  DBLE     55202 55233   750701  24998-16001
   *DBLE   55203
BP LINKAGE 00736
  IAND     55234 55243   750701  24998-16001
   *IAND   55234
BP LINKAGE 00737
  PAUSE    55244 55407  750701  24998-16001
   *.PAUS  55244
   *.STOP  55302
BP LINKAGE 00740
  PAU.E    55410 55410  750701  24998-16001
   *PAU.E  55410
BP LINKAGE 00741
  SNGL     55411 55521   750701  24998-16001
   *SNGL   55411
BP LINKAGE 00742
  .FLUN    55522 55537  750701  24998-16001
   *.FLUN  55522
BP LINKAGE 00743
  .OPSY    55540 55577  750701  24998-16001
   *.OPSY  55540
BP LINKAGE 00744
  .XPAK    55600 55763  750701  24998-16001
   *.XPAK  55605
BP LINKAGE 00745
  .DFER    55765 56036  750701  24998-16001
   *.DFER  55765
BP LINKAGE 00746
  .ENTR    56043 56132  750701  24998-16001
   *.ENTR  56052
   *.ENTP  56043
BP LINKAGE 00750

EDITR(0050)50002 54456  92002-16010 REV.C  750505
BP LINKAGE 01071
  REIO     54457 54561  92001-16005 741120
   *REIO   54463
BP LINKAGE 01072
  CREAT    54562 55037  92002-16006  741022
   *CREAT  54572
BP LINKAGE 01073
```

```
   OPEN      55040 55225  92002-16006 741205
    *OPEN    55047
BP LINKAGE  01074
   READF     55226 55763  92002-16006 760607
    *READF   55240
    *WRITF   55226
BP LINKAGE  01076
   CLOSE     55765 56073  92002-16006  740801
    *CLOSE   55770
BP LINKAGE  01101
   NAM..     56103 56177  92002-16006 740801
    *NAM..   56104
BP LINKAGE  01102
   $OPEN     56200 56406  92002-16006   740801
    *$OPEN   56200
BP LINKAGE  01103
   P.PAS     56407 56435  92002-16006 740801
    *P.PAS   56407
BP LINKAGE  01104
   RW$UB     56436 56707  92002-16006 750422
    *RW$UB   56436
    *NX$EC   56611
    *$KIP    56531
BP LINKAGE  01106
   RWND$     56710 57020  92002-16006  740801
    *RWND$   56712
    *RFLG$   57015
BP LINKAGE  01110
   R/W$      57021 57154  92002-16006  740801
    *R/W$    57021
    *D$XFR   57063
    *D.R     57152
BP LINKAGE  01113
   RMPAR     57155 57200  750701  24998-16001
    *RMPAR   57155
BP LINKAGE  01114
   .DFER     57201 57252  750701  24998-16001
    *.DFER   57201
BP LINKAGE  01115
   .ENTR     57253 57342  750701  24998-16001
    *.ENTR   57262
    *.ENTP   57253
BP LINKAGE  01117

ASMB (0095)50002 55601  92060-16022 REV.A 750420
    *ASMB    55377
    *?ASCN   52520
    *?ASMB   51205
    *?BNCN   53330
    *?BPKU   54210
    *?CHOP   51350
    *?CHPI   54536
    *?DCOD   54544
    *?ENDS   54054
    *?ERPR   53774
    *?MSYS   54615
    *?GETC   54602
    *?MOVE   52257
    *?MSYM   53626
    *?RLUN   55257
    *?AFLG   55304
    *?LSTL   53545
    *?LUNI   55312
```

```
*?RFLG  55301
*?Z     55322
*?ASM1  52206
*?LABE  52224
*?OKOL  54171
*?ORRP  53423
*?PNLE  55317
*?SETM  54622
*?SUP   54163
*?LPER  54166
*?PERL  54150
*?LOUT  54220
*?LTFL  54156
*?DRFL  55307
*?LTSA  54506
*?LTSB  54507
*?ORGS  54161
*?CNTR  54316
*?TSTR  55310
*?ASII  55330
*?ICSA  53772
*?FLGS  55276
*?BFLG  55277
*?LFLG  55300
*?TFLG  55302
*?X     55321
*?MESX  51122
*?ASCI  55327
*?LINC  53734
*?LINS  53614
*?LIST  53474
*?LUNP  55314
*?OPLK  51263
*?OPER  54566
*?PKUP  54203
*?PLIT  54334
*?PNCH  52452
*?PRNT  53664
*?RSTA  51664
*?LWA   55320
*?RDSC  55263
*?WEOF  54761
*?WRIF  55026
*?LGFL  55306
*?SEGM  51172
*?SYMK  52326
*?V     54561
*?ARTL  54420
*?LST   54155
*?PLIN  55311
*?PCOM  53736
*?SECT  55275
*?NEAU  51047
*?HA38  54275
*?XRFI  51171
*?FPT   50211
*?FP    51113
*?ENER  54167
*?PRPG  54017
*?BPSV  54152
*?BASF  54151
*?GETA  54572
*?NDOP  55323
```

```
   *?NDSY  55324
   *?SYML  54317
   *?SYMT  51762
BP LINKAGE 01207

ASMBD(0099)55602 56410  92060-16023 REV.A 750420
   *ASMBD  56125
BP LINKAGE 01227

ASMB1(0099)55602 57632  92060-16024 REV.A 750420
   *ASMB1  56124
   *?LITI  56643
   *?CMO   56363
   *?INSR  56532
   *?HA3Z  56325
   *?ENP   56464
   *?EXP   56447
BP LINKAGE 01262

ASMB2(0099)55602 60100  92060-16025 REV.A 750420
   *ASMB2  56033
   *?ART   56633
   *?BREC  56160
   *?LKLI  57415
BP LINKAGE 01263

ASMB3(0099)55602 56671  92060-16026 REV.A 750420
   *ASMB3  56050
   *?INS?  56240
BP LINKAGE 01235

ASMB4(0099)55602 57333  92060-16027 REV.A 750420
   *ASMB4  56033
   *?AREC  56160
BP LINKAGE 01232

XREF (0096)50002 56170  92060-16028 REV.A 750420
BP LINKAGE 01143
  .OPSY    56171 56230  750701  24998-16001
   *.OPSY  56171
BP LINKAGE 01144

LOADR(0097)50002 61053    92001-16002 REV.1616  760413
BP LINKAGE 01376

FMGR (0090)50002 50757  92002-16008 REV.1630 760616
   *IFLG.  50522
   *CAD.   50647
   *FM.AB  50442
   *D.     50751
   *CUSE.  50747
   *PARS.  50650
   *SEG.R  50472
   *P.SEG  50460
   *INI1.  50227
   *IN12.  50234
   *I.BUF  50222
   *O.BUF  50002
   *N.OPL  50534
   *P.RAM  50546
   *TTY.   50533
   *NO.RD  50523
   *NOCM.  50546
```

```
    *ACTV.   50525
    *J.REC   50526
    *J.NAM   50527
    *G0..    50661
    *JRN.    50524
    *.IDAD   50521
    *TL.P    50754
    *TM.VL   50756
    *L.SEG   50454
    *GT.JB   50256
    *.R.E.   50737
    *SCR.    50532
BP LINKAGE 00720
  FM.CM      50761 52664  92002-16008 760616
    *FM.ER   51764
    *OPEN.   52051
    *CLOS.   52364
    *IER.    52512
    *BRKF.   50761
    *MSS.    51665
    *JER.    52524
    *EC.HO   52426
    *CONV.   52541
    *CAMS.   50762
    *C.BUF   51045
    *.TTY    52631
    *CAM.I   51115
    *CAM.O   51335
    *ECH.    51336
    *BUF.    51337
    *ECHF.   51540
    *C.DLM   51541
    *.E.R.   51542
    *P.TR    51544
    *TMP.    51545
BP LINKAGE 00733
   .DRCT     52771 52777  92001-16005 741120
    *.DRCT   52771
BP LINKAGE 00734
   IFBRK     53000 53021  92001-16005 741120
    *IFBRK   53000
BP LINKAGE 00735
   OPEN      53022 53207  92002-16006 741205
    *OPEN    53031
BP LINKAGE 00736
   CLOSE     53210 53316  92002-16006  740801
    *CLOSE   53213
BP LINKAGE 00737
   $OPEN     53317 53525  92002-16006   740801
    *$OPEN   53317
BP LINKAGE 00740
   RWND$     53526 53636  92002-16006  740801
    *RWND$   53530
    *RFLG$   53633
BP LINKAGE 00741
   R/W$      53637 53772  92002-16006  740801
    *R/W$    53637
    *D$XFR   53701
    *D.R     53770
BP LINKAGE 00743
   RMPAR     53773 54016  750701  24998-16001
    *RMPAR   53773
BP LINKAGE 00744
```

```
   .DFER     54021 54072  750701   24998-16001
    *.DFER   54021
BP LINKAGE 00745
   .ENTR     54073 54162  750701   24998-16001
    *.ENTR   54102
    *.ENTP   54073
BP LINKAGE 00746

FMGR0(0099)54163 54170  92002-16008  740801
BP LINKAGE 00750
   PK..      54171 55614
    *PK..    54323
BP LINKAGE 00756
   CR..      55615 56677  92002-16008 760616
    *CR..    55756
BP LINKAGE 00761
   COR.A     57045 57060  92001-16005 741120
    *COR.A   57045
BP LINKAGE 00762
   READF     57051 57616  92002-16006 760607
    *READF   57073
    *WRITF   57061
BP LINKAGE 00766
   REIO      57617 57721  92001-16005 741120
    *REIO    57623
BP LINKAGE 00767
   RWNDF     57722 60003  92002-16006  740801
    *RWNDF   57731
BP LINKAGE 00770
   NAM..     60006 60102  92002-16006 740801
    *NAM..   60007
BP LINKAGE 00772
   P.PAS     60103 60131  92002-16006 740801
    *P.PAS   60103
BP LINKAGE 00773
   RW$UB     60132 60403  92002-16006 750422
    *RW$UB   60132
    *NX$EC   60305
    *$KIP    60225
BP LINKAGE 00775
   LOCK.     60404 60445  92002-16006 760616
    *LOCK.   60414
BP LINKAGE 00776
   FM.UT     60446 61606  92002-16006 760616
    *D.RIO   61126
    *DR.RD   61211
    *D.SDR   60446
    *PK.DR   60646
    *DS.LU   61046
    *D.LT    61047
    *D.LB    61050
    *DS.DF   61051
    *DS.F1   61052
BP LINKAGE 01005
   CREA.     61607 61660
    *CREA.   61616
BP LINKAGE 01006
   CREAT     61672 62147  92002-16006  741022
    *CREAT   61732
BP LINKAGE 01014

FMGR1(0099)54163 54311  92302-16008  760518
BP LINKAGE 00757
```

```
 .PARS      54312 55575   92002-16008 765025
   *.PARS   54551
BP LINKAGE  00774
  C.TAB     55576 55741   92102-16008 760622
   *C.TAB   55576
BP LINKAGE  00775
  CA..      55745 56166   92002-16008  760513
   *CA..    55750
BP LINKAGE  01003
  REA.C     56175 56247   92002-16008  760616
   *REA.C   56202
BP LINKAGE  01005
  EE..      56250 56310   92002-16008  760512
   *EE..    56256
BP LINKAGE  01007
  TR..      56311 56542   92002-16008  76
   *TR..    56340
BP LINKAGE  01014
  MR..      56543 57005   9200
   *MR..    56600
BP LINKAGE  01017
  SE..      57006 57172
   *SE..    5702
   *GLOBS   57
BP LINKAGE
  IF.
   *
BP
```

NOTE

To save space within this appendix, a portion of this listing (from the loading of FMGR to the loading of ALGOL) has been deleted.

```
                                   24998-16001

                   63526   750701  24998-16001
           467
           01400

   (0099)63527  64172
   *ALGL1   64171
   *%LNAL   63530
   *%ABAL   63527
BP LINKAGE  01403

RT2GN(0090)50002 61630  92001-16031 REV.1631 760622
```

```
*PROMT   56703
*READ    54277
*RNAME   54271
*YE/NO   54352
*DOCON   54057
*GETAL   54072
*GETNA   54127
*GETOC   54171
*GINIT   54256
*ERROR   54405
*INERR   54264
*IRERR   54450
*ABORT   54461
*CRETF   56332
*CLOSF   56363
*CLSAB   56423
*CHFIL   57417
*DRKEY   55536
*SPACE   54376
*LFOUT   55722
*RDNAM   55736
*RDBIN   56021
*GTERM   55442
*DISKA   57467
*DISKI   57515
*DISKO   57550
*DISKD   60224
*IPDCB   61171
*LFDCB   60531
*RRDCB   60751
*NMDCB   61411
*INLST   54772
*LSTS    54776
*LSTX    55023
*LSTE    55136
*TLST    55162
*PLST    55163
*.LST1   55200
*.LST2   55201
*.LST3   55202
*.LST4   55203
*.LST5   55204
*INIDX   54502
*IDXS    54506
*IDX     54533
*TIDNT   54674
*PIDNT   54675
*ID1     54712
*ID2     54713
*ID3     54714
*ID4     54715
*ID5     54716
*ID6     54717
*ID7     54720
*ID8     54721
*ID9     54722
*ID10    54723
*ID11    54724
*ID12    54725
*ID13    54726
*ID14    54727
*ID15    54730
*ID16    54731
```

```
*FIXX    55245
*FIX     55251
*PFIX    55361
*TFIX    55360
*FIX1    55376
*FIX2    55377
*FIX3    55400
*FIX4    55401
*LNKX    53533
*LNK     53537
*LNKS    53561
*LNK1    53570
*LNK2    53571
*LNK3    53572
*LLOAD   53313
*LOADS   53322
*GENIO   53331
*FWBPL   53310
*DSTBL   53340
*FSECT   53356
*TBLNK   52011
*CPLIM   53155
*LRBP    52014
*URBP    52015
*1RBP    52016
*LBBP    52017
*UBBP    52020
*IBBP    52021
*CUBP    52022
*UCUBP   52023
*ICUBP   52024
*CUBPA   53156
*CONVD   53445
*LABDO   53575
*USER    53766
*USERS   53772
*SEGS    54005
*SYS     54015
*NAMRC   56117
*NAMBL   56120
*NAMOF   56121
*ERRLU   60343
*ATRCM   54443
*IACOM   60344
*TRCHK   57051
*SWRET   53411
*FMRR    57466
*DPRS2   60462
*BPARS   60463
*OCTNO   54252
*BUFUL   54124
*TCHAR   54247
*DSKAD   60350
*ADBUF   60455
*MAPFG   60351
*NUMPG   60352
*PTYPE   60353
*TYPMS   60354
*DSKAB   52006
*$RNT    53167
*$PRV    53170
*TBCHN   53174
*PIOC    53176
```

```
    *SWAPF   53177
    *LBUF    53201
    *TBUF    53301
    *LWASM   53175
    *PPREL   53173
    *SDS#    57514
    *CURAL   53171
    *CPL2    53172
    *CMFLG   54125
    *ABCOR   53751
    *MXABC   53752
    *SETDS   53757
    *OLDDA   53744
    *ADBP    52007
    *NADBP   52010
    *OUBUF   57620
    *TTIME   53164
    *TIME1   53165
    *MULR    53166
    *LWSBP   53157
    *NLCOM   53162
    *EOBP    53160
    *#IREG   53161
    *CPLSB   60456
    *ASKEY   60457
    *SISDA   60460
    *SKEYA   60461
    *M1      55567
    *P2      53306
    *P3      53311
    *P4      53315
    *P5      53333
    *P6      60331
    *P14     60333
    *M7400   60337
BP LINKAGE 01160
  LURQ       61645 62171  92001-16005 751023
    *LURQ    61645
BP LINKAGE 01165
  $ALRN      62173 62300  92001-16005  741106
    *$ALRN   62173
    *$RNSU   62227
    *$RNEX   62237
    *$LUEX   62253
    *$LUSU   62232
    *$DRAD   62263
BP LINKAGE 01171
  COR.A      62301 62314  92001-16005 741120
    *COR.A   62301
BP LINKAGE 01172
  PARSE      62315 62334  92001-16005 741120
    *PARSE   62320
BP LINKAGE 01174
  CNUMD      62335 62354  92001-16005 741120
    *CNUMD   62337
BP LINKAGE 01175
  CREAT      62355 62632  92002-16006  741022
    *CREAT   62365
BP LINKAGE 01176
  OPEN       62633 63020  92002-16006 741205
    *OPEN    62642
BP LINKAGE 01177
  READF      63021 63556  92002-16006 760607
```

```
   *READF   63033
   *WRITF   63021
BP LINKAGE 01201
  REIO      63557 63661  92001-16005 741120
   *REIO    63563
BP LINKAGE 01202
  APOSN     63667 64030  92002-16006 750227
   *APOSN   63701
BP LINKAGE 01203
  LOCF      64036 64224  92002-16006 750416
   *LOCF    64047
BP LINKAGE 01204
  CLOSE     64225 64333  92002-16006  740801
   *CLOSE   64230
BP LINKAGE 01205
  NAM..     64334 64430  92002-16006 740801
   *NAM..   64335
BP LINKAGE 01206
  $OPEN     64431 64637  92002-16006   740801
   *$OPEN   64431
BP LINKAGE 01207
  P.PAS     64640 64666  92002-16006 740801
   *P.PAS   64640
BP LINKAGE 01210
  RW$UB     64667 65140  92002-16006 750422
   *RW$UB   64667
   *NX$EC   65042
   *$K1P    64762
BP LINKAGE 01213
  RWND$     65141 65251  92002-16006  740801
   *RWND$   65143
   *RFLG$   65246
BP LINKAGE 01215
  R/W$      65252 65405  92002-16006  740801
   *R/W$    65252
   *D$XFR   65314
   *D.R     65403
BP LINKAGE 01220
  RMPAR     65406 65431  750701  24998-16001
   *RMPAR   65406
BP LINKAGE 01221
  .DFER     65432 65503  750701  24998-16001
   *.DFER   65432
BP LINKAGE 01222
  .ENTR     65504 65573  750701  24998-16001
   *.ENTR   65513
   *.ENTP   65504
BP LINKAGE 01224

RT2G1(0099)65574 70057  92001-16031          760617
   *DSETU   66425
   *PTBOT   66721
   *DSTB    67710
   *FSEC    67744
   *DLRM1   66313
BP LINKAGE 01306

RT2G2(0099)65574 71510  92001-16031          760617
   *INPUT   66342
BP LINKAGE 01433
  RWNDF     71511 71572  92002-16006  740801
   *RWNDF   71520
BP LINKAGE 01434
```

```
RT2G3(0099)65574 71612  92001-16031          760622
   *FWENT  66372
BP LINKAGE 01557

RT2G4(0099)65574 70705  92001-16031          760622
   *NLOAD  66400
   *LODER  66422
BP LINKAGE 01444

RT2G5(0099)65574 70401  92001-16031          760618
   *GNIO   66336
BP LINKAGE 01416

RT2G7(0099)65574 70257  92001-16031          760618
   *DSET5  66506
   *PTBT5  67110
   *DSTB5  70077
   *FSEC5  70171
   *DLRM7  66313
BP LINKAGE 01311

SWTCH(0010)50002 65636  92060-16038 REV.1631 760621
   *SWTCH  52722
   *MAINR  53207
   *DFTR   65220
   *DNHD   65222
   *DNSU   65223
   *DNSP   65224
   *DNTR   65221
   *DSBCH  65215
   *TUNIT  65232
   *TCH    65239
   *TSBCH  65231
   *INITF  65350
   *LNGTH  65347
   *BUFAD  65352
   *XOUT   64544
   *DSTAD  65351
   *CNVAS  65042
   *CLEN   65107
   *DSPLY  65000
   *LINBL  64773
   *BOOTF  65333
BP LINKAGE 01165
  CNUMD    65637 65656  92001-16005 741120
   *CNUMD  65541
BP LINKAGE 01166
  GETST    65671 66120  92001-16005 760622
   *GETST  65674
BP LINKAGE 01172
  OPEN     66126 66313  92002-16006 741205
   *OPEN   66135
BP LINKAGE 01173
  READF    66314 67051  92002-16006 760607
   *READF  66326
   *WRITF  66314
BP LINKAGE 01174
  REIO     67052 67154  92001-16005 741120
   *REIO   67056
BP LINKAGE 01175
  LOCF     67155 67343  92002-16006 750416
   *LOCF   67166
```

```
BP LINKAGE 01176
  CLOSE     67344 67452  92002-16006  740801
   *CLOSE   67347
BP LINKAGE 01177
  $OPEN     67453 67661  92002-16006   740801
   *$OPEN   67453
BP LINKAGE 01200
  P.PAS     67662 67710  92002-16006 740801
   *P.PAS   67662
BP LINKAGE 01201
  RW$UB     67717 70170  92002-16006 750422
   *RW$UB   67717
   *NX$EC   70072
   *$KIP    70012
BP LINKAGE 01210
  RWND$     70173 70303  92002-16006  740801
   *RWND$   70175
   *RFLG$   70300
BP LINKAGE 01212
  R/W$      70304 70437  92002-16006  740801
   *R/W$    70304
   *D$XFR   70346
   *D.R     70435
BP LINKAGE 01215
  RMPAR     70440 70463  750701  24998-16001
   *RMPAR   70440
BP LINKAGE 01216
  .DFER     70464 70535  750701  24998-16001
   *.DFER   70464
BP LINKAGE 01217
  .ENTR     70536 70625  750701  24998-16001
   *.ENTR   70545
   *.ENTP   70536
BP LINKAGE 01221

DSEG0(0011)70626 71555   92060-16038           760616
   *DISK0   71130
   *STDS0   70655
   *INP0    70653
   *INIT0   70654
   *FLGTR   70721
BP LINKAGE 01230

DSEG5(0011)70626 72060   92060-16038           760621
   *DISK5   71214
   *STDS5   70654
   *INP5    70627
   *INIT5   70630
BP LINKAGE 01233

SAVE (0099)50002 50046  92060-16039 REV.1631 76022
BP LINKAGE 00720
  COR.A     50047 50062  92001-16005 741120
   *COR.A   50047
BP LINKAGE 00720
  RMPAR     50063 50106  750701  24998-16001
   *RMPAR   50063
BP LINKAGE 00721
  DMT       50127 52120
   *DMT     50136
BP LINKAGE 00774
  IAND      52123 52132   750701  24998-16001
   *IAND    52123
```

```
BP LINKAGE 00775
  PAUSE     52133 52276  750701   24998-16001
   *.PAUS   52133
   *.STOP   52171
BP LINKAGE 00777
  REIO      52277 52401  92001-16005 741120
   *REIO    52303
BP LINKAGE 01000
  PAU.E     52402 52402  750701   24998-16001
   *PAU.E   52402
BP LINKAGE 01001
  .OPSY     52403 52442  750701   24998-16001
   *.OPSY   52403
BP LINKAGE 01002
  .TAPE     52443 52455  750701   24998-16001
   *.TAPE   52443
BP LINKAGE 01003
  .DFER     52456 52527  750701   24998-16001
   *.DFER   52456
BP LINKAGE 01004
  .ENTR     52530 52617  750701   24998-16001
   *.ENTR   52537
   *.ENTP   52530
BP LINKAGE 01005
  BUFER     52620 52672  92060-16043 760622
   *BUFER   52620
BP LINKAGE 01007
  CHDLU     52673 53047
   *CHDLU   52677
BP LINKAGE 01010
  CHUTP     53050 53256
   *CHUTP   53053
BP LINKAGE 01011
  LUTRK     53257 53750
   *LUTRK   53270
BP LINKAGE 01012
  MPEND     53753 54427
   *MPEND   53760
BP LINKAGE 01017
  PRNTH     54437 54611
   *PRNTH   54442
BP LINKAGE 01020
  TPPOS     54612 55026
   *TPPOS   54615
BP LINKAGE 01021
  ASCDC     55027 55156  92060-16043 760622
   *ASCDC   55027
   *ASCOC   55033
BP LINKAGE 01022
  DCASC     55157 55264  92060-16043 760622
   *DCASC   55157
BP LINKAGE 01023
  DRT       55265 55354  92060-16043 760622
   *DRT     55265
BP LINKAGE 01024
  DSCAD     55355 55425  92060-16043 760622
   *DSCAD   55355
BP LINKAGE 01025
  MEMGT     55426 55441  92060-16043 760622
   *MEMGT   55426
BP LINKAGE 01026
  SUB       55442 55463  92060-16043 760622
   *SUB     55442
```

```
BP LINKAGE 01027
  READU     55464 55556
   *READU   55467
BP LINKAGE 01030
  RMOVI     55557 55564  92060-16043 760622
   *RMOVI   55557
BP LINKAGE 01031
  MESG      55605 56667  92060-16043 760622
   *MESG    55605
   *ITASK   56653
BP LINKAGE 01033

RSTOR(0099)50002 50111  92060-16040 REV.1631 760622
BP LINKAGE 00720
  RMPAR     50112 50135  750701  24998-16001
   *RMPAR   50112
BP LINKAGE 00721
  MTD       50247 52652
   *MTD     50265
BP LINKAGE 00722
  IAND      52667 52676   750701  24998-16001
   *IAND    52667
BP LINKAGE 00723
  PAUSE     52677 53042  750701  24998-16001
   *.PAUS   52677
   *.STOP   52735
BP LINKAGE 00725
  REIO      53043 53145  92001-16005 741120
   *REIO    53047
BP LINKAGE 00726
  PAU.E     53146 53146  750701  24998-16001
   *PAU.E   53146
BP LINKAGE 00727
  .OPSY     53147 53206  750701  24998-16001
   *.OPSY   53147
BP LINKAGE 00730
  .TAPE     53207 53221  750701  24998-16001
   *.TAPE   53207
BP LINKAGE 00731
  .DFER     53222 53273  750701  24998-16001
   *.DFER   53222
BP LINKAGE 00732
  .ENTR     53274 53363  750701  24998-16001
   *.ENTR   53303
   *.ENTP   53274
BP LINKAGE 00733
  BUFER     53364 53436  92060-16043 760622
   *BUFER   53364
BP LINKAGE 00734
  COR.A     53437 53452  92001-16005 741120
   *COR.A   53437
BP LINKAGE 00735
  CHDLU     53453 53627
   *CHDLU   53457
BP LINKAGE 00736
  CHUTP     53637 54045
   *CHUTP   53642
BP LINKAGE 00740
  LUTRK     54050 54541
   *LUTRK   54061
BP LINKAGE 00741
  MATCH     54542 55101  90260-16043 760622
   *MATCH   54542
```

```
BP LINKAGE 00742
  MPFND     55102 55556
   *MPFND   55107
BP LINKAGE 00743
  PRNTH     55557 55731
   *PRNTH   55562
BP LINKAGE 00744
  TPPOS     55734 56150
   *TPPOS   55737
BP LINKAGE 00747
  ASCDC     56155 56304   92060-16043 760622
   *ASCDC   56155
   *ASCOC   56161
BP LINKAGE 00750
  DCASC     56305 56412   92060-16043 760622
   *DCASC   56305
BP LINKAGE 00751
  DRT       56413 56502   92060-16043 760622
   *DRT     56413
BP LINKAGE 00752
  DSCAD     56503 56553   92060-16043 760622
   *DSCAD   56503
BP LINKAGE 00753
  MEMGT     56554 56567   92060-16043 760622
   *MEMGT   56554
BP LINKAGE 00754
  SUB       56570 56611   92060-16043 760622
   *SUB     56570
BP LINKAGE 00755
  READU     56612 56704
   *READU   56615
BP LINKAGE 00756
  RMOVI     56705 56712   92060-16043 760622
   *RMOVI   56705
BP LINKAGE 00757
  MESG      56713 57775   92060-16043 760622
   *MESG    56713
   *ITASK   57761
BP LINKAGE 00761

COPY (0099)50002 50036   92060-16042 REV.1631 760622
BP LINKAGE 00720
  RMPAR     50037 50062   750701  24998-16001
   *RMPAR   50037
BP LINKAGE 00721
  DD        50104 52124
   *DD      50111
BP LINKAGE 01002
  IAND      52127 52136    750701  24998-16001
   *IAND    52127
BP LINKAGE 01003
  PAUSE     52137 52302   750701  24998-16001
   *.PAUS   52137
   *.STOP   52175
BP LINKAGE 01004
  REIO      52303 52405   92001-16005 741120
   *REIO    52307
BP LINKAGE 01005
  PAU.E     52406 52406   750701  24998-16001
   *PAU.E   52406
BP LINKAGE 01006
  .OPSY     52407 52446   750701  24998-16001
   *.OPSY   52407
```

```
BP LINKAGE 01007

  .DFER     52447 52520  750701  24998-16001
   *.DFER   52447
BP LINKAGE 01010
  .ENTR     52521 52610  750701  24998-16001
   *.ENTR   52530
   *.ENTP   52521
BP LINKAGE 01011
  BUFER     52611 52663  92060-16043 760622
   *BUFER   52611
BP LINKAGE 01012
  COR.A     52664 52677  92001-16005 741120
   *COR.A   52664
BP LINKAGE 01013
  CHDLU     52700 53054
   *CHDLU   52704
BP LINKAGE 01014
  CHUTP     53055 53263
   *CHUTP   53060
BP LINKAGE 01015
  LUTRK     53264 53755
   *LUTRK   53275
BP LINKAGE 01017
  MATCH     53760 54317  90260-16043 760622
   *MATCH   53760
BP LINKAGE 01023
  MPFND     54321 54775
   *MPFND   54326
BP LINKAGE 01024
  ASCDC     54776 55125  92060-16043 760622
   *ASCDC   54776
   *ASCOC   55002
BP LINKAGE 01025
  DCASC     55126 55233  92060-16043 760622
   *DCASC   55126
BP LINKAGE 01026
  DRT       55234 55323  92060-16043 760622
   *DRT     55234
BP LINKAGE 01027
  DSCAD     55324 55374  92060-16043 760622
   *DSCAD   55324
BP LINKAGE 01030
  MEMGT     55375 55410  92060-16043 760622
   *MEMGT   55375
BP LINKAGE 01031
  SUB       55411 55432  92060-16043 760622
   *SUB     55411
BP LINKAGE 01032
  READU     55433 55525
   *READU   55436
BP LINKAGE 01033
  RMOVI     55526 55533  92060-16043 760622
   *RMOVI   55526
BP LINKAGE 01034
  MESG      55554 56636  92060-16043 760622
   *MESG    55554
   *ITASK   56622
BP LINKAGE 01036

VERFY(0099)50062 50047  92060-16041 REV.1631 760622
BP LINKAGE 00720
  COR.A     50050 50063  92001-16005 741120
```

```
    *COR.A   50050
BP LINKAGE 00721
  RMPAR      50064 50107  750701  24998-16001
    *RMPAR   50064
BP LINKAGE 00722
  VRFSB      50110 51325
    *VRFSB   50114
BP LINKAGE 00723
  IAND       51326 51335   750701  24998-16001
    *IAND    51326
BP LINKAGE 00724
  PAUSE      51336 51501  750701  24998-16001
    *.PAUS   51336
    *.STOP   51374
BP LINKAGE 00726
  REIO       51502 51604  92001-16005 741120
    *REIO    51506
BP LINKAGE 00727
  PAU.E      51605 51605  750701  24998-16001
    *PAU.E   51605
BP LINKAGE 00730
  .OPSY      51606 51645  750701  24998-16001
    *.OPSY   51606
BP LINKAGE 00731
  .TAPE      51646 51660  750701  24998-16001
    *.TAPE   51646
BP LINKAGE 00732
  .DFER      51661 51732  750701  24998-16001
    *.DFER   51661
BP LINKAGE 00733
  .ENTR      51737 52026  750701  24998-16001
    *.ENTR   51746
    *.ENTP   51737
BP LINKAGE 00740
  DCASC      52030 52135  92060-16043 760622
    *DCASC   52030
BP LINKAGE 00741
  MEMGT      52136 52151  92060-16043 760622
    *MEMGT   52136
BP LINKAGE 00742

BP LINKAGE 01557

SYSTEM STORED ON DISC
SYS SIZE: 34 TRKS, 009 SECS(10)
```

E-2. RT3GN LISTED OUTPUT

```
ECHO?
YES                                   * ECHO

EST. # TRACKS IN OUTPUT FILE?
35                                    * EST # TRACKS

OUTPUT FILE NAME?
RTEIII,,2,                            * OUTPUT FILE

TARGET DISK?
7905                                  * SYSTEM DISC

CONTROLLER CHNL?
27

# TRKS, FIRST CYL #, HEAD #, # SURFACES, UNIT, # SPARES FOR SUBCHNL#
  00?
203,0,0,2,0,3                         * SUBCHANNEL 0
  01?
203,104,0,2,0,3                       * SUBCHANNEL 1
  02?
400,208,0,2,0,4                       * SUBCHANNEL 2
  03?
203,0,2,1,0,3                         * SUBCHANNEL 3
  04?
203,206,2,1,0,2                       * SUBCHANNEL 4
  05?
203,0,0,2,1,3                         * SUBCHANNEL 5
  06?
600,104,0,2,1,10                      * SUBCHANNEL 6
  07?
203,0,2,1,1,3                         * SUBCHANNEL 7
  08?
203,206,2,1,1,2                       * SUBCHANNEL 8
  09?
/E

# 128 WORD SECTORS/TRACK?
48

SYSTEM SUBCHNL?
0                                     * SYSTEM SUBCHANNEL

AUX DISC (YES OR NO OR # TRKS)?
YES                                   * AUX DISC

AUX DISC SUBCHNL?
1                                     * AUX SUBCHANNEL

TBG CHNL?
13                                    * TBG

PRIV. INT. CARD ADDR?
0                                     * PRIV INT

PRIV. DRIVERS ACCESS COMMON?
NO                                    * ACCESS COMMON

FG CORE LOCK?
YE                                    * FG CORE LOCK

BG CORE LOCK?
```

```
YE                                  * BG CORE LOCK

SWAP DELAY?
50                                  * SWAP DELAY

MEM SIZE?
64                                  * MEM SIZE

BOOT FILE NAME?
RT3BOT,,2,                          * BOOT FILE

PROG INPUT PHASE:
-
LINKS IN CURRENT                    * PROGRAM INPUT PHASE
-
MAP ALL
-
REL,%CR3SY,,19
-
REL,%$CMD3,,19
-
REL,%MTM  ,,19
-
REL,%3DP43,,19
-
REL,%DVR00,,19
-
REL,%4DV05,,19
-
REL,%DVR11,,19
-
REL,%DVR12,,19
-
REL,%DVA12,,19
-
REL,%DVR23,,19
-
REL,%DVR32,,19
-
REL,%AUTOR,,19
-
REL,%EDITR,,19
-
REL,%ASMB ,,19
-
REL,%XREF ,,19
-
REL,%LDR3 ,,19
-
REL,%WHZT3,,19
-
REL,SYSONR,,19
-
REL,%BMPG1,,19
-
REL,%6MPG2,,19
-
REL,%EMPG3,,19
-
REL,%3SP01,,19
-
REL,%3SP02,,19
-
REL,%SYLIB,,19
-
```

```
REL,%RLIB1,,19
-
REL,%RLIB2,,19
-
REL,%RMLIB,,19
-
REL,%FF4,N,,19
-
REL,%1FFT4,,19
-
REL,%2FFT4,,19
-
REL,%ALGOL,,19
-
REL,%ALGL1,,19
-
REL,%RT3G1,,19
-
REL,%RT3G2,,19
-
REL,%SWTCH,,19
-
REL,%SAVE ,,19
-
REL,%RESTR,,19
-
REL,%COPY ,,19
-
REL,%VERFY,,19
-
REL,%DBKLB,,19
-
/E
 UNDEFS

PARAMETERS

-
D,RTR,1,1                          * PARAMETERS
-
```

```
WHZAT,2,1
-
SYSON,82
-
ASMB,3,95
-
XREF,3,96
-
LOADR,3,97
-
EDITR,3,50
-
AUTOR,3,1
-
SPOUT,2
-
PRMPT,2
-
R$PN$,2,50
-
/E

CHANGE ENTS?

-
.MPY,RP,100200                    * EAU MACROS
-
.DIV,RP,100400
-
.DLD,RP,104200
-
.DST,RP,104400
-
.FAD,RP,105000                    * FFP MACROS
-
.FSB,RP,105020
-
.FMP,RP,105040
-
.FDV,RP,105060
-
IFIX,RP,105100
-
FLOAT,RP,105120
-
.MVW,RP,105777                    * 21MX EXTENSION MACRO
-
/E


* OF BLANK ID SEGMENTS?
10                                * BLANK ID SEGMENTS

* OF BLANK BG SEG. ID SEGMENTS?
20                                * BLANK BG ID SEGMENTS

MAX NUMBER OF PARTITIONS?
10                                * MAX PARTITIONS

FWA BP LINKAGE?
```

```
SYSTEM

$CSYS(0099)02000 01777  92001-12003 REV.1631 760622
BP LINKAGE 01646

DISPM(0099)02024 04745  92060-16013 REV.1631 760622
    *$RENT  02375
    *$BRED  04545
    *$ZZZZ  04626
    *$XEQ   02101
    *$MRMP  02323
    *$ENDS  02324
    *$MATA  02325
    *$MPFT  02326
    *$BGFR  02327
    *$RTFR  02331
    *$ALOM  03451
    *$DMAL  03454
    *$SMAP  02502
    *$PRCN  03500
    *$EMRP  02267
    *$LPSA  02270
    *$XDMP  02575
 BP LINKAGE 01646

RTIME(0099)05050 05621  92060-16014 REV.A  750305
    *$TADD  05521
    *$CLCK  05050
    *$TREM  05543
    *$TIME  05252
    *$TIMV  05320
    *$ETIM  05466
    *$TIMR  05414
    *$ONTM  05365
    *$TMRQ  05571
    *$SCLK  05271
    *$BATM  05247
 BP LINKAGE 01644

 $ASCM(0099)05622 05714  92060-16015 REV.1631 760622
    *$OPER  05652
    *$ERIN  05672
    *$NOPG  05662
    *$ILST  05622
    *$NOLG  05633
    *$LGBS  05643
    *$NMEM  05702
 BP LINKAGE 01644

 RTIOC(0099)05720 12416  92060-16016 REV.1631 760622
    *$CIC   05720
    *$XSIO  10154
    *$SYMG  11766
    *$IORQ  06145
    *$IOUP  11635
    *$IODN  11525
    *$ETEQ  12072
```

```
    *$IRT    06060
    *$XCIC   05740
    *$DEVT   11440
    *$GTIO   07235
    *$UPIO   11636
    *$CVEQ   12051
    *$YCIC   05741
    *$BITB   10573
    *$UNLK   11266
    *$XXUP   11700
    *$DLAY   11422
    *$DMEQ   06444
    *$CKLO   10364
    *$BLLO   01643
    *$BLUP   01644
    *$DVM    07620
    *$RSM    07753
    *$MEU    06143
    *$IOCL   12131
BP LINKAGE 01512

$ALC (0099)12427 12654  92060-16017 REV.A 750505
    *$ALC    12427
    *$RTN    12530
BP LINKAGE 01510

EXEC (0099)12674 14446  92060-16018 760722
    *EXEC    12674
    *$ERMG   14275
    *$RQST   12676
    *$OTRL   14105
    *$LIBR   13106
    *$LIBX   13572
    *$DREQ   14137
    *$DREL   14234
    *$SDRL   14112
    *$SDSK   14252
    *$ERAB   14100
    *$PVCN   13227
    *$REIO   13367
    *$CREL   14000
    *$RSRE   13436
    *$ABRE   13516
    *$PWR5   12763
BP LINKAGE 01474

$TRRN(0099)14471 14634  92060-16019 REV.A 750326
    *$TRRN   14471
    *$CGRN   14535
    *$ULLU   14557
BP LINKAGE 01472

SCHED(0099)14664 20471  92060-16020 REV.1631 760622
    *$LIST   14726
    *$MESS   15264
    *$CVT3   17240
    *$CVT1   17304
    *$ABRT   17374
    *$TYPE   17310
    *$MPT1   17437
```

```
   *$MPT2   17612
   *$MPT3   17625
   *$MPT4   17715
   *$MPT5   17735
   *$MPT6   17757
   *$PARS   15373
   *$STRT   16263
   *$SCD3   17673
   *$INER   16724
   *$MPT7   20011
   *$ASTM   15326
   *$MPT8   20151
   *$IDNO   17776
   *$WORK   14674
   *$WATR   17602
   *$IDSM   16776
   *$MPT9   20205
   *$RTST   20410
   *$CVWD   20465
   *$STRG   20404
   *$MPSA   16415
   *$MSEX   15312
BP LINKAGE 01321

DVP43(0099)20515 21330  92060-16001 REV.1631 760622
   *$POWR   20515
   *IP43    21276
   *CP43    21175
BP LINKAGE 01314

DVR00(0099)21356 22445  29029-60001 REV 1602 750115
   *I.00    21356
   *C.00    21716
   *I.01    21356
   *C.01    21716
   *I.02    21356
   *C.02    21716
BP LINKAGE 01312

DVR05(0099)22574 25303       92001-16027  1631 760621
   *I.05    22574
   *C.05    22663
BP LINKAGE 01312

DVR11(0099)25426 26555
   *C.11    26210
   *I.11    25426
BP LINKAGE 01277

DVR12(0099)26573 27122
   *I.12    26573
   *C.12    26733
BP LINKAGE 01277

DVA12(0099)27135 30065
   *IA12    27135
   *CA12    27420
BP LINKAGE 01277

DVR23(0099)30073 30736       92202-16001  REV. A
```

```
   *I.23   30073
   *C.23   30710
BP LINKAGE 01277

DVR32(0099)30747 32474  92060-16031 REV A 751024
   *I.32   32102
   *C.32   31163
BP LINKAGE 01265

$BMON(0099)32567 32566  92002-12001 REV.1631 760622
BP LINKAGE 01265

$SPOL(0099)32567 32566  92002-16001 REV. 1631 760622
BP LINKAGE 01265

DVS43(0099)32575 34653  92060-16009 REV. 1631 760622
   *IS43   32575
   *CS43   34154
   *$MPID  32764
   *N.SEQ  34242
BP LINKAGE 01265

$YSLB(0099)34703 34702  92001-16005 REV 1545 751020
BP LINKAGE 01265

FF4.A(0099)34703 34702          24998-16002   751101
BP LINKAGE 01265

$BALB(0099)34703 34702  92002-16006 REV.1631 760622
BP LINKAGE 01265

RLIB (0099)34703 34702   24998-16001 REV. 1610  760301
BP LINKAGE 01265

DBKLB(0099)34703 34702  92060-16043 REV.1631 760622
   *DBKLB  34703
BP LINKAGE 01265


** OF I/O CLASSES?
12                                  * I/O CLASSES

** OF LU MAPPINGS?
12                                  * LU MAPPINGS

** OF RESOURCE NUMBERS?
12                                  * RESOURCE NUMBERS

BUFFER LIMITS (LOW, HIGH)?
100,400                             * BUFFER LIMITS

* EQUIPMENT TABLE ENTRY

EQT 01?
27,DVR32,0                          * EQT 1  - 7905 DISC

EQT 02?
15,DVR05,8,X=13                     * EQT 2  - 2644 CONSOLE

EQT 03?
```

```
14,DVR11,0                      * EQT 3  = 2892 CARD READER

EQT 04?
17,DVR02,B,T=50                 * EQT 4  = 2895 TAPE PUNCH

EQT 05?
16,DVR01,T=50                   * EQT 5  = 2748 PHOTOREADER

EQT 06?
20,DVR12,B,T=100                * EQT 6  = 2767 LINE PRINTER

EQT 07?
25,DVR00,B,T=2000               * EQT 7  = 2600 CONSOLE

EQT 08?
23,DVR23,0,B,T=9999             * EQT 8  = 7970 MAG TAPE

EQT 09?
26,DVA12,B,T=100                * EQT 9  = 2607 LINE PRINTER

EQT 10?
60,DVR05,B,T=5000,X=13          * EQT 10 = 2644 AUX TERMINAL

EQT 11?
61,DVR05,B,T=5000,X=13          * EQT 11 = 2644 AUX TERMINAL

EQT 12?
62,DVR05,B,T=5000,X=13          * EQT 12 = 2644 AUX TERMINAL

EQT 13?
63,DVR05,B,T=5000,X=13          * EQT 13 = 2640 AUX TERMINAL

EQT 14?
64,DVR05,B,T=5000,X=13          * EQT 14 = 2640 AUX TERMINAL

EQT 15?
65,DVR05,B,T=5000,X=13          * EQT 15 = 2640 AUX TERMINAL

EQT 16?
66,DVR05,B,T=5000,X=13          * EQT 16 = 2640 AUX TERMINAL

EQT 17?
67,DVR05,B,T=5000,X=13          * EQT 17 = 2640 AUX TERMINAL

EQT 18?
30,DVS43,X=18                   * EQT 18 = SPOCL EQT

EQT 19?
31,DVS43,X=18                   * EQT 19 = SPOCL EQT

EQT 20?
32,DVS43,X=18                   * EQT 20 = SPOCL EQT

EQT 21?
33,DVS43,X=18                   * EQT 21 = SPOCL EQT

EQT 22?
34,DVS43,X=18                   * EQT 22 = SPOCL EQT

EQT 23?
```

```
35,DVS43,X=18                    * EQT 23 = SPOOL EQT

EQT 24?
36,DVS43,X=18                    * EQT 24 = SPOOL EQT

EQT 25?
37,DVS43,X=18                    * EQT 25 = SPOOL EQT

EQT 26?
40,DVS43,X=18                    * EQT 26 = SPOOL EQT

EQT 27?
41,DVS43,X=18                    * EQT 27 = SPOOL EQT

EQT 28?
4,DVP43                          * EQT 28 = POWER FAIL

EQT 29?
/E


* DEVICE REFERENCE TABLE

 1 = EQT #?
2,0                              * LU 1  = SYSTEM CONSOLE

 2 = EQT #?
1,0                              * LU 2  = SYSTEM DISC, SUBCHANNEL 0

 3 = EQT #?
1,1                              * LU 3  = AUX DISC, SUBCHANNEL 1

 4 = EQT #?
2,1                              * LU 4  = CTL, LEFT

 5 = EQT #?
2,2                              * LU 5  = CTL, RIGHT

 6 = EQT #?
6,0                              * LU 6  = LINE PRINTER

 7 = EQT #?
7,0                              * LU 7  = TERMINAL

 8 = EQT #?
8,0                              * LU 8  = MAG TAPE, UNIT 0

 9 = EQT #?
8,1                              * LU 9  = MAG TAPE, UNIT 1

10 = EQT #?
8,2                              * LU 10 = MAG TAPE, UNIT 2

11 = EQT #?
8,3                              * LU 11 = MAG TAPE, UNIT 3

12 = EQT #?
3,0                              * LU 12 = CARD READER

13 = EQT #?
```

```
0                                   * LU 13 = BIT BUCKET

14 = EQT #?
4,4                                 * LU 14 = PUNCH

15 = EQT #?
5,0                                 * LU 15 = PHOTOREADER

16 = EQT #?
1,2                                 * LU 16 = PERIPHERAL SUBCHANNEL 2

17 = EQT #?
1,3                                 * LU 17 = PERIPHERAL SUBCHANNEL 3

18 = EQT #?
1,4                                 * LU 18 = PERIPHERAL SUBCHANNEL 4

19 = EQT #?
1,5                                 * LU 19 = PERIPHERAL SUBCHANNEL 5

20 = EQT #?
1,6                                 * LU 20 = PERIPHERAL SUBCHANNEL 6

21 = EQT #?
1,7                                 * LU 21 = PERIPHERAL SUBCHANNEL 7

22 = EQT #?
1,8                                 * LU 22 = PERIPHERAL SUBCHANNEL 8

23 = EQT #?
9,0                                 * LU 23 = LINE PRINTER

24 = EQT #?
10,0                                * LU 24 = TERMINAL

25 = EQT #?
10,1                                * LU 25 = CTU, LEFT

26 = EQT #?
10,2                                * LU 26 = CTU, RIGHT

27 = EQT #?
11,0                                * LU 27 = TERMINAL

28 = EQT #?
11,1                                * LU 28 = CTU, LEFT

29 = EQT #?
11,2                                * LU 29 = CTU, RIGHT

30 = EQT #?
12,0                                * LU 30 = TERMINAL

31 = EQT #?
12,1                                * LU 31 = CTU, LEFT

32 = EQT #?
12,2                                * LU 32 = CTU, RIGHT

33 = EQT #?
```

```
13,0                                    * LU 33 = TERMINAL

34 = EQT #?
14,0                                    * LU 34 = TERMINAL

35 = EQT #?
15,0                                    * LU 35 = TERMINAL

36 = EQT #?
16,0                                    * LU 36 = TERMINAL

37 = EQT #?
17,0                                    * LU 37 = TERMINAL

38 = EQT #?
0                                       * LU 38

39 = EQT #?
0                                       * LU 39

40 = EQT #?
0                                       * LU 40

41 = EQT #?
0                                       * LU 41

42 = EQT #?
0                                       * LU 42

43 = EQT #?
0                                       * LU 43

44 = EQT #?
0                                       * LU 44

45 = EQT #?
0                                       * LU 45

46 = EQT #?
0                                       * LU 46

47 = EQT #?
0                                       * LU 47

48 = EQT #?
0                                       * LU 48

49 = EQT #?
0                                       * LU 49

50 = EQT #?
0                                       * LU 50

51 = EQT #?
18,0                                    * LU 51 = SPOOL LU

52 = EQT #?
19,0                                    * LU 52 = SPOOL LU

53 = EQT #?
```

```
20,0                                    * LU 53 = SPOOL LU

54 = EQT #?
21,0                                    * LU 54 = SPOOL LU

55 = EQT #?
22,0                                    * LU 55 = SPOOL LU

56 = EQT #?
23,0                                    * LU 56 = SPOOL LU

57 = EQT #?
24,0                                    * LU 57 = SPOOL LU

58 = EQT #?
25,0                                    * LU 58 = SPOOL LU

59 = EQT #?
26,0                                    * LU 59 = SPOOL LU

60 = EQT #?
27,0                                    * LU 60 = SPOOL LU

61 = EQT #?
28,0                                    * LU 61 = POWER FAIL

62 = EQT #?
/E


* INTERRUPT TABLE
-
4,ENT,$POWR                             * INTERRUPT TABLE
-
14,EQT,3
-
15,PRG,PRMPT
-
16,EQT,5
-
17,EQT,4
-
20,EQT,6
-
23,EQT,8
-
24,EQT,8
-
25,PRG,PRMPT
-
26,EQT,9
-
27,EQT,1
-
30,EQT,18
-
31,EQT,19
-
32,EQT,20
-
```

```
33,EQT,21
-
34,EQT,22
-
35,EQT,23
-
36,EQT,24
-
37,EQT,25
-
40,EQT,26
-
41,EQT,27
-
60,PRG,PRMPT
-
61,PRG,PRMPT
-
62,PRG,PRMPT
-
63,PRG,PRMPT
-
64,PRG,PRMPT
-
65,PRG,PRMPT
-
66,PRG,PRMPT
-
67,PRG,PRMPT
-
/E

BP LINKAGE 01260

LIBRARY

  PRTN      42535 42637  92001-16005  741120
   *PRTM    42630
   *PRTN    42535
BP LINKAGE 01256


SUBSYSTEM GLOBAL MODULES

(NONE)


RT COMMON  00000
 CHANGE RT COMMON ?
0                                  * RT COMMON
RT COM     42640


BG COMMON  00000
 CHANGE BG COMMON ?
0                                  * BG COMMON
BG COM     42640
```

```
LWA BG COMMON  42637
ALIGN AT NEXT PAGE?
YES                                  * ALIGN
LWA BG COMMON  43777

MEMORY RESIDENTS

D.RTR(0001)44001 46011  92002-16007 760528
BP LINKAGE 00074
  P.PAS     46022 46050  92002-16006 740801
   *P.PAS   46022
BP LINKAGE 00075

EXTND(0010)46051 46232  92060-16010 REV.1631 760622
BP LINKAGE 00077
  RMPAR     46233 46256  750701  24998-16001
   *RMPAR   46233
BP LINKAGE 00100


RT DISC RESIDENTS

$$CMD(0001)44002 45127  92060-16036 REV.1631 760620
   *$$CMD   44007
BP LINKAGE 00010
  RMPAR     45130 45153  750701  24998-16001
   *RMPAR   45130
BP LINKAGE 00011

PRMPT(0010)44002 44112  92001-16003 REV.B  741216
BP LINKAGE 00003
  EQLU      44113 44170  92001-16005 741120
   *EQLU    44113
BP LINKAGE 00004

R$PN$(0050)44002 44150  92001-16003 REV.B  741002
BP LINKAGE 00003
  EQLU      44151 44226  92001-16005 741120
   *EQLU    44151
BP LINKAGE 00004
  MESSS     44227 44337  92001-16005 760622
   *MESSS   44232
BP LINKAGE 00005
  .ENTR     44340 44427  750701  24998-16001
   *.ENTR   44347
   *.ENTP   44340
BP LINKAGE 00006

WHZAT(0001)44002 45676  92060-16006 REV.1631 760617
BP LINKAGE 00003
  TMVAL     45677 45716   92001-16005 741120
   *TMVAL   45701
BP LINKAGE 00004
  .ENTR     45720 46007  750701  24998-16001
   *.ENTR   45727
   *.ENTP   45720
BP LINKAGE 00015
```

```
SYSON(0090)44002 44036     10 JUL 74 EJW
   *SYSON  44002
BP LINKAGE 00003

JOB  (0030)44002 45741  92002-16005 REV. 1631 760621
BP LINKAGE 00005
  RNRQ     45745 46172  92001-16005 741120
   *RNRQ   45745
BP LINKAGE 00006
  $ALRN    46174 46301  92001-16005  741106
   *$ALRN  46174
   *$RNSU  46230
   *$RNEX  46240
   *$LUEX  46254
   *$LUSU  46233
   *$DRAD  46264
BP LINKAGE 00012
  LURQ     46302 46626  92001-16005 751023
   *LURQ   46302
BP LINKAGE 00016
  .DRCT    46627 46635  92001-16005 741120
   *.DRCT  46627
BP LINKAGE 00017
  REIO     46636 46740  92001-16005 741120
   *REIO   46642
BP LINKAGE 00020
  OPEN     46741 47126  92002-16006 741205
   *OPEN   46750
BP LINKAGE 00021
  READF    47127 47664  92002-16006 760607
   *READF  47141
   *WRITF  47127
BP LINKAGE 00023
  CLOSE    47665 47773  92002-16006  740801
   *CLOSE  47670
BP LINKAGE 00024
  POST     47774 50022  92002-16006  740801
   *POST   47776
BP LINKAGE 00025
  $OPEN    50027 50235  92002-16006   740801
   *$OPEN  50027
BP LINKAGE 00026
  P.PAS    50236 50264  92002-16006 740801
   *P.PAS  50236
BP LINKAGE 00027
  RW$UB    50265 50536  92002-16006 750422
   *RW$UB  50265
   *NX$EC  50440
   *$KIP   50360
BP LINKAGE 00031
  RWND$    50537 50647  92002-16006  740801
   *RWND$  50541
   *RFLG$  50644
BP LINKAGE 00033
  R/W$     50650 51003  92002-16006  740801
   *R/W$   50650
   *D$XFR  50712
   *D.R    51001
BP LINKAGE 00036
  SPOPN    51004 51054  92002-16006  741025
```

```
   *SPOPN  51006
BP LINKAGE 00037
  RMPAR    51055 51100  750701  24998-16001
   *RMPAR  51055
BP LINKAGE 00040
  .DFER    51101 51152  750701  24998-16001
   *.DFER  51101
BP LINKAGE 00041
  .ENTR    51153 51242  750701  24998-16001
   *.ENTR  51162
   *.ENTP  51153
BP LINKAGE 00042

SPOUT(0011)44002 44750  92060-16011 REV. 1631 760618
BP LINKAGE 00004
  LURQ     44751 45275  92001-16005 751023
   *LURQ   44751
BP LINKAGE 00006
  $ALRN    45276 45403  92001-16005  741106
   *$ALRN  45276
   *$RNSU  45332
   *$RNEX  45342
   *$LUEX  45356
   *$LUSU  45335
   *$DRAD  45366
BP LINKAGE 00012
  .DRCT    45404 45412  92001-16005 741120
   *.DRCT  45404
BP LINKAGE 00013


BG DISC RESIDENTS

AUTOR(0001)44002 44440
   *AUTOR  44002
BP LINKAGE 00003
  TMVAL    44441 44460   92001-16005 741120
   *TMVAL  44443
BP LINKAGE 00004
  FMTIO    44465 46074          24998-16002
   *.RIO.  44727
   *.IIO.  44715
   *.XIO.  44744
   *.XAY.  45105
   *.RAY.  45137
   *.IAY.  45150
   *.DIO.  45317
   *.BIO.  45426
   *.IOI.  45055
   *.IOR.  45014
   *.IAR.  45203
   *.RAR.  45161
   *.DTA.  45514
   *NEWIO  45444
   *OLDIO  45451
   *CODE   45256
   *ACODE  45256
   *ITLOG  45726
   *ISTAT  45733
```

```
BP LINKAGE 00011
  REIO      46100 46202  92001-16005 741120
   *REIO    46104
BP LINKAGE 00012
  FMT.E     46203 46203          24998-16002
   *FMT.E   46203
BP LINKAGE 00013
  FRMTR     46224 51025          24998-16002
   *.FRMN   46544
   *.LS2F   46536
   *.INPN   46566
   *.OTAN   46560
BP LINKAGE 00017
  CLRIO     51173 51201  750701  24998-16001
   *CLRIO   51173
BP LINKAGE 00020
  DBLE      51202 51233   750701  24998-16001
   *DBLE    51203
BP LINKAGE 00021
  IAND      51234 51243   750701  24998-16001
   *IAND    51234
BP LINKAGE 00022
  PAUSE     51244 51407  750701  24998-16001
   *.PAUS   51244
   *.STOP   51302
BP LINKAGE 00023
  PAU.E     51410 51410  750701  24998-16001
   *PAU.E   51410
BP LINKAGE 00024
  SNGL      51411 51521   750701  24998-16001
   *SNGL    51411
BP LINKAGE 00025
  .FLUN     51522 51537  750701  24998-16001
   *.FLUN   51522
BP LINKAGE 00026
  .OPSY     51540 51577  750701  24998-16001
   *.OPSY   51540
BP LINKAGE 00027
  .XPAK     51600 51763  750701  24998-16001
   *.XPAK   51605
BP LINKAGE 00030
  .DFER     51765 52036  750701  24998-16001
   *.DFER   51765
BP LINKAGE 00031
  .ENTR     52043 52132  750701  24998-16001
   *.ENTR   52052
   *.ENTP   52043
BP LINKAGE 00033

EDITR(0050)44002 50456  92002-16010 REV.C  750505
BP LINKAGE 00155
  REIO      50457 50561  92001-16005 741120
   *REIO    50463
BP LINKAGE 00156
  CREAT     50562 51037  92002-16006  741022
   *CREAT   50572
BP LINKAGE 00157
  OPEN      51040 51225  92002-16006 741205
   *OPEN    51047
BP LINKAGE 00160
```

```
  READF     51226 51763  92002-16006 760607
   *READF   51240
   *WRITF   51226
BP LINKAGE 00162
  CLOSE     51765 52073  92002-16006  740801
   *CLOSE   51770
BP LINKAGE 00165
  NAM..     52103 52177  92002-16006 740801
   *NAM..   52104
BP LINKAGE 00166
  $OPEN     52200 52406  92002-16006   740801
   *$OPEN   52200
BP LINKAGE 00167
  P.PAS     52407 52435  92002-16006 740801
   *P.PAS   52407
BP LINKAGE 00170
  RW$UB     52436 52707  92002-16006 750422
   *RW$UB   52436
   *NX$EC   52611
   *$KIP    52531
BP LINKAGE 00172
  RWND$     52710 53020  92002-16006  740801
   *RWND$   52712
   *RFLG$   53015
BP LINKAGE 00174
  R/W$      53021 53154  92002-16006  740801
   *R/W$    53021
   *D$XFR   53063
   *D.R     53152
BP LINKAGE 00177
  RMPAR     53155 53200  750701  24998-16001
   *RMPAR   53155
BP LINKAGE 00200
  .DFER     53201 53252  750701  24998-16001
   *.DFER   53201
BP LINKAGE 00201
  .ENTR     53253 53342  750701  24998-16001
   *.ENTR   53262
   *.ENTP   53253
BP LINKAGE 00203

ASMB (0095)44002 51601  92060-16022 REV.A 750420
   *ASMB    51377
   *?ASCN   46520
   *?ASMB   45205
   *?BNCN   47330
   *?BPKU   50210
   *?CHOP   45350
   *?CHPI   50536
   *?DCOD   50544
   *?ENDS   50054
   *?ERPR   47774
   *?MSYS   50615
   *?GETC   50602
   *?MOVE   46257
   *?MSYM   47626
   *?RLUN   51257
   *?AFLG   51304
   *?LSTL   47545
   *?LUNI   51312
```

```
*?RFLG  51301
*?Z     51322
*?ASM1  46206
*?LABE  46224
*?OKOL  50171
*?ORRP  47423
*?PNLE  51317
*?SETM  50622
*?SUP   50163
*?LPER  50166
*?PERL  50150
*?LOUT  50220
*?LTFL  50156
*?DRFL  51307
*?LTSA  50506
*?LTSB  50507
*?ORGS  50161
*?CNTR  50316
*?TSTR  51310
*?ASII  51330
*?ICSA  47772
*?FLGS  51276.
*?BFLG  51277
*?LFLG  51300
*?TFLG  51302
*?X     51321
*?MESX  45122
*?ASCI  51327
*?LINC  47734
*?LINS  47614
*?LIST  47474
*?LUNP  51314
*?OPLK  45263
*?OPER  50566
*?PKUP  50203
*?PLIT  50334
*?PNCH  46452
*?PRNT  47664
*?RSTA  45664
*?LWA   51320
*?RDSC  51263
*?WEOF  50761
*?WRIF  51026
*?LGFL  51306
*?SEGM  45172
*?SYMK  46326
*?V     50561
*?ARTL  50420
*?LST   50155
*?PLIN  51311
*?PCOM  47736
*?SECT  51275
*?NEAU  45047
*?HA38  50275
*?XRFT  45171
*?FPT   44211
*?FP    45113
*?ENER  50167
*?PRPG  50017
*?BPSV  50152
```

```
   *?BASF  50151
   *?GETA  50572
   *?NDOP  51323
   *?NDSY  51324
   *?SYML  50317
   *?SYMT  45762
BP LINKAGE 00272

ASMBD(0099)51602 52410  92060-16023 REV.A 750420
   *ASMBD  52125
BP LINKAGE 00312

ASMB1(0099)51602 53632  92060-16024 REV.A 750420
   *ASMB1  52124
   *?LITI  52643
   *?CMQ   52363
   *?INSR  52532
   *?HA3Z  52325
   *?ENP   52464
   *?EXP   52447
BP LINKAGE 00345

ASMB2(0099)51602 54100  92060-16025 REV.A 750420
   *ASMB2  52033
   *?ART   52633
   *?BREC  52160
   *?LKLI  53415
BP LINKAGE 00346

ASMB3(0099)51602 52671  92060-16026 REV.A 750420
   *ASMB3  52050
   *?INS?  52240
BP LINKAGE 00320

ASMB4(0099)51602 53333  92060-16027 REV.A 750420
   *ASMB4  52033
   *?AREC  52160
BP LINKAGE 00315

XREF (0096)44002 52170  92060-16028 REV.A 750420
BP LINKAGE 00226
  .OPSY    52171 52230  750701  24998-16001
   *.OPSY  52171
BP LINKAGE 00227

LOADR(0097)44002 55301    92060-16004 REV.1616  760413
BP LINKAGE 00534

FMGR (0090)44002 44757  92002-16008 REV.1630 760616
   *IFLG.  44522
   *CAD.   44647
   *FM.AB  44442
   *D.     44751
   *CUSE.  44747
   *PARS.  44650
   *SEG.R  44472
   *P.SEG  44460
   *INI1.  44227
   *INI2.  44234
   *I.BUF  44222
```

```
    *O.BUF   44002
    *N.OPL   44534
    *P.RAM   44546
    *TTY.    44533
    *NO.RD   44523
    *NOCM.   44646
    *ACTV.   44525
    *J.REC   44526
    *J.NAM   44527
    *G0..    44661
    *JRN.    44524
    *.IDAD   44521
    *TL.P    44754
    *TM.VL   44756
    *L.SEG   44454
    *GT.JB   44256
    *.R.E.   44737
    *SCR.    44532
BP LINKAGE 00003
  FM.CM      44761 46664  92002-16008 760616
    *FM.ER   45764
    *OPEN.   46051
    *CLOS.   46364
    *IER.    46512
    *BRKF.   44761
    *MSS.    45665
    *JER.    46524
    *EC.HO   46426
    *CONV.   46541
    *CAMS.   44762
    *C.BUF   45045
    *.TTY    46631
    *CAM.I   45115
    *CAM.O   45335
    *ECH.    45336
    *BUF.    45337
    *ECHF.   45540
    *C.DLM   45541
    *.E.R.   45542
    *P.TR    45544
    *TMP.    45545
BP LINKAGE 00016
  .DRCT      46771 46777  92001-16005 741120
    *.DRCT   46771
BP LINKAGE 00017
  IFBRK      47000 47021  92001-16005 741120
    *IFBRK   47000
BP LINKAGE 00020
  OPEN       47022 47207  92002-16006 741205
    *OPEN    47031
BP LINKAGE 00021
  CLOSE      47210 47316  92002-16006  740801
    *CLOSE   47213
BP LINKAGE 00022
  $OPEN      47317 47525  92002-16006   740801
    *$OPEN   47317
BP LINKAGE 00023
  RWND$      47526 47636  92002-16006  740801
    *RWND$   47530
    *RFLG$   47633
```

```
BP LINKAGE 00024
  R/W$      47637 47772  92002-16006  740801
   *R/W$    47637
   *DSXFR   47701
   *D.R     47770
BP LINKAGE 00026
  RMPAR     47773 50016  750701  24998-16001
   *RMPAR   47773
BP LINKAGE 00027
  .DFER     50021 50072  750701  24998-16001
   *.DFER   50021
BP LINKAGE 00030
  .ENTR     50073 50162  750701  24998-16001
   *.ENTR   50102
   *.ENTP   50073
BP LINKAGE 00031

FMGR0(0099)50163 50170  92002-16008  740801
BP LINKAGE 00033
  PK..      50171 51614
   *PK..    50323
BP LINKAGE 00041
  CR..      51615 52677  92002-16008 760616
   *CR..    51756
BP LINKAGE 00044
  COR.A     53045 53060  92001-16005 741120
   *COR.A   53045
BP LINKAGE 00045
  READF     53061 53616  92002-16006 760607
   *READF   53073
   *WRITF   53061
BP LINKAGE 00051
  REIO      53617 53721  92001-16005 741120
   *REIO    53623
BP LINKAGE 00052
  RWNDF     53722 54003  92002-16006  740801
   *RWNDF   53731
BP LINKAGE 00053
  NAM..     54006 54102  92002-16006 740801
   *NAM..   54007
BP LINKAGE 00055
  P.PAS     54103 54131  92002-16006 740801
   *P.PAS   54103
BP LINKAGE 00056
  RW$UB     54132 54403  92002-16006 750422
   *RW$UB   54132
   *NX$EC   54305
   *$KIP    54225
BP LINKAGE 00060
  LOCK.     54404 54445  92002-16006 760616
   *LOCK.   54414
BP LINKAGE 00061
  FM.UT     54446 55606  92002-16006 760616
   *D.RIO   55126
   *DR.RD   55211
   *D.SDR   54446
   *PK.DR   54646
   *DS.LU   55046
   *D.LT    55047
   *D.LB    55050
```

```
    *DS.DF   55051
    *DS.F1   55052
BP LINKAGE 00070
  CREA.      55607 55660
    *CREA.   55616
BP LINKAGE 00071
  CREAT      55672 56147   92002-16006  74
    *CREAT   55702
BP LINKAGE 00077

FMGR1(0099)5016
BP LINKAGE 00
  .PA
```

NOTE

To save space within this appendix, a portion of this listing (from the loading of FMGR to the loading of ALGOL) has been deleted.

```
                                  1   24998-16001

                    3

   (0099)57527  60172
    *ALGL1   60171
    *%LNAL   57530
    *%ABAL   57527
BP LINKAGE 00466

RT3GN(0090)44002 55637  92060-16037 REV.1631 760622
    *PROMT   52712
    *READ    50306
    *RNAME   50300
    *YE/NO   50361
    *DOCON   50066
    *GETAL   50101
    *GETNA   50136
    *GETOC   50200
    *GINIT   50265
```

```
*ERROR   50414
*INERR   50273
*IRERR   50457
*ABORT   50470
*CRETF   52341
*CLOSF   52372
*CLSAB   52432
*CHFIL   53426
*DRKEY   51545
*SPACE   50405
*LFOUT   51731
*RDNAM   51745
*RDBIN   52030
*GTERM   51451
*DISKA   53476
*DISKI   53524
*DISKO   53557
*DISKD   54233
*IPDCB   55200
*LFDCB   54540
*RRDCB   54760
*NMDCB   55420
*INLST   51001
*LSTS    51005
*LSTX    51032
*LSTE    51145
*TLST    51171
*PLST    51172
*.LST1   51207
*.LST2   51210
*.LST3   51211
*.LST4   51212
*.LST5   51213
*INIDX   50511
*IDXS    50515
*IDX     50542
*TIDNT   50703
*PIDNT   50704
*ID1     50721
*ID2     50722
*ID3     50723
*ID4     50724
*ID5     50725
*ID6     50726
*ID7     50727
*ID8     50730
*ID9     50731
*ID10    50732
*ID11    50733
*ID12    50734
*ID13    50735
*ID14    50736
*ID15    50737
*ID16    50740
*FIXX    51254
*FIX     51260
*PFIX    51370
*TFIX    51367
*FIX1    51405
*FIX2    51406
```

```
*FIX3    51407
*FIX4    51410
*LNKX    47542
*LNK     47546
*LNKS    47570
*LNK1    47577
*LNK2    47600
*LNK3    47601
*LLOAD   47313
*LOADS   47322
*GENIO   47331
*FWBPL   47310
*DSTBL   47347
*FSECT   47365
*PARTD   47340
*TBLNK   46011
*CPLIM   47155
*LRBP    46014
*URBP    46015
*IRBP    46016
*LBBP    46017
*UBBP    46020
*IBBP    46021
*CUBP    46022
*UCUBP   46023
*ICUBP   46024
*CUBPA   47156
*CONVD   47454
*LABDO   47604
*USER    47775
*USERS   50001
*SEGS    50014
*SYS     50024
*NAMRC   52126
*NAMBL   52127
*NAMOF   52130
*ERRLU   54352
*ATRCM   50452
*IACOM   54353
*TRCHK   53060
*SWRET   47420
*FMRR    53475
*DPRS2   54471
*BPARS   54472
*OCTNO   50261
*BUFUL   50133
*TCHAR   50256
*DSKAD   54357
*ADBUF   54464
*MAPFG   54360
*NUMPG   54361
*PTYPE   54362
*TYPMS   54363
*DSKAB   46006
*$RNT    47167
*$PRV    47170
*TBCHN   47174
*PIOC    47176
*SWAPF   47177
*LBUF    47201
```

```
   *TBUF    47301
   *LWASM   47175
   *PPREL   47173
   *SDS#    53523
   *CURAL   47171
   *CPL2    47172
   *CMFLG   50134
   *ABCOR   47760
   *MXABC   47761
   *SETDS   47766
   *OLDDA   47753
   *ADBP    46007
   *NADBP   46010
   *OUBUF   53627
   *TTIME   47164
   *TIME1   47165
   *MULR    47166
   *LWSBP   47157
   *NLCOM   47162
   *EOBP    47160
   **IREG   47161
   *CPLSB   54465
   *ASKEY   54466
   *SISDA   54467
   *SKEYA   54470
   *M1      51576
   *P2      47306
   *P3      47311
   *P4      47315
   *P5      47333
   *P6      54340
   *P14     54342
   *M7400   54346
BP LINKAGE 00246
  LURQ      55654 56200  92001-16005 751023
   *LURQ    55654
BP LINKAGE 00252
  $ALRN     56202 56307  92001-16005  741106
   *$ALRN   56202
   *$RNSU   56236
   *$RNEX   56246
   *$LUEX   56262
   *$LUSU   56241
   *$DRAD   56272
BP LINKAGE 00256
  COR.A     56310 56323  92001-16005 741120
   *COR.A   56310
BP LINKAGE 00257
  PARSE     56324 56343  92001-16005 741120
   *PARSE   56327
BP LINKAGE 00261
  CNUMD     56344 56363  92001-16005 741120
   *CNUMD   56346
BP LINKAGE 00262
  CREAT     56364 56641  92002-16006  741022
   *CREAT   56374
BP LINKAGE 00263
  OPEN      56642 57027  92002-16006 741205
   *OPEN    56651
BP LINKAGE 00264
```

```
   READF     57030 57565  92002-16006 760607
    *READF   57042
    *WRITF   57030
BP LINKAGE 00266
   REIO      57566 57670  92001-16005 741120
    *REIO    57572
BP LINKAGE 00267
   APOSN     57676 60037  92002-16006 750227
    *APOSN   57710
BP LINKAGE 00270
   LOCF      60047 60235  92002-16006 750416
    *LOCF    60060
BP LINKAGE 00271
   CLOSE     60236 60344  92002-16006  740801
    *CLOSE   60241
BP LINKAGE 00272
   NAM..     60345 60441  92002-16006 740801
    *NAM..   60346
BP LINKAGE 00273
   $OPEN     60442 60650  92002-16006   740801
    *$OPEN   60442
BP LINKAGE 00274
   P.PAS     60651 60677  92002-16006 740801
    *P.PAS   60651
BP LINKAGE 00275
   RW$UB     60700 61151  92002-16006 750422
    *RW$UB   60700
    *NX$EC   61053
    *$KIP    60773
BP LINKAGE 00300
   RWND$     61152 61262  92002-16006  740801
    *RWND$   61154
    *RFLG$   61257
BP LINKAGE 00302
   R/W$      61263 61416  92002-16006  740801
    *R/W$    61263
    *D$XFR   61325
    *D.R     61414
BP LINKAGE 00305
   RMPAR     61417 61442  750701  24998-16001
    *RMPAR   61417
BP LINKAGE 00306
   .DFER     61443 61514  750701  24998-16001
    *.DFER   61443
BP LINKAGE 00307
   .ENTR     61515 61604  750701  24998-16001
    *.ENTR   61524
    *.ENTP   61515
BP LINKAGE 00311

RT3G1(0099)61605 64111  92060-16037          760617
    *DSETU   62457
    *PTBOT   62753
    *DSTB    63742
    *FSEC    63776
    *DLRM1   62345
BP LINKAGE 00375

RT3G2(0099)61605 65575  92060-16037          760617
    *INPUT   62374
```

```
BP LINKAGE 00520
  RWNDF     65576 65657  92002-16006  740801
    *RWNDF  65605
BP LINKAGE 00521

RT3G3(0099)61605 66146  92060-16037          760622
    *FWENT  62424
BP LINKAGE 00636

RT3G4(0099)61605 65014  92060-16037           760622
    *NLOAD  62432
    *LODER  62460
BP LINKAGE 00533

RT3G5(0099)61605 64435  92060-16037           760618
    *GNIO   62370
BP LINKAGE 00511

RT3G6(0099)61605 64350  92060-16037           760618
    *PARTS  62444
BP LINKAGE 00377

RT3G7(0099)61605 64311  92060-16037           760618
    *DSET5  62540
    *PTBT5  63142
    *DST65  64131
    *FSEC5  64223
    *DLRM7  62345
BP LINKAGE 00377

SWTCH(0010)44002 61636  92060-16038 REV.1631 760621
    *SWTCH  46722
    *MAINR  47207
    *DFTR   61220
    *DNHD   61222
    *DNSU   61223
    *DNSP   61224
    *DNTR   61221
    *DSBCH  61215
    *TUNIT  61232
    *TCH    61230
    *TSBCH  61231
    *INITF  61350
    *LNGTH  61347
    *BUFAD  61352
    *XOUT   60544
    *DSTAD  61351
    *CNVAS  61042
    *CLEN   61107
    *DSPLY  61000
    *LINBL  60773
    *BOOTF  61333
 BP LINKAGE 00250
   CNUMD    61637 61656  92001-16005 741120
    *CNUMD  61641
 BP LINKAGE 00251
   GETST    61671 62120  92001-16005 760622
    *GETST  61674
 BP LINKAGE 00255
   OPEN     62126 62313  92002-16006 741205
```

```
    *OPEN    62135
BP LINKAGE  00256
  READF      62314 63051   92002-16006 760607
    *READF   62326
    *WRITF   62314
BP LINKAGE  00257
  REID       63052 63154   92001-16005 741120
    *REID    63056
BP LINKAGE  00260
  LOCF       63155 63343   92002-16006 750416
    *LOCF    63166
BP LINKAGE  00261
  CLOSE      63344 63452   92002-16006  740801
    *CLOSE   63347
BP LINKAGE  00262
  $OPEN      63453 63661   92002-16006   740801
    *$OPEN   63453
BP LINKAGE  00263
  P.PAS      63662 63710   92002-16006 740801
    *P.PAS   63662
BP LINKAGE  00264
  RW$UB      63717 64170   92002-16006 750422
    *RW$UB   63717
    *NX$EC   64072
    *$KIP    64012
BP LINKAGE  00273
  RWND$      64173 64303   92002-16006  740801
    *RWND$   64175
    *RFLG$   64300
BP LINKAGE  00275
  R/W$       64304 64437   92002-16006  740801
    *R/W$    64304
    *D$XFR   64346
    *D.R     64435
BP LINKAGE  00300
  RMPAR      64440 64463   750701  24998-16001
    *RMPAR   64440
BP LINKAGE  00301
  .DFER      64464 64535   750701  24998-16001
    *.DFER   64464
BP LINKAGE  00302
  .ENTR      64536 64625   750701  24998-16001
    *.ENTR   64545
    *.ENTP   64536
BP LINKAGE  00304

DSKG0(0011)64626 65555    92060-16038            760616
    *DISK0   65130
    *STDS0   64655
    *INP0    64653
    *INIT0   64654
    *FLGTR   64721
BP LINKAGE  00313

DSKG5(0011)64626 66060    92060-16038            760621
    *DISK5   65214
    *STDS5   64654
    *INP5    64627
    *INIT5   64630
BP LINKAGE  00316
```

```
SAVE (0099)44002 44046  92060-16039 REV.1631 760222
BP LINKAGE 00003
  COR.A     44047 44062  92001-16005 741120
   *COR.A   44047
BP LINKAGE 00003
  RMPAR     44063 44106  750701  24998-16001
   *RMPAR   44063
BP LINKAGE 00004
  DMT       44127 46120
   *DMT     44136
BP LINKAGE 00057
  IAND      46123 46132   750701  24998-16001
   *IAND    46123
BP LINKAGE 00060
  PAUSE     46133 46276  750701  24998-16001
   *.PAUS   46133
   *.STOP   46171
BP LINKAGE 00062
  REIO      46277 46401  92001-16005 741120
   *REIO    46303
BP LINKAGE 00063
  PAU.E     46402 46402  750701  24998-16001
   *PAU.E   46402
BP LINKAGE 00064
  .OPSY     46403 46442  750701  24998-16001
   *.OPSY   46403
BP LINKAGE 00065
  .TAPE     46443 46455  750701  24998-16001
   *.TAPE   46443
BP LINKAGE 00066
  .DFER     46456 46527  750701  24998-16001
   *.DFER   46456
BP LINKAGE 00067
  .ENTR     46530 46617  750701  24998-16001
   *.ENTR   46537
   *.ENTP   46530
BP LINKAGE 00070
  BUFER     46620 46672  92060-16043 760622
   *BUFER   46620
BP LINKAGE 00072
  CHDLU     46673 47047
   *CHDLU   46677
BP LINKAGE 00073
  CHUTP     47050 47256
   *CHUTP   47053
BP LINKAGE 00074
  LUTRK     47257 47750
   *LUTRK   47270
BP LINKAGE 00075
  MPFND     47753 50427
   *MPFND   47760
BP LINKAGE 00102
  PRNTH     50437 50611
   *PRNTH   50442
BP LINKAGE 00103
  TPPOS     50612 51026
   *TPPOS   50615
BP LINKAGE 00104
  ASCDC     51027 51156  92060-16043 760622
```

```
    *ASCOC   51027
    *ASCOC   51033
BP LINKAGE 00105
  DCASC      51157 51264  92060-16043 760622
    *DCASC   51157
BP LINKAGE 00106
  DRT        51265 51354  92060-16043 760622
    *DRT     51265
BP LINKAGE 00107
  DSCAD      51355 51425  92060-16043 760622
    *DSCAD   51355
BP LINKAGE 00110
  MEMGT      51426 51441  92060-16043 760622
    *MEMGT   51426
BP LINKAGE 00111
  SUB        51442 51463  92060-16043 760622
    *SUB     51442
BP LINKAGE 00112
  READU      51464 51556
    *READU   51467
BP LINKAGE 00113
  RMOVI      51557 51564  92060-16043 760622
    *RMOVI   51557
BP LINKAGE 00114
  MESG       51605 52667  92060-16043 760622
    *MESG    51605
    *ITASK   52653
BP LINKAGE 00116

RSTOR(0099)44002 44111  92060-16040 REV.1631 760622
BP LINKAGE 00003
  RMPAR      44112 44135  750701  24998-16001
    *RMPAR   44112
BP LINKAGE 00004
  MTD        44247 46652
    *MTD     44265
BP LINKAGE 00005
  IAND       46667 46676   750701  24998-16001
    *IAND    46667
BP LINKAGE 00006
  PAUSE      46677 47042  750701  24998-16001
    *.PAUS   46677
    *.STOP   46735
BP LINKAGE 00010
  REIO       47043 47145  92001-16005 741120
    *REIO    47047
BP LINKAGE 00011
  PAU.E      47146 47146  750701  24998-16001
    *PAU.E   47146
BP LINKAGE 00012
  .OPSY      47147 47206  750701  24998-16001
    *.OPSY   47147
BP LINKAGE 00013
  .TAPE      47207 47221  750701  24998-16001
    *.TAPE   47207
BP LINKAGE 00014
  .DFER      47222 47273  750701  24998-16001
    *.DFER   47222
BP LINKAGE 00015
  .ENTR      47274 47363  750701  24998-16001
```

```
   *.ENTR   47303
   *.ENTP   47274
BP LINKAGE 00016
  BUFER     47364 47436   92060-16043 760622
   *BUFER   47364
BP LINKAGE 00017
  COR.A     47437 47452   92001-16005 741120
   *COR.A   47437
BP LINKAGE 00020
  CHDLU     47453 47627
   *CHDLU   47457
BP LINKAGE 00021
  CHUTP     47637 50045
   *CHUTP   47642
BP LINKAGE 00023
  LUTRK     50050 50541
   *LUTRK   50061
BP LINKAGE 00024
  MATCH     50542 51101   90260-16043 760622
   *MATCH   50542
BP LINKAGE 00025
  MPEND     51102 51556
   *MPEND   51107
BP LINKAGE 00026
  PRNTH     51557 51731
   *PRNTH   51562
BP LINKAGE 00027
  TPPOS     51734 52150
   *TPPOS   51737
BP LINKAGE 00032
  ASCOC     52155 52304   92060-16043 760622
   *ASCOC   52155
   *ASCOC   52161
BP LINKAGE 00033
  DCASC     52305 52412   92060-16043 760622
   *DCASC   52305
BP LINKAGE 00034
  DRT       52413 52502   92060-16043 760622
   *DRT     52413
BP LINKAGE 00035
  DSCAD     52503 52553   92060-16043 760622
   *DSCAD   52503
BP LINKAGE 00036
  MEMGT     52554 52567   92060-16043 760622
   *MEMGT   52554
BP LINKAGE 00037
  SUB       52570 52611   92060-16043 760622
   *SUB     52570
BP LINKAGE 00040
  READU     52612 52704
   *READU   52615
BP LINKAGE 00041
  RMOVI     52705 52712   92060-16043 760622
   *RMOVI   52705
BP LINKAGE 00042
  MESG      52713 53775   92060-16043 760622
   *MESG    52713
   *ITASK   53761
BP LINKAGE 00044
```

```
COPY (0099)44002 44036  92060-16042 REV.1631 760622
BP LINKAGE 00003
  RMPAR     44037 44062  750701  24998-16001
   *RMPAR   44037
BP LINKAGE 00004
  DD        44104 46124
   *DD      44111
BP LINKAGE 00065
  IAND      46127 46136   750701  24998-16001
   *IAND    46127
BP LINKAGE 00066
  PAUSE     46137 46302  750701  24998-16001
   *.PAUS   46137
   *.STOP   46175
BP LINKAGE 00067
  REIO      46303 46405  92001-16005 741120
   *REIO    46307
BP LINKAGE 00070
  PAU.E     46406 46406  750701  24998-16001
   *PAU.E   46406
BP LINKAGE 00071
  .OPSY     46407 46446  750701  24998-16001
   *.OPSY   46407
BP LINKAGE 00072
  .DFER     46447 46520  750701  24998-16001
   *.DFER   46447
BP LINKAGE 00073
  .ENTR     46521 46610  750701  24998-16001
   *.ENTR   46530
   *.ENTP   46521
BP LINKAGE 00074
  BUFER     46611 46663  92060-16043 760622
   *BUFER   46611
BP LINKAGE 00075
  COR.A     46664 46677  92001-16005 741120
   *COR.A   46664
BP LINKAGE 00076
  CHDLU     46700 47054
   *CHDLU   46704
BP LINKAGE 00077
  CHUTP     47055 47263
   *CHUTP   47060
BP LINKAGE 00100
  LUTRK     47264 47755
   *LUTRK   47275
BP LINKAGE 00102
  MATCH     47760 50317  90260-16043 760622
   *MATCH   47760
BP LINKAGE 00106
  MPEND     50321 50775
   *MPEND   50326
BP LINKAGE 00107
  ASCDC     50776 51125  92060-16043 760622
   *ASCDC   50776
   *ASCOC   51002
BP LINKAGE 00110
  DCASC     51126 51233  92060-16043 760622
   *DCASC   51126
BP LINKAGE 00111
  DRT       51234 51323  92060-16043 760622
```

```
   *ORT     51234
BP LINKAGE 00112
  DSCAD     51324 51374  92060-16043 760622
   *DSCAD   51324
BP LINKAGE 00113
  MEMGT     51375 51410  92060-16043 760622
   *MEMGT   51375
BP LINKAGE 00114
  SUB       51411 51432  92060-16043 760622
   *SUB     51411
BP LINKAGE 00115
  READU     51433 51525
   *READU   51436
BP LINKAGE 00116
  RMOVI     51526 51533  92060-16043 760622
   *RMOVI   51526
BP LINKAGE 00117
  MESG      51554 52636  92060-16043 760622
   *MESG    51554
   *ITASK   52622
BP LINKAGE 00121

VERFY(0099)44002 44047  92060-16041 REV.1631 760622
BP LINKAGE 00003
  COR.A     44050 44063  92001-16005 741120
   *COR.A   44050
BP LINKAGE 00004
  RMPAR     44064 44107  750701  24998-16001
   *RMPAR   44064
BP LINKAGE 00005
  VRFSB     44110 45325
   *VRFSB   44114
BP LINKAGE 00006
  IAND      45326 45335   750701  24998-16001
   *IAND    45326
BP LINKAGE 00007
  PAUSE     45336 45501  750701  24998-16001
   *.PAUS   45336
   *.STOP   45374
BP LINKAGE 00011
  REIO      45502 45604  92001-16005 741120
   *REIO    45506
BP LINKAGE 00012
  PAU.E     45605 45605  750701  24998-16001
   *PAU.E   45605
BP LINKAGE 00013
  .OPSY     45606 45645  750701  24998-16001
   *.OPSY   45606
BP LINKAGE 00014
  .TAPE     45646 45660  750701  24998-16001
   *.TAPE   45646
BP LINKAGE 00015
  .DFER     45661 45732  750701  24998-16001
   *.DFER   45661
BP LINKAGE 00016
  .ENTR     45737 46026  750701  24998-16001
   *.ENTR   45746
   *.ENTP   45737
BP LINKAGE 00023
  DCASC     46030 46135  92060-16043 760622
```

```
   *DCASC  46030
BP LINKAGE 00024
  MEMGT    46136 46151  92060-16043 760622
   *MEMGT  46136
BP LINKAGE 00025


RT PARTITION REQMTS:
  $$CMD 02 PAGES
  PRMPT 02 PAGES
  R$PN$ 02 PAGES
  WHZAT 03 PAGES
  SYSON 02 PAGES
  JOB   04 PAGES
  SPOUT 02 PAGES

BG PARTITION REQMTS:
  AUTOR 05 PAGES
  EDITR 05 PAGES
  ASMB  06 PAGES
  XREF  05 PAGES
  LOADR 06 PAGES
  FMGR  07 PAGES
  GASP  06 PAGES
  FTN4  10 PAGES
  ALGOL 08 PAGES
  RT3GN 11 PAGES
  SWTCH 11 PAGES
  SAVE  05 PAGES
  RSTOR 05 PAGES
  COPY  05 PAGES
  VERFY 03 PAGES

LARGEST ADDRESSABLE PARTITION:
W/O COM 15 PAGES
W/  COM 15 PAGES


LWA MEM RESIDENT PROG AREA 46256
ALIGN AT NEXT PAGE?
YES                                 * ALIGN
LWA MEM RESIDENT PROG AREA 47777

SYS AV MEM:  01024 WORDS

1ST DSK PG 00021
 CHANGE 1ST DSK PG?
21                                  * FIRST DISC PAGE

SYS AV MEM:  01024 WORDS

PAGES REMAINING: 00043
DEFINE PARTITIONS
-
1,4,RT                              * DEFINE PARTITIONS
-
2,3,RT
-
3,3,RT,R
-
```

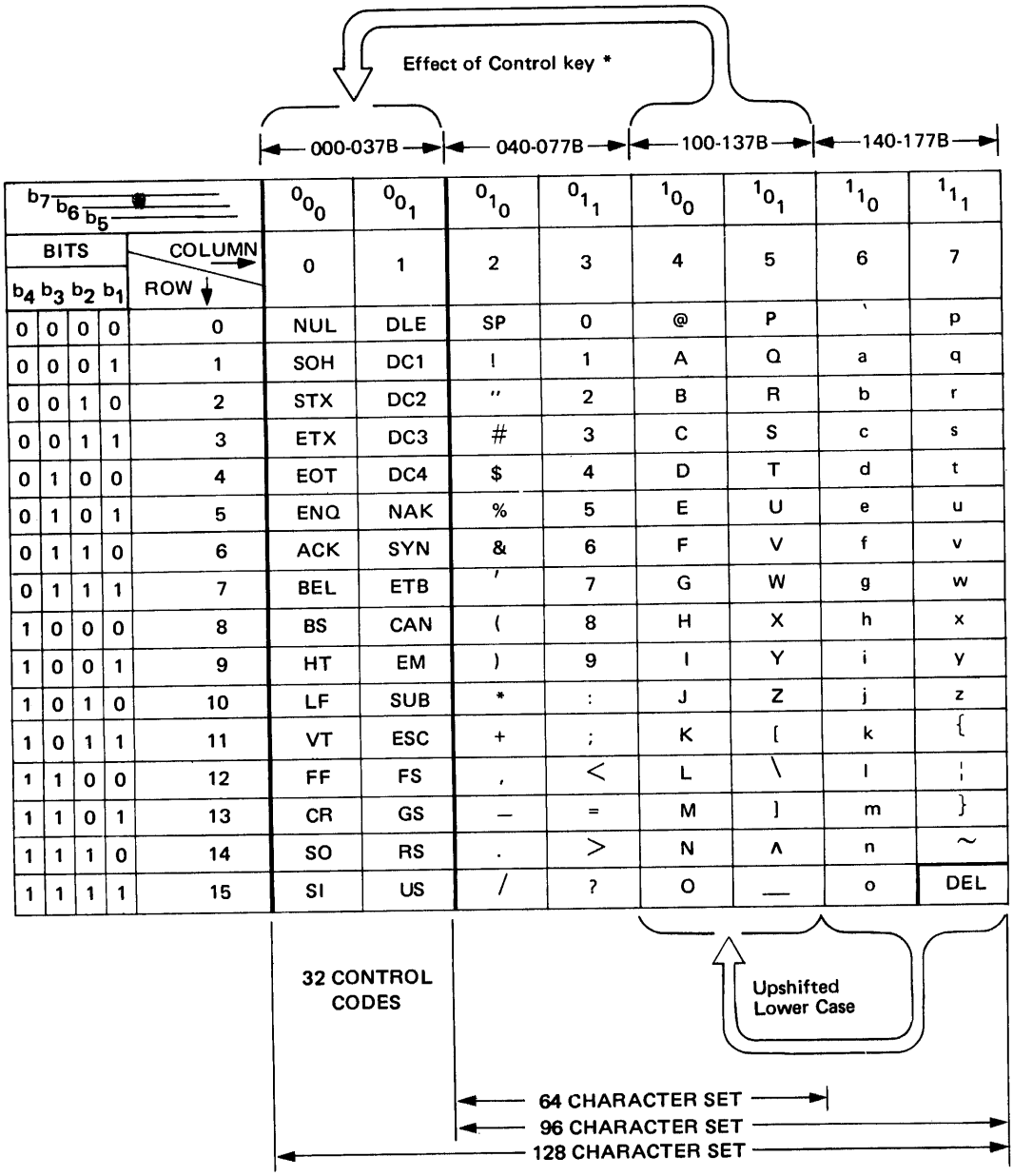
```
4,15,BG
-
5,7,BG
-
6,11,BG
-
/E

MODIFY PROGRAM PAGE REQUIREMENTS?
-
LOADR,15                          * MODIFY PAGE REQ
-
ASMB,15
-
RTGEN,15
-
XREF,11
-
ALGOL,11
-
FTN4,11
-
EDITR,11
-
SAVE,15
-
RSTOR,15
-
COPY,15
-
VERFY,15
-
/E

ASSIGN PROGRAM PARTITIONS?
-
WHZAT,3                           * ASSIGN PARTITIONS
-
/E
SYSTEM STORED ON DISC
SYS SIZE: 34 TRKS, 027 SECS(10)
```

HP CHARACTER SET

APPENDIX F



b_7 b_6 b_5					0_0	0_1	0_{10}	0_{11}	1_0	1_1	1_{10}	1_{11}
BITS				COLUMN →	0	1	2	3	4	5	6	7
b_4	b_3	b_2	b_1	ROW ↓								
0	0	0	0	0	NUL	DLE	SP	0	@	P	`	p
0	0	0	1	1	SOH	DC1	!	1	A	Q	a	q
0	0	1	0	2	STX	DC2	"	2	B	R	b	r
0	0	1	1	3	ETX	DC3	#	3	C	S	c	s
0	1	0	0	4	EOT	DC4	$	4	D	T	d	t
0	1	0	1	5	ENQ	NAK	%	5	E	U	e	u
0	1	1	0	6	ACK	SYN	&	6	F	V	f	v
0	1	1	1	7	BEL	ETB	'	7	G	W	g	w
1	0	0	0	8	BS	CAN	(	8	H	X	h	x
1	0	0	1	9	HT	EM	)	9	I	Y	i	y
1	0	1	0	10	LF	SUB	*	:	J	Z	j	z
1	0	1	1	11	VT	ESC	+	;	K	[	k	{
1	1	0	0	12	FF	FS	,	<	L	\	l	¦
1	1	0	1	13	CR	GS	–	=	M	]	m	}
1	1	1	0	14	SO	RS	.	>	N	^	n	~
1	1	1	1	15	SI	US	/	?	O	_	o	DEL

EXAMPLE: The representation for the character "K" (column 4, row 11) is.

	b_7	b_6	b_5	b_4	b_3	b_2	b_1
BINARY	1	0	0	1	0	1	1
OCTAL	1		1			3	

* Depressing the Control key while typing an upper case letter produces the corresponding control code on most terminals. For example, Control-H is a backspace.

9206-1A

HEWLETT-PACKARD CHARACTER SET FOR COMPUTER SYSTEMS

This table shows HP's implementation of ANS X3.4-1968 (USASCII) and ANS X3.32-1973. Some devices may substitute alternate characters from those shown in this chart (for example, Line Drawing Set or Scandanavian font) Consult the manual for your device.

The left and right byte columns show the octal patterns in a 16 bit word when the character occupies bits 8 to 14 (left byte) or 0 to 6 (right byte) and the rest of the bits are zero. To find the pattern of two characters in the same word, add the two values. For example, "AB" produces the octal pattern 040502. (The parity bits are zero in this chart.)

The octal values 0 through 37 and 177 are control codes. The octal values 40 through 176 are character codes.

Decimal Value	Octal Values		Mnemonic	Graphic[1]	Meaning
	Left Byte	Right Byte			
0	000000	000000	NUL	$^{N}_{U}$	Null
1	000400	000001	SOH	$^{S}_{H}$	Start of Heading
2	001000	000002	STX	$^{S}_{X}$	Start of Text
3	001400	000003	ETX	$^{E}_{X}$	End of Text
4	002000	000004	EOT	$^{E}_{T}$	End of Transmission
5	002400	000005	ENQ	$^{E}_{Q}$	Enquiry
6	003000	000006	ACK	$^{A}_{K}$	Acknowledge
7	003400	000007	BEL		Bell, Attention Signal
8	004000	000010	BS	$^{B}_{S}$	Backspace
9	004400	000011	HT	$^{H}_{T}$	Horizontal Tabulation
10	005000	000012	LF	$^{L}_{F}$	Line Feed
11	005400	000013	VT	$^{V}_{T}$	Vertical Tabulation
12	006000	000014	FF	$^{F}_{F}$	Form Feed
13	006400	000015	CR	$^{C}_{R}$	Carriage Return
14	007000	000016	SO	$^{S}_{O}$	Shift Out } Alternate
15	007400	000017	SI	$^{S}_{I}$	Shift In } Character Set
16	010000	000020	DLE	$^{D}_{L}$	Data Link Escape
17	010400	000021	DC1	D_1	Device Control 1 (X-ON)
18	011000	000022	DC2	D_2	Device Control 2 (TAPE)
19	011400	000023	DC3	D_3	Device Control 3 (X-OFF)
20	012000	000024	DC4	D_4	Device Control 4 ($\overline{\text{TAPE}}$)
21	012400	000025	NAK	$^{N}_{K}$	Negative Acknowledge
22	013000	000026	SYN	$^{S}_{Y}$	Synchronous Idle
23	013400	000027	ETB	$^{E}_{B}$	End of Transmission Block
24	014000	000030	CAN	$^{C}_{N}$	Cancel
25	014400	000031	EM	$^{E}_{M}$	End of Medium
26	015000	000032	SUB	$^{S}_{B}$	Substitute
27	015400	000033	ESC	$^{E}_{C}$	Escape[2]
28	016000	000034	FS	$^{F}_{S}$	File Separator
29	016400	000035	GS	$^{G}_{S}$	Group Separator
30	017000	000036	RS	$^{R}_{S}$	Record Separator
31	017400	000037	US	$^{U}_{S}$	Unit Separator
127	077400	000177	DEL	▓	Delete, Rubout[3]

Decimal Value	Octal Values		Character	Meaning
	Left Byte	Right Byte		
32	020000	000040		Space, Blank
33	020400	000041	!	Exclamation Point
34	021000	000042	"	Quotation Mark
35	021400	000043	#	Number Sign, Pound Sign
36	022000	000044	$	Dollar Sign
37	022400	000045	%	Percent
38	023000	000046	&	Ampersand, And Sign
39	023400	000047	'	Apostrophe, Acute Accent
40	024000	000050	(	Left (opening) Parenthesis
41	024400	000051	)	Right (closing) Parenthesis
42	025000	000052	*	Asterisk, Star
43	025400	000053	+	Plus
44	026000	000054	,	Comma, Cedilla
45	026400	000055	-	Hyphen, Minus, Dash
46	027000	000056	.	Period, Decimal Point
47	027400	000057	/	Slash, Slant
48	030000	000060	0	} Digits, Numbers
49	030400	000061	1	
50	031000	000062	2	
51	031400	000063	3	
52	032000	000064	4	
53	032400	000065	5	
54	033000	000066	6	
55	033400	000067	7	
56	034000	000070	8	
57	034400	000071	9	
58	035000	000072	:	Colon
59	035400	000073	;	Semicolon
60	036000	000074	<	Less Than
61	036400	000075	=	Equals
62	037000	000076	>	Greater Than
63	037400	000077	?	Question Mark

Decimal Value	Octal Values		Character	Meaning
	Left Byte	Right Byte		
64	040000	000100	@	Commercial At
65	040400	000101	A	
66	041000	000102	B	
67	041400	000103	C	
68	042000	000104	D	
69	042400	000105	E	
70	043000	000106	F	
71	043400	000107	G	
72	044000	000110	H	
73	044400	000111	I	
74	045000	000112	J	
75	045400	000113	K	
76	046000	000114	L	
77	046400	000115	M	Upper Case Alphabet, Capital Letters
78	047000	000116	N	
79	047400	000117	O	
80	050000	000120	P	
81	050400	000121	Q	
82	051000	000122	R	
83	051400	000123	S	
84	052000	000124	T	
85	052400	000125	U	
86	053000	000126	V	
87	053400	000127	W	
88	054000	000130	X	
89	054400	000131	Y	
90	055000	000132	Z	
91	055400	000133	[	Left (opening) Bracket
92	056000	000134	\	Backslash, Reverse Slant
93	056400	000135	]	Right (closing) Bracket
94	057000	000136	^ ↑	Caret, Circumflex; Up Arrow[4]
95	057400	000137	_ ←	Underline; Back Arrow[4]

Decimal Value	Octal Values		Character	Meaning
	Left Byte	Right Byte		
96	060000	000140	`	Grave Accent[5]
97	060400	000141	a	
98	061000	000142	b	
99	061400	000143	c	
100	062000	000144	d	
101	062400	000145	e	
102	063000	000146	f	
103	063400	000147	g	
104	064000	000150	h	
105	064400	000151	i	
106	065000	000152	j	
107	065400	000153	k	
108	066000	000154	l	
109	066400	000155	m	
110	067000	000156	n	Lower Case Letters[5]
111	067400	000157	o	
112	070000	000160	p	
113	070400	000161	q	
114	071000	000162	r	
115	071400	000163	s	
116	072000	000164	t	
117	072400	000165	u	
118	073000	000166	v	
119	073400	000167	w	
120	074000	000170	x	
121	074400	000171	y	
122	075000	000172	z	
123	075400	000173	{	Left (opening) Brace[5]
124	076000	000174	¦	Vertical Line[5]
125	076400	000175	}	Right (closing) Brace[5]
126	077000	000176	~	Tilde, Overline[5]

9206-1C

Notes: [1]This is the standard display representation. The software and hardware in your system determine if the control code is displayed, executed, or ignored. Some devices display all control codes as "||", "@", or space.

[2]Escape is the first character of a special control sequence. For example, ESC followed by "J" clears the display on a 2640 terminal.

[3]Delete may be displayed as "__", "@", or space.

[4]Normally, the caret and underline are displayed. Some devices substitute the up arrow and back arrow.

[5]Some devices upshift lower case letters and symbols (` through ~) to the corresponding upper case character (@ through ^). For example, the left brace would be converted to a left bracket.

RTE Special Characters

Mnemonic	Octal Value	Use
SOH (Control A)	1	Backspace (TTY)
EM (Control Y)	31	Backspace (2600)
BS (Control H)	10	Backspace (TTY, 2615, 2640, 2644)

INDEX

S

T

U

W

READER COMMENT SHEET

RTE-II/RTE-III ON-LINE GENERATOR REFERENCE MANUAL

92060-90020 JUL 1977

We welcome your evaluation of this manual. Your comments and suggestions help us improve our publications. Please use additional pages if necessary.

Is this manual technically accurate?

Is this manual complete?

Is this manual easy to read and use?

Other comments?

FROM:

Name _____

Company _____

Address _____

_____

_____

FOLD FOLD

FIRST CLASS
PERMIT NO. 141
CUPERTINO
CALIFORNIA

BUSINESS REPLY MAIL

No Postage Necessary if Mailed in the United States Postage will be paid by

Hewlett-Packard Company
Data Systems Division
11000 Wolfe Road
Cupertino, California 95014
ATTN: Technical Marketing Dept.

FOLD FOLD

PART NO. 92060-90020
Revised 7/77
Printed in U.S.A. 7/76

HEWLETT hp PACKARD

Sales and service from 172 offices in 65 countries.
11000 Wolfe Road, Cupertino, California 95014