Radio Shack®

TECHNICAL INFORMATION SERIES

TRS-80®

XENIX INFORMATION

0220 TECHNICAL SUPPORT SERVICES

This installation procedure will be divided into several sections. The first section will deal primarily with what you need to know in order to transfer the XENIX Core System from the three floppy diskettes provided in the TRS-XENIX Operations Manual to the customer's primary hard drive. Also included in this section will be common error messages to look for and what they mean so that you may be better equipped to diagnose potential hardware or software problems.

Section Two will discuss the hardware aspects of the system. Proper jumpering, card order, and mandatory modifications to the system will be explored.

Section Three will include a deeper look into the XENIX Operating System to help familiarize you with some of the more powerful commands. This section is intended to give you a more in depth look into the XENIX system as it compares to TRSDOS.

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Before proceeding with the installation of the XENIX Core System, it is MANDATORY that you refer to Section Two and verify that ALL hardware modifications have been properly implemented.

****

****

Some Important things you need to know

BEFORE STARTING

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1) When running TRS-XENIX, the hard disks are numbered hdØ - hd3, where Drive hdØ is the primary hard disk.

2) The hard drives must not be write protected and the floppy diskettes must have a write enable tab. Approximately every 3Ø seconds TRS-XENIX will access the drives to update its files and directories. This will occur even when the system is idle.

3) TRS-XENIX utilizes the Media Error Map located on the bottom of the hard drive. Copy the contents of this map for each drive in the system and then replace the map into its sleeve on the bottom of its drive. Do this for all hard drives before beginning to initialize XENIX.

If the Media Error Map is missing from the bottom of the unit, remove the cover and check for the map inside. If it still cannot be located, the bubble may need to be checked with HDVER or HDREL56. Refer to the end of this document for information about how to reconstruct an error map.

4) All commands except those specifically stipulated must be entered in **lower case** only.

5) If the hard drive to be initialized has been used previously for other data, operating systems, and etc.; insure that all needed programs and data files have been SAVED or COPYed off of it as diskutil will wipe all information.

6) **root** is the super-user. When logged into the system under this name, the user has unlimited access to all user, system, data, and program files. In addition, only the super-user may add or delete users on the system. He has complete control. When you login on a customer installation as root, exercise extreme caution because you could inadvertently obliterate something. . . Two months worth of payroll information, a 6Ø,ØØØ name mailing list, the company president's password, the . . .

.....
The Super-User has unlimited access to the system.
Be careful not to accidently nebulize any
customer data when logged in as root.

The life you save could be your own!
.....

****

DO NOT ASSUME ANYTHING!

(Really. I kid you not)

****

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SECTION ONE

A Painless Method to Install the
XENIX Core System

****

Before beginning this procedure you must have the Media Error Map/s of the hard drive/s that you are going to Format. This is essential so that the system may lock-out any known flaws during the formatting process. Be sure not to mix the maps up if you are formatting more than one drive and return each map to its drive when this procedure is completed.

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From this point forward all commands are to be entered in lower case unless otherwise stated.

.....

1) Power up the computer, hard drive/s, and all connected peripherals. Hold the <BREAK> and <REPEAT> keys until the "Insert Diskette" message appears on the screen.

2) Insert the **Boot Disk** into floppy drive Ø and allow the system to boot. At this time verify that the hard drive/s are not write protected.

3) When the boot message appears, type **diskutil** after the colon (:) and press the <ENTER> key. Remember, diskutil must be typed in lower case.

```
TRS-XENIX Boot
: diskutil <ENTER>
```

4) Answer the following prompts:

Diskutil: hard or floppy disk (h or f)?
Type <h> to format a hard drive.

Copy or format (c or f)?
Answer <f> to format.

Hard disk unit number (Ø...3)?
Answer Ø to indicate the primary hard drive.

5) The next prompts will ask how many heads and cylinders are to be formatted.

EIGHT MEG HARD DRIVES:

How many cylinders?
Answer 256.

How many heads?
Answer 4.

TWELVE MEG HARD DRIVES:

How many cylinders?
Answer 23Ø.

How many heads?
Answer 6.

6) In this step you will enter into the system the flaws shown on the primary hard drive Media Error Map. Note the example below:

If the Media Error Map shows:

TRACK	HEAD	BYTE COUNT	LENGTH
133	ØØ	Ø1333	Ø2
174	Ø1	Ø9826	Ø5

You should type:

133,Ø <ENTER>
174,1 <ENTER>
done <ENTER>

where directed. If the Media Error Map is blank, type only:

done <ENTER>

The screen will look like this:

enter numbers or "done": 133,Ø
enter numbers or "done": 174,1
enter numbers or "done": done

The first number above, 133, is the cylinder number where the error has been detected. The second number, Ø, is the head number associated with that error. There is no need to enter a count of bad bytes or the number of blocks affected. When all the information is typed in, enter **done**. Remember, if there are no flaws reported on the Media Error Map, simply enter **done** at the prompt: "enter numbers or "done":"

.....

<BREAK> may be used to abort the process at any time should you make a mistake.

.....

7) The system should now display the message:

About to format hard disk drive Ø.

The system will also display approximately how long the formatting process will take. You may abort the formatting process at any time, but the hard drive will remain unusable until the process has been completed. The cylinder number and the head number currently being formatted will be displayed.

8) When the formatting is complete, this message will be displayed:

Hard disk drive successfully formatted. Drive parameters and MEDIA ERROR MAP successfully written. Your hard disk is ready for the TRS-XENIX initialization.

****

At this point, the Hard Disk Formatting is complete. You are now ready to begin transferring the XENIX System over to the primary hard drive.

****

You are now ready to run **hdinit**. This program will accomplish several important tasks.

* Copy the boot track to the hard disk.
* Create a TRS-XENIX file system on the hard disk.
* Copy the contents of the Boot Disk to the hard disk.
* Perform a system shutdown.

9) With the Boot Disk still installed in floppy drive Ø, press the RESET button while holding the <BREAK> and the <REPEAT> keys. The boot prompt will appear. Press <ENTER>.

```
TRS-XENIX
:   <ENTER>
```

1Ø) The system will respond as if you had typed the word "xenix" after the colon. You should see a message in a box which tells you that you are running TRS-XENIX from the "Installation Floppy".

11) The system will ask you:

Do you wish to initialize your hard disk?
Answer <y> for yes.

Has your hard disk been formatted with diskutil?
Answer <y> for yes.

12) You will again be prompted for the number of cylinders and heads on your hard disk. You must respond with the same numbers you indicated during the formatting of the hard disk with diskutil.

256 cylinders and 4 heads for an 8 meg hard drive
23Ø cylinders and 6 heads for a 12 meg hard drive

13) The system will proceed with the four steps outlined earlier: installing the boot track, making a file system, copying TRS-XENIX files from the floppy disk to the hard disk and finally shutting the system down.

.....

DO NOT TOUCH THE SYSTEM UNTIL YOU SEE THE MESSAGE:

Normal System Shutdown

.....

NOTE: If for some reason your are repeating this procedure, you may be warned, while the file system is being created, that "**mkfs contains data**". You will be asked whether to "overwrite". Answer <y> to finish installing the system.

****

Welcome to the final phase
of installing the XENIX Core System.
After the ***Normal System Shutdown*** message,
RESET the computer and boot from the
hard drive.

****

The purpose of this final phase is to copy the contents of the remaining two XENIX floppy diskettes, Install 1 and Install 2, onto the hard drive. To do this, you will be utilizing another program named **firsttime**.

14) Reboot the system from the hard disk if you have not already done so.

15) Again, respond to the boot prompt by typing <ENTER> after the colon (:). This time the message in the box will read:

TRS-XENIX Hard Disk
Basic System
File System Installation.

16) Instructions for inserting and removing your floppy diskettes are displayed.

17) You are prompted with the question:

First Floppy?:

Insert the **Install 1** floppy diskette into Drive Ø. Press <**y**> and then <**ENTER**>.

18) The system will respond with the message:

Extracting files from floppy...

When this is complete, you will be prompted with:

Next floppy?

19) Insert the **Install 2** diskette into Drive Ø. Answer the prompt with <y> and <ENTER>. The system will now continue to copy the files from the second diskette onto the hard drive.

2Ø) After the transfer is completed for the Install 2 diskette, you will again be prompted with the "Next floppy?" message. Answer <n> and <ENTER>.

You will see the message:

```
Setting up directories and permissions.
Installation complete.
```

The primary hard drive now contains a complete TRS-XENIX system and the installation procedure is complete. The next message will be:

```
Type control-d to proceed with normal startup
(or give root password for system maintenance):
```

This is the normal XENIX boot prompt you may expect whenever you boot from the hard drive.

****

Checking out the system
or
How much guts do you really have?

****

At this point, you are ready to try the XENIX system.

Type <CTRL> <d>

This tells the system that you wish to engage a normal startup procedure. After a moment or two you will be prompted to enter the date and time. Although the system will accept <ENTER> in place of the date/time, you are encouraged to enter the information.

The screen will clear and in the upper left hand corner of the CRT the message **login:** will be displayed. Type in **root** and press <ENTER>.

If you are in the process of doing the Install Procedure, you will not be prompted for a password. If you are not the technician that did the Install Procedure, you may need to check with the customer to get the password.

After a moment, the "Welcome to TRS-XENIX" message box will appear and some seconds later the root prompt " # " will be displayed. The system is now ready for any commands that you may wish to give.

It really isn't necessary at this point to test the system with complex commands. Below will be outlined some simple commands to try along with the results that these commands should yield.

1) **l <ENTER>** (l = lower case L)
This command will cause a listing of the current directory contents to be displayed. This is the long form of the directory listing, much like the "DIR (S,I,A)" command used with the Model I or III. You should expect to see something like:

```
total 5Ø1
drwxr-x--- 2 boris        272 Apr     5  14:33  dirl
-rw-r----- 1 olaf         2Ø2 Apr     7  15:11  filel
...
```

Shown above are only two lines of an imaginary directory listing. When you perform this command you should see many such entries scroll through the screen.

.....

You may halt the screen output at anytime
ON A TERMINAL
by utilizing two commands. These are:

<CTRL> <S> To hold video output (X-OFF)
<CTRL> <Q> To restart video output (X-ON)

At the CONSOLE, you may use the <HOLD> key.

.....

2) **ps -lax**
This commands interrogates the system for process status. All active processes will be displayed. It is not important that you understand the information displayed, only that the system does indeed display it and returns to the # prompt.

3) **who am i**
After entering the above command the system will respond with your login name. For example, if you logged in under root, the system will return with root.

4) <CTRL> <D>
When you enter control-d at the " # " prompt, the system will log you out, clear the screen and redisplay the login prompt. Try this command and insure that this is what happens.

5) Login again as root, just as outlined above, and when the root prompt (#) appears type:

shutdown

The system will now ask "how many minutes to shutdown?". Enter a Ø for an immediate shutdown.

This will gracefully shut the system down. When the message ***Normal System shutdown*** has been displayed it is safe to turn the system off, boot up a diagnostic, or whatever.

.....

NEVER, NEVER Turn the system off without first performing this command:

shutdown

The above command will halt the system normally. Failure to use this command will necessitate "cleaning" when the XENIX system is again brought up.

You MUST be logged in as root to perform the shutdown!

.....

****

Formatting additional Hard Drives
is easy.
Use diskutil.

****

To format additional hard drives, use the XENIX utility **diskutil**. The method is much the same as when formatting the primary except the drive number to format will change. Be sure to enter the correct Media Error Map information.

NOTE: After additional hard drives are formatted, they will need to be mounted before XENIX will recognize them. Refer to section three of this document for additional information.

.....

Under TRS-XENIX:

Drives hdØ through hd3 are hard disks
Drives fdØ through fd3 are floppy

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SECTION TWO

Care and Feeding
of
TRS-XENIX Support Hardware

(cookies, plenty of chips, and liverwurst)

****

Model II and 16

1) Card Order (right to left, as viewed from rear):

Z-8Ø CPU
FDC
Hard Disk Interface
VDG
Memory
68ØØØ Cards

2) Technical Bulletins to check for:

II:5	Zener diode on old style FDC board
II:7	Motorola video monitor board modification
II:21	Early design FDC board modification
II:32	Early design FDC board has C17 installed backwards
II:37	Boot Error DC on Shugart Drive (LSI only)
II:42	Boot Errors on Shugart Drive (discreet only)
II:43	Wire jumper on early design FDC board and -Ø2 FDC chip
II:48	as above
II:45	Missing trace on Leika VDG boards
II:47	System with five or more boards (Reset modification)
II:5Ø	Missing trace on late design FDC board
II:52	as above
II:54	Missing jumpers on 64K RAM board and HD interface board
II:55	Missing jumpers on CPU board
II:64	Missing trace on late design FDC board (REV blank)
II:66	Prevent XENIX from thinking a double sided diskette is in drive Ø when used with terminator and early design FDC
16:3	Improve Z8Ø clock on REV D CPU board
16:15	Low 5 volts in card cage

3) Proper Board Jumpering:

Reference Jumpers and Notes Manual

Model 12 and Model 16B

1) Card Order (bottom to top when viewing rear of card cage):

Slot #	Board
1	Hard Disk Interface
2	Arcnet (if installed)
3	VDG
4	blank or 68ØØØ memory
5	blank or 68ØØØ memory
6	68ØØØ memory
7	68ØØØ CPU

2) Technical Bulletins to check for:

12:2 Increase reset drive (early PP3 Boards)
12:3 Power up problems - U81 (REV PP3)
12:5 Card Cage Interrupt modification (verify that this one is correct)
12:6 DMA modification; main logic board
12:9 Proper jumpering of Model 12 and 16B

NOTE: **The above technical bulletins must be verified to insure proper operation of the XENIX system.** Do not just look to see if 12:5 was done, verify that it was done correctly. Some Model 16B's may be jumpered incorrectly (main logic board). If you are not installing the card cage, verify all the memory, both Z8Ø and 68ØØØ, is functional.

Remember, the 12 meg interface PCB will be jumpered differently depending upon the machine that it is installed within. Reference the next section.

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If you have some extra time and really want to have some fun watching the system blow apart, ignore Technical Bulletins 12:5 and 12:6

.....

12 Megabyte Hard Disk Interface Card And 12 Megabyte Hard Drives

The 12 meg hard disk interface PCB will need to be jumpered differently depending upon whether it is installed within a Model 12 or 16B. This is due to a difference of internal memory configurations, as supplied from the factory, between the Model 12 and 16B.

The Model 12, as shipped, will contain internal memory mapped at page 15 with a mirror image appearing at page 14. For this reason, it is necessary to remap the memory included on the 12 meg interface PCB to another location, customarily pages 8 and 9.

The Model 16B is supplied with no internal memory mapped at pages 14 and 15 and as such, the interface card must supply this memory. Be aware that these differences apply not only to XENIX but to the 4.X operating systems as well.

Jumpering:

Model 12	AG - AL	selects pages 8 and 9
Model II, 16, 16B	AK - AP	selects pages 14 and 15

Additional Jumpers (same for all computers):

A - B
A - B (cloverleaf next to CTC chip)
V - W

.....

*** NOTE: ***

Not all 12 meg interface boards will work with all 12 meg primaries.

(Nothing is easy. Right?)

.....

There has been a modification incorporated on the 5 inch hard drive systems' controller board (AX-9282) that may make these modified boards incompatible with existing interface boards (AX-9367). If you encounter a problem getting the two boards talking to each other, refer to Technical Bulletin HD:13 for a more in depth description of the modifications involved.

There exist several possibilities:

1) An unmodified controller will function with an unmodified interface card.

2) An unmodified controller will NOT function with a modified interface card.

3) A modified controller will NOT function with an unmodified interface card. No way.

Termination and Drive Select:

It is mandatory that proper hard drive termination and drive select jumpering be followed to the letter. If not, anything may be expected including bizarre system errors to smoke potential. **Secondary hard drives, eight or twelve meg, will not be delivered properly jumpered or terminated.**

If only a primary is to be used, insure that it is terminated and that it is jumpered as drive Ø (DS-1 jumper in place).

When adding one or more secondaries, the terminator must be removed from the primary and installed into the last secondary hard drive in the daisy chain. In addition, the drive select jumpers must be set accordingly. Consider the example:

A customer currently owns a Model 12 with one primary 12 meg hard drive and he wishes to upgrade to three hard drives. When you install the additional two secondaries, follow the steps described below:

1) Remove the terminator from the primary hard drive.

2) Inspect the drive select jumper in the first secondary. If it is not set at DS-2, do so.

3) Install additional data cables (2Ø conductor ribbon) in primary hard drive as required.

4) Install the terminator removed from the primary into the second secondary and set the select jumper to DS-3.

5) Verify proper operation.

The necessity of the above procedure cannot be over emphasized. Do not assume anything.

The 8 Megabyte Hard Drive and its Associated Interface Card

Did you read the 12 Meg Hard Drive Section? If not, go back and read it because the considerations for the 8 Meg Hard Drive are much the same.

1) Possible Memory Conflicts:

As with the 12 Meg drives, the 8 Meg Interface Card will need to be jumpered according to the machine in which it finds itself. The reasons are the same; possible memory contention at pages 14 and 15. The following is a good rule of thumb:

Model 12	AG - AL	selects pages 8 and 9
Model II, 16, 16B	AK - AP	selects pages 14 and 15

Additional Interface Card Switch Settings:

S1	1, 3, 5, and 7 ON
S2	1, 3, 5, and 7 ON
S3	3 and 4 ON

Additional Interface Card Jumpers:

A - B
W - V

2) Drive Select Jumpering and Proper Termination:

The drive select jumpering and the placement of the resistor pack terminator are handled almost the same as with the 12 Meg. The only real difference is that **pin 6 of the terminating resistor pack MUST be lifted.**

In addition to the above, there are several Technical Bulletins that are considered necessary to the complacent operation of the 8 Meg within the XENIX environment. These are:

HD:2	Proper alignment of controller board
HD:3	R3 during alignment cannot be adjusted properly
HD:5	Schmitt trigger clock modification
HD:6	Write gate termination modification
HD:7	Modification to prevent stepper from getting lost

3) Potential 8 Meg Hard Drive Lockup Problems:

It has been found, through past experience, that the 8 megabyte hard drives are subject to disturbances created from RF fields. These problems may manifest themselves in a variety of ways, however the most common symptom by far has been the dreaded system lockup.

To this end, when performing a TRS-XENIX installation, or any system service including an 8 meg hard drive, keep your eyes open for potential problems. Radio transmitters, X-Ray machines, close proximity to telephone switching equipment and other computers may cause problems to system integrity.

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Radio Frequency Interference and its cure is not to be used as a panacea for hardware faults.

.....

Be aware, though, that this potential problem and its cure is not all encompassing or to be used as a panacea for other hardware faults. Suspect RF interference only when all other methods of trouble shooting have failed. What this means is simply; do the alignments, check for the proper implementation of the appropriate Technical Bulletins and when all else fails; consider RF interference as the culprit.

If you suspect an RF problem, contact Technical Support for assistance.

4) Magnetic Media Retention Problems:

Consider the following problem:

> A customer formats his 8 meg hard drive under XENIX or one of the TRSDOS 4.X operating systems. The Media Error Map shows no errors and the format process upon completion reports no flaws.
>
> The system runs smoothly for a period of time (5 hours to 2 weeks) and then begins to crash or loose files. Errors reported will generally be of the CRC variety although in some cases, no errors will be returned. When pulling a directory under 4.X, some or all of the directory entries will be missing.
>
> The customer reformats and reinitializes the system; the problems go away only to return several days later.

There are several possible causes for the above mess, however the most difficult to diagnose will be the retention problem. This occurs when the media in specific locations on the platter is defective and unable to permanently hold the information written to it. In essence, the data and format information "bleeds off" leaving the defective area unusable.

The format utilities will generally not detect this type of problem due to the way in which they usually function. This is to write the track and then to immediately read it to insure that it is error free. The problem arises because retention problems may take weeks to become apparent, not milliseconds, so the formatter, regardless of flavor, doesn't detect the problem.

If you suspect this type of disaster, consult part three of this document on how to regenerate an error map or contact Technical Support for assistance.

****

SECTION THREE

Error Messages, Media Error Map Regeneration
and
Other Assorted Goodies.

****

When servicing a XENIX system that has a history of intermittent type errors it would be valuable to see a history table of these errors. Fortunately TRS-XENIX provides such a file. It is:

/usr/adm/messages

This file contains a record of most console messages, containing typically disk related errors. It will be worth your time to scan this file before tearing into the system to see what has been happening over the last week or so. By doing this, you may see a pattern; such as floppy drive Ø keeps throwing hard errors or hdl is never ready. You may be able to eliminate the bulk of the hardware and so make trouble-shooting the system faster.

To view the file, type:

cat /usr/adm/messages

The file will be displayed on the CRT. Remember, you may halt the screen output with the <HOLD> key from the console. If the file is lengthy and you would prefer to work from hard copy, enter the following command:

cat /usr/adm/messages | lpr

This will "pipeline" the files output to the printer. Be aware that it may be several seconds before the printer activates. This is normal. The **pipeline symbol** | is generated with <CTRL> <Ø> from the console.

.....

/usr/adm/messages
can be a veritable wealth of
information. Don't overlook this
tool when trouble-shooting.

.....

Media Error Map Regeneration

At some point in time, it may be necessary to regenerate the Media Error Map for a particular hard drive. Possibly the map provided with the unit does not match the bubble, or the map is simply missing. The following procedure will allow you to generate a "quasi" error map, however bear in mind that this method will not be 1ØØ% accurate. If at all possible find the real map!

This procedure is valid for all hard drives currently available from Radio Shack.

1) Select the appropriate Diagnostic Program (refer to your hard disk diagnostic literature) that will allow you to sequentially read and verify all tracks.

2) Save all data on the hard drive if the customer desires and has not already done so. **If in doubt. . . Check!**

3) Format the hard drive with diskutil.

4) Load and run the diagnostic selected in step 1. You do not want to do any writes, only sequential reads. **For this procedure to be effective, the diagnostic must run for a substantial period of time.** If possible allow it to run overnight.

5) Select the history table option under the diagnostic and all errors will be displayed. From this information you should be able to gain a fairly good idea into where the flaws are on the media. Remember, XENIX is only interested in the cylinder and head number.

Setting Terminal Options:

The TRS-XENIX system does not automatically power up with the terminals enabled. The baud rates must be set to match that of the data terminals and the serial channels must be enabled at least once.

For example:

> You have just installed the TRS-XENIX Boot diskette and the two Install diskettes. From this point forward whenever you boot XENIX, the serial channels will not be enabled.
>
> However, if you configure the serial channels once, enable them, and leave them turned on; whenever you boot the system the serial ports WILL BE ENABLED. XENIX remembers how you last left the system.

Unfortunately, setting the baud rates with XENIX is not the easiest thing in the world. Mind you, it's not terribly difficult. . . just not easy the first time or two. Consider the following chart:

```
lhconsole
13tty01
02tty02
||  |
||  |_____ Port Name
||
||_______ Speed
|           h = hard wired console
|           0 = 300 / 1200 / 150 / 110 baud
|           1 = 150 baud
|           2 = 9600 baud          (version 1.1 only)
|           3 = 1200 / 300 baud
|           4 = Dec LA36
|           5 = 300 / 1200 baud
|           6 = 2400 baud
|           9 = 9600 baud          (version 1.2 and greater)
|
|_______ Status (set by enable / disable)
            1 = enabled
            2 = disabled
```

The information:

```
lhconsole
13ttyØ1
Ø2ttyØ2
```

is contained within a file called /etc/ttys. If you were to cat (short for concatenate) this file to the screen, you could see at a glance just how your communications channels were configured.

"lhconsole" means simply that the console is enabled (lhconsole), it is hardwired (lhconsole), and that the device name is console (lhconsole)

"13ttyØ1" decodes to enabled (13ttyØ1), the system will check for 12ØØ or 3ØØ baud (13ttyØ1), and the device name or channel is ttyØ1 (13ttyØ1).

"Ø2ttyØ2" decodes to disabled (Ø2ttyØ2), when enabled it will communicate at 96ØØ baud (Ø2ttyØ2), and a device name of ttyØ2 (Ø2ttyØ2).

To enable a channel, enter the following command:

enable ttyØn <ENTER>

where n is the channel number. For example to enable channel 2 (otherwise known as serial port B) type: **enable ttyØ2 <ENTER>**.

.....

Serial Channel A is ttyØ1
Serial Channel B is ttyØ2
The computer's keyboard is console

.....

Conversely, to disable a channel enter:

disable ttyØn <ENTER>

where n is the channel number. **disable ttyØ2** would disable serial port B.

****

OK Guys, buck up.
You Are Now About To Learn How To Use

The Editor.

(lots of coffee, smokes if you do,
extra strength asprin optional)

****

In order to change the baud rates of the serial channels, you must modify the file **/etc/ttys** to correspond to what you want. In order to make these changes, the file must be edited. This means that you must know how to use the XENIX editor. This editor is called **ed**.

ed is a fairly versatile, if somewhat stupid program designed to edit files. He will do exactly what you tell him with a minimum (really!) of cockpit error checking. Be careful; understand what you're doing before doing it. **Never Assume!** Read this document carefully before doing anything with ed or you may find yourself in a somewhat embarrassing situation.

.....

ed is a versatile, if somewhat stupid program
designed to edit files. He will do exactly what you
tell him with a minimum of cockpit error checking.

.....

To invoke ed and edit the /etc/ttys file, type:

ed /etc/ttys <ENTER>

After a moment of whirring and clicking, the system will respond with a number roughly corresponding to the number of bytes contained within the file. To see the file in its entirety, type:

1,$p <ENTER>

This command instructs the editor to print the file beginning with line one to its end. The $ signifies the last line number and the p tells ed to print these lines to the screen. As an example, you should now see something like the following on your screen:

```
ed /etc/ttys
4Ø8
1,$p
1hconsole
Ø3ttyØ1
Ø2ttyØ2
```

Let's assume (yes I know it's dangerous) that the customer has two DT-1 terminals. One DT-1 is to be run from a remote location over telephone lines. It will have a modem, but because of situations beyond the customer's control, it may at times be a 12ØØ baud modem and at other times it may be a 3ØØ baud device. The other DT-1 will be in the office and will run at a baud rate of 96ØØ.

We will configure ttyØ1 for 96ØØ baud and ttyØ2 to search for 3ØØ or 12ØØ baud. **It should be noted here that ttyØ1 and ttyØ2 can be configured to search a range of baud rates and select the one that matches the incomming data.** Reference the /etc/ttys chart.

What we need to do then, is to change the /etc/ttys file as shown below:

FROM	TO
1hconsole	1hconsole
Ø3ttyØ1	Ø2ttyØ1
Ø2ttyØ2	Ø3ttyØ2

In ed, every line has a number. Ed is a line oriented text editor and because of this, we must give him the line number we wish to change. The tricky part arises because the line numbers are not displayed so you must count them yourself. In addition to this, we must also tell ed what to do to that line.

Type the following command:

2p <ENTER>

You should see displayed on the screen the second line of the file. It's always a good idea to print the line you are about to change first. . . just to make sure you do indeed have the correct line number.

With the next command we will change the second line. Type in:

2s/Ø3/Ø2/p <ENTER>

You would now see on your screen:

Ø2ttyØ1

The above command instructed ed to get line 2 (2s/Ø3/Ø2/p), search it for the first occurrence of Ø3 (2s/Ø3/Ø2/p), change the Ø3 to a Ø2 (2s/Ø3/Ø2/p), and finally to print the line as changed (2s/Ø3/Ø2/p)

The / character is used as a delineator between arguments of the command. If you omit one, ed will probably do something a bit strange and most likely; not at all what you intended.

In our example, to change tty02 you would enter the following command:

3s/02/03/p <ENTER>

Get line 3, find the first occurrence of a 02, change the 02 to a 03, and then reprint the line as edited. This completes the changes. To make absolutely sure the changes are correct, list the entire file:

1,$p <ENTER>

If it is correct, then you must write the file back out with the w command:

w <ENTER>

Again the system will respond with a number to signify that the file has now been written.

To leave the editor, type q:

q <ENTER>

The root prompt # will be displayed.

It is very important to note here that until the w command is entered, there is no change made to the actual file. The editor loads the file into a buffer and that's where the editing actually takes place. The w command simply overwrites the file with the information stored within the buffer. **What this means is: If you make a mistake and can't or don't know how to recover, then use the q command to quit the editor and return to the root prompt. If you have not used the w command, then the file has not been altered. Go back into ed and try again.**
NOTE: If q will not allow you to exit the editor, then you may be stuck in the append mode. Try the following command sequence:

. <ENTER>
q <ENTER>

.....

No Matter What You Do While In ed,
There Will Be No Changes Made To The
File Until The w Command Is Used.

.....

The above information about the editor should be sufficient to enable you to alter the /etc/ttys file if you need to. However, for more detailed information about the editor in general you should refer to the TRS-XENIX Operations Guide, pages X-9 through X-14.

ACCESSING ADDITIONAL HARD DRIVES WITH TRS-XENIX:

Before you can access any additional secondary hard drives under XENIX several steps must be taken. Briefly; the drive/s must have been formatted with **diskutil**, a file system must have been created on each additional hard drive with **/etc/mkfs**, and the drive/s must be **mounted**. This procedure is really much easier than it sounds, and the steps will be discussed below.

Formatting Secondary Hard Drives:

To format anything under XENIX, be it a hard drive or floppy diskette, the program **diskutil** must be used. The system is booted from the floppy **Boot Diskette** and at the prompt the program **diskutil** is called. This procedure is the same as when formatting the primary hard drive with the exception that the drive number will change to correspond to whichever secondary you may wish. You are directed to SECTION ONE of this document for formatting instructions.

Creating the File System:

Once all secondary hard drives are formatted and the system has been booted from the primary hard drive, you are ready to begin creating file systems. Follow the steps outlined below:

1) All hard drives should be **write enabled.**

2) Enter the appropriate command listed below:

   For an eight meg hard drive enter:

   /etc/mkfs /dev/rhdx 16966 1 17 <ENTER>

   For a twelve meg hard drive enter:

   /etc/mkfs /dev/rhdx 23Ø18 1 17 <ENTER>

The x should be replaced with the drive number of the secondary hard drive you wish to create the file system on. This process will need to be repeated for all secondary drives.

The numbers "16966" and "23Ø18" represent the total number of disk blocks on the hard drive. A block is equal to 512 bytes.

Mounting File Systems:

In order to access files located within the second hard drive (or third or fourth, for that matter) it must first be mounted. If this is the first time that the hard drive is to be used, an extra step is necessary. This step is to create an empty subdirectory within the root directory. Use the following commands:

```
cd / <ENTER>
mkdir h1 <ENTER>
```

The first command (cd /) moves the system to the root directory. The second instructs XENIX to create a directory entry named h1. If you also wanted to mount a second secondary hard drive, then you would need to use mkdir to create another directory entry called h2. Actually, you could call these directory entries just about anything you wanted, but h1, h2, and h3 are fairly standard.

After these directory entries are created, you will never need to use the mkdir command again to add hard drives. . . unless, of course, you are totally reinitializing the system.

Mounting:

Before the hard drive can be accessed for anything, it must first be mounted onto the system. This must be done for each secondary hard drive in the system. Use the following command/s as applicable:

```
/etc/mount /dev/hd1 /h1 <ENTER>    (first secondary)

/etc/mount /dev/hd2 /h2 <ENTER>    (second secondary)

/etc/mount /dev/hd3 /h3 <ENTER>    (third secondary)
```

Unmounting:

If you need to remove or turn off a secondary hard drive that is mounted, you must first unmount it. Shutdown automatically unmounts all drives so when utilizing this command (shutdown), it is not necessary to do any unmounts. The unmount command is:

```
/etc/umount /dev/hd1 <ENTER>
```

If additional hard drives need to be unmounted, substitute the device number for hd1. For example; hd1, hd2, or hd3.

BACKING UP THE SYSTEM:

At some point in time, it may be necessary for you to save the contents of a hard drive before proceeding with your trouble-shooting efforts. You will need several diskettes previously formatted with **diskutil**. Ten or so double sided floppies should be adequate for a large system. Follow the commands outlined below:

1) Log in as root

2) Enter the trsshell by typing:

tsh <ENTER>

3) To save everything enter:

for single sided diskettes

save_:Ø_-ss_/[a-c]*_/[e-z]*_/[Ø-9]*_/[A-Z]* <ENTER>

or

for double sided diskettes

save_:Ø_-ds_/[a-c]*_/[e-z]*_/[Ø-9]*_/[A-Z]* <ENTER>

NOTE: The underline character "_" in the above command denotes spaces. DO NOT enter the underine character as part of the command.

4) Follow the prompts on the screen

RESTORING THE SYSTEM:

1) With diskettes in hand, enter the following command to restore the diskettes created with **save**:

restore :Ø <ENTER>

2) Follow the prompts on the screen

Error Messages:

Below you will find listed 68ØØØ Trap Errors.

Trap #	Assignment
2	Bus Error
3	Address Error
4	Illegal Instruction
5	Zero Divide
6	CHK Instruction
7	TRAPV Instruction
8	Privilege Violation
9	Trace
1Ø	Line 1Ø1Ø Emulator
11	Line 1111 Emulator
12-14	Unassigned, Reserved
15	Uninitialized Interrupt Vector
16-23	Unassigned, Reserved
24	Spurious Interrupt
25	Level 1 Interrupt Autovector
26	Level 2 Interrupt Autovector
27	Level 3 Interrupt Autovector
28	Level 4 Interrupt Autovector
29	Level 5 Interrupt Autovector
3Ø	Level 6 Interrupt Autovector
31	Level 7 Interrupt Autovector
32-47	Trap Instruction Vectors
48-63	Unassigned, Reserved

Description of system console messages:
(reprinted from TRS-XENIX man function)

This section describes the various non-device system messages which may occur on the system console. Device-related messages start with the name of the device driver.

Most of these system messages begin with "panic:" and are fatal (the system refuses to execute further). Fatal messages represent serious hardware problems or serious kernel software inconsistencies. Such internal inconsistencies are usually tracable to hardware problems themselves, often forms of memory failure.

A few messages represent kernel operational problems, typically the overflow of a critical table. These potential problems are guarded against by the kernel, it takes such extreme situations to bring them about that they should never occur in normal system use.

The messages are presented below in alphabetical order. The accompanying text indicates fatal for those messages from which recovery is impossible. System inconsistency indicates a contradictory or impossible situation in the kernel, abnormal represents a probably legitimate but extreme situation, hardware indicates a clear hardware problem.

Many of these messages are accompanied by a device specification dev. This will print as nn/mm where nn is the major number and mm is the minor number of the offending device.

If you do not recognize the device by its numbers type:

ls -l /dev | grep nn | grep mm

bad block on dev dev
A non-existent disk block was found on or is being inserted in the structure's free list. System inconsistency.

bad count on dev dev

Bad free count on dev dev
A structural inconsistency in the superblock of a file system. The system attempts a repair, but this message will probably be followed by more complaints about this file system. System inconsistency.

err on dev
This is the way that most device driver diagnostic messages start. The message will indicate the specific driver and complaint.

Inode table overflow
Each open file requires an inode entry to be kept in memory. When this table overflows the specific request is refused (usually open(2) or creat(2)). Although not fatal to the system, this event may damage the operation of various spoolers, deamons, the mailer, and other important utilities. Anomalous results and missing data files are a common result. If this message occurs during normal operation, if possible reconfigure your kernel with more inode table entries. Abnormal.

interrupt from unknown device, vec=xxxx
The CPU received an interrupt via a supposedly unused vector. This message is followed by "panic: unknown interrupt." Typically this event comes about when a hardware failure miscomputes the vector of a valid interrupt. Hardware.

no file
: There are too many open files, the system has run out of entries in its "open file" table. The warnings given for the message "inode table overflow" apply here; if this occurs during normal operation use config(8) to increase the size of the file table. Abnormal.

no space on dev dev
: This all-to-frequent message means that the specified file system has run out of free blocks. Although not normally as serious, the warnings discussed for "inode table overflow" apply: often programs are written casually and ignore the error code returned when they tried to write to the disk; this results in missing data and "holes" in data files. The system administrator should keep close watch on the amount of free disk space and take steps to avoid this situation.

** Normal System Shutdown **
: This message appears when the system has been shutdown properly. It indicates that the machine may now be rebooted or powered down.

Out of inodes on dev dev.
: The indicated file system has run out of free inodes. The number of inodes available on a file system is determined when mkfs(1) is run. The default number is quite generous, this message should be very rare. The only recourse is to remove some worthless files from that file system, or dump the entire system to a backup device, rerun mkfs(1) with more inodes specified, and restore the files from backup.

out of text
: When programs linked with the -i or -n switch are run, a table entry is made so that only one copy of the pure text will be in memory even if there are multiple copies of the program running. This message appears when this table is full. The system refuses to run the program which caused the overflow. Note that there is only one entry in this table for each different pure text program, multiple copies of one program will not require multiple table entries. Each "sticky" program (see chmod(1)) requires a permanent entry in this table; non-sticky pure-text programs require an entry only when there is at least one copy being executed. See config(8) to increase the size of the text table.

panic: /Ø trap
: A divide-by-zero occurred when executing kernel or device driver code. System inconsistency, fatal.

panic: blkdev

panic: devtab
An internal disk I/O request, already verified as valid, is discovered to be referring to a non-existent disk. System inconsistency, fatal.

panic: core free list
The internal memory allocation list has become corrupted. System inconsistency, fatal.

panic: free mm <1 pages

panic: freeing free mm
The internal memory management tables have become corrupted. System inconsistency, fatal.

Panic: iaddress > 2^24
This indicates an attempted reference to an illegal block number (one so large that it could only occur on a file system larger than 8 billion bytes). System inconsistency, fatal.

panic: iinit
The super-block of the root file system could not be read. This message occurs only at boot time. Hardware, fatal.

panic: impossible data page

panic: impossible stack page

panic: impossible text page
The internal description of a task's memory has become corrupted. System inconsistency, fatal.

panic: Ill. TTY driver
An attempt was made to call an illegal tty driver. System inconsistency, fatal.

panic: Impossible trap type
The system hardware generated a trap of an unknown type. Hardware, fatal.

panic: IO err in swap
A fatal I/O error occurred while reading or writing the swap area. Hardware, fatal.

panic: Kernel data too large
An attempt to boot a XENIX kernel whose ``data+bss'' segments are too large. Rerun config(8) with reduced table and/or buffer requirements.

panic: mmblock

panic: mmufremm

panic: mmugetmm

panic: mmumvmap

panic: mmuset:chk

panic: multi seg data
The internal memory management tables have become corrupted. System inconsistency, fatal.

panic: Multiplex Pipes not Present
An internal reference was made to multiplex pipes; this is an obsolete feature not present in this system. System inconsistency, fatal.

panic: no fs
A file system descriptor has disappeared from its table. System inconsistency, fatal.

panic: no imt
A mounted file system has disappeared from the mount table. System inconsistency, fatal.

panic: no procs
Each user is limited in the amount of simultaneous processes he can have; an attempt to create a new process when none is available or when the user's limit is exceeded is refused. That is an occasional event and produces no console messages; this panic occurs when the kernel has certified that a free process table entry is available and yet can't find one when it goes to get it. System inconsistency, fatal.

panic: out of swap space
There is insufficient space on the swap disk to hold a task. The system refuses to create tasks when it feels there is insufficient disk space, but it is possible to create situations to fool this mechanism. Abnormal, fatal.

panic: overflow trap
The CPU generated an overflow trap while executing kernel or device driver code. System inconsistency, fatal.

panic: request for <1 mem
The internal memory management tables have become corrupted. System inconsistency, fatal.

panic: Running a dead proc
A dead process has found its way onto the "run" queue. System inconsistency, fatal.

panic: Sleeping on wchan Ø
The kernel or a device driver has requested an illegal form of an operation called "sleep". System inconsistency, fatal.

panic: Text on Non-Sep
The internal description of a task's memory has become corrupted. System inconsistency, fatal.

panic: Timeout table overflow
The timeout table is full. Timeout requests are generated by device drivers, there should usually be room for one entry per system serial line plus ten more for other usages. This table can be increased via config(8). Abnormal, fatal.

panic: too much text
The internal description of a task's memory has become corrupted. System inconsistency, fatal.

panic: trap in sys
The CPU has generated an illegal instruction trap while executing kernel or device driver code. This message is preceded with an information dump describing the trap. System inconsistency, fatal.

panic: unknown interrupt
The CPU received an interrupt via a supposedly unused vector. Typically this event comes about when a hardware failure miscomputes the vector of a valid interrupt. Hardware, fatal.

panic: zero wchan
A kernel or device driver has requested an illegal form of an operation called "sleep". System inconsistency, fatal.

Stray int: level n
The CPU received an interrupt via a supposedly unused vector. This message is followed by "panic: unknown interrupt." Typically this event comes about when a hardware failure miscomputes the vector of a valid interrupt. Hardware, fatal.

z8Ø panic: FD: Ill. Cmd
The z8Ø checks floppy disk commands for validity, so that a hardware or software problem does not cause a bad disk command to be executed by the z8Ø. The probable cause of this error is an M68ØØØ hardware problem. System inconsistency, fatal.

z8Ø panic: HD: Ill. Cmd

The z8Ø checks hard disk commands for validity, so that a hardware or software problem does not cause a garbage hard disk command to be executed by the z8Ø. The probable cause of this error is an M68ØØØ hardware problem. System inconsistency, fatal.

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