Getting Started with

RT-11 FORTRAN

DEC-11-LFGOA-A-D

Order additional copies as directed on the Software
Information page at the back of this document.

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The HOW TO OBTAIN SOFTWARE INFORMATION page, located at the back of
this document, explains the various services available to DIGITAL
software users.

The postage prepaid READER'S COMMENTS form on the last page of this
document requests the user's critical evaluation to assist us in
preparing future documentation.

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Dear Customer:

We would like to take this opportunity to introduce our product and services and offer suggestions for familiarizing yourself with your RT-11 FORTRAN Software. Chapter 1 of this document provides an overview of the RT-11 FORTRAN Software Packages, while Chapter 2 contains a description of DEC Software Services. Chapter 3 is the RT-11 FORTRAN Demonstration Package which contains step-by-step instructions for "getting on the air" and exercising your RT-11 FORTRAN System. Chapter 4 contains a list of differences between RT-11 FORTRAN and DOS/BATCH FORTRAN (V06) and RSX-11D FORTRAN (V07). Finally, Chapter 5 contains patches to other RT-11 related software which correct problems which might interfere with RT-11 FORTRAN operations.

Immediately upon receipt of your RT-11 FORTRAN Software Kit, you should read this complete document and both the RT-11 FORTRAN LANGUAGE REFERENCE MANUAL and the RT-11 FORTRAN COMPILER AND OBJECT TIME SYSTEM USER'S MANUAL. Once familiar with the contents of these documents, the RT-11 FORTRAN Demonstration Package should be exercised to help develop familiarity through "hands on" experience with the system.

Included with your system is the Software Performance Summary which lists any known software problems and solutions where available. This document should be inspected carefully, and any modifications to FORTRAN which affect your application should be made immediately.

                              Small Systems Software Marketing

CHAPTER 1

OVERVIEW OF RT-11 FORTRAN IV SOFTWARE KIT

The basic RT-11 FORTRAN Software Kit is provided on four media; DECpack, DECtape, cassette and paper tape. Each kit contains user documentation and the materials necessary to build a complete RT-11 FORTRAN System. Besides the basic FORTRAN kit, other software "kits" are available, including such kits as Diagnostic (maintenance) software and RT-11 FORTRAN Source Kits. The components of each package are inventoried on checklists attached to the outside of the kit. It is recommended that the Software Package contents be verified with the checklist. Any discrepancies should be reported to Digital's Software Distribution Center in Maynard.

The RT-11 FORTRAN DECtape, DECpack and cassette kits each contains a "ready-to-run" FORTRAN compiler and the modules necessary to build a library for each supported arithmetic option. The paper tape kit includes object modules which are used to build a running FORTRAN compiler and the appropriate library. Included in all kits is the simple demonstration program, DEMO.

Also included in the RT-11 FORTRAN kit are Version 2 of the RT-11 Linker and Version 1 of the RT-11 Librarian. Users of RT-11 V01-15 will use these new system programs in conjunction with FORTRAN (they are applicable for general use as well). Users of later versions of RT-11 should not use these programs, as their RT-11 system will have been delivered with more recent versions of the Linker and Librarian which should be used in place of those provided with FORTRAN. In addition to the Linker and Librarian, a third RT-11 system program, PATCHO, is included in the FORTRAN kit. PATCHO is a general utility which can be used to modify .OBJ files, and which will be used to implement corrections for the FORTRAN Object Time System.

All the kits include RT-11 FORTRAN user documentation and this document. Specific instructions for building an RT-11 FORTRAN System are contained in the RT-11 FORTRAN Demonstration Package (Chapter 3 of this document); more general linking and assembly instructions are contained in Appendix D of the RT-11 FORTRAN COMPILER AND OBJECT TIME SYSTEM USER'S MANUAL. Before using RT-11 FORTRAN, it is important that the user should be familiar with RT-11 itself and all FORTRAN documentation. Furthermore, before using RT-11 FORTRAN, the FORTRAN Demonstration Package should be exercised to facilitate familiarization with FORTRAN itself.

In addition to the system kits described above, RT-11 FORTRAN 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 DEC'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

What can you do when you spot software problems, have suggestions for new features, discover errors or inadequacles in DEC's software or documentation?

First, make sure you have a reproducible problem and that this problem is not already documented in the PDP-11 Small Systems Software Performance Summary. Then fill out a Software Performance Report (SPR) and send it to DEC's Software Communication Services in Maynard. You are then on the way to getting an individual answer, directing maintenance attention, and possibly initiating a software revision or document rewrite. Your input is recorded by DEC, receipt is acknowledged, and the SPR is sent to the appropriate maintainer to answer. Periodic reports are given to maintainers and management on the status of SPR activity.

All of this means your input is not lost or ignored, and you furnish valuable information for planning maintenance and development efforts. Other groups such as Software Marketing and Software Services use SPR records to learn what users need and want.

SPR forms are appropriate to most DEC software systems or their documentation. That includes all diagnostic (MAINDEC) software as well as system programs. You may obtain blank forms from the Software Distribution Center. You receive blank forms in your software kits, and blank forms are sent with each answer. This service is guaranteed for one year after you receive your system.

You can help by sending in fully documented problem reports or well described suggestions. Be sure to give full configuration information

and the software version number, and include any appropriate examples, tapes, listings, etc, which might help us investigate the problem or evaluate a suggested change.

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 FORTRAN registration form will assure you of receiving this publication for at least one year.

Software Distribution Center

The PDP-11 Software Price List contains a complete list of programs and documents currently available. You may order any item(s) 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 DEC, whose objectives are to:

1. Advance the art of computation through mutual education and interchange of ideas and information,

2. Establish standards and provide channels to facilitate the free exchange of computer programs among members, and

3. 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.

The 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:

> Digital Equipment Co., Int.--Europe
> 81 Route de L'Aire C.P 340
> 1211 Geneva 26, Switzerland

Software Consulting Services

DEC maintains a staff of programmers and consultants whose services are available to DEC 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 your kit, you are eligible to order new updates of your software at the prevailing Software Distribution Center prices plus any handling or shipping charges. You must register to be eligible. Complete and mail the form to:

        Digital Equipment Corporation
        Software Distribution Center
        Building 1-2
        146 Main Street
        Maynard, Massachusetts 01754

CHAPTER 3

RT-11 FORTRAN DEMONSTRATION PACKAGE

INTRODUCTION

This chapter provides the step-by-step information needed to perform a simple demonstration of RT-11 FORTRAN. The steps described are intended to provide a user who is familiar with RT-11, but unfamiliar with RT-11 FORTRAN, enough information to build and exercise FORTRAN.

This procedure assumes familiarity with the RT-11 Operating System; a user unfamiliar with RT-11 should exercise the RT-11 System Demonstration Package before attempting to exercise this package. Besides the RT-11 System Reference Manual, the user should also be familiar with the contents of both the RT-11 FORTRAN LANGUAGE REFERENCE MANUAL and the RT-11 FORTRAN COMPILER AND OBJECT TIME SYSTEM USER'S MANUAL.

The program required in the demonstration of RT-11 FORTRAN is labeled DEMO.FOR, and is provided as part of the RT-11 FORTRAN kit.

There are five sections to this demonstration package:

1. Section I - Building FORTRAN from DECpack
disk (RK11).

2. Section II - Building FORTRAN from DECtape
(TC11).

3. Section III - Building FORTRAN from cassette.
(TA11).

4. Section IV - Building FORTRAN from paper tape
(PC11).

5. Section V - Running FORTRAN.

Instructions for operating any of the RT-11 supported peripherals with which you are unfamiliar can be found in Section VII of the RT-11 System Demonstration Package (DEC-11-ORCPA-C-D).

After reading the general instructions which follow, you should begin with Section I if your FORTRAN system arrived on disk, Section II if DECtape, Section III if cassette, and Section IV if paper tape. Once FORTRAN has been built, these sections will direct you to Section V, which serves to demonstrate some simple FORTRAN operations.

<u>NOTE</u>

No RT-11 system program ever HALTs with
the expectation that the CONTINUE switch
can be depressed 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 the
appropriate chapter 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 used:

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
   TT   - Terminal keyboard & printer
   PR   - High-speed paper tape reader
   PP   - High-speed paper tape punch
   DT   - DECtape
   DK   - Default storage device
   SY   - System device
   LP   - Line printer
   CT   - Cassette tape

3. <CR> or <LF> indicates 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 depressed and
   held down while another key, "X", is also depressed.

7. <TAB> indicates that a horizontal tab should be typed.

8. On ASR33 and ASR35 Teletype[1] terminals, special characters that are produced by holding down one key and depressing 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 may not be identical to those typed by your system; this should not be considered a system or user error. The same is true of "FREE CORE" messages printed by any of the system programs or for "FREE BLOCKS" messages included in device directories.

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[1]Teletype is a registered trademark of the Teletype Corporation.

SECTION I - Building FORTRAN from DECpack disk.

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

1. Boot an RT-11 system from a systems disk running on Unit 0, and enter the date. Before continuing, make any patches necessary, as indicated in Chapter 5.

   Mount the RT-11 FORTRAN IV System Disk (DEC-11-LRF4A-A-HC) on Unit 1, WRITE PROTECTED.

   To the running RT-11 Monitor,

Type:	R PIP<CR>
Response:	*
Type:	*.*=RK1:*.*/X<CR>
Response:	*
Type:	CTRL/C
Response:	*
Type:	R LIBR<CR>
Response:	*

   If the FORTRAN system will be running on a configuration that includes an EAE, proceed. Otherwise, go to Step 2.

Type:	FORLIB=UNI,EAE/G<CR>
Response:	ENTRY POINT:
Type:	$ERRS<CR> $ERRTB<CR> <CR>
Response:	*

   Go to Step 6.

2. If the configuration includes a PDP-11/45 processor without FPP or a PDP-11/40 processor with EIS but without FIS, proceed. Otherwise, go to Step 3.

Type:	FORLIB=UNI,EIS/G<CR>
Response:	ENTRY POINT:
Type:	$ERRS<CR> $ERRTB<CR> <CR>
Response	*

Go to Step 6.

3. If the configuration includes a PDP-11/40 processor with FIS, proceed. Otherwise, go to Step 4.

      Type: FORLIB=UNI,FIS/G<CR>

      Response: ENTRY POINT:

      Type: $ERRS<CR>
                $ERRTB<CR>
                <CR>

      Response: *

Go to Step 6.

4. If the configuration includes a PDP-11/45 processor with FPU, proceed. Otherwise, go to Step 5.

      Type: FORLIB=UNI,FPU/G<CR>

      Response: ENTRY POINT:

      Type: $ERRS<CR>
                $ERRTB<CR>
                <CR>

      Response: *

Go to Step 6.

5. If the configuration contains none of the above options:

      Type: FORLIB=UNI,OTS/G<CR>

      Response: ENTRY POINT:

      Type: $ERRS<CR>
                $ERRTB<CR>
                <CR>

      Response: *

6.   Type: CTRL/C

      Response: ↑C
                .

Dismount the master disk from Unit 1 and store in a safe place.

Proceed to section V.

SECTION II - Building FORTRAN from DECtape

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

1. Boot an RT-11 System, and enter the date. If an RT-11 DECtape system is being used, there must be at least 300 free blocks on the system tape. Before continuing, make any patches necessary, as indicated in Chapter 5.

   Mount the RT-11 FORTRAN System DECtape, Tape 1 of 2 (DEC-11-LRF4A-A-UC1) on Unit 7, WRITE LOCKED.

   To the running RT-11 Monitor,

Type:	R PIP<CR>
Response:	*
Type:	SY:*.*=DT7:*.*/X<CR>
Type:	CTRL/C
Response:	↑C
Type:	R LIBR<CR>
Response:	*

   Dismount the master tape from Unit 7, and store it in a safe place.

   Mount the RT-11 FORTRAN System DECtape, Tape 2 of 2 (DEC-11-LRF4A-A-UC2) on Unit 7, WRITE LOCKED.

   If the configuration on which FORTRAN will be running includes an EAE, a PDP-11/40 processor with FIS or EIS, or a PDP-11/45 processor, proceed to Step 2. Otherwise,

Type:	SY:FORLIB[140]=DT7:UNI,OTS/G<CR>
Response:	ENTRY POINT:
Type:	$ERRS<CR>
	$ERRTB<CR>
	<CR>
Response:	*
Type:	CTRL/C
Response:	↑C
	.

   Proceed to Section V.

2. If the configuration includes an EAE, proceed. Otherwise, go to Step 3.

```
Type:        SY:FORLIB[140]=DT7:UNI,EAE/G<CR>

Response: ENTRY POINT:

Type:        $ERRS<CR>
             $ERRTB<CR>
             <CR>

Response: *
```

Go to Step 6.

3. If the configuration includes a PDP-11/45 processor without FPP or a PDP-11/40 processor with EIS but without FIS, proceed. Otherwise, go to Step 4.

```
Type:        SY:FORLIB[140]=DT7:UNI,EIS/G<CR>

Response: ENTRY POINT:

Type:        $ERRS<CR>
             $ERRTB<CR>                    '
             <CR>

Response: *
```

Go to Step 6.

4. If the configuration includes a PDP-11/40 processor with FIS, proceed. Otherwise, go to Step 5.

```
Type:        SY:FORLIB[140]=DT7:UNI,FIS/G<CR>

Response: ENTRY POINT:

Type:        $ERRS<CR>
             $ERRTB<CR>
             <CR>

Response: *
```

Go to Step 6.

5. If the configuration includes a PDP-11/45 processor with FPU, proceed. Otherwise, go to Step 6.

```
Type:        SY:FORLIB[140]=DT7:UNI,FPU/G<CR>

Response: ENTRY POINT:

Type:        $ERRS<CR>
             $ERRTB<CR>
             <CR>

Response: *
```

6. Dismount the master DECtape from Unit 7, and store it in a safe place.

```
Type:        CTRL/C

Response: ↑C
             .
```

Proceed to Section V

SECTION III - Building FORTRAN from cassette.

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

1. Boot an RT-11 System, and enter the date. Before continuing, make any necessary patches, as indicated in Chapter 5.

   If the running RT-11 Monitor is V01-15, go to Step 2. If the running monitor is V02 or later, proceed.

      Type: R PIP<CR>

      Response: *

   Go to Step 3.

2.   Type: R PIPC<CR>

      Response: *

3. Mount the RT-11 FORTRAN IV System Cassette, Tape 1 of 7 (DEC-11-LRF4A-A-TC1) in cassette unit 0. Before loading the cassette, make certain it is write protected.

      Type: SY:*.*=CT0:*.*/X<CR>

      Response: *

   Dismount the master cassette from unit 0 and store it in a safe place. Mount the RT-11 FORTRAN IV System assette, Tape 2 of 7 (DEL-11-LRF4A-A-TC2) in cassette unit 0, write protected.

      Type: SY:*.*=CT0:*.*/X<CR>

      Response: *

   If the configuration includes an EAE, mount the RT-11 FORTRAN IV System Cassette, Tape 4 of 7 (DEC-11-LRF4A-A-TC4) in cassette unit 1, write protected. If not, proceed.

   If the configuration includes a PDP-11/45 processor without FPP or a PDP-11/40 processor with EIS but without FIS, mount the RT-11 FORTRAN IV System Cassette, Tape 5 of 7 (DEC-11-LRF4A-TC5) in cassette unit 1, write protected. If not, proceed.

   If the configuration includes a PDP-11/40 processor with FIS, mount the RT-11 FORTRAN IV System Cassette, Tape 6 of 7 (DEC-11-LRF4A-A-TC6) in cassette unit 1, write protected. If not, proceed.

   If the configuration includes a PDP-11/45 processor with FPU, mount the RT-11 FORTRAN IV System Cassette, Tape 7 of 7 (DEC-11-LRF4A-A-TC7) in cassette unit 1, write protected. If not proceed.

If the configuration contains none of the above options, mount the RT-11 FORTRAN IV System assette, Tape 3 of 7 (DEC-11-LRF4A-A-TC3) in cassette Unit 1, write protected.

Type: SY:OTS.OBJ=CT1:*.*/X<CR>

Response: *

Type: CTRL/C

Response: ↑C

.

Type: R LIBR<CR>

Response: *

Type: FORLIB=UNI,OTS/G<CR>

Response: ENTRY POINT:

Type: $ERRS<CR>
            $ERRTB<CR>
            <CR>

Response: *

Dismount the master tapes from cassette units 0 and 1, and store them in a safe place.

Type: CTRL/C

Response: ↑C
            .

Proceed to Section V

SECTION IV - Building FORTRAN from paper tape.

This section contains instructions for those who have received RT-11 FORTRAN on paper tape. The instructions involve transfer of the FORTRAN related paper tapes to the system device, then the linking of the FORTRAN files from their components. Final instructions involve creation of the FORTRAN library.

1. Boot an RT-11 System, and enter the date. Before continuing, make any patches necessary, as indicated in Chapter 5.

   To the running RT-11 monitor,

   Type: R PIP<CR>

   Response: *

2. Place the paper tape labeled "FROOT.OBJ", (DEC-11-LRF4A-A-PR1), in the reader. Depress the FEED button till blank leader is over the read head.

   For this, and all the following paper tape instructions in Step 3, the convention xxxxxx.xxx will be used to represent the name contained on the tape label underneath the FORTRAN version number. In this first example, the command below would be "FROOT.OBJ=PR:/B<CR>".

   Type: [xxxxxx.xxx]=PR:/B<CR>

   If the RT-11 system in use is V01-15, the response will be a "↑". Strike any character to initiate the read operation. If a V02 or later system is in use, the paper tape will be read immediately.

   After the tape has passed completely through the reader,

   Response: *

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

3. Repeat Step 2 for the paper tapes labelled:

"F0.OBJ"	(DEC-11-LRF4A-A-PR2)
"F1.OBJ"	(DEC-11-LRF4A-A-PR3)
"F2.OBJ"	(DEC-11-LRF4A-A-PR4)
"F3.OBJ"	(DEC-11-LRF4A-A-PR5)
"F4.OBJ"	(DEC-11-LRF4A-A-PR6)
"F5.OBJ"	(DEC-11-LRF4A-A-PR7)
"F6.OBJ"	(DEC-11-LRF4A-A-PR8)
"F7.OBJ"	(DEC-11-LRF4A-A-PR9)
"F8.OBJ"	(DEC-11-LRF4A-A-PR10)
"F9.OBJ"	(DEC-11-LRF4A-A-PR11)
"F10.OBJ"	(DEC-11-LRF4A-A-PR12)
"F11.OBJ"	(DEC-11-LRF4A-A-PR13)
"F12.OBJ"	(DEC-11-LRF4A-A-PR14)
"F13.OBJ"	(DEC-11-LRF4A-A-PR15)
"F14.OBJ"	(DEC-11-LRF4A-A-PR16)
"F15.OBJ"	(DEC-11-LRF4A-A-PR17)

```
"F16.OBJ"      (DEC-11-LRF4A-A-PR18)
"F17.OBJ"      (DEC-11-LRF4A-A-PR19)

"OTSC1.OBJ"    (DEC-11-LRF4A-A-PR20)
"OTSC2.OBJ"    (DEC-11-LRF4A-A-PR21)
"OTSC4.OBJ"    (DEC-11-LRF4A-A-PR22)
"ORSC4.OBJ"    (DEC-11-LRF4A-A-PR23)
"OTSC5.OBJ"    (DEC-11-LRF4A-A-PR24)

"UNI.OBJ"      (DEC-11-LRF4A-A-PR30)
```

Repeat Step 2 for the following paper tapes, using "/A" in place of "/B" in the command string

```
"FORTRA.HLP"   (DEC-11-LRF4A-A-PA1)
"DEMO.FOR"     (DEC-11-LRF4A-A-PA2)
```

If the RT-11 system being used is V01-15, proceed. If it is V02 or later, go to Step 4.

Repeat Step 2 for the following paper tapes:

```
"LINK0.OBJ"    (DEC-11-ORLLA-B-PR1)
"LNKOV1.OBJ"   (DEC-11-ORLLA-B-PR2)
"LNKOV2.OBJ"   (DEC-11-ORLLA-B-PR3)
"LNKOV3.OBJ"   (DEC-11-ORLLA-B-PR4)
"LNKOV4.OBJ"   (DEC-11-ORLLA-B-PR5)
"LIBR0.OBJ"    (DEC-11-ORLBA-A-PR1)
"LIBR1.OBJ"    (DEC-11-ORLBA-A-PR2)
"LIBR2.OBJ"    (DEC-11-ORLBA-A-PR3)
"LIBR3.OBJ"    (DEC-11-ORLBA-A-PR4)
"LIBR4.OBJ"    (DEC-11-ORLBA-A-PR5)

"PAT0.OBJ"     (DEC-11-ORPOA-A-PR1)
"PAT1.OBJ"     (DEC-11-ORPOA-A-PR2)
"PAT2.OBJ"     (DEC-11-ORPOA-A-PR3)
"PAT3.OBJ"     (DEC-11-ORPOA-A-PR4)
"PAT4.OBJ"     (DEC-11-ORPOA-A-PR5)
"PAT5.OBJ"     (DEC-11-ORPOA-A-PR6)
"PAT6.OBJ"     (DEC-11-ORPOA-A-PR7)
"IRAD50.OBJ"   (DEC-11-ORPOA-A-PR8)
"R50ASC.OBJ"   (DEC-11-ORPOA-A-PR9)
```

4. If the configuration contains an EAE, repeat Step 2 for the paper tape:

```
"EAEP.OBJ"     (DEC-11-LRF4A-A-PR26)
```

If the configuration contains a PDP-11/40 with EIS or a PDP-11/45 without FPP, repeat Step 2 for the paper tape:

```
"EISP.OBJ"     (DEC-11-LRF4A-A-PR27)
```

If the configuration contains a PDP-11/40 with FIS, repeat Step 2 for the paper tape:

```
"FISP.OBJ"     (DEC-11-LRF4A-A-PR28)
```

If the configuration contains a PDP-11/45 with FPP, repeat Step 2 for the paper tapes:

```
"FPUP.OBJ"     (DEC-11-LRF4A-A-PR29)
```

If the configuration does not contain any of the above options, repeat step 2 for the paper tapes:

"BARP.OBJ"   (DEC-11-LRF4A-A-PR25)

5.   TYPE: CTRL/C

Response: ↑C
.

Type: R LINK<CR>

Response: *

Type: LINKV2=LINK0/C<CR>

Response: *

Type: LNKOV1/O:1/C<CR>

Response: *

Type: LNKOV2/O:1/C<CR>

Response: *

Type: LNKOV3/O:1/C<CR>

Response: *

Type: LNKOV4/O:1<CR>

Response: ADDITIVE REF OF DPUR1
          ADDITIVE REF OF MAIN2
          ADDITIVE REF OF MAIN2
          ADDITIVE REF OF MAIN2
          ADDITIVE REF OF MAIN2
          ADDITIVE REF OF MAIN2
          ADDITIVE REF OF MAIN2
          ADDITIVE REF OF MAIN2
          ADDITIVE REF OF CHAR2
          ADDITIVE REF OF CHAR3
          ADDITIVE REF OF DPUR4
          ADDITIVE REF OF MAIN4
          ADDITIVE REF OF MAIN4
          ADDITIVE REF OF MAIN4
          ADDITIVE REF OF MAIN4
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          *

TYPE: CTRL/C

Response: †C

Type: R LINKV2<CR>

Response: *

Type: LIBR=LIBR0/C<CR>

Response: *

Type: LIBR1/0:1/C<CR>

Response: *

Type: LIBR2/0:1/C<CR>

Response: *

Type: LIBR3/0:1/C<CR>

Response: *

Type: LIBR4/0:1<CR>

Response: *

Type: CTRL/C

Response: †C
           •

Type: R LINKV2<CR>

Response: *

Type: FORTRA=FROOT/C<CR>

Response: *

Type: F0/0:1/C<CR>

Response: *

Type: F1/0:1/C<CR>

Response: *

Type: F2/0:1/C<CR>

Response: *

Type: F3/0:1/C<CR>

Response: *

Type: F4/0:1/C<CR>

Response: *

Type: F5/0:1/C<CR>

Response: *

Type: F6/0:1/C<CR>

Response: *

Type: F7/0:1/C<CR>

Response: *

Type: F8/0:1/C<CR>

Response: *

Type: F9/0:1/C<CR>

Response: *

Type: F10/0:1/C<CR>

Response: *

Type: F11/0:1/C<CR>

Response: *

Type: F12/0:1/C<CR>

Response: *

Type: F13/0:1/C<CR>

Response: *

Type: F14/0:1/C<CR>

Response: *

Type: F15/0:1/C<CR>

Response: *

Type: F16/0:1/C<CR>

Response: *

Type: F17/0:1<CR>

Response: ADDITIVE REF OF WRNBAS
          ADDITIVE REF OF WRNBAS
          ADDITIVE REF OF WRNBAS
          ADDITIVE REF OF WRNBAS
          ADDITIVE REF OF WRNBAS

```
                    *
Type:      CTRL/C

Response:  ↑C
                    .
Type:      R LIBR<CR>

Response:  *
```

If the configuration includes an EAE,

```
Type:      FORLIB=UNI,OTSC1,OTSC2,OTSC3,OTSC4,OTSC5/C/G<CR>
           EAEP<CR>
```

If the configuration includes a PDP-11/40 processor with
EIS or a PDP-11/45 processor without FPU,

```
Type:      FORLIB=UNI,OTSC1,OTSC2,OTSC3,OTSC4,OTSC5/C/G<CR>
           EISP<CR>
```

If the configuration includes a PDP-11/40 processor with
FIS,

```
Type:      FORLIB=UNI,OTSC1,OTSC2,OTSC3,OTSC4,OTSC5/C/G<CR>
           FISP<CR>
```

If the configuration includes a PDP-11/45 processor with
FPU,

```
Type:      FORLIB=UNI,OTSC1,OTSC2,OTSC3,OTSC4,OTSC5/C/G<CR>
           FPUP<CR>
```

If the configuration includes none of the above arithmetic
options,

```
Type:      FORLIB=UNI,OTSC1,OTSC2,OTSC3,OTSC4,OTSC5/C/G<CR>
           BARP<CR>

Response:  ENTRY POINT:

Type:      $ERRS<CR>
           $ERRTB<CR>
           <CR>

Response:  *

Type:      CTRL/C

Response:  ↑C .

Type:      R LINKV2<CR>

Response:  *

Type:      PATCHO=PAT0/F/I/C/B:1100<CR>

Response:  *

Type:      PAT1,IRAD50/O:1/C<CR>
```

Response: *

Type: PAT3,R50ASC/O:1/C<CR>

Response: *

Type: PAT2/O:2/C<CR>

Response: *

Type: PAT4/O:2/C<CR>

Response: *

Type: PAT5/O:2/C<CR>

Response: *

Type: PAT6/O:2<CR>

RESPONSE: LIBRARY SEARCH:

TYPE: $SHORT<CR>
            <CR>

Response: *

Type: CTRL/C

Response: ↑C
                    .

Proceed to Section V

This section contains instructions for compiling the sample program (DEMO.FOR), linking, and executing it. The program is a simple FORTRAN program to calculate a Fibonacci Series, (each term is the sum of the preceding two terms), based on user inputs.

1. Enter the date this demonstration is being run.

    Type: DAT DD-MMM-YR<CR>

[Where DD-MMM-YR is the current date in the form 12-JAN-74].

    Response: .

If the configuration does not include a line printer, proceed to Step 2. Otherwise;

    Type: ASS LP TT<CR>

    Response: .

2. Compile the FORTRAN program DEMO.FOR as follows.

    Type: R FORTRAN<CR>

    Response: *

    Type: DEMO,TT:=DEMO

[If the configuration includes a line printer, the source listing will be printed on the printer. If not, the listing will appear on the terminal]

    Response:

```
RT-11 FORTRAN IV        V01-08  SOURCE LISTING           PAGE 001

          C       RT-11 FORTRAN PROGRAM TO GENERATE N TERMS OF
          C       A FIBONACCI SERIES, THE FIRST TWO TERMS OF
          C       WHICH ARE SPECIFIED BY THE USER
          C
          C       PRINT IDENTIFYING MESSAGE
0001              WRITE (5,1000)
          C
          C       GET THE LENGTH AND FIRST TWO TERMS OF THE SERIES
0002      100     WRITE (5,1010)
0003              READ (5,1060) LENGTH
0004              IF (LENGTH) 150,125,150 !A LENGTH OF ZERO MEANS HE IS FINISHED
0005      125     STOP
0006      150     WRITE (5,1020)
0007              READ (5,1060) ITERM1
0008              WRITE (5,1030)
0009              READ (5,1060) ITERM2
          C
          C       MAKE SURE THE LENGTH HE TYPED WASN'T NEGATIVE OR TOO LARGE
0010              IF (LENGTH - 3) 200,250,250
0011      200     WRITE (5,1040) LENGTH
0012              GOTO 100
0013      250     IF (LENGTH - 50) 300,300,200
          C
```

```
      C        PRINT THE FIRST TWO TERMS OF THE SERIES
0014  300      WRITE (5,1050)
0015           WRITE (5,1060) ITERM1
0016           WRITE (5,1060) ITERM2
0017           LENGTH = LENGTH - 2
      C
      C        CALCULATE THE NEXT TERM AND PRINT IT
0018  400      ITNEW = ITERM1 + ITERM2
0019           ITERM1 = ITERM2
0020           ITERM2 = ITNEW
0021           WRITE (5,1060) ITNEW
      C
      C        DETERMINE IF SERIES IS FINISHED.  IF SO, DO NEXT ONE.
0022           LENGTH = LENGTH - 1
0023           IF (LENGTH) 100,100,400
      C
0024  1000     FORMAT ('0PROGRAM TO GENERATE A FIBONACCI SERIES')
0025  1010     FORMAT ('0HOW MANY TERMS DO YOU WANT GENERATED? ')
0026  1020     FORMAT (' WHAT IS THE FIRST TERM? ')
0027  1030     FORMAT (' WHAT IS THE SECOND TERM? ')
0028  1040     FORMAT (I5,' TERMS DOES NOT REALLY MAKE SENSE. ')
0029  1050     FORMAT ('0THE REQUESTED SERIES IS:')
0030  1060     FORMAT (I10)
0031           END
RT-11 FORTRAN IV          STORAGE MAP

NAME     OFFSET    ATTRIBUTES

LENGTH   000334    INTEGER*2 VARIABLE
ITERM1   000336    INTEGER*2 VARIABLE
ITERM2   000340    INTEGER*2 VARIABLE
ITNEW    000342    INTEGER*2 VARIABLE
```

*

Type: CTRL/C

Response: ↑C

•

3. Link the program with the FORTRAN library, FORLIB.OBJ, as follows.

Type: R LINK2<CR>

Response: *

Type: DEMO=DEMO/F<CR>

Response: *

Type: CTRL/C

Response: ↑C

•

4. Execute the program.

Type: R DEMO<CR>

Response: PROGRAM TO GENERATE A FIBONACCI SERIES

           HOW MANY TERMS DO YOU WANT GENERATED?

Type: 10<CR>

Response: WHAT IS THE FIRST TERM?

Type: 2<CR>

Response: WHAT IS THE SECOND TERM?

Type: 4<CR>

Response: THE REQUESTED SERIES IS:
                     2
                     4
                     6
                    10
                    16
                    26
                    42
                    68
                   110
                   178

           HOW MANY TERMS DO YOU WANT GENERATED?

Type: 10<CR>

Response: WHAT IS THE FIRST TERM?

Type: 17<CR>

Response: WHAT IS THE SECOND TERM?

Type: -3<CR>

Response: THE REQUESTED SERIES IS:
                    17
                    -3
                    14
                    11
                    25
                    36
                    61
                    97
                   158
                   255

Response: HOW MANY TERMS DO YOU WANT GENERATED?

Type: 0<CR>

Response: .

CHAPTER 4

DIFFERENCES BETWEEN RT-11 FORTRAN AND DOS/BATCH FORTRAN IV V06 AND RSX-11D FORTRAN IV V07

Outlined below are the differences between RT-11 FORTRAN and PDP-11 FORTRAN as implemented under DOS/BATCH and RSX-11D. Knowledge of these differences will ease efforts to move FORTRAN programs between the aforementioned systems.

The first section describes features of RT-11 FORTRAN not supported in DOS/BATCH and RSX-11D FORTRAN. The second section details aspects both FORTRAN processors have in common, but treat differently. The final section outlines those features of DOS/BATCH-11 and RSX-11D FORTRAN not supported by RT-11 FORTRAN. Where applicable, documentation references follow each item.

I. New Language Features in RT-11 FORTRAN.

1. Expressions are allowed in the output list of a WRITE,PRINT,or TYPE statement. (PDP-11 FORTRAN Language Reference Manual, Sec. 5.2.1)

2. Expressions are permitted in the parameter portion of the DO statement, and negative increments are supported as well. (PDP-11 FORTRAN Language Reference Manual, Sec. 4.3).

3. An expression may be used as the transfer variable in a Computed GOTO Statement. (PDP-11 FORTRAN Language Reference Manual, Sec. 4.1.2).

4. An unlimited number of continuation lines are permitted, although it is recommended that more than 19 not be used. (PDP-11 FORTRAN Language Reference Manual, Sec. 1.5.4)

5. A "D" in the first column of a statement may be used to indicate a "debug" statement. (PDP-11 FORTRAN Language Reference Manual, Sec. 1.5.3.1)

6. A "!" may be used to include a comment at the end of a FORTRAN statement. (PDP-11 FORTRAN Language Reference Manual, Sec. 1.4.2)

7. Exclusive OR (.XOR.) and logical equivalence (.EQV.) are supported as logical operators. (PDP-11 FORTRAN Language Reference Manual, Sec. 2.5.3.2)

8. ACCEPT and TYPE statements are supported for convenient terminal I/O. (PDP-11 FORTRAN Language Reference Manual, Sec. 5.4.3 and 5.4.4).

9. Arrays may have up to 7 subscripts. (PDP-11 FORTRAN Language Reference Manual, Sec. 7.3)

10. Variables with names of greater than six characters in length will be accepted, although a warning message can be issued. (RT-11 FORTRAN Compiler and Object Time System User's Manual, Sec. 3.1)

11. Strings may be used with STOP and PAUSE statements to cause messages to be printed on the terminal. (PDP-11 FORTRAN Language Reference Manual, Sec. 4.7 and 4.8).

12. RT-11 FORTRAN statements may appear in any order, although a warning can be issued if incorrect ordering is used. (RT-11 FORTRAN Compiler and Object Time System User's Manual, Sec. 3.6).

II. Changed Features in RT-11 FORTRAN.

1. The "Q" FORMAT descriptor is treated differently in RT-11 FORTRAN. (PDP-11 FORTRAN Language Reference Manual, Sec. 6.2.12 and 6.2.13)

2. The syntax of the IMPLICIT statement is modified. (PDP-11 FORTRAN Language Reference Manual, Sec. 7.1).

3. A length specification for a given variable can be used to override the general length specified in a Type Declaration statement. (PDP-11 FORTRAN Language Reference Manual, Sec. 7.2)

4. The default unit numbers and file names are different for RT-11 FORTRAN (RT-11 FORTRAN compiler and Object Time System User's Manual, Sec 3.4)

5. RAD50 constants have a modified syntax under RT-11 FORTRAN. (PDP-11 FORTRAN Language Reference Manual, Sec. 2.2.8)

6. The RT-11 FORTRAN compiler converts lower-case input to upper case before processing.

7. RT-11 FORTRAN has a maximum record length of 136 characters for ENCODE/DECODE and formatted I/O statements. This maximum is a compile time parameter and can be changed. (RT-11 FORTRAN Compiler and Object Time System User's Manual, Sec. 3.5).

III. DOS/BATCH FORTRAN and RSX-11D FORTRAN Features not Supported.

1. Expressions in FORMAT statements are not supported.

2. There is no BYTE data type. In most cases, programs can be simply converted by changing BYTE variables to LOGICAL*1 variables.

3. The FORMAT processor will not supply defaults.

4. Quoted strings are not permitted in expressions.

5. Formatted and unformatted data cannot be mixed in the same file.

6. A comma or slash is required between all items in the FORMAT statement.

7. Hollerith constants are not permitted except in DATA statements, FORMAT STATEMENTS, and as arguments in SUBROUTINE or FUNCTION references.

8. The system specific subroutines for DOS/BATCH FORTRAN and RSX-11D FORTRAN are not supported in the RT-11 FORTRAN library.

9. Transfer of control to FORMAT statements is not permitted.

CHAPTER 5

Patches Neccessary For Proper FORTRAN Operation.

RT-11 FORTRAN is an RT-11 system program; as such it should be used
with a monitor containing all the patches published to date in the
DIGITAL SOFTWARE NEWS. The patches listed below, however, directly
impact the performance of RT-11 FORTRAN.

V01-15 MONITOR

There is a problem with the V01-15 monitor that will cause occasional
and unpredicatable failure of I/O done in conjunction with the CALL
ASSIGN Function. The patch has been published in the DIGITAL SOFTWARE
NEWS as V01-15I, and is given below.

Underlined responses are typed by the user. <CR> represents CARRIAGE
RETURN,<LF>is LINE FEED.

```
        .R PATCH<CR>
        PATCH VERSION#
        FILE NAME--
        *MONITR.SYS/M<CR>
        *16000;0R
        *0,12664/          104160          4767<LF>
        0,12666/           104161          1574<CR>
        *0,14464/          xxxxxx          5704<LF>
        14466/             xxxxxx          1003<LF>
        14470/             xxxxxx          104160<LF>
        14472/             xxxxxx          104161<LF>
        14474/             xxxxxx          207<LF>
        14476/             xxxxxx          62716<LF>
        14500/             xxxxxx          16<LF>
        14502/             xxxxxx          207<CR>
        *106\              xxxxxx          111 <CR>
        *E

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

The resulting monitor is V01-15I.

V01 of RT-11 BASIC outputs floating numbers to a virtual memory file
in such a way as to be incompatible with FORTRAN direct access I/O.
Those who are not interested in operating on the same files with BASIC
and FORTRAN need not take any action; those who are should install
the patch given below.

The problem impacts only floating point (2 word) virtual memory files
written by V01-05 BASIC.   Once the correction has been made, all
virtual memory files written by BASIC will be FORTRAN compatible, and
BASIC will still be able to read files written before the correction
was installed. The problem will not exist in subsequent versions of
BASIC.

The patch below is given in two forms. Those who are changing the
BASIC Files,   BASIC.SAV, BAS8K.SAV, BASGT.SAV, BASLPS.SAV and
BGTLPS.SAV (all of which were distributed in the BASIC kit) should
install the patches directly as instructed below. If the patch is to
be made to a customized version of BASIC (perhaps one with a user
function added), the last patch should be used, with the values
indicated determined from the appropriate link map. The symbols used
are all global.

<CR> represents RETURN, <LF> is LINE FEED. Underlined responses are
typed by the user.

For BASIC.SAV, BASGT.SAV, BASLPS.SAV, and BGTLPS.SAV:

```
        .R PATCH<CR>
        PATCH Version#
        FILE NAME--
        *BASIC.SAV <CR>    [or appropriate]
         *25106/       16523     4737<LF>
          25110/       40        140<CR>
         *140/         0         4437<LF>
          142/         0         35056<LF>
          144/         0         32426<LF>
          146/         0         35542<LF>
          150/         0         35030<LF>
          152/         0         16523<LF>
          154/         0         40<LF>
          156/         0         207<CR>
         *E
```

For BAS8K.SAV:

```
        .R PATCH<CR>
        PATCH Version#
        FILE NAME--
        *BAS8K/O<CR>
        *400;B
         *2:12544/     16523     4737<LF>
          2:12546/     40        140<CR>
         *140/         0         4437<LF>
          142/         0         21156<LF>
          144/         0         17462<LF>
          146/         0         21632<LF>
          150/         0         21130<LF>
          152/         0         16523<LF>
          154/         0         40<LF>
          156/         0         207<CR>
         *E
```

For customized BASIC without strings, the patch is as follows:

LOCATION	OLD	NEW
EXECX+150	16523	4737
EXECX+152	40	140
140	0	4437
142	0	FNDSTR+40
144	0	EVAL+766
146	0	POP
150	0	FNDSTR+12
152	0	16523
154	0	40
156	0	207

For customized BASIC with strings,

EXECX+164	16523	4737
EXECX+166	40	140
140	0	4437
142	0	FNDSTR+60
144	0	EVAL+1056
146	0	POP
150	0	FNDSTR+32
152	0	16523
154	0	40
156	0	207

When implementing either of the above two corrections, the values of EXECX, FNDSTR, EVAL and POP should be obtained from the appropriate link map.

VØ1 and VØ2 LINKER

The RT-11 Linkers (VØ1 and VØ2) have the restriction that overlay
command strings must be specified in order of increasing region
number. For example:

```
.R LINKV2
*A=A/C
*B/O:1/C
*C/O:1/C
*D/O:2/C
*E,F/O:2/C
*G/O:3/C
*H/O:3
```

is legal and will perform correctly, while

```
.R LINKV2
*A=A/C
*D/O:2/C
*B/O:1/C
*C/O:1/C
*G/O:3/C
*H/O:3/C
*E,F/O:2
```

is illegal, since the overlay regions are given in a random numerical
order. VØ1 and VØ2 of the Linker have this restriction but do not
enforce it; VØ3 will generate error messages when erroneous overlay
commands are entered. Look for "BAD OVERLAY" error messages when
incorrect overlay commands are given to VØ1 or VØ2 Linkers.

VØ2 LINKER

The RT-11 Linker allows input files to be entered in any order with
one restriction; if modules in one library are needed to resolve
references from another library, then the library needed to resolve
the references must follow, in the Linker command string, the
library which generated those references. For example:

```
A, B and C are object modules.
D, E and F are libraries.  Routines in library E
will cause other routines from library F to be loaded.
```

```
.R LINKV2
*Z=A,B,C,D,F          is legal
*Z=A,B,C,F,D          is legal
*Z=A,B,C,D,E,F        is legal
*Z=A,B,C,D,F,E        will generate an UNDEF GLBL message because
                      library F precedes library E in the command
                      string.
```

VØ1 LIBRARIAN

The VØ1 Librarian may not operate properly if too many files (>1Ø)
are inserted into the library in the same command string. This can
be circumvented in either of two ways:

1) Concatenate all the files to be inserted into the library
    with PIP, and use the concatenated file as input to the
    Librarian.

```
.R PIP
*TEMP=A.OBJ,B.OBJ,C.OBJ,... etc.
*↑C
.R LIBR
*LIB=TEMP
```

2) Insert the object files into the library a few at a time.

```
.R LIBR
*LIB=A,B,C
*LIB=LIB,D,E,F
etc.
```

PATCHO VØ1

Version VØ1 of the PATCHO program does not allow patches to be made
at the same time as a LIST command. If a LIST is desired, a separate
run of PATCHO should be made. Typing CNTL/C then running PATCHO again
will allow successful patching.

SOFTWARE NEWSLETTERS, MAILING LIST

The Software Communications Group, located at corporate headquarters in Maynard, publishes newsletters and Software Performance Summaries (SPS) for the various Digital products. <u>Newsletters</u> are published monthly, and contain announcements of new and revised software, programming notes, software problems and solutions, and documentation corrections. <u>Software Performance Summaries</u> are a collection of existing problems and solutions for a given software system, and are published periodically. For information on the distribution of these documents and how to get on the software newsletter mailing list, write to:

> Software Communications
> P. O. Box F
> Maynard, Massachusetts 01754

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Questions or problems relating to Digital's software should be reported to a Software Support Specialist. A specialist is located in each Digital Sales Office in the United States. In Europe, software problem reporting centers are in the following cities.

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Tel Aviv, Israel	Munich, West Germany

Software Problem Report (SPR) forms are available from the specialists or from the Software Distribution Centers cited below.

PROGRAMS AND MANUALS

Software and manuals should be ordered by title and order number. In the United States, send orders to the nearest distribution center.

Digital Equipment Corporation	Digital Equipment Corporation
Software Distribution Center	Software Distribution Center
146 Main Street	1400 Terra Bella
Maynard, Massachusetts 01754	Mountain View, California 94043

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DECUS	DECUS
Digital Equipment Corporation	Digital Equipment, S.A.
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	Switzerland

READER'S COMMENTS

NOTE: This form is for document comments only. Problems
with software should be reported on a Software
Problem Report (SPR) form (see the HOW TO OBTAIN
SOFTWARE INFORMATION page).

Did you find errors in this manual? If so, specify by page.

_____

_____

_____

_____

_____

_____

Did you find this manual understandable, usable, and well-organized?
Please make suggestions for improvement.

_____

_____

_____

_____

_____

_____

Is there sufficient documentation on associated system programs
required for use of the software described in this manual? If not,
what material is missing and where should it be placed?

_____

_____

_____

_____

_____

_____

Please indicate the type of user/reader that you most nearly represent.

- ☐ Assembly language programmer
- ☐ Higher-level language programmer
- ☐ Occasional programmer (experienced)
- ☐ User with little programming experience
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Name _____ Date _____

Organization _____

Street _____

City _____ State _____ Zip Code_____
                                                 or
                                              Country

If you do not require a written reply, please check here. ☐

- **Fold Here** -

- **Do Not Tear - Fold Here and Staple** -
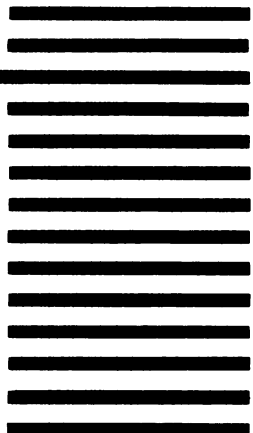
Product Code: DEC-11-LFGOA-A-DN1

Product Name: Change Notice to
                Getting Started with RT-11 FORTRAN

Date Created: August, 1974

Maintainer: Software Documentation

The HOW TO OBTAIN SOFTWARE INFORMATION page, located at the back of this document, explains the various services available to DIGITAL software users.

The postage prepaid READER'S COMMENTS form on the last page of this document requests the user's critical evaluation to assist us in preparing future documentation.

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DECCOMM	GLC-8	OS/8	RT-11
DECTAPE	IDAC	PDP	SABR
DIBOL	IDACS	PHA	TYPESET 8
			UNIBUS

Dear Customer:

Please insert page 3-11 of this Change Notice in place of page 3-11 of Getting Started with RT-11 FORTRAN. The changes are indcated by a change bar in the right hand margin.

.

```
"F16.OBJ"      (DEC-11-LRF4A-A-PR18)
"F17.OBJ"      (DEC-11-LRF4A-A-PR19)

"OTSC1.OBJ"    (DEC-11-LRF4A-A-PR20)
"OTSC2.OBJ"    (DEC-11-LRF4A-A-PR21)
"OTSC3.OBJ"    (DEC-11-LRF4A-A-PR22)
"OTSC4.OBJ"    (DEC-11-LRF4A-A-PR23)
"OTSC5.OBJ"    (DEC-11-LRF4A-A-PR24)

"UNI.OBJ"      (DEC-11-LRF4A-A-PR30)
```

Repeat Step 2 for the following paper tapes, using "/A" in place of "/B" in the command string

```
"FORTRA.HLP"   (DEC-11-LRF4A-A-PA1)
"DEMO.FOR"     (DEC-11-LRF4A-A-PA2)
```

If the RT-11 system being used is V01-15, proceed. If it is V02 or later, go to Step 4.

Repeat Step 2 for the following paper tapes:

```
"LINK0.OBJ"    (DEC-11-ORLLA-B-PR1)
"LNKOV1.OBJ"   (DEC-11-ORLLA-B-PR2)
"LNKOV2.OBJ"   (DEC-11-ORLLA-B-PR3)
"LNKOV3.OBJ"   (DEC-11-ORLLA-B-PR4)
"LNKOV4.OBJ"   (DEC-11-ORLLA-B-PR5)
"LIBR0.OBJ"    (DEC-11-ORLBA-A-PR1)
"LIBR1.OBJ"    (DEC-11-ORLBA-A-PR2)
"LIBR2.OBJ"    (DEC-11-ORLBA-A-PR3)
"LIBR3.OBJ"    (DEC-11-ORLBA-A-PR4)
"LIBR4.OBJ"    (DEC-11-ORLBA-A-PR5)

"PAT0.OBJ"     (DEC-11-ORPOA-A-PR1)
"PAT1.OBJ"     (DEC-11-ORPOA-A-PR2)
"PAT2.OBJ"     (DEC-11-ORPOA-A-PR3)
"PAT3.OBJ"     (DEC-11-ORPOA-A-PR4)
"PAT4.OBJ"     (DEC-11-ORPOA-A-PR5)
"PAT5.OBJ"     (DEC-11-ORPOA-A-PR6)
"PAT6.OBJ"     (DEC-11-ORPOA-A-PR7)
"IRAD50.OBJ"   (DEC-11-ORPOA-A-PR8)
"R50ASC.OBJ"   (DEC-11-ORPOA-A-PR9)
```

4. If the configuration contains an EAE, repeat Step 2 for the paper tape:

```
"EAEP.OBJ"     (DEC-11-LRF4A-A-PR26)
```

If the configuration contains a PDP-11/40 with EIS or a PDP-11/45 without FPP, repeat Step 2 for the paper tape:

```
"EISP.OBJ"     (DEC-11-LRF4A-A-PR27)
```

If the configuration contains a PDP-11/40 with FIS, repeat Step 2 for the paper tape:

```
"FISP.OBJ"     (DEC-11-LRF4A-A-PR28)
```

If the configuration contains a PDP-11/45 with FPP, repeat Step 2 for the paper tapes:

```
"FPUP.OBJ"     (DEC-11-LRF4A-A-PR29)
```

If the configuration does not contain any of the above options, repeat step 2 for the paper tapes:

"BARP.OBJ"   (DEC-11-LRF4A-A-PR25)

5.   TYPE: CTRL/C

        Response: ↑C
                  .

        Type: R LINK<CR>

        Response: *

        Type: LINKV2=LINK0/C<CR>

        Response: *

        Type: LNKOV1/O:1/C<CR>

        Response: *

        Type: LNKOV2/O:1/C<CR>

        Response: *

        Type: LNKOV3/O:1/C<CR>

        Response: *

        Type: LNKOV4/O:1<CR>

        Response: ADDITIVE REF OF DPUR1
                  ADDITIVE REF OF MAIN2
                  ADDITIVE REF OF MAIN2
                  ADDITIVE REF OF MAIN2
                  ADDITIVE REF OF MAIN2
                  ADDITIVE REF OF MAIN2
                  ADDITIVE REF OF MAIN2
                  ADDITIVE REF OF MAIN2
                  ADDITIVE REF OF CHAR2
                  ADDITIVE REF OF CHAR3
                  ADDITIVE REF OF DPUR4
                  ADDITIVE REF OF MAIN4
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