RT–11 System Generation Guide

AA–M240A–TC

March 1983

This manual describes the system generation process and is designed for RT–11 users who need to build special monitors and handlers.

This manual supersedes the *RT–11 Installation and System Generation Guide*, AA–H376A–TC.

Operating System: RT–11 Version 5.0

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Preface

How to Use This Manual

The RT–11 software kit contains four generic operating systems that are designed to meet the needs of most RT–11 users. However, you need not be limited to the use of any one of these systems if they do not meet your needs. This manual provides you with the information you need to generate a system tailored to your specific needs. Chapter 1 describes the system generation procedure that you must follow and specific questions you must answer to generate your particular system. Chapter 2 tells you how to run the SYSGEN program to build the resulting system. Chapter 3 describes system generation on a dual-diskette system. However, DIGITAL does not recommend a system generation of this kind.

Additional information available in the appendixes includes: system generation answers that duplicate the standard, distributed monitors, system generation answers that create an example multiterminal system, RT–11 conditionals, and customizations required for specially generated monitors.

Before you begin, you should read the *Guide to RT–11 Documentation*, which describes the other software documents associated with the RT–11 operating system. Familiarity with the RT–11 system, as described in the *RT–11 System User's Guide*, *RT–11 System Utilities Manual*, and Chapter 1 of the *RT–11 Installation Guide*, is particularly helpful when you perform the procedures in this manual.

If you are a FORTRAN IV, BASIC–11, CTS–300, or other layered product user, you build your FORTRAN IV, BASIC–11, FMS–11, CTS–300, or other system after building the RT–11 system. A layered product is software that is sold separately but requires the RT–11 operating system environment to run. See the appropriate installation manual for instructions on installing such products.

Documentation Conventions

You should become familiar with certain symbolic conventions used in this manual.

1. Examples consist of actual computer output whenever possible. In these examples, user input appears in red where it must be differentiated from computer output.

2. Unless the manual indicates otherwise, all commands or command strings end with a carriage return. The symbol (RET) represents a carriage return, (LF) a line feed, (SP) a space, (ESC) an ESCAPE or ALTMODE, and (TAB) a tab.

3. To produce certain characters in system commands, you must type a combination of keys concurrently. For example, while holding down the CTRL key, type C to produce the CTRL/C character. Key combinations such as this are documented as (CTRL/C), (CTRL/O), and so forth.

4. In descriptions of command syntax, capital letters represent the command name, which you must type. Lowercase letters represent a variable for which you must supply a value.

5. In examples, you must distinguish between the capital letter O and the number 0. Examples in this manual represent these characters as follows:

   Letter O: O

   Number 0: 0

6. The sample terminal dialog in this manual contains version numbers where they would normally appear. The version numbers include xx in those fields that can vary from installation to installation. The exact contents of these fields are not of interest in the examples in this manual, as long as appropriate digits appear in the indicated area. The same is true for the FREE BLOCKS messages included in device directories.

   If you submit a software performance report (SPR) to DIGITAL, you must include the complete version number.

7. A decimal point (.) follows a number to indicate that it is a decimal number. A number without a decimal point is an octal number. For example, 128. is 128 (decimal) and 126 is 126 (octal).

Chapter 1
Preparing for System Generation

You can build a unique RT–11 monitor through the system generation process; however, the procedure requires some preparation. Because the procedure lets you set the parameters for the system you want, you should be knowledgeable about the process and also prepared with the information and selections you will be called on to provide.

System generation can be either an interactive or an automated procedure. You must run the program SYSGEN.COM through the IND processor and supply answers to the questions it asks. Answers can be supplied interactively through the console or automatically through an answer file. To complete the process, you will have to assemble and link one or more monitors and device handlers that will then reflect the parameters you set.

The system generation process requires a significant amount of mass storage space and execution time. DIGITAL has distributed four standard monitors in the distribution kit and recommends that you undertake the system generation process only if none of these standard monitors fully meets your needs.

Before beginning the system generation process, you should:

1. Successfully install and test your working system.
2. Determine whether the features you need are available only through system generation. (Read Chapter 1 of the *RT–11 Installation Guide* to assess whether or not you need to perform a system generation.)
3. Become familiar with the RT–11 documentation, giving special attention to the *RT–11 System User's Guide* and *RT–11 System Utilities Manual*, and to Chapter 1 of the *RT–11 Installation Guide.*
4. Become comfortable with the keyboard monitor commands and RT–11 operating characteristics.
5. Read the installation guide for any layered products you have. (Some of these products require specific answers to SYSGEN questions.)

You should not attempt to perform the system generation process unless your hardware configuration meets certain requirements.

DIGITAL supports automatic system generation (under license) only on a system with at least 16K words of memory and 2000 contiguous free blocks of disk storage. The minimum configuration that DIGITAL recommends for system generation is a system with at least two disk drives and 24K words of memory.

DIGITAL also supports system generation on RX01 and RX02 diskette systems (with at least 28K words of memory), provided you use the manual procedure described in Chapter 3. However, DIGITAL does not recommend this very lengthy method.

To prepare for system generation, you should:

1. Study the system generation process (Section 1–1).
2. Gather the information or make decisions described in Section 1.2.
3. Study the SYSGEN dialog (Section 1–3).

You can use the worksheet at the end of this chapter (Figure 1–6) to record information, decisions, and choices.

1.1 System Generation Process

Once you have gathered some information about your configuration, you can run SYSGEN and answer the system generation questions to set the parameters for your special system. The command to run the system generation process is:

```
·RUN IND.SAV SYSGEN.COM
```

IND.SAV is an indirect control file processor that uses the input file SYSGEN.COM to drive the system generation process. (Both file type specifications, .SAV and .COM, may be omitted.) However, if the command SET KMON IND was previously issued, you can use the indirect command @SYSGEN.

The questions that you are asked are in the form of a dialog. SYSGEN.COM contains the dialog and the monitor conditionals. It contains IND directives to display explanatory text, query for options, open input and output files, test the validity of responses, test and modify conditions, and set values for variables. Executing SYSGEN.COM produces the following default output files:

- SYSGEN.CND
- SYSGEN.TBL
- SYSGEN.BLD

- SYSGEN.MON
- SYSGEN.DEV
- SYSGEN.ANS

SYSGEN allows you to choose your own names for them. Your responses to the dialog establish the conditionals that SYSGEN writes to the conditional file SYSGEN.CND. SYSGEN uses some of the conditionals that it generates to create SYSGEN.TBL, another conditional file that sets up device table entries for each device you specify and defines device handlers. SYSGEN.TBL is included in the assembly and link procedures for all generated monitors. (For a list of RT–11 conditionals, refer to Appendix C.)

SYSGEN also creates three indirect command files: SYSGEN.BLD, SYSGEN.MON, and SYSGEN.DEV. These files contain all the command strings that perform the assemblies and links that build the system you specify when you answer the dialog questions. SYSGEN.MON builds the monitor or monitors you define; SYSGEN.DEV builds the device handlers you define. SYSGEN.BLD executes SYSGEN.MON and SYSGEN.DEV.

SYSGEN.COM optionally creates a user-defined answer file, named SYSGEN.ANS by default. This file reflects all responses made during the system generation session, and can be used as input during a later system generation session to generate a new monitor without running the entire system generation dialog. When an answer file is used, SYSGEN does not ask the dialog questions; rather, it gets all the necessary information for the attributes of the system to be generated from the answer file. After executing the file, SYSGEN allows you to alter the output file to reflect any changes you wish to make, for example, to add monitor options, to support additional peripheral devices, or to change device addresses.

Ultimately, you must assemble and link the SYSGEN.CND, SYSGEN.TBL, and (optionally) TRMTBL.MAC conditional files with certain system source files, depending on options you choose during system generation. For example, you would need RMONSJ.MAC, the SJ resident monitor source file, if your desired system included the SJ monitor. The conditional file TRMTBL.MAC, which is distributed with your system software, is required only if you are building a multiterminal system. The source file EDTGBL.MAC is always required, because it contains system-wide definitions.

Once you have answered the SYSGEN questions, copy the system source files you need (SYSGEN.CND and SYSGEN.TBL) to the volume that the command files use as the source input device. Then assemble and link the sources with the conditional files (using SYSGEN.BLD alone or, if you wish, SYSGEN.MON and SYSGEN.DEV). You can enter the commands individually if you choose.

Figure 1–1 shows the procedures involved in the system generation process; Figure 1–2 shows the files required for system generation.

Figure 1–1: System Generation Process

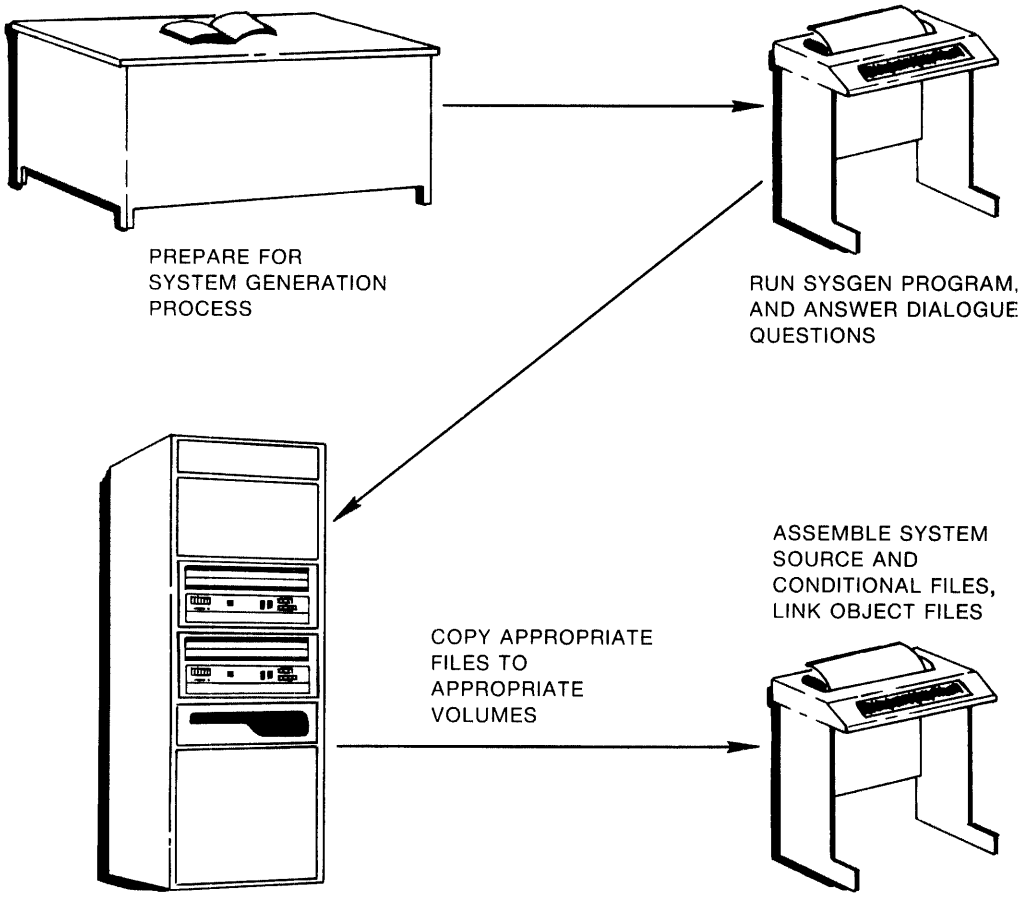
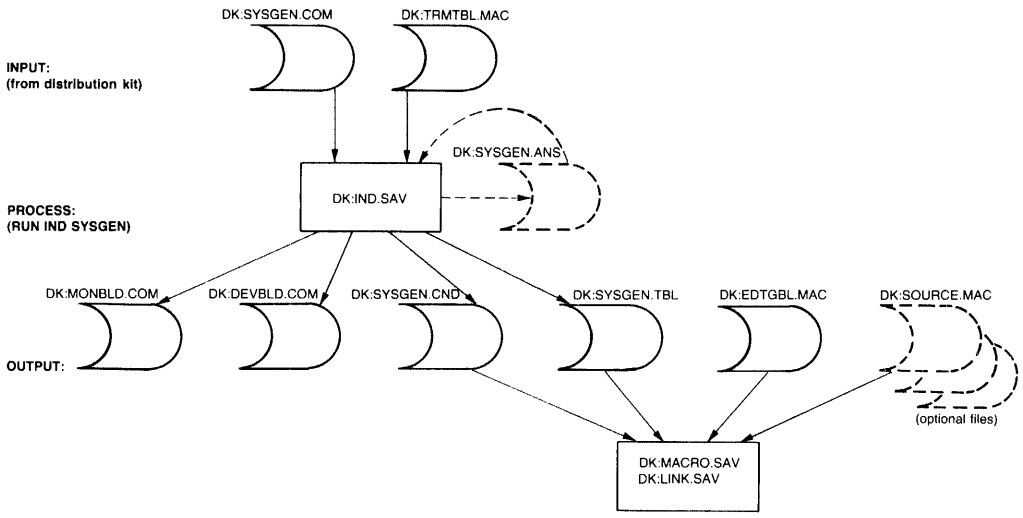


Figure 1–2: SYSGEN Input and Output Files



1.2 Gathering Information

To answer SYSGEN dialog questions, you must be familiar with both the target system configuration (that is, the one you are generating) and your current configuration (that is, the one on which you will run SYSGEN and assemble and link the new monitor or monitors and handlers). You should also know which monitor services you want in the target system and which vector and control status register (CSR) addresses are involved. You will be unable to perform the system build process unless you know your current configuration and its capabilities, you have planned an optimal file arrangement for system build on your configuration, and you have answered the relevant SYSGEN dialog questions appropriately. In addition, you may have to edit the conditional files before you build the target system. To make sure that you have all the information you need, identify the following:

1. Peripheral devices to be supported in the special system you are generating (that is, the target system)
2. Interrupt vector and CSR addresses for devices in the target system
3. Monitor services you require for the target system
4. Edits you may need to make to the conditional files
5. Device assignments for the system build procedure

The following sections describe how to identify these items.

1.2.1 Peripheral Devices

Identify all the peripheral devices that your target system configuration will include. List the device mnemonic for each device on the worksheet at the end of this chapter (for example, DY for an RX02 diskette).

NOTE

You may need to include some empty device slots to make sure that your system has enough device slots for your application's requirements. The number of logical device assignments you will be able to make in the working system is equal to the number of device slots available in the system.

1.2.2 Interrupt Vectors and CSRs

Identify the interrupt vector addresses and CSR addresses at which the field service technician installed each peripheral in your configuration. When installing the hardware, the field service technician is responsible for leaving a written record of this address information at your site, usually on a sticker attached to the processor. List each address on the worksheet (Figure 1–6).

Although most peripherals have standard interrupt vector and CSR addresses, some have floating addresses. The presence or absence of such floating address devices affects the addresses at which the other floating address devices in the system are installed. (Floating address devices must be installed in a standard sequence.) Even devices with standard vectors may have been installed at nonstandard addresses.

1.2.3 Monitor Services for Target Application

DIGITAL has generated the standard monitors through the system generation process; you will probably need to select support for features that standard monitors also support. In other words, many SYSGEN questions offer features you will recognize as standard features in the distributed monitors. Table 1–1 summarizes special features that are available only through the system generation process.

Table 1–1: Features Available Only Through System Generation Process

Feature	Function
Asynchronous terminal status	Provides a program with the updated status of terminals in multiterminal systems. MU BASIC–11 require this support.
BATCH	Allows RT–11 to operate unattended. All monitors except BL support BATCH.
Device I/O timeout	Permits device handlers to issue a mark-time programmed request. DECnet applications require this support.
Disable .FETCH request under XM	Disables the use of the .FETCH request under XM, requiring device handlers to be resident in memory.
Double-density only RX02	Permits you to use only double-density RX02 diskettes on the system. This feature makes the RX02 handler smaller.
DZ11 up to 9600 baud	Permits you to initialize lines at specific baud rates up to 9600.
Error logging	Keeps a statistical record of device, memory parity, and memory cache errors. An error logging job is created when you select this support for FB; a handler is created for SJ. The EL job retrieves information that is later available to you in summary report format.
Extra device slots	Permits you to add devices to the system after it is built. The number of logical assignments you can make is equal to the number of devices plus empty device slots in the system.
High-speed ring buffer	Causes character processing and interpretation to be performed at fork level. This allows short bursts of characters transmitted at very high rates to be received. Use of this feature is recommended with PDTs.

(continued on next page)

Table 1–1: Features Available Only Through System Generation Process (Cont.)

Feature	Function
Keyboard monitor command subsets	Allows you to choose one, two, or three subsets of the keyboard monitor commands instead of all the commands.
Memory parity	Causes the system to print an error message when a memory parity error occurs if your configuration includes memory parity hardware. If you have this hardware but do not select this support, the system halts when memory errors occur.
Month and year rollover	Adds support that automatically rolls over the date at the end of the month and the end of the year. Normally, you must reset the date and time. This support is useful for applications that run continuously and over a long period of time.
Multiterminal support	Permits you to use two or more terminals with the SJ, FB, or XM monitor. MU BASIC–11 requires this support.
Multiterminal timeout	Causes the monitor to reset at regular intervals any terminal that goes off line. This support minimizes the impact of static in multiterminal systems. MU BASIC–11 requires this support.
Programmable clock as system clock	Allows you to substitute as the system clock the KW11–P programmable clock for the usual line clock. However, the programmable clock would not then be available for program use.
Ring buffer size	Allows you to change the size of the input and output ring buffers. The input ring is a buffer in the monitor that holds characters you type at a terminal until a program requests them. The output ring is a buffer in the monitor that holds characters until the terminal can print them. The default input ring buffer size is 134 (decimal) characters, and the default output ring buffer size is 40 (decimal) characters.
Second RX01, RX02, or TU58 controller	Adds support for a second RX01, RX02, or TU58 RX02, or TU58 controller, allowing a total of four units in the configuration instead of the usual two.
SJ message on system I/O errors	Causes the SJ monitor to issue an error message instead of simply halting. This feature helps to reduce confusion when an error occurs. The FB and XM monitors always issue error messages.
SJ timer	Configures the SJ monitor to support mark-time and cancel mark-time programmed requests. Otherwise, only the FB and XM monitors support these requests, which provide timer capabilities.

(continued on next page)

Table 1–1: Features Available Only Through System Generation Process (Cont.)

Feature	Function
.SPCPS programmed request	Changes the flow of control of main-line code by saving the PC and PS and changing the main-line PC to a new value. This support can be generated for only the FB and XM monitors. .SPCPS is especially useful for controlling switching among users in multiuser applications.
System jobs	Assembles the FB monitor to support as many as eight simultaneously active jobs instead of the usual two. Both the error logging subsystem and the device queue program (QUEUE) can run as system jobs. This feature is available in the distributed XM monitor.
User command linkage	Permits users to create their own commands.

Every SYSGEN dialog question is a SYSGEN option. Some options enable support for monitor services, while other options enable support for peripheral devices and device interfaces. The options that enable monitor services are as follows:

Asynchronous terminal status

BATCH support

Device timeout support

Error logging support

Error messages on system I/O errors

.FETCH request

Floating point support

50 Hz clock rather than 60 Hz

High-speed ring buffer

Input ring buffer size

Keyboard monitor command subsets

Memory parity

Month and year date rollover

Multiterminal support

Multiterminal timeout

Output ring buffer size

Power failure message

Programmable clock as system clock

SJ timer support

.SPCPS programmed request

Start-up indirect command file

System jobs

User command linkage

Section 1.3 describes each dialog question in detail. When you study the dialog, check off on the worksheet any options you want to select when you actually run SYSGEN.

1.2.4 Edits to SYSGEN.CND File

Before you assemble your monitor, it is possible to edit SYSGEN.CND, the conditional file that SYSGEN produces. SYSGEN.CND contains conditionals that, when assembled with system source files, enable options chosen during the SYSGEN session. Editing this file lets you, in effect, change responses to the dialog without rerunning SYSGEN. However, DIGITAL recommends that, under most circumstances, you rerun SYSGEN and change any necessary responses. Editing SYSGEN.CND requires great care. For the most part, only the most knowledgeable user should try to manipulate the conditional files.

This rule has several exceptions, which call for minor edits in special situations. If you find it necessary to edit a conditional file, list these edits on the worksheet (Figure 1–6).

One such case where you may find it necessary to edit the SYSGEN.CND file is the inclusion of multiterminal support for the United Kingdom. United Kingdom applications require RT–11 to disconnect a remote line immediately when the line hangs up. Normally, RT–11 delays disconnecting remote lines when it loses the carrier. It waits for a specific period of time to avoid dropping lines due to noise. You can add a conditional to SYSGEN.CND that adds support for immediate disconnect of DL11–E interfaces with modem support. To include immediate disconnect support, insert the following line in the file SYSGEN.CND:

```
U.K. = 1
```

NOTE

DIGITAL does not support the use of edited answer files. To make a change to an answer file, run SYSGEN, specifying input and output answer file names. The same file name may be used for both input and output answer files. After SYSGEN reads in the answer file, it will ask if you want to make any changes. The changes you make will be reflected in the output answer file.

1.2.5 System Build Procedure

The system build procedure requires that you assemble and link your generated monitors and handlers but not the utility programs or other nonexecutive system components. The SYSGEN program produces indirect command files that issue all the commands to perform these assemblies and links. However, if your only mass storage device is an RX01 or RX02 diskette, you may have insufficient free storage space to use indirect command files, so you will need to issue individual commands to perform the same system build procedures. (Refer to Chapter 3.)

The following sections describe both system build procedures, so that you can plan the method you will use and answer the SYSGEN dialog questions relative to the indirect command files.

NOTE

Once you have created the conditional files SYSGEN.CND and SYSGEN.TBL, you can use them over and over without rerunning the SYSGEN program. To add source customizations to your generated system, simply use the SLP utility to customize your system. Then, reassemble those files, and relink the system.

1.2.5.1 Automatic System Build — At the end of the system generation process, the SYSGEN dialog asks you to identify the devices that the indirect command files should use for input, binary output, and map output during the assembly and link processes. When you answer the dialog questions and SYSGEN completes, SYSGEN has tailored the indirect command files, so that they make the logical assignments SRC:, BIN:, and MAP: according to your instructions. The command files then expect to find the correct files on each device. Therefore, before you answer these questions, you must know which files you want and how much free space you need for the build procedure. Then you must plan the organization of files so that you can choose the appropriate devices for SRC:, BIN:, and MAP:. Figures 1–3 through 1–5 illustrate examples of such organization.

NOTE

If you answer NO to the SYSGEN question "Do you want to retain the system OBJs?", the indirect command files include deletion commands to remove the .OBJ files.

In most cases, you can use the indirect command files to build your system, but you may want to make minor alterations to the command files themselves. For example, you might need to change the devices on which individual source or binary files reside to optimize mass storage usage.

Study the following paragraphs, which categorize requirements by device. Then organize files on volumes according to the:

- Hardware you have available
- Free storage you have
- Storage requirements for building each component

If possible, you will want to use the largest and fastest storage devices included in your configuration.

System Device

When you perform the system build procedures, you must run RT–11 from a system device that contains at least the following:

Monitor
System device handler
SWAP.SYS
Handlers for SRC:, BIN:, and MAP:
MACRO
LINK
PIP
SYSMAC.SML

During the build procedure, the default (DK) device needs as many as 128 free blocks to accommodate the work file MACRO uses during system assembly.

Source Input Device

The source input device must contain the files SYSGEN.CND and SYSGEN.TBL, which are the conditional files that result from a SYSGEN session, and TRMTBL.MAC, which is required only if you plan multiterminal support. In addition, the source device must include the system source files to build the system you are generating.

The system source files are included in the distribution kit, but you probably did not include them in your working system. You will need to copy the appropriate source files from your customized distribution backup volume(s). Establish which source files you need by using Table 1–2, and write the file names on the worksheet.

Table 1–2: Source Files Required for System Build

Source File	To Build Support For
BA.MAC	BATCH
BSTRAP.MAC	All monitors
CR.MAC	Card reader
CT.MAC	TA11 cassette
DD.MAC	DECtape II cartridge
DL.MAC	RL01/02 disk
DM.MAC	RK06/07 disk
DP.MAC	RP11/RPR02/RP03
DS.MAC	RJS03/04 disk
DT.MAC	DECtape
DU.MAC	MSCP-class devices
DX.MAC	RX01 diskette
DY.MAC	RX02 diskette
EDTGBL.MAC	All monitors
EL.MAC	Error logging
ELCOPY.MAC	Error logging
ELINIT.MAC	Error logging
ELTASK.MAC	Error logging
ERRTXT.MAC	Error logging
FB.MAC	FB monitor
FSM.MAC	File-structured magtape
KMON.MAC	All monitors
KMOVLY.MAC	All monitors
LD.MAC	Logical disk subsetting
LP.MAC	Line printer
LS.MAC	Serial line printer
MTTEMT.MAC	Multiterminals
MTTINT.MAC	Multiterminals
NL.MAC	Null handler
PC.MAC	High-speed paper tape
PD.MAC	PDT–11 series
RF.MAC	RF11 disk
RK.MAC	RK05 disk
RMONFB.MAC	FB or XM monitor
RMONSJ.MAC	SJ monitor
SJ.MAC	SJ monitor
SYSGEN.CND*	All monitors
SYSGEN.TBL*	All devices
TJ.MAC	TJU16 magtape
TM.MAC	TM11 magtape
TRMTBL.MAC	All monitors
TS.MAC	TS11 magtape
TT.MAC	SJ monitor
USR.MAC	All monitors
VM.MAC	Virtual memory "disk"
XM.MAC	XM monitor
XMSUBS.MAC	XM monitor

* Or specified file name.

Binary Output Device

The binary output device receives the object files created by the assembly process. Identify all the components you must build, that is, all the monitors and device handlers for which your SYSGEN answers are intended. Then refer to Table 1–3 to establish how much free storage you will need on the binary output device to build each of these components.

Table 1–3: Free Storage Required to Build Components

Component	Number of Blocks
Monitor	300
Device handler	11
Set of monitor object modules retained	200
Set of handler object modules retained	8

When a device is initialized, some space is used for the boot and directory blocks. Table 1–4 shows the number of free blocks remaining on various devices, after being initialized.

Table 1–4: Free Blocks on Devices After Initialization

Device	Device Name	Size in Blocks
RX01 diskette	DX	486
RX02 diskette	DY	974
RK05 disk	RK	4.8K
RL01/02 disk	DL	10.2/20.4K
RK06/07 disk	DM	27.1/53.7K
RX50 diskette	DU	786
RD51 disk	DU	19.6K
RC25 disk	DU	43K (approximate)
RA80 disk	DU	220K (approximate)
Virtual memory	VM	Variable, depending on physical memory available
Logical disk	LD	Variable

Map Output Device

The map output device receives the link maps that result from the linking process. It is sometimes useful to list the link maps on the terminal or a line printer, in which case you should specify TT: or LP:, respectively, for the map output device.

If you specify the name of a block-replaceable device, such as a disk, you can send the link maps as files to that device. Send the link maps to a disk (instead of a terminal or line printer) so that you will be sure they are saved. DIGITAL requires that you include a link map and answer file listing whenever you submit a Software Performance Report (SPR) for a monitor created by SYSGEN.

You can suppress the link maps altogether by sending the output to the null device (answer NL: to the SYSGEN question "What is the PHYSICAL name of the map output device?"). However, DIGITAL strongly recommends saving the link maps.

Figure 1–3: All Files on One Disk for System Build

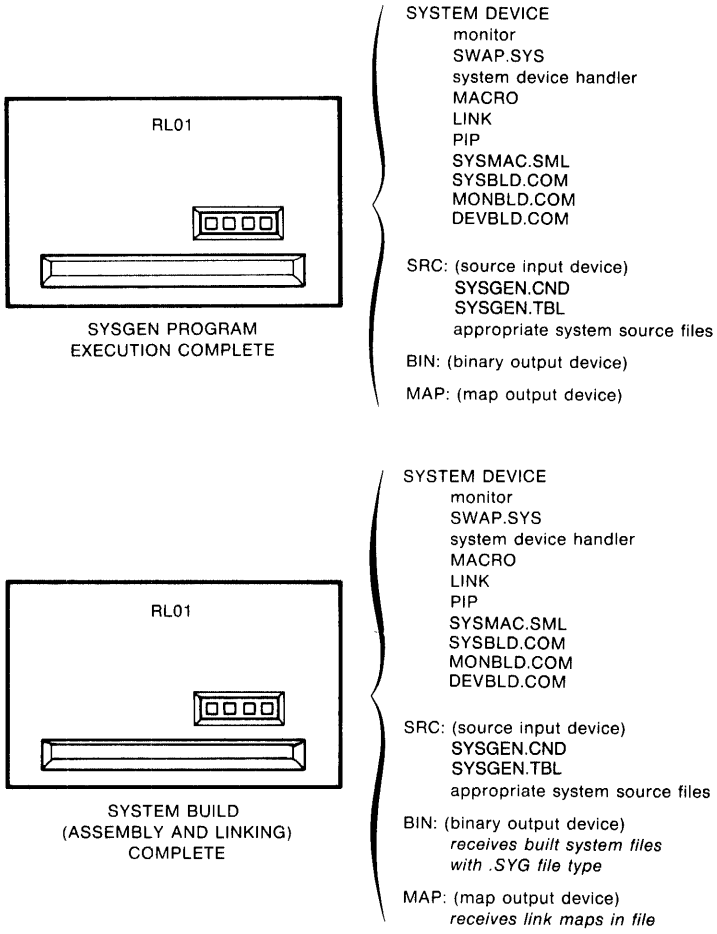


Figure 1–4: Source Files on Second Disk for System Build

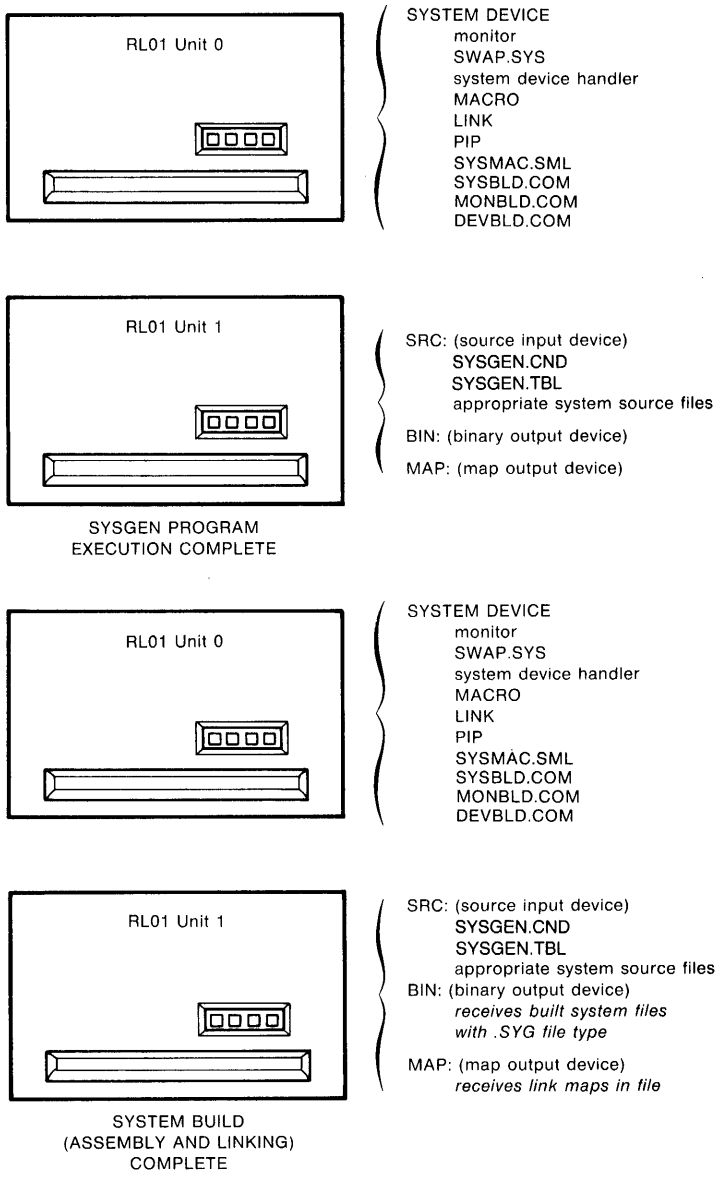
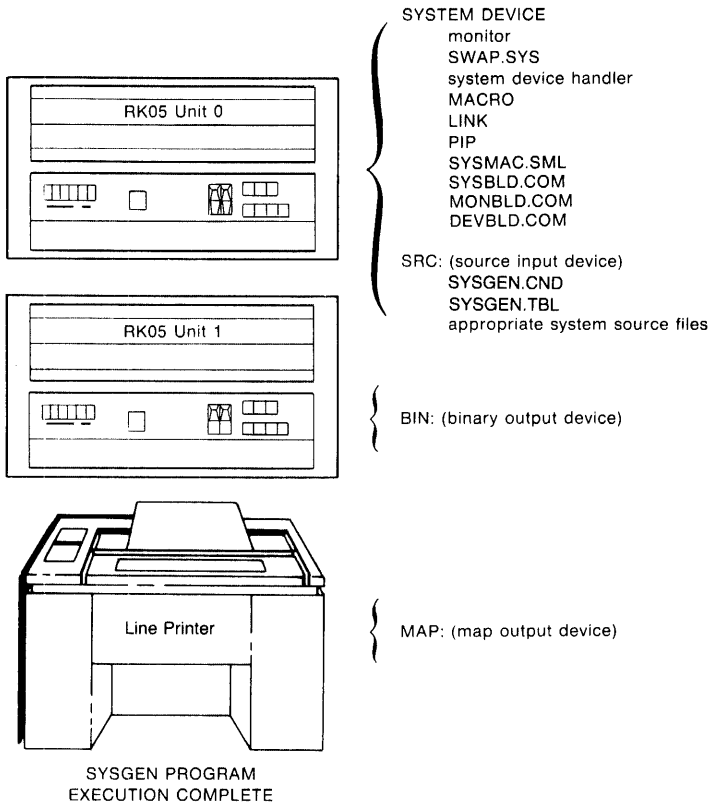


Figure 1–5: Second Disk and Line Printer Receive System Build Output



1.2.5.2 Manual System Build — You may need to use a sequence of individual commands to build the system or one or more components of the system. Use this manual method if you do not have enough mass storage space to execute the entire command file or if you need to rebuild a particular component because an error occurred when you built it.

In this case, specify devices included in your configuration. (Refer to the questions asking for physical device names in the "Physical Device Selection and SYSGEN Cleanup" section of the SYSGEN dialog.) However, you need not plan the arrangement of files on SRC:, BIN:, and MAP:, since you will not be using the indirect command files SYSGEN.MON, SYSGEN.DEV, and SYSGEN.BLD to build the system automatically. You will need the indirect files for information, and you will need to arrange specific files on diskettes in order to perform the system build procedure.

If you intend to perform the system generation process on an RX01 or RX02 diskette system, you will have to use the manual system build procedure, because you cannot fit all the required files on two diskettes. Consequently, you must arrange the files so that you can copy them to your system volume a few at a time and perform the component assemblies. Chapter 3 provides step-by-step procedures for generating special monitors and handlers on diskette systems. Those procedures require a special organization of files on diskettes for the assembly procedure. Study Chapter 3 if you need to use manual system build procedures.

1.3 Studying the SYSGEN Dialog

The SYSGEN dialog is reproduced here so that you can study it. When you run the program SYSGEN.COM, most of this dialog prints on your terminal. Some dialog questions appear only if you answered a previous question in a specific way. Therefore, SYSGEN may not ask you all the questions shown in this dialog.

Default answers are shown in parentheses. If you respond to a question by pressing only RET, the default answer is used.

The following dialog that prints on your terminal when you run SYSGEN appears below as actual computer output. Additional information follows the actual SYSGEN dialog.

```
************************************************************
          RT-11 SYSTEM GENERATION PROGRAM V05.00
************************************************************

Do you want an introduction to system generation (N)?

 Type "Y" for a detailed explanation of the system generation
 process.
```

Respond YES if you want to read an introduction to the system generation process.

```
The System Generation (SYSGEN) program functions as an interactive dialog in which the program asks you a series of questions. Your answers establish the characteristics and features of the monitor(s) and device handlers that the program generates. SYSGEN prints each question and waits for your response. You can reply immediately with a valid response, or you can obtain a detailed explanation of the question by typing the ESCAPE key followed by the RETURN key. You can prevent SYSGEN from printing the entire explanation by typing <CTRL/O> at any time during the explanation. SYSGEN then stops printing the explanation, prints the question, and waits for your response.

SYSGEN can generate one or more monitors from the output of one dialog session, depending on the responses you give. However, your responses during a session apply to all the monitors generated during that session.

The system generation process produces two conditional files and three indirect command files as output. To produce these files, the SYSGEN dialog asks you questions about the target system configuration and about monitor and device support options you want. To be able to respond effectively, you should read the RT-11 SYSTEM GENERATION GUIDE before proceeding.

The dialog simply asks a question and waits for your response. Although the dialog questions are sequentially numbered, certain responses cause SYSGEN to skip some questions which do not apply for the system you are generating.

Dialog questions require one of several types of responses. Responses may be in the form of a character string, a number, or YES/NO (Y/N). SYSGEN expects a decimal number for all numeric answers except for CSR and vector addresses; in these cases it expects an octal number. A default response, in parentheses, follows each question. If you choose to use the default response, type only RETURN in response to the question.

To terminate SYSGEN at any time, type <CTRL/C>.

Do you want to use a previously created answer file (N)?

SYSGEN can use commands and responses contained in an answer file to determine the characteristics of the monitors and device handlers for your target system. If you choose to use an answer file, SYSGEN uses the responses in the answer file instead of printing the interactive dialog to obtain your responses.

Answer files that create the distributed monitors and handlers are included on the RT-11 distribution kit. You can also use answer files that you have created during earlier system generation sessions.

What answer file do you want to use (SYSGEN.ANS)?

Type the device, filename and filetype of the answer file you want to create. Use the follcwing format for your response:

                ddn:filnam.typ

The variable ddn is the device name and unit number where the answer file is to reside, and filnam.typ is the filename and filetype of the answer file you are creating.
```

If the specified answer file cannot be found, has an invalid file name, or cannot be accessed, SYSGEN issues an appropriate error message.

```
Do you want to create an answer file (N)?

 Type Y to create an answer file that reflects the responses you
 make during this session. This answer file can be used during a
 later SYSGEN session.

What answer file do you want to create (SYSGEN.ANS)?

 Type the device, filename and filetype of the answer file you
 want to create. Use the following format for your response:

                ddn:filnam.typ

 The variable ddn is the device name and unit number where the
 answer file is to reside, and filnam.typ is the filename and
 filetype of the answer file you are creating.
```

If the specified answer file already exists or is invalid, SYSGEN prints the following warning message and question:

```
?SYSGEN-W-File already exists ddn:filnam.typ

Do you want to create a new SYSGEN.ANS file (N)?

 A file already exists with the same name as the answer file you
 have chosen to create. If you still want to use this name for
 your output answer file, the data contained in the already
 existing file of the same name will be lost.
```

SYSGEN now checks for protected output files and prints:

```
...checking for protected output files.
```

If any are protected, SYSGEN prints:

```
?SYSGEN-F-Protected file already exists <filename>

*****************************************************************
          MONITOR TYPE
*****************************************************************
```

You must respond YES to at least one of questions 1 through 3. Each SYSGEN run must build at least one monitor. You cannot build device support without building a monitor.

```
1.  Do you want the single-Job (SJ) monitor (Y)?

 SINGLE-JOB MONITOR:
 The single-Job (SJ) monitor provides an environment suitable for
 developing simple FORTRAN or BASIC applications. The SJ monitor
 includes many of the same features as the foreground/background
 (FB) monitor — it supports all hardware devices (except the memory
 management unit), all programmed requests (except .MRKT and
 .CMKT), and all the utility programs. It offers the most features
 in the smallest size. You can add features during SYSGEN, but at
 the cost of increased monitor size.
```

Respond YES if you want to generate an SJ monitor. Review Section 1.1.2 of the *RT–11 Installation Guide* to compare the advantages of the various monitors. In addition, Appendix A in this manual gives the SYSGEN answers that will duplicate the distributed monitors.

```
2.  Do you want the foreground/background (FB) monitor (Y)?

 FOREGROUND/BACKGROUND MONITOR:
 The foreground/background (FB) monitor offers an extended set of
 features that aid real-time or data acquisition applications. In
 addition to the foreground job capability, this monitor supports
 serialized asynchronous I/O and additional programmed requests
 (including .MRKT and .CMKT).
```

Respond YES if you want to generate an FB monitor. Review Section 1.1.2 of the *RT–11 Installation Guide* to compare the advantages of the various monitors.

```
3.  Do you want the extended memory (XM) monitor (N)?

 EXTENDED MEMORY MONITOR:
 The extended memory (XM) monitor, which supports up to 124K words
 of memory, is a version of the FB monitor. It requires KT11
 hardware (the memory management unit) and the extended instruc-
 tion set (EIS). The XM monitor supports additional programmed
 requests that allow you to extend a program's logical addressing
 space. However, the XM monitor is larger than the FB monitor and
 requires that the user service routine (USR) be resident.
```

Respond YES if you want to generate an XM monitor. Review Section 1.1.2 of the *RT–11 Installation Guide* to compare the advantages of the various monitors.

```
*****************************************************************
          MONITOR OPTIONS
*****************************************************************
```

Note that when you select certain options, SYSGEN automatically enables other options, even if you respond NO to the questions. For example, if you respond NO to SJ timer support and device timeout support but YES to multiterminal support, SYSGEN enables SJ timer support and device timeout support anyway.

```
4.  Do you want timer support in the SJ monitor (N)?

 SJ TIMER SUPPORT OPTION:
 The SJ monitor normally does not include timer support. You can
 include this support, which enables you to use the .MRKT (mark
 time) and .CMKT (cancel mark time) programmed requests.
```

Respond YES if you want to use the .MRKT and .CMKT programmed requests with the SJ monitor. The FB and XM monitors support these programmed requests, which provide timer capability. However, you must spe-

cifically select this support for SJ, since it adds approximately 360 (decimal) words to the resident monitor. Timer support reduces response time slightly because of the additional interrupt-level overhead. If your application requires timer support, you must select it. Note also that the SJ monitor increments the date at midnight only if you select this support. RT–11 does not require it.

```
5.  Do you want device time-out support (N)?

 DEVICE TIME-OUT SUPPORT OPTION:
 The device time-out option permits device handlers to issue .MRKT
 (mark time) programmed requests. DECnet support requires this
 option.
```

Respond YES if you are a DECnet user or if your application uses device timeout support. RT–11 does not use this support. This support adds approximately 40 (decimal) words to the resident FB and XM monitors; it adds approximately 360 (decimal) words to the resident SJ monitor, since enabling this support automatically enables SJ timer support.

```
6.  Do you want an error message on system I/O errors (Y)?

 ERROR MESSAGE ON SYSTEM I/O ERRORS OPTION:
 The SJ monitor normally halts if a fatal system I/O error occurs.
 You can replace this halt with a system error message. DIGITAL
 highly recommends this option if the system will be used by
 anyone but the most experienced individuals.
```

Respond YES if you want an error message instead of a system halt when the SJ monitor detects a fatal I/O error. Although this option adds approximately 30 (decimal) words to the resident monitor, DIGITAL strongly recommends this option for all but the most space-conscious applications. The confusion this option saves is well worth the small amount of additional memory it requires. The FB and XM monitors include this support.

```
7.  Do you want system job support (N)?

 SYSTEM JOB OPTION:
 The system job option allows you to run up to eight simultane-
 ously active jobs. The error logger and the QUEUE program can be
 either foreground jobs or system jobs. If you want to run both
 simultaneously, or if you want to run either one along with a
 foreground job, you need system job support.
```

Respond YES if you want system job support. You need this support if you use the error logger or the device queue program (QUEUE) as well as a foreground job, or if you use both the error logger and QUEUE. (Note that you need not select system job support if you intend to run the error logger only under the SJ monitor.) You can also use system job support to create application-specific system jobs. This support adds approximately 300 (decimal) words to the resident monitor.

```
8.  Do you want to use the .SPCPS request (N)?

 SAVE/SET MAIN-LINE PC AND PS OPTION:
 The save/set main-line PC and PS option is a conditionally
 assembled programmed request for the FB and XM monitors. The
 .SPCPS request changes the flow of control of main-line code by
 saving the main-line code PC and PS and changing the main-line PC
 to a new value. This request may be useful in multi-user
 applications to control switching among users.
```

Respond YES if you want to use the .SPCPS request. Refer to the *RT–11 Programmer's Reference Manual* for more information about this programmed request.

```
9.  Do you want multiterminal support (N)?

 MULTITERMINAL SUPPORT OPTION:
 The multiterminal option lets you use special programmed
 requests to do I/O to more than one terminal. RT-11 normally
 supports only one terminal interfaced through the console (DL11)
 which is shared by both background and foreground jobs. You can
 select multiterminal support for up to 16 terminals interfaced
 through a choice of DL11 and DZ11 interfaces. Subsequent
 questions will establish the number and type of interfaces. Note
 that if you choose multiterminal support your system cannot
 support VT11 or VSGO graphics.
```

Respond YES if you want multiterminal support and are generating an SJ, FB, or XM monitor. This option selects monitor support for up to 16 terminals. However, if the application itself provides support for additional terminals and if you require only console support in the monitor, you should not select this support. MU BASIC–11 requires that you respond YES to this question.

You need not select multiterminal support to use a hard copy terminal as a line printer. You need only the serial line printer handler, LS.SYS, which is included in the software kit.

Multiterminal support adds considerably to the space requirements of the resident monitor. It adds a minimum of 750 (decimal) words for the first additional terminal and approximately 100 (decimal) words for each additional terminal. However, the exact number of words added depends on the interfaces, the configuration, and the other options you select.

```
10.  Do you want asynchronous terminal status (Y)?

 ASYNCHRONOUS TERMINAL STATUS OPTION:
 The asynchronous terminal status option provides a program with
 the updated status of a terminal and modem. When a program
 attaches a terminal, the program can supply a status word that
 the monitor updates as changes occur in the terminal status
 (double CTRL/C, input available, output buffer empty, carrier
 present). This support is required for MU BASIC applications.
```

Respond YES if you are an MU BASIC user or if your application uses asynchronous terminal status information. If you are in doubt about this option, respond YES. This support applies only to multiterminal applications, so SYSGEN asks you this question only if you respond YES to question 9.

```
11.  Do you want multiterminal time-out support (Y)?

 MULTITERMINAL TIME-OUT OPTION:
 Multiterminal time-out support causes the monitor to reset (at
 regular intervals) any terminal that may have gone off-line.
 This action helps to minimize the impact of static and similar
 problems.  DIGITAL recommends selecting this option if your
 application requires maximum terminal availability.
```

Respond YES for maximum terminal availability. If you are an MU BASIC–11 user, be sure to select this support.

This support applies only to multiterminal applications, so SYSGEN asks you this question only if you respond YES to question 9. DIGITAL recommends that you select this option unless you have space problems.

```
12.  Enter the size of the output buffers (40):

 OUTPUT RING BUFFER SIZE OPTION:
 The RT-11 terminal service requires a set of output ring buffers
 for each supported terminal.  The output ring is a buffer in the
 monitor that holds characters until the terminal can print them.
 (A program can send characters faster than a terminal can print
 them.)
```

Respond with the number (decimal) of characters that you want the monitor to hold in the output ring buffers. Each character adds n bytes to the resident monitor size, where n is the total number of terminal lines. Note that you must count the carriage return and line feed combination as two characters. The range for valid responses is from 10 to 134.

```
13.  Enter the size of the input buffers (134):

 INPUT RING BUFFER SIZE OPTION:
 The RT-11 terminal service requires a set of input ring buffers
 for each terminal supported.  The input ring is a buffer in the
 monitor that holds the characters that you type at a terminal
 until a program requests them.  You may want to change the input
 ring size, in particular, since the size you need depends on the
 terminal's width and the amount of type-ahead you expect.
```

Respond with the number (decimal) of characters that you want the monitor to hold in the input ring buffers. If you specify an odd number of characters, SYSGEN rounds the number down. Each character adds n bytes to the resident monitor size, where n is the total number of terminal lines.

You should make the input ring buffers large enough to hold at least one line of input. If the largest line accepted by an application is greater than 134 characters, you can adjust the size of the input buffers.

The minimum acceptable input buffer size is 74 characters. If you specify less than 74, an error occurs at monitor assembly time. The monitors require 82-character buffers for efficient command operation. Buffers larger than 82 characters are useful if you anticipate using the type-ahead feature.

The RT–11 keyboard monitor and the .GTLIN programmed request accept up to 80 characters. However, if your program uses the VT100 132-character mode, you should select support for an input ring buffer of 134 characters.

The range for valid responses is from 74 to 254.

```
14.  Do you want to use the .FETCH request under XM (Y)?

 If you choose .FETCH support under XM, then device handlers can
 be fetched by user background programs. Also, pre-Version 5
 programs which do not use the form of the .PROTECT directive
 which includes automatic vector setup must be modified to do so.
 If you do not select this option, all in-line service routines
 would, as in Version 4, have to remain clear of the memory mapped
 by Kernel APR 1 and handlers must be loaded before use.

15.  Do you want end of month and year date rollover (N)?

 MONTH ROLLOVER OPTION:
 When you run a system continuously, over a long period of time,
 you normally have to reset the date and time at the beginning of
 each month. You can select a feature that automatically sets the
 correct date and time. However, this option greatly increases the
 size of the monitor.
```

Respond YES if you want the date automatically reset at the beginning of a month or year and if space is not a serious concern. This option adds approximately 50 (decimal) words to the resident monitor.

```
17.  Do you want the user command linkage(N)?

 USER COMMAND LINKAGE
 The user command linkage allows you to define your own commands
 which can be issued in a format similar to the standard DCL
 commands.

19. Do you want high speed ring buffer support (N)?

 HIGH SPEED RING BUFFER
 When the high speed ring buffer is present, all character
 processing and interpretation is performed at fork level. The
 advantage of having the high speed ring buffer is that it allows
 short bursts of characters coming in at a very high rate. This is
 useful for systems with VT100 or other terminals that report
 their status by sending a burst of information to the host
 computer. Use of the high speed ring buffer is especially
 recommended with a PDT.
```

```
20.  Do you want all the Keyboard monitor commands (Y)?

KEYBOARD MONITOR COMMANDS OPTION:
The Keyboard monitor commands option lets you choose the Keyboard
monitor commands your generated monitor will support. You will
probably find all of the commands useful. However, you can
reduce KMON size and assembly time if you select support for a
subset of the available commands. You have a choice of three
subsets (or any combination of subsets). The three command
subsets you can choose are: the UTILITY PROGRAM COMMANDS, the
LANGUAGE COMMANDS, and the MINIMAL COMMANDS. If you do not
choose the complete set of commands or any of the subsets, you
will be able to use only the RUN command.
```

Respond YES if you want support for all the keyboard monitor commands. All the commands available with RT–11 are in the following list. If you choose the complete set of keyboard commands, the disk (or other device) file image of the SJ monitor is increased by 14 blocks and the image of the FB or XM monitor by 18 blocks. If you choose one of the subsets, the monitor disk file images will be smaller.

NOTE

If you want just one or several commands, select the appropriate conditionals in Appendix C and edit SYSGEN.CND.

ABORT	ASSIGN	B	BACKUP
BASIC	BOOT	CLOSE	COMPILE
COPY	CREATE	D	DATE
DEASSIGN	DELETE	DIBOL	DIFFERENCES
DIRECTORY	DISMOUNT	DUMP	E
EDIT	EXECUTE	FORMAT	FORTRAN
FRUN	GET	GT	HELP
INITIALIZE	INSTALL	LIBRARY	LINK
LOAD	MACRO	MOUNT	PRINT
PROTECT	R	REENTER	REMOVE
RENAME	RESET	RESUME	RUN
SAVE	SET	SHOW	SQUEEZE
SRUN	START	SUSPEND	TIME
TYPE	UNLOAD	UNPROTECT	

```
21.  Do you want the UTILITY subset (Y)?

The following commands are included when the UTILITY commands
are chosen:

BACKUP      BOOT          COPY          CREATE
DELETE      DIFFERENCES   DIRECTORY     DUMP
EDIT        FORMAT        INITIALIZE    PRINT
PROTECT     RENAME        SHOW          SQUEEZE
TYPE        UNPROTECT

Type Y if you want support for the UTILITY subset of the
Keyboard monitor commands. Type N if you do not want the subset
or if you wish to specify individual commands by editing the
SYSGEN.CND file after this session.
```

Choosing this subset increases the size of the disk (or other device) image of the monitor file by only six blocks (rather than the 14 to 18 blocks for all the commands). Note that you can select more than one subset; SYSGEN asks you about the other subsets. However, SYSGEN does not ask this question if you respond YES to question 20. Note also that the R and RUN commands cannot be removed; they are included in all the sets of commands.

```
22.  Do you want the LANGUAGE subset (Y)?

 The following commands are included when the LANGUAGE commands
 are chosen:

 BASIC       COMPILE       DIBOL         EXECUTE
 FORTRAN     LIBRARY       LINK          MACRO

 Type Y if you want support for the LANGUAGE subset of the
 keyboard monitor commands. Type N if you do not want the subset
 or if you wish to specify individual commands by editing the
 SYSGEN.CND file after this session.
```

Choosing this subset increases the size of the disk (or other device) image of the monitor file by only four blocks (rather than the 14 to 18 blocks for all the commands). Note that you can select more than one subset. SYSGEN does not ask this question if you respond YES to question 20. The default response to this question is YES.

```
23.  Do you want the MINIMAL subset (Y)?

 The following commands are included when the MINIMAL commands
 are chosen:

 ABORT       ASSIGN        B             CLOSE
 D           DATE          DEASSIGN      DISMOUNT
 E           FRUN          GET           GT
 HELP        INSTALL       LOAD          MOUNT
 R           REENTER       REMOVE        RESET
 RESUME      RUN           SAVE          SET
 SRUN        START         SUSPEND       TIME
 UNLOAD

 Type Y if you want support for the MINIMAL subset of the
 keyboard monitor commands. Type N if you do not want the subset
 or if you wish to specify individual commands by editing the
 SYSGEN.CND file after this session.
```

The execution code for all the commands in the MINIMAL subset is resident in KMON. If you select this option but do not select FB or XM monitor support, SYSGEN does not include the commands FRUN, RESUME, and SUSPEND. If you select this subset but do not select support for VT–11 graphics display, SYSGEN does not include the GT command. If you do not select system job support, SYSGEN does not include the SRUN command. Note, however, that you can select more than one subset. Choosing this subset increases the size of the disk (or other device) image of the SJ monitor file by only six blocks and the FB or XM monitor file by only 10 blocks

(rather than the 14 to 18 blocks for all the commands). SYSGEN does not ask this question if you respond YES to question 20.

```
24.  Do you want the optional 50 Hz clock support (N)?

 50 HZ CLOCK OPTION:
 A line clock generates periodic interrupts to allow the system to
 keep track of the time. The number of ticks per second depends on
 the power line frequency, 60 Hz or 50 Hz. RT-11 assumes a 60 Hz
 line frequency, but you can select support for a 50 Hz clock. The
 50 Hz frequency has specialized uses and is the common frequency
 in Europe.
```

Respond YES if your computer's line frequency is 50 Hz.

```
25.  Do you want to use the KW11-P clock as the system clock (N)?

 PROGRAMMABLE CLOCK AS SYSTEM CLOCK OPTION:
 RT-11 normally uses a line clock for the system clock. You can
 substitute the KW11-P programmable clock as the system clock, but
 the KW11-P will not then be available for program use. The
 programmable clock normally allows you to program interrupts at
 preset intervals.
```

Respond YES if your configuration includes the KW11–P clock and you want to use it as the system clock. The monitor uses the system clock for certain functions (time-of-day calculations, timer requests, and FB and XM scheduling). If the system clock is the programmable clock, your application cannot access the programmable clock or change its rate without affecting monitor function. Therefore, DIGITAL recommends that you use a line clock, if available, for the system clock.

```
26.  Do you want the start-up indirect file (Y)?

 STARTUP INDIRECT COMMAND FILE OPTION:
 This option causes the bootstrap to execute an indirect command
 file (with the name STARTx.COM, where x identifies the monitor)
 when starting the system. An indirect command file contains
 monitor commands that the monitor processes (in the order in
 which they appear) when the file is executed. A startup indirect
 command file is particularly useful for setting up initial
 conditions (for example, assigning the default device to the data
 device, installing a device into the system tables when the
 device was not originally built into the system, or running a
 specific program).
```

Respond YES if you want the monitor bootstrap to execute a start-up indirect file every time you boot the system. If you select this support, the bootstrap looks for a file STARTx.COM to execute (where x is S, F, or X for single-job, foreground/background, or extended memory monitor). You create this file, with commands to perform whatever operations you choose. If no STARTx.COM file resides on a volume, the monitor prints an error message when you boot that volume. This option requires no additional resident monitor space.

```
27.  Do you want floating point support (Y)?

 FLOATING POINT OPTION:
 If your configuration includes floating point hardware and your
 application requires this feature, you should enable this option.
 Floating point hardware is available for many PDP-11 processors.
 This is especially useful for FORTRAN IV and BASIC-11 users whose
 applications perform data manipulations.
```

Respond YES if your configuration includes the appropriate hardware and your application uses floating point manipulations. If you try to perform floating point manipulations but have not selected this support, system failure results.

If you select this support, the monitor intercepts all floating point traps. If your program has not set up an exception handler, the monitor prints an informative message and aborts the program. If your program has set up an exception handler, that routine is entered with the FPU status (if appropriate) on the stack. The monitor makes sure that the correct job's context is set up.

In addition, if you select floating point support, the .SFPA programmed request (refer to the *RT–11 Programmer's Reference Manual*) is enabled. If you do not choose floating point support, none of the functions of .SFPA is performed; for example, the floating point registers are never context switched.

If you do not include floating point support, all programs that use the floating point instructions must set up and .PROTECT or .CNTXSW the vector. FORTRAN IV requires monitor floating point support if you use one of the floating point libraries.

Floating point support adds approximately 200 (decimal) words to the resident SJ and FB monitors and approximately 300 (decimal) words to the resident XM monitor.

```
28.  Do you want memory parity support (N)?

 MEMORY PARITY SUPPORT OPTION:
 If your configuration includes memory parity hardware, you should
 select this option. Memory parity hardware checks for memory
 errors and this option enables RT-11 support for the hardware.
 RT-11 issues an error message and supplies the location of access
 when a memory error occurs. If you have this hardware but do not
 enable this support, the system halts when memory errors occur.
 If you select error logging as well as memory parity support, the
 error logger logs parity errors as well as device errors.
```

Respond YES if your configuration includes memory parity hardware. Memory parity support adds approximately 8 (decimal) words to the resident SJ monitor and approximately 25 (decimal) words to the resident FB and XM monitors. If you have this hardware, you need RT–11 memory

parity support both to make use of the hardware's capabilities and to avoid unwanted system halts.

```
29.  Do you want power failure messages (N)?

 POWER FAILURE MESSAGE OPTION:
 The monitor normally halts on power recovery startup after a
 power failure. You can elect to have the monitor print a message
 explaining that power failure caused the halt. However, you must
 not select this option if you have semiconductor memory, which is
 volatile.
```

Respond YES if you want an error message on start-up after system halt to report the cause of the halt. Select this option only if your hardware configuration includes core memory or battery backup, not semiconductor memory (which is volatile). This option adds approximately 90 (decimal) words to the resident monitor. However, DIGITAL strongly recommends this option, since it quickly identifies the cause of failure. Frequently, system halts are caused by power failures too brief to detect visually.

```
30.  Do you want BATCH support (N)?

 BATCH SUPPORT OPTION:
 You can select support for the BATCH job control language, which
 allows RT-11 to operate unattended. Once you prepare a BATCH
 stream, you can leave it for an operator to start and run, and
 the BATCH stream will execute programs or monitor commands
 without your intervention. Indirect command file support, which
 offers similar capabilities, is separately available in all
 monitors. You need not select BATCH support to obtain indirect
 command file support.
```

Respond YES if you want BATCH support. RT–11 BATCH support is similar to indirect command file support, but it offers certain advantages. BATCH produces a log file, allows job-stream programmability, and permits the operator to interact with the job during execution. Unless you need the features not provided by indirect command file support, you need not select this support.

```
31.  Do you want error logging (N)?

 ERROR LOGGING OPTION:
 The error logging option creates the error logging (EL) system
 job, and incorporates error logging support in the device
 handlers. Error logging reports device, memory parity (if
 selected), and memory cache errors. When error logging is
 enabled, most device handlers call EL on each successful transfer
 and on each error. The EL job retrieves information from the
 handlers that is later available to you in summary report format.
```

Respond YES if you want to use the error logging system job. This option adds approximately 2000 (decimal) words to the resident monitor and 50 (decimal) words to each device handler you generate. However, error logging is useful in monitoring system reliability.

```
32.  How many device units does error log job support (10)?

 NUMBER OF UNITS SUPPORTED BY ERROR LOGGING OPTION:
 The error logger can handle up to 34 individual device units.
 You can conserve space by reducing the number of units the logger
 can handle to the specific number of supported units in the
 target configuration.
```

Respond with the number (decimal) of supported device units in the system you are generating. For example, if the target system has three RK05 drives and a dual diskette drive, the response is 5. Each unit adds seven words to the error logger. The range for valid responses is from 1 to 34. SYSGEN asks this question only if you respond YES to question 31.

```
*****************************************************************
          DEVICE OPTIONS
*****************************************************************

 Type <ESCAPE> <RETURN> for help.
 Type ?<RETURN> to list all devices.
 Type .<RETURN> when device selection is complete.

Enter the device name you want support for [dd]:

 The device options let you select the peripheral devices that the
 generated system will support.  By selecting support for a
 specific device, you make the device known to the monitor's
 device tables, and SYSGEN generates a device handler named
 xx.SYG, (where xx is the physical device name) for the device.
 If you do not select a specific device at this time, you will
 have to create the device handler separately and use the monitor
 INSTALL command before you can access the device.

 The following is a list of the valid RT-11 devices and their
 associated device names.  SYSGEN will display the device name
 list each time you type a question mark (?) followed by a
 carriage return in response to the device name question.  An
 asterisk (*) will precede the device name if selected.  Type a dot
 when you have entered all the device names you want support for.

Do you want a list of available devices (Y)?
```

A YES response causes SYSGEN to list all valid RT–11 devices and their associated device names. An asterisk (*) precedes those devices for which support has already been selected. Valid RT–11 devices are:

DX	RX01 Single-Density Diskette	DY	RX02 Double-Density Diskette
DD	TU58 DECtape II	RK	RK05 Cartridge Disk
DL	RL01/RL02 Cartridge Disk	DM	RK06/RK07 Cartridge Disk
MT	TM11 (UNIBUS) Magtape	MM	TJU16 (MASSBUS) Magtape
MS	TS11 (UNIBUS) Magtape	NL	Null Handler
LP	Line Printer	LS	Serial Line Printer
DU	MSCP Disk Class Handler	LD	Logical Disk Handler
VM	Virtual Memory Handler		

```
33.  Do you want support for a second <device> controller (N)?
```

SYSGEN asks this question only if you request RX01 (DX), RX02 (DY), or DECtape II (DD) support.

```
The <RX01/02 diskette or TU58 cartridge> subsystem supports only
two drives for each controller. If your system contains four
drives, a second controller governs the third and fourth
units, and you must select RT-11 support for it.
```

Respond YES if your target configuration includes four <device> drives. Note that you can boot RT–11 only from Unit 0 or Unit 1.

```
34.  Do you want RX02 double density only support (N)?

The RX02 diskette supports both single and double densities by
default. If you select double-density only support, you can
slightly improve the performance and reduce the size of the
device handler.
```

Respond YES if you plan to use only double-density diskettes. SYSGEN asks this question only if you request RX02 (DY) support.

```
35.  What is the CSR address for the <nth> <device> (nnnnnn)?

The valid range for the CSR address is from 160000 to 177570.
```

SYSGEN asks this question only if you request RX01 (DX), RX02 (DY), or DECtape II (DD) support. Respond with the appropriate CSR address(es) for the device controller(s). The field service representative who installs your hardware system is responsible for supplying you with a written record of addresses at which he or she installs each device. The default (octal) addresses appear in parentheses.

```
36.  What is the vector address for the <nth> <device> (nnn)?
```

For the first and second RX01, RX02, and DECtape II controllers:

```
The valid range for the vector address is from 100 to 474.
```

SYSGEN asks this question only if you request RX01 (DX), RX02 (DY), or DECtape II (DD) support. Respond with the appropriate vector address(es) for the device controller(s). The field service representative who installs your hardware system is responsible for supplying you with a written record of addresses at which he or she installs each device. The default (octal) addresses appear in parentheses.

```
37.  How many disk platters are installed on the RF11 (1)?

Respond with the number (decimal) of RF11 platters included in
your RF11 subsystem. The range of valid responses is from 1 to 8.
```

SYSGEN asks this question only if you request RF11 support.

```
38.  Do you want RJS03 rather than RJS04 support (Y)?

Type Y if your target system includes an RJS03 disk subsystem
rather than an RJS04.
```

If your response is NO, SYSGEN prints the following message:

```
RJS04 support assumed.
```

SYSGEN asks this question only if you request RJS03/04 MASSBUS fixed-head disk support.

```
39.  How many RL01/RL02 units are to be supported (2)?

 Enter the number (decimal) of RL01/RL02 units included in your
 RL01/RL02 subsystem. The range of valid responses is from 1 to 4.
```

SYSGEN asks this question only if you request RL01/RL02 cartridge disk support.

```
40.  Do you want RPR02 rather than RPR02/RP03 support (N)?

 Type Y if your target system includes an RPR02 disk subsystem
 rather than RPR02/RP03.
```

If your response is N, SYSGEN prints the following message:

```
RPR02 and RP03 support are assumed
```

SYSGEN asks this question only if you request RP11 support.

```
41.  Do you want the file-structured magtape handler (Y)?

 FILE-STRUCTURED MAGTAPE OPTION:
 RT-11 magtape support is available in two forms. The standard
 form is file-structured magtape support, which uses a subset of
 ANSI file format. The file-structured handler stores and
 retrieves data in a file format usable with most RT-11 system
 programs. The second form of magtape support, hardware handler
 support, omits file structuring and reads and writes data
 directly in variable length records. While this handler is sig-
 nificantly smaller than the file-structured handler, you cannot
 use it with any system programs. The file-structured handler can
 also perform direct hardware functions.
```

Select this option only if you intend to use any of the system programs, RT–11 commands, FORTRAN IV programs, or BASIC–11 programs with the magtape.

```
42.  How many magtape units are to be supported (2)?

 NUMBER OF MAGTAPE UNITS OPTION:
 The magtape handler requires table space for each magtape unit.
 You can minimize the size of the magtape handler by limiting the
 number of units it can simultaneously handle to the number
 actually present on the target machine.
```

Respond with the number (decimal) of magtape drives included in your magtape subsystem. SYSGEN asks this question only if you responded YES to question 41. The range for valid responses is from 1 to 8, and the default response is 2.

```
43.  What is the address of the <nth> unit (nnnnnn)?

 Each TS11 unit requires two contiguous UNIBUS addresses for
 status registers. Enter the address (octal) of the <nth> unit.
 The range of valid responses is from 160000 to 177570.
```

If you request TS11 support, SYSGEN asks questions 43 and 44 once for each TS11 tape unit you wish to support. SYSGEN asks you for the addresses of as many units as you specified. Respond with the address (octal) of each TS11 unit. The field service representative who installs your hardware system is responsible for supplying you with a written record of addresses at which he or she installs each device.

Up to eight TS11 controllers can be supported. Default status register addresses and vector addresses are as follows:

Magtape Unit	Register Address	Vector Address
1	172522	224
2	172526	300
3	172532	304
4	172536	310
5	172542	314
6	172546	320
7	172552	324
8	172556	330

```
44.  What is the vector address of the <nth> unit (nnn)?

 Enter the vector address (octal) of the first unit. The range for
 valid responses is from 100 to 474.

45.  Does your printer have a nonstandard vector or CSR (N)?

 The standard line printer vector address is 200 and the standard
 CSR address is 177514. If your printer is installed at another
 vector or CSR address, specify the correct values.
```

Respond YES if the line printer control register address is not 177514 or the vector address is not 200. These addresses usually are nonstandard only if the printer is an LA180S.

SYSGEN asks this question only if you request parallel line printer (LP) support, and asks questions 46 and 47 only if the response is YES.

```
46.  What is the CSR address for the printer (177514)?

 Respond with the address of the control register for the line
 printer. The range for valid responses is from 160000 to 177570.
```

The field service representative who installs your hardware system is responsible for supplying you with a written record of addresses at which he or she installs each device.

SYSGEN asks this question only if the answer to question 45 is YES.

```
47.  What is the vector address for the printer (200)?

 Respond with the vector address for the line printer. The range
 for valid responses is from 100 to 474.
```

SYSGEN asks this question only if the answer to question 45 is YES.

```
48.  What is the CSR for the serial line printer (176500)?

 Respond with the address of the control register for the serial
 line printer. The range for valid responses is from 160000 to
 177570.
```

SYSGEN asks this question only if you request serial line printer (LS) support. The field service representative who installs your hardware system is responsible for supplying you with a written record of addresses at which he or she installs each device.

```
49.  What is the vector for the serial line printer (300)?

 Respond with the vector address for the serial line printer. The
 range for valid responses is from 100 to 474.
```

SYSGEN asks this question only if you request serial line printer (LS) support.

```
Do you want to add support for any of your own devices (N)?

 SYSGEN will generate commands to assemble and link any user
 supplied device handlers. SYSGEN also adds the device names to
 the system device tables in SYSGEN.TBL.

 Type <ESCAPE> <RETURN> for help.
 Type ?<RETURN> to list all devices.
 Type .<RETURN> when device specification is complete.

Enter the device name you want support for [dd]:

 Enter the 2 character device name for the device for which you
 are supplying a device handler.

50.  How many extra device slots do you want (0)?

 EXTRA DEVICE SLOT OPTION:
 SYSGEN allocates space in the monitor for only the devices
 specified. You can allocate additional space by requesting
 empty device slots. Allocate one empty slot for each device you
 intend to add to the system after it is built. Also keep in mind
 that the number of logical device assignments you will be able
 to make in the running system is equal to the number of devices
 plus empty device slots in the system you have generated. You
 may need to allocate extra device slots for logical device
 assignment purposes.
```

Respond with the number (decimal) of extra device slots you need. If a device will be supported only by an in-line service routine in a particular application and not by a system handler, you need not set aside a device slot for it. Remember also to consider the number of logical device assignments you will want to make. The range for valid responses is from 0 to 32.

```
*****************************************************************
          GRAPHICS OPTIONS
*****************************************************************

51.  Do you want VT11 or VS60 graphics support (N)?

 Type Y if your target configuration includes a VT11 or VS60
 graphics subsystem. RT-11 support for VS60 is minimal. The
 display handler, VTHDLR, supports VT11 but does not support any
 special features of VS60.

52.  Do you want VS60 support (N)?

 Type Y if the graphics subsystem is VS60.
```

If your response is NO, SYSGEN prints the following message:

```
VT11 hardware assumed.

53.  What is the CSR address for the VT11/VS60 (172000)?

 The CSR addresses can be floating. The presence or absence of
 such floating address devices affects the addresses at which the
 other floating address devices in the system are installed.
 Floating address devices must be installed in a standard
 sequence.

 The standard VT11/VS60 CSR address is 172000. However, VT11/VS60s
 can use floating addresses. If your VT11/VS60 is installed at
 nonstandard CSR addresses, supply the correct value. The valid
 range for responses is from 160000 to 177570.
```

Respond with the address (octal) of the control register for the VT11 or VS60. The range for valid responses is from 160000 to 177570. The field service representative who installs your hardware system is responsible for supplying you with a written record of addresses at which he or she installs each device.

```
54.  What is the vector address for the VT11/VS60 (320)?

 Many devices have floating vector addresses. The presence or
 absence of such floating address devices affects the addresses at
 which the other floating address devices in the system are
 installed. Floating address devices must be installed in a
 standard sequence.

 The standard VT11/VS60 vector address is 320. However, VT11/VS60s
 can use floating addresses. If your VT11/VS60 is installed at
 nonstandard vector addresses, supply the correct value. The
 range for valid responses is from 100 to 474.
```

Respond with the vector address (octal) for the VT11 or VS60. The range for valid responses is from 100 to 474.

```
*****************************************************************
          TERMINAL INTERFACE OPTIONS
*****************************************************************

Do you want an introduction to terminal interface options (N)?

 The introduction explains the DL interfaces supported by RT-11
 and how SYSGEN assigns the terminal numbers.
```

SYSGEN displays the following text if your response is YES.

```
The terminal interface options allow you to select RT-11 support
for the terminal interfaces installed in your system. RT-11
supports a combination of serial asynchronous interfaces, which
include the DLV11, DLV11-E, DLV11-F, DLV11-J, and the DL11
series. It also supports DL11-E and DLV11-E interfaces, with
modem capabilities.

The dialog asks first for the number of local DL11 lines, then
the number of remote DL11 lines. The total number of lines is
the sum of local and remote lines and must not exceed 8 lines.
SYSGEN assigns physical unit numbers of the DL11 lines first to
local lines and then to remote lines. This assignment is
permanent and you cannot change its order.

After SYSGEN has established the number of lines of each type, it
must establish the CSR and vector addresses for each line. The
first such question corresponds to the first local line (the
console), the second to the second local line, etc., until all
local lines are accounted for. At that point, the next question
applies to the first remote line, the second to the second remote
line, etc., until all remote lines are accounted for.

If your interfaces are DL11-W interfaces, they should be at REV E
or higher. If they are not, an Engineering Change Order (ECO DEC
-D-LOG M7856-S0002) must be applied to the M7856 module. The
field service representative who installs your hardware should
apply the ECO, if necessary.

55. How many local DL11 lines, including the console, are to be
supported (1)?

Enter the total number of LOCAL DL11 terminals included in the
target configuration. Since the console is always a local DL11,
the response is never less than 1. Do not include REMOTE DL11
lines in this number. Remote DL11 lines are specified in the next
question. The range for valid responses is from 1 to 8.

56. How many remote DL11 lines are to be supported (0)?

Enter the total number of REMOTE DL11 terminals included in the
target configuration. Do not include LOCAL DL11 lines in this
number. This response must not be greater than 7.
```

This response must not be greater than 7, and the sum of this response and the response to question 55 (local DL11 lines) must be less than or equal to 8. If the total exceeds this number, SYSGEN prints the following message:

```
?SYSGEN-W-Exceeded total number of valid DL11 lines

57. What is the CSR address for the first (console) DL11 (177560)?

Enter the address (octal) of the DL11 interface. The range for
valid responses is from 160000 to 177570.
```

The field service representative who installs your hardware system is responsible for supplying you with a written record of addresses at which he or she installs each device.

```
58.  What is the vector for the first (console) DL11 (60)?

 Enter the vector address (octal) of the DL11 interface for the
 console terminal. The range for valid responses is from
 60 to 474.
```

The next questions that SYSGEN asks depend on your responses to questions 55 and 56. SYSGEN repeats questions 57 and 58, asking for the CSR and vector addresses for as many local interfaces as you specified in question 55 and for as many remote interfaces as you specified in question 56. Respond with the addresses for all the local interfaces before supplying the addresses for all the remote interfaces. Remember that the default response is in parentheses after the question.

Default CSR and vector addresses for the next local DL11 interfaces are as follows:

CSR Address	Vector Address
176500	300
176510	310
176520	320
176530	330
176540	340
176550	350
176560	360

Default CSR and vector addresses for the next remote DL11 interfaces are as follows:

CSR Address	Vector Address
175610	310
175620	320
175630	330
175640	340
175650	350
175660	360
175670	370

```
59.  Do you want DZ11 or DZV11 multiplexor support (N)?

 You can select RT-11 support for one DZ11-A or DZ11-B eight-line
 multiplexor with an additional DZ11-C or DZ11-D eight-line
 multiplexor, for a maximum of 16 lines. Or you can select one
 to four DZV11 four-line multiplexors. Modem support is available
 on remote lines, but is limited to Bell 103 type modems or
 equivalent. RT-11 support for modems requires the modems to
 operate in auto-answer mode. Therefore, the "common carrier and
 clear to send" options must have been installed (during manufac-
 ture or installation). Type Y if your configuration includes a
 DZ11 or DZV11 multiplexor.
```

```
60.  Do you want DZ11 multiplexor support (Y)?

 Type Y if your configuration includes a DZ11 multiplexor
```

SYSGEN asks you this question only if you respond YES to question 59. If you respond NO, SYSGEN prints the message:

```
DZV11 four-line multiplexor support is assumed.

61.  How many DZ multiplexors are to be supported (1)?

 Enter the number of DZ multiplexors in the target configuration.
```

SYSGEN asks this question only if you respond YES to question 59.

The following dialog asks first for the number of local DZ11 or DZV11 lines, then the number of remote lines. The total number of lines is the sum of local and remote lines. SYSGEN assigns physical unit numbers of the DZ11 or DZV11 lines first to local lines and then to remote lines. This assignment is permanent and cannot be changed.

```
62.  How many local DZ lines are to be supported altogether (1)?

 Enter the total number (decimal) of DZ lines that are local
 terminals. The range for valid responses is from 0 to 16.

63.  How many remote DZ lines are to be supported altogether (0)?

 Enter the total number (decimal) of DZ lines that are remote
 terminals. The range for valid responses is from 0 to 16.
```

The interface vectors and CSR addresses are assigned to the floating device region and vary with each installation.

```
64.  What is the CSR for the first DZ multiplexor (160010)?

 Enter the CSR address for the first DZ multiplexor. The valid
 range is 160000-177570.
```

The field service representative who installs your hardware system is responsible for supplying you with a written record of addresses at which he or she installs each device.

```
65.  What is the vector for the first DZ multiplexor (300)?

 Enter the vector address for the first DZ multiplexor. The valid
 range is from 60 to 474.
```

If the response to question 61 was greater than 1, SYSGEN requests the CSR and vector addresses for the second through fourth DZ multiplexers. Default values for these addresses are as follows:

DZ Multiplexer	CSR Address	Vector Address
2	160020	310
3	160030	320
4	160040	340

```
66.  What baud rate do you want your lines initialized to (300)?

 The lines must be initialized to a specific baud rate. You can
 select 9600, 4800, 2400, 1200, 300, 150, or 110 baud.
```

Respond with the specific baud rate at which you want your lines initialized. All DZ11 or DZV11 lines must be initialized to the same baud rate. The default response to this question is 300. A response other than those listed above produces the message:

```
?SYSGEN-E-Invalid baud rate

67.  How many ports are to be supported (1)?

 Enter the number of ports you want the MSCP disk class handler
 to support.
```

SYSGEN asks this question only if you request MSCP disk-class handler (DU) support.

At this point, SYSGEN allows you to change any previous responses. However, if no changes are necessary, processing continues with the creation of the SYSGEN.CND file.

```
Do you want to change any of your responses (N)?

 Responses have been obtained for all of the SYSGEN questions.
 You are now given an opportunity to make minor changes to the
 monitor options which you have selected or to remove support for a
 device or add support for a device. If you have made a large
 number of errors in this SYSGEN session it is recommended that you
 restart the SYSGEN dialog.
```

Press RET if you do not wish to change any of your previous responses. If you wish to change one or more dialog responses, answer YES. SYSGEN continues by asking the following questions.

```
Do you want to change monitor/terminal option responses (N)?

 You may make changes to most of the dialog questions concerning
 the options to be assembled into the monitor. You may not change
 the monitor types to be SYSGENed. Also, you may not add or remove
 multiterminal support. To make these changes, you must restart
 the SYSGEN dialog.
```

If no monitor-related changes are to be made, SYSGEN inquires about changes to device-related answers. If monitor changes are to be made, SYSGEN continues with the following questions.

```
What question number do you want re-asked?

 Respond with the number which precedes the question that you wish
 to have re-asked.

 The monitor option questions which you may change are:

 4.  SJ timer support                    17.  User command interface
 5.  Device timeout support              19.  High speed ring buffer
 6.  System I/O error messages           20.  Keyboard monitor commands
 7.  System job support                  24.  50 Hz clock
 8.  .SPCPS request                      25.  KW11-P as system clock
10.  Asynchronous terminal status        26.  Startup command file
11.  Multiterminal timeout support       27.  Floating point support
12.  Output buffer size                  28.  Memory parity support
13.  Input buffer size                   29.  Power failure message
14.  .FETCH request under XM             30.  Batch support
15.  Month and year rollover support     31.  Error logging
                                         50.  Number of empty device slots
                                         51.  VT11/VS60 graphics

 If you do not want to modify any additional monitor option
 reponses, type <RETURN>.

Do you want to change your device support (N)?

 Type "Y" if you want to remove, add, or modify support for any
 devices.

Do you want to remove support for any device (N)?

 You are now given an opportunity to remove support for any device
 for which support was requested.
```

If your response is YES, SYSGEN asks the following question.

```
What device do you NOT want supported?

 If you previously asked to have a device supported, but you now
 do not want support for a device, type the two letter name for
 that device.

Do you want a list of available devices (Y)?
```

After you enter the two-letter device mnemonic, SYSGEN prints the message:

```
<device> will not be supported.

Do you want to add support for any device or have the questions for
any device re-asked (N)?

 SYSGEN will give you an opportunity to add support for both
 DIGITAL supported devices and your own devices. Type "Y" if you
 want to add support for any device or change your response to a
 question relating to a device.

Do you want to add/modify a DIGITAL supported device (Y)?

 Type "Y" if you want to add support for any DIGITAL supported
 device or have questions related to any such device re-asked.
```

If you respond YES, SYSGEN prints the following:

```
 Type <ESCAPE><RETURN> for help.
 Type ?<RETURN> to list all devices.
 Type .<RETURN> when device specification is complete.

Enter the device name to add/modify [dd]:

*****************************************************************
          PHYSICAL DEVICE SELECTION AND SYSGEN CLEANUP
*****************************************************************
```

When all responses have been given and no further changes are to be made, SYSGEN begins this phase by asking the following questions:

```
What is the PHYSICAL name of the source input device [xxn] (ddn)?

 The SYSGEN assembling and linking process requires a source input
 device and a binary output device, as well as an output device
 for monitor link maps. You must specify the physical name and
 unit number for each (for example, RK1, DP4, etc.). For more
 explanation, see the RT-11 SYSTEM GENERATION GUIDE.
```

Respond with the physical device and unit number for the device on which you want the system sources to reside during system generation. SYSGEN assigns the logical device SRC: to the physical device you specify. Then, the SYSGEN command files use SRC: for source input. Review Section 1.2.5.1 if you are unsure of the answer.

```
What is the PHYSICAL name of the binary output device [xxn] (ddn)?

 The SYSGEN assembling and linking process requires a source input
 device and a binary output device, as well as an output device
 for monitor link maps. You must specify the physical name and
 unit number for each (for example, RK1, DP4, etc.). For more
 explanation, see the RT-11 SYSTEM GENERATION GUIDE.
```

Respond with the physical device and unit number for the device that you want to receive binary and system output. SYSGEN assigns the logical device BIN: to the physical device you specify. Then, the SYSGEN command files send to BIN: the .OBJ and system files output during the system generation process. This device can be the same as the source input device; it can also be an independent output device or a system device. In any case, there must be sufficient space for all the files. Review Section 1.2.5.1 if you are unsure of the answer.

```
What is the PHYSICAL name of the map output device [xxn] (ddn)?

 The SYSGEN assembling and linking process requires a source input
 device and a binary output device, as well as an output device
 for monitor link maps. You must specify the physical name and
 unit number for each (for example, RK1, DP4, etc.). For more
 explanation, see the RT-11 SYSTEM GENERATION GUIDE.
```

Respond with the physical device and unit number for the device that you want to list the link maps that result when you assemble and link the system components. SYSGEN assigns the logical device MAP: to the physical device you specify. You can specify the console terminal or a line printer. Or, you can build a file for the map listings by specifying the physical name of a block-replaceable device such as a disk. Usually, the binary output device is suitable for the map files as well. Note that if you submit an SPR to DIGITAL for a system that you created through the system generation process, you must include the link maps (and the file SYSGEN.CND) for that system. Review Section 1.2.5.1 if you are unsure of the answer.

```
Do you want to retain the system OBJs (Y)?

 The indirect command files that the SYSGEN program generates
 delete the object modules (from which the system is built) when
 the object modules are no longer needed. This measure serves to
 conserve disk space while the system is being built. However, the
 object modules are often useful later when you patch the system.
 If your output device has sufficient free space, you can elect to
 retain all system object modules for future use.
```

Respond YES if you have abundant mass storage (approximately 500 blocks per monitor being built) and if you want to retain the system .OBJ files for later updating purposes. Note that DIGITAL distributes monitor updates in source form. If in doubt, respond NO. The default response to this question is YES.

```
Do you want to retain the work files (Y)?

 SYSGEN creates five files which are used for the system builds:
 These are the 3 indirect command files (SYSGEN.BLD, SYSGEN.MON,
 and SYSGEN.DEV) and the 2 source conditional files (SYSGEN.CND
 and SYSGEN.TBL). If you wish to have these files deleted after
 the system build procedure, SYSGEN.BLD, is run, type "N" and
 these work files will not be retained.

 To build an entire system, mount the source and binary volumes,
 copy the files SYSGEN.CND, SYSGEN.TBL, and the sources for any
 user-supplied device handlers to the source volume, and type
 $@SYSGEN.BLD. To build just the monitors, type $@SYSGEN.MON.
 To build just the device handlers, type $@SYSGEN.DEV. For
 more information, read the RT-11 SYSTEM GENERATION GUIDE.

 END OF SYSGEN PROGRAM -
```

Figure 1–6: System Generation Worksheet

Monitor Type

☐ 1. SJ monitor (Y)
☐ 2. FB monitor (Y)
☐ 3. XM monitor (N)

Monitor Options

☐ 4. SJ timer support (N)
☐ 5. Device timeout support (N)
☐ 6. Message on system I/O errors (Y)
☐ 7. System job support (N)
☐ 8. .SPCPS programmed request (N)
☐ 9. Multiterminal support (N)
☐ 10. Asynchronous terminal status (Y)
☐ 11. Multiterminal timeout (Y)
☐ 12. Output ring buffer size: ____ (40)
☐ 13. Input ring buffer size: ____ (134)
☐ 14. .FETCH request under XM (Y)
☐ 15. Month and year date rollover (N)
☐ 17. User command linkage (N)
☐ 19. High-speed ring buffer (N)
☐ 20. All keyboard monitor commands (Y)
☐ 21. Utility subset (Y)
☐ 22. Language subset (Y)
☐ 23. Minimal subset (Y)
☐ 24. 50 Hz clock (N)
☐ 25. Programmable clock as system clock (N)
☐ 26. Start-up indirect command file (Y)
☐ 27. Floating point (Y)
☐ 28. Memory parity support (N)
☐ 29. Power failure messages (N)
☐ 30. BATCH support (N)
☐ 31. Error logging (N)
☐ 32. Number of units supported by error logging (10)

Device Options

☐ DX RX01 Single-Density Diskette
☐ DY RX02 Double-Density Diskette
☐ DD TU58 DECtape II
☐ PD PDT–11 Intelligent Terminal
☐ RF RF11 Disk
☐ RK RK05 Cartridge Disk
☐ DL RL01/RL02 Cartridge Disk
☐ DP RP11 Disk Pack
☐ DM RK06/RK07 Cartridge Disk
☐ MT TM11 (UNIBUS) Magtape
☐ MM TJU16 (MASSBUS) Magtape
☐ MS TS11 (UNIBUS) Magtape
☐ CR Card Reader
☐ NL Null Handler
☐ LP Line Printer
☐ LS Serial Line Printer
☐ DU MSCP Disk-Class Handler
☐ LD Logical Disk Handler
☐ DT DECtape
☐ DS RJS03/04 Fixed-head Disk
☐ CT TA11 Cassette
☐ PC PC11 Paper Tape Reader/Punch
☐ PR PR11 Paper Tape Reader
☐ VM Virtual Memory Handler

☐ 33. Second device controllers:

☐ RX11 (N)
☐ RX02 (N)
☐ TU58 (N)

☐ 34. Double-density only RX02 support (N)

Addresses for Peripheral Device Controllers

(Questions 35 and 36)

Controller	CSR	Vector
1st RX11	_____ (177170)	___ (264)
2nd RX11	_____ (177174)	___ (270)
1st RX211	_____ (177170)	___ (264)
2nd RX211	_____ (177150)	___ (270)
1st TU58	_____ (176500)	___ (300)
2nd TU58	_____ (176510)	___ (310)

☐ 37. No. of disk platters on RF11 controller: ___ (1)
☐ 38. RJS03 (not RJS04) support (Y)
☐ 39. No. of RL01/RL02 units: ___ (2)
☐ 40. RPR02 (not RPR02/RP03) support (N)
☐ 41. File-structured magtape handlers (Y)

☐ TM11 (Y)
☐ TJU16 (Y)
☐ TS11 (Y)

☐ 42. No. of magtape units supported:

☐ TM11 ___ (2)
☐ TJU16 ___ (2)
☐ TS11 ___ (2)

Addresses for TS11 Units

(Questions 43 and 44)

Unit	CSR	Vector
1	_____ (172522)	___ (224)
2	_____ (172526)	___ (300)
3	_____ (172532)	___ (304)
4	_____ (172536)	___ (310)
5	_____ (172542)	___ (314)
6	_____ (172546)	___ (320)
7	_____ (172552)	___ (324)
8	_____ (172556)	___ (330)

☐ 45. Printer has nonstandard CSR/vector addresses (N)
☐ 46. Nonstandard CSR address for printer: _____ (177514)
☐ 47. Nonstandard vector address for printer: ___ (200)
☐ 48. CSR address for serial line printer: _____ (176500)
☐ 49. Vector address for serial line printer: ___ (300)
☐ 50. No. of extra device slots: ___ (0)

Graphics Options

☐ 51. VT11/VS60 graphics support (N)
☐ 52. VS60 support (N)
☐ 53. CSR address for VT11/VS60: _____ (172000)
☐ 54. Vector address for VT11/VS60: ___ (320)

Terminal Interface Options

☐ 55. No. of local DL11 lines: ___ (1)
☐ 56. No. of remote DL11 lines: ___ (0)

(continued on next page)

Figure 1–6: System Generation Worksheet (Cont.)

CSR and Vector Addresses for Local and Remote DL11

(Questions 57 and 58)

	Local DL11 Addresses		Remote DL11 Addresses	
Lines	**CSR**	**Vector**	**CSR**	**Vector**
1	_____ (177560)	___ (60) (console)		
2	_____ (176500)	___ (300)	_____ (175610)	___ (310)
3	_____ (176510)	___ (310)	_____ (175620)	___ (320)
4	_____ (176520)	___ (320)	_____ (175630)	___ (330)
5	_____ (176530)	___ (330)	_____ (175640)	___ (340)
6	_____ (176540)	___ (340)	_____ (175650)	___ (350)
7	_____ (176550)	___ (350)	_____ (175660)	___ (360)
8	_____ (176560)	___ (360)	_____ (175670)	___ (370)

☐ 59. DZ11 or DZV11 multiplexer support (N)
☐ 60. DZ11 multiplexer support (Y)
☐ 61. No. of DZ multiplexers: ___ (1)
☐ 62. No. of local DZ lines: ___ (1)
☐ 63. No. of remote DZ lines: ___ (0)

Addresses for DZ Multiplexers

(Questions 64 and 65)

Unit	**CSR**	**Vector**
1	_____ (160010)	___ (300)
2	_____ (160020)	___ (310)
3	_____ (160030)	___ (320)
4	_____ (160040)	___ (330)

☐ 66. Baud rate of lines: ___ (300)
☐ 67. No. of MSCP ports supported: ___ (1)

Physical Device Selection and SYSGEN Cleanup

☐ Source input device: _____ (ddn)
☐ Binary output device: _____ (ddn)
☐ Map output device: _____ (ddn)
☐ Retain system OBJs (Y)
☐ Retain work files (Y)

Source Files Required

_____

_____

_____

_____

_____

_____

_____

_____

Chapter 2
Performing the System Generation Process on a Disk System

To perform the system generation process on a disk system, perform the procedures summarized in the following list and described in Sections 2.1 through 2.4.

1. Run the program IND.SAV.
2. Edit the file SYSGEN.CND, if necessary.
3. Collect the appropriate files on the appropriate media.
4. Assemble and link the monitor(s) and device handler(s).

The following sections correspond to each of these four procedures and describe the steps involved in each procedure. Chapter 3 describes the procedures for performing the system generation process on diskette configurations.

2.1 Running the Program IND.SAV

The first procedure in the system generation process is to run the SYSGEN program and answer the dialog questions.

Make sure that the files IND.SAV and SYSGEN.COM are on your system device and that the system device is not write-protected. The .COM files can reside on another volume (except magtape) as long as the volume has 2000 free blocks and you assign the default DK: to that unit. The steps in this section assume that these files are on the system volume.

Use the following command:

```
.RUN IND.SAV SYSGEN.COM<RET>
```

(The dialog prints.)

Use the worksheet (Figure 1–6) you compiled when you read Chapter 1, and respond to each dialog question. The dialog asks a question, waits for your response, and resumes at the appropriate point. SYSGEN may skip some questions, depending on the responses you give. If you are not familiar with the Version 5 SYSGEN dialog, type ESC at the end of any question to print an explanation. Type RET to terminate each response.

Parentheses at the end of each question contain the default response. To select that default response, simply type RET. You can terminate SYSGEN by typing CTRL/C.

If you type CTRL/O whenever an explanation is printing, SYSGEN stops printing the explanation, reprints the question, and waits for your response. Note, however, that you should not type CTRL/O while SYSGEN is printing a question; in this case, the end of the question is truncated, and you will be unable to read the question, but SYSGEN waits for a response.

If you give an inappropriate response to a dialog question, SYSGEN prints an error message and repeats the question. If you receive any other error message while running SYSGEN, check the *RT–11 System Message Manual* for that message.

If you want to change a response to a question, make a note of it, and continue through the dialog. After you have answered all questions, SYSGEN will ask you if you wish to change any responses. Most responses can be changed; however, you cannot change what monitor(s) are being built, nor can you add or remove multiterminal support. To make these major changes, you must rerun SYSGEN.

After you respond to the final system generation question, the end message prints on the terminal and control returns to the monitor.

2.2 Editing SYSGEN.CND

If you need to make any edits to SYSGEN.CND (see Section 1.2.4), do so at this time, but edit the file carefully.

2.3 Collecting the Appropriate Files on the Appropriate Media

At this point, prepare to copy files to devices according to the arrangement you planned in Section 1.2.5. Gather distribution backup copies that contain the source files you will need. Make sure the command files SYSGEN.MON and SYSGEN.DEV (and SYSGEN.BLD, if you can use it) are on device DK:.

2.4 Assembling and Linking the Monitor(s) and Device Handlers

SYSGEN creates command files to assemble and link the monitor(s) and device handlers you are generating. These command files consist of assembly and link commands (plus file deletion commands if you chose not to

retain the .OBJ files). You can execute the command files as they are, or you can alter them, as long as the final commands perform the required functions. For example, you might want to alter the command files as follows:

1. You can change the map output device to a block-replaceable device and create a file instead of a listing. You can suppress the link maps by sending the output to the null device, NL:. However, you will need to include a link map and answer file listing with any SPR you might submit to DIGITAL for a monitor created by SYSGEN. DIGITAL recommends saving the link maps in a file on a disk, if possible, so they will not be misplaced. You will also need the link maps if you wish to apply software customizations.

2. You can change the devices on which individual source or binary files are to reside to optimize mass storage use.

You can choose the indirect command file(s) you want to use to build the system. SYSGEN creates SYSGEN.MON and SYSGEN.DEV. If you want to build both the handlers and the monitors in the same operation and you have sufficient free storage, use SYSGEN.BLD, a distributed indirect command file that invokes SYSGEN.MON and SYSGEN.DEV. On the other hand, if you want to build the handlers separately from the monitors, use SYSGEN.MON to build the monitors and SYSGEN.DEV to build the handlers.

Edit the indirect command files at this point, if necessary. Then proceed to the section that describes the procedure you need to use:

- Using SYSGEN.BLD to build the system (Section 2.4.1)
- Using SYSGEN.MON and SYSGEN.DEV to build the system (Section 2.4.2)
- Building handlers separately (Section 2.4.3)

2.4.1 Using SYSGEN.BLD to Build the System

Generally, if you have sufficient space on the device BIN: (approximately 2000 free blocks), you should use SYSGEN.BLD to build the system. Make sure that the disks to be used as SRC: and BIN: are mounted. Refer to Section 1.2.5 to review your plans for the system build procedure.

Copy the appropriate source files to the device that is to serve as SRC:. In the following command, xxn: is your distribution backup device, unless you put source files on one of your working system volumes when you installed RT–11, and yyn: is SRC:.

```
.COPY xxn:filnam.MAC yyn:filnam.MAC
.
```

Then, copy SYSGEN.CND and SYSGEN.TBL to the source disk, if necessary. In the following command, xxn: is the device that contains SYSGEN.CND and SYSGEN.TBL, and yyn: is the device you specified as SRC: near the end of the SYSGEN dialog.

```
.COPY xxn:SYSGEN.CND yyn:SYSGEN.CND(RET)
.COPY xxn:SYSGEN.TBL yyn:SYSGEN.TBL(RET)
.
```

Now, consolidate the free space on the binary disk. This step is very important if you have space problems. In this command, zzn: is the device you specified as BIN: near the end of the SYSGEN dialog.

```
.SQUEEZE zzn:(RET)
zzn:/Squeeze? Are you sure? Y(RET)
.
```

Finally, invoke the indirect command file SYSGEN.BLD. Each command line in SYSGEN.BLD, SYSGEN.MON, annd SYSGEN.DEV logs on the terminal as the system executes the command. The following example shows terminal output similar to the output that will print on your terminal when you invoke SYSGEN.BLD.

```
.@SYSGEN.BLD(RET)
$@SYSGEN.MON
ASSIGN DL1 SRC
ASSIGN DL0 BIN
ASSIGN DL0 MAP
ASSIGN DL0 OBJ
MACRO/OBJ:OBJ:KMFB SRC:(FB+SYSGEN.CND+EDTGBL+KMON+KMOVLY)
MACRO/OBJ:OBJ:RMFB SRC:(FB+SYSGEN.CND+EDTGBL+USR+RMONFB)
MACRO/OBJ:OBJ:TBFB SRC:(FB+SYSGEN.CND+EDTGBL+SYSGEN.TBL)
MACRO/OBJ:OBJ:BTFB SRC:(FB+SYSGEN.CND+EDTGBL+BSTRAP)
MACRO/OBJ:OBJ:MEFB SRC:(FB+SYSGEN.CND+EDTGBL+MTTEMT)
MACRO/OBJ:OBJ:MIFB SRC:(FB+SYSGEN.CND+EDTGBL+MTTINT)
LINK/EXE:OBJ:RT11FB.SYG/BOU:1000/PROMPT/MAP:MAP:RT11FB OBJ:BTFB
OBJ:RMFB,KMFB,MEFB,MIFB,TBFB//
OVLYO
$@SYSGEN.DEV
ASSIGN DL1 SRC
ASSIGN DL0 BIN
ASSIGN DL0 OBJ
MACRO/OBJ:OBJ:BA SRC:(SYSGEN.CND+BA)
LINK/EXE:BIN:BA.SYG OBJ:BA
MACRO/OBJ:OBJ:DX SRC:(SYSGEN.CND+DX)
LINK/EXE:BIN:DX.SYG OBJ:DX
MACRO/OBJ:OBJ:RK SRC:(SYSGEN.CND+RK)
LINK/EXE:BIN:RK.SYG OBJ:RK
MACRO/OBJ:OBJ:LP SRC:(SYSGEN.CND+LP)
LINK/EXE:BIN:LP.SYG OBJ:LP
.
```

The most common errors that can occur during the build process are listed in Table 2–1.

Table 2–1: System Build Errors

Type of Error	Cause*
Assembly errors	Incorrect or conflicting responses to SYSGEN dialog. Reexamine your responses to SYSGEN. Often, reading the conditional files helps you spot errors. If the SYSGEN responses seem correct, make sure that you have the proper versions of the source files on the source disk. Check that you have not introduced an error if you edited the source files. Compare the files on the source disk to the originals in the distribution.
?MACRO–F–File not found DEV:FILNAM.TYP	Failure to copy dev:filnam.typ to source disk,or failure to include all necessary source modules on disk.
?MACRO–F–Device full DEV:	Insufficient space on binary output device to accommodate all output files.
?MACRO–F–I/O error on workfile	Insufficient space on default output device. Check the following possibilities: You did not squeeze the default device before starting the build. Try squeezing it and rebuilding. Try rerunning SYSGEN to specify not retaining .OBJ files and then rebuild. Try deleting other unnecessary files on the binary device (but be sure they are unnecessary). If all these techniques fail, you must build the system manually, entering the commands individually and building one component at a time. Refer to Chapter 3.
?MACRO–F–I/O error on DEV:FILNAM.TYP	Bad volumes or write-protected devices. If the volume is bad, try another. If the device is write-protected, enable it.

* If you encounter an error you cannot explain or correct, refer to the *RT–11 System Message Manual*; if you still cannot resolve the problem, send an SPR to DIGITAL with a listing of the answer files and link maps.

Once you have built the system, copy and store the answer files, and if possible, the conditional, command, and output files from the generation process. You should retain at least the answer files, if you use a generated monitor, since all SPRs must be accompanied by a listing of these files (as well as link maps). If you keep the object files, you can reassemble a particular component and relink manually, if necessary.

The .SYG files that result from the system build are masters for your generated system and you should preserve them. Refer to the appropriate installation chapter in the *RT–11 Installation Guide*, and perform the procedures to install the generated system. Rename .SYG files, monitors and handlers, to .SYS. You can also rename the monitor to distinguish it from standard monitors. You will have to copy the bootstrap for the generated monitor to your system device, if you want that monitor to boot. Note that you can always identify a user-generated monitor by the (S) that prints in the boot message.

2.4.2 Using SYSGEN.MON and SYSGEN.DEV to Build the System

If you use SYSGEN.MON and SYSGEN.DEV to build the system, you need approximately 2000 free blocks on device BIN:. Make sure that the disks you planned to serve as SRC: and BIN: are mounted. Refer to Section 1.2.5 to review your plans for the system build procedure.

Copy the appropriate source files for building the monitor(s) to the device that is to serve as SRC:. In the following command, xxn: is your distribution backup device, unless you included the source files in your working system, and yyn: is SRC:.

```
.COPY xxn:filnam.MAC yyn:filnam.MAC
.
```

Then, copy SYSGEN.CND and SYSGEN.TBL to the source disk. In the following command, xxn: is the device that contains SYSGEN.CND and SYSGEN.TBL, and yyn: is the device you specified as SRC: near the end of the SYSGEN dialog.

```
.COPY xxn:SYSGEN.CND yyn:SYSGEN.CND
.COPY xxn:SYSGEN.TBL yyn:SYSGEN.TBL
.
```

Now, consolidate the free space on the binary disk. In this command, zzn: is the device you specified as BIN: near the end of the SYSGEN dialog.

```
.SQUEEZE zzn:
zzn:/Squeeze; Are you sure? Y
.
```

Next, invoke the indirect command file SYSGEN.MON to build the monitor(s). The currently running monitor logs the commands on the terminal as it executes them. The following example shows terminal output similar to the output that will print on your terminal when you invoke SYSGEN.MON.

```
.$@SYSGEN.MON(RET)
ASSIGN DL1 SRC
ASSIGN DL0 BIN
ASSIGN DL0 MAP
ASSIGN DL0 OBJ
MACRO/OBJ:OBJ:KMFB SRC:(FB+SYSGEN.CND+EDTGBL+KMON+KMOVLY)
MACRO/OBJ:OBJ:RMFB SRC:(FB+SYSGEN.CND+EDTGBL+USR+RMONFB)
MACRO/OBJ:OBJ:TBFB SRC:(FB+SYSGEN.CND+EDTGBL+SYSGEN.TBL)
MACRO/OBJ:OBJ:BTFB SRC:(FB+SYSGEN.CND+EDTGBL+BSTRAP)
MACRO/OBJ:OBJ:MEFB SRC:(FB+SYSGEN.CND+EDTGBL+MTTEMT)
MACRO/OBJ:OBJ:MIFB SRC:(FB+SYSGEN.CND+EDTGBL+MTTINT)
LINK/EXE:OBJ:RT11FB.SYG/BOU:1000/PROMPT/MAP:MAP:RT11FB OBJ:BTFB
OBJ:RMFB,KMFB,MEFB,MIFB,TBFB//
OVLY0
.
```

The most common errors that can occur during the build process are listed in Table 2–1.

Now, delete all the source files that you needed to build the monitor(s) from SRC:. Do not delete SYSGEN.CND or SYSGEN.TBL. In the following command, yyn: is SRC:, and aaaaaa is the file name of the source file.

```
.DELETE yyn:aaaaaa.MAC(RET)
.
```

Then, copy to SRC: the source files that were used for building the handlers. In the following command, xxn: is your distribution backup device, yyn: is SRC:, and aa is the file name of the device handler source file.

```
.COPY xxn:aa.MAC yyn:aa.MAC(RET)
                .
                .
                .
.COPY xxn:zz.MAC yyn:zz.MAC(RET)
.
```

Finally, invoke the indirect command file SYSGEN.DEV to build the device handlers. The monitor logs the commands on the terminal as it executes them. The following example shows terminal output similar to the output that will print on your terminal when you invoke SYSGEN.DEV.

```
.$@SYSGEN.DEV(RET)
ASSIGN DL1 SRC
ASSIGN DL0 BIN
ASSIGN DL0 OBJ
MACRO/OBJ:OBJ:BA SRC:(SYSGEN.CND+BA)
LINK/EXE:BIN:BA.SYG OBJ:BA
MACRO/OBJ:OBJ:DX SRC:(SYSGEN.CND+DX)
LINK/EXE:BIN:DX.SYG OBJ:DX
MACRO/OBJ:OBJ:RK SRC:(SYSGEN.CND+RK)
LINK/EXE:BIN:RK.SYG OBJ:RK
MACRO/OBJ:OBJ:LP SRC:(SYSGEN.CND+LP)
LINK/EXE:BIN:LP.SYG OBJ:LP
.
```

The most common errors that can occur during the build process are listed in Table 2–1.

Once you have built the system, copy and store the conditional, command, and output files from the generation process, if possible. You should retain at least the link maps and answer files, if you use a generated monitor, since listings of these files must accompany all SPRs. If you keep the object files, you can reassemble a particular component and relink manually, if necessary.

Preserve the .SYG files that result from the system build; they are masters for your generated system.

Refer to the appropriate installation chapter in the *RT–11 Installation Guide*, and perform the procedures to install the generated system. Rename .SYG files, monitors and handlers, to .SYS. You can also rename the monitor to distinguish it from standard monitors. You will have to copy the bootstrap for the generated monitor to your system device, if you want that monitor to boot. Note that you can always identify a user-generated monitor by the (S) that prints in the boot message.

2.4.3 Building Handlers Separately

To keep the monitor as small as possible, you may want to build a monitor with only a few device slots, or build many device handlers to go along with that monitor but use only a few devices at a time. When you select a device during the SYSGEN dialog, SYSGEN allocates a slot for it in the monitor device tables and adds commands to SYSGEN.DEV that build it. To build device handlers separately, you need to run SYSGEN twice.

First, execute SYSGEN, selecting monitor options and support for the few devices for which you want to allocate slots. Use the resulting conditional and command files to build the basic system. Then, rerun SYSGEN, specifying the identical monitor options but selecting only the additional devices. Use the version of SYSGEN.DEV created during the second SYSGEN session to build the additional handlers. Discard SYSGEN.MON and SYSGEN.BLD files from the second SYSGEN run.

You can use one of two procedures to install additional device handlers for the devices you want to use during a particular session.

1. Use the REMOVE and INSTALL commands.
2. Use the bootstrap routine's automatic installation capability by simply replacing device handlers on the system device and rebooting.

Refer to Section 2.7.11 of the *RT–11 Installation Guide* for a description of both procedures.

Chapter 3
Performing the System Generation Process on a Small System

If you intend to perform the system generation process on an RX01 or RX02 system, follow the procedures in this chapter. If your system has two diskette units, you can perform the system generation process, but it is not recommended. It takes a long time and is not automated. If you want to attempt the procedures, follow all the steps in this chapter very carefully.

Do not try to generate a system for a target configuration that is different from the diskette configuration on which you are performing the system generation process. The procedures in this chapter may not work if you try to generate support for many devices.

3.1 Creating a Working System for This Process

Begin the system generation process by creating a system diskette with the SJ monitor.

Include the following files (from your working system and distribution backups) on the system diskette:

RT11SJ.SYS
xx.SYS (DX.SYS or DY.SYS)
SWAP.SYS
TT.SYS
LP.SYS (if appropriate)
IND.SAV
SYSGEN.COM
DIR.SAV
PIP.SAV
DUP.SAV

Be sure to squeeze the diskette and copy the bootstrap to it. Then boot this system.

3.2 Running the Program SYSGEN.COM

This procedure describes building only one monitor (and its associated device handlers) at a time. Run SYSGEN.COM once for each monitor you need. Each time you run SYSGEN, answer YES to only one of the questions that offer the various monitors. Follow the procedure in this section to build that monitor and its associated handlers. Then run SYSGEN again to choose another monitor. Repeat the procedure in this section to build the monitor and handlers, and so on.

Use the following command to run the SYSGEN program.

```
.RUN IND.SAV SYSGEN.COM(RET)
```

(The dialog prints.)

Use the worksheet (Figure 1–6) you compiled when you read Chapter 1, and respond to each dialog question. The dialog asks a question, waits for your response, and resumes at the appropriate point. SYSGEN may skip some questions, depending on the responses you give. If you are not familiar with the Version 5 SYSGEN dialog, type (ESC)(RET) at the end of any question to print an explanation. Type (RET) to terminate each response.

Parentheses at the end of each question contain the default response. To select that default response, simply type (RET). You can terminate SYSGEN by typing (CTRL/C).

If you type (CTRL/O) whenever an explanation is printing, SYSGEN stops printing the explanation, reprints the question, and waits for your response. Note, however, that you should not type (CTRL/O) while SYSGEN is printing a question; in this case, the end of the question is truncated, and you will be unable to read the question, but SYSGEN waits for a response.

If you give an inappropriate response to a dialog question, SYSGEN prints an error message and repeats the question. If you receive any other error message while running SYSGEN, check the *RT–11 System Message Manual* for that message.

Answer the system build questions near the end of the dialog with the names of devices in your configuration. Since you will read the indirect command files (not run them), it does not matter which device is SRC:, BIN:, or MAP:.

If you want to change a response to a question, make a note of it, and continue through the dialog. After you have answered all questions, SYSGEN will ask you if you wish to change any responses. Most responses can be changed; however, you cannot change what monitor(s) are being built, nor can you add or remove multiterminal support. To make these major changes, you must rerun SYSGEN.

After you respond to the final question, the end message prints on the terminal, and control returns to the monitor.

When SYSGEN completes, the following new files appear in your system diskette's directory. (See Figure 1–2.)

SYSGEN.CND
SYSGEN.TBL
SYSGEN.BLD
SYSGEN.MON
SYSGEN.DEV
SYSGEN.ANS (optional)

Using the following command, examine your directory to make sure that these files have been created.

```
.DIRECTORY(RET)
```

(The directory prints.)

3.3 Collecting the Appropriate Files on the Diskettes

Because you cannot fit all the files required to build your system on two diskettes, you must arrange the files so that you can copy them to your system diskette one at a time and perform the component assemblies separately. First, you will need to study the indirect command files to identify the files you will need for system build. Then, you will need to create four diskettes to hold the various files during the build procedure.

3.3.1 System Build Indirect Command Files

To ascertain the files you need, list the files SYSGEN.MON and SYSGEN.DEV on the terminal or line printer. These files contain the names of all the source files you need to perform the assemblies to build the system. They also contain all the keyboard monitor commands that assemble and link it.

On terminal

```
.TYPE SYSGEN.MON(RET)
.TYPE SYSGEN.DEV(RET)
```

On line printer

```
.PRINT SYSGEN.MON(RET)
.PRINT SYSGEN.DEV(RET)
```

Figure 3–1 shows an example of SYSGEN.MON and SYSGEN.DEV (for a multiterminal foreground/background system). Certain lines in this example are numbered for reference. For example, lines 1, 2, 3, and 4 show the commands that assign various devices to SRC:, BIN:, MAP:, and OBJ:.

Figure 3–1: Sample SYSGEN.MON and SYSGEN.DEV Files

```
    !SYSGEN EDIT LEVEL = 1
    !       SYSGEN.MON CREATED  19-Oct-82  16:28:35
    !
    ! THIS SOFTWARE IS FURNISHED UNDER A LICENSE AND MAY ONLY BE USED
    ! OR COPIED IN ACCORDANCE WITH THE TERMS OF SUCH LICENSE.
    !
    ! COPYRIGHT (c) 1982, 1983 BY DIGITAL EQUIPMENT CORPORATION.
    ! ALL RIGHTS RESERVED.

1   ASSIGN DL1 SRC
2   ASSIGN DL0 BIN
3   ASSIGN DL0 MAP
4   ASSIGN DL0 OBJ
5   MACRO/OBJ:OBJ:KMFB SRC:(FB+SYSGEN.CND+EDTGBL+KMON+KMOVLY)
6   MACRO/OBJ:OBJ:RMFB SRC:(FB+SYSGEN.CND+EDTGBL+USR+RMONFB)
7   MACRO/OBJ:OBJ:TBFB SRC:(FB+SYSGEN.CND+EDTGBL+SYSGEN.TBL)
8   MACRO/OBJ:OBJ:BTFB SRC:(FB+SYSGEN.CND+EDTGBL+BSTRAP)
9   MACRO/OBJ:OBJ:MEFB SRC:(FB+SYSGEN.CND+EDTGBL+MTTEMT)
10  MACRO/OBJ:OBJ:MIFB SRC:(FB+SYSGEN.CND+EDTGBL+MTTINT)
11  LINK/EXE:BIN:RT11FB.SYG/BOU:1000/PROMPT/MAP:MAP:RT11FB OBJ:BTFB
12  OBJ:RMFB,KMFB,MEFB,MIFB,TBFB//
13  OVLY0

    !SYSGEN EDIT LEVEL = 1
    !       SYSGEN.DEV CREATED  19-Oct-82  16:28:35
    !
    ! THIS SOFTWARE IS FURNISHED UNDER A LICENSE AND MAY ONLY BE USED
    ! OR COPIED IN ACCORDANCE WITH THE TERMS OF SUCH LICENSE.
    !
    ! COPYRIGHT (c) 1982, 1983 BY DIGITAL EQUIPMENT CORPORATION.
    ! ALL RIGHTS RESERVED.

14  ASSIGN DL1 SRC
15  ASSIGN DL0 BIN
16  ASSIGN DL0 OBJ
17  MACRO/OBJ:OBJ:BA SRC:(SYSGEN.CND+BA)
18  LINK/EXE:BIN:BA.SYG OBJ:BA
19  MACRO/OBJ:OBJ:DX SRC:(SYSGEN.CND+DX)
20  LINK/EXE:BIN:DX.SYG OBJ:DX
21  MACRO/OBJ:OBJ:DL SRC:(SYSGEN.CND+DL)
22  LINK/EXE:BIN:DL.SYG OBJ:DL
23  MACRO/OBJ:OBJ:LP SRC:(SYSGEN.CND+LP)
24  LINK/EXE:BIN:LP.SYG OBJ:LP
```

Line 5 assembles the keyboard monitor. In this command line, MACRO/OBJ:OBJ: invokes the MACRO–11 assembler and specifies the output device for the object file that results from this operation. OBJ: is the device; note that line 2 assigns DL0: to OBJ:. Therefore, if you were to invoke SYSGEN.MON, the object file would go to DL0:.

KMFB is the output file name. The file type is .OBJ, since MACRO creates object files by default.

On the input side of the command string, SRC: is the input device. Line 1 assigns DL1: to SRC:. The parentheses contain the source files to be assembled. The source input files in this command string are FB.MAC, SYSGEN.CND, EDTGBL.MAC, KMON.MAC and KMOVLY.MAC. The system assumes .MAC files as input to MACRO. Because the files are separated by plus signs (rather than commas), one object file (KMFB.OBJ) results from this assembly.

SYSGEN.MON contains commands similar to the ones in lines 9 and 10 only if you are generating a multiterminal system.

Lines 11, 12, and 13 link the monitor object modules. In the command string, LINK invokes the linker. The option /EXE:OBJ:RT11FB.SYG specifies a device (OBJ:) and file specification (RT11FB.SYG) for the executable file that results from this operation. The monitor created by this example is RT11FB, but it has the .SYG file type, since it is created through the system generation process. The option /BOU:1000 specifies the address boundary on which LINK should start a program section to be named when LINK asks for its name (line 13). /PROMPT allows additional lines to be entered when the command string is too long to fit on one line. If you were to execute SYSGEN.MON, the system would prompt with an asterisk (*) at line 12. Additional lines can be entered before the double slashes (//), which indicate the end of the command string.

On the input side of the command, OBJ: is the input device. The default LINK input file type is .OBJ. BTFB is the object file BTFB.OBJ that results from the assembly performed at line 8; RMFB is the object file RMFB.OBJ that results from the assembly performed at line 6; and so on.

Line 13 is the name of the program section whose address boundary is specified in the /BOU:1000 option. This line responds to the system prompt *Boundary section?*, which would appear (if you were to execute SYSGEN.MON) once the command string is completed.

The command lines in the versions of SYSGEN.MON and SYSGEN.DEV that result from your SYSGEN session are variations of the commands in Figure 3–1. You can identify all the source files that you will need for your assemblies if you study the command files.

When you actually assemble components, you will type each command line in the indirect command file. Before typing the command, however, you must copy to the system diskette the source files you need to perform that assembly. When you type the command, you must substitute specific devices (DX0: or DY0:) for SRC: and (DX1: or DY1:) for BIN:. You will not make the device assignments in lines 1, 2, 3, 4, 14, and 15.

3.3.2 Creating System Build Diskettes

Create four diskettes for the system build procedure. SYSGEN.CND and SYSGEN.TBL should be on your system diskette (since you have run SYSGEN). The other source files are on your backup distribution diskettes.

When you initialize each diskette, give it an identifying volume ID. For example, to initialize Diskette 1, type:

```
.INITIALIZE/BAD/VOL xx1:RET
xx1:/Initialize; Are you sure? YRET
?DUP-I-No bad blocks detected xx1:
Volume ID? DISKETTE 1RET
Owner? RET
.
```

Then, you can easily identify each diskette. For example, you can type:

```
.DIRECTORY/VOLRET
DISKETTE 1
.
```

3.3.2.1 Diskette Contents — The four diskettes for this procedure should contain the files (but only the files) in the following lists.

Diskette 1

The system diskette for the assembly procedure should contain:

RT11SJ.SYS
xx.SYS (DX.SYS or DY.SYS)
SWAP.SYS
TT.SYS
LP.SYS
MACRO.SAV
SYSGEN.CND (from the SYSGEN session you just performed)
PIP.SAV
DUP.SAV
DIR.SAV
SYSMAC.SML
yy.MAC (yy is the monitor you are building: SJ, FB, or XM)
EDTGBL.MAC
KMON.MAC

Diskette 2

The second diskette will store two .MAC source files for the second assembly. It will also receive .OBJ files produced during assemblies. It should contain:

USR.MAC
RMONxx.MAC (xx is SJ or FB)

Diskette 3

The third diskette will store most of the .MAC source files for the assemblies until they are needed on the system diskette. It must contain:

xx.MAC (DX.MAC or DY.MAC)
SYSGEN.TBL (from the SYSGEN session you just performed)
BSTRAP.MAC
zz.MAC (zz is device name for support specified during SYSGEN)
.
.
.
zz.MAC (zz is device name for support specified during SYSGEN)
Other source files, except KMOVLY.MAC (Refer to SYSGEN.MON and SYSGEN.DEV.)
LINK.SAV

Diskette 4

The fourth diskette should contain the KMON overlays for the KMON assembly. It will receive the KMON object file, and you will copy the other object files to it as you assemble them on Diskette 2. Diskette 4 should contain:

KMOVLY.MAC

3.3.2.2 Copying the Files — Review the installation procedures in the *RT–11 Installation Guide*, if necessary, when you create these diskettes. If you run out of room when you create a diskette, squeeze the diskette to consolidate free space. When you copy files from nonbootable diskettes, use the COPY/SYSTEM/WAIT command. For example, type:

```
.COPY/SYSTEM/WAIT xx1:filnam.typ xx0:filnam.typ(RET)
Mount input volume in xx1:; Continue?
```

Place the diskette that contains the file you want to copy in Unit 1.

```
Y(RET)
Mount output volume in xx0:; Continue?
```

Replace the system diskette in Unit 0 with the diskette to which you want to copy filnam.typ.

```
Y(RET)
Mount system volume in xx0:; Continue?
```

Replace the newly created output diskette in Unit 0 with the system diskette.

```
Y(RET)
```

Do not forget to copy the bootstrap to Diskette 1 and to squeeze the diskettes to consolidate free space. Do not use diskettes with bad blocks. Use the hardware bootstrap to boot Diskette 1, and set the date and time.

3.4 Assembling and Linking the Monitor(s) and Device Handlers

Now that your files are arranged on the four diskettes, you can enter the command lines to assemble and link the components. First, assign the logical name WF: to Unit 1 (RX01 or RX02). The MACRO–11 assembler uses a work file during some assemblies.

```
.ASSIGN xx1: WF:RET
.
```

3.4.1 Assembling Files

Insert Diskette 4 in Unit 1. Refer to your listing of SYSGEN.MON for the first command. Ignore the command lines that begin with ASSIGN. The source files required for this assembly are on Diskettes 1 and 4.

When you type the command, you will substitute DXn: or DYn: for OBJ: and SRC: as shown in the following examples. You must also make other adjustments to this first command line because of the special size constraints of the keyboard monitor assembly (always the first assembly). For example, you must add the /ALLOCATE:150 option to the MACRO command, and you must indicate that KMOVLY resides on the diskette in Unit 1.

The command varies according to the type of monitor being built. For example, if you were building an FB monitor, the first assembly command line in SYSGEN.MON would be Example 1 below; you would type the command line displayed in Example 2. Study all these examples and your SYSGEN.MON listing; then execute the first assembly. Press RET at the end of each line.

Example 1

```
MACRO/OBJ:OBJ:KMFB SRC:(FB+SYSGEN.CND+EDTGBL+KMON+KMOVLY)
```

Example 2

```
.MACRO/OBJ:xx1:KMFB/ALLOCATE:150 xx0:(FB+SYSGEN.CND+EDTGBL+KMON)+xx1:KMOVLYRET
.
```

NOTE

Refer to Table 3–1 if errors occur during assemblies.

The first assembly may take as long as half an hour. The exact amount of time depends on the amount of memory — the more memory in your configuration, the faster the assembly.

When the system completes the assembly, delete the source files KMON from Diskette 1 and KMOVLY from Diskette 4. Leave SYSGEN.CND and EDTGBL on Diskette 1; you need SYSGEN.CND for all assemblies and

EDTGBL for most assemblies. After you delete these files, squeeze Diskette 1 to consolidate free space.

```
.DELETE xx0:KMON.MAC<RET>
.DELETE xx1:KMOVLY.MAC<RET>
.SQUEEZE xx0:<RET>
xx0:/Squeeze; Are you sure? Y<RET>
RT-11SJ V05.00
(Followed by any start-up file commands.)
.
```

Replace Diskette 4 in Unit 1 with Diskette 2. Look at the next command line in SYSGEN.MON. Among the source files you need for the next assembly are USR.MAC and RMONxx.MAC (where xx is SJ or FB). These two source files are on Diskette 2. The other source files you need for this assembly are on Diskette 1. Since some of the source files are on Diskette 1 and some are on Diskette 2, you must alter the command line appropriately. For example, if the command line were Example 1 (line 6 in Figure 3–1), you would type the command line displayed in Example 2.

Example 1

```
MACRO/OBJ:OBJ:RMFB SRC:(FB+SYSGEN.CND+EDTGBL+USR+RMONFB)
```

Example 2

```
.MACRO/OBJ:xx1:RMFB xx0:(FB+SYSGEN.CND+EDTGBL)+xx1:(USR+RMONFB)<RET>
.
```

Delete the two source files from Diskette 2 in Unit 1.

```
.DELETE xx1:(USR,RMONFB).MAC<RET>
.
```

Copy the object file from this assembly from Diskette 2 to Diskette 4.

```
.COPY/WAIT xx1:RMFB.OBJ xx0:RMFB.OBJ<RET>
Mount input volume in xx1:; Continue? Y<RET>
Mount output volume in xx0:; Continue? Y<RET>
Mount system volume in xx0:; Continue? Y<RET>
```

Then delete the object file from Diskette 2.

```
.DELETE xx1:RMFB.OBJ<RET>
.
```

Look at the next command line in SYSGEN.MON, and copy the source files you need for that assembly from Diskette 3 in Unit 1 to Diskette 1 in Unit 0. For example, type:

```
.COPY xx1:SYSGEN.TBL xx0:SYSGEN.TBL<RET>
.
```

Replace Diskette 3 in Unit 1 with Diskette 2. Enter the command line from SYSGEN.MON, making the required substitutions. For example, if the command line were Example 1 (line 7 in Figure 3–1), you would type the command line displayed in Example 2.

Example 1

```
MACRO/OBJ:OBJ:TBFB SRC:(FB+SYSGEN.CND+EDTGBL+SYSGEN.TBL)
```

Example 2

```
.MACRO/OBJ:xx1:TBFB xx0:(FB+SYSGEN.CND+EDTGBL+SYSGEN.TBL)RET
.
```

Then, delete the source file (that you previously copied) from Diskette 1.

```
.DELETE xx0:SYSGEN.TBLRET
.SQUEEZE xx0:RET
```

Copy the object file created during this assembly from Diskette 2 to Diskette 4, and delete it from Diskette 2.

```
.COPY/WAIT xx1:TBFB.OBJ xx0:TBFB.OBJRET
Mount input volume in xx1:; Continue? YRET
Mount output volume in xx0:; Continue? YRET
Mount system volume in xx0:; Continue? YRET
.DELETE xx1:TBFB.OBJRET
.
```

Use the same procedure to perform all the assemblies in SYSGEN.MON and SYSGEN.DEV; do not perform the link operations yet. Copy source files from Diskette 3 to Diskette 1, and delete them from Diskette 1 after the assembly is complete. After you perform each assembly, be sure to copy the object file to Diskette 4 and delete it from Diskette 2.

Ignore the ASSIGN commands. When you perform the link operations, the object files will already be on Diskette 4. The following list summarizes the sequence of operations for each subsequent assembly.

1. Examine the next command line. If the command does not invoke MACRO, ignore the command line. If it invokes MACRO, establish which source files you need for the assembly.
2. Copy these source files from Diskette 3 in Unit 1 to Diskette 1 in Unit 0.
3. Replace Diskette 3 in Unit 1 with Diskette 2.
4. Type the command, substituting xx0: for SRC: and xx1: for OBJ: (where xx is DX or DY).
5. Delete the source files you copied in step 2 from Diskette 1, unless you need them for the next assembly.

6. Copy the object file from Diskette 2 to Diskette 4.
7. Delete the object file from Diskette 2.
8. Repeat steps 1 through 7 for each assembly command line.

Now you are ready to perform the link operations.

3.4.2 Linking Files

Copy LINK from Diskette 3 to Diskette 1.

```
.COPY xx1:LINK.SAV xx0:RET
.
```

Mount Diskette 4 in Unit 1. Find the monitor LINK command in SYSGEN.MON. Type the command, substituting xx1: for OBJ:. Substitute LP: for MAP: if you want to send the link map to the line printer. Substitute TT: for MAP: if you want to send the link map to the terminal. For example, if the command lines were Example 1 (lines 11, 12, and 13 in Figure 3–1), you would type the command lines displayed in Example 2.

Example 1

```
LINK/EXE:BIN:RT11FB,SYG/BOU:1000/PROMPT/MAP:MAP:RT11FB OBJ:BTFB
OBJ:RMFB,KMFB,MEFB,MIFB,TBFB//
OVLYO
```

Example 2

```
.LINK/EXE:xx1:RT11FB,SYG/BOU:1000/PROMPT/MAP:LP:RT11FB xx1:BTFBRET
*BIN:RMFB,KMFB,MEFB,MIFB,TBFB//RET
Boundary section? OVLYORET
```

NOTE

Save the link map that results. If you ever need to submit an SPR to DIGITAL for your specially generated monitor, you must include the monitor link map with the SPR.

Now find the next LINK command in SYSGEN.DEV. The LINK commands in SYSGEN.DEV link the device handlers for which you requested support when you ran SYSGEN. Type all the link commands, making substitutions for BIN:.

The resulting linked components on Diskette 4 have the file type .SYG. The .SYG files are masters for your generated monitors and handlers, and you should preserve them. Back up the generated system and store the backup.

Copy the .SYG files to another diskette, along with any other components (for example, utility programs) you need in your working system. Refer to the appropriate installation chapter in the *RT–11 Installation Guide*, if necessary, to install the generated system. Rename the .SYG files, monitors and handlers, to .SYS. You can also rename the monitor to distinguish

it from standard monitors. You will have to copy the bootstrap for the generated monitor to your working system device if you want that monitor to boot. Note that you can always identify a user-generated monitor by the (S) that prints in the boot message.

Once you have built the system, store the conditional, command, and output files from the generation process. You must retain at least the link maps and answer files, since a listing of these files must accompany all SPRs, if a custom monitor is used.

Table 3–1: System Build Errors

Type of Error	Cause*
Assembly errors	Incorrect or conflicting responses to SYSGEN dialog. Reexamine your responses to SYSGEN. Often, reading the conditional files helps you spot errors. If the SYSGEN responses seem correct, make sure that you have the proper versions of the source files on the source disk. Check that you have not introduced an error if you edited the source files. Compare the files on the source disk to the originals in the distribution.
?MACRO–F–File not found DEV:FILNAM.TYP	Failure to copy dev:filnam.typ to source disk or failure to include all necessary source modules on the disk.
?MACRO–F–Device full DEV:	Insufficient space on binary output device to accommodate all output files.
?MACRO–F–I/O error on workfile	Insufficient space on default output device. Check the following possibilities: You performed the system build manually but did not assign the work file (or the work file needs more space). You did not squeeze the default device before starting the build. Try squeezing it and rebuilding.
?MACRO–F–I/O error on DEV:FILNAM.TYP	Bad volumes or write-protected devices. If the volume is bad, try another. If the device is write-protected, enable it.

* If you encounter an error you cannot explain or correct, refer to the *RT–11 System Message Manual*; if you still cannot resolve the problem, send an SPR to DIGITAL with listings of the link maps and answer files.

Appendix A
SYSGEN Answers That Will Duplicate the Standard Monitors

Sections A.1 and A.2 list the answers DIGITAL gave to create the standard (distributed) FB and XM monitors. Section A.3 lists all the SYSGEN questions, without the descriptive text.

A.1 SJ and FB Monitors

```
1.          Y
2.          Y
3.          N
4.          N
5.          N
6.          Y
7.          N
8.          N
9.          N
10.         skipped
11.         skipped
12.         skipped
13.         40.
14.         134.
15.         N
17.         skipped
19.         N
20.         Y
21.         skipped
22.         skipped
23.         skipped
24.         N
25.         N
26.         Y
27.         N
28.         N
29.         Y
30.         N
31.         N
32.         skipped
```

```
Enter the device name you want support for [dd]: DX
33.       N
34.       skipped
35.       177170
36.       264

Enter the next device name [dd]: DY
33.       N
34.       N
35.       177170
36.       264

Enter the next device name [dd]: DD
33.       N
34.       skipped
35.       176500
36.       300

Enter the next device name [dd]: PD

Enter the next device name [dd]: RF
37.       1

Enter the next device name [dd]: RK

Enter the next device name [dd]: DL
39.       skipped

Enter the next device name [dd]: DP
40.       Y

Enter the next device name [dd]: DM

Enter the next device name [dd]: MT
41.       Y
42.       2

Enter the next device name [dd]: MM
41.       Y
42.       2

Enter the next device name [dd]: MS
41.       Y
42.       2
43.       172522
44.       224

Enter the next device name [dd]: CR

Enter the next device name [dd]: NL

Enter the next device name [dd]: LP
45.       skipped
46.       skipped
47.       skipped

Enter the next device name [dd]: LS
48.       176500
49.       300

Enter the next device name [dd]: DU
67.       1

Enter the next device name [dd]: LD

Enter the next device name [dd]: DT
```

```
Enter the next device name [dd]: DS
38.       Y

Enter the next device name [dd]: CT

Enter the next device name [dd]: PC

Enter the next device name [dd]: PR

Enter the next device name [dd]: VM

Enter the next device name [dd]: .(RET)
50.       N
51.       Y
52.       172000
53.       320
54.       0
55.       skipped
56.       skipped
57.       skipped
58.       skipped
59.       skipped
60.       skipped
61.       skipped
62.       skipped
63.       skipped
64.       skipped
65.       skipped
66.       skipped
```

A.2 XM Monitor

```
1.        N
2.        N
3.        Y
4.        skipped
5.        N
6.        Y
7.        N
8.        N
9.        N
10.       skipped
11.       skipped
12.       Y
13.       40.
14.       134.
15.       N
17.       Y
19.       N
20.       Y
21.       skipped
22.       skipped
23.       skipped
24.       N
25.       N
26.       Y
27.       Y
28.       N
29.       Y
30.       N
31.       N
32.       skipped
```

```
Enter the device name you want support for [dd]: DX
33.       N
34.       skipped
35.       177170
36.       264

Enter the next device name [dd]: DY
33.       N
34.       N
35.       177170
36.       264

Enter the next device name [dd]: DD
33.       N
34.       skipped
35.       176500
36.       300

Enter the next device name [dd]: RF
37.       1

Enter the next device name [dd]: RK

Enter the next device name [dd]: DL
39.       skipped

Enter the next device name [dd]: DP
40.       Y

Enter the next device name [dd]: DM

Enter the next device name [dd]: MT
41.       Y
42.       2

Enter the next device name [dd]: MM
41.       Y
42.       2

Enter the next device name [dd]: MS
41.       Y
42.       2
43.       172522
44.       224

Enter the next device name [dd]: CR

Enter the next device name [dd]: NL

Enter the next device name [dd]: LP
45.       skipped
46.       skipped
47.       skipped

Enter the next device name [dd]: LS
48.       176500
49.       300

Enter the next device name [dd]: DU
67.

Enter the next device name [dd]: LD

Enter the next device name [dd]: DT

Enter the next device name [dd]: DS
38.       Y
```

```
Enter the next device name [dd]: CT

Enter the next device name [dd]: PC

Enter the next device name [dd]: PR

Enter the next device name [dd]: VM

Enter the next device name [dd]: .RET
50.       Y
51.       N
52.       172000
53.       320
54.       0
55.       skipped
56.       skipped
57.       skipped
58.       skipped
59.       skipped
60.       skipped
61.       skipped
62.       skipped
63.       skipped
64.       skipped
65.       skipped
66.       skipped
```

A.3 SYSGEN Questions

```
Do you want an introduction to system generation (N)?

Do you want to use a previously created answer file (N)?

What answer file do you want to use (SYSGEN.ANS)?

Do you want to create an answer file (N)?

What answer file do you want to create (SYSGEN.ANS)?

Do you want to create a new SYSGEN.ANS file (N)?

          MONITOR TYPE

1.   Do you want the single-job (SJ) monitor (Y)?

2.   Do you want the foreground/background (FB) monitor (Y)?

3.   Do you want the extended memory (XM) monitor (N)?

          MONITOR OPTIONS

4.   Do you want timer support in the SJ monitor (N)?

5.   Do you want device timeout support (N)?

6.   Do you want an error message on system I/O errors (Y)?

7.   Do you want system job support (N)?

8.   Do you want to use the .SPCPS request (N)?

9.   Do you want multiterminal support (N)?

10.  Do you want asynchronous terminal status (Y)?

11.  Do you want multiterminal timeout support (Y)?
```

```
12.  Enter the size of the output buffers (40):
13.  Enter the size of the input buffers (134):
14.  Do you want to use the .FETCH request under XM (Y)?
15.  Do you want end of month and year date rollover (N)?
17.  Do you want the user command linkage (N)?
19.  Do you want high-speed ring buffer support (N)?
20.  Do you want all the keyboard monitor commands (Y)?
21.  Do you want the UTILITY subset (Y)?
22.  Do you want the LANGUAGE subset (Y)?
23.  Do you want the MINIMAL subset (Y)?
24.  Do you want the optional 50 Hz clock support (N)?
25.  Do you want to use the KW11-P clock as the system clock (N)?
26.  Do you want the start-up indirect file (Y)?
27.  Do you want floating point support (Y)?
28.  Do you want memory parity support (N)?
29.  Do you want power failure messages (N)?
30.  Do you want BATCH support (N)?
31.  Do you want error logging (N)?
32.  How many device units does error log job support (10)?
          DEVICE OPTIONS
Enter the device name you want support for [dd]:
Do you want a list of available devices (Y)?
33.  Do you want support for a second <device> controller (N)?
34.  Do you want RX02 double-density only support (N)?
35.  What is the CSR address for the <nth> <device> (nnnnnn)?
36.  What is the vector address for the <nth> <device> (nnn)?
37.  How many disk platters are installed on the RF11 (1)?
38.  Do you want RJS03 rather than RJS04 support (Y)?
39.  How many RL01/RL02 units are to be supported (2)?
40.  Do you want RPR02 rather than RPR02/RP03 support (N)?
41.  Do you want the file-structured magtape handler (Y)?
42.  How many magtape units are to be supported (2)?
43.  What is the address of the <nth> unit (nnnnnn)?
44.  What is the vector address of the <nth> unit (nnn)?
45.  Does your printer have a nonstandard vector or CSR (N)?
46.  What is the CSR address for the printer (177514)?
```

```
47.  What is the vector address for the printer (200)?

48.  What is the CSR for the serial line printer (176500)?

49.  What is the vector for the serial line printer (300)?

Do you want to add support for any of your own devices (N)?

Enter the device name you want support for [dd]:

50.  How many extra device slots do you want (0)?

          GRAPHICS OPTIONS

51.  Do you want VT11 or VS60 graphics support (N)?

52.  Do you want VS60 support (N)?

53.  What is the CSR address for the VT11/VS60 (172000)?

54.  What is the vector address for the VT11/VS60 (320)?

          TERMINAL INTERFACE OPTIONS

Do you want an introduction to terminal interface options (N)?

55.  How many local DL11 lines, including the console, are to be
     supported (1)?

56.  How many remote DL11 lines are to be supported (0)?

57.  What is the CSR address for the first (console) DL11 (177560)?

58.  What is the vector for the first (console) DL11 (60)?

59.  Do you want DZ11 or DZV11 multiplexer support (N)?

60.  Do you want DZ11 multiplexer support (Y)?

61.  How many DZ multiplexers are to be supported (1)?

62.  How many local DZ lines are to be supported altogether (1)?

63.  How many remote DZ lines are to be supported altogether (0)?

64.  What is the CSR for the first DZ multiplexer (160010)?

65.  What is the vector for the first DZ multiplexer (300)?

66.  What baud rate do you want your lines initialized to (300)?

67.  How many ports are to be supported (1)?

Do you want to change any of your responses (N)?

Do you want to change monitor/terminal option responses (N)?

What question number do you want re-asked?

Do you want to change your device support (N)?

Do you want to remove support for any device (N)?

What device do you NOT want supported?

Do you want a list of available devices (Y)?

Do you want to add support for any device or have the questions for
any device re-asked (N)?

Do you want to add/modify a DIGITAL supported device (Y)?
```

```
Enter the device name to add/modify [dd]:

          PHYSICAL DEVICE SELECTION AND SYSGEN CLEANUP

What is the PHYSICAL name of the source input device [xxn] (ddn)?

What is the PHYSICAL name of the binary output device [xxn] (ddn)?

What is the PHYSICAL name of the map output device [xxn] (ddn)?

Do you want to retain the system OBJs (Y)?

Do you want to retain the work files (Y)?
```

Appendix B
SYSGEN Answers That Create a Multiterminal System

This appendix lists SYSGEN answers that create an example of a multiterminal system. Refer to Appendix A for a list of the SYSGEN questions.

Note that this is intended to be only an example. It is highly improbable that the example would exactly meet your needs or that the CSR and vector addresses given in the example would be the same for your hardware configuration. DIGITAL does not recommend using this example, as is.

This example creates a foreground/background multiterminal system. Device support includes RK05 disk, RX01 diskette, and eight terminals with a DZ11–A 8-line multiplexer.

```
1.      N
2.      Y
3.      N
4.      skipped
5.      Y
6.      Y
7.      skipped
8.      N
9.      Y
10.     Y
11.     Y
12.     Y
13.     40.
14.     134.
15.     N
17.     Y
19.     N
20.     Y
21.     skipped
22.     skipped
23.     skipped
24.     Y
25.     N
26.     Y
27.     N
28.     N
```

```
29.       Y
30.       N
31.       N
32.       skipped

Enter the device name you want support for [dd]: DX
33.       N
34.       skipped
35.       177170
36.       264
37.       skipped
38.       skipped

Enter the next device name [dd]: RK
39.       skipped
40.       skipped
41.       skipped
42.       skipped
43.       skipped
44.       skipped

Enter the next device name [dd]: LP
45.       N
46.       skipped
47.       skipped

Enter the next device name [dd]: DU
67.       1

Enter the next device name [dd]: .(RET)
48.       skipped
49.       skipped
50.       skipped
51.       skipped
52.       skipped
53.       skipped
54.       5
55.       1.
56.       0.
57.       177560
58.       60
59.       Y
60.       Y
61.       1.
62.       8
63.       0
64.       160010
65.       300
66.       300
```

Appendix C
RT–11 Conditionals

The following listings contain the conditionals that the RT–11 system uses, with a brief explanation of each conditional. The symbols in these listings have the following meanings:

Symbol	Meaning
nnnnnn	CSR address
nnn	Vector address
n	Number
x	Number of local DL interfaces
y	Number of remote DL11–E lines

C.1 System Conditionals

```
AI$COD   = 1         ;AUTOMATIC INSTALLATION MONITOR

BATC$H   = 1         ;BATCH SUPPORT

CLOCK    = 50.       ;POWER LINE FREQUENCY (50 CYCLE)
CLOCK    = 60.       ;POWER LINE FREQUENCY (60 CYCLE)
CONT$N   = 1         ;CONTINUATION INDIRECT FILE
CT$CSR   = nnnnnn    ;STATUS REGISTER FOR TA11 CASSETTE
CT$VEC   = nnn       ;VECTOR FOR TA11 CASSETTE

DD$PRI   = n         ;DECTAPE II PRIORITY
DD$CSR   = nnnnnn    ;STATUS REGISTER FOR FIRST DECTAPE II CONTROLLER
DD$VEC   = nnn       ;VECTOR FOR FIRST DECTAPE II CONTROLLER
DD$CS2   = nnnnnn    ;SECOND DECTAPE II CONTROLLER STATUS REGISTER
DD$VC2   = nnn       ;VECTOR FOR SECOND DECTAPE II CONTROLLER
DDT$0    = 1         ;SECOND DECTAPE II CONTROLLER IS PRESENT
DL$UN    = n         ;NUMBER OF RL01/RL02 UNITS
DL11$L   = x         ;NUMBER OF LOCAL DL11 INTERFACES
DL11$M   = y         ;NUMBER OF REMOTE DL11-E LINES
DL11$N   = x + y     ;TOTAL NUMBER OF DL11 LINES
DLC$0    = nnnnnn    ;CSR OF FIRST DL11 (CONSOLE)
DLV$0    = nnn       ;VECTOR OF FIRST DL11 (CONSOLE)
DLC$1    = nnnnnn    ;CSR OF SECOND DL11 (LOCAL OR REMOTE)
DLV$1    = nnn       ;VECTOR OF SECOND DL11 (LOCAL OR REMOTE)
DLC$2    = nnnnnn    ;CSR OF THIRD DL11 (LOCAL OR REMOTE)
DLV$2    = nnn       ;VECTOR OF THIRD DL11 (LOCAL OR REMOTE)
```

```
DLC$3   = nnnnnn  ;CSR OF FOURTH DL11 (LOCAL OR REMOTE)
DLV$3   = nnn     ;VECTOR OF FOURTH DL11 (LOCAL OR REMOTE)
DLC$4   = nnnnnn  ;CSR OF FIFTH DL11 (LOCAL OR REMOTE)
DLV$4   = nnn     ;VECTOR OF FIFTH DL11 (LOCAL OR REMOTE)
DLC$5   = nnnnnn  ;CSR OF SIXTH DL11 (LOCAL OR REMOTE)
DLV$5   = nnn     ;VECTOR OF SIXTH DL11 (LOCAL OR REMOTE)
DLC$6   = nnnnnn  ;CSR OF SEVENTH DL11(LOCAL OR REMOTE)
DLV$6   = nnn     ;VECTOR OF SEVENTH DL11 (LOCAL OR REMOTE)
DLC$7   = nnnnnn  ;CSR OF EIGHTH DL11 (LOCAL OR REMOTE)
DLV$7   = nnn     ;VECTOR OF EIGHTH DL11 (LOCAL OR REMOTE)
DU$CS2  = nnnnnn  ;STATUS REGISTER FOR SECOND MSCP
DU$VC2  = nnn     ;VECTOR FOR SECOND MSCP
DU$CS3  = nnnnnn  ;STATUS REGISTER FOR THIRD MSCP
DU$VC3  = nnn     ;VECTOR FOR THIRD MSCP
DU$CS4  = nnnnnn  ;STATUS REGISTER FOR FOURTH MSCP
DU$VC4  = nnn     ;VECTOR FOR FOURTH MSCP
DU$POR  = n       ;NUMBER OF MSCP PORTS
DX$CSR  = nnnnnn  ;STATUS REGISTER FOR FIRST RX11
DX$VEC  = nnn     ;VECTOR FOR FIRST RX11
DX$CS2  = nnnnnn  ;STATUS REGISTER FOR SECOND RX11
DX$VC2  = nnn     ;VECTOR FOR SECOND RX11
DXT$0   = 1       ;SECOND RX11 CONTROLLER IS PRESENT
DY$DD   = 1       ;RX02 DOUBLE DENSITY ONLY
DY$CSR  = nnnnnn  ;STATUS REGISTER FOR FIRST RX02
DY$VEC  = nnn     ;VECTOR FOR FIRST RX02
DY$CS2  = nnnnnn  ;STATUS REGISTER FOR SECOND RX02
DY$VC2  = nnn     ;VECTOR FOR SECOND RX02
DYT$0   = 1       ;SECOND RX02 CONTROLLER IS PRESENT
DZ11$N  = 0       ;NO DZ11 OR DZV11 SUPPORT
DZ11$N  = n       ;NUMBER OF DZ11 OR DZV11 MULTIPLEXERS SUPPORTED
DZV$11  = 0       ;DZ11 MULTIPLEXER SUPPORT
DZV$11  = 1       ;DZV11 MULTIPLEXER SUPPORT
DZCS$0  = nnnnnn  ;CSR FOR FIRST DZ11
DZVC$0  = nnn     ;VECTOR FOR FIRST DZ11
DZCS$1  = nnnnnn  ;CSR FOR SECOND DZ11
DZVC$1  = nnn     ;VECTOR FOR SECOND DZ11
DZCS$2  = nnnnnn  ;CSR FOR THIRD DZV11
DZVC$2  = nnn     ;VECTOR FOR THIRD DZV11
DZCS$3  = nnnnnn  ;CSR FOR FOURTH DZV11
DZVC$3  = nnn     ;VECTOR FOR FOURTH DZV11
DZ11$L  = n       ;NUMBER OF LOCAL LINES
DZ11$M  = n       ;NUMBER OF REMOTE LINES
DZSP$D  = n       ;BAUD RATE
DZST$P  = n       ;STOP UNIT

EIS$I   = 1       ;USE EIS INSTRUCTIONS
EMPTY   = 0       ;NO EMPTY DEVICE SLOTS
EMPTY   = n       ;NUMBER OF EMPTY DEVICE SLOTS
ERL$G   = 1       ;ERROR LOG SUPPORT
ERL$S   = 1       ;ERROR LOG BUFFER SIZE IN BLOCKS
ERL$U   = n       ;NUMBER OF UNITS TO BE LOGGED

FPU$11  = 1       ;FLOATING POINT SUPPORT

GRAFX   = 1       ;GRAPHICS SUPPORT

HELP$B  = 1       ;USE LARGE SINGLE LINE EDITOR HELP DISPLAY
HSR$B   = 1       ;HIGH SPEED RING BUFFER

JOB$    = n       ;NUMBER OF JOBS SUPPORTED BY SINGLE LINE EDITOR

KW11$P  = 1       ;USE KW11$P CLOCK AS SYSTEM CLOCK

L$ANG   = 1       ;LANGUAGE COMMANDS
LET$    = 1       ;SUPPORT LET AS CCL (SINGLE LINE EDITOR)
LETNO$  = n       ;LET ASSIGNMENT COUNT (SINGLE LINE EDITOR)
```

```
LETSZ$   = n        ;LET STRING LENGTH (SINGLE LINE EDITOR)
LINSZ$   = n        ;DEFAULT LINE SIZE (SINGLE LINE EDITOR)
LIGH$T   = 1        ;LIGHTS ROUTINE FOR 11/45 AND 11/70
LP.CSZ   = n        ;DEFAULT VALUE FOR "SET LP WIDTH=nn"
LP.PSZ   = n        ;DEFAULT VALUE FOR "SET LP LENGTH=nn"
LS.CSZ   = n        ;DEFAULT VALUE FOR "SET LS WIDTH=nn"
LS.PSZ   = n        ;DEFAULT VALUE FOR "SET LS LENGTH=nn"
LP$CSR   = nnnnnn   ;NON-STANDARD LINE PRINTER CSR
LP$VEC   = nnn      ;NON-STANDARD LINE PRINTER VECTOR
LS$CSR   = nnnnnn   ;CSR FOR SERIAL LP
LS$VEC   = nnn      ;VECTOR FOR SERIAL LP

M$INI    = 1        ;MINIMAL COMMANDS
MAT$S    = 1        ;ASYNCHRONOUS TERMINAL STATUS
MM$FSM   = 1        ;TJU16 FILE-STRUCTURE SUPPORT
MM$UN    = n        ;NUMBER OF TJU16 UNITS
MPT$Y    = 1        ;MEMORY PARITY SUPPORT
MQH$P2   = 1        ;USE 2 PARs FOR MQ: AND INTERRUPT FORWARDING
MS$FSM   = 1        ;TS11 FILE-STRUCTURED SUPPORT
MS$UN    = n        ;NUMBER OF TS11 UNITS
MS$CSR   = nnnnnn   ;STATUS REGISTER OF FIRST TS11
MS$VEC   = nnn      ;VECTOR OF FIRST TS11
MS$CS1   = nnnnnn   ;STATUS REGISTER OF SECOND TS11
MS$VC1   = nnn      ;VECTOR OF SECOND TS11
MS$CS2   = nnnnnn   ;STATUS REGISTER OF THIRD TS11
MS$VC2   = nnn      ;VECTOR OF THIRD TS11
MS$CS3   = nnnnnn   ;STATUS REGISTER OF FOURTH TS11
MS$VC3   = nnn      ;VECTOR OF FOURTH TS11 UNIT
MS$CS4   = nnnnnn   ;STATUS REGISTER OF FIFTH TS11
MS$VC4   = nnn      ;VECTOR OF FIFTH TS11
MS$CS5   = nnnnnn   ;STATUS REGISTER OF SIXTH TS11
MS$VC5   = nnn      ;VECTOR OF SIXTH TS11
MS$CS6   = nnnnnn   ;STATUS REGISTER OF SEVENTH TS11
MS$VC6   = nnn      ;VECTOR OF SEVENTH TS11
MS$CS7   = nnnnnn   ;STATUS REGISTER OF EIGHTH TS11
MS$VC7   = nnn      ;VECTOR OF EIGHTH TS11
MT$FSM   = 1        ;TM11 FILE-STRUCTURE SUPPORT
MT$UN    = n        ;NUMBER OF TM11 UNITS
MTI$M    = 1        ;TERMINAL TIME OUT
MTT$Y    = 1        ;MULTITERMINAL SUPPORT

OFORM    = 1        ;FORM PROCESSING (LEN, FF, SKIP) LP: LS:

PDT$OP   = 1        ;PDT SUPPORT
PP$CSR   = nnnnnn   ;PC11 PP STATUS REGISTER
PP$VEC   = nnn      ;PC11 PP VECTOR
PR11$X   = 0        ;PC11 OR PR11 READER/PUNCH
PWF$L    = 1        ;POWER FAIL

$RFNUM   = n        ;NUMBER OF RF11 PLATTERS
RDF$L    = 0        ;NO SYSTEM I/O ERROR MESSAGE
RDF$L    = 1        ;ADD SYSTEM I/O ERROR MESSAGE
RJS0$3   = 0        ;RJS DISK IS RJS04
RJS0$3   = 1        ;RJS DISK IS RJS03
RK6$B    = 1        ;BAD BLOCK SUPPORT FOR RK06/07 DISK
RK6$S    = 1        ;SPECIAL FUNCTIONS FOR RK06/07 DISK
ROL$OV   = 1        ;MONTH ROLLOVER SUPPORT
RP0$3    = 0        ;RP11 DISK IS RP02/RPR02
RP0$3    = 1        ;RP11 DISK IS RP03
RTE$M    = 1        ;MONITOR RUNNING UNDER RTEM-11

SILN$T   = 1        ;BOOT MESSAGE NOT DISPLAYED
SJONLY   = 1        ;LOGICAL DISK SUPPORT FOR SJ ONLY
SK$CSR   = nnnnnn   ;SK STATUS REGISTER
SK$VEC   = nnn      ;SK VECTOR
SPC$PS   = 1        ;SAVE/SET MAIN-LINE PC AND PS SUPPORT
```

```
STAR$T  = 1         ;STARTUP COMMAND FILE
SYSG$N  = 1         ;INDICATE SYSGENED MONITOR
SYT$K   = 1         ;SYSTEM JOB SUPPORT

TIM$IT  = 1         ;ADD DEVICE TIMER SUPPORT
TIME$R  = 1         ;ADD SJ TIMER SUPPORT
TTYIN   = n         ;SIZE OF INPUT RING BUFFERS
TTYOUT  = n         ;SIZE OF OUTPUT RING BUFFERS

U.K.    = 1         ;UK MODEM SUPPORT
U$CL    = 1         ;USER COMMAND LINKAGE SUPPORT
U$TIL   = 1         ;UTILITY COMMANDS

VM$BAS  = n         ;VMX: LOWEST ADDRESS TO USE (/64.)
VS60$   = 1         ;VS60 DISPLAY SUPPORT
VT11$   = 1         ;VT11 DISPLAY SUPPORT
VT52$   = 1         ;VT52 SUPPORT WITH SINGLE LINE EDITOR
VT100$  = 1         ;VT100 SUPPORT WITH SINGLE LINE EDITOR
VT102$  = 1         ;VT102 SUPPORT WITH SINGLE LINE EDITOR
VT.CSR  = nnnnnn    ;CSR FOR VT11/VS60
VT.VEC  = nnn       ;VECTOR FOR VT11/VS60

XM$FET  = 1         ;.FETCH SUPPORT IN XM
XTNCHN  = n         ;NUMBER OF DL-TYPE SERIAL LINES
XT$PRI  = n         ;PRIORITY OF DL-TYPE SERIAL LINES
XT$CS0  = nnnnnn    ;STATUS REGISTER OF FIRST DL-TYPE LINE
XT$VC0  = nnn       ;VECTOR OF FIRST DL-TYPE LINE
XT$CS1  = nnnnnn    ;STATUS REGISTER OF SECOND DL-TYPE LINE
XT$VC1  = nnn       ;VECTOR OF SECOND DL-TYPE LINE
XT$CS2  = nnnnnn    ;STATUS REGISTER OF THIRD DL-TYPE LINE
XT$VC2  = nnn       ;VECTOR OF THIRD DL-TYPE LINE
XT$CS3  = nnnnnn    ;STATUS REGISTER OF FOURTH DL-TYPE LINE
XT$VC3  = nnn       ;VECTOR OF FOURTH DL-TYPE LINE
XT$CS4  = nnnnnn    ;STATUS REGISTER OF FIFTH DL-TYPE LINE
XT$VC4  = nnn       ;VECTOR OF FIFTH DL-TYPE LINE
XT$CS5  = nnnnnn    ;STATUS REGISTER OF SIXTH DL-TYPE LINE
XT$VC5  = nnn       ;VECTOR OF SIXTH DL-TYPE LINE
XT$CS6  = nnnnnn    ;STATUS REGISTER OF SEVENTH DL-TYPE LINE
XT$VC6  = nnn       ;VECTOR OF SEVENTH DL-TYPE LINE
XT$CS7  = nnnnnn    ;STATUS REGISTER OF EIGHTH DL-TYPE LINE
XT$VC7  = nnn       ;VECTOR OF EIGHTH DL-TYPE LINE
```

C.1.1 SJ.MAC

```
BF      = 0         ;SJ MONITOR SUPPORT
```

C.1.2 FB.MAC

```
BF      = 1         ;NO SJ MONITOR SUPPORT
```

C.1.3 XM.MAC

```
BF      = 1         ;NO SJ MONITOR SUPPORT
MMG$T   = 1         ;MEMORY MANAGEMENT SUPPORT
```

C.2 Individual Keyboard Monitor Command Conditionals

To include or exclude individual keyboard commands, insert the particular conditional in SYSGEN.CND and substitute 0 (to exclude the command) or 1 (to include the command) for n.

Utility Program Subset

```
U$TIL    = n        ;IF N IS SET EQUAL TO 0, ALL
                    ;UTILITY COMMANDS DEFAULT = 0
                    ;IF N IS SET EQUAL TO 1, ALL
                    ;UTILITY COMMANDS DEFAULT = 1

BACK$$   = n        ;BACKUP
BOOT$$   = n        ;BOOT
COPY$$   = n        ;COPY
CREA$$   = n        ;CREATE
DELE$$   = n        ;DELETE
DIFF$$   = n        ;DIFFERENCES
DIRE$$   = n        ;DIRECTORY
DUMP$$   = n        ;DUMP
EDIT$$   = n        ;EDIT
FORM$$   = n        ;FORMAT
INIT$$   = n        ;INITIALIZE
MAKE$$   = n        ;MAKE
MUNG$$   = n        ;MUNG
PRIN$$   = n        ;PRINT
PROT$$   = n        ;PROTECT
RENA$$   = n        ;RENAME
SHOW$$   = n        ;SHOW
SQUE$$   = n        ;SQUEEZE
TECO$$   = n        ;TECO
TYPE$$   = n        ;TYPE
UNPR$$   = n        ;UNPROTECT
```

Language Subset

```
L$ANG    = n        ;IF N IS SET EQUAL TO 0, ALL
                    ;LANGUAGE COMMANDS DEFAULT = 0
                    ;IF N IS SET EQUAL TO 1, ALL
                    ;LANGUAGE COMMANDS DEFAULT = 1

BASI$$   = n        ;BASIC
COMP$$   = n        ;COMPILE
DIBO$$   = n        ;DIBOL
EXEC$$   = n        ;EXECUTE
FORT$$   = n        ;FORTRAN
LIBR$$   = n        ;LIBRARY
LINK$$   = n        ;LINK
MACR$$   = n        ;MACRO
```

Minimal Subset

```
M$INI    = n        ;IF N IS SET EQUAL TO 0, ALL
                    ;MINIMAL COMMANDS DEFAULT = 0
                    ;IF N IS SET EQUAL TO 1, ALL
                    ;MINIMAL COMMANDS DEFAULT = 1

ABOR$$   = n        ;ABORT
ASSI$$   = n        ;ASSIGN
B$$      = n        ;BASE
CLOS$$   = n        ;CLOSE
D$$      = n        ;DEPOSIT
DATE$$   = n        ;DATE
DEAS$$   = n        ;DEASSIGN
DISM$$   = n        ;DISMOUNT
E$$      = n        ;EXAMINE
FRUN$$   = n        ;FRUN
GET$$    = n        ;GET
```

```
GT$$     = n        ;GT ON/OFF
HELP$$   = n        ;HELP
INST$$   = n        ;INSTALL
LOAD$$   = n        ;LOAD
MOUN$$   = n        ;MOUNT
REEN$$   = n        ;REENTER
REMO$$   = n        ;REMOVE
RESE$$   = n        ;RESET
RESU$$   = n        ;RESUME
SAVE$$   = n        ;SAVE
SET$$    = n        ;SET
SRUN$$   = n        ;SRUN
STAR$$   = n        ;START
SUSP$$   = n        ;SUSPEND
TIME$$   = n        ;TIME
UNLO$$   = n        ;UNLOAD
```

Appendix D
Customizations for Specially Generated Monitors

In the following software customizations, lowercase alphabetic x represents a character that varies according to the specific software component you are modifying.

D.1 Installing Only the Generated Handlers

Normally, when you bootstrap an RT–11 system, the monitor automatically installs any device handlers that are present on the system device, if there are enough device slots for them. Under certain circumstances, you may want the system to include only the handlers that you named during your system generation process. To prevent the system from recognizing handlers that you did not specify during system generation, install the following customization.

NOTE

Do not install this customization on any of the distributed monitors.

In this customization, monitr.SYS is the name of the monitor file that you want to modify, and ..INSA is the value of that symbol from the monitor link map.

```
.RUN SIPP(RET)
*monitr.SYS(RET)
Base?      0(RET)
Offset?    ..INSA(RET)
     Base      Offset        Old       New
   000000      ..INSA     010105      240(RET)
   000000      ..INSA+2   020200      (CTRL/Y)(RET)
*(CTRL/C)
.
```

If the monitor you want to alter is the hardware bootable monitor, write a new system bootstrap with the COPY/BOOT command.

D.2 Suppressing the Multiterminal Polling Routines

If you selected DZ–11 modem support or the multiterminal timeout feature when you performed your system generation, the monitor automatically polls the terminal lines twice every second. This can cause ODT to malfunction. If you make the following modification to the monitor, it will not do this periodic polling. This allows you to use ODT, but defeats the value of the multiterminal timeout feature, and prevents the monitor from recognizing remote DZ–11 or DZV–11 lines.

In the customization, monitr.SYS is the name of the monitor file that you want to modify, and ..DZOD is the value of that symbol from the monitor link map.

```
.RUN SIPP(RET)
*monitr.SYS(RET)
Base?      0(RET)
Offset?    ..DZOD(RET)
     Base      Offset        Old      New
   000000      ..DZOD     000000      1(RET)
   000000      ..DZOD+2   001002      (CTRL/Y)(RET)
*(CTRL/C)
.
```

If the monitor you want to alter is the hardware bootable monitor, write a new system bootstrap with the COPY/BOOT command.

D.3 Changing the Handler File-Name Suffix

In an ordinary RT–11 SJ or FB system, the monitor recognizes device handlers by the format of their names. Device handler names have the format dd.SYS. In an XM system, handlers are in files named ddX.SYS. Thus, two sets of handlers can coexist on one system volume.

If you generate one or more monitors with different combinations of the device timeout, error logging, and extended memory features, you can have need of up to eight different sets of device handlers. You can keep such handlers on one system volume by associating one or more monitors with the corresponding handlers. Do this by customizing the monitor so that it recognizes device handler file names of the form ddn.SYS, where n is any alphabetic character that you choose. Then rename the corresponding handler files.

In this customization, monitr.SYS is the name of the monitor file that you want to modify, and z is the one-character suffix that you use when you rename the associated handlers. The old values depend on the system generation options that you chose.

```
.RUN SIPP(RET)
*monitr.SYS(RET)
Base?      0(RET)
Offset?    4774(RET)
```

```
    Base      Offset      Old      New
  000000      004774   000030      ;R<RET>
  000000      004774    <  X>      ;R<SP><SP>z<RET>
  000000      004776    <nnn>      <CTRL/Y><RET>
*<CTRL/C>
.
```

If the monitor you want to alter is the hardware bootable monitor, write a new system bootstrap with the COPY/BOOT command.

D.4 Changing the Default Device for the SRUN Command

When you start a system job (by typing SRUN filnam), the default device on which the monitor looks for the program file is SY:. (You can run system jobs under an FB or XM monitor that includes the system job feature.) If you have a special application, you can change this default to any three-character device name.

In this customization, monitr.SYS is the name of the monitor file that you want to modify, ..SRDK is the value of that symbol from the monitor link map, and nnn is the new default device name.

```
.RUN SIPP<RET>
*monitr.SYS<RET>
Base?      0<RET>
Offset?    ..SRDK<RET>
     Base      Offset        Old      New
   000000      ..SRDK     015270      ;R<RET>
   000000      ..SRDK      <SY >      ;Rnnn<RET>
   000000      ..SRDK+2    <AW1>      <CTRL/Y><RET>
*<CTRL/C>
.
```

D.5 Changing the Default File Type for the SRUN Command

When you start a system job, the default file type for the program file is .REL. If you have a special application, you can change this default to any three-character file type.

In this customization, monitr.SYS is the name of the monitor file that you want to modify, ..SRUX is the value of that symbol from the monitor link map, and nnn is the new default file type.

```
.RUN SIPP<RET>
*monitr.SYS<RET>
Base?      0<RET>
Offset?    ..SRUX<RET>
     Base      Offset        Old      New
   000000      ..SRUX     075273      ;R<RET>
   000000      ..SRUX      <REL>      ;Rnnn<RET>
   000000      ..SRUX+2    <xxx>      <CTRL/Y><RET>
*<CTRL/C>
.
```

D.6 Assigning a Remote Line as the Console Terminal

You can customize your FB and XM monitors to allow a terminal connected via a dial-up line to be used as the console terminal. The multiterminal software will answer the line when called (provided appropriate modem hardware is in place) and connect the remote terminal to the system as the console terminal.

In this customization, monitr.SYS is the name of the multiterminal monitor file that you wish to modify, and ..CRMT is the value of that symbol from the monitor link map.

```
.RUN SIPP<RET>
*monitr.SYS<RET>
Base?      0<RET>
Offset?    ..CRMT<RET>
      Base       Offset          Old       New?
       000000    ..CRMT      020000       0<RET>
       000000    ..CRMT+2    xxxxxx       <CTRL/Y><RET>
*<CTRL/C>
.
```

D.7 Changing the Device Name of the UCL File

If you selected user command linkage (UCL) support when you performed your system generation, you can customize the monitor to change the device name from where the UCL file is run (by default SY:). Use the following alteration to change the contents of location ..UCLF to the RAD50 device name.

In the customization, monitr.SYS is the name of the monitor file that you wish to modify, ..UCLF is the value of that symbol from the monitor link map, and yyy is the name of the device from which the UCL file will be run.

```
.RUN SIPP<RET>
*monitr.SYS<RET>
Base?      0<RET>
Offset?    ..UCLF<RET>
      Base       Offset          Old       New?
       000000    ..UCLF      xxxxxx       ;Ryyy0<RET>
       000000    ..UCLF+2    xxxxxx       <CTRL/Y><RET>
*<CTRL/C>
.
```

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