

R S T S - 1 1

SYSTEM MANAGER'S GUIDE

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Your attention is invited to the last two pages of this document. The "How to Obtain Software Information" page tells you how to keep up-to-date with DEC's software. The "Reader's Comments" page, when filled in and mailed, is beneficial to both you and DEC; all comments received are acknowledged and are considered when documenting subsequent manuals.

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Associated document:

BASIC-Plus Programming Manual

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PREFACE

This guide contains procedures for building an RSTS-11 system. It is intended solely for the use of the RSTS-11 system manager. As the information in this guide is not required by the RSTS-11 user, the system manager is advised to keep it confidential.

Additional information on RSTS-11 can be found in the BASIC-Plus Programming Manual, PL-11-71-01-01-A-D.

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RSTS-11 is equipped to handle as many as 124 accounts. Up to 16 active users can be accommodated simultaneously. Associated with each account is a pair of identification numbers and a password. The pair of numbers is specified in the form:

[n,n]

where each n is a decimal number in the range 1 to 255₁₀. The first number represents a project, which may have several programmers associated with it; the second number represents an individual programmer. More than one user can be logged in on the same account number pair at the same time. Account numbers may be known to anyone; however, passwords are only known to their owners and the system manager.

The disk area of account [1,1] contains the Master File Directory. This directory contains the information necessary for retrieving files from any disk area: account numbers, passwords, and pointers to each User's File Directory. The password for this file, MAGI, should therefore be known only to the system manager. To add users to the system, accounts are created in the [1,1] disk area.

System programs¹ are supplied on a paper tape, and are filed in the system library disk area, account number [1,2], password LIBR. This password should, likewise, be known only to the system manager.

Note that currently there is no way of changing passwords MAGI and LIBR.

BUILDING AN RSTS-11 SYSTEM

Building an RSTS-11 software system takes four steps:

1. Loading the Monitor onto the disk
2. Refreshing the disk (i.e. initializing the file system)
3. Building the system program library
4. Defining account numbers and passwords.

INITIALIZING THE PDP-11 SYSTEM UNITS

Before using the computer system, it is good practice to initialize all units as specified below.

- a. Main power cord is properly plugged in
- b. Computer POWER key is ON

¹Sometimes known as CUSPs

- c. Console switches are set: ENABLE/HALT to HALT
 SR=000000
- d. Console Teletype is turned to LINE
- e. Low-speed punch is OFF
- f. Low-speed reader is set to FREE
- g. High-speed reader/punch is ON

The system is now initialized and ready for your use.

When your PDP-11 computer is first received, its core memory is completely demagnetized -- it "knows" absolutely nothing, not even how to receive paper tape input. However, the computer can accept data when toggled directly into core using the console switches. Since the Bootstrap Loader program is the very first program to be loaded, it must be toggled into core.

The Bootstrap Loader is a program that instructs the computer to accept and store in core, data that is punched on paper tape in bootstrap format. This Loader is used to load very short paper tape programs of 162_8 16-bit words or less -- primarily the Absolute Loader. Programs longer than 162_8 16-bit words are loaded into core using the Absolute Loader.

The Absolute Loader is a system program which enables you to load into any available core memory bank, data punched on paper tape in absolute binary format. It is used here to load RSTS-11 and its system programs.

THE BOOTSTRAP LOADER

The Bootstrap Loader should be loaded (toggled) into the highest core memory bank. The locations and corresponding instructions of the Bootstrap Loader are listed and explained below.

<u>Location</u>	<u>Instruction</u>
xx7744	016701
xx7746	000026
xx7750	012702
xx7752	000352
xx7754	005211
xx7756	105711
xx7760	100376
xx7762	116162
xx7764	000002
xx7766	xx7400
xx7770	005267
xx7772	177756
xx7774	000765
xx7776	177550

Figure 1. Bootstrap Loader Instructions

In Figure 1, xx represents the highest available memory bank. For example, the first location of the Loader would be one of the following, depending on memory size, and xx in all subsequent locations would be the same as the first.

<u>1st Location</u>	<u>Memory Bank</u>	<u>Memory Size</u>
117744	4	20K
137744	5	24K
157744	6	28K

Note also in Figure 1 that the contents of location xx7766 should reflect the appropriate memory bank in the same manner as the location.

LOADING THE BOOTSTRAP LOADER INTO CORE

With the computer initialized for use as described above, toggle in the Bootstrap Loader as explained below.

1. Set xx7744 in the Switch Register (SR) and press LOAD ADDRESS (xx7744 will be displayed in the ADDRESS REGISTER).
2. Set the first instruction, 016701, in the SR and lift DEPOSIT (016701 will be displayed in the DATA register).

NOTE

When DEPOSITING data into consecutive words, the DEPOSIT automatically increments the ADDRESS REGISTER to the next word.

3. Set the next instruction, 000026, in the SR and lift DEPOSIT (000026 will be displayed in the DATA register).
4. Set the next instruction in the SR, press DEPOSIT, and continue depositing subsequent instructions (ensure that location xx7766 reflects the proper memory bank) until after 17750 has been deposited in location xx7776.

It is good programming practice to verify that all instructions are stored correctly. This is done by proceeding at step 5 below.

5. Set xx7744 in the SR and press LOAD ADDRESS.
6. Press EXAMINE (the octal instruction in location xx7744 will be displayed in the DATA register so that it can be compared to the correct instruction, 016701. If the instruction is correct, proceed to step 7, otherwise go to step 9.

7. Press EXAMine (the instruction of the location displayed in the ADDRESS REGISTER will be displayed in the DATA register; compare the DATA register contents to the instruction for the displayed location).
8. Repeat step 7 until all instructions have been verified or go to step 9 whenever the correct instruction is not displayed.

Whenever an incorrect instruction is displayed, it can be corrected by performing steps 9 and 10.

9. With desired location displayed in the ADDRESS REGISTER, set the correct instruction in the SR and lift DEPOSIT (the contents of the SR will be deposited in the displayed location).
10. Press EXAMine to ensure that the instruction was correctly stored (it will be displayed in the DATA REGISTER).
11. Proceed at step 8 until all instructions have been verified.

The Bootstrap Loader is now loaded into core.

LOADING THE ABSOLUTE LOADER

The Absolute Loader begins with special leader code (ASCII code 351).

With the Bootstrap Loader in core, the Absolute Loader can be loaded into core starting anywhere between location xx7400 and location xx7743, i.e., 162₈ words. The paper tape input device used is the high-speed reader.

The Absolute Loader is loaded into core as explained below.

1. Set the ENABLE/HALT switch to HALT.
2. Place the Absolute Loader tape in the high-speed reader with the special leader code over the reader sensors (under the reader station).
3. Set the SR to xx7744 (the starting address of the Bootstrap Loader) and press LOAD ADDRESS.
4. Set the ENABLE/HALT switch to ENABLE.
5. Press START. The tape will pass through the reader as data is being loaded into core.
6. The tape stops after the last frame of data has been read into core. The Absolute Loader is now in core.

With the Absolute Loader in core, you can now load the RSTS-11 binary paper tape as follows:

1. Set the ENABLE/HALT switch to HALT
2. Set the SR to xx7500 and press LOAD ADDR.
3. Place the RSTS-11 tape in the high-speed reader with blank leader tape directly over the reader sensors.
4. Set ENABLE/HALT to ENABLE.
5. Press START. The RSTS-11 tape will begin passing through the reader station as data is being loaded into core.

DUMPING THE SYSTEM ON DISK

When the tape has been loaded, RSTS-11 prints

L D R S?

asking you which of the following tasks you wish to perform --

Load, Dump, Refresh, or Start

The appropriate keyboard response at this initial stage would be to type D followed by the RETURN key.

NOTE

All lines are terminated by the typing of the RETURN key, unless otherwise specified.

Responding with the D option dumps RSTS-11 onto the first 20K of the disk.

REFRESHING THE RSTS-11 FILE SYSTEM

After the system has been dumped onto the disk, the system repeats the question

L D R S?

The response here should be R, for Refresh. This operation initializes the file system (i.e., deletes everything but RSTS itself from the disk) and must be performed whenever RSTS is first loaded on a PDP-11. RSTS then seeks confirmation by printing

ARE YOU SURE?

Typing Y for Yes refreshes the disk and also assigns the passwords MAGI and LIBR to system account numbers [1,1] and [1,2] respectively. An N response (or typing just the RETURN key) causes the R request to be cancelled. In either case, the system goes on to the next step, which once again is the printout

L D R S?

STARTING THE SYSTEM

An S response to L D R S? (or typing just the RETURN key) starts the system. RSTS prints

[1,2]?

asking if you wish to log in using the system library account number. A response of Y logs you in under [1,2] so you can load the library. If you refreshed the disk, this is the only way to get onto the system.

The next two printouts are requests from RSTS for the current date and time of day. In response to

DD-MON-YY?

type the data in the indicated form, e.g.,

5-JUN-71

Impossible dates, such as any that are older than RSTS, are detected by the system.

In response to

HH:MM?

type the current time in the 24-hour clock system, where 1:00 A.M. through 12:00 midnight is notated 1:00 through 24:00. For example, 9:45 A.M. would be typed as 9:45, and 9:45 P.M. would be typed as 21:45.

RSTS then identifies itself by printing RSTS-11 followed by its version number.

You will now be on the air.

If you refreshed, and logged in under [1,2], place the library tape in the high-speed reader, and type

RUN PTR:

This causes various routines to be loaded from the tape. The library loader FASTLD provides instructions for its operation as follows:

INPUT DEVICE ? PTR:
LOGIN.BAS STORED
REACT.BAS STORED
FASTLD.BAS STORED
DUMPER.BAS STORED
LOGOUT.BAS STORED
PIP.BAS STORED
RELEAS.BAS STORED

(User specifies high-speed reader)
(System program FASTLD prints
what it has done: stored
the ASCII source tapes listed.
The extension .BAS identifies
the program format as source.)

THE CUSP'S HAVE NOW BEEN STORED ON DISK
THEY SHOULD NOW BE COMPILED TO MAKE LOADING AND
EXECUTION AS FAST AS POSSIBLE. TO ACCOMPLISH THIS END
TYPE THE FOLLOWING COMMANDS

OLD LOGIN
COMPILE
OLD LOGOUT
COMPILE
OLD REACT
COMPILE
OLD PIP
COMPILE

RUN RELEAS

THE SYSTEM IS NOW READY FOR TIME-SHARING PDP-11 STYLE
GOOD LUCK...

When RSTS prints READY type OLD LOGIN. RSTS will acknowledge execution
of the command by printing READY once again. Typing COMPILE will com-
pile OLD LOGIN. This sequence continues through compilation of OLD PIP
as shown below.

READY
OLD LOGIN
READY
COMPILE
READY
OLD LOGOUT
READY
COMPILE
READY
OLD REACT
READY
COMPILE
READY
OLD PIP
READY
COMPILE
READY

You should now create NOTICE.TXT, the text to be printed out when a user logs in (where useful, underline indicates printout):

```
RUN PIP
*NOTICE.TXT<TTY:
```

Here, type the message for the user. The message will be printed out to a user logging in if he indicated his account number in the form n,n, but it will not be printed out if his number was given as n/n.

Typing CTRL/Z ends the file, and PIP prints:

```
n LINES IN FILE
*
```

where n is the number of lines in the file.

Typing =NOTICE.TXT <40> will protect the file.

Following the final direction, you should now type

```
RUN RELEAS
```

which causes the following to be listed:

```
FILES RELEASED FOR USER USE:
LOGIN.BAC           (.BAC extension indicates a
LOGOUT.BAC          compiled program)
PIP.BAC
REACT.BAC
DUMPER.BAS
```

The system programs perform the following tasks:

1. LOGIN - run by the HELLO command. Logs the user into the system and checks the validity of the account number and password.
2. LOGOUT - run by the BYE command. User leaving terminal. Closes and saves user's open files.
3. PIP - copies files on specified device.
4. FASTLD - loads system programs onto the disk.
5. DUMPER - dumps from the disk onto a specified device.
6. RELEAS - makes compiled system programs accessible to users.
7. REACT - used to create new accounts in [1,1].

From this point, the system manager must add his own library programs (if any), make any necessary changes to the system programs, and expand the Master File Directory to include entries for other system users.

To add a user to the system, log in under [1,1]:

HELLO

(RSTS identifies itself)

#1,1

(message is printed)

PASSWD: (type MAGI - it will not echo)

NEW OR OLD RUN \$REACT (\$=DSK:[1,2])

(type account number followed by password for each new account - password will echo now)

#CTRL/C (return to BASIC command mode - echoes as
 ↑C)

READY

(issue BASIC command)

HOW TO OBTAIN SOFTWARE INFORMATION

Announcements for new and revised software, as well as programming notes, software problems, and documentation corrections are published by Software Information Service in the following newsletters.

Digital Software News for the PDP-8 & PDP-12
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