

**GETTING STARTED WITH  
RT-11 (V02B)**

DEC-11-ORCPA-E-3

pdp11

digital



# **GETTING STARTED WITH RT-11 (V02B)**

DEC-11-ORCPA-E-D

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**digital equipment corporation · maynard, massachusetts**

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## INTRODUCTION

This document introduces RT-11 V02B to users receiving an RT-11 V02B kit for the first time. It should be read completely before any action is taken with the RT-11 kit, since it points out relevant facts necessary for smooth installation of the software.

Chapter 1 provides an explanation of the contents of the RT-11 V02B Software Kits. Chapter 2 contains capsule descriptions of some of the software services available from DIGITAL. Chapter 3 contains step-by-step instructions for building RT-11 from the distribution kit and performing a simple demonstration of some of the system programs. A list of the differences between RT-11 V02B and earlier versions of RT-11 is included in Chapter 4 for those users of V01-15 and V02-01 who wish to upgrade to V02B. Chapter 5 includes release notes, documentation corrections, software corrections, and restrictions known at the time of system release. Any corrections documented in Chapter 5 should be made immediately in order to ensure proper system performance. Finally, for those not familiar with DIGITAL hardware, Chapter 6 contains instructions for using (mounting, dismounting) some of the RT-11 supported peripheral units.

Immediately upon receiving the RT-11 Software Kit, both this document and the RT-11 System Reference Manual (DEC-11-ORUGA-C-D) should be read thoroughly. The System Reference Manual contains a great deal of information, and new users can often ease their understanding of the system by multiple readings. Differences between the V02B System Reference Manual and the previous manual (DEC-11-ORUGA-B-D) are marked with change bars in the outermost margin; the sections on BATCH and SYSLIB are entirely new.

Once the contents of the System Reference Manual are understood, the system demonstration in Chapter 3 of this manual should be exercised. This demonstration will serve to build a working system from the

distribution kits and ease familiarity with the software itself, since the RT-11 system programs are used in the building and demonstration process.

Included in the kit is the Software Performance Summary and recent editions of the Digital Software News; both documents list known software problems and solutions (if any) for PDP-11 software. These documents should be inspected carefully. The user should make the recommended modifications to the software and documents immediately; failure to do so may cause difficulty which could have been avoided by early correction of known problems.



CHAPTER 1  
OVERVIEW OF RT-11 SOFTWARE KIT

The basic RT-11 Software Kit is available on five media: DECpack, Floppy disk, DECTape, cassette, and paper tape. Each kit contains user documentation and the materials necessary to build a complete RT-11 system. The components of an RT-11 Software Kit are inventoried on checklists attached to the outside of the kit. It is recommended that the user verify the contents of the package against the checklist and report any discrepancies to DIGITAL's Software Distribution Center.

The RT-11 DECTape, DECpack, and Floppy disk kits contain "ready-to-run" RT-11 DECTape or disk Single-Job systems; copies of the masters can be mounted and bootstrapped directly without modification. The cassette kit contains RT-11 system cassettes, which are used to build an RK11 disk system; a special program (CBUILD) is used to initialize the disk, then to copy the requisite system files and programs over to the disk. The paper tape kit consists of a special program (PT BUILD) and all system components in the form of relocatable binary object modules. PT BUILD is run to initialize the disk with a temporary monitor, linker, and paper tape handler. These tools are then used to link a complete RT-11 V02B system onto the disk. Detailed instructions for building the system from all five media are contained in Chapter 3 of this document; general system assembly, linking, and build instructions are contained in Appendix A of the RT-11 System Reference Manual. Note that the RT-11 System Reference Manual should be read thoroughly before exercising the package in Chapter 3, and Chapter 3 should be exercised before the system is put to general use.

The contents of the RT-11 DECTape, DECpack, Floppy disk, and cassette kits can be divided into two logical groups: system files and system programs. The system files include the monitor files and the device

handlers (all with .SYS extensions), the system macro files (SYSMAC.SML, SYSMAC.8K and VTMAC.MAC), the display support handler (VTHDLR.OBJ), and the FORTRAN system routines (SYSF4.OBJ). The monitors included are Single-Job and Foreground/Background versions for RK11 disk, TC11 DECTape, RX11 disk, RP11/RP02 disk, RJS03/4 disk, and RF11 disk; their names are identified in the table below.

DISTRIBUTION MEDIA

<u>MONITOR</u>	<u>DECPACK</u>	<u>DECTAPE</u>	<u>CASSETTE</u>	<u>FLOPPY DISK</u>
Single-Job, RK11	MONITR.SYS	RKMNSJ.SYS	MONITR.SYS	RKMNSJ.SYS
Foreground/ Background, RK11	RKMNFB.SYS	RKMNFB.SYS	RKMNFB.SYS	RKMNFB.SYS
Single-Job, RF11	RFMNSJ.SYS	RFMNSJ.SYS	Not Available	RFMNSJ.SYS
Foreground/ Background, RF11	RFMNFB.SYS	RFMNFB.SYS	Not Available	RFMNFB.SYS
Single-Job, TC11	DTMNSJ.SYS	MONITR.SYS	Not Available	DTMNSJ.SYS
Foreground/ Background, TC11	DTMNFB.SYS	DTMNFB.SYS	Not Available	DTMNFB.SYS
Single-Job, RX11	DXMNSJ.SYS	DXMNSJ.SYS	Not Available	MONITR.SYS
Foreground/ Background, RX11	DXMNFB.SYS	DXMNFB.SYS	Not Available	DXMNFB.SYS
Single-Job, RP11/ RP02	DPMNSJ.SYS	DPMNSJ.SYS	Not Available	DPMNSJ.SYS
Foreground/ Background, RP11/ RP02	DPMNFB.SYS	DPMNFB.SYS	Not Available	DPMNFB.SYS
Single-Job, RJS03 RJS04	DSMNSJ.SYS	Not Available	Not Available	Not Available
Foreground/ Background, RJS03 RJS04	DSMNFB.SYS	Not Available	Not Available	Not Available

The actual running version of the monitor is always named "MONITR.SYS"; to change monitors, the monitor in use is renamed to a name other than "MONITR.SYS", the desired monitor is named to "MONITR.SYS", the bootstrap is rewritten, and the system rebooted. It can be noted from the table above that DECPack, Floppy disk, and DECTape systems are distributed with running Single-Job monitors, which are already named "MONITR.SYS". Additional instructions for modification of system files and their use can be found in Appendix A of the RT-11 System Reference Manual.

The device handler files are named "dev.SYS" where dev is the two-character device name for the device in question.

SYSMAC.SML, SYSMAC.8K and VTMAC.MAC are the system macro libraries, and are used when system macros are called from user-written assembly language programs. VTHDLR.OBJ is a set of display support routines used with assembly language programs that use the display processor (if any). SYSLIB.OBJ is a set of FORTRAN callable subroutines which allow direct access to the RT-11 monitor capabilities from an RT-11 FORTRAN program.

Those files with .SAV extensions are the system programs; they can be executed directly with appropriate monitor commands. In all cases, these are the latest released versions of all programs, and they obsolete any other versions that may be in use. Specifically, RT-11 FORTRAN IV V01-11 users who have LINKV2.SAV, LIBR.SAV, and PATCHO.SAV from the FORTRAN V01-11 kits should discontinue their use in favor of the more recent versions (LINK.SAV, LIBR.SAV, and PATCHO.SAV) in this kit.

The table below gives the version numbers of the components in the V02B kit. These are the latest RT-11 components and supersede in all cases any earlier versions that might be in the user's possession.

<u>Program</u>	<u>Version 2B Identification</u>
Monitors (S/J and F/B)	V02B-05
EDIT	V02-10
PIP	V03-04
MACRO	VM02-10
CREF	V01-03
LINK	V04-02
LIBR	V03-01
ODT	V01-01
EXPAND	V02-02
ASEMBL	VS02-10
FILEX	V02-01
SRCCOM	V01-02
DUMP	V02-01
PATCH	V01-02
PATCHO	V01-03
BATCH	V01-02

Recipients of RT-11 V02B paper tape kits must build all the files named above using the build process described in Chapter 3 of this document.

(New users may skip the following and continue their reading with Chapter 2.)

Users of RT-11 V02-01 will note the lack of update modules to BASIC and FORTRAN in the V02B kit. BASIC/RT-11 V01B and RT-11 FORTRAN V01B were released simultaneously with RT-11 V02B; the updates have been included directly in the new FORTRAN and BASIC kits, and hence are no longer required in the RT-11 kit.

Users of RT-11 Version 2 who upgrade to V02B should upgrade their BASIC and FORTRAN systems to V01B in order to take advantage of the improved reliability. If users of RT-11 Version 2 choose not to upgrade their BASIC and FORTRAN systems, they can run the versions of BASIC and FORTRAN they were using on Version 2 with V02B. Users of RT-11 Version 1 who upgrade to V02B directly (without using Version 2) must upgrade their FORTRAN and BASIC systems to V01B; unmodified FORTRAN V01 and BASIC V01 systems will not operate correctly under RT-11 V02B.

In addition to the basic system kit described above, RT-11 Source Kits and Listing Kits are available to assist in system development or modification.

## CHAPTER 2 SERVICES

### Training

A variety of hardware and software courses are offered by DIGITAL's Educational Services Groups as detailed in the Educational Courses Catalog (available from the Software Distribution Center). These courses are excellent vehicles for learning about both basic PDP-11 programming and the use of PDP-11 software. "Hands on" training using PDP-11 family systems is a particularly valuable feature of most courses and seminars.

### SPR System

The SPR (Software Performance Report) system is the mechanism by which RT-11 users can report software problems, inadequacies, and suggestions for improvements. (Documentation errors and inadequacies should be reported on the READER'S COMMENTS page at the end of each manual.) SPRs are acknowledged when received in Maynard, and an individual answer is returned to the sender as soon as possible. If the SPR reports a software problem, the answer will include a patch or alternate procedure if possible.

Before sending an SPR to DIGITAL, the user should make certain that the problem is reproducible and that a correction for the problem has not already been published in the Digital Software News or Software Performance Summary. If the problem is new, fill out a Software Performance Report and send it to:

Software Communications  
Post Office Box F  
Maynard, Massachusetts 01754

The SPR should include as much documentation as possible to help describe and isolate the problem. It must include configuration information, software version numbers, and any examples, tapes, and listings that may be necessary for us to investigate a problem or suggested change. In general the response time is shortened by additional information provided.

In addition to software problems, SPRs are useful for reporting suggestions and comments on RT-11. SPRs are monitored by DIGITAL management, and are considered by the development groups when RT-11 changes are made.

Blank SPR forms are included in software kits, and additional forms are available from the Software Distribution Center. Replacement forms are included with each answer.

#### Digital Software News for the PDP-11

Announcements of new and revised software as well as programming notes, software problems and proposed solutions, and documentation corrections are published monthly in the Digital Software News. Filling out the RT-11 registration form included in the RT-11 kit assures the user of receiving this publication for one year.

#### Software and Document Distribution

The PDP-11 Software Price List contains a complete list of programs and documents currently available. Item(s) may be ordered directly from the Software Distribution Center by using the Software Order Form enclosed in the Price List. As noted previously, new and revised software is announced via the Digital Software News.

#### DECUS

Digital Equipment Computers Users Society (DECUS) was established to advance the effective use of Digital Equipment Corporation's computers and peripheral equipment. It is a voluntary, non-profit, users group supported by DIGITAL, whose objectives are to:

- (a) Advance the art of computation through mutual education and interchange of ideas and information,

- (b) Establish standards and provide channels to facilitate the free exchange of computer programs among members,
- (c) Provide feedback to the manufacturer on equipment and programming needs.

The Society sponsors technical symposia twice a year (Spring and Fall) in the U.S., and once a year in Europe, Canada, and Australia. It maintains a Program Library, publishes a library catalog, proceedings of symposia, and a periodic newsletter: DECUSCOPE.

A DECUS-Europe organization was formed in 1970 to assist in the servicing of European members.

A user interested in joining DECUS must obtain and complete a registration form. Forms can be obtained from the nearest DIGITAL sales office or from the appropriate Administrative office.

The main Administrative office is located at Digital Equipment Corporation, Maynard, Massachusetts 01754, and all correspondence should be directed to the attention of the DECUS Executive Director.

The European Regional Administrative office is located at:

DECUS EUROPE  
Digital Equipment Corporation International (Europe)  
P. O. Box 340  
1211 Geneva 26  
Switzerland

#### Software Consulting Services

DIGITAL maintains a staff of programmers and consultants whose services are available to DIGITAL customers for a fee. Through DIGITAL's Software Consulting Services, customers have been able to reduce development costs and still obtain quality customized software. Areas of expertise include process control, data communications, data analysis, information retrieval, numerical control, direct digital control, typesetting, simulation, commercial data processing, and special purpose timesharing.

Registration

By completing and returning the registration form included in the kit, the user is eligible to order new updates of this software at the prevailing RT-11 Update Kit prices plus any handling or shipping charges. The user must register to be eligible. Complete and mail the form to:

Digital Equipment Corporation  
Software Distribution Center  
Building 11-3  
146 Main Street  
Maynard, Massachusetts 01754



CHAPTER 3  
RT-11 SYSTEM BUILD AND DEMONSTRATION INSTRUCTIONS

Introduction

This chapter contains the step-by-step information necessary to perform a simple demonstration of the RT-11 Single Job and Foreground/Background Operating Systems. The steps described are intended to provide the new user with sufficient information to build and exercise the system. The examples are written for the minimum memory size system (8K for Single Job, 16K for Foreground/Background), but will run equally well on any RT-11 system that exceeds this minimum.

Before executing this package, the user should be thoroughly familiar with the RT-11 System Reference Manual.

Two programs are required as part of this demonstration, DEMOFG.MAC and DEMOFG.MAC. Both are provided as part of the RT-11 kit.

There are seven sections to this demonstration package:

- Section I Building and Starting RT-11 from DECTape (TC11)
- Section II Building and Starting RT-11 from DECPack Disk (RK11)
- Section III Building and Starting RT-11 from Paper Tape (PC11)
- Section IV Building and Starting RT-11 from Cassette (TA11)
- Section V Building and Starting RT-11 from Floppy Disk (RX11)
- Section VI Running the RT-11 Single-Job Monitor
- Section VII Running the RT-11 Foreground/Background Monitor

For those who are unfamiliar with the hardware, instructions for operating some of the RT-11 supported peripherals can be found in Chapter 6 of this document.

After reading the general instructions which follow, proceed to Section I if the RT-11 system distribution medium is DECTape, Section II if DECpack disk, Section III if paper tape, Section IV if cassette, or Section V if Floppy disk. Once the system has been built, these sections will direct the user to Sections VI and VII, which serve to demonstrate the system.

#### NOTE

No RT-11 system program ever HALTs with the expectation that the CONTINUE switch can be pressed to resume operation after corrective action has been taken. If the computer HALTs (the RUN light is off), a significant error has occurred and the entire section should be repeated from the beginning.

In case of errors not explained in this document, please refer to Appendix P in the RT-11 System Reference Manual.

If user errors occur within a section, go back to the beginning of that particular section.

User typing errors may be corrected using the standard RT-11 input editing techniques (RUBOUT and CTRL U).

#### Conventions, Abbreviations and Standards

- (1) All numbers are listed in octal unless otherwise indicated.
- (2) The following abbreviations are used:

CTRL	CONTROL key
CR	RETURN key
LF	LINE FEED key
- (3) <CR> or <LF> indicate that the RETURN or LINE FEED key should be typed at that place in the dialogue.
- (4) <ALT> indicates that the ALTMODE (or ESCAPE) key should be typed at that place in the dialogue.
- (5) Text enclosed in square brackets, [ ], is a comment. Do not type any such text.
- (6) CTRL x indicates that the CONTROL key should be pressed and held down while another key, "x", is also pressed.
- (7) <TAB> indicates that a horizontal tab should be typed.

- (8) On ASR33 and ASR35 Teletype<sup>1</sup> terminals, special characters that are produced by holding down one key and pressing another are:

^	SHIFT N
\	SHIFT L
[	SHIFT K
]	SHIFT M
<TAB>	CTRL I

- (9) The sample terminal dialogue provided in this document contains version numbers where they would normally appear. The version numbers given include "xx's" in those fields that may vary from installation to installation. The exact contents of these fields are not of interest, as long as appropriate digits appear in the area indicated in this document. The same is true for "FREE CORE" messages printed by any of the system programs and for "FREE BLOCKS" messages included in device directories.

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<sup>1</sup>Teletype is a registered trademark of the Teletype Corporation.

SECTION I  
BUILDING AND STARTING RT-11 FROM DECTAPE

This section contains instructions for those who have received RT-11 on DECTape. If DECTape is to be the system device, the user is instructed how to copy the master tape. If disk (RK11, RF11, or RP11/RP02) is to be the system device, the user is instructed how to make a disk system from the master DECTape. It is important (for the user's protection) to build the system as instructed, then to store the master in a safe place.

RK11 and RP11/RP02 users need a blank, formatted disk for this procedure. (If necessary, the user should format the disk before beginning; instructions for formatting an RK11 disk are in Chapter 6; the RP11E Drive Formatter Program, MAINDEC-11-DZRP2, available from the Software Distribution Center, can be used to format an RP disk.)

- (1) Mount the RT-11 System DECTape (Tape 1 of 2, DEC-11-ORTSA-D-UC1) on Unit 0, WRITE PROTECTED. (For information on how to mount a DECTape, see Chapter 6.)
- (2) If the system has a hardware bootstrap capable of bootstrapping the DECTape, boot the DECTape and proceed to Step 4; otherwise, proceed with Step 3.
- (3) Deposit the basic DECTape bootstrap loader into memory as follows:
  - (a) Set the ENABLE/HALT switch to HALT, then set the first address, 001000, in the Switch Register. (Set switch 9 to the up (1) position and all others to the down (0) position.)
  - (b) Press the LOAD ADDR switch.
  - (c) Set the proper contents from the table below in the Switch Register and lift the DEP switch.
  - (d) Repeat Step (c) until all the instructions have been deposited.

<u>LOCATION</u>	<u>CONTENTS</u>	<u>LIKE THIS</u>
ØØ1ØØØ	Ø127ØØ	Set switches 12, 1Ø, 8, 7 and 6 to the up (1) position. Set all others to the down (Ø) position.
ØØ1ØØ2	177344	Set switches 15 through 9, 7, 6, 5 and 2 to the up (1) position. Set all others to the down (Ø) position.
ØØ1ØØ4	Ø1271Ø	Set switches 12, 1Ø, 8, 7, 6 and 3 to the up (1) position. Set all others to the down (Ø) position.
ØØ1ØØ6	1774ØØ	Set switches 15 through 8 to the up (1) position. Set all others to the down (Ø) position.
ØØ1Ø1Ø	Ø1274Ø	Set switches 12, 1Ø, 8, 7, 6 and 5 to the up (1) position. Set all others to the down (Ø) position.
ØØ1Ø12	ØØ4ØØ2	Set switches 11 and 1 to the up (1) position. Set all others to the down (Ø) position.
ØØ1Ø14	ØØ571Ø	Set switches 11, 9, 8, 7, 6 and 3 to the up (1) position. Set all others to the down (Ø) position.
ØØ1Ø16	1ØØ376	Set switches 15 and 7 through 1 to the up (1) position. Set all others to the down (Ø) position.
ØØ1Ø2Ø	Ø1271Ø	Set switches 12, 10, 8, 7, 6 and 3 to the up (1) position. Set all others to the down (Ø) position.
ØØ1Ø22	ØØØØØ3	Set switches 1 and Ø to the up (1) position. Set all others to the down (Ø) position.
ØØ1Ø24	1Ø571Ø	Set switches 15, 11, 9, 8, 7, 6 and 3 to the up (1) position. Set all others to the down (Ø) position.
ØØ1Ø26	1ØØ376	Set switches 15 and 7 through 1 to the up (1) position. Set all others to the down (Ø) position.
ØØ1Ø3Ø	Ø1271Ø	Set switches 12, 1Ø, 8, 7, 6 and 3 to the up (1) position. Set all others to the down (Ø) position.

<u>LOCATION</u>	<u>CONTENTS</u>	<u>LIKE THIS</u>
001032	000005	Set switches 2 and 0 to the up (1) position. Set all others to the down (0) position.
001034	105710	Set switches 15, 11, 9, 8, 7, 6 and 3 to the up (1) position. Set all others to the down (0) position.
001036	100376	Set switches 15 and 7 through 1 to the up (1) position. Set all others to the down (0) position.
001040	005007	Set switches 11, 9, 2, 1 and 0 to the up (1) position. Set all others to the down (0) position.

Verify that the bootstrap program has been deposited properly as follows:

- (e) Set the starting address in the Switch Register as in Step 3a above.
- (f) Press the LOAD ADDR Switch.
- (g) Display the contents of that address in the Data Register by pressing the EXAM switch.
- (h) Compare the number in the Data Register with the value in the table above.
- (i) If they are the same, repeat Step (g) until all words have been examined.
- (j) If not the same, repeat Step 3.

Set the starting address 001000 in the Switch Register as in Step 3a above, then press the LOAD ADDR switch.

Set the ENABLE/HALT switch to ENABLE, then press the START switch.

- (4) The DECTape should move back and forth (for about 15 seconds) and then the following message is displayed on the terminal:

RT-11SJ V02B-xx  
.

If not, repeat this section from Step 2.

Users of DECTape as the system device, proceed to Step 5. Users of disk should proceed to Step 6.

- (5) Type: R PIP<CR>  
Response: \*

Mount a blank DECTape on an empty drive and set to Unit 1, WRITE ENABLED.

Type: DT1:A=DT0:/S<CR>

[The system tape will be copied onto the blank tape.  
The process takes about one minute.]

Response: \*  
Type: DT1:A=MONITR.SYS/U<CR>

[Both tapes will move as the system bootstrap is copied  
onto the tape on Unit 1. The process takes about 15  
seconds.]

Response: \*

Remove the master RT-11 System Tape and store in a  
safe place. (Instructions for dismounting DECTapes  
are in Chapter 6.)

Label the tape on Unit 1 as "RT-11 SYSTEM TAPE".  
Change the unit selector dial for the new tape from  
1 to 0.

Type: DT:/O<CR>

[The new system tape (now on Unit 0) will move as the  
system is bootstrapped from the newly made copy.]

RT-11 should respond by displaying the following on  
the terminal:

RT-11SJ V02B-xx

(If it does not, repeat from Step 1.)

Mount a blank DECTape on Unit 1, WRITE ENABLED, for use  
in the rest of the demonstration.

Type: ASS DT1:DK<CR>  
Response: .

Type: R PIP<CR>  
Response: \*

Type: DT1:/Z<CR>  
Response: DT1:/Z ARE YOU SURE?

Type: Y<CR>  
Response: \*

Type: CTRL C  
Response: ^C

Proceed to Section VI.

- (6) Mount the RT-11 System DECTape, Tape 2 of 2  
(DEC-11-ORTSA-C-UC2) on Unit 1, WRITE PROTECTED.

If the disk in use is an RK11 DECpack or RP11/RP02  
disk cartridge, mount a blank, formatted disk on  
Unit 0, WRITE ENABLED. (Instructions for mounting  
an RK11 disk pack are in Chapter 6.)

If the system is to be built on RK11 disk,

Type: ASS RK:DK<CR>  
Response: .

If the system is to be built on RF11 disk,

Type: ASS RF:DK<CR>  
Response: .

If the system is to be built on an RP11/FP02 disk,

Type: ASS DP:DK<CR>  
Response: .

In any case,

Type: R PIP<CR>  
Response: \*

If the system device will be RP11/FP02 disk,

Type: DK:/Z/N:37<CR>

Otherwise,

Type: DK:/Z/N:12<CR>

In either case,

Response: DK:/Z ARE YOU SURE?

Type: Y<CR>  
Response: \*

Type: DK:\*.\*=DTØ:\*.\*/Y/X<CR>  
Response: \*

Type: DK:\*.\*=DT1:\*.\*/Y/X<CR>  
Response: \*

Type: DK:DTMNSJ.SYS=DK:MONITR.SYS/Y/R<CR>  
Response: \*

If the disk being built is an RK11 disk,

Type: DK:MONITR.SYS=DK:RKMNSJ.SYS/Y/R<CR>  
Response: \*

If the disk being built is an RF11 disk,

Type: DK:MONITR.SYS=DK:RFMNSJ.SYS/Y/R<CR>  
Response: \*

If the disk being built is an RP11/FP02 disk,

Type: DK:MONITR.SYS=DK:DPMNSJ.SYS/Y/R<CR>  
Response: \*



In any case,

Type           DK:A=DK:MONITR.SYS/U<CR>  
Response:      \*

Type:           DK:/O<CR>

RT-11 should bootstrap off the disk and respond with its identifying message:

RT-11SJ V02B-xx

If it does not, repeat this entire section.

Dismount the master DECTapes from Unit 0 and Unit 1, and store in a safe place.

Proceed to Section VI.

SECTION II  
BUILDING AND STARTING RT-11 FROM DECPACK DISK (RK11)

The following instructions describe building an RF11, RP11/RP02, or RJS03/4 disk system from RK disk or, for RK users, duplicating the master RT-11 disk, then bootstrapping the copy for use as the system disk. RK11 and RP11/RP02 users will need a blank, formatted disk for this procedure. (If necessary, the user should format the disk before beginning; instructions for formatting an RK11 disk are in Chapter 6; use the RP11E Drive Formatter Program, MAINDEC-11-DZRP2, to format an RP disk.)

- (1) Mount the RT-11 System Disk on Unit 0, WRITE PROTECTED. (Instructions for mounting an RK11 disk can be found in Chapter 6.)
- (2) If the system has a hardware bootstrap capable of bootstrapping the RK11 disk, boot the disk and proceed to Step 4; otherwise, proceed with Step 3.
- (3) Deposit the basic RK11 disk bootstrap loader into memory as follows:
  - (a) Set the ENABLE/HALT switch to HALT, then set the first address, 001000, in the Switch Register. (Set switch 9 to the up (1) position and all others to the down (0) position.)
  - (b) Press the LOAD ADDR switch.
  - (c) Set the proper contents for the table below in the Switch Register and lift the DEP switch.
  - (d) Repeat Step (c) until all the instructions have been deposited.

<u>LOCATION</u>	<u>CONTENTS</u>	<u>LIKE THIS</u>
001000	012700	Set switches 12, 10, 8, 7 and 6 to the up (1) position. Set all others to the down (0) position.
001002	177406	Set switches 15 through 8, 2, and 1 to the up (1) position. Set all others to the down (0) position.

<u>LOCATION</u>	<u>CONTENTS</u>	<u>LIKE THIS</u>
001004	012710	Set switches 12, 10, 8 through 6, and 3 to the up (1) position. Set all others to the down (0) position.
001006	177400	Set switches 15 through 8 to the up (1) position. Set all others to the down (0) position.
001010	012740	Set switches 12, 10 and 8 through 5 to the up (1) position. Set all others to the down (0) position.
001012	000005	Set switches 2 and 0 to the up (1) position. Set all others to the down (0) position.
001014	105710	Set switches 15, 11, 9 through 6, and 3 to the up (1) position. Set all others to the down (0) position.
001016	100376	Set switches 15 and 7 through 1 to the up (1) position. Set all others to the down (0) position.
001020	005007	Set switches 11, 9, and 2 through 0 to the up (1) position. Set all others to the down (0) position.

Set the starting address 001000 in the Switch Register as in Step 3a above, then press the LOAD ADDR switch.

Set the ENABLE/HALT switch to ENABLE, then press the START switch.

- (4) There will be a slight pause, after which RT-11 will respond with:

RT-11SJ VØ2B-xx

.

If the master disk is being used to build an RF11 system,

Type: ASS RF:DK<CR>  
Response: .

If the master disk is being used to build an RP11/RP02 system, mount a blank, formatted disk on Unit 0, WRITE ENABLEd.

Type: ASS DP:DK<CR>  
Response: .

If the master disk is being used to build an RJS03/4 system,

Type: ASS DS:DK<CR>  
Response: .

If the master is being used to build an RK11 system, mount a blank, formatted disk cartridge on Unit 1, WRITE ENABLED.

Type: ASS RK1:DK<CR>  
Response: .

In any case,

Type: R PIP<CR>  
Response: \*

Scan the master disk for readability on this drive:

Type: RK:/K<CR>

Each block on the disk will be read and checked for errors; the process takes about four minutes.

Response: \*

If the response is anything but the above, the drive may need alignment to successfully read the master disk.

Type: DK:\*.\*=RK:\*.SYS/Y/X  
Response: \*

If the system being built is an RF11 or RJS03/4 system, type the following. Otherwise, go to Step 5.

Type: DK:MONITR.SYS,RKMNFB.SYS/Y/D<CR>  
Response: \*

Type: DK:DTMNSJ.SYS,DTMNFB.SYS/Y/D<CR>  
Response: \*

Type: DK:DPMNSJ.SYS,DPMNFB.SYS/Y/D<CR>  
Response: \*

Type: DK:DXMNSJ.SYS,DXMNFB.SYS/Y/D<CR>  
Response: \*

Type: DK:\*.\*=RK:\*.\*/X<CR>  
Response: ?NO SYS ACTION?  
\*

If the system being built is an RF11 system,

Type: DK:MONITR.SYS=DK:RFMNSJ.SYS/Y/R<CR>  
Response: \*

If the system being built is an RJS03/4 system,

Type: DK:MONITR.SYS=DK:DSMNSJ.SYS/Y/R<CR>  
Response: \*

(5) If the system being built is an RP11/RP02 system,

Type: DK:RKMNSJ.SYS=DK:MONITR.SYS/Y/R<CR>  
Response: \*

Type: DK:MONITR.SYS=DK:DPMNSJ.SYS/Y/R<CR>  
Response: \*

In any case,

Type: DK:A=DK:MONITR.SYS/U<CR>  
Response: \*

Type: DK:/O<CR>

RT-11 should bootstrap from the new system disk and type its identifying message,

RT-11SJ V02B-xx  
.

If it does not, repeat this section.

If it does, remove the master disk from Unit 0 and store in a safe place.

If the new system is an RF11, RJS03/4, or RP11/RP02 system, proceed to Section VI.

If the new system is an RK system,

Type: R PIP<CR>  
Response: \*

Remove the copy from Unit 1, label it "RT-11 V02B System Disk", then mount it in Unit 0, WRITE ENABLED.

Type: RK0:/O<CR>  
Response: RT-11SJ V02B-xx  
.

Proceed to Section VI.

SECTION III  
BUILDING AND STARTING RT-11 ON DISK FROM PAPER TAPE

The following instructions first describe loading the Absolute Loader into memory at the 8K boundary, then detail the building of an RK11 or RF11 system from paper tape. RK11 users will need a blank, formatted disk for this procedure (if necessary, the user should format the disk before beginning; instructions for formatting an RK11 disk are in Chapter 6).

- (1) Check to see if the Bootstrap Loader is in memory, starting at 37744. If not, deposit it starting at 37744. (Instructions for checking and depositing the Bootstrap Loader can be found in Chapter 6.)

Load the Absolute Loader, DEC-11-L2PC-PO, into the paper tape reader. (Instructions for loading paper tape in the reader can be found in Chapter 6.) Press the FEED button until the special leader is over the read head.

Set 37744 in the Switch Register. (Set switches 13 through 5 and switch 2 to the up (1) position. Set switches 15, 14, 4, 3, 1 and 0 to the down (0) position.)

Press the LOAD ADDR switch.

Press the START switch.

The paper tape should pass through the reader and then the computer should halt.

If the system being built is an RK11 system, mount a blank, formatted disk cartridge in Unit 0, WRITE ENABLED. Place the paper tape labeled "RK PT BUILD TAPE 1 of 3" (DEC-11-ORPBA-C-PB1) in the reader. If the system being built is an RF11 system, place the tape labeled "RF PT BUILD TAPE 3 of 3" (DEC-11-ORPBA-C-PB3) in the reader.

Set the starting address of the Absolute Loader, 37500, in the Switch Register. (Set switches 13 through 8 and 6 to the up (1) position. Set switches 15, 14, 7 and 5 through 0 to the down (0) position.)

Press the LOAD ADDR switch.

Press the START switch.

The paper tape should pass through the reader and the following message should be displayed on the terminal:

PT BUILD Vxx-xx

[There will be a slight pause, after which PT BUILD will display the following on the terminal.]

PLACE SECOND TAPE IN READER.  
STRIKE ANY CHARACTER TO CONTINUE.

Place the paper tape labeled "PT BUILD TAPE 2 OF 3" (DEC-11-ORPBA-C-PB2) in the reader. Press the FEED button until blank leader (unpunched tape preceding the punched data) is over the read head. PT BUILD TAPE 2 of 3 serves as the second tape for both RK and RF systems.

Strike any character on the keyboard to start the read operation.

The paper tape should pass through the reader and the following message should be displayed on the terminal. [There will again be a slight pause between reading the tape and displaying the message.]

RT-11 BUILD COMPLETE.  
RT-11 V01-15 [A rudimentary V01-15 monitor  
• is used to build V02B]  
Type: DATE dd-mmm-yy <CR>

[where dd-mmm-yy is the current date in the form 12-JAN-75.]

Response: .

If the console terminal is an ASR or KSR Teletype, a VT50 Alphanumeric Display, a parallel LA30, or an LA36 DECwriter II, go to Step 2.

If the console terminal is a VT05 Alphanumeric Display operating at 300 baud, go to Step 2.

If the console terminal is a serial LA30 DECwriter operating at 300 baud,

Type: D 56=5015<CR>  
Response: .

Go to Step 2.

If the console terminal is a serial LA30 DECwriter operating at 150 baud,

Type: D 56=2015<CR>  
Response: .

Go to Step 2.

If the console terminal is a VT05 Alphanumeric Display operating at 2400 baud,

Type: D 56=2012<CR>  
Response: .

Go to Step 2.

If the console terminal is a VT05 Alphanumeric Display operating at 1200 baud,

Type: D 56=1012<CR>  
Response: .

Go to Step 2.

If the console terminal is a VT05 Alphanumeric Display operating at 600 baud,

Type: D 56=412<CR>  
Response: .

(2) Type: R LINK<CR>  
Response: \*

Place the paper tape labeled "OLDPIP.OBJ" (DEC-11-OROPA-C-PR) in the reader. Press the FEED button until blank leader is over the read head.

Type: OLDPIP=PR:<CR>  
Response: ^

[The V01 system being used to build V02B will respond with an up-arrow or circumflex whenever it is ready to read a tape.]

Strike any character on the keyboard to initiate the read operation.

The paper tape should pass through the reader.

Response: ^

Reload OLDPIP.OBJ in the reader so it can be read a second time.

Strike any character on the keyboard to initiate the read operation.

The paper tape should pass through the reader.

Response: \*

Type: CTRL C  
Response: ^C

Type: R OLDPIP<CR>  
Response: \*

(3) Place the paper tape labeled, "PATCH.OBJ" (DEC-11-ORPAA-D-PR), in the reader. Press the FEED button until blank leader is over the read head.

For this, and all the following paper tape instructions in Step 4, the convention xxxxxx.xxx is used to represent the name contained on the tape label underneath the RT-11 version number. In this first example, the command below will look like "PATCH.OBJ=PR:/B<CR>".



Type:       xxxxxx.xxx=PR:/B<CR>  
Response:   ^

Strike any character on the keyboard to initiate the read operation.

The paper tape should pass through the reader.

Response:   \*

[During the following operations, a ?CHK SUM? message typed during a paper tape input operation means an input error has occurred. Retry the tape if such a message is received.]

- (4) Repeat Step 3 for the paper tape labeled "EDIT.OBJ" (DEC-11-ORTEA-D-PR1).

Repeat Step 3 for the paper tape labeled "ODT.OBJ" (DEC-11-ORODA-D-PR).

Repeat Step 3 for the paper tape labeled "TT.OBJ" (DEC-11-ORTTA-D-PR).

Repeat Step 3 for the paper tape labeled "LP.OBJ" (DEC-11-ORTLA-D-PR).

Repeat Step 3 for the paper tape labeled "PP.OBJ" (DEC-11-ORTPA-D-PR).

Repeat Step 3 for the paper tape labeled "PREEXEC.OBJ" (DEC-11-OREXA-D-PR1).

Repeat Step 3 for the paper tape labeled "PREPAS.OBJ" (DEC-11-OREXA-D-PR2).

Repeat Step 3 for the paper tape labeled "SMEXEC.OBJ" (DEC-11-ORTAA-D-PR1).

Repeat Step 3 for the paper tape labeled "SMMAC.OBJ" (DEC-11-ORTAA-D-PR2).

Repeat Step 3 for the paper tape labeled "SMPST.OBJ" (DEC-11-ORTAA-D-PR3).

Repeat Step 3 for the paper tape labeled "RTEXEC.OBJ" (DEC-11-ORMAA-D-PR1).

Repeat Step 3 for the paper tape labeled "RTMAC.OBJ" (DEC-11-ORMAA-D-PR2).

Repeat Step 3 for the paper tape labeled "RTPST.OBJ" (DEC-11-ORMAA-D-PR3).

Repeat Step 3 for the paper tape labeled "VTCED1.OBJ" (DEC-11-ORTEA-D-PR2).

Repeat Step 3 for the paper tape labeled "VTCED4.OBJ" (DEC-11-ORTEA-D-PR3).

Repeat Step 3 for the paper tape labeled "VTBEDT.OBJ" (DEC-11-ORTEA-D-PR4).

Repeat Step 3 for the paper tape labeled "LINK0.OBJ"  
(DEC-11-ORLLA-D-PR1).

Repeat Step 3 for the paper tape labeled "LNKOV1.OBJ"  
(DEC-11-ORLLA-D-PR2).

Repeat Step 3 for the paper tape labeled "LNKOV2.OBJ"  
(DEC-11-ORLLA-D-PR3).

Repeat Step 3 for the paper tape labeled "LNKOV3.OBJ"  
(DEC-11-ORLLA-D-PR4).

Repeat Step 3 for the paper tape labeled "LNKOV4.OBJ"  
(DEC-11-ORLLA-D-PR5).

Repeat Step 3 for the paper tape labeled "LNKOV5.OBJ"  
(DEC-11-ORLLA-D-PR6).

Repeat Step 3 for the paper tape labeled "LNKV2B.OBJ"  
(DEC-11-ORLLA-D-PR7).

Repeat Step 3 for the paper tape labeled "LIBR0.OBJ"  
(DEC-11-ORLBA-D-PR1).

Repeat Step 3 for the paper tape labeled "LIBR1.OBJ"  
(DEC-11-ORLBA-D-PR2).

Repeat Step 3 for the paper tape labeled "LIBR2.OBJ"  
(DEC-11-ORLBA-D-PR3).

Repeat Step 3 for the paper tape labeled "LIBR3.OBJ"  
(DEC-11-ORLBA-D-PR4).

Repeat Step 3 for the paper tape labeled "LIBR4.OBJ"  
(DEC-11-ORLBA-D-PR5).

Repeat Step 3 for the paper tape labeled "DUMP.OBJ"  
(DEC-11-ORDMA-D-PR).

Repeat Step 3 for the paper tape labeled "SRCOM.OBJ"  
(DEC-11-OSRCA-D-PR).

Repeat Step 3 for the paper tape labeled "FILEX.OBJ"  
(DEC-11-ORFLA-D-PR).

Repeat Step 3 for the paper tape labeled "PIP.OBJ"  
(DEC-11-ORPPA-D-PR).

Repeat Step 3 for the paper tape labeled "CREF.OBJ"  
(DEC-11-ORCFA-D-PR).

Repeat Step 3 for the paper tape labeled "VTHDLR.OBJ"  
(DEC-11-OVTHA-D-PR).

Repeat Step 3 for the paper tape labeled "RKBTSJ.OBJ"  
(DEC-11-ORBTA-D-PR4).

Repeat Step 3 for the paper tape labeled "RKBTFB.OBJ"  
(DEC-11-ORBTA-D-PR2).

Repeat Step 3 for the paper tape labeled "RFBTSJ.OBJ"  
(DEC-11-ORBTA-D-PR3).

Repeat Step 3 for the paper tape labeled "RFBTFB.OBJ"  
(DEC-11-ORBTA-D-PR1).

Repeat Step 3 for the paper tape labeled "RT11SJ.OBJ"  
(DEC-11-ORMNA-D-PR2).

Repeat Step 3 for the paper tape labeled "RT11FB.OBJ"  
(DEC-11-ORMNA-D-PR1).

Repeat Step 3 for the paper tape labeled "RK.OBJ"  
(DEC-11-ORKHA-D-PR).

Repeat Step 3 for the paper tape labeled "RF.OBJ"  
(DEC-11-ORFHA-D-PR).

Repeat Step 3 for the paper tape labeled "PR.OBJ"  
(DEC-11-ORPHA-D-PR).

Repeat Step 3 for the paper tape labeled "MT.OBJ"  
(DEC-11-OMTHA-D-PR).

Repeat Step 3 for the paper tape labeled "CT.OBJ"  
(DEC-11-OCAHA-D-PR).

Repeat Step 3 for the paper tape labeled "CR.OBJ"  
(DEC-11-OCRHA-D-PR).

Repeat Step 3 for the paper tape labeled "DS.OBJ"  
(DEC-11-ORJSA-D-PR).

Repeat Step 3 for the paper tape labeled "MM.OBJ"  
(DEC-11-OTUMA-D-PR).

Repeat Step 3 for the paper tape labeled "BA.OBJ"  
(DEC-11-ORBHA-D-PR).

Repeat Step 3 for the paper tape labeled "BATCH.OBJ"  
(DEC-11-ORBCA-D-PR).

Repeat Step 3 for the paper tape labeled "SYSF4.OBJ"  
(DEC-11-ORLIA-D-PR).

Place the paper tape labeled "VTMAC.MAC" (DEC-11-OVTMA-D-PA)  
in the paper tape reader. Press the FEED button until  
blank leader is over the read head.

Type: VTMAC.MAC=PR:/A<CR>  
Response: ^

Strike any character to read the tape.

Response: \*

Place the paper tape labeled "SYSMAC.SML" (DEC-11-ORSYA-D-  
PA1) in the paper tape reader. Press the FEED button until  
blank leader is over the read head.

Type: SYSMAC.SML=PR:/A<CR>  
Response: ^

Strike any character to read the tape.

Response: \*

Place the paper tape labeled "SYSMAC.8K" (DEC-11-ORSYA-D-PA2) in the paper tape reader. Press the FEED button until blank leader is over the read head.

Type: SYSMAC.8K=PR:/A<CR>  
Response: ^

Strike any character to read the tape.

Response: \*

Place the paper tape labeled "DEMOFG.MAC" (DEC-11-ORDFA-D-PA) in the paper tape reader. Press the FEED button until blank leader is over the read head.

Type: DEMOFG.MAC=PR:/A<CR>  
Response: ^

Strike any character to read the tape.

Response: \*

Place the paper tape labeled "DEMOBG.MAC" (DEC-11-ORDSA-D-PA) in the paper tape reader. Press the FEED button until blank leader is over the read head.

Type: DEMOFG.MAC=PR:/A<CR>  
Response: ^

Strike any character to read the tape.

Response: \*

Type: CTRL C  
Response: ^C

.

Type: R LINK<CR>  
Response: \*

Type: LINK=LINKØ/C<CR>  
Response: \*

Type: LNKOV1/O:1/C<CR>  
Response: \*

Type: LNKOV2/O:1/C<CR>  
Response: \*

Type: LNKV2B/O:1/C<CR>  
Response: \*

Type: LNKOV3/O:1/C<CR>  
Response: \*

Type: LNKOV4/O:1/C<CR>  
Response: \*

Type: LNKOV5/O:1<CR>

(At this point, several "ADDITIVE REF" messages will appear on the terminal. These are expected and should be ignored.)

```
Response: *
Type:     CTRL C
Response: ^C
Type:     R LINK<CR>
Response: *
Type:     LIBR=LIBRØ/C<CR>
Response: *
Type:     LIBR1/O:1/C<CR>
Response: *
Type:     LIBR2/O:1/C<CR>
Response: *
Type:     LIBR3/O:1/C<CR>
Response: *
Type:     LIBR4/O:1<CR>
Response: *
Type:     PATCH=PATCH<CR>
Response: *
Type:     TT.SYS=TT<CR>
Response: *
Type:     PR.SYS=PR<CR>
Response: *
Type:     PP.SYS=PP<CR>
Response: *
```

If the configuration includes a line printer,

```
Type:     LP.SYS=LP<CR>
Response: *
```

If the configuration includes a card reader,

```
Type:     CR.SYS=CR<CR>
Response: *
```

If the configuration includes TM11/TU10 magtape,

```
Type:     MT.SYS=MT<CR>
Response: *
```

If the configuration includes TM02/TJU16 magtape,

```
Type:     MM.SYS=MM<CR>
Response: *
```

If the configuration includes RF11 disk,

Type: RF.SYS=RF<CR>  
Response: UNDEF GLBLS  
\*

If the configuration includes RJS03 or RJS04 disk,

Type: DS.SYS=DS<CR>  
Response: UNDEF GLBLS  
\*

If the configuration includes RK11 disk,

Type: RK.SYS=RK<CR>  
Response: UNDEF GLBLS  
\*

If the configuration includes cassette,

Type: CT.SYS=CT<CR>  
Response: \*

In any case,

Type: PIP=PIP<CR>  
Response: \*

Type: EXPAND=PREXEC,PREPAS<CR>  
Response: \*

Type: ASEMBL=SMEXEC,SMMAC,SMPST<CR>  
Response: \*

Type: MACRO=RTEEXEC,RTMAC, RTPST<CR>  
Response: \*

Type: DUMP=DUMP<CR>  
Response: \*

Type: FILEX=FILEX<CR>  
Response: \*

Type: SRCCOM=SRCCOM<CR>  
Response: \*

Type: CREF=CREF<CR>  
Response: \*

Type: EDIT=VTCED1,VTCED4,VTBEDT,EDIT<CR>  
Response: \*

Type: BATCH=BATCH<CR>  
Response: \*

Type: BA.SYS=BA<CR>  
Response: \*

If the system being built is on an RK11 disk,

Type: MONITR.SYS=RKBTSJ,RT11SJ,RK<CR>  
Response: \*

Type: RKMNFB.SYS=RKBTFB,RT11FB,RK<CR>  
Response: \*

If the system being built is on an RF11 disk,

Type: MONITR.SYS=RFBTSJ,RT11SJ,RF<CR>  
Response: \*

Type: RFMNFB.SYS=RFBTFB,RT11FB,RF<CR>  
Response: \*

In either case,

Type: CTRL C  
Response: ^C  
.

Type: R OLDPIP<CR>  
Response: \*

If the new system is on RF11 disk,

Type: RF:A=RF:MONITR.SYS/U<CR>

If the new system is on RK11 disk,

Type: RK:A=RK:MONITR.SYS/U<CR>

In either case,

Response: \*

Type: CTRL C  
Response: ^C  
.

Type: R PIP<CR>  
Response: \*

Type: DK:/O<CR>  
Response: RT-11SJ V02B-xx  
.

If the response is not the system identification message,  
repeat the entire section.

At this point, the files listed below may be deleted from the disk, as they are no longer needed. To delete a disk file named xxxxxx.xxx:

Type: R PIP<CR>  
Response: \*

Type: xxxxxx.xxx/D<CR>  
Response: \*

The deletable files are:

OLDPIP.SAV	LIBR1.OBJ
EDIT.OBJ	LIBR2.OBJ
TT.OBJ	LIBR3.OBJ
LP.OBJ	LIBR4.OBJ
PP.OBJ	DUMP.OBJ
PREEXEC.OBJ	SRCCOM.OBJ
PREPAS.OBJ	FILEX.OBJ
SMEEXEC.OBJ	PIP.OBJ
SMMAC.OBJ	CREF.OBJ
SMPST.OBJ	RKBTSJ.OBJ
RTEXEC.OBJ	RKBTFB.OBJ
RTMAC.OBJ	RFBTSJ.OBJ
RTPST.OBJ	RFBTFB.OBJ
VTCED1.OBJ	RT11SJ.OBJ
VTCED4.OBJ	RT11FB.OBJ
VTBEDT.OBJ	RK.OBJ
LINK0.OBJ	RF.OBJ
LNKOV1.OBJ	PR.OBJ
LNKOV2.OBJ	MT.OBJ
LNKV2B.OBJ	CT.OBJ
LNKOV3.OBJ	CR.OBJ
LNKOV4.OBJ	DS.OBJ
LNKOV5.OBJ	MM.OBJ
LIBR0.OBJ	BA.OBJ
	BATCH.OBJ

Paper tape users who do not have FORTRAN cannot build the program PATCHO, as PATCHO requires the FORTRAN library to link. Paper tape users who do have FORTRAN systems should complete this demonstration, then install FORTRAN as described in Getting Started With RT-11 FORTRAN (DEC-11-LFGOA-B-D), then link PATCHO as described in Appendix A of the RT-11 System Reference Manual.

Paper tape users should take special note of the program DIREXT, which is described in Chapter 5 of this document. It can be used to extend the directory size of a disk that has already been built.

Proceed to Section VI.



SECTION IV  
BUILDING AND STARTING RT-11 FROM CASSETTE

The following instructions describe the building of an RK11 disk system from cassette.

RK11 users will need a blank, formatted disk for this procedure (if necessary, the user should format the disk before beginning; instructions for formatting an RK11 disk are in Chapter 6).

Prior to inserting any master cassette during this procedure, WRITE PROTECT the data by placing the orange tabs such that the holes are uncovered. Cassette Unit 0 is on the left and cassette Unit 1 is on the right.

- (1) Mount a blank, formatted disk cartridge in Unit 0, WRITE ENABLED. (Instructions for mounting disks can be found in Chapter 6.)

Insert the RT-11 System Cassette, Tape 1 of 5 (DEC-11-ORTSA-D-TC1), into Unit 0.

Set the ENABLE/HALT switch to HALT to stop any previous program that may be running.

Set the ENABLE/HALT switch to ENABLE.

If the system has a hardware bootstrap capable of bootstrapping the cassette, boot the cassette and proceed to Step 4. Otherwise, proceed with Step 2.

- (2) Deposit the cassette software bootstrap into memory as follows:
  - (a) Set the first address, 001000, in the Switch Register. (Set switch 9 to the up (1) position and all others to the down (0) position.)
  - (b) Press the LOAD ADDR switch.
  - (c) Set the proper contents in the Switch Register as found in the following table and lift the DEP switch.
  - (d) Repeat Step (c) until all values have been deposited.

<u>LOCATION</u>	<u>CONTENTS</u>	<u>LIKE THIS</u>
ØØ1ØØØ	Ø127ØØ	Set switches 12, 1Ø, 8, 7 and 6 to the up (1) position and all others to the down (Ø) position.
ØØ1ØØ2	1775ØØ	Set switches 15, 14, 13, 12, 11, 1Ø, 9, 8, and 6 to the up (1) position and all others to the down (Ø) position.
ØØ1ØØ4	ØØ5Ø1Ø	Set switches 11, 9 and 3 to the up (1) position and all others to the down (Ø) position.
ØØ1ØØ6	Ø1Ø7Ø1	Set switches 12, 8, 7, 6 and Ø to the up (1) position and all others to the down (Ø) position.
ØØ1Ø1Ø	Ø627Ø1	Set switches 14, 13, 1Ø, 8, 7, 6 and Ø to the up (1) position and all others to the down (Ø) position.
ØØ1Ø12	ØØØØ52	Set switches 5, 3 and 1 to the up (1) position and all others to the down (Ø) position.
ØØ1Ø14	Ø127Ø2	Set switches 12, 1Ø, 8, 7, 6 and 2 to the up (1) position and all others to the down (Ø) position.
ØØ1Ø16	ØØØ375	Set switches 7 through 2 and Ø to the up (1) position and all others to the down (Ø) position.
ØØ1Ø2Ø	1121Ø3	Set switches 15, 12, 1Ø, 6, 1 and Ø to the up (1) position and all others to the down (Ø) position.
ØØ1Ø22	11211Ø	Set switches 15, 12, 1Ø, 6 and 3 to the up (1) position and all others to the down (Ø) position.
ØØ1Ø24	1ØØ413	Set switches 15, 8, 3, 1 and Ø to the up (1) position and all others to the down (Ø) position.
ØØ1Ø26	13Ø31Ø	Set switches 15, 13, 12, 7, 6 and 3 to the up (1) position and all others to the down (Ø) position.
ØØ1Ø3Ø	ØØ1776	Set switches 9 through 1 to the up (1) position and all others to the down (Ø) position.

<u>LOCATION</u>	<u>CONTENTS</u>	<u>LIKE THIS</u>
ØØ1Ø32	1Ø52Ø2	Set switches 15, 11, 9, 7 and 1 to the up (1) position and all others to the down (Ø) position.
ØØ1Ø34	1ØØ772	Set switches 15, 8 through 3, and 1 to the up (1) position and all others to the down (Ø) position.
ØØ1Ø36	116Ø12	Set switches 15, 12, 11, 1Ø, 3 and 1 to the up (1) position and all others to the down (Ø) position.
ØØ1Ø40	ØØØØØ2	Set switch 1 to the up (1) position and all others to the down (Ø) position.
ØØ1Ø42	12Ø337	Set switches 15, 13, 7, 6 and 4 through Ø to the up (1) position and all others to the down (Ø) position.
ØØ1Ø44	ØØØØØØ	Set all switches to the down (Ø) position.
ØØ1Ø46	ØØ1767	Set switches 9 through 4 and 2 through Ø to the up (1) position and all others to the down (Ø) position.
ØØ1Ø5Ø	ØØØØØØ	Set all switches to the down (Ø) position.
ØØ1Ø52	ØØØ755	Set switches 8 through 5, 3, 2 and Ø to the up (1) position and all others to the down (Ø) position.
ØØ1Ø54	ØØ571Ø	Set switches 11, 9 through 6, and 3 to the up (1) position and all others to the down (Ø) position.
ØØ1Ø56	1ØØ774	Set switches 15 and 8 through 2 to the up (1) position and all others to the down (Ø) position.
ØØ1Ø6Ø	ØØ5ØØ7	Set switches 11, 9, and 2 through Ø to the up (1) position and all others to the down (Ø) position.
ØØ1Ø62	Ø1764Ø	Set switches 12 through 7 and 5 to the up (1) position and all others to the down (Ø) position.

<u>LOCATION</u>	<u>CONTENTS</u>	<u>LIKE THIS</u>
001064	002415	Set switches 10, 8, 3, 2 and 0 to the up (1) position and all others to the down (0) position.
001066	112024	Set switches 15, 12, 10, 4 and 2 to the up (1) position and all others to the down (0) position.

(3) Verify that the bootstrap is properly in memory as follows:

- (a) Set the first address in the Switch Register as in Step 2a above.
- (b) Press the LOAD ADDR switch.
- (c) Display the contents of that address in the Data Register by pressing the EXAM switch.
- (d) Compare the number in the Data Register with the value in the table above.
- (e) If they are the same, repeat Step (c) until all words have been examined.
- (f) If not the same, repeat Step 2.

Set the starting address in the Switch Register as in Step 2a above.

Press the LOAD ADDR switch.

Press the rewind button on the cassette drives.

Press the START switch.

(4) The cassette will move as the cassette build program is loaded.

CBUILD should respond by displaying the following message on the terminal:

```
CBUILD Vxx-xx
*
```

Press the rewind button on the cassette drive.

```
Type:      RK:/Z/N:12<CR>
Response:  ARE YOU SURE?
```

```
Type:      Y<CR>
Response:  *
```

```
Type:      RK:*.*=CT0:*/Y/X<CR>
Response:  ?REBOOT?
          *
```

```
Type:      RK:A=CT0:MONITR.SYS/U<CR>
Response:  *
```

Insert the RT-11 System Cassette, Tape 2 of 5 (DEC-11-ORTSA-D-TC2), into Cassette Unit 1. WRITE PROTECT it before insertion (as described above).

Press the rewind button on the cassette drive.

Type: RK:\*.\*=CT1:\*/Y/X<CR>  
Response: ?REBOOT?  
\*

Remove the RT-11 System Cassette, Tape 2 of 5, from Unit 1 and mount the RT-11 System Cassette, Tape 3 of 5 (DEC-11-ORTSA-D-TC3) in its place, WRITE PROTECTED.

Type: RK:\*.\*=CT1:\*/X<CR>  
Response: \*

Remove the RT-11 System Cassette, Tape 3 of 5, from Unit 1 and mount the RT-11 System Cassette, Tape 4 of 5 (DEC-11-ORTSA-D-TC4), in its place, WRITE PROTECTED.

Type: RK:\*.\*=CT1:\*/X<CR>  
Response: \*

Remove the System Cassette, Tape 4 of 5, from Unit 1 and mount the RT-11 System Cassette, Tape 5 of 5 (DEC-11-ORTSA-D-TC5) in Unit 1, WRITE PROTECTED.

Type: RK:\*.\*=CT1:\*/X/Y<CR>  
Response: ?REBOOT?  
\*

Remove the master tapes from Unit 0 and 1.

Type: RK:/O<CR>  
Response: RT-11SJ VØ2B-xx  
.

The system is now running from the disk. If the above message is not displayed, repeat this section.

If the message is displayed, proceed to Section VI.

SECTION V  
BUILDING AND STARTING RT-11 FROM FLOPPY DISK

This section contains instructions for those who have received RT-11 on Floppy disk. If Floppy disk is to be the system device, the user is instructed how to copy his master disk. If another disk (RK11, RF11 or RP11/RP02) is to be the system device, the user is instructed how to make his larger disk system from the master Floppy disk. It is important (for the user's protection) to build the system as instructed, then store the master in a safe place.

RK11 and RP11/RP02 users will need a blank, formatted disk for this procedure. (If necessary, the user should format the disk before beginning; instructions for formatting an RK11 disk are in Chapter 6; the RP11E Drive Formatter Program, MAINDEC-11-DZRP2, can be used to format an RP disk.)

- (1) Mount the RT-11 System Disk (Disk 1 of 2, DEC-11-ORTSA-D-YC1) in the left-hand drive (Unit 0).
- (2) If the system has a hardware bootstrap capable of bootstrapping the Floppy disk, boot the disk and proceed to Step 4; otherwise, proceed with Step 3.
- (3) Deposit the basic Floppy disk bootstrap loader into memory as follows:
  - (a) Set the ENABLE/HALT switch to HALT, then set the first address, 001000, in the Switch Register. (Set switch 9 to the up (1) position and all others to the down (0) position.)
  - (b) Press the LOAD ADDR switch.
  - (c) Set the proper contents from the following table in the Switch Register and lift the DEP switch.
  - (d) Repeat Step (c) until all the instructions have been deposited.

<u>LOCATION</u>	<u>CONTENTS</u>	<u>LIKE THIS</u>
001000	012702	Set switches 12, 10, 8, 7, 6, and 1 to the up (1) position and all others to the down (0) position.
001002	1002n7 (n=4 for unit 0 and n=6 for unit 1)	Set switches 15, 7, 2, 1, and 0 to the up (1) position and all others to the down (0) position. For unit 0, set switch 5 to the up (1) position; for unit 1, set switches 5 and 4 to the up (1) position.
001004	012701	Set switches 12, 10, 8, 7, 6, and 0 to the up (1) position and all others to the down (0) position.
001006	177170	Set switches 15 through 9, and 6 through 3 to the up (1) position and all others to the down (0) position.
001010	130211	Set switches 15, 13, 12, 7, 3, and 0 to the up (1) position and all others to the down (0) position.
001012	001776	Set switches 9 through 1 to the up (1) position and all others to the down position.
001014	112703	Set switches 15, 12, 10, 8, 7, 6, 1, and 0 to the up (1) position and all others to the down (0) position.
001016	000007	Set switches 2, 1, and 0 to the up (1) position and all others to the down (0) position.
001020	010100	Set switches 12 and 6 to the up (1) position and all others to the down position.
001022	010220	Set switches 12, 7, and 4 to the up (1) position and all others to the down (0) position.
001024	000402	Set switches 8 and 1 to the up (1) position and all others to the down (0) position.
001026	012710	Set switches 12, 10, 8, 7, 6, and 3 to the up (1) position and all others to the down (0) position.
001030	000001	Set switch 0 to the up (1) position and all others to the down (0) position.
001032	006203	Set switches 11, 10, 7, 1, and 0 to the up (1) position and all others to the down (0) position.
001034	103402	Set switches 15, 10, 9, 8, and 1 to the up (1) position and all others to the down (0) position.

<u>LOCATION</u>	<u>CONTENTS</u>	<u>LIKE THIS</u>
001036	112711	Set switches 15, 12, 10, 8, 7, 6, 3, and 0 to the up (1) position and all others to the down (0) position.
001040	111023	Set switches 15, 12, 9, 4, 1, and 0 to the up (1) position and all others to the down (0) position.
001042	030211	Set switches 13, 12, 7, 3, and 0 to the up (1) position and all others to the down (0) position.
001044	001776	Set switches 9 through 1 to the up (1) position and all others to the down (0) position.
001046	100756	Set switches 15, 8, 7, 6, 5, 3, 2, and 1 to the up (1) position and all others to the down (0) position.
001050	103766	Set switches 15, 10 through 4, 2, and 1 to the up (1) position and all others to the down (0) position.
001052	105711	Set switches 15, 11, 9, 8, 7, 6, 3, and 0 to the up (1) position and all others to the down (0) position.
001054	100771	Set switches 15, 8 through 3, and 0 to the up (1) position and all others to the down (0) position.
001056	005000	Set switches 11 and 9 to the up (1) position and all others to the down (0) position.
001060	022710	Set switches 13, 10, 8, 7, 6, and 3 to the up (1) position and all others to the down (0) position.
001062	000240	Set switches 7 and 5 to the up (1) position and all others to the down position.
001064	001347	Set switches 9, 7, 6, 5, 2, 1, and 0 to the up (1) position and all others to the down (0) position.
001066	122702	Set switches 15, 13, 10, 8, 7, 6, and 1 to the up (1) position and all others to the down (0) position.
001070	000247	Set switches 7, 5, 2, 1, and 0 to the up (1) position and all others to the down (0) position.
001072	005500	Set switches 11, 9, 8, and 6 to the up (1) position and all others to the down (0) position.
001074	005007	Set switches 11, 9, 2, 1, and 0 to the up (1) position and all others to the down (0) position.



Verify that the bootstrap program has been deposited properly as follows:

- (e) Set the starting address in the Switch Register as in Step 3a above.
- (f) Press the LOAD ADDR Switch.
- (g) Display the contents of that address in the Data Register by pressing the EXAM switch.
- (h) Compare the number in the Data Register with the value in the table above.
- (i) If they are the same, repeat Step (g) until all words have been examined.
- (j) If not the same, repeat Step 3.

Set the starting address 001000 in the Switch Register as in Step 3a above, then press the LOAD ADDR switch.

Set the ENABLE/HALT switch to ENABLE, then press the START switch.

- (4) There will be a slight pause after which the following message is displayed on the terminal:

RT-11SJ VØ2B-xx

.

If not, repeat this section from Step 2.

Users of Floppy disk as the system device, proceed to Step 5. Users of other disks as the system device should proceed to Step 6.

- (5) Type: R PIP<CR>  
Response: \*

Mount a blank Floppy disk in Unit 1.

Type: DX1:A=DXØ:/S<CR>

[The system will be copied onto the blank disk. The process takes about one minute.]

Response: \*  
Type: DX1:A=MONITR.SYS/U<CR>

[The system bootstrap will be copied onto the disk on Unit 1.]

Response: \*

Remove the master RT-11 System Disk and store in a safe place.

Label the new disk as "RT-11 SYSTEM DISK"; dismount it from Unit 1 and mount it on Unit 0.

Type: DX:/O<CR>

RT-11 should respond by displaying the following on the terminal:

RT-11SJ V02B-xx

.

If it does not, repeat from Step 1.

Mount a blank disk on Unit 1 for use in the rest of the demonstration.

Type: ASS DX1:DK<CR>  
Response: .

Type: R PIP<CR>  
Response: \*

Type: DX1:/Z<CR>  
Response: DX1:/Z ARE YOU SURE?

Type: Y<CR>  
Response: \*

Type: CTRL C  
Response: ^C

.

Proceed to Section VI.

- (6) Mount the RT-11 System Disk, Disk 2 of 2 (DEC-11-ORTSA-D-YC2) on Unit 1.

If the disk is being used to build a system for RK11 DECpack or RP11/RP02 disk cartridge, mount a blank, formatted disk on Unit 0, WRITE ENABLED. (Instructions for mounting an RK11 disk pack are in Chapter 6.)

If the system is to be built on RK11 disk,

Type: ASS RK:DK<CR>  
Response: .

If the system is to be built on RF11 disk,

Type: ASS RF:DK<CR>  
Response: .

If the system is to be built on RP11/RP02 disk,

Type: ASS DP:DK<CR>  
Response: .

In any case,

Type: R PIP<CR>  
Response: \*

If the system device will be RP11/RP02 disk,

Type: DK:/Z/N:37<CR>

Otherwise,

Type: DK:/Z/N:l2<CR>

In either case,

Response: DK:/Z ARE YOU SURE?

Type: Y<CR>

Response: \*

Type: DK:\*.\*=DXØ:\*.\*/Y/X<CR>

Response: \*

Type: DK:\*.\*=DXl:\*.\*/Y/X<CR>

Response: \*

Type: DK:DXMNSJ.SYS=DK:MONITR.SYS/Y/R<CR>

Response: \*

If the disk being built is an RK11 disk,

Type: DK:MONITR.SYS=DK:RKMNSJ.SYS/Y/R<CR>

Response: \*

If the disk being built is an RF11 disk,

Type: DK:MONITR.SYS=DK:RFMNSJ.SYS/Y/R<CR>

Response: \*

If the disk being built is an RP11/RP02 disk,

Type: DK:MONITR.SYS=DK:DPMNSJ.SYS/Y/R<CR>

Response: \*

In any case,

Type: DK:A=DK:MONITR.SYS/U<CR>

Response: \*

Type: DK:/O<CR>

RT-11 should bootstrap off the new disk and respond with its identifying message:

RT-11SJ VØ2B-xx

.

If it does not, repeat this entire section.

Dismount the master Floppy disks from Unit 0 and Unit 1, and store in a safe place.

Proceed to Section VI.

SECTION VI  
RUNNING THE RT-11 SINGLE-JOB MONITOR

For the purposes of this demonstration, a small program (DEMOBG.MAC) is edited, assembled, linked, and executed. When executed, DEMOBG types a message on the terminal.

- (1) If the console terminal is an ASR or KSR Teletype, a parallel LA30 DECwriter, a VT50 Alphanumeric Display, or an LA36 DECwriter II, go to Step 2.

If the console terminal is a VT05 Alphanumeric Display operating at 300 baud, go to Step 2.

If the console terminal is a serial LA30 DECwriter operating at 300 baud,

Type:       D 56=5Ø15<CR>  
Response:   .

Go to Step 2.

If the console terminal is a serial LA30 DECwriter operating at 150 baud,

Type:       D 56=2Ø15<CR>  
Response:   .

Go to Step 2.

If the console terminal is a serial LA30 DECwriter operating at 110 baud,

Type:       D 56=1Ø15<CR>  
Response:   .

Go to Step 2.

If the console terminal is a VTØ5 Alphanumeric Display operating at 2400 baud,

Type:       D 56=2Ø12<CR>  
Response:   .

Go to Step 2.

If the console terminal is a VT05 Alphanumeric Display operating at 1200 baud,

Type:       D 56=1Ø12<CR>  
Response:   .

Go to Step 2.

If the operating console is a VT05 Alphanumeric Display operating at 600 baud,

Type: D 56=412<CR>  
Response: .

- (2) If the system configuration does not include a GT40 or VT11 display processor and scope, proceed to Step 4.
- (3) Verify that the scope is on by turning the BRIGHTNESS knob to an adequate level.

Type: GT ON<CR>

The system output will shift to the display scope. Commands are still entered at the keyboard, but echo will be on the screen.

Response: .[On screen]

Build the VT11 support library as follows:

Type: R LIBR<CR>  
Response: \*

Type: VTLIB=SY:VTHDLR<CR>  
Response: \*

Type: CTRL C  
Response: ^C

- (4) Enter the date this demonstration is being run.

Type: DAT DD-~~MMM~~-YY<CR>

[where DD-~~MMM~~-YY is the current date in the form 12-JAN-75.]

Response: .

Display the directory of the system device on the terminal.

Type: R PIP<CR>  
Response: \*

Type: SY:/F<CR>  
Response: MONITR.SYS  
DT .SYS  
LP .SYS  
PP .SYS  
PR .SYS  
TT .SYS  
PATCH .SAV  
EDIT .SAV  
MACRO .SAV  
EXPAND.SAV  
ASEMBL.SAV  
SYSMAC.SML  
LINK .SAV  
ODT .OBJ  
PIP .SAV  
\*

[Depending on the medium from which RT-11 is built and the individual system configuration, the above directory will vary. As long as a directory is printed, its exact content is not of concern.]

Use the Text Editor to modify the demonstration program, DEMOBG.MAC.

```
Type:      CTRL C
Response:  ^C

(4a) Type:      R EDIT<CR>
      Response:  *

      Type:      EBSY:DEMOBG.MAC<ALT><ALT>
      Response:  *

      Type:      F;<TAB>.ASCII<ALT><ALT>
      Response:  *

      Type:      ØAD<ALT><ALT>
      Response:  *

      Type:      EX<ALT><ALT>
      Response:  .
```

Assemble DEMOBG.MAC with EXPAND and ASEMBL and obtain a listing.

```
Type:      R EXPAND<CR>
Response:  *

Type:      DEMOBG=SY:DEMOBG<CR>
Response:  ERRORS DETECTED: Ø
          *

Type:      CTRL C
Response:  ^C

Type:      R ASEMBL<CR>
Response:  *
```

If a line printer is available, go to Step 6

(5) If running on an 8K Floppy-based system,

```
Type:      DEMOBG=DEMOBG<CR>
Response:  ERRORS DETECTED: Ø
          FREE CORE: xxx WORDS
          *

Type:      ,TT:=DEMOBG<CR>
Response:  [see following]
```

All other systems,

```
Type:      DEMOBG,TT:=DEMOBG<CR>
Response:  [see following]
```

```

1          ; RT-11 MACRO EXPAND V02-02
24         ; DEMOBBG MAC
25         ; DEMONSTRATION PROGRAM TO PRINT DEMONSTRATION MESSAGE, THEN
26         ; RING BELL IF FG JOB SENDS A MESSAGE.
27
28         ;          MCALL   . V2 . . . REGDEF, . RCYDC, . PRINT
29         ; MACRO   . V2 . .
30         ;          V2=1
31         ; ENDM
32         ; MACRO   . PRINT . ADD
33         ; IF NB . ADD
34         ;          MOV     . ADD, %0
35         ; ENDC
36         ;          EMT     ^0351
37         ; ENDM
38         ; MACRO   . RCYDC . AREA, . BUFF, . WCNT, . CRTN
39         ; IF NB . AREA
40         ;          MOV     . AREA, %0
41         ;          MOV     #13000, (0)
42         ; ENDC
43         ; IF NB . BUFF
44         ;          MOV     . BUFF, 4, (0)
45         ; ENDC
46         ; IF NB . WCNT
47         ;          MOV     . WCNT, 6, (0)
48         ; ENDC
49         ; IF NB . CRTN
50         ;          MOV     . CRTN, 8, (0)
51         ; ENDC
52         ;          EMT     ^0375
53         ; ENDM
54         ; MACRO   . REGDEF
55         ; R0=%0
56         ; R1=%1
57         ; R2=%2
58         ; R3=%3
59         ; R4=%4
60         ; R5=%5
61         ; SP=%6
62         ; PC=%7
63         ; ENDM
64
65         ;          REGDEF
66         000000 R0=%0
67         000001 R1=%1
68         000002 R2=%2
69         000003 R3=%3
70         000004 R4=%4
71         000005 R5=%5
72         000006 SP=%6
73         000007 PC=%7
74
75 00000   START, . RCYDC #AREA, #BUFFER, #400, #MSGIN ; POST REQUEST FOR MESS
76         ; IF NB #AREA
77 00000 012700   MOV     #AREA, %0
78         000226
79 00004 012710   MOV     #13000, (0)
MAIN. RT-11 MACRO V502-09 PAGE 1+

```

013000

```

79      . ENDC
80      IF NB #BUFFER
81 00010 012760      MOV      #BUFFER, 4. (0)
      000236
      000004
82      . ENDC
83      IF NB #400
84 00016 012760      MOV      #400, 6. (0)
      000400
      000006
85      . ENDC
86      IF NB #MSGIN
87 00024 012760      MOV      #MSGIN, 8. (0)
      000044
      000010
88      . ENDC
89 00032 104375      EMT      00375
90      PRINT #MSG      PRINT DEMONSTRATION MESSAGE
91      IF NB #MSG
92 00034 012700      MOV      #MSG, %0
      000112
93      . ENDC
94 00040 104351      EMT      00351
95 00042 000777      BR          AND LOOP
96
97      ; COMPLETION ROUTINE ENTERED WHEN FG SEBDS MESSAGE
98 00044      MSGIN; PRINT #BELL      RING BELL IN RESPONSE TO MESSAG
99      IF NB #BELL
100 0044 012700      MOV      #BELL, %0
      000110
101      . ENDC
102 0050 104351      EMT      00351
103      RCVDC #AREA, #BUFFER, #400, #MSGIN ; POST ANOTHER MESSAGE
104      IF NB #AREA
105 0052 012700      MOV      #AREA, %0
      000226
106 0056 012710      MOV      #13000, (0)
      013000
107      . ENDC
108      IF NB #BUFFER
109 0062 012760      MOV      #BUFFER, 4. (0)
      000236
      000004
110      . ENDC
111      IF NB #400
112 0070 012760      MOV      #400, 6. (0)
      000400
      000006
113      . ENDC
114      IF NB #MSGIN
115 0076 012760      MOV      #MSGIN, 8. (0)
      000044
      000010
116      . ENDC
117 0104 104375      EMT      00375
118 0106 000207      RTS      PC      AND RETURN FROM COMPLETION ROUT
MAIN. RT-11 MACRO VS02-09 PAGE 1+

```

```

119
120      ; ASCII MESSAGES
121 0110 007 BELL: . BYTE 7, 200      ; MESSAGE THAT RINGS BELL
      0111 200
122
123 0112 122 MSG: . ASCII /RT-11 DEMONSTRATION PROGRAM/
      0113 124

```



	0114	055	
	0115	061	
	0116	061	
	0117	040	
	0120	104	
	0121	105	
	0122	115	
	0123	117	
	0124	116	
	0125	123	
	0126	124	
	0127	122	
	0130	101	
	0131	124	
	0132	111	
	0133	117	
	0134	116	
	0135	040	
	0136	120	
	0137	122	
	0140	117	
	0141	107	
	0142	122	
	0143	101	
	0144	115	
124	0145	015	. BYTE 15.12
	0146	012	
125	0147	111	. ASCII /IF INCORRECTLY EDITED, THIS IS THE LAST LINE. /
	0150	106	
	0151	040	
	0152	111	
	0153	116	
	0154	103	
	0155	117	
	0156	122	
	0157	122	
	0160	105	
	0161	103	
	0162	124	
	0163	114	
	0164	131	
	0165	040	
	0166	105	
	0167	104	
	0170	111	
	0171	124	
	0172	105	
	0173	104	
	0174	054	
	0175	124	
. MAIN. RT-11 MACRO V502-09 PAGE 1+			

	0176	110
	0177	111
	0200	123
	0201	040
	0202	111
	0203	123
	0204	040
	0205	124
	0206	110
	0207	105
	0210	040
	0211	114
	0212	101

```

0213 123
0214 124
0215 040
0216 114
0217 111
0220 116
0221 105
0222 056
126 0223 015 . BYTE 15,12
0224 012
127
128 0225 000 . ASCII /WELL DONE./
. BYTE 0
129
130 ;RCVDC PACKET AREA
131 0226 000236 AREA: . = +10
132 ;RCVDC MESSAGE AREA
133 0236 BUFFER:
134 000000 . END START
.MAIN. RT-11 MACRO V502-09 PAGE 1+
SYMBOL TABLE

```

```

AREA 000226R BELL 000110R EUFFER 000236R
MSG 000112R MSGIN 000044R FC =%000007
R0 =%000000 R1 =%000001 R2 =%000002
R3 =%000003 R4 =%000004 R5 =%000005
SP =%000006 START 000000R
ABS 000000 000
000236 001
ERRORS DETECTED: 0
FREE CORE: 20488. WORDS

DEMOBG, TT:=DEMOBG

ERRORS DETECTED: 0
FREE CORE: 20488. WORDS

```

Response: \*

Go to Step 7.

(6) If running on an 8K Floppy-based system,

```

Type: DEMOGB=DEMOGB<CR>
Response: ERRORS DETECTED = 0
FREE CORE: xxx WORDS
*

```

```

Type: ,LP:=DEMOGB<CR>
Response: *[The listing on the printer will be similar
to the response for Step 5, except that
the FREE core message appears only once.]

```

All other systems,

```

Type: DEMOGB,LP:=DEMOGB<CR>
Response: ERRORS DETECTED: 0
FREE CORE: xxx WORDS

```

\*[The listing on the printer will be similar to the response for Step 5, except that the FREE CORE message appears only once.]

(7)           Type:       CTRL C  
              Response: ^C  
                          .

Link the program DEMOBG.

              Type:       R LINK<CR>  
              Response:  \*

              Type:       SY:DEMOBG=DEMOBG<CR>  
              Response:  \*

              Type:       CTRL C  
              Response: ^C  
                          .

Execute the demonstration program.

              Type:       R DEMOBG<CR>  
              Response:  RT-11 DEMONSTRATION PROGRAM.  
                          IF INCORRECTLY EDITED, THIS IS THE LAST LINE.  
                          WELL DONE.

              Type:       CTRL C  
                          CTRL C  
              Response: ^C  
                          ^C  
                          .

If the file was incorrectly edited, the procedure may be repeated, although this is not necessary for successful continuation. To repeat, first,

              Type:       .R PIP<CR>  
              Response:  \*

              Type:       DEMOBG.MAC=DEMOBG.BAK/R<CR>  
              Response:  \*

              Type:       ^C  
              Response:  .

Then go to Step 4a.

If the system will be running the Foreground/Background Monitor, proceed to Section VII. Otherwise, the demonstration is complete.

Before continuing to use the system, make all patches and corrections documented in the Digital Software News and Software Performance Summary, and note the restrictions documented in Chapter 5 of this document. In addition, the user may wish to permanently customize his system for special hardware, as described in Appendix A of the RT-11 System Reference Manual and in Chapter 5 of this document. Specific attention should be given to Appendix A by users of serial LA30 DECwriters, high-speed VT05s, fixed-head disks, TJUL6 magtape, and 50-cycle clocks; these users will want to permanently alter their system to correctly operate with those devices.

SECTION VII  
RUNNING THE RT-11 FOREGROUND/BACKGROUND MONITOR

For the purposes of this demonstration, a second program (DEMOFG.MAC) is assembled, linked for the foreground, and executed in conjunction with DEMOBG. DEMOFG is a small foreground program that sends a message every two seconds to DEMOBG, running in the background, telling it to ring the terminal bell. Besides printing the terminal message used in Section VI, DEMOBG recognizes these messages and rings the bell once for each message sent.

Although DEMOFG is always active, sending messages to the background every two seconds, this demonstration will execute other programs in the background besides DEMOBG. Only when DEMOBG is active, however, is the circuit complete and messages successfully received and honored. During those periods when DEMOBG is not running, DEMOFG will enter the messages in the message queue; when DEMOFG is started, all the messages queued since the last forced exit will be dequeued immediately, resulting in many successive bell rings. When the queue is empty, the normal send/receive cycle resumes and the bell is only rung every two seconds, as each current message is sent and honored.

- (1)           Type:           R PIP<CR>  
              Response:       \*
- If running an RK11 system,  
              Type:           RKMNSJ.SYS=MONITR.SYS/Y/R<CR>
- If running an RF11 system,  
              Type:           RFMNSJ.SYS=MONITR.SYS/Y/R<CR>
- If running a DECTape system,  
              Type:           SY:DTMNSJ.SYS=SY:MONITR.SYS/Y/R<CR>
- If running a RJS03/4 system,  
              Type:           DSMNSJ.SYS=MONITR.SYS/Y/R<CR>
- If running a RP11/RP02 system,  
              Type:           DPMNSJ.SYS=MONITR.SYS/Y/R<CR>

If running a Floppy disk system,

Type: SY:DXMNSJ.SYS=SY:MONITR.SYS/Y/R<CR>

In any case, the response will be:

Response: ?REBOOT?  
\*

If running an RK11 system,

Type: MONITR.SYS=RKMNFB.SYS/Y/R<CR>

If running an RF11 system,

Type: MONITR.SYS=RFMNFB.SYS/Y/R<CR>

If running a RP11/RP02 system,

Type: MONITR.SYS=DPMNFB.SYS/Y/R<CR>

If running a Floppy disk system,

Type: SY:MONITR.SYS=SY:DXMNFB.SYS/Y/R<CR>

If running a RJS03/4 system,

Type: MONITR.SYS=DSMNFB.SYS/Y/R<CR>

If running a DECTape system,

Type: SY:MONITR.SYS=SY:DTMNFB.SYS/Y/R<CR>

In any case, the response will be,

Response: ?REBOOT?  
\*

Type: SY:A=SY:MONITR.SYS/U<CR>

Response: \*

Type: SY:/O<CR>

Response: RT-11FB V02B-xx  
.

The F/B Monitor is now running.

If the console terminal is an ASR or KSR Teletype, a VT50 Alphanumeric Display, an LA36 DECwriter II, or a parallel LA30 DECwriter, go to Step 2.

If the console terminal is a VT05 Alphanumeric Display operating at 300 baud, go to Step 2.

If the console terminal is a serial LA30 DECwriter operating at 300 baud,

Type: D 56=5015<CR>

Response: .

Go to Step 2.

If the console terminal is a serial LA30 DECwriter operating at 150 baud,

Type: D 56=2015<CR>  
Response: .

Go to Step 2.

If the console terminal is a serial LA30 DECwriter operating at 110 baud,

Type: D 56=1015<CR>  
Response: .

Go to Step 2.

If the console terminal is a VT05 Alphanumeric Display operating at 2400 baud,

Type: D 56=2012<CR>  
Response: .

Go to Step 2.

If the console terminal is a VT05 Alphanumeric Display operating at 1200 baud,

Type: D 56=1012<CR>  
Response: .

Go to Step 2.

If the console terminal is a VT05 Alphanumeric Display operating at 600 baud,

Type: D 56=412<CR>  
Response: .

- (2) If the configuration does not include a GT40 or VT11 display processor and scope, proceed to Step 3.

Otherwise, verify that the scope is on by turning the BRIGHTNESS knob to an adequate level.

Type: GT ON<CR>

System output will shift to the screen, although commands are still entered at the keyboard.

Response: . [On screen]

- (3) Enter the date.

Type: DAT DD-MMM-YY<CR>

[where DD-MMM-YY is the current date, e.g., 12-JAN-75.]

Response: .

Enter the time of day.

Type: TIM HH:MM:SS<CR>

[where HH:MM:SS is the current hour, minutes and seconds in the form 13:12:50.]

Assemble the foreground demonstration program, DEMOFG.MAC.

Type: R MACRO<CR>  
Response: \*

Type: DEMOFG=SY:DEMOFG<CR>  
Response: ERRORS DETECTED: 0  
FREE CORE xxxxx. WORDS  
\*

Type: CTRL C  
Response: ^C  
.

Link DEMOFG for the foreground.

Type: R LINK<CR>  
Response: \*

Type: SY:DEMOFG=DEMOFG/R<CR>  
Response: \*

Type: CTRL C  
Response: ^C  
.

Start DEMOFG as the foreground job.

Type: FRUN SY:DEMOFG<CR>  
Response: F>  
FOREGROUND DEMONSTRATION PROGRAM, SENDS A  
MESSAGE TO THE BACKGROUND PROGRAM "DEMOBG"  
EVERY 2 SECONDS, TELLING IT TO RING THE  
BELL.  
B>

DEMOFG is now running and queuing messages for DEMOFG every two seconds.

Execute DEMOFG and receive the messages.

Type: R DEMOFG<CR>  
Response: RT-11 DEMONSTRATION PROGRAM  
IF INCORRECTLY EDITED, THIS IS THE LAST LINE.  
WELL DONE.  
[The bell will ring quickly several times,  
then will ring once every two seconds.]

Execute PIP in the background to get a directory listing.

Type: CTRL C  
CTRL C [The bell will stop]  
Response: ^C  
^C  
.

Type: R PIP<CR>  
Response: \*

Type: /L<CR>  
Response: DD-MMM-YR  
[The directory of the device DK: will be printed on the terminal. Its exact contents are not of consequence.]  
\*

Type: CTRL C  
Response: ^C

Rerun DEMOBG to collect all the foreground messages queued while PIP was running.

Type: R DEMOBG<CR>  
Response: RT-11 DEMONSTRATION PROGRAM  
IF INCORRECTLY EDITED, THIS IS THE LAST LINE.  
WELL DONE.  
[The bell will ring several times in rapid succession, then will begin ringing once every two seconds.]

Type: CTRL C  
CTRL C  
Response: ^C  
^C  
.  
[The bell will stop ringing.]

Stop the foreground program and remove it from memory.

Type: CTRL F  
Response: F>

Type: CTRL C  
CTRL C  
Response: ^C  
^C  
B>

Type: UNL FG<CR>  
Response: .

The demonstration is complete.

Before continuing to use the system, make all patches and corrections documented in the Digital Software News and Software Performance Summary, and note the restrictions documented in Chapter 5 of this document. In addition, the user may wish to permanently customize his system for special hardware, as described in Appendix A of the RT-11 System Reference Manual and in Chapter 5 of this document. Specific attention should be given to Appendix A by users of serial LA30 DECwriters, high-speed VT05s, fixed-head disks, TJU16 magtape, and 50-cycle clocks; these users will want to permanently alter their system to correctly operate on those devices.



## CHAPTER 4

### DIFFERENCES BETWEEN RT-11 V02B AND EARLIER RELEASES OF RT-11

#### I. Differences between RT-11 V02B and RT-11 V02

Outlined below are the major differences between V02B and V02-01. Where applicable, a chapter reference to the RT-11 System Reference Manual follows the item.

1. BATCH (Chapter 12) and SYSLIB (Appendix O) were added to the system, as well as TJU16, RP11/RP02, RX11/RX01 and RJS03/4 support.
2. The system macro expansion format no longer defaults to V01 forms. A ..V1.. macro must be specified specifically in a .MCALL statement for programs which contain V01 macro calls (Chapter 9).
3. An upper- and lower-case capability has been added to the Editor for those with upper-/lower-case terminals (Chapter 3).
4. All known bugs at the time of release have been fixed.

#### II. Differences between RT-11 V01-15 and RT-11 V02B

Outlined below are the major differences between RT-11 V01-15 and RT-11 V02B. Users upgrading from V01-15 to V02B should be aware of these differences; knowledge of them will make the transition easier. Where applicable, a chapter reference to the RT-11 System Reference Manual follows the item.

1. Most keyboard monitor commands require three characters instead of two. For example, DAT is now required for the DATE command, rather than DA (Chapter 2).
2. The assembly language expansion differs for V02B and V01 macros (Chapter 9).

3. The device handler interface is different between V01 and V02B. See Appendix H of the System Reference Manual for changes that must be made to user-written device handlers. Additional information about device handlers can be found in the RT-11 Software Support Manual (DEC-11-ORPGA-B-D).
4. The .SETTOP programmed request conventions must be more strictly observed (Chapter 9).
5. The programs GTON, GTDIAL and PIPC have been obsoleted by extended features in V02B.
6. The PR: handler no longer prompts before reading a paper tape; the tape must be in the reader before the command to read is issued. If the tape is not in the reader, an end of file condition is returned.
7. EXPAND no longer uses the file SYSMAC.SML for its default macro library; SYSMAC.8K is used in its place. SYSMAC.SML is the default macro library for MACRO only.
8. The RK Single-Job resident monitor has increased in size by 25 (decimal) words (maximum).
9. When using TT: to provide file input, the CTRL Z end of file character no longer needs to be followed by a carriage return.
10. Under the F/B monitor, calls to the CSI which require terminal input do an implicit .UNLOCK (Chapter 9).
11. The error byte in the system communication area (byte 52) can now have a negative value in conjunction with .SERR (Chapter 9).
12. The system no longer halts on traps 4<sub>8</sub> and 10<sub>8</sub>; a monitor error message results. The only significant halts are the monitor "system halts" (Chapter 2).
13. Fatal monitor error messages now include the PC address for the offending instruction (Chapter 2).
14. Device handler characteristics such as line printer width are modified via the SET command rather than a patch (Chapter 2).
15. In the Foreground/Background Monitor, the device handler TT: is resident as part of the monitor.
16. When adding handlers to the system, the permanent device names no longer have to be in any particular order (alphabetical or otherwise).
17. When adding handlers to the system, the new monitor device tables contain 14<sub>10</sub> device slots; all are in use.

CHAPTER 5  
RELEASE NOTES AND RESTRICTIONS

RT-11 V02B users should always keep abreast of RT-11 related notices published by DIGITAL. Changes published in the Software Performance Summary need be made only once and should be made immediately. Changes published in the Digital Software News should be made as soon as possible to systems in use. In addition to continued surveillance of the above documents, the user should be aware of the following notes and restrictions at installation time. In all examples throughout this chapter, underlined responses represent computer output.

V04 Linker

The new V04 Linker is the result of dramatic performance improvements to the V03 Linker. One of the optimizations makes use of resident library directories; the library directories are read into memory and kept there until no longer needed.

The Linker needs approximately 10.5K of user space for this optimization to take effect. The Linker will function in less but performance deteriorates as memory decreases; the 10.5K point marks a sharp drop in the performance curve.

Users with 16K of memory, therefore, should be careful when loading handlers and options if concerned about link times. The F/B Monitor uses 3.5K, GT ON uses 1.25K, and handlers use from 100<sub>10</sub> to 1000<sub>10</sub> words each. If many of these options are invoked, the Linker will be left with less than 10.5K and will be unable to benefit from the major optimizations.

For the same reasons, the /S switch should not be used unless absolutely necessary. It disables several optimizations for the accompanying gain in symbol table space.

### V03 Librarian and V04 Linker

The V02 Librarian (distributed with RT-11 V02-01) has a bug that causes it to produce faulty library directories. Although these libraries were acceptable to the V03 Linker, the improved V04 Linker is sensitive to the bug and will not operate correctly on libraries built with the V02 Librarian. To correct the problem, libraries built with the V02 Librarian need only be run through the V03 Librarian; the result will be a correct library.

For example, if LIB.OBJ is an existing library built with the V02 Librarian, it can be prepared for use under the V04 Linker as follows:

```
._R LIBR                [V03 Librarian]
*_LIB=LIB
```

It is recommended that all existing libraries be modified at once, as soon as this kit is received, to avoid possible confusion as to which libraries have been modified and which have not. Modified libraries will work with both V03 and V04 Linkers.

### Interfacing TJU16 to V02B

Although the TJU16 device handler is included in RT-11 V02B kits, this device is not included in the monitor device tables due to lack of available space. To interface this device to RT-11 V02B, the user should update the tables so that this device replaces one not in use on his system; this procedure is described in Appendix A (Section A.2.6) of the RT-11 System Reference Manual.

### Interfacing RJS04 to V02B

RT-11 V02B RJS03/4 support is distributed with disk sizes initialized for RJS03. To make full use of all the capacity of an RJS04 disk, the monitor should be modified as described in Appendix A (Section A.2.5) of the RT-11 System Reference Manual.

### RP11/RP02 Support

The RP11C controller requires that I/O to the disk involve transfers of even numbers of words only. Odd numbers of words can be read, but when written, the word count is increased by 1 and the last word of the buffer is duplicated to complete the transfer.

User programs must, therefore, be careful to read and write only even numbers of words when the RP11 disk is involved. RT-11 makes no check to determine if the word count is even and the resulting transfer may not be what the user expected.

Since most programs transfer in units of 256 words, this restriction is not a problem for many applications. Problem areas concern only those that write odd numbers of words on RP11/RP02/RP03 disks.

For more information, consult the PDP-11 Peripherals Handbook.

### RP03 Support

The RP11/RP02 support provided in the distribution kit is initialized for RP02 only. The RT-11 file structure can accommodate a maximum of  $64000_{10}$  blocks. The  $40000_{10}$ -block RP02 cartridge, therefore, can be accommodated as a single logical unit, while an RP03 cannot.

The RT-11 RP11/RP02 support can easily be altered, however, to accommodate RP03s as follows:

1. Each RP03 drive must be considered as two logical units of 40000 blocks each; in essence, a single RP03 drive looks like two RP02 drives to the system. The cartridge on physical unit "n" is accessed as logical "DPn" and "DPn+4"; thus, drive 0 is referenced as "DP0:" and "DP4:", drive 1 is "DP1:" and "DP5:", and so on. Note that although an RP03 is physically one device, it is two separate devices to the system. Each logical unit has its own complete directory and data space.
2. The DP.SYS handler must be patched to change location RP23 from  $404_8$  to  $1404_8$ . The actual address of RP23 for the released system can be found in this chapter under the heading "Important Memory Locations in V02B."
3. The DP monitors must be patched to alter location RP23 from  $404_8$  to  $1404_8$ . The actual location of RP23 in each monitor is listed in "Important Memory Locations in V02B."

For example, to allow RT-11 to support RP03s:

```
.R PATCH
PATCH Version number
FILE NAME --
*DP.SYS
*RP23/ 404 1404<CR> [Note that the actual address of
*E RP23 can be found later in this
chapter.]
```

```
.R PATCH
PATCH Version number
FILE NAME --
*DPMNFB.SYS
*RP23/ 404 1404<CR>
*E
```

```
.R PATCH
PATCH Version number
FILE NAME --
*DPMNSJ.SYS
*RP23/ 404 1404<CR>
*E
```

Note that a maximum of four RP03s can be supported on the system. RP02s and RP03s can be mixed as long as the total number of units (physical drives) on the system does not exceed four. If the system contains only RP02s, the above changes must not be made and the system can support as many as eight units.

#### Magtape Support under RT-11 V02B

Several changes have been made in RT-11 V02B magtape support. Users of RT-11 V02B will be able to read Version 2 magtapes; however, users who try to read V02B magtapes under Version 2 will experience difficulties. The RT-11 V02B magtape handler inserts a "." between the filename and extension in the magtape file header (HDR1). The V02 magtape handler does not expect a "." and as a result does not correctly match file names with a V02B magtape. The Version 2 magtape handler lists files on a V02B magtape as "ABCDEF.MA" instead of "ABCDEF.MAC".

To transfer files from a V02B magtape using the Version 2 magtape handler, use the \*.\* transfer mode in PIP. If only selected files

are to be transferred, use the PIP /Q switch to choose the files to transfer. The command format appears as:

```
.R PIP  
* .MAC=MTØ:*.*/X/Q<CR>
```

This assigns the output files a normal RT-11 extension.

#### Loaded CT and MT Handlers

If the cassette or magtape handlers are made resident with the LOAD command and a job using either device is aborted while a tape file is open, the handler must be UNLOADED and reLOADED before it will allow processing of any new files. This is caused by flags internal to the handler, which cannot be reset unless a file is closed.

Normal procedure is not to keep CT or MT handlers resident. Users should also avoid .PURGE for files open on MT or CT.

#### Cassette Directories

Cassette users are directed to Chapter 4 of the RT-11 System Reference Manual (Sections 4.2.1 and 4.2.6), where they should take special note of the fact that the "file length" column in directory listings is used to list "file sequence number" when the directory is for a cassette. The normal item in this field is "0", meaning this is the first segment of the cassette file, not that the file has no length.

For example:

##### On cassette:

A	.MAC	Ø	2-JAN-75
B	.MAC	Ø	2-JAN-75
C	.MAC	Ø	4-JAN-75

[Here the third column represents the sequence number.]

##### On disk:

A	.MAC	13	2-JAN-75
B	.MAC	4	2-JAN-75
C	.MAC	1	4-JAN-75

[Here the third column represents the file length.]

Both sets of files are identical.

## Directory Overflow

The

```
?M-DIR  OVRFLO XX
```

error message occurs if there is no room in the directory to create the desired new file entry. When this occurs, there are two courses of action:

1. Compress the device. The volume should be thoroughly backed-up (i.e., all files stored on another device also) before the compress is performed. Once compressed, the directory usually contains more space for new files.
2. If compress does not yield enough space to remove the error condition, the device should be copied to another device after first initializing the new volume to have a larger directory than the old volume. Do not use /S to transfer the files.

For example:

```
.R PIP
*RK1:/Z/N:20           [Old directory had
RK1:/Z ARE YOU SURE?Y  10 segments.]
*RK1:*.*=RK:*.*/X/Y   [Copy the files]
```

The new device now has room for additional file entries.

3. If the compress fails and the above option is not available, the DIREXT program documented in the next section may be used as a last resort to extend the directory.

## Directory Extension

When a device is zeroed, additional directory segments can be specified by use of the PIP /N switch. Once files are written on the device, however, the directory size cannot be changed without using the /Z option in PIP, which destroys existing directory information.

Although it is recommended that, whenever possible, the PIP /Z/N combination be used to determine directory size, the following program may be used to change the size of a directory "on-line" without re-initializing the disk. It can be used if there is no other alternative, and will be of special interest to paper tape users who cannot specify the size of their disk directory at system build time.



The program should be used only as a last resort, and only on a disk which has been thoroughly backed-up. It should be entered as instructed in the comments. Instructions for its use are also in the comments.

```

#####
;DIREXT-PROGRAM TO ADD SEGMENTS TO AN RT-11 DIRECTORY
;TO USE, THE FIRST ENTRY IN THE DIRECTORY MUST BE <UNUSED>, AND ITS LENGTH
;MUST BE TWICE AS MANY BLOCKS AS THE NUMBER OF SEGMENTS THAT ARE TO
;BE ADDED. THE FIRST ENTRY MAY BE MADE <UNUSED> SIMPLY BY CALLING
;PIP TO MOVE THE FIRST FILE ON THE DEVICE. ONCE THE UNUSED AREA HAS BEEN
;CREATED, DIREXT IS RUN BY TYPING:
;
;          .R DIREXT
;THE RESPONSE: *
;
;A COMMAND LINE IS ENTERED OF THE FORM "DEV:/N:M" WHERE DEV IS
;THE DEVICE WHOSE DIRECTORY IS TO BE EXPANDED AND "M" IS
;THE NUMBER OF SEGMENTS (NOT BLOCKS) TO ADD TO THE DIRECTORY.
;
;FOR EXAMPLE:
;
;          *RK:/N:14          WILL ADD 12 (DECIMAL) SEGMENTS TO THE
;                              DIRECTORY ON RK0, FOR WHICH THE FIRST
;                              FILE MUST BE AN <UNUSED> AREA OF AT
;                              LEAST 24 BLOCKS
;
;THERE ARE TWO POSSIBLE ERROR MESSAGES:
;
;          ?HARD I/O ERROR?    WILL OCCUR IF THE DIRECTORY FOR THE
;                              DEVICE CANNOT BE READ OR WRITTEN WITHOUT
;                              HARDWARE ERROR.
;
;          ?ILLEGAL COMMAND?   WILL OCCUR ON ANY OF THE FOLLOWING CONDITIONS
;
;                              1) INAPPROPRIATE COMMAND STRING
;                              2) FIRST ENTRY IN DIRECTORY NOT <UNUSED>
;                              3) REQUESTED NUMBER OF SEGMENTS WOULD
;                              CAUSE TOTAL TO EXCEED ALLOWABLE 31(10)
;                              4) SIZE OF <UNUSED> AREA TOO SMALL TO
;                              ACCOMODATE REQUESTED DIRECTORY INCREASE
;
;IF THE ?ILLEGAL COMMAND? MESSAGE OCCURS, THE DIRECTORY IS UNMODIFIED
;AND THE PROGRAM IS RESTARTED.
;
;TO CREATE DIREX , TYPE THIS TEXT INTO THE FILE "DIREXT.MAC" WITH THE EDITOR.
;
;TO ASSEMBLE,      R MACRO
;                  *DIREXT=DIREXT
;
;TO LINK,         R LINK
;                  *DIREXT=DIREXT
#####

```

```

.MCALL ..V1.,.CSIGEN,.READW,.WRITW,.EXIT,.PRINT
..V1..
R0=%0
R1=%1
R2=%2
R3=%3
R4=%4
R5=%5
SF=%6

ILLCMD: .PRINT #MSG1 ;TYPE "?ILLEGAL COMMAND?"
START: .CSIGEN #DSPACE,#DXT,#0 ;GET COMMAND STRING
DEC (SF)+ ;ANY SWITCHES?
BNE ILLCMD ;NO-BAD COMMAND
CMP (SF)+,#101516 ;/N:M ON FIRST INPUT FILE?
BNE ILLCMD ;NO-BAD COMMAND
MOV (SF)+,R1 ;NUMBER OF SEGS TO ADD INTO R1
MOV #6,R2 ;BLOCK FOR CURRENT SEG IN R2
MOV #DIRBUF,R3 ;R3 POINTS INTO DIRECTORY BUFFER
.READW 3,R3,#256.,R2 ;READ FIRST DIRECTORY SEG
BCS HERR ;READ ERROR
CMP 12(R3),#1000 ;FIRST ENTRY <UNUSED>?
BNE ILLCMD ;NO-BAD COMMAND
MOV (R3),R4 ;NUMBER OF SEGS NOW IN DIR INTO R4
ADD R1,R4 ;TOTAL SEGS FOR NEW DIR IN R4
MOV R4,R5 ;REMEMBER NEW SEG TOTAL
CMP R4,#37 ;IS NEW TOTAL TOO LARGE?
BHI ILLCMD ;YES-BAD COMMAND
ASL R1 ;# OF BLOCKS NEEDED FOR NEW SEGS
CMP R1,22(R3) ;<UNUSED> LARGE ENOUGH TO TAKE NEW SEGS?
BGT ILLCMD ;NO-BAD COMMAND
ADD R1,10(R3) ;UPDATE FILE START ADDRESS
SUB R1,22(R3) ;REDUCE <UNUSED> SIZE
LOOP: MOV R4,(R3) ;UPDATE NUMBER OF SEGS TO NEW TOTAL
.WRITW 3,R3,#256.,R2 ;WRITE SEG BACK OUT
BCS HERR ;WRITE ERROR
DEC R5 ;ALL SEGS UPDATED?
BLE DONE ;YES
TST (R2)+ ;NO-ADD 2 TO BLOCK NUMBER
.READW 3,R3,#256.,R2 ;READ NEXT SEG
BCC LOOP ;AND UPDATE
HERR: .PRINT #MSG2 ;PRINT "?HARD I/O ERROR?"
DONE: .EXIT
MSG1: .ASCIZ "?ILLEGAL COMMAND?"
MSG2: .ASCIZ "?HARD I/O ERROR?"
.EVEN
DXT: 0,0,0,0
DIRBUF: =.+1000
DSPACE:
.END START

```

## V02-02 EDIT

The Editor is constructed in such a way that when the scope is in use, the window into the buffer and the scrolled command lines are separate "pictures". On rare occasions, if the text window around the cursor contains long lines and several line feeds (or form feed characters), the window can "overflow" onto the scrolled editing commands, making that portion of the screen difficult to read.

In most applications this problem does not occur; when it does, the obscure lines can be seen by advancing the cursor several lines to bring them into clear view.

If the problem is troublesome for a particular application, it can be removed by reducing the size of the window displayed as follows.

```
.R PATCH
PATCH Version number
FILE NAME--
*EDIT.SAV
*EBASE;R
*,DSARG/____ 12 ____ n<CR>
*E
```

where "n" is the number of lines to be displayed above and below the cursor.

### Using "}" and "~" Characters on LA36

The LA36 contains two characters (} and ~) which generate ASCII codes 175<sub>8</sub> and 176<sub>8</sub>. Because many older terminals generate 175<sub>8</sub> and 176<sub>8</sub> for ALTMODE (or ESCAPE), RT-11 EDIT treats 175<sub>8</sub> and 176<sub>8</sub> as ALTMODE, making the new characters impossible to insert as text.

The Editor may be patched as follows to remove the special-case check for these characters so that they may be used on an LA36 or other terminal capable of handling them. Note that the actual address of ALTTST can be found in this chapter under the heading "Important Memory Locations in V02B."

.R PATCH

PATCH Version number

FILE NAME --  
\*EDIT.SAV  
\*ALTTST/ 175 33<CR>  
\*ALTTST+6 176 33<CR>  
\*E

Once EDIT is altered, "}" and "~" can be used normally.

### V02B-05 Monitor

RT-11 is distributed such that the maximum size of a file allocated in a general .ENTER request is half the largest space, or the entire second largest space available, whichever is larger. This is satisfactory for most applications, and should be left unchanged. It is possible that certain applications require that an upper limit be set on the size of a file; for these applications (and these only), the following change can be made.

### For Single-Job Monitors:

.R PATCH

PATCH Version number

FILE NAME--  
\*MONITR.SYS/M  
\*BASE;ØR  
\*Ø,MAXBLK/ 177777 n<CR>  
\*E

[The address for BASE can be found in this chapter under "Important Memory Locations in V02B".]

where n is an octal number of blocks defining the maximum file size.

### For Foreground/Background Monitors:

.R PATCH

PATCH Version number

FILE NAME--  
\*MONITR.SYS/M  
\*BASE;ØR  
\*Ø,MAXBLK/ 177777 n<CR>  
\*E

[The address for BASE can be found in this chapter under "Important Memory Locations in V02B".]

The V02B-05 monitors have bootstraps which allow the system to run in less memory than is available on the system (e.g., RT-11 can be bootstrapped to run in the lower 12K or 8K of a 16K machine). Most applications require that RT-11 make use of all memory available, and the system is distributed such that it automatically does so.

If (and only if) an application requires that RT-11 run in less memory than is available, the following change can be made.

For all monitors:

```
.R PATCH
PATCH Version number
FILE NAME--
*MONITR.SYS/M
*nnn/ 407 Ø<CR>
*E
```

where nnn is a value obtained from the following table:

<u>System Device</u>	<u>Value of nnn</u>
DT	636
RK	572
RF	564
DP	654
DX	61Ø
DS	576

Once the change has been made and a new system bootstrap written on the device (with PIP /U switch), a halt occurs whenever the system is booted. At this point the user sets the switch register to one of the following values and presses CONTINUE, and the bootstrap operation completes for the specified memory size.

```
40000 = 8K
60000 = 12K
100000 = 16K
120000 = 20K
140000 = 24K
160000 = 28K
>160000 = Use all available memory.
```

## System HALT Clarification

As documented in Section 2.8.1 in the RT-11 System Reference Manual, there are two HALTs in the RT-11 monitors. Users should carefully read this section since knowledge of these HALTs and their meaning will help diagnose problems.

The Single-Job Monitor HALTs when monitor I/O to the system device fails. The most common reason is a WRITE-LOCKed system device.

The F/B Monitor HALTs when a trap through 4 or 10 occurs from monitor level code (RMON or handlers). The most common causes of this are:

1. Coding errors in user-written device drivers.
2. Calling a device which is not supported on the configuration. The handler traps when the device registers are referenced. One way to avoid this is to delete the handlers for those devices which are not on the configuration from the system disk. If the handler is not on the disk, the monitor will report an error for attempted references.
3. Hardware problems causing bus timeout traps through location 4. This is very rare and should be investigated only as a last resort.

The system halts are easily recognized by the fact that they occur in high memory, above the contents of location 54.

## Setting the Stack with .ASECT in a Foreground Job

A relocatable symbol must not be used as the contents of location 42 when resetting the initial stack pointer via an .ASECT in a foreground job. Such a symbol is not relocated when it occurs in an .ASECT in a foreground job. To set the stack to relative location 1000 in a foreground job, use:

```
.ASECT
.=42
.WORD 1000
```

## SYSMAC.SML, SYSMAC.8K

There was a problem in the Version 2 system macro libraries that caused the channel number to be automatically set to zero if a macro call was made using only the ".area" argument.

This problem has been corrected in V02B at a slight increase in the number of words required for the expanded macro code as detailed below. In V02B SYSMAC, the channel byte is only altered if a macro call includes a channel argument. If it does not, the channel byte is left unaltered unless the particular request requires a channel number of zero, in which case it is automatically cleared.

The following macro calls expand into one more word than V02-01 if either SYSMAC is used:

.CHCOPY	.RENAME	.READC
.CSTAT	.REOPEN	.READW
.DELETE	.SAVESTATUS	.WRITE
.ENTER	.SPFUN	.WRITC
.LOOKUP	.READ	.WRITW

The following macro calls expand into two more words than in V02-01 if SYSMAC.SML is used. If SYSMAC.8K is used, these do not require any additional space:

.CDFN	.MRKT	.SDATC
.CNTXSW	.PROTECT	.SDATW
.CMKT	.RCVD	.SFPA
.DEVICE	.RCVDC	.TRPSET
.GTIM	.RCVDW	.TWAIT
.GTJB	.SDAT	

#### V02B/VT11 Display Support

The following restriction should be noted when the display is in use.

In the Single-Job Monitor, if a program that uses the display is running with the scroller in use (GT ON is in effect) and the program does a soft exit (.EXIT with R0≠0) with the display stopped, the display remains stopped until a CTRL C is typed at the keyboard.

This is a rare occurrence that can be recognized by failure of the monitor to echo on the screen when expected. If the display stops unexpectedly, always type CTRL C to restore. If CTRL C fails to restore the display, the running program probably has an error.

Note that the majority of applications are not affected by this restriction, since it is not a common practice to stop the display before doing a soft exit.

### Using PIP Compress Option to Copy Floppy Disks

The PIP compress option (/S) is commonly used to copy one volume to another under RT-11. On DT, DP, or RK, this suffices to initialize the volume as well as copy both directory and files.

On Floppy disk (DX), /S can also be used to copy one volume to another, but it is imperative that the target disk be initialized with the /Z switch before the copy operation is performed. Besides initializing the directory, /Z (on Floppy) writes appropriate volume identification not written by /S.

### Accessing Nonsystem Disks on Single-Disk Systems

Source disks and other nonsystem disks can be accessed on single-disk systems with more than 8K as follows:

1. Boot the system disk and enter the date.
2. Load the handler for the device to which the desired files will be transferred.
3. Run PIP. When the prompting "\*" appears, dismount the system disk.
4. Mount the source disk, WRITE LOCKed, in place of the system disk.
5. Transfer the desired files to the backup device (such as magtape or cassette).
6. Remount the system disk.
7. CTRL C out of PIP.

PIP always keeps the USR resident, and with the handler loaded the system disk is not required (as long as no other devices are referenced).

For example, to transfer RT-11 sources from the source disk to magtape on a single-disk system:

1. Boot system and enter the date.
2. Type:

```
.LOAD MT  
.R PIP  
*  
-
```



3. Dismount system disk, mount source disk.
4. Type:  

```
MTØ:*.**.*/*X/M:1
```
5. When done, remount system disk.

The sources can now be manipulated from magtape.

Important Memory Locations in V02B

*For V02C see update to  
 pages further on.*

Listed below are the V02B specific memory locations referenced in RT-11 documentation. The locations are documented for the purposes of modification; therefore they do not represent actual memory locations, but addresses in the disk file as accessed by PATCH.

<u>Location</u>	<u>S/J Monitor</u>	<u>F/B Monitor</u>	<u>Other</u>
ALTTST			12072 (EDIT.SAV)
BASE	17000	20000	
CONFIG	35300*	37300*	
DSARG			14030 (EDIT.SAV)
DSSIZ	32704*	34612*	
\$DVSIZ	13702	14610	
EBASE			2366 (EDIT.SAV)
\$ENTRY	16564	17706	
GTVECT	35354*	37354*	
\$HSIZE	13646	14554	
LISTFB	-	25756	
LOWMAP	16326	17326	
MAXBLK	16314	17314	
MTHSIZ	32662*	34570*	
MTPNAM	35504*	37626*	
MTSTAT	35540*	37662*	
\$PNAME	16470	17612	
RFSIZ	32710*	34616*	
RP23	43146*	54356*	1076 (RP.SYS)
\$STAT	16524	17646	
STATIN	340	340	
STATOUT	340	340	
TTCNFG	-	21362	
TTWIDT	-	21354	
VECTIN	37550	47244	
VECTOUT	40760	50210	

\*BASE has been added into number

<u>Location</u>	<u>Monitor (Same for S/J and F/B Versions)</u>					
	<u>RK</u>	<u>DT</u>	<u>DX</u>	<u>DP</u>	<u>DS</u>	<u>RF</u>
BHALT	572	636	610	654	576	564
RELLST	1550	1560	1552	1624	1544	1506

## Making TTY SET Conditions Permanent

SET TTY commands must be reissued every time the monitor is bootstrapped. Users who wish to permanently modify TTY SET characteristics for a given configuration can do so by modifying the monitor as described in Chapter 2 of the RT-11 Software Support Manual.

## Device Names for RK11 and RF11

Users of other DIGITAL operating systems will notice that RT-11 uses the controller names (RK and RF) rather than the more common user-level names (DK and DF) for these devices. This is due to the fact that RT-11 uses the name DK to refer to the "default storage device," which may not necessarily be the RK11.

If the user finds this situation annoying, the device names can be reassigned with the monitor ASSIGN command, as follows:

```
.ASS RK:DK  
.ASS RF:DF
```

Note, however, that when DK is reassigned in this manner all default storage goes to device name DK, and the user may not wish to use the physical device RK as the default storage device.

## KB.MAC

Applications for the F/B Monitor frequently require that the foreground program dialogue appear on a separate terminal, independent of the console terminal.

To facilitate development of these applications, or any others requiring multiple terminals, a source for a device-independent terminal handler has been included in the distribution kit. The source is provided for user convenience and can be used as a model for handler development, modified to meet specific needs, or assembled and used as is to provide support for a second terminal.

Documentation for the use of KB.MAC is contained in the comments at the beginning of the source; a listing appears in Appendix B of the RT-11 Software Support Manual. Page 3 of this listing, as it appears in Ap-

pendix B, contains an error. Lines 17, 18, and 19 on this page should read:

STAT=HIGH ORDER BYTE=Ø, LOW ORDER BYTE=24

#### Physical End of Magtape on Write

The magtape handler for RT-11 Version 2B has been modified such that it no longer leaves a partial file on the tape when physical end of tape is detected during write operations. Upon detecting end of tape when writing, the magtape handler will delete the partial file by backspacing and writing logical end of tape over the file's header label.

#### Paper Tape Transfers in Image Mode using PIP

When copying an ASCII or binary paper tape with PIP without using "/A" or "/B", the size of the output file (or paper tape if copying to the punch) depends upon the memory size of the system. Without "/A" or "/B", the transfer defaults to image mode and PIP attempts to do a single read to fill its input buffer. When a read from a nonfile-structured device such as the reader encounters end of file (end of tape), no count of words transferred is returned. PIP assumes its input buffer is full and copies it to the output device. The output file size thus depends upon the input buffer size, which is determined by the memory size of the system. The output file will have several blocks of zeroes after the end of the paper tape image. If copying to the punch, large amounts of blank tape will be punched after the input tape image is output. The extra length is harmless (except for the device space lost), and can be avoided by use of "/A" or "/B" with nonfile-structured devices.

#### New Output Format for PATCHO EXIT Command

PATCHO now types:

STOP --

following the user's response to the ENTER CHECKSUM: statement of the EXIT command. For example:

\*EXIT  
ENTER CHECKSUM: 27Ø4<CR>

STOP --

⋮

## Location Counter Modification Restriction for Foreground Links

Using the assembler location counter instruction (.) to modify the same segment of relocatable code more than once is restricted for foreground links. For example:

```
MAIN. RT-11 MACRO VM02-10    00:08:40 PAGE 1

1      000000'      . CSECT  TEST
2      .           . GLOBL  A,B,C
3      .           . MCALL  ..V2... REGDEF
4 000000      . V2...
5 000000      . REGDEF
6 000000 000000G    . WORD   A
7 000002 016701 START: MOV    A+6,R1
      000006G
8 000006 060127    ADD     R1,(PC)+
9 000010 000000G    . WORD   B
10     000002'     . = -10
11 000002 000004G    . WORD   A+4
12     000002'     . = -2
13 000002 000002G    . WORD   B+2
14     000000'     . = -4
15 000000 000006G    . WORD   C+6
16     000002'     . END    START
```

The global relocation at lines 6 and 15 illustrates this restriction. Note that the code at line 15 starts at 0 due to the location counter modification.

## CREF Listings to Magtape and Cassette

When using MT or CT as listing devices for MACRO assembly listings with cross-references, it is necessary to LOAD the handler. This is necessary because MACRO chains to CREF and the handler must remain intact across the .CHAIN. If a cross-reference directory is not requested, the handler need not be LOADED.

## Magtape Rewind Followed by LOOKUP or ENTER

If a user program issues a REWIND special function for magtape followed by a LOOKUP or ENTER without rewind (by specifying a positive file count, the magtape handler will not observe the first file on the magtape. The handler will read the volume label of the magtape and assume it is the file header of the first file. The file name compare will fail

the handler will space past the first file header to the second file and continue the LOOKUP or ENTER.

Issuing a LOOKUP or ENTER with rewind (negative or zero file count) instead of a REWIND special function followed by a LOOKUP or ENTER will avoid the problem. See Appendix H of the RT-11 Reference Manual for details.

#### JADD, JSUB in SYSLIB

The JADD and JSUB functions in SYSLIB will fail if the last two arguments are the same. The problem can be avoided by using different variables for the second and third arguments to these functions, or it can be fixed with the patch given below.

```
.R PIP<CR>
*NSYSF4.OBJ=SYSF4.OBJ/X
*^C
--

.R PATCHO

*OPEN<CR>
ENTER INPUT FILE *NSYSF4.OBJ<CR>
ENTER OUTPUT FILE *NSYSF4.OBJ<CR>
*POINT JADD<CR>
*WORD 12=#12402<CR>
*WORD 14=#62302<CR>
*WORD 16=#11405<CR>
*WORD 20=#5505<CR>
*WORD 22=#-75376<CR>
*WORD 24=#61305<CR>
*WORD 26=#-75774<CR>
*WORD 30=#5002<CR>
*WORD 32=#5005<CR>
*WORD 34=#12700<CR>
*WORD 36=#-2<CR>
*WORD 40=#10221<CR>
*WORD 42=#10511<CR>
*WORD 44=#167<CR>
*WORD 46=%$SETR0+0<CR>
*EXIT<CR>
ENTER CHECKSUM 155444<CR>
STOP --
```

```

.R PATCHO

*OPEN
ENTER INPUT FILE *NSYSF4.OBJ<CR>
ENTER OUTPUT FILE *NSYSF4.OBJ<CR>
*POINT JSUB<CR>
*WORD 12=#12402<CR>
*WORD 14=#-15476<CR>
*WORD 16=#11405<CR>
*WORD 20=#5605<CR>
*WORD 22=#-75376<CR>
*WORD 24=#-16473<CR>
*WORD 26=#-75774<CR>
*WORD 30=#5002<CR>
*WORD 32=#5005<CR>
*WORD 34=#12700<CR>
*WORD 36=#-2<CR>
*WORD 40=#10221<CR>
*WORD 42=#10511<CR>
*WORD 44=#167<CR>
*WORD 46=%$SETR0+0<CR>
*EXIT<CR>
ENTER CHECKSUM 45423<CR>
STOP --

```

#### BATCH /TIME Switch Restriction

There is a problem in the BATCH compiler which prevents the \$DATA command from operating properly when the /TIME switch is used on the \$JOB command. The implementation chosen for the /TIME option uses the KMON TIME command to print the current time on the log for each BATCH command, including the \$DATA command. This causes an abort of the program which was to use the data.

For example, this job will not run properly:

```

$JOB/TIME
$RUN PROG
$DATA
123
$EOD
$EOJ

```

To avoid the problem, use RT11 mode:

```

$JOB/TIME
$RT11
.R PROG
*123
$EOJ

```

## BATCH \$COPY Command

There is an error in the BATCH \$COPY command which the following patch corrects. The new BATCH version number will be V01-02A.

.R PATCH

### PATCH Version number

```
FILE NAME--
*BATCH.SAV<CR>
*6062;0R<CR>
*0,670 \40      101<CR>
*0,7146/        6674      2366<LF>
0,7150/ 1727    240<CR>
*0,15576/      174156     660<CR>
*0,16460/      20124      4767<LF>
0,16462/      46102      173272<LF>
0,16464/      41517      42764<LF>
0,16466/      20113      100000<LF>
0,16470/      6460       5026<LF>
0,16472/      4412       207<CR>
*E
```

.

## IFETCH in SYSLIB

The IFETCH function in SYSLIB will cause the system to crash if the error 1 return is taken (device name specified does not exist). This problem is fixed by the following patch.

.R PATCHO

```
*OPEN
ENTER INPUT FILE *SYSF4.OBJ<CR>
ENTER OUTPUT FILE *SYSF4N.OBJ<CR>
*POINT IFETCH<CR>
*WORD 20=#12601 <CR>
*WORD 22=#12601 <CR>
*WORD 24=#12626 <CR>
*WORD 26=#-74355<CR>
*EXIT<CR>
```

ENTER CHECKSUM: 115570<CR>

STOP --

```
.R PIP<CR>
*SYSF4.OBJ/X=SYSF4N.OBJ<CR>
*^C
```

```
.R LIBR<CR>
*SYSLIB=SYSF4<CR>
```

\*^C

.

### Problem with .CSIGEN in F/B Monitor

If the USR is owned by a job doing a .CSIGEN request, the F/B monitor releases the USR until a command string has been collected. However, this also causes the CSIRN\$ flag (CSI Running) in the job's status word to be cleared, producing an addressing error when the CSI does a .LOOKUP. The following patch will correct this problem.

```
.R PATCH<CR>
FILE NAME--
*MONITR.SYS/M<CR>
*200000;0R<CR>
*324\      0      101<CR>
*0,15230/  566    1456<CR>
*0,16710/  0      17746<LF>
0,16712/   0      175616<LF>
0,16714/   0      52736<LF>
0,16716/   0      4<LF>
0,16720/   0      167<LF>
0,16722/   0      177074<CR>
*E
-
```

The new monitor version will be V02B-05A.

### Error in F/B I/O Queue Manager

I/O requests in F/B are queued on a device in order of priority or job number, the F/G job having priority over the B/G job. Due to an error in the QMANGR code, queue elements are always placed first in the queue. This patch corrects the problem:

```
.R PATCH<CR>
FILE NAME--
*MONITR.SYS/M<CR>
*200000;0R<CR>
*0,30526/26501  26500<CR>
*324\      101    102<CR>
*E
-
```

The monitor version will be V02B-05B.



### Change in .SAVESTATUS Error Return

The .SAVESTATUS request does not return an error (code 0) if the channel is not oper. This is a change from Version 1 and is true in Versions 2 and 2B. This change permits a program to .SAVESTATUS all channels without concern for their being open. The .WAIT request should be used to determine if a channel is open.

### CTRL C During .FRUN

A double CTRL C during execution of the .FRUN command may cause loss of use of the memory allocated to the F/G job. The following patch corrects the problem.

.R PATCH

PATCH Version number

```
FILE NAME --
*MONITR.SYS/M<CR>
*200000;0R<CR>
*0,41622/_____10346 13700<LF>
0,41624/_____4267 54<LF>
0,41626/_____173534 10660<LF>
0,41630/_____62 4614<LF>
0,41632/_____0 10346<LF>
0,41634/_____0 4267<LF>
0,41636/_____0 173524<LF>
0,41640/_____0 62<CR>
*324\_____102 103<CR>
*E
```

⋮

The new monitor version will be V02B-05C.

### .RELEASE Request from F/G Job

The .RELEASE request permits a F/G job to release a device handler that is resident in the B/G job. The following patch corrects the problem:

.R PATCH

PATCH Version number

```
FILE NAME --
*MONITR.SYS/M<CR>
*200000;0R<CR>
*0,12534/      5015   167<LF>
0,12536/      771    4164<CR>
*0,16724/      0     5777 <LF>
0,16726/      0     175606<LF>
0,16730/      0     1001<LF>
0,16732/      0     5015<LF>
0,16734/      0     167<LF>
0,16736/      0     172160<LF>
0,16740/      0     <CR>
*324      103    104<CR>
*E
-
```

The new monitor version will be V02B-05D.

CHAPTER 6  
INSTRUCTIONS FOR OPERATING PERIPHERAL UNITS

This chapter contains step-by-step instructions for operating some of the peripheral units supported by RT-11, and for depositing the Bootstrap Loader.

A. Instructions for Mounting and Formatting the RK05 Disk

1. To mount disk:

Set switch labeled RUN/LOAD to LOAD position.

Verify that the light labeled PWR is on.

Wait for the light labeled LOAD to come on.

Verify that the lights labeled RDY, ON CYL, FAULT, WT, and RD are off.

Open access door.

Insert cartridge.

Close access door.

Set switch labeled RUN/LOAD to the RUN position.

Wait for the light labeled RDY and ON CYL to come on.

Press switch labeled WT PROT and verify that the light labeled WT PROT goes on and off.

If the disk is to be left WRITE PROTECTED, press the WT PROT switch until the WT PROT light goes on, then leave it on. If the disk is to be WRITE ENABLED, press the WT PROT switch until the WT PROT light is off.

Verify that lights labeled FAULT, WT, and LOAD are off.

If the cartridge is new and has never been formatted, go on to the next step. If it has been in use with other software or diagnostics, the mounting procedure is finished.

2. To format a disk:

Make certain that the disk to be formatted is mounted in Unit 0. A disk cannot be formatted on any unit but 0 using the following procedure. Set the ENABLE/HALT switch to HALT to stop any previous program which may be running.

Deposit the following disk formatting program into memory.

- a. Set the starting address, 001000, in the Switch Register. (Set switch 9 to the up (1) position and all others to the down (0) position.)
- b. Press the LOAD ADDR switch.
- c. Set the proper contents from the table below in the Switch Register and lift the DEP switch.
- d. Repeat Step (c) until all the instructions have been deposited.

<u>LOCATION</u>	<u>CONTENTS</u>	<u>LIKE THIS</u>
001000	012737	Set switches 12, 10, 8, 7, 6 and 4 through 0 to the up (1) position. Set all others to the down (0) position.
001002	006003	Set switches 11, 10, 1 and 0 to the up (1) position. Set all others to the down (0) position.
001004	177404	Set switches 15 through 8 and 2 to the up (1) position. Set all others to the down (0) position.
001006	105737	Set switches 15, 11, 9 through 6, and 4 through 0 to the up (1) position. Set all others to the down (0) position.
001010	177404	Set switches 15 through 8 and 2 to the up (1) position. Set all others to the down (0) position.
001012	100375	Set switches 15, 7 through 2, and 0 to the up (1) position. Set all others to the down (0) position.
001014	000137	Set switches 6 and 4 through 0 to the up (1) position. Set all others to the down (0) position.
001016	001000	Set switch 9 to the up (1) position. Set all others to the down (0) position.

Verify that the formatting program is properly in memory as follows:

- e. Set the starting address in the Switch Register as in Step 2a above.
- f. Press the LOAD ADDR switch.
- g. Display the contents of that address in the Data Register by pressing the EXAM switch.
- h. Compare the number in the Data Register with the value in the table above.

- i. If they are the same, repeat Step (g) until all words have been examined.
- j. If not the same, repeat Step 2.

Set the starting address in the Switch Register as in Step 2a above.

Press the LOAD ADDR switch.

Set the ENABLE/HALT switch to ENABLE.

Verify that the disk mounted in Unit  $\emptyset$  is the one to be formatted. If so, WRITE ENABLE Unit  $\emptyset$ .

Press the START switch. Let the program execute for 6 $\emptyset$  seconds, then set the ENABLE/HALT switch to HALT to stop the program.

The disk is now formatted and ready for use.

3. To dismount a disk:

Set the switch labeled RUN/LOAD to the LOAD position. Wait for the light labeled LOAD to come on. Open the access door and remove the disk cartridge.

## B. Instructions for Depositing the Bootstrap Loader

1. Checking the Bootstrap Loader

- a. Set the ENABLE/HALT switch to HALT to stop any previous program that may be running.
- b. Set the ENABLE/HALT switch to ENABLE.
- c. Set the first address, 37744, in the Switch Register. (Set switches 13 through 5 and switch 2 to the up (1) position. Set all other switches to the down ( $\emptyset$ ) position.
- d. Press the LOAD ADDR switch.
- e. Press the EXAM switch. The data is displayed in the Data Register.
- f. Compare the data displayed to the value given in the table in Step 2 below.
- g. If they are the same, repeat Steps (e) through (f) until the entire Bootstrap Loader has been checked. If they are not the same, go to Step 2 and enter the loader correctly. If all locations are the same as in the table, the Bootstrap Loader is correctly in memory and Step 2 can be bypassed.

2. Deposit the Bootstrap Loader into memory as follows:

- a. Set the first address, 37744, in the Switch Register as in Step 1c above.
- b. Press the LOAD ADDR switch.
- c. Set the proper contents from the table below in the Switch Register and lift the DEP switch.
- d. Repeat Step (c) until all the instructions have been deposited.

<u>LOCATION</u>	<u>CONTENTS</u>	<u>LIKE THIS</u>
37744	Ø167Ø1	Set switches 12, 11, 1Ø, 8, 7, 6 and Ø to the up (1) position. Set all other switches to the down (Ø) position.
37746	ØØØØ26	Set switches 4, 2 and 1 to the up (1) position. Set all other switches to the down (Ø) position.
3775Ø	Ø127Ø2	Set switches 12, 1Ø, 8, 7, 6 and 1 to the up (1) position. Set all other switches to the down (Ø) position.
37752	ØØØ352	Set switches 7, 6, 5, 3, and 1 to the up (1) position. Set all other switches to the down (Ø) position.
37754	ØØ5211	Set switches 11, 9, 7, 3 and Ø to the up (1) position. Set all others to the down (Ø) position.
37756	1Ø5711	Set switches 15, 11, 9, 8, 7, 6, 3 and Ø to the up (1) position. Set all others to the down (Ø) position.
3776Ø	1ØØ376	Set switches 15, 7, 6, 5, 4, 3, 2 and 1 to the up (1) position. Set all others to the down (Ø) position.
37762	116162	Set switches 15, 12, 11, 1Ø, 6, 5, 4 and 1 to the up (1) position. Set all others to the down (Ø) position.
37764	ØØØØØ2	Set switch 1 to the up (1) position. Set all others to the down (Ø) position.
37766	Ø374ØØ	Set switches 13, 12, 11, 1Ø, 9 and 8 to the up (1) position. Set all others to the down (Ø) position.
3777Ø	ØØ5267	Set switches 11, 9, 7, 5, 4, 2, 1 and Ø to the up (1) position. Set all others to the down (Ø) position.

<u>LOCATION</u>	<u>CONTENTS</u>	<u>LIKE THIS</u>
37772	177756	Set switches 15 through 5, 3, 2, and 1 to the up (1) position. Set all others to the down (Ø) position.
37774	ØØØ765	Set switches 8, 7, 6, 5, 4, 2 and Ø to the up (1) position. Set all others to the down (Ø) position.
37776	17755Ø	Set switches 15 through 8, 6, 5, and 3 to the up (position). Set all others to the down (Ø) position.

Repeat Step 1 to verify that the Bootstrap Loader has been correctly deposited.

C. Instructions for Loading the High-speed Paper Tape Reader

1. Raise the paper tape retainer cover.

Put the paper tape into the right hand bin with the sprocket holes toward the machine. As the tape is unfolded, the printed side should be up, and the arrow marking should point from right to left.

Place several folds of blank tape through the reader and into the left hand bin.

Place the tape over the reader head with feed holes engaged in the teeth of the sprocket wheel.

Lower the retainer cover.

Set the OFF/ON switch on the reader to ON.

2. Press the FEED button until leader is over the read head. Most RT-11 tapes use blank tape for the leader; note that some tapes use special leader, however, and this will be noted in the demonstration instructions to which they apply.

D. Instructions for Mounting and Dismounting a DECTape

1. To mount a DECTape:

Place the DECTape on the left spindle with the label out. Wind four turns onto an empty DECTape reel on the right spindle.

Set the REMOTE/OFF/LOCAL switch to LOCAL.

Press the + switch for a few seconds to make sure the tape is properly mounted.

Dial the unit selector to the desired unit number.

Set the REMOTE/OFF/LOCAL switch to REMOTE.

If the tape is to be WRITE ENABLED, set the WRITE ENABLE/WRITE LOCK switch to WRITE ENABLE. If it is to be WRITE LOCKED (write protected), set the WRITE ENABLE/WRITE LOCK switch to WRITE LOCK.

The tape is now ready for use.

2. To dismount a DECTape:

Set the REMOTE/OFF/LOCAL switch to LOCAL.

Press the + switch until the tape is completely off the right hand spindle.

Set the REMOTE/OFF/LOCAL switch to OFF.

Remove the DEctape from the left hand spindle.



REPLACEMENT PAGES

The following pages are page replaceable updates to the RT-11 System Generation Manual for V02C.

In all cases, these pages replace the existing pages in this manual or in any addendum to it. Change bars indicate where changes were made.



## SYSTEM BUILD INSTRUCTIONS

6. Type: `DKI*,**RKI*,*/X<CR>`  
Response: `?NO ;SYS/,BAD ACTION?`  
•
- Type: `DKI/K<CR>`  
Response: •

Each block on the disk being built will be checked for errors; the process takes about 4 minutes on an RK11, 1 minute on a single platter RF11 or RJS03/4, or about 30 minutes on an RP02.

### NOTE

If the response is anything but the above, see the RT-11 System Reference Manual, Section 4.2.12.

Type: `DKIA=DKIMON!TR,SYS/U<CR>`  
Response: •

7. Remove the master disk from Unit 0 and store it in a safe place. If the new system is an RK system, remove the copy from Unit 1, label it RT-11 V02C SYSTEM DISK, then mount it in Unit 0, WRITE-ENABLED.

If the system has a hardware bootstrap capable of bootstrapping the new system disk, boot the disk; otherwise, perform the bootstrapping procedures in the appropriate section of Appendix A.

RT-11 should bootstrap from the new system disk and type its identifying message,

RT-11SJ V02C-xx

If it does not, repeat this section.

8. Proceed to Section 2.2.2 if building a FORTRAN system from DECpack, Section 2.2.3 if building a BASIC system from DECpack, or consult the Table of Contents for the appropriate section if building FORTRAN or BASIC from another media. If neither FORTRAN nor BASIC will be used on the system, go to Chapter 3.

### 2.2.2 FORTRAN IV

This section contains instructions for those who received RT-11 FORTRAN on DECpack disk. The instructions involve the transfer of the necessary FORTRAN-related files to the system disk and the creation of the FORTRAN library.

1. Bootstrap an RT-11 V02C system (if you have completed Section 2.2.1, the system is already booted and running).

To the running RT-11 monitor,

SYSTEM BUILD INSTRUCTIONS

Type: DATE dd-mmm-yy<CR>

where dd-mmm-yy is the current date in the form 27-NOV-75.

Response: .

Type: TIME hh:mm:ss<CR>

where hh:mm:ss is the current 24-hour time in hours:minutes:seconds.

Response: .

2. If an RK11 system is being built, mount the RT-11 FORTRAN IV system disk on Unit 1, WRITE-PROTECTED.

Type: ASSIGN RK11DIS<CR>

Response: .

Go to Step 3.

If an RF11, RSJ03/4, or RP02 system is being built, mount the RT-11 FORTRAN IV system disk on Unit 0, WRITE-PROTECTED.

Type: ASSIGN RK01DIS<CR>

Response: .

3. Type: R PIP<CR>  
Response: \*

Type: \*.\*DIS!\*,\*/X<CR>

Response: \*

Dismount the RT-11 FORTRAN master disk and store it in a safe place.

Type: CTRL C

RESPONSE: ^C

.

Type: R LIBR<CR>

Response: \*

4. If the FORTRAN system will be running on a configuration that includes an EAE, proceed. Otherwise, go to Step 5.

Type: FORLIB=UNI,OT\$COM,V2NS,EAE/G<CR>

Response: ENTRY POINT!

Type: SERRTB<CR>

SERRS<CR>

<CR>

Response: SEND2 ILL INS  
SEND2 ILL INS  
SF102 ILL INS  
SCLO2 ILL INS  
SF102 ILL INS  
SF102 ILL INS

## SYSTEM BUILD INSTRUCTIONS

Type: CTRL C  
Response: ␣  
.

If the system has a hardware bootstrap capable of bootstrapping the new system DEctape, bootstrap the DEctape; otherwise, perform the bootstrapping procedures in Section A.2.

1. Bootstrap an RT-11 V02C system. Ensure that the system device is WRITE-ENABLED.

Type: DATE dd-mmm-yy<CR>

where dd-mmm-yy is the current date in the form 27-NOV-75.

Response: .

2. Mount the BASIC/RT-11 System DEctape 1 (DEC-11-LBACA-C-UC1) on Unit 1, WRITE LOCKed.

3. Type: R PIP<CR>  
Response: \*

Type: ␣,␣DT1;BASIC,SAV,BASOK;SAV,DEMO,BAS/X<CR>  
Response: \*

Dismount the master DEctape and store it in a safe place.

Type: CTRL C  
Response: ␣  
.

Proceed to Chapter 3.

## 2.4 BUILDING AND STARTING ON DISKETTE

### 2.4.1 RT-11

This section contains instructions for those who received RT-11 on diskette. If diskette is to be the system device, the user is instructed how to copy the master diskette. If another disk (RK11, RF11, or RP02) is to be the system device, the user is instructed how to make the larger disk system from the master diskette. It is important (for the user's protection) to build the system as instructed, then store the master in a safe place.

1. Mount the RT-11 master diskette (Disk 1 of 2, DEC-11-ORTSA-E-YC1) in the left-hand drive (Unit 0). Set the ENABLE/HALT switch to HALT to stop any previous program that may be running. Set the ENABLE/HALT switch to ENABLE.
2. If the system has a hardware bootstrap capable of bootstrapping the diskette, boot the diskette and proceed to Step 3; otherwise, see Section A.3, then proceed to Step 3.
3. There is a slight pause after which the following message is displayed on the terminal:

# SYSTEM BUILD INSTRUCTIONS

RT-11SJ V02C-xx

If not, repeat this section from Step 2.

Type: DATE dd-mmm-yy<CR>

where dd-mmm-yy is the current date in the form 27-NOV-75.

Users of diskette as the system device, proceed to Step 4.  
Users of other disks as the system device, proceed to Step 6.

4. Type: R PIP<CR>  
Response: \*

Mount a blank diskette in Unit 1.

Type: DX11/Z<CR>  
Response: DX11 /Z ARE YOU SURE?

Type: Y<CR>  
Response: \*

Type: DX11\*,\*\*DX01\*,\*/X/Y<CR>

(The system will be copied onto the blank diskette. The process takes about one minute.)

Response: \*  
Type: DX11A=DX11MONITR;SYS/U<CR>

(The system bootstrap will be copied onto the diskette on Unit 1.)

Response: \*

Type: DX11/K<CR>  
Response: \*

Each block of the diskette being built will be checked for errors. This process takes about 30 seconds.

## NOTE

If the response is anything but the above, see the RT-11 System Reference Manual, Section 4.2.12.

Remove the master RT-11 System Disk and store in a safe place. Dismount the new disk from Unit 1, label it as RT-11 SYSTEM DISK 1.

5. Mount the RT-11 System Disk (Disk 2 of 2, DEC-11-ORTSA-E-YC2) on Unit 0. Mount a blank diskette in Unit 1.

Type: DX11/Z<CR>  
Response: DX11 /Z ARE YOU SURE?

Type: Y<CR>  
Response: \*

## SYSTEM BUILD INSTRUCTIONS

```
Response: SEND2 ILL INS
          SEND2 ILL INS
          SF102 ILL INS
          SCL02 ILL INS
          SF102 ILL INS
          SF102 ILL INS
```

Go to Step 7.

- \* 6. If the configuration contains none of the above options:

```
Type: SYIPORLIB[140]=SYIUNI,OTSCOM,V2NS,NHD/G<CR>
Response: ENTRY POINTI
```

```
Type: SERRTB<CR>
      SERRS<CR>
      <CR>
```

```
Response: SEND2 ILL INS
          SEND2 ILL INS
          SF102 ILL INS
          SCL02 ILL INS
          SF102 ILL INS
          SF102 ILL INS
```

```
Type: SYIPORLIB,V2S[140]=SYIUNI,OTSCOM,V2S,NHD/G<CR>
Response: ENTRY POINTI
```

```
Type: SERRTB<CR>
      SERRS<CR>
      <CR>
```

```
Response: SEND2 ILL INS
          SEND2 ILL INS
          SF102 ILL INS
          SCL02 ILL INS
          SF102 ILL INS
          SF102 ILL INS
```

7. Type: CTRL C  
Response: ^C

Proceed to Section 2.5.3 if building a BASIC system from magtape or consult the Table of Contents for the appropriate section if building BASIC from another media. If BASIC will not be used on the system, go to Chapter 3.

### 2.5.3 BASIC/RT-11

This section contains instructions for those who received BASIC/RT-11 on magtape. The instructions involve placing running versions of BASIC on the system device.

## SYSTEM BUILD INSTRUCTIONS

The system device onto which BASIC is being built must have at least 80 free blocks. The monitor, the appropriate magtape handler (MM.SYS or MT.SYS), and PIP.SAV are the only system components necessary on this system device.

1. Bootstrap an RT-11 V02C system (if you have completed Section 2.5.1 or 2.5.2, the system is already booted and running).
2. Mount the BASIC/RT-11 master magtape (DEC-11-LBACA-C-MC7 for 7-track tape or DEC-11-LBACA-C-MC9 for 9-track tape) on Unit 0.

Type: DATE dd-mmm-yy<CR>

where dd-mmm-yy is the current date in the form 27-NOV-75.

Response: ,

3. Type: R PIP<CR>  
Response: \*

If the master magtape is on MT11,

Type: \*,\*MT0IBASIC,SAV,BAS0K,SAV,DEMO,BAS/X/M,1000<CR>

If the master magtape is on TJU16,

Type: \*,\*MM0IBASIC,SAV,BAS0K,SAV,DEMO,BAS/X/M,1000<CR>

In either case,

Response: \*

Dismount the master magtape and store it in a safe place.

Type: CTRL C

Response: \*C

,

Proceed to Chapter 3.

## 2.6 BUILDING AND STARTING FROM CASSETTE

### 2.6.1 RT-11

This section contains instructions for those who received RT-11 on cassettes. The instructions describe the building of an RK11 disk system from cassette. RK11 users will need a blank, formatted disk for this procedure. See Appendix B for formatting procedures.

Prior to inserting any master cassette during this procedure, WRITE PROTECT the data by placing the orange tabs so that the holes are uncovered. Cassette Unit 0 is on the left and cassette Unit 1 is on the right.

1. Set the ENABLE/HALT switch to HALT to stop any previous program that may be running. Set the ENABLE/HALT switch to ENABLE.



## RT-11 SYSTEM CUSTOMIZATION

.\_R PATCH<CR>

PATCH Version number

FILE NAME--

\*MONITR.SYS/M<CR>

\*56\0\_\_\_\_\_15<LF> (Fill after <CR>

57\0\_\_\_\_\_4<CR> with 4 nulls)

\*E

Once the change is made, the bootstrap recopied with the PIP /U switch, and the monitor rebooted with the PIP /O switch, all programs that use the monitor for console I/O will operate correctly.

### 4.6.2 Magtape Parity, Density, Number of Tracks

4.6.2.1 TM1 (MT.SYS) -- The RT-11 TM11 magtape handler is distributed such that it will correctly handle both 7- and 9-track drives without modification. It does so at 800 bpi, using the TM11 dump mode for 7-track drives. Seven-track drives can also be written (in hardware mode only; see the RT-11 System Reference Manual, Appendix H) at 200, 556, and 800 bpi (non-dump mode) by modifying the handler as described below.

To alter the magtape density used by the handler, the following patches must be made:

1. Patch the handler density word (location PARDEN in MT.SYS).
2. When changing from 800 bpi 9- or 7-track dump mode to 200, 556, or 800 bpi 7-track, you must patch the handler to default to hardware mode (location HW in MT.SYS) and patch the \$STAT entry in the monitor for MT.SYS (location MTSTAT in MONITR.SYS) so that the special device bit (bit 12) is off (zero).
3. When changing to 800 bpi 9- or 7-track dump mode from 200, 556, or 800 bpi 7-track, you must patch the handler to default to software mode and patch the \$STAT entry in the monitor for MT.SYS so that the special device bit is on (one).

#### NOTE

In the 200, 556, and 800 bpi 7-track modes, with the \$STAT table patched so that bit 12 is off, the MT handler will not get control when a .LOOKUP, .ENTER, .CLOSE, or .DELETE is issued for MT. Doing a .LOOKUP, .ENTER, or .CLOSE in this state simply opens or closes a channel associated with MT. The magtape is not rewound for any of these functions in this state; the only operations that are passed to the magtape handler are .READ, .WRITE, and special functions (.SPFUN).

RT-11 SYSTEM CUSTOMIZATION

The following table describes the patches for the various magtape densities:

Location	200 bpi	556 bpi	800 bpi	7-track dump mode
	7-track	7-track	7-track	(800 bpi) or 800 bpi 9-track
PARDEN (MT.SYS)	0	20000	40000	60000
HW (MT.SYS)	377	377	377	0
MTSTAT (MONITR.SYS)	2011	2011	2011	12011

For example, to cause the MT handler to write 7-track tapes at 556 bpi:

.R PATCH<CR>

PATCH Version number

FILE NAME--

\*MT.SYS<CR>

\*PARDEN/60000 20000<CR>

\*HW /00000 377<CR>

\*F

FILE NAME--

\*MONITR.SYS/M<CR>

\*MTSTAT/12011 2011<CR>

\*E

.R PIP<CR>

\*SY:A=MONITR.SYS/U<CR>

\*SY:/O<CR>

NOTE

See RT-11 System Release Notes, Table 2, for the exact addresses of PARDEN, HW, and MTSTAT.

4.6.2.2 TJU16 (MM.SYS) -- The TJU16 allows five possible tape modes in file-structured operation. Since the user may wish to transfer between tapes written in various modes, the TJU16 handler includes a table that defines the default mode for each magtape unit (MM0 to MM7). The user can change the default mode for a particular unit simply by patching that unit's entry in the mode table. The table is located at UNIMOD in the magtape handler and is eight words long. Each word contains the mode for a given unit (0-7).

The default mode for a particular unit may also be changed dynamically under program control. A nonfile-structured LOOKUP with a file count between 1 and 5 causes a mode change for the unit accessed. The following list shows the possible modes and corresponding table value for patching and file count for dynamic modification:

<u>Mode</u>	<u>Table Value</u>	<u>File Count</u>
200 bpi	0	1
556 bpi	400	2
800 bpi (odd parity)	1000	3
800 bpi (even parity)	1400	4
1600 bpi (phase-encoded)	2000	5

## RT-11 SYSTEM CUSTOMIZATION

```
.R PIP<CR>
*SY:A=MONITR.SYS/U<CR>
*SY:,O<CR>
```

### 4.6.5 Interfacing RJS03/4 DISKS TO RT-11

RT-11 is distributed with the monitor device tables for RJS03/4 disk initialized for RJS03. To allow complete use of all the space available on an RJS04 disk, modify the device size table in the monitor as follows:

<u>Location</u>	<u>RJS03 Value</u>	<u>RJS04 Value</u>
DSSIZ	2000	4000

For example, to modify the RT11 DS monitor to support an RJS04 disk rather than RJS03, type:

```
.R PATCH
PATCH: Version number
FILE NAME--
*MONITR.SYS/M<CR>
*DSSIZ/2000 4000<CR>
*E

.R PIP<CR>
*SY:A=MONITR.SYS/U<CR>
*SY:,O<CR>
```

#### NOTE

See RT-11 System Release Notes, Table 2, for the exact address of DSSIZ in the current monitor.

Once the above change has been made, zeroing the disk (using the PIP /Z switch) will adjust the directory to the appropriate size. If the system is already running from fixed-head disk as the system device and the disk cannot be zeroed without destroying the system, compressing the disk (with the PIP /S switch) will automatically re-adjust the directory size.

### 4.6.6 Interfacing RP03 Disks to RT-11

The RP02 support provided in the distribution kit is initialized for RP02 only. The RT-11 file structure can accommodate a maximum of 64000(10) blocks. The 40000(10)-block RP02 cartridge, therefore, can be accommodated as a single logical unit, while an RP03 cannot.

The RT-11 RP02 support can easily be altered, however to accommodate RP03s as follows:

RT-11 SYSTEM CUSTOMIZATION

1. Each RP03 drive must be considered as two logical units of 40000 blocks each; in essence, a single RP03 drive looks like two RP02 drives to the system. The cartridge on physical unit n is accessed as logical DPn and DPn+4; thus, drive 0 is referenced as DP0: and DP4:, drive 1 is DP1: and DP5:, etc. Note that although an RP03 is physically one device, it is two separate devices to the system. Each logical unit has its own complete directory and data space.
2. The DP.SYS handler must be patched to change location RP23 from 404 (octal) to 1404 (octal).
3. The DP monitors must be patched to alter location RP23 from 404 (octal) to 1404 (octal).

For example, to allow RT-11 to support RP03s:

```
._R PATCH<CR>
PATCH Version number
FILE NAME--
*DP.SYS<CR>
*RP23/ 404 1404<CR>
*_E
```

```
._R PATCH<CR>
PATCH Version number
FILE NAME--
*DPMNFB.SYS/M <CR>
*RP23/ 404 1404<CR>
*_E
```

```
._R PATCH<CR>
PATCH Version number
FILE NAME--
*DPMNSJ.SYS/M<CR>
*RP23/ 404 1404<CR>
*_E
```

```
._R PIP<CR>
*_SY:/O<CR>
```

NOTE

See RT-11 System Release Notes, Table 2, for the actual location of RP23 in each monitor and in DP.SYS.

Note that a maximum of four RP03s can be supported on the system. RP02s and RP03s can be mixed as long as the total number of units (physical drives) on the system does not exceed four. If the system contains only RP02s, the above changes must not be made and the system can support as many as eight units.

4.6.15 Reassigning Device Names for RK11 and RF11

Users of other DIGITAL operating systems will notice that RT-11 uses the controller names (RK and RF) rather than the more common user-level names (DK and DF) for these devices. This is due to the fact that RT-11 uses the name DK to refer to the default storage device, which may not necessarily be the RK11.

If you find this situation annoying, the device names can be reassigned with the monitor ASSIGN command, as follows:

```

ASSIGN RK|DK<CR>
ASSIGN RF|DF<CR>

```

Note, however, that when DK is reassigned in this manner, all default storage goes to the device name DK, and you may not wish to use the physical device RK as the default storage device.

4.6.16 Interfacing a Foreground Terminal

Applications for the F/B Monitor frequently require that the foreground program dialogue appear on a separate terminal, independent of the console terminal.

To facilitate development of these applications, or any others requiring multiple terminals, a source (KB.MAC) for a device-independent terminal handler has been included in the distribution kit. The source is provided for user convenience and can be used as a model for handler development, modified to meet specific needs, or assembled and used as is to provide support for a second terminal.

Documentation for the use of KB.MAC is contained in the comments at the beginning of the source; a listing appears in Appendix B of the RT-11 Software Support Manual.

4.6.17 Modifying the Line Count in MACRO and CREF

RT-11 MACRO and CREF set the number of lines printed per listing page at 60. This line count is satisfactory for applications with line printers that use paper 10.5 inches long. Applications that use paper of a different size (e.g., 8.5 inches long) and applications without line printers should modify MACRO and CREF as follows.

For MACRO:

```

R PATCH<CR>

PATCH Version number

FILE NAME--
*MACRO.SAV<CR>
*MACR1;OR<CR>
*0,12366/ 74 n<CR>
*E

R PIP<CR>
*SY:/O<CR>

```

where n is the new line count specified in octal.

For CREF:

```

.R PATCH<CR>
PATCH Version number

FILE NAME--
*CREF.SAV<CR>
*CREF1;OR<CR>
*0,3122/____ 74 ____ n<CR>
*E

.R PIP<CR>
*SY:/O<CR>

```

where n is the new line count specified in octal.

NOTE

See RT-11 System Release Notes, Table 2, for the actual addresses of MACR1 and CREF1.

4.6.18 Changing the DUMP Default Output Device

The DUMP utility program uses LP as its default output device. Systems that do not have line printers will want to change the default device, normally to TT.

DUMP.SAV can be easily altered to change the default output device as follows:

1. Patch to change location LP to the .RAD50 code for the new default output device.
2. Patch to change location MSGO+1 to the .ASCII code for the first letter of the new default output device.
3. Patch to change location MSGO+2 to the .ASCII code for the second letter of the new default output device.

For example, to change the DUMP default output device to TT (the console terminal),

```

.R PATCH<CR>
PATCH Version number

FILE NAME--
*DUMP.SAV<CR>
*LP/____ 46600 ____ 10040<CR>      [.RAD50 for TT]
*MSGO+1\114 ____ 124<CR>          [.ASCII for T]
*MSGO+2\120 ____ 124<CR>          [.ASCII for T]
*E

.R PIP<CR>
*SY:/O<CR>

```

REPLACEMENT PAGES

The following pages are page replaceable updates to the RT-11 System Release Notes for V02C.

In all cases, these pages replace the existing pages in this manual or in any addendum to it. Change bars indicate where changes were made.





RT-11 V02C SYSTEM RELEASE NOTES

Table 1  
RT-11 V02C Version Identifications

System Component	V02C Identification	How Obtained
Monitors (S/C & F/B)	V02C-02	Automatic
ASEMBL	VS02-12	Listing
BATCH	V01-04	/V
CBUILD	V01-02	Automatic
CREF	V01-04	Listing
DUMP	V02-02	PATCH
EDIT	V02-12	EV\$\$
EXPAND	V02-02	Listing
FILEX	V02-02	/V
LIBR	V03-03	Map
LINK	V04-04	Map
MACRO	VM02-12	Listing
MBUILD	V02-03	Automatic
MSBOOT	V01-05	Automatic
MTINIT	V01-01	Automatic
ODT	V01-02	Automatic
PATCH	V01-02	Automatic
PATCHO	None	
PIP	V04-06	/V
PTBUILD	V02-01	Automatic
SRCCOM	V01-03	/H
SYSLIB	V6	SYSLBV

3.1 Important Memory Locations in V02C

Table 2 lists the V02C specific memory locations referenced in RT-11 documentation. The locations are documented for the purposes of modification; therefore they do not represent actual memory locations, but addresses in the disk file as accessed by PATCH.

3.2 System Device Handler Information

Table 3 lists pertinent information concerning RT-11 system device handlers. This information is useful when replacing one device with another in the system, modifying device handlers, adding new devices to the system, etc.

RT-11 V02C SYSTEM RELEASE NOTES

Table 2  
Memory Locations in V02C

Location	S/J Monitor	F/B Monitor	Other
ALTTST	-	-	12106 (EDIT.SAV)
BASE	17000	20000	
CONFIG	35300*	37300*	
CREFL	-	-	1000 (CREF.SAV)
DSARG	-	-	14040 (EDIT.SAV)
DSSIZ	32662*	34614*	
\$DVSIZ	13660	14612	
DXIOP	-	-	1214 (DY.SYS)
EBASE	-	-	2402 (EDIT.SAV)
\$ENTRY	16564	17724	
GTVECT	35354*	37354*	
\$HSIZE	13624	14556	
HW	-	-	1366 (MT.SYS)
LISTFB	-	26032	
LOWMAP	16326	17326	
LP	-	-	2626 (DUMP.SAV)
MACR1	-	-	7662 (MACRO.SAV)
MAXBLK	16314	17314	
MSGO	-	-	2520 (DUMP.SAV)
MMHSIZ	32650*	34602*	
MMPNAM	35514*	37654*	
MMSTAT	35550*	37710*	
MTHSIZ	32640*	34572*	
MTPNAM	35504*	37644*	
MTSTAT	35540*	37700*	
PARDEN	-	-	1104 (MT.SYS)
\$PNAME	16470	17630	
RFSIZ	32666*	34620*	
RP23	43260*	54556*	1076 (DP.SYS)
\$STAT	16524	17664	
STATIN	340	340	
STATOUT	340	340	
TTCNFG	-	21416	
TTWIDT	-	21410	
UNIMOD	-	-	1312 (MM.SYS)
VECTIN	37572	47314	
VECTOUT	41026	50264	

\*BASE has already been added to these numbers.

Location	Monitor (Same for S/J and F/B Versions)					
	RK	DT	DX	DP	DS	RF
BHALT	570	634	606	652	574	562
RELLST	1610	1556	1564	1622	1542	1504

RT-11 V02C SYSTEM RELEASE NOTES

Table 3  
System Device Handler Information

Entry #	Octal Offset	Device Name		Device Code	Handler Size (Bytes)	Device Size <sub>g</sub>	Status Word
		ASCII	RAD5 <sub>g</sub>				
1	0	TT	100040	4	500	0	4
2	2	DS	15770	16	320	2000*	100016
3	4	RK	71070	0	342	11300	100000
4	6	RF	70560	12	270	2000	100012
5	10	PR	63320	7	176	0	40007
6	12	PP	63200	10	132	0	20010
7	14	MT	52140	11	4300	0	12011
8	16	LP	46600	3	306	0	20003
9	20	DT	16040	1	322	1102	100001
10	22	CT	12740	13	3710	0	12013
11	24	MM	51510	20	4700	0	12020
12	26	BA	6250	4	4076	0	4
13	30	DP	15600	21	434	116110	100021
14	32	DX	16300	22	670	756	102022
-	-	CR		14	1326	0	40014

\*RJS03. The RJS04 has 4000 blocks.

3.3 Linker

3.3.1 Changes

1. The V04 Linker (RT-11 V02C and V02B) is the result of dramatic performance improvements to the V03 Linker (RT-11 V02). One of the optimizations makes use of resident library directories; the library directories are read in to memory and kept there until no longer needed.

The Linker needs approximately 10.5K of user space for this optimization to take effect. The Linker will function in less space, but performance deteriorates as memory decreases; the 10.5K point marks a sharp drop in the performance curve.

Users with 16K of memory, therefore, should be careful when loading handlers and options if concerned about link times. The F/B Monitor uses 3.5K, GT ON uses 1.25K, and handlers use from 100 (decimal) to 1000 (decimal) words each. If many of these options are invoked, the Linker will be left with less than 10.5K and will be unable to benefit from the major optimizations.

For the same reasons, the /S switch should not be used unless absolutely necessary. It disables several optimizations for the accompanying gain in symbol table space.

The user may combine object modules using the librarian, such as combining the modules in FORLIB and SYSLIB. Doing so makes it easier to specify the command string when linking some FORTRAN programs but can also cause the link time to be more than twice as long. This is because the FORTRAN library is almost at the maximum entry point limit that the Linker can keep resident in memory in 16K or larger memory configurations.

2. The CHAIN\$ bit in the job status word for LINK.SAV is set.

### 3.3.2 Restrictions

1. If a file of zero length is accidentally specified as input to the Linker, the Linker may malfunction when generating the link map. If this happens, type two CTRL C's to return to the monitor.
2. If relocatable code is to be linked for the foreground, no location may be filled more than once (using location counter arithmetic); any such location may be improperly relocated during the FRUN and may cause program or system failure. (See the RT-11 System Reference Manual, Section 6.3, for further information.)
3. If two or more libraries are used in a link, they should be specified on the same command line.
4. The Linker may print the message ?HARD I/O ERROR? when it exceeds memory.

## 3.4 Librarian

### 3.4.1 Changes

1. The V02 Librarian (RT-11 V02) had a bug that caused it to produce faulty library directories. Although these libraries were acceptable to the V03 Linker (RT-11 V02), the improved V04 Linker (RT-11 V02C and V02B) is sensitive to the bug and will not operate correctly on libraries built with the V02 Librarian. To correct the problem, libraries built with the V02 Librarian need only be run through the V03 Librarian; the result will be a correct library.



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