The UNIX Equipment Test Package: Operational Procedures

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1. INTRODUCTION

The Equipment Test Package (ETP) is a collection of hardware exercisers that run on the UNIX† operating system. The hardware is exercised by using *shell* scripts and the operating system itself to generate a large number of reads and writes to all devices. The reads and writes test all combinations of I/O and devices under heavy load conditions.

The purpose of this document is to explain the procedures for running the ETP. It first presents a list of materials needed to use the ETP. The user is then shown how to place the ETP on disk and in memory. Finally, the procedures to run and reconfigure the ETP are explained.

2. CHECKLIST

In preparation for running the ETP, the user should have the following:

- A copy of the ETP tape marked "PDP-11" or "VAX" (as appropriate) and this document.
- A formatted, flag-free disk.
- Knowledge of the bootstrap loader program for disk drive and tape drive (the appendices to this document contain information on commonly used loaders).
- Knowledge of the hardware configuration for each machine:
  - — type of processor;
  - — K words of memory;
  - — existence of floating-point hardware;
  - — names, addresses, and vectors of all devices.

3. BOOT PROCEDURES

Booting the ETP consists of two distinct steps: initial load to disk and loading into memory. To prepare to run the ETP, you must produce a "bootable" ETP disk pack from the distribution tape. Then you must bring the ETP into memory by booting the ETP disk pack. Additionally, a special test is provided for PDP-11/70's to exercise their memory management registers.

3.1 Initial Load to Disk

The ETP is normally distributed on a single, multi-file magnetic tape, recorded in 9-track format at 800 bpi. The tape is marked either "PDP-11" or "VAX"; be sure you have the correct tape for your machine. The ETP is a disk-based system exerciser. Therefore, the ETP must be placed on disk before it can used. To place the ETP on disk:

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1. Mount the ETP distribution tape (*without* a write ring) at load point.
2. Boot the ETP tape:

   PDP-11 This tape boots in the same manner a DEC diagnostic tape. If you do not have a hardware bootstrap for the tape drive, see Appendix 2.

   VAX The floppy delivered with the VAX does not have tape-boot capability; see Appendix 3.
3. Follow the directions printed on the console. Samples of PDP-11 and VAX console dialogue can be found in Appendix 6.
4. When the tape rewinds, HALT the CPU.

3.1.1 Initial test of PDP-11/70 CPU memory management registers. The file */stand/mmtest* is a stand-alone diagnostic program for the PDP-11/70's memory management registers. It should be booted and run (20 minutes) if you are not *absolutely* sure that DEC FCO (field change order) M8140-R002 has been applied to your PDP-11/70. To place the diagnostic in memory, use the hardware bootstrap loader to boot the disk you have just created. The disk boots just like a DEC diagnostic. If you do not have a hardware bootstrap, see Appendix 2.

To start the memory management test, proceed as follows (note that "<NO CR>" means "do not hit carriage return"):

[sys] # <NO CR>

[you] 0 <NO CR>

[sys] = <NO CR>

[you] /stand/mmtest

The memory management test will begin to run; when it is complete, it will print "DONE" on the console terminal.

If any errors occur during this test, the ETP will *not* run until your hardware maintenance contractor applies FCO M8140-R002 to your PDP-11/70 CPU.

3.2 Booting ETP from the Disk

To place ETP in memory, boot the disk you have created using the procedures for the PDP-11 or VAX, as appropriate.

3.2.1 Boot procedures for PDP-11. Place the ETP in memory by booting the disk you have just created. The disk boots just like a DEC diagnostic. If you do not have a hardware bootstrap for the disk drive, see Appendix 2. Proceed as follows:

[sys] # <NO CR>

[you] 0 <NO CR>

[sys] = <NO CR>

[you] *name*

where *name* is the name printed out by the initial load-to-disk program.

3.2.2 Boot procedures for VAX. The floppy disk delivered with the VAX does not have UNIX disk-boot capability; see Appendix 3. Proceed as follows:

[sys] $$ <NO CR>

[you] *name*

where *name* is the name printed out by the initial load-to-disk program.

3.3 Common boot procedures for PDP-11 and VAX

Once the ETP is placed into memory, the running of the ETP is the same for PDP-11 and VAX:

```
[sys]   UNIX/etp1.3: name
        real mem  = MMMM bytes
        avail mem = NNNN bytes
        enter date in the following format: MMddhhmmyy <NO CR>

[you]   MMddhhmmyy
```

where *MM* is the month (01-12), *dd* is the day of the month (01-31), *hh* is the hour of the day (00-23), *mm* are the minutes past the hour (00-59), and *yy* are the last two digits of the year (70-??).

The current date will be echoed and the ETP will check the disk pack just generated and then initialize itself; this process takes about five minutes. See Appendix 6 for the console dialogue.

After the startup is complete, you should login as follows:

```
[sys]   login: <NO CR>

[you]   etp
```

The ETP will identify itself and print out its version number, e.g.:

```
Equipment Test Package Version 1.3
```

4. RUNNING THE ETP

The ETP is run in two parts: a general-purpose configuration and a specific configuration for your system. This is done to allow you the flexibility to reconfigure the ETP as your system's configuration changes. You may save your specific configuration once you've booted a configuration with a tape device.

4.1 Initial Test of Root Device.

Before generating specific configurations, the root device, memory, and CPU speed on which those configurations will reside must be tested. If any of these devices malfunction, it is useless to proceed further. To begin the tests, enter the command:

etpall [*loop_count*]

Where *loop_count* indicates how many times you wish to loop through the entire test. The default *loop_count* is 1. When all the tests have been completed and no errors have been detected, you are ready to generate other configurations. To begin the generation, enter the command:

etpgen

This interactive program will prompt for all the information it needs to generate an ETP for up to 4 configurations. It is limited to 4 because of disk-space limitations. The names used to describe a configuration are listed in Appendix 5 in the "Device" column. A sample run is shown in Appendix 6.

When the generation is complete, you must shut down the system. To shut down the system, enter the command:

shutdown

4.2 Tests for Specific Configurations

Repeat all of the steps shown in Section 3.2 above, *but instead of typing the* name *used in the initial boot, type the* project name *of the configuration you wish to test.* The "project name" (entered

as the first line of a configuration during generation) identifies a specific configuration. It must be only one word of no more than 14 characters.

If a tape device has been configured into the new system, you may save all generated configurations on tape. To save the configurations on tape, enter the command:

etptape

A bootable ETP tape will be created on drive 0 of the tape device configured into the system. This tape can be booted by the same procedures used for the original ETP distribution tape.

The ETP can be run in either interactive or non-interactive mode. Interactive mode is used to test character devices that require operator intervention. The default mode of operation is non-interactive.

To change or inquire about the mode of operation of the ETP, enter the command:

etpchmod [−i] [−n]

With no options, *etpchmod* prints the current status. The *−i* and *−n* options change the mode of testing to interactive and non-interactive, respectively.

5. TESTS

The ETP provides a number of individual tests. For ease of use, it also provides a test that performs all the individual tests. This section briefly describes this all-encompassing test and each individual test.

5.1 Test of All Devices

The all-encompassing test includes tests of all block and character devices, memory, CPU speed, and a load bus routine. To begin the test, enter the command:

etpall [*loop_count*] [*test* ...]

If individual *tests* are specified on the command line, only those tests will be performed. The test names are *block*, *char*, *mem*, *time*, and *load*. The length of time needed for this test is dependent upon the number of devices on the system and the size of memory.

5.2 Test of Block Devices

To test individual block devices, enter the command:

etpblock [*loop_count*] [*device* ...]

If individual *devices* are specified on the command line, only those devices will be tested. If no devices are specified, all of the block devices configured into the system at ETP generation time will be tested. The list of possible devices is given in Appendix 5 in the "Generic" column.

5.3 Test of Character Devices

To test individual character devices, enter the command

etpchar [*loop_count*] [*device* ...]

If individual *devices* are specified on the command line, only those devices will be tested. If no devices are specified, all of the character devices configured into the system at ETP generation time will be tested. The list of possible devices is given in Appendix 5. User interaction is required for testing the *dh*, *dz*, and *dn* lines.

5.4 Test of Memory and Swap Device

To test all of memory, floating-point hardware, and the swap device, enter the command:

etpmem [*loop_count*]

Memory and the swap device are filled with programs that store and retrieve test patterns of characters, integers, and double floating-point quantities.

5.5 Test of CPU Throughput

To test the throughput of a CPU, enter the command:

etptime [*loop_count*]

Throughput of a CPU may vary from machine to machine, because of variation in memory speeds, CPU speeds, and cache speeds. The numbers in Appendix 7 are rough guides as to what you should expect for your configuration.

5.6 Test of Bus Loading

To start simultaneous I/O on all devices, enter the command:

etpload [*loop_count*]

This test starts simultaneous I/O activity on all tape and disk devices, thereby loading the UNIBUS.

6. ERROR REPORT

The ETP logs all of the errors it detects in an error log file. This file is not removed when the system is shut down or booted up. In effect, new errors are logged at the end of the log file if this file already exists.

This error log can be printed out in a terse format. To print out all the errors logged to date, enter the command:

errpt −a

The resulting error report can be easily interpreted by your hardware maintenance contractor. For further information on the *errpt* command, see Appendix 4.

To save the current error log (which is file **/usr/adm/errfile**) in **/usr/adm/oerrfile**, enter the command:

etperrmv

This command will temporarily stop error logging, move the current error log file, and restart error logging.

7. ACKNOWLEDGEMENTS

We gratefully acknowledge the work of the originators of the Equipment Test Package, Rick Brandt and Cathy Perez. Special thanks are due to the hundreds of users who provided extensive feedback, helping us to make the package more effective and easier to use.

Appendix 1: PDP-11/70 Boot

The PDP-11/70 has a dedicated hardware bootstrap loader called the M9301-YC. This allows it to bootstrap programs from a wide range of storage media.

The M9301-YC attempts to boot from the device and drive number specified in the console switches. Console switches 7-3 select the device, while console switches 2-0 select the drive number. The table below below describes the devices selected for each switch setting.

To start operation of the bootstrap loader:

1. Halt the CPU by depressing the HALT switch.
2. Set the Address Display select switch to CONS PHY.
3. Set the Console Switch Register to 165 000 (octal).
4. Depress the LOAD ADRS switch.
5. Reset the console switches to 0.
6. Set switches 7-0 for the desired device.
7. Put the HALT switch in the ENABL position.
8. Depress the START switch.

The selected device will be booted. This takes approximately three seconds.

Any error during the boot will cause the CPU to halt. A list of possible halt addresses and their meanings is given in the DEC PDP-11/70 Processor Handbook in the chapter on Console Operation.

Console Switches (7-3)	*Device*	*Name*
00	illegal	—
01	TM11/TU10	Magnetic tape
02	TC11/TU56	DECtape
03	RK11/RK05	Disk pack
04	RP11/RP03	Disk pack
05	reserved	—
06	RH70/TU16	Magnetic tape
07	RH70/RP04	Disk pack
10	RH70/RS04	Fixed-head disk
11	RX11/RX01	Diskette
12-37	illegal	—

Appendix 2: PDP-11 ROM Boot

Standard DEC ROM bootstrap loaders may not correctly execute UNIX initial load programs. Therefore, special bootstrap loaders were designed that may be manually toggled into memory.

Each special bootstrap loader is position-independent, that is, it may be placed anywhere in memory. Normally, it is placed in high memory to avoid being overwritten. Each special bootstrap loader reads one block from drive 0 into memory starting at address 0 and then jumps to address 0. To minimize the size of the special bootstrap loaders, they each assume that a hardware INIT was generated prior to execution. In each case, each special bootstrap loader will read in at least 256 words, which is the maximum size of the UNIX initial load.

On disk devices, block 0 is read. On tape devices, one block starting at the current position of the tape is read, so that, the tape should normally be positioned at the load point prior to booting.

Below, we give the the octal listing of five such special bootstrap loaders, together with the corresponding assembly language instructions.

TU10 — Magnetic Tape:

```
012700          mov   $mtcma,r0
172526
010040          mov   r0,-(r0)        /use magnetic tape addr for byte count
012740          mov   $60003,-(r0)    /read, 800 bpi, 9 track
060003
105710    1:    tstb  (r0)            /wait for ready
002376          bge   1b
005007          clr   pc              /transfer to zero
```

TU16 — Magnetic Tape:

```
012700          mov   $mtwc,r0
172442
012760          mov   $1300,30(r0)    /set 800 bpi, PDP format
001300
000030
010010          mov   r0,(r0)         /use magnetic tape addr for word count
012740          mov   $71,-(r0)       /read
000071
105710    1:    tstb  (r0)            /wait for ready
002376          bge   1b
005007          clr   pc              /transfer to zero
```

RK05 — Disk Pack:

```
012700          mov   $rkda,r0
177412
005040          clr   -(r0)
010040          mov   r0,-(r0)        /use RK05 addr for word count
012740          mov   $5,-(r0)        /read
000005
105710    1:    tstb  (r0)            /wait for ready
002376          bge   1b
005007          clr   pc              /transfer to zero
```

RP03 – Disk Pack:

```
012700          mov     $rpmr,r0
176726
005040          clr     -(r0)
005040          clr     -(r0)
005040          clr     -(r0)
010040          mov     r0,-(r0)        /use RP03 addr for word count
012740          mov     $5,-(r0)        /read
000005
105710  1:      tstb    (r0)            /wait for ready
002376          bge     1b
005007          clr     pc              /transfer to zero
```

RP04 – Disk Pack:

```
012700          mov     $rpcs1,r0
176700
012720          mov     $21,(r0)+       /read-in preset
000021
012760          mov     $10000,30(r0)   /set to 16-bits/word
010000
000030
010010          mov     r0,(r0)         /use RP04 addr for word count
012740          mov     $71,-(r0)       /read
000071
105710  1:      tstb    (r0)            /wait for ready
002376          bge     1b
005007          clr     pc              /transfer to zero
```

Appendix 3: VAX-11/780 Boots

1. TAPE BOOT

The floppy disk delivered with the VAX does not have UNIX tape-boot capability. The user must type in the following program to read the first record on tape drive 0 (type a carriage return at the end of each input line):

```
>>> H
>>> U
>>> I

        INIT SEQ DONE

>>> D 20000 20008FD0
>>> D+ D0502001
>>> D+ 3204A001
>>> D+ C003C08F
>>> D+ A0D40424
>>> D+ 8FD00C
>>> D+ C0800000
>>> D+ 8F320800
>>> D+ 10A0FE00
>>> D+ C007D0
>>> D+ C039D004
>>> D+ 400
>>> S 20000                (Starts tape load)

        HALT INST EXECUTED
        HALTED AT 0002002F

>>> S 0                    (Execute boot program loaded from tape)
```

From this point on, the loader initiates a question-and-answer sequence to control the remainder of the load process.

2. DISK BOOT

The floppy disk delivered with the VAX does not have UNIX disk-boot capability. The user must type in the following program to read the first block on disk drive 0 (type carriage return at the end of each line):

```
>>>H
>>>LINK                    (Save the following sequence on the floppy)
                           (the prompt should change to "<<<")

<<<H
<<<U
<<<I
<<<D 20000 00009FDE       (Boot program for MBA 0, drive 0)
<<<D+ D0512001
<<<D+ D004A101
<<<D+ 0400C113
<<<D+ 10008F32
<<<D+ D40424C1
<<<D+ 8FD00CA1
<<<D+ 80000000
<<<D+ 320800C1
<<<D+ A1FE008F
<<<D+ 28C1D410
<<<D+ 14C1D404
<<<D+ C139D004
<<<D+ 400
<<<S 20000
<<<S 2
<<<Control-C              (Exit LINK load)
>>>
```

You are now ready to boot UNIX. Each time it is necessary to boot (or reboot) UNIX, one simply follows the sequence:

```
>>>P                      (This executes the commands saved in the floppy link file;
                           the console should echo each command in the file.)

$$ unix<cr>               (Load and execute /unix)
```

Appendix 4: Error Report

The following command may be used print out various aspects of the error log file:

errpt [**−a**] [−*dev* ...] [**−int**] [**−mem**] [−s*date*] [−e*date*] [**−p***n*] [**−f**] [*file* ...]

Errpt processes data collected by the error logging mechanism (*errdemon*(1M) entry in the *UNIX User's Manual*) and generates a report of that data. The default report is a summary of all errors posted in the named files. Options apply to all files and are described below. If no files are specified, *errpt* attempts to use **/usr/adm/errfile** as *file*.

A summary report indicates the options that may limit its completeness, gives the times of the earliest and latest errors encountered, and gives the total number of errors of one or more types. Each device summary contains the total number of unrecovered errors, recovered errors, errors unable to be logged, I/O operations on the device, and miscellaneous activities that occurred on the device. The number of times that *errpt* has difficulty reading input data is included as read errors.

A detailed report contains, in addition to specific error information, all instances of the error logging process being started and stopped and any time changes (via *date*(1)) and configuration changes (for UNIX/RT only) that took place during the interval being processed. A summary of each error type included in the report is appended to a detailed report.

A report may be limited to certain records in the following ways:

−s*date* Ignore all records posted earlier than *date*, where *date* has the form **MMddhhmmyy**, as for the *date*(1) command.

−e*date* Ignore all records posted later than *date*.

−a Produce a detailed report that includes all error types.

−*dev* Limit a detailed report to *dev*, a block device identifier. *Errpt* is familiar with the common form of identifiers. Currently, the block devices for which errors are logged are RP03, RP04, RP05, RP06, RS03, RS04, TU10, TU16, RK05, RF11, RL01.

−int Include in a detailed report errors of the stray-interrupt type.

−mem Include in a detailed report errors of the memory-parity type.

−p*n* Limit the size of a detailed report to *n* pages.

−f In a detailed report, limit the reporting of block device errors to unrecovered errors.

Appendix 5: Generic Names for Peripheral Devices

Processors

The Equipment Test Package is currently available for the following processors:

PDP-11/70, 11/45, 11/34
VAX 11/780

Devices

There are testing procedures defined for the following devices. The *Device names* are used when entering a configuration during generation. The *Generic names* are used when running the tests.

Device Name	*Generic Name*
dh11	dh
dm11	dm
dn11	dn
dz11	dz
dzkmc	dzk
kmc11	kmc
lp11	lp
rf11	rf
rk05	rk
rl01, rl11	rl
rp03, rp11	rp
rp04, rp05, rp06	hp
rs04, rs03	hs
tu10, tm11	tm
tu45, tu77, tu16, te16	ht
vp	vp

There are *no* testing procedures defined for the following devices, but they may be entered into a configuration so that they may be accessed by the user.

Device Name	*Generic Name*
da11b	da
dl11, la36, kl11	kl
dmc11	dmc
dqs11b, dqs11a	dqs
dr11c	cat
du11	du

Appendix 6: Sample Run

Boot Procedures for the PDP-11*

UNIX tape boot loader

Equipment Test Package Version 1.3

Initial Load: Tape-to-Disk

The disk drive type which will be used for the Root file system
and the tape drive type which will be used for the Initial Load Tape
must be specified below.

Answer the questions with a 'y' or 'n' followed by
a carriage return or line-feed.
There is no type-ahead — — — wait for each question to complete.
The character '@' will kill the entire line
and the character '#' will erase the last character typed.
To restart the program during the question phase,
type the DEL character.

PDP-11/70?: **y**

RP03 at address 176710?: **n**
RP04/5/6 at address 176700?: **y**
Drive number (0-7)?: **0**
Disk drive 0 selected

Mount formatted pack on drive 0
Ready?: **y**

TU10/TM11 at address 172520?: **n**
TU16 at address 172440?: **y**
Drive number (0-7)?: **0**
Tape drive 0 selected

The tape on drive 0 will be read from the current position
at 800bpi, 5120 characters (10 blocks) per record
and written onto the pack on drive 0 starting at block 0.

Ready?: **y**
Size of file system to be copied is 4000 blocks.
The pack will be labeled etp1.3;
disk boot block for your disk drive type will be installed now.

The file system copy is now completed.

To boot the basic ETP for your disk
as indicated above, mount this pack on drive 0
and read in the boot block (block 0) using
whatever means you have available. See Appendix 1 in
Equipment Test Package: Operational Procedures.

Then boot the program hp.
Normally: **#0=hp**

---

* User's responses are shown in **bold**.

ETP will come up and ask you for the date and ask you to login. Please see Equipment Test Package: Operational Procedures for further details.

Good Luck!

The tape will now be rewound.

Boot Procedures for the VAX-11/780

UNIX tape boot loader

Equipment Test Package Version 1.3

Initial Load: Tape-to-Disk

The disk drive type which will be used for the Root file system
and the tape drive type which will be used for the Initial Load Tape
must be specified below.

Answer the questions with a 'y' or 'n' followed by
a carriage return or line-feed.
There is no type-ahead — — — wait for each question to complete.
The character '@' will kill the entire line
and the character '#' will erase the last character typed.
To restart the program during the question phase,
type the DEL character.

VAX-11/780?: **y**

RP06 at NEXUS 8?: **y**
Drive number (0-7)?: **0**
Disk drive 0 selected

Mount formatted pack on drive 0
Ready?: **y**

TE16 at NEXUS 9?: **y**
Drive number (0-7)?: **0**
Tape drive 0 selected

The tape on drive 0 will be read from the current position
at 800bpi, 5120 characters (10 blocks) per record
and written onto the pack on drive 0 starting at block 0.

Ready?: **y**
Size of file system to be copied is 6000 blocks.
The pack will be labeled etp1.3;
disk boot block for your disk drive type will be installed now.

The file system copy is now completed.

To boot the basic ETP for your disk
as indicated above, mount this pack on drive 0
and read in the boot block (block 0) using
whatever means you have available. See Appendix 3 in
Equipment Test Package: Operational Procedures.

Then boot the program hp.
Normally: **$$ hp**

ETP will come up and ask you for the date and ask you
to login. Please see Equipment Test Package: Operational
Procedures for further details.

Good Luck!

The tape will now be rewound.

Common Boot Procedures for the PDP-11 and VAX-11/780

```
UNIX/etp1.3: hp
real mem  = 1048576
avail mem = 921088
enter date in the following format: MMddhhmmyy 0107113880
Mon Jan  7 11:38:53 EST 1980

                *** Equipment Test Package Start for Project: hp ***

Check Root Filesystem

/dev/hp0
File System: master Volume: etp1.3

** Phase 1 - Check Blocks and Sizes
** Phase 2 - Check Pathnames
** Phase 3 - Check Connectivity
** Phase 4 - Check Reference Counts
** Phase 5 - Check Free List
303 files   3151 blocks   2660 free

ETP Start Complete

login: etp
Equipment Test Package System - Version 1.3
```

Initial Test of Root Device

```
# etpall

                *** Equipment Test Package ***

*** Equipment Test Package Pass Number: 1       Jan 07 11:39

                *** Block Device Tests ***

*** Block Test Pass Number: 1   Jan 07 11:39

Testing null with hp0a   Jan 07 11:39

Copy 2000 records of size 512 bytes from hp0a to null
2000+0 records in
2000+0 records out
Copy 1000 records of size 1024 bytes from rhp0a to null
1000+0 records in
1000+0 records out
Copy 100 records of size 10240 bytes from rhp0a to null
100+0 records in
100+0 records out
Copy 50 records of size 20480 bytes from rhp0a to null
50+0 records in
50+0 records out

Testing hp0a with hp0a   Jan 07 11:40

Making filesystem on hp0a
507 blocks
Checking filesystem on hp0a
```

```
Copy 2000 records of size 512 bytes from hp0a to hp0a
2000+0 records in
2000+0 records out
Copy 1000 records of size 1024 bytes from rhp0a to rhp0a
1000+0 records in
1000+0 records out
Copy 100 records of size 10240 bytes from rhp0a to rhp0a
100+0 records in
100+0 records out
Copy 50 records of size 20480 bytes from rhp0a to rhp0a
50+0 records in
50+0 records out

Testing hp0b with hp0a   Jan 07 11:43
   :
   :
Block Device Tests Complete

                                   *** CPU Timing Test ***

*** CPU Timing Test Pass Number: 1      Jan 07 11:55

CPU time:      14.2

Compare the CPU time with those in Appendix 7

CPU Timing Test Complete

                                *** Character Device Tests ***

                                 ** Non-interactive Mode **

*** Character Test Pass Number: 1       Jan 07 11:55

Character Device Tests Complete

                                   *** I/O Bus Load Test ***

*** I/O Bus Load Pass Number: 1   Jan 07 11:55

I/O Bus Load Test Complete

                              *** Memory and Swap Device Test ***

*** Memory and Swap Test Pass Number: 1   Jan 07 12:02

Memory and Swap Test Complete
```

Summary Error Report

```
  Summary Error Report       Prepared on Jan  7 12:06          Page  1

       Error Types: All
       Limitations:
       Date of Earliest Entry: Mon Jan  7 11:38:55 1980
       Date of Latest   Entry: Mon Jan  7 11:40:02 1980

            Total Stray Interrupts          -  0
            Total Memory Parity Errors      -  0

ETP Complete
#
```

Generation For Specific Configurations

 # etpgen
Equipment Test Package (ETP) Generation

Please enter system configuration.
You will be in the editor.
To begin, you must enter:
a
When finished, you must enter:
.
w
q
Do you want to see format rules? (y or n) **y**

FORMAT:

* project name
* K−words of core
* type of processor (vax)
* floating point or not (fpp, nfpp)
device (tab) vector (tab) address (tab) number-of-devices

NOTE:
1. The project name must be only one word of no more than 14 characters.
2. The device names should be selected from the DEVICE column in Appendix 5 of the "Operational Procedures" manual.
3. If the number of devices is omitted, a maximum number will be assumed, so be careful when entering numbers.
4. List each dh, dm, dz, and dn as separate entries, and leave the number-of-devices column blank, unless there are less than:

   16 lines/device on each: dh, dm
   8 lines/device on each: dz
   4 lines/device on each: dn

Proceed to enter system configuration:

a
*** vaxe**
*** 512**
*** vax**
*** fpp**
rp06 0 0 2
te16 0 0 1
dn11 310 775200
dz11 320 760100
dz11 550 760120
kmc11 300 760070
.
w
q

```
Any more projects to be on the same disk/tape? (y or n)  n
Building Rest of Configuration File for: vaxe
Taking Care of Necessary Devices for: vaxe
Making Operating System for: vaxe

ETP Generation Complete
#
# shutdown

SHUTDOWN PROGRAM

Mon Jan  7 13:56:02 EST 1980

  NOTE:
       If this command has not completed in 10 minutes, do the following:
       1) Hit the DEL key
       2) Execute the following commands:
          killall
          sync
          init 1
          fsck
       3) Halt the system

All currently running processes will now be terminated

   PID   TTY   TIME   COMMAND
     0     ?   3:54   swapper
     1     ?   0:00   init
    45    co   0:01   sh
   323    co   0:00   ps
   291    co   0:01   sh

HALT the system

#
```

Tests for Specific Configurations

$$ vaxe

UNIX/etp1.3: vaxe
real mem = 1048576
avail mem = 916992
enter date in the following format: MMddhhmmyy **0107140280**
Mon Jan 7 14:02:00 EST 1980

*** Equipment Test Package Start for Project: vaxe ***

Check Root Filesystem

/dev/hp0
File System: master Volume: etp1.3

** Phase 1 — Check Blocks and Sizes
** Phase 2 — Check Pathnames
** Phase 3 — Check Connectivity
** Phase 4 — Check Reference Counts
** Phase 5 — Check Free List
303 files 3151 blocks 2660 free

ETP Start Complete

login: **etp**
Equipment Test Package System — Version 1.3
#
etpchmod
Non-interactive
etpchmod −i

etpchar dn dz[0−7] kmc

*** Character Device Tests ***

** Interactive Mode **

*** Character Test Pass Number: 1 Jan 07 14:05

DN TEST

Please enter the phone # of a telephone in this room: **1234**
When that phone rings,
pick up the receiver to establish communication and then replace it.
That number will be dialed as many times as there are dn lines to be tested.

Testing DN Line: dn0
Testing DN Line: dn1
Testing DN Line: dn2
Testing DN Line: dn3

KMC TEST

Testing kmc0: kmc0 okay

MULTIPLEXER TEST

Ready to test multiplexer lines at 300 baud
To do so:

a) log onto a terminal by dialing the phone number associated with each line
b) log in as 'tty'
c) You will automatically be logged off when the line has been tested

When finished testing lines, hit 'carriage return'.
Lines Tested: (in order of testing)

dz0
dz1
dz2
dz3
dz4
dz5
dz6
dz7

Character Device Tests Complete
#

Appendix 7: CPU Timings

Cache	*VAX 11/780*	*PDP 11/70*	*PDP 11/45*	*PDP 11/34*	*PDP 11/23*
on	14.5	16.6	22.8	33.9	N/A*
off	40.3	51.8	40.1	57.7	59.9

* Not available.

Appendix 8: Error Conditions

This Appendix contains a list all of the error messages produced by the set of programs that make up the ETP. Each error message has an error code, which may be used to refer to this Appendix. Below each error message, a possible cause and a related action are described. This Appendix is to be used only as a guide to probable causes and probable solutions. If any error persists, first make sure that the directions in this document were followed precisely. Other errors messages that may appear on the ETP printout are caused by the operating system itself, and usually merit some attention (see Appendix 4).

err001: usage: etpstart *project*

cause: A *project* name is missing as the first argument to the start-up procedure that is executed automatically upon bringing up the operating system. This error shows up when the file system has been corrupted.

action: Reboot the ETP using a new disk.

err002: unknown project: *project*

cause: A corrupted file system may have caused either the */project* or the **/usr/lib/etp/configs/***project* directory to be destroyed.

action: Regenerate the ETP configuration for that project.

err003: missing directory

cause: A file system directory that is required for execution of either the start-up or the project generation procedure is missing. This error may be caused by a corrupted file system.

action: Regenerate the ETP configuration for that project.

err004: no test devices for *project*

cause: None of the devices entered into the configuration for *project* at generation time are supported by the ETP.

action: Check the ETP configuration for *project* and regenerate the ETP configuration for that *project*.

err005: root unknown

cause: A corrupted file system may have caused the file **/usr/lib/etp/configs/running/root** to be destroyed or not created properly.

action: Regenerate the ETP configuration for that project.

err006: premature termination

cause: The currently running test procedure has been prematurely terminated because the user hit either the DEL key or the BREAK key.

action: A summary error report will be printed automatically. If you wish to stop it, hit the DEL key again.

err007: etpstart did not run correctly

cause: The start-up procedure, which is executed automatically upon bringing up the operating system, did not run properly.

action: Reboot the ETP.

err008: not configured for device: *device*

cause: The *device* argument typed in on the command line was not configured into the system during the generation of ETP for this project.
action: Make sure the generic name was used on the command line and check the configuration to make sure that the device was configured into the system for this project.

err009: no test for device: *device*

cause: The *device* specified is not supported by the ETP.
action: The *device* will available for use, but it will not be tested by the ETP.

err010: conf file is missing

cause: Error in the generation procedure.
action: Reissue the **etpgen** command.

err011: illegal root device: *device*

cause: The ETP will not fit on *device*, which is the largest capacity disk entered into the configuration.
action: ETP needs at least one disk with at least 4000 blocks for PDP-11 systems and 6000 blocks for VAX systems. If the system configuration for the project does not include such a disk, the ETP cannot run on that system.

err012: no disk devices in system configuration

cause: No supported disk devices were entered into the configuration for the project.
action: The ETP requires at least one supported disk in a system.

err013: invalid processor type: *processor*

cause: The *processor* used in the configuration for the project is not supported by ETP.
action: Make sure that the processor type was entered correctly.

err014: $proj must be exported to this shell

cause: Parameters are not being placed in the environment correctly.
action: Reboot the ETP.

err015: ETP Generation Failed

cause: The configuration entered for the project is bad.
action: Check the configuration for the project to make sure that it was entered correctly and regenerate the ETP configuration for that project.

err016: there is no etp*test* test available

cause: The *test* specified on the command line does not exist.
action: Refer to the body of this document for usage and available tests.