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OS/8
System Generation Notes

Order No. AA-H606A-TA

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March 1979

ABSTRACT

This document describes the procedures for getting on line with OS/8.

SUPERSESSION/UPDATE INFORMATION: This manual supersedes and updates information in the OS/8 Handbook (DEC-S8-OSHBA-A-D) and the OS/8 Handbook Update (DEC-S8-OSHBA-A-DN4).

OPERATING SYSTEM AND VERSION: OS/8 V3D.

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First Printing, March 1979

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DOCUMENTATION SET FOR OS/8

OS/8 SYSTEM GENERATION NOTES (AA-H606A-TA)

The System Generation Notes provide the information you need to get a new OS/8 system running.

OS/8 SYSTEM REFERENCE MANUAL (AA-H607A-TA)

The System Reference Manual describes OS/8 system conventions, keyboard commands, and utility programs.

OS/8 TECO REFERENCE MANUAL (AA-H608A-TA)

The TECO Reference Manual describes the OS/8 version of this character-oriented text editing and correcting program.

OS/8 LANGUAGE REFERENCE MANUAL (AA-H609A-TA)

The Language Reference Manual describes all languages supported by OS/8, including BASIC, FORTRAN IV, and the PAL8 assembly language.

OS/8 ERROR MESSAGES (AA-H610A-TA)

This manual lists in alphabetical order all error messages generated by OS/8 system programs and languages.

OS/8 SYSTEM GENERATION NOTES

1.0 GETTING ON LINE WITH OS/8

OS/8 software is distributed in a form appropriate for your particular hardware configuration. The general system categories are DECtape (LINCtape), cassette, and paper tape. This manual provides the information that the user of any of these types of systems needs to start using OS/8.

This manual also describes the procedures for bootstrapping a disk system and for restarting OS/8.

To get on-line when your system is installed, refer to the section that deals with your medium of distribution.

2.0 DECTAPE SYSTEMS

OS/8 supports the following DECtape systems: TC01/TC08, TD8E, and LINCtape (PDP-12). Since the software is supplied on a system DECtape (or LINCtape), it is not necessary to build an initial system, as it is when using cassettes or paper tapes.

Two tapes are distributed with each DECtape (LINCtape) system.

System Tape #1 contains the system programs and all OS/8 Monitor functions.

System Tape #2 contains TDINIT.SV (used in TD8E system initialization) and two TD8E DECtape monitor images (8K ROM and 12K). Other files on this second tape contain the device handlers in a format suitable for the OS/8 BUILD program. Each file contains a handler for a specific device type. These files are to be used as input for the LOAD command in BUILD and are described in the BUILD section of Chapter 2. In addition to these files, the tape also contains relocatable binary files of the FORTRAN II library subroutines. LIBSET, the FORTRAN II librarian, is used to create a FORTRAN II library as described in the OS/8 Language Reference Manual. Finally, the tape contains several OS/8 help files. These help files are intended to provide the user with a quick command summary for most OS/8 programs. They can be printed with either OS/8 PIP or the CCL command HELP.

2.1 The TC01/TC08 DECtape

The following short procedure is used to start OS/8 on a TC01/TC08 system:

1. Mount the system DECtape (AL-4711C-BA) on unit 0 (this appears as unit 8 on some DECtape units), making certain to wind at least 10 feet of tape onto the empty reel. Set the tape unit switches to REMOTE and WRITE LOCK.

2. Bootstrap the OS/8 DECtape by following one of two methods. If the system includes an MI8-E hardware bootstrap option:

   a. Place the terminal on line. Raise the SING STEP switch on the PDP-8/E console. Press the CONT switch. Then lower and raise the HALT switch. At least one console indicator lamp should light.

   b. Having mounted the OS/8 System Tape #1 on unit 0 as described above, lower and raise the SW switch on the left side of the console.

   If the system does not include a hardware bootstrap, this procedure will have no effect. In this case, execute step 1 above, place the terminal on line, and then perform the switch manipulations shown in Table 1. For each step in the table, place each of the PDP-8/E console SWITCH REGISTER switches numbered 0 to 11 either in the up position if the corresponding table entry is a 1, or in the down position if the corresponding table entry is a 0. When all 12 switches have been set to correspond to a line in the table, follow the instructions in the right hand column and proceed to the next line. In step 4, for example, place switches 2, 4, 7, and 10 in the up position; place switches 1, 3, 5, 6, 8, 9, and 11 in the down position; lift the DEP switch; and proceed to step 5. The table also includes octal values of the binary switch settings for the benefit of users familiar with octal numbers.

Table 1
TC01/TC08 DECtape Bootstrap

STEP #	OCTAL VALUES	SWITCH REGISTER SETTING				AND THEN
		012	345	678	91011	
1	0000	000	000	000	000	press EXTD ADDR LOAD
2	7613	111	110	001	011	press ADDR LOAD
3	6774	110	111	111	100	lift DEP key
4	1222	001	010	010	010	lift DEP key
5	6766	110	111	110	110	lift DEP key
6	6771	110	111	111	001	lift DEP key
7	5216	101	010	001	110	lift DEP key
8	1223	001	010	010	011	lift DEP key
9	5215	101	010	001	101	lift DEP key
10	0600	000	110	000	000	lift DEP key
11	0220	000	010	010	000	lift DEP key
12	7754	111	111	101	100	press ADDR LOAD
13	7577	111	101	111	111	lift DEP key
14	7577	111	101	111	111	lift DEP key
15	7613	111	110	001	011	press ADDR LOAD and press CLEAR and press CONT

Either bootstrapping procedure first rewinds the DECtape on unit 0 to the end zone, then starts it moving forward, reading block 0 into locations beginning at 7600 in field 0. In block 0 of the DECtape is a larger bootstrap. This bootstrap continues to read the tape and install the resident Monitor code, finally turning control over to the OS/8 Keyboard Monitor.

3. DECtape unit 0 will rock, and the console terminal will respond by printing a dot (.) at the left margin. At this point, OS/8 is active; DECtape unit 0 must be set to WRITE ENABLE.

NOTE

If the terminal does not respond properly, check that the bootstrap was loaded correctly, that unit 0 is selected and set to REMOTE, that the correct tape is mounted, and that the terminal is set to REMOTE or LINE. If trouble persists, contact the local Digital sales office.

2.2 TD8E DECtapes

OS/8 supports TD8E DECtape hardware in two configurations: TD8E DECtape and 12K or more core, and TD8E DECtape and 8K core and 256-word Read-Only-Memory (ROM).

2.2.1 **TD8E Initialization Program** - TD8E DECtape users must run a special initialization program before OS/8 can be used. This program need only be run once to create the proper configuration; thereafter, the appropriate TD8E bootstrap (discussed shortly) can be used to start OS/8.

Use the following procedures to initialize the TD8E DECtape system.

1. Mount the binary DECtape (AL-4712C-BA) on DECtape unit 0. Set the tape unit switches to REMOTE and WRITE LOCK.

2. Turn the console terminal to LINE or REMOTE.

3. Execute one of the TD8E bootstraps (see Section 2.2.3).

4. When the bootstrap is executed correctly, the message:

   TD8E INITIALIZER PROGRAM VERSION 4

   is printed on the terminal. Then, depending upon which type of TD8E configuration is present, one of the following messages is printed to indicate the system on which OS/8 will be built.

   a. 8K ROM SYSTEM

      is printed if the user has the 256-word ROM.

b. 12K SYSTEM

is printed if the user has no ROM but does have 12K or more of core memory.

NOTE

If neither the ROM nor 12K of memory exists, the message:

NEED ROM OR 12K

appears, and the machine halts. This indicates that the configuration is not suitable for running the TD8E version of OS/8.

5. After the message specifying the hardware configuration (a or b above), the following instructions to the user appear:

```
MOUNT A CERTIFIED DECTAPE ON UNIT 1 WRITE-ENABLED
ALWAYS KEEP ORIGINAL SYSTEM DECTAPES WRITE-LOCKED
STRIKE A CHARACTER TO CONTINUE
```

Perform the specified operations. At this point, the current OS/8 Monitor is written onto a blank DECtape on unit 1. Note that the original tape (on unit 0) is not written upon.

6. When the copy operation is complete, the following instructions are printed:

```
DISMOUNT TAPE #2 FROM UNIT 0 AND SAVE IT
MOUNT ORIGINAL SYSTEM TAPE #1 ON UNIT 0
PREPARE TO COPY FILES OVER
STRIKE A CHARACTER TO CONTINUE
```

The system programs will now be copied from System Tape #1 (AL-4711C-8A) to the tape being created. Perform the specified operations and type any character except CTRL/Z to continue. PREPARE TO COPY FILES OVER means to expect copying to take place; no additional preparation is implied. The following message is printed:

```
COPYING FILES FROM UNIT 0 TO UNIT 1
```

and the system copies the files and updates the DECtape directory.

NOTE

If you wish to perform nonstandard special processing, you can respond with a CTRL/Z to the preceding dialogue. If CTRL/Z is typed, the following messages appear:

```
TYPE 1 TO COPY FILES FROM UNIT 0 TO UNIT 1
TYPE 2 TO ZERO THE DIRECTORY OF UNIT 1
TYPE 3 TO LEAVE THE DIRECTORY OF UNIT 1 ALONE
STRIKE A CHARACTER TO CONTINUE
```

Reply with either a 1, 2, or 3 (which will not echo) to indicate the desired option. Typing any character other than those indicated will repeat the request message. One of the following confirmatory messages will appear, to indicate the options 1, 2, or 3, respectively:

```
COPYING FILES FROM UNIT 0 TO 1
ZEROING THE DIRECTORY ON TAPE UNIT 1
DIRECTORY ON UNIT 1 PRESERVED
```

7. When the files have been copied, the following instructions appear:

```
REMOVE AND SAVE TAPE ON UNIT 0
TAKE NEW TAPE (ON UNIT 1) WHICH WAS JUST CREATED
AND PLACE IT ON UNIT 0
IT IS YOUR NEW OS/8 SYSTEM TAPE
STRIKE A CHARACTER TO CONTINUE
```

Remove the original OS/8 tape and save it for later use. Set DECtape unit 0 to WRITE-ENABLE, and type any character to continue. The tape on unit 0 will be initialized to a TD8E configuration.

When the initialization is completed, a dot (.) is printed at the left margin of the terminal. OS/8 is active on a TD8E-based system.

2.2.2 **TD8E Initialization Error Messages** - The messages listed in Table 2 may appear during the TD8E initialization process.

Table 2
TD8E Initialization Error Messages

Message	Meaning
FATAL IO ERROR	Unable to read from newly copied system tape.
MOUNT CORRECT TAPE ON UNIT 0	Cannot copy tape currently mounted.
NEED ROM OR 12K	Improper hardware configuration.
NOT ORIGINAL OS/8 SYSTEM TAPE #2	The tape copied from was not an original OS/8 tape supplied by Digital.
STRIKE A CHARACTER TO CONTINUE	An I/O error occurred on the DECtape. Type any character to retry the operation.
TYPE ANY OTHER CHARACTER TO RETRY THIS I/O OPERATION	First retry failed. Type any other character to retry another time.
TYPE A TO ABORT AND START OVER AGAIN	Return to Step 1.

2.2.3 **TD8E Bootstraps** - The 8K ROM and 12K TD8E bootstraps both read record 0 of the system tape into memory and then start it at location 7400 in field 0. The code that is read into 7400 is a larger bootstrap which installs all resident tables and then turns control over to the OS/8 Keyboard Monitor or the TD8E initialization program. (The 12K system must move down to tape block 154 to accomplish the full bootstrap. This explains the extra tape motion.)

When the TD8E system (either 8K ROM or 12K) is initialized, only TD8E DECtapes 0 and 1 (DTA0, DTA1) are available on the system. The others (DTA2-DTA7) are not in the system. To make other drives available, you must run the BUILD program. See the BUILD chapter in the OS/8 System Reference Manual for details on how to reconfigure a system.

2.2.3.1 **8K ROM Bootstrap (PDP-8/E)**

1. Set the switch register on the PDP-8/E console to 7470 (octal), i.e., set switches 0, 1, 2, 3, 6, 7, and 8 in the up position, and set switches 4, 5, 9, 10, and 11 in the down position.

2. Raise the SING STEP switch. Lower and raise the HALT switch.

3. Press the EXTD ADDR LOAD, ADDR LOAD, CLEAR, and CONT switches. The tape bootstrap will be executed and a message will be printed (if initializing) or the OS/8 Keyboard Monitor will print a dot (.) to indicate that it is active. If initializing, set DECtape unit 0 to WRITE-LOCK. If OS/8 is already active, set DECtape unit 0 to WRITE-ENABLE.

2.2.3.2 **12K TD8E Bootstrap** - The contents of the 12K TD8E bootstrap are included in Table 3.

The tape bootstrap will be executed and a message will be printed (if initializing) or the OS/8 Keyboard Monitor will print a dot (.) to indicate that it is active. If initializing, set DECtape unit 0 to WRITE-LOCK. If OS/8 is already active, set DECtape unit 0 to WRITE-ENABLE.

Table 3
12K TD8E DECtape Bootstrap

STEP #	OCTAL VALUES	SWITCH REGISTER SETTING				AND THEN
		012	345	678	91011	
1	7300	111	011	000	000	press ADDR LOAD and press EXTD ADDR LOAD
2	1312	001	011	001	010	lift DEP key
3	4312	100	011	001	010	lift DEP key
4	4312	100	011	001	010	lift DEP key
5	6773	110	111	111	011	lift DEP key
6	5303	101	011	000	011	lift DEP key
7	6777	110	111	111	111	lift DEP key
8	3726	011	111	010	110	lift DEP key
9	2326	010	011	010	110	lift DEP key
10	5303	101	011	000	011	lift DEP key
11	5732	101	111	011	010	lift DEP key
12	2000	010	000	000	000	lift DEP key
13	1300	001	011	000	000	lift DEP key
14	6774	110	111	111	100	lift DEP key
15	6771	110	111	111	001	lift DEP key
16	5315	101	011	001	101	lift DEP key
17	6776	110	111	111	110	lift DEP key
18	0331	000	011	011	001	lift DEP key
19	1327	001	011	010	111	lift DEP key
20	7640	111	110	100	000	lift DEP key
21	5315	101	011	001	101	lift DEP key
22	2321	010	011	010	001	lift DEP key
23	5712	101	111	001	010	lift DEP key
24	7354	111	011	101	100	lift DEP key
25	7756	111	111	101	110	lift DEP key
26	7747	111	111	100	111	lift DEP key
27	0077	000	000	111	111	lift DEP key
28	7400	111	100	000	000	lift DEP key
29	7300	111	011	000	000	press ADDR LOAD and press CLEAR and press CONT

2.3 LINCtape (PDP-12 Users)

The following is the bootstrap procedure for PDP-12 systems:

1. Mount the system LINCtape (AL-3580C-BM) on LINCtape unit 0. Set the LINCtape switches to WRITE-LOCK and REMOTE. Set the terminal to LINE or to REMOTE.

2. Set the left switches to 0700. Set the right switches to 0000. Set the MODE key to LINC.

3. Press I/O PRESET.

4. Press DO.

   The LINCtape bootstrap will be executed, causing unit 0 to move. When tape movement stops, make sure that the AC contains -1 (has all lights on). If the AC does not contain -1, return to step 1 above.

5. Press the START 20 key.

   The LINCtape on unit 0 will move again, and a dot (.) will be printed at the left margin of the terminal. OS/8 is now active.

6. Set LINCtape unit 0 to WRITE-ENABLE.

3.0 CASSETTE SYSTEMS

Use the following procedures to build and load an OS/8 system from cassettes.

3.1 Building OS/8 from Cassette

When OS/8 software is supplied on cassettes, use the BUILD system library program to create the initial OS/8 system. The following procedures build OS/8 onto a mass storage device.

1. The OS/8 cassette containing BUILD (AR-4585C-BA) supplied by DIGITAL is write-protected (lugged red tabs expose write-protect holes). Open the locking bar on the right side of cassette transport unit 0 by pushing it to the right. Hold the cassette so that the DIGITAL trademark in large letters is upright and to the front. Insert the cassette into transport unit 0, rotating it over the drive sprockets without forcing it, so that the locking bar closes over the back edge.

   Press the rewind button on the cassette transport unit once to rewind the tape to the beginning of its leader/trailer segment. When the unit stops moving, the tape is positioned for data transfer operations.

2. Bootstrap the OS/8 cassette by following one of two methods. If the system includes an M18-E hardware bootstrap option:

   a. Place the terminal on line. Raise the SING STEP switch on the PDP-8/E console. Press the CONT switch. Then lower and raise the HALT switch. At least one console indicator lamp should light.

   b. Having mounted the OS/8 system cassette on unit 0 as described above, lower and raise the SW switch on the left side of the console.

If the system does not include a hardware bootstrap, this procedure will have no effect. In this case, execute step 1 above and then perform the switch manipulations in Table 4. For each step in the table, place each of the PDP-8/E console SWITCH REGISTER switches numbered 0 to 11 either in the up position if the corresponding table entry is a 1, or in the down position if the corresponding table entry is a 0. When all twelve switches have been set to correspond to a line in the table, follow instructions in the right-hand column and proceed to the next line. In step 3, for example, place switches 2, 4, 9, and 10 in the up position; place switches 0, 1, 3, 5, 6, 7, 8, and 11 in the down position; lift the DEP switch; and proceed to step 4. The table also includes octal values of the binary switch settings for the benefit of users familiar with octal numbers.

Table 4
Cassette Bootstrap

STEP #	OCTAL VALUES	SWITCH REGISTER SETTING	AND THEN
		012 345 678 91011	
1	4000	100 000 000 000	press ADDR LOAD and press EXTD ADDR LOAD
2	1237	001 010 011 111	lift DEP key
3	1206	001 010 000 110	lift DEP key
4	6704	110 111 000 100	lift DEP key
5	6706	110 111 000 110	lift DEP key
6	6703	110 111 000 011	lift DEP key
7	5204	101 010 000 100	lift DEP key
8	7264	111 010 110 100	lift DEP key
9	6702	110 111 000 010	lift DEP key
10	7610	111 110 001 000	lift DEP key
11	3211	011 010 001 001	lift DEP key
12	3636	011 110 011 110	lift DEP key
13	1205	001 010 000 101	lift DEP key
14	6704	110 111 000 100	lift DEP key
15	6706	110 111 000 110	lift DEP key
16	6701	110 111 000 001	lift DEP key
17	5216	101 010 001 110	lift DEP key
18	7002	111 000 000 010	lift DEP key
19	7430	111 100 011 000	lift DEP key
20	1636	001 110 011 110	lift DEP key
21	7022	111 000 010 010	lift DEP key
22	3636	011 110 011 110	lift DEP key
23	7420	111 100 010 000	lift DEP key
24	2236	010 010 011 110	lift DEP key
25	2235	010 010 011 101	lift DEP key
26	5215	101 010 001 101	lift DEP key
27	7346	111 011 100 110	lift DEP key
28	7002	111 000 000 010	lift DEP key
29	3235	011 010 011 101	lift DEP key
30	5201	101 010 000 001	lift DEP key
31	7737	111 111 011 111	lift DEP key
32	3557	011 101 101 111	lift DEP key
33	7730	111 111 011 000	lift DEP key
34	4000	100 000 000 000	press ADDR LOAD key and press CLEAR and press CONT

Either bootstrapping procedure should cause the system cassette to move and BUILD to print a $ at the left margin of the console terminal. If there is no response, check that the system cassette is properly mounted on transport unit 0 and repeat the bootstrapping procedure, paying particular attention to the switch manipulations. Be careful not to bounce the DEP switch.

3. When BUILD prints:

```
$
```

respond with the system device on which OS/8 is to be built. (At this point, the usual command editing features of BUILD are available; for details, see the BUILD chapter in the OS/8 System Reference Manual.) This response must be in the following form:

```
$SYS dev=n
```

where "dev" represents one of the legal replies taken from Table 5. The "n" is optional and need only be used to indicate the number of physical disk platters that are present if the system device is RF08 or DF32. The possible replies and the maximum value of n that can be used for each one are indicated below.

Table 5
System Devices

Device	Maximum n
DF32 (DF32 disk)	4
RF08 (RF08 disk)	4
RK8 (RK8 disk)	1
RK8E (RK8E disk)	1

n must be a digit in the range 1 to 4. If no value for n is specified, a value of 1 is assumed. If you enter a response that is not a digit, the message:

```
?SYNTAX
```

is printed, and you must type the SYS command again. If you specify n as a digit that is too large for the device specified, you must retype the SYS command. For example:

```
$SYS RF08=5
?PLAT
$SYS RF08=4
```

4. When you have entered a SYS command correctly, e.g.,

```
$SYS RK8E
```

BUILD prints another $. At this time, insert the desired devices for the initial system, which must include as a minimum the terminal handler, the mass storage device, and the cassette handlers. (See the BUILD chapter in the OS/8 Reference Manual for detailed information.)

In response to the $ printed by BUILD, type the following, remembering to make a carriage return at the end of each command line.

```
$IN TA8A:CSA0-1        (cassette unit 0, drives 0 and 1)
$IN KL8E:TTY           (terminal keyboard)
```

5. You should also specify the device that is to be the default mass storage device by entering the DSK command. For example:

```
$DSK=SYS
```

Any device other than SYS (or carriage return) specified in the DSK command must be the permanent name of a device that appeared in one of the INSERT commands.

6. When you have entered all desired devices with INSERT commands, type the following in response to the $:

```
$BUILD
```

BUILD responds by printing:

```
LOAD OS/8:
```

Type CSA0, followed by carriage return, in response to this message, i.e.,

```
LOAD OS/8: CSA0
```

BUILD loads and writes the various parts of OS/8 onto the system device. If a SYS ERR message occurs at any time during the load, make sure that the system device is write-enabled and press the CONT switch to retry. If the retry is unsuccessful, return to step 2.

7. After writing OS/8, BUILD prints:

```
LOAD CD:
```

Respond with a carriage return. BUILD loads the Command Decoder from cassette unit 0 and writes it onto the system device.

8. When BUILD responds with another $, type the following:

```
$BOOT
```

to initiate the final system creation process. BUILD creates OS/8 on the system device, writes ABSLDR on the system device, and prints:

```
SYS BUILT
.
```

The dot indicates that the OS/8 Keyboard Monitor is activated. BUILD is still in memory at this time and must be written onto the system device. To save the copy of BUILD just used with the current date, type:

```
.DATE mm/dd/yy  (mm=month, dd=day, yy=year)

.SAVE SYS BUILD
```

This copy of BUILD reflects the current configuration of the system. It can be loaded and rerun with the command:

```
.RUN SYS BUILD
```

9. To prepare for loading the OS/8 system programs from their respective cassettes, first load MCPIP (Magnetic Tape/Cassette Peripheral Interchange Program). Type the following commands to load MCPIP:

```
.GET SYS BUILD
.START 17400
.SAVE SYS MCPIP  12000=6400
```

3.2 Loading System Programs from Cassette

After creating an OS/8 system from cassettes, you must transfer the system programs from cassette to the system device. This transfer operation is performed with MCPIP, which you have saved on the system device.

NOTE

Users with OS/8 software supplied on DECtape (LINCtape) already have core images of the system programs on the system device. This section concerns only users with software supplied on cassettes.

Each cassette supplied with OS/8 contains several OS/8 system programs. To transfer the programs to the system device, mount the appropriate cassette on a cassette drive and type MCPIP commands as shown below. Use the following procedures to load the system programs.

1. Mount the system cassette AR-4586C-BA on cassette drive 0.

2. Mount the system cassette AR-4587C-BA on cassette drive 1.

3. Type the following to call MCPIP from the system device:

```
.R MCPIP
```

   MCPIP responds with an asterisk, indicating that it is ready to receive a command line of I/O specifications.

4. Respond as follows to the asterisks printed by MCPIP:

```
*SYS:CCL.SV<CSA0:CCL.SV
*SYS:DIRECT.SV<CSA0:DIRECT.SV
*SYS:FOTP.SV<CSA0:FOTP.SV
*SYS:PIP.SV<CSA0:PIP.SV
*SYS:LIB8.RL<CSA0:LIB8.RL
*SYS:EDIT.SV<CSA0:EDIT.SV
*SYS:PAL8.SV<CSA0:PAL8.SV
*SYS:CREF.SV<CSA0:CREF.SV
*SYS:BITMAP.SV<CSA0:BITMAP.SV
*SYS:BOOT.SV<CSA0:BOOT.SV
*SYS:CAMP.SV<CSA0:CAMP.SV
```

```
*SYS:FORT.SV<CSA1:FORT.SV
*SYS:SABR.SV<CSA1:SABR.SV
*SYS:LOADER.SV<CSA1:LOADER.SV
*SYS:SRCCOM.SV<CSA1:SRCCOM.SV
*SYS:EPIC.SV<CSA1:EPIC.SV
*SYS:PIP10.SV<CSA1:PIP10.SV
*SYS:RESORC.SV<CSA1:RESORC.SV
*SYS:DTCOPY.SV<CSA1:DTCOPY.SV
*SYS:TDCOPY.SV<CSA1:TDCOPY.SV
*SYS:TDFRMT.SV<CSA1:TDFRMT.SV
*SYS:DTFRMT.SV<CSA1:DTFRMT.SV
*SYS:LIBSET.SV<CSA1:LIBSET.SV
*SYS:RXCOPY.SV<CSA1:RXCOPY.SV
*SYS:HELP.SV<CSA1:HELP.SV
```

5. To write SET.SV and HELP.HL files on the system device, mount AR-4688C-BA in drive 0 and AR-4689C-BA in drive 1. Type the following command line after the asterisk is printed on the terminal:

```
*SYS:SET.SV<CSA0:SET.SV
*SYS:HELP.SV<CSA1:HELP.SV
```

   By typing the command line:

```
.R CCL
```

   you can run your programs using CCL commands.

6. The source file of CCL should be written onto the system device if you wish to add your own CCL commands. To write this file on the system device, mount the system cassette AR-4690C-B on cassette drive 0. Respond as follows to the asterisk printed by MCPIP:

```
*SYS:CCL.PA<CSA0:CCL.PA
```

This completes the building of the OS/8 system. If the OS/8 extension cassette is available, see the appropriate chapters for loading instructions. Additional device handlers may be loaded and made active using BUILD. See the BUILD chapter in the OS/8 System Reference Manual for this procedure.

4.0 PAPER TAPE SYSTEMS

You can construct an OS/8 system initially on a mass storage device from the paper tapes supplied with each OS/8 kit. The paper tapes can be loaded from a low-speed reader on a Teletype or from a high-speed reader. This initial construction is only necessary when the software is not supplied on DECtape or cassettes.

4.1 Building from Paper Tape

The system library program BUILD is used to construct an OS/8 system from paper tapes in the following manner.

1. Load the RIM and Binary loaders into field 0 (refer to Appendix B in the System Reference Manual for instructions on loading programs manually and on paper tape).

2. Using the Binary Loader, load the BUILD binary tape (AK-4678C-BA) into memory.

3. After you have loaded the entire BUILD binary tape with no checksum errors (i.e., AC=0), set the switch register to 200 (octal), i.e., set switch 4 in the up position, set all other switches in the down position. Press the ADDR LOAD and CONT switches. BUILD prints:

```
$
```

(At this point, all the usual editing features of BUILD are available.) Respond with the system (mass storage) device on which OS/8 is to be built. This response must be in the following form:

```
$SYS dev=n
```

where "dev" represents one of the legal replies taken from Table 6. The "=n" is optional and need only be used to indicate the number of physical disk platters that are present if the system device is a RF08 or DF32 disk.

The "n" must be a digit in the range 1 to 4. If no value for n is specified, a value of 1 is assumed. If you enter a response that is not a digit, the message:

```
?SYNTAX
```

is printed, and you must type the SYS command line again. If you specify n as a digit that is too large for the device specified, you must retype the SYS command. For example:

```
$SYS RF08=5
?PLAT
$SYS RF08=4
```

Table 6
System Devices

Device	Maximum
DF32 (DF32 disk)	4
RF08 (RF08 disk)	4
RK8 (RK8 disk)	1
RK8E (RK8E disk)	1

4. When you have entered a correct SYS command line, e.g.,

```
$SYS RK8E
```

BUILD prints another $. At this time, insert the desired devices for the initial system. You must insert the devices listed below for a minimum system with paper tape. Type the following commands, followed by carriage returns, to insert a low-speed paper tape configuration.

```
$IN KS33:PTP,PTR      (low-speed paper tape punch/reader)
$IN KL8E:TTY          (terminal keyboard)
```

Type the following commands, followed by carriage returns, to insert a high-speed paper tape configuration.

```
$IN PT8E:PTP,PTR      (high-speed paper tape punch/reader)
$IN KL8E:TTY          (terminal keyboard)
```

5. At this time, you must specify the device that is to be the default mass storage device by entering the DSK command. For example:

```
$DSK=SYS
```

Any device other than SYS (or carriage return) specified in the DSK command must be the permanent name of a mass storage device that appeared in one of the INSERT commands.

6. When you have entered all desired devices with IN commands, type the following in response to the BUILD $.

```
$BUILD
```

BUILD responds by printing:

```
LOAD OS/8:
```

At this point, load the OS/8 Keyboard Monitor tape (AK-4679C-BA) in the proper reader and respond PTR followed by a carriage return, i.e.,

```
LOAD OS/8: PTR
```

BUILD loads and writes the various parts of the OS/8 Keyboard Monitor onto the system device. If a SYS ERR message occurs at any time during the load, make sure that the system device is write-enabled and press the CONT switch on the PDP-8/E console to retry. If the retry is unsuccessful, return to step 2.

NOTE

When building from the low-speed reader (KS33), after you enter PTR followed by carriage return, the system responds with an up-arrow; you must respond by typing any character on the terminal and then immediately turning on the reader. If the reader is not turned on promptly, the system hangs. Remember to turn off the reader when it reaches the leader/trailer at the end of the tape.

7. After successfully writing the Keyboard Monitor onto the system device, BUILD prints:

```
LOAD CD:
```

Place the Command Decoder binary tape (AK-4680C-BA) in the proper paper tape reader and respond PTR followed by a carriage return, i.e.,

```
LOAD CD: PTR
```

BUILD loads and writes the Command Decoder.

8. When BUILD responds with another $, type the following:

```
$BOOT
```

to initiate the final system creation process. BUILD creates OS/8 on the system device, writes ABSLDR on the system device, and prints:

```
SYS BUILT
.
```

The dot indicates that the OS/8 Keyboard Monitor is activated.

9. At this time, BUILD is still in memory and you will have to copy it onto the system device. To save the copy of BUILD with the current date, type:

```
.DATE mm/dd/yy      (mm=month, dd=day, yy=year)
.SAVE SYS BUILD
```

This copy of BUILD reflects the current configuration of the system. You can load and rerun it with the command:

```
.RUN SYS BUILD
```

See the BUILD chapter in the OS/8 Reference Manual for details on how to use BUILD effectively.

You must now use EPIC (which resides on the system device) to load the various system programs. Refer to the following section for instructions.

4.2 Loading a Paper Tape Binary Kit

Paper tape binary kits for OS/8 V3D are punched using EPIC. This use of EPIC simplifies loading these tapes onto SYS:. All tapes, except those used to build a Monitor and a System Head and EPIC itself, must be loaded onto SYS: using EPIC. The procedure for loading paper tape binary kits is described below.

NOTE

Skip step 1 if EPIC.SV exists in system directory.

1. Place the EPIC binary tape (AK-4667C-BA) in the reader and type:

```
.R ABSLDR
*PTR:($)^
```

Turn on reader and type any key on keyboard.

NOTE

($) is escape or altmode; strike ESC key.

EPIC will be read in by this procedure. If necessary, turn off the reader. Save EPIC as a file by typing:

```
.SAVE SYS:EPIC.SV
```

2. Type

```
.R EPIC
```

3. To load any paper tape onto SYS:, put the paper tape for that file in the reader and type:

*SYS:</O/Y($)	for the high-speed reader or
*SYS:</O/Y/L($)	for the low-speed reader. (Turn on the low-speed reader, depress CONT on the operator's console after the computer halts to allow loading the tape in the reader. After the tape has read in, the computer halts again. If there are no more tapes to that file to be loaded, turn off the reader and depress CONT. If there are more tapes to the file continue to step 4.

4. If the file you are creating requires more than one tape to be input, the message:

```
END OF TAPE ENTER NEXT
```

will be displayed on the console terminal and the computer will halt with 7777(8) in the AC. Place the next tape of the file in the reader, turn it on, and depress CONT. Repeat step 4 until all tapes for the file are loaded.

If the tapes of a multiple tape file are read out of sequence an error message:

```
NEED nnnnn FOUND mmmmm
```

will be output on the console terminal. Check the tapes of the file, place the proper tape in the reader, and depress CONT on the operators console.

5. Repeat steps 3 and 4 to load each tape or set of tapes into a file on SYS:

See the OS/8 System Reference Manual for more information on EPIC.

6. If desired, you can load CCL.SV, EDIT,SV, and BATCH.SV (if you have the OS/8 Extension Kit) and then create a batch stream to load the desired files onto SYS:

Create a batch file as follows:

```
.CREATE LOAD.BI
*^A
$JOB TO LOAD FILES USING EPIC
.R EPIC
*SYS:</O/Y$          $=dollar sign key (shift/4) - not
*SYS:</O/Y$          escape or altmode.  Add/L before
     .               $ (see example in step 3 above)
     .               if reading from low-speed
     .               reader.
*SYS:</O/Y$          Put in a few of the load commands;
```

```
.SU LOAD.BI/T        the more you put in, the fewer times
                     the job will re-submit itself.
^L                   (CTRL/FORM) means hold down
^E                   CTRL key, depress "L" (form) key
```

Then run the file, using the command:

```
.SU LOAD.BI/T
```

Every time the computer stops, replace the tape in the reader with a new one (or next in sequence) and depress CONT. Ignore any

```
L/T ERROR
```

messages on console terminal caused by running off the end of the paper tape.

5.0 USING A DISK AS THE SYSTEM DEVICE

If your OS/8 system device is a disk, you must build an OS/8 system onto the disk from the distribution media, i.e., cassettes, paper tape, or DECtape (LINCtape). The disks available as system devices are RF08, DF32, RK8, RK8E, and the RX01 diskette. Refer to the appropriate part of this section for the cassette or paper tape building procedure. For DECtape or LINCtape distribution, refer to the BUILD chapter in the OS/8 System Reference Manual.

Once you have built an OS/8 system on a disk, it may occasionally be necessary to start (bootstrap) the system into operation when nothing is in memory. For example, whenever an RK8E disk cartridge is placed in its slot for use, the system should be bootstrapped. Also, if a program error is encountered such that the contents of locations 7600-7777 in either field 0 or field 1 are in doubt, the system should be bootstrapped. The following sections detail the specific bootstrap used for each type of disk.

5.1 RF08 and DF32 Disks

If the OS/8 system device is a RF08 or DF32 disk, use the bootstrap shown in Table 7.

Table 7
RF08/DF32 Disk Bootstrap

STEP #	OCTAL VALUES	SWITCH REGISTER SETTING	AND THEN
		012 345 678 91011	
1	0000	000 000 000 000	press EXTD ADDR LOAD
2	7750	111 111 101 000	press ADDR LOAD
3	7600	111 110 000 000	lift DEP key
4	6603	110 110 000 011	lift DEP key
5	6622	110 110 010 010	lift DEP key
6	5352	101 011 101 010	lift DEP key
7	5752	101 111 101 010	lift DEP key
8	7750	111 111 101 000	press ADDR LOAD and press CLEAR and press CONT

When you have loaded the bootstrap, the OS/8 Keyboard Monitor should respond with a dot (.). If it does not, repeat the bootstrap procedure. If an error persists, consult the local DIGITAL sales office.

5.2 The RK8E Disk

If only one RK8E disk unit is present on the OS/8 system, use the bootstrap shown in Table 8.

NOTE

If you are using a PDP-12 computer, execute an I/O PRESET in 8 mode before performing step 5 of the bootstrap in Table 8.

Table 8
Single RK8E Disk Bootstrap

STEP #	OCTAL VALUES	SWITCH REGISTER SETTING	AND THEN
		012 345 678 91011	
1	0000	000 000 000 000	press EXTD ADDR LOAD
2	0030	000 000 011 000	press ADDR LOAD
3	6743	110 111 100 011	lift DEP key
4	5031	101 000 011 001	lift DEP key
5	0030	000 000 011 000	press ADDR LOAD and press CLEAR and press CONT

If more than one RK8E disk unit is present on the system, you may choose which unit (0-3) you wish to be the system device. To specify the correct RK8E unit as the system device, load the OS/8 disk cartridge in the desired unit and enter the bootstrap shown in Table 9.

Table 9
Multiple RK8E Disk Bootstrap

STEP #	OCTAL VALUES	SWITCH REGISTER SETTING	AND THEN
		012 345 678 91011	
1	0000	000 000 000 000	press EXTD ADDR LOAD
2	0025	000 000 010 101	press ADDR LOAD
3	7604	111 110 000 100	lift ^^DEP key
4	6746	110 111 100 110	lift DEP key
5	6743	110 111 100 011	lift DEP key
6	7604	111 110 000 100	lift DEP key
7	5031	101 000 011 001	lift DEP key
8	0025	000 000 010 101	press ADDR LOAD

Enter the desired unit number (0-3) in switch register settings 9 and 10 as follows:

unit 0 all switches down
unit 1 switch 10 up; all others down
unit 2 switch 9 up; all others down
unit 3 switches 9 and 10 up; all others down

Press CLEAR and CONT.

If you have loaded either of the bootstraps, the OS/8 Keyboard Monitor should respond with a dot (.). If it does not, repeat the bootstrap procedure. If an error persists, consult the local DIGITAL sales office.

5.3 The RK8 Disk

If you have only one RK8 disk unit on your OS/8 system, use the bootstrap in Table 10 to start.

Table 10
Single RK8 Disk Bootstrap

STEP #	OCTAL VALUES	SWITCH REGISTER SETTING	AND THEN
		012 345 678 91011	
1	0000	000 000 000 000	press EXTD ADDR LOAD
2	0030	000 000 011 000	press ADDR LOAD
3	6733	110 111 011 011	lift DEP key
4	5031	101 000 011 001	lift DEP key
5	0030	000 000 011 000	press ADDR LOAD and press CLEAR and press CONT

NOTE

If you are using a PDP-12 computer, execute an I/O PRESET in 8 mode before performing step 5 of the above bootstrap.

If more than one RK8 disk unit is present on the system, you may choose which unit (0-3) you wish to be the system device. To specify the correct RK8 unit as the system device, load the OS/8 disk cartridge in the desired unit and enter the bootstrap shown in Table 11.

Table 11
Multiple RK8 Disk Bootstrap

STEP #	OCTAL VALUES	SWITCH REGISTER SETTING	AND THEN
		012 345 678 91011	
1	0000	000 000 000 000	press EXTD ADDR LOAD
2	0026	000 000 010 110	press ADDR LOAD
3	7604	111 110 000 100	lift DEP key
4	6732	110 111 011 010	lift DEP key
5	6733	110 111 011 011	lift DEP key
6	5031	101 000 011 001	lift DEP key
7	0026	000 000 010 110	press ADDR LOAD

Enter the desired unit number (0-3) in the switch register settings 9 and 10 as follows:

unit 0 all switches down
unit 1 switch 10 up; all others down
unit 2 switch 9 up; all others down
unit 3 switches 9 and 10 up; all others down

Press CLEAR and CONT.

If you have loaded either of the above bootstraps, the OS/8 Keyboard Monitor should respond with a dot (.). If it does not, repeat the bootstrap procedure. If an error persists, consult the local Digital sales office.

5.4 The RX01 Diskette

If the OS/8 system device is an RX01 diskette, use the following bootstrap procedure.

Table 12
RX01 Floppy Disk Bootstrap

STEP #	OCTAL VALUES	SWITCH REGISTER SETTING	AND THEN
		012 345 678 91011	
1	0000	000 000 000 000	press EXTD ADDR LOAD
2	0024	000 000 010 100	press ADDR LOAD
3	7126	111 001 010 110	lift DEP key
4	1060	001 000 110 000	lift DEP key
5	6751	110 111 101 001	lift DEP key
6	7201	111 010 000 001	lift DEP key
7	4053	100 000 101 011	lift DEP key
8	4053	100 000 101 011	lift DEP key
9	7104	111 001 000 100	lift DEP key
10	6755	110 111 101 101	lift DEP key
11	5054	101 000 101 100	lift DEP key
12	6754	110 111 101 100	lift DEP key

(continued on next page)

Table 12 (Cont.)
RX01 Floppy Disk Bootstrap

STEP #	OCTAL VALUES	SWITCH REGISTER SETTING	AND THEN
13	7450	111 100 101 000	lift DEP key
14	7610	111 110 001 000	lift DEP key
15	5046	101 000 100 110	lift DEP key
16	1060	001 000 110 000	lift DEP key
17	7041	111 000 100 001	lift DEP key
18	1061	001 000 110 001	lift DEP key
19	3060	011 000 110 000	lift DEP key
20	5024	101 000 010 100	lift DEP key
21	6751	110 111 101 001	lift DEP key
22	4053	100 000 101 011	lift DEP key
23	3002	011 000 000 010	lift DEP key
24	2050	010 000 101 000	lift DEP key
25	5047	101 000 100 111	lift DEP key
26	0000	000 000 000 000	lift DEP key
27	6753	110 111 101 011	lift DEP key
28	5033	101 000 011 011	lift DEP key
29	6752	110 111 101 010	lift DEP key
30	5453	101 100 101 011	lift DEP key
31	7024	111 000 010 100	lift DEP key
32	6030	110 000 011 000	lift DEP key
33	0033	000 000 011 011	press ADDR LOAD and press CLEAR and press CONT

6.0 RESTARTING OS/8

If you ever fail to receive apparent response from the OS/8 system, you can restart the computer by loading a restart address of either 7600 or 7605. If you choose to start at location 7600, you can save the contents of locations 0-1777 on the system device. These locations are then available when the Keyboard Monitor resumes operation. Starting at 7605 does not have the core locations, but does save time on a DECtape configuration.

To load a restart address, set the console switches to 7600 or 7605; press the HALT, ADDR LOAD, EXTD ADDR, CLEAR, and CONT switches. A period should appear on the terminal. If there is no response, OS/8 is no longer in memory and must be bootstrapped in.

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