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I   INTRODUCTION :

Congratulations on your selection of the SAGE™ II/IV
microcomputer system. We've designed our machine from the
ground up with performance in mind. We think that you'll
quickly appreciate the SAGE II/IV's speed and its inherent
advantages over other microsystems.

As with anything new, there will be a period of transition
while you learn how to fully operate the SAGE and utilize
its many features. However, this needn't be a painful
process.

Computers are simply tools to help you do your job better;
whether that job is letter writing, accounting, engineering,
financial planning, computer science, or any of a thousand
other tasks. Since our machine will be working for you, we
encourage you to treat it as a friend. If you spend a
little extra time getting acquainted now, you'll find the
SAGE will return the favor by making things much easier for
you in the future.

You may have already noticed that we've packed an awful lot
of reading material with this computer. Rest assured that
you needn't memorize it all before using your SAGE II/IV.
Our system is a powerful tool for programmers and
developers, but the SAGE II/IV is also designed with the
first-time user in mind.

Our documentation and manuals reflect those diverse needs.
In other words, you will have to read only those sections
that apply to your application. If you are aiming at
traditional microcomputer solutions, such as business and
personal uses, you will probably find that the "In the
Beginning" section of the GETTING STARTED MANUAL will answer
most of your questions about operating the SAGE II/IV
itself.

Software packages (the programs that make your computer into
a useful tool) also have their own set of instructions. At

the back of this manual we've included the documentation for
using the WORD/7 word processing package. The TIMBERLINE
Spreadsheet is explained in a separate manual provided by
TIMBERLINE. If you have purchased other software (a general
ledger package for example), you will need to read the
accompanying materials to run those applications.

Eighty-five percent of our users stop at this point and are
able to operate the system fully to satisfy their complete
processing needs. However, we have also included complete
technical details for those with special needs.

If you are using a terminal other than the SAGE II/IV model,
you will find setup notes in the "Installation" section of
this manual. Likewise, those with the Winchester hard disk
unit will also find details on that product in the
"Installation Section." The same applies for those who will
be using the Multi-User capabilities of their SAGE II/IV to
support more than one terminal.

While it is not mandatory, you may find the enclosed book,
"Personal Computing with the UCSD p-System" , very
helpful. It explains the p-System™, which serves as the
prime operating system for the SAGE II/IV. An operating
system allows a computer to handle duties such as running
the floppy diskette drives, organizing files, and
transferring information from place to place within the
machine. While you are using word processing or any other
application, you'll be unaware that the p-System even
exists. It is useful to understand, however, when you are
loading new programs, copying material from disk or
diskettes, or preparing new diskettes for use.

Programmers and developers will find complete details on the
technical aspects of the SAGE II/IV and the p-System in the
4 SAGE manuals: **p-System OPERATING SYSTEM, p-System
PROGRAM DEVELOPMENT, SAGE II/IV TECHNICAL MANUAL, AND
SDT-ASSEMBLER.**

Most importantly, don't let our little box, or any computer
intimidate you. Pushing the wrong key is seldom fatal. In

fact, you'll find that the SAGE is an extremely forgiving piece of hardware. Before it allows you to make any really big mistakes, it gives you an opportunity to review most decisions.

Finally, if we use any terms you don't understand, please forgive us. Computer buzz words have corrupted our language, making it difficult to remember that everyone doesn't communicate through "input/output devices".

So relax, sit back, and enjoy your SAGE II/IV.

II   UNPACKING YOUR SAGE II/IV :

Since you're reading this manual, you've obviously unpacked
at least a portion of your SAGE II/IV.   If you haven't
already done so, remove the manuals box, the SAGE II/IV
itself, and the cables from the shipping cartons.   Please
check to see that you have the following items:

> SAGE II/IV
> AC power cord
> Cable "Terminal to Aux-470" (One for each terminal)
> Printer cable (Optional)
> SAGE Documentation (This volume and 4 others)
> **"Personal Computing with the UCSD p-System"**
> TIMBERLINE Spreadsheet Manual
> SAGE Software Catalog

Additionally, the SAGE II/IV terminal (if ordered) will be
packed in a separate box.   Inside it you will find:

> Terminal screen
> Terminal keyboard
> The SAGE (QVT-102) Operator Manual

If you have ordered a printer with your SAGE II/IV, it too
will be in a separate shipping container.   Carefully check
the packing list to make sure you remove all the contents.
If purchased directly from SAGE Computer, your printer cable
will be packed with the SAGE II/IV.   Otherwise, the cable
will be supplied by your dealer or the printer manufacturer.

If you are missing any of the items above, please contact
your SAGE Computer dealer.

It is a good idea to save all the shipping cartons if
possible.   Should the need arise to return any of your
hardware for maintenance purposes, they are designed to give
maximum protection during transport.

air flows out
bottom vent

Upper latch

air flows in
right vent

●PROCESSOR   SAGE II

Floppy
Drive #4

Lower latch

Floppy
Drive #5

SAGE II

air flows out
left vent

air flows in
right vent

Upper Latch

● PROCESSOR   SAGE IV

Floppy
Drive #4

Lower Latch

Winchester
Hard Disk

SAGE IV (With Hard Disk)
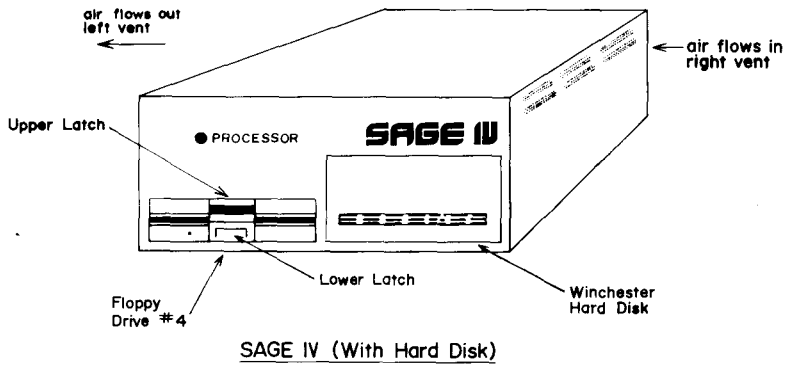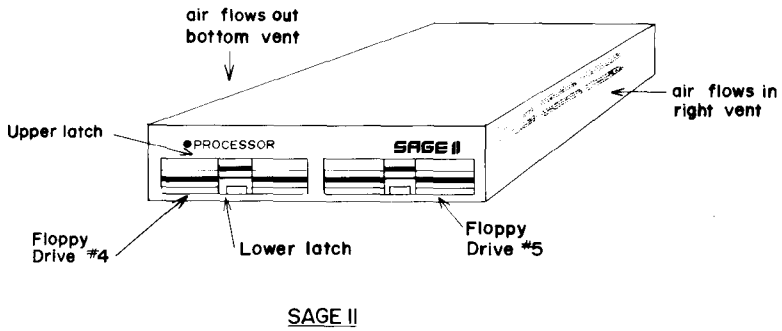
II.01 SETTING UP :

The SAGE II/IV should be placed on a flat level surface for
best operation.   Adequate ventilation is mandatory.   The
SAGE II (see illustration on facing page) draws air into the
machine on the right side; the fan exhausts from the bottom
left hand corner.   Both of these areas should be free from
obstruction.   The fan will work correctly while the machine
sits on its feet, but make sure the fan port itself is not
blocked by debris.

The SAGE IV with hard-disk has a higher cabinet.   Air intake
is again on the right side, but the fan exhausts from a port
on the left-hand side of the case.

All SAGE II/IV's will also operate in a tilted environment
as long as you do not exceed 15 degrees of tilt from full
horizontal or vertical.   However, it is difficult to provide
adequate ventilation and access in these positions.

Follow the manufacturer's recommendation for placement of
terminals and printers.   The SAGE II/IV case will support
the weight of most CRT units, should you wish to place your
terminal on top of the computer.

At this time, remove the thin white cardboard protectors
from the diskette drive units.   You will see a small tab
sticking out of each drive you have.   If the protector does
not easily slide out, check to see that the drive is not
latched.   You may disengage the latch by pressing in on the
center section just below the diskette slot.
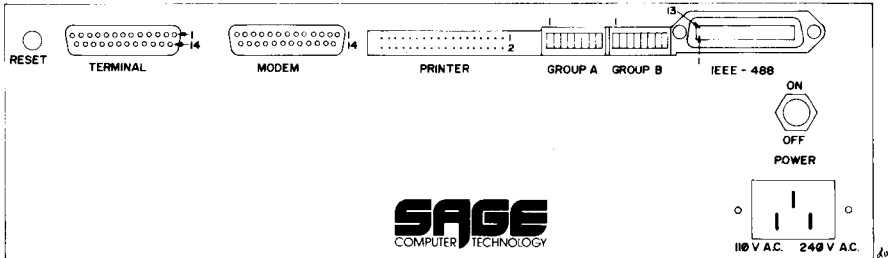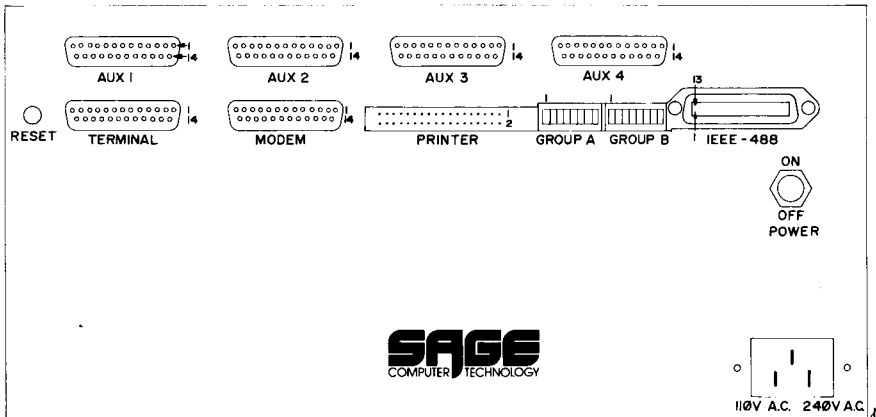
SAGE II

SAGE IV (With Hard Disk)

II.02 CONNECTING THE TERMINAL :

If you purchased your terminal from SAGE, then follow the
simple instructions given here. If not, refer to the more
detailed section "p-SYSTEM TERMINAL CONFIGURATIONS" on page
201.

Your SAGE II/IV was shipped with a 10-foot cable to connect
the terminal to the computer. This cable has gray
connectors on each end. One end is labeled "TERMINAL" and
the other end is labeled "AUX-470".

Insert the end marked "AUX-470" into the back of the SAGE
II/IV on the port marked "TERMINAL". This plug is located
at the left edge of your computer. The shape of the
connector prevents it from being inserted upside down. It
should attach easily without excessive force.

Although the cable connectors have screws to make a
permanent connection, we do not make a provision for their
use with the SAGE II/IV. While this may occasionally result
in an accidental disconnect, we feel that it will also
prevent the computer from ending up on the floor if the
cable is accidentally jerked.

The other end of the cable marked "TERMINAL" should be
inserted into the port on the back of the terminal marked
"EIA". The screw mounts are provided on the terminal,
should you choose to make a more permanent connection here.

Cables are also available in lengths up to 200 ft. for more
convenient placement of terminals. They can be ordered from
your SAGE Computer dealer.

Plug the SAGE Terminal keyboard into the left side of the
terminal. This connector is similar to a phone jack, and
should snap into place.

If you are planning a Multi-User system, one terminal should
be attached to the "TERMINAL" port at this time. Later,
additional terminals will be connected to the ports marked

AUX 1-4 and the MODEM port. HOWEVER, at this time do not
connect the additional terminals. Please complete the "In
the Beginning" section of this manual with just one
terminal, and then procede to the Multi-User" portion of the
manual.

II.03 CONNECTING THE PRINTER :

The SAGE II/IV will operate with a number of different
printers. While these may differ widely in the method, or
quality, of printing; there are just two different ways for
them to talk to the computer: via the Serial port or the
Parallel port.   These terms refer to the method of data
transmission between the two devices.

Serial printers will be connected to the SAGE II/IV using
the "MODEM" port on the back of the computer.   Parallel
printers will use the connector marked "PRINTER".

The cables for these two types are easy to distinguish. A
serial machine uses connectors just like the plugs on the
computer-to-terminal cable.   A parallel cable resembles a
wide, grooved ribbon.   The two connectors are not
interchangeable.

If your printer and cable were supplied by SAGE or a SAGE
dealer, you should be able to simply plug one end into the
computer and the other end to the printer itself.

There is a chapter in the Installation section called
"PRINTER INSTALLATION" which discusses printers and cables
should you need further assistance.

Most printers also have one or more DIP switches.   They
should be set to the recommendations of the printer
manufacturer. Check the owner's manual that came with your
printer for details.

II.04 DIP SWITCH SETTINGS :

Just about every piece of electronic gear manufactured today contains one or more DIP switches. These are small devices housing multiple switches. DIP stands for Dual In-line Package. These devices allow changing the machine by just moving the switch settings.

The DIP switches on your SAGE II/IV were preset at the factory to allow your computer to perform most tasks. Please double check to see that your switches match the settings shown below.

SAGE II

GROUP A   GROUP B

SAGE IV

GROUP A   GROUP B
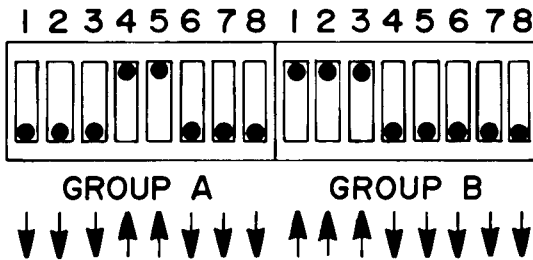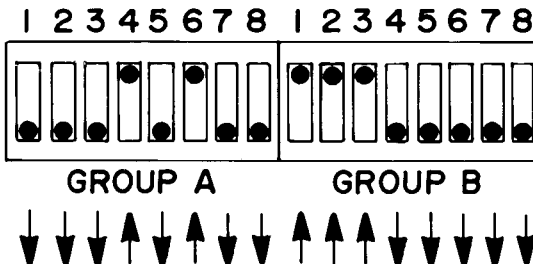
A complete discussion of the DIP switches and alternative settings may be found in the Installation section of this manual.

PLEASE RE-CHECK YOUR SETTINGS CAREFULLY
These switches are very small and are easily mis-read.   Be sure to look at them straight-on so you do not transpose the numbers.

II.05   CONFIGURING THE SAGE TERMINAL :

A unique feature of the SAGE Terminal is that it does not
have any DIP switches.   However, you can still customize
your terminal through use of the "Set Up" key.

To correctly configure your terminal to work with the SAGE
II/IV system, power up the terminal.   Re-check to insure
that the power cord is connected to a 110VAC/60Hz outlet.
Turn on the terminal using the black rocker switch located
at the rear corner of the base.   As you face the screen,
this switch is to the right rear.   A beep should occur
within two seconds of turning the switch.   If it does not,
turn the switch in the other direction and check the power
connection.

After 10 seconds, you should see a cursor appear in the
upper left corner and a banner across the bottom of the
screen.   If these are missing, or appear dim, adjust the
Screen Intensity knob on the front right corner of the base
by turning it clockwise.

The banner at the bottom of the screen is known as the
Status Line, and it displays the current configuration of
the terminal.   We can use the "Set Up" key to change any of
the terminal characteristics.   Press the "Set Up" key and
notice that the cursor jumps to the first item in the line
titled "On Line".

You can use the Right and Left Arrow cursor keys to move to
any of the nine items on the bottom line.   Try moving back
and forth.   Once you have selected which item you want, you
can change it by using the Space Bar on the keyboard.   Try
this example:

Move the cursor to the right edge so it is on the item
titled "9600". Press the Space Bar. Each time you press
this bar, a different number will appear. This particular
item sets the BAUD rate of the terminal. The SAGE II/IV
requires a BAUD rate of 19200. Press the Space Bar until
this item reads 19200.

All of the set up items work in a similar manner, working
from left to right. Make sure that your banner looks like
the one shown below. If it is different, use the Space Bar
to change any needed items.

`ON LINE |CHAR MODE |FDX |PROT OFF |KB ON |AUX OFF |(MON)OFF |GRAPH OFF |19200`

There are five more set up lines that may be changed. To see these, press the Down Arrow cursor key. The "Set 1" line should be displayed. As you did with the previous example, move through each item and make them match the configurations shown below:

SET 1 AUX/KB: AUX |REPEAT ON |CLICK OFF |MARGIN BELL OFF |EIA/CL: EIA |E.O.M.: NUL

If any item does not match, use the Space Bar to change it. Now, use the Down Arrow cursor key to move to the "Set 2" line. Match it to the line shown

SET 2 LINE WRAP ON |LINE FEED OFF |SCROLL ON |DISPLAY PE OFF |STD VID |X|ON ONLY

Check that the last item is "X-ON ONLY" and not "X-ON & DTR". Use the Down Arrow again to move to "Set 3". Match the items shown below:

SET 3 DATA BIT 8 |BIT8 0 |PARITY OFF |PARITY BIT ODD |STOP BIT 1 |EMULATION SAGE
                                                                    (QVT102)

This line should not have required any changes, but if it did, use the Space Bar to make the corrections. Use the Down Arrow to move to "Set 4". Match the items shown below:

SET 4 CURSOR BLOCK |CURSOR STEADY |HERE IS: |TIME OFF |FREQ 60

Again use the Down Arrow to move to "Set 5" and match the items shown below:

SET 5 XPARENT OFF |KB TYPE: US

Now use the Up Arrow to move back through the Set Up lines
and check your settings. When you are back to the start (ON
LINE...), hold down the SHIFT key and press "S". This will
save your changes into the terminal's memory. This also
makes the cursor jump back to the top of the screen. You
might want to go through the Set Up routine one more time.
All the items should now be set correctly, and you need only
press the "Set Up" key to return the cursor to the screen.

NOTE: Some of these items are mandatory such as the BAUD
Rate and Parity setting, but others are a matter of
preference such as blinking or non-blinking cursor. Please
check the Operator Manual (Pgs. 19-26) which accompanied
your terminal for full details.

The Status Line is displayed whenever you turn on your
terminal. While some find it useful, others consider this a
distraction. To turn off the Status Line, follow the
procedure below:

Press "Set Up". Use the Space Bar to change ON LINE to
LOCAL. Press "Set Up" again. Press <esc>. Hold down the
SHIFT key and press <left bracket>. Press "Set Up". Use
the Space Bar to change LOCAL to ON LINE. Press "Set Up".

II.06 AC POWER CONNECTIONS :

All models of the SAGE II/IV have similar connections on the
rear panel, the only difference being that the SAGE IV
features an extra row of four auxiliary ports.

Connect the female plug on the black power cord to the AC
Inlet located on the back of the SAGE II/IV in the lower
right-hand corner.

Check the bottom of your computer for a small white label
which will indicate the proper power requirement; 110VAC or
220VAC.

If so configured, connect the male end of the plug to a
110VAC 60Hz or 50Hz power source (standard U.S. house
current). Note that the power cord has a three-pronged
safety plug to provide a reliable system ground. Use of a
3-to-2 pronged adapter is NOT recommended. If used, the
adapter MUST BE GROUNDED properly.

Systems which have been changed for 220VAC operation will
carry such a notation on the small white label affixed to
the bottom of the SAGE II/IV.

II.07   THE KEYBOARD :

There are as many different styles and designs of keyboards
in the computer industry as there are clothes in the fashion
world.   However, the SAGE II/IV terminal is fairly close to
standard.

You'll notice two main groups of keys: The **ALPHANUMERIC
KEYS** and the smaller group to the right known as the
NUMERIC KEYPAD .

Both have numbers, so which should you use?   It really
doesn't make much difference.   With practice, you'll
probably find that the numeric keypad is faster, and you'll
never make a mistake because of the **SHIFT** key.   Remember
that an "8" on the alphanumeric keys could type as a "*" if
the SHIFT key is depressed.   On the numeric pad, an "8" is
always an "8".

At the top right edge of the keyboard you'll notice a short
row of keys with the designations: **PF1, PF2, PF3 and PF4.**
These are **PROGRAMMABLE FUNCTION KEYS** .   Their use is
controlled by software.   In other words, they can change
from program to program.   For example, in the word
processing package, PF4 is used to delete lines.   In another
program, this same key can be used for an entirely different
purpose.   These keys can have many other functions depending
on the program you are running.   You'll have to consult the
instructions for each application to determine a PF-keys's
purpose.
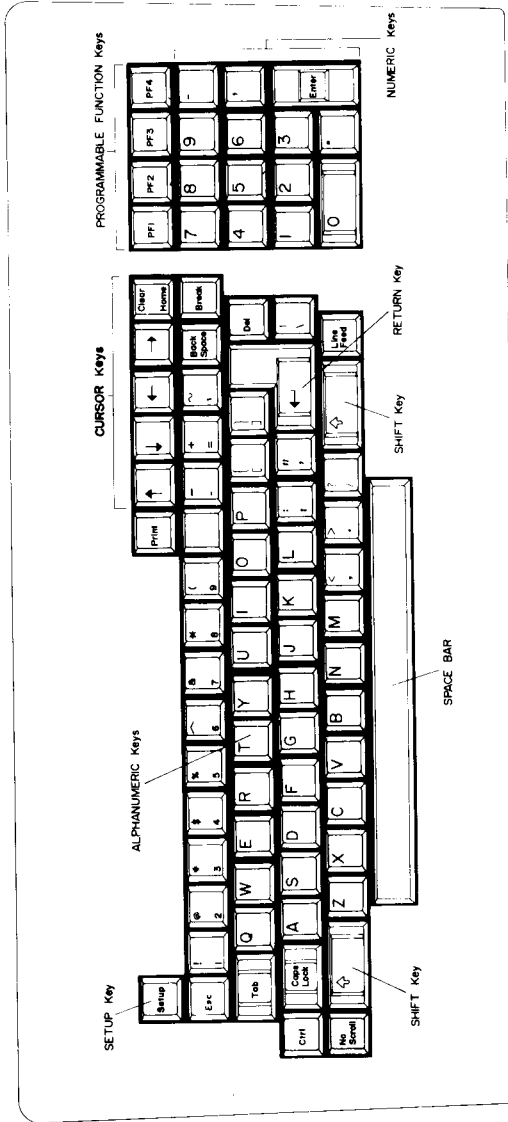
To the left of the function keys, there are four keys with arrows.   These are   the **CURSOR KEYS** . They're self-explanatory.   Push the up arrow and the cursor will go up one space.   One important point to note is that they do not erase letters or characters as they move.   On the other hand, if you use the space bar to move the cursor, everything it passes over will be erased.   The cursor keys will move without creating blanks.   You'll find that the cursor keys will become great friends as you spend more time with the SAGE II/IV.

Details of the SAGE keyboard are contained in the manual that was packed with your terminal.   But here are a few quick tips:

The " ← " or " **ENTER** " keys generally perform the same function, and in most applications they are interchangeable. These two keys are often called "Carriage Return" or just <cr>.   That is an old typewriter term that made it into the electronic age.

The " **DEL**" key is often called the Delete key or <del>.

The " **ESC** " key is called the Escape key or <esc>.

Depending on the nature of your printer or the type of character set or print wheel installed, all the keys may not print the characters shown on the keyboard.   It is a good idea to make a test yourself.   The biggest difference will probably be in the special characters above the numbers.

As you might expect, the **CAPS LOCK** key will shift your keyboard into all upper case letters and keep it there. However, it will not affect the special character keys like #$%©]†"+= <?|and many others.   You will still have to use the SHIFT to change these keys to their shifted positions. AND, unlike some typewriters, the CAPS LOCK key will NOT release when you push the SHIFT key.   REMEMBER, when the CAPS LOCK is down, everything will be in capital letters until you release it.   On the SAGE terminal, you'll notice the letters CAPS in the lower left-hand corner of the screen

anytime the CAPS LOCK key is depressed. This is a helpful reminder.

The **LINE FEED** key is the same as the down arrow cursor key.

The **SETUP** key is used to configure your terminal with specific attributes. Details are contained in the "DIP SWITCH SETTING" portion of this manual under the subheading: "Configuring the Terminal" and in the operator manual which accompanied the terminal.

The "." and the "," and the "-" are interchangeable between the alphanumeric and numeric keys. Use which ever one suits your fancy.

Note that the O, which is the number zero, is different from the capital letter O. These two look the same on a printed page, but on the screen you'll notice that the zero has a diagonal cross bar. These two are definitely NOT interchangeable.

Once again, refer to the terminal manual or program documentation for more specific details on keyboard functions.

III   INITIAL POWER-UP :

The power switch for the SAGE terminal is located at the back of the machine. When facing the screen, this switch is in the lower right hand corner. It is a rocker type switch, and depressing the side nearest the right edge of the terminal will turn on the machine. With use, you will quickly learn to feel for this switch. Turn **ON** your terminal.

The ON/OFF power switch for the SAGE II/IV is located directly above the AC Inlet for the power cord. To turn the power on, the switch toggle should be up. Down will turn off the power. Turn **ON** your SAGE II/IV microcomputer.

It makes no difference which device you turn on or off first. The Basic Input/Output System (BIOS) of the SAGE II/IV ignores any illegal characters generated by the terminal so that a program will not be affected if the terminal is turned on/off during execution.

If you have a SAGE II , after a few moments the screen should display the following:


```
.------------------------------------------------.
. SAGE Startup Test [xx]                          .
. RAM SIZE = xxx K                                .
.                                                 .
. Booting from Floppy                             .
. Put in BOOT disk and press a key (Q-quits)      .
------------------------------------------------
```


Do not put in a diskette at this time. If you had no problems Powering Up, turn to page 27.

If you have a SAGE IV , after switching on both the computer and the terminal, your SAGE IV should display the following:

```
.--------------------------------------------.
.                                            .
.    SAGE Startup Test [xx]                  .
.    RAM Size  xxxxK                         .
.                                            .
.    Booting from Hard Disk                  .
.    Waiting for Drive Ready (Q-quits)       .
.                                            .
--------------------------------------------
```

In approximately 15 seconds or less, your machine will automatically "boot" to the BUSINESS system installed at the factory on Partition 1 of your hard disk. **If your terminal has NOT been pre-configured** , your screen will now display the QUICK TERMINAL INSTALLATION MENU. Select the letter for the terminal you have. If you are using a terminal that is not listed on the menu, refer to the INSTALLATION section of this manual.

```
QUICK TERMINAL INSTALLATION MENU


    S-  SAGE or QVT102

    T-  TELEVIDEO TV925

    F-  FREEDOM 100

    A-  ABORT

Select the letter for the terminal you have:
```

If your terminal has been pre-configured , your screen should now display the SAGE logo.

III.01 HINTS ON POWER UP :

Power consumption for all SAGE microcomputers is extremely low. At rest, our largest model draws about the equivalent of a standard 75-watt light bulb. Since most component stress occurs during startup, we recommend leaving your machine ON as much as possible.

One additional benefit of this procedure is that the SAGE II/IV will always be at peak operating state. If the temperature environment drops below 50 degrees F, we suggest a warm up period before attempting to process data.

On SAGE IV equipment, a cold start may result in a "Drive Error 08" message. Let the machine run for approximately 15 minutes, and then press the RESET button.

You should find that low-cost "surge protectors" will not be necessary for your SAGE micro, as all SAGE II/IV's have an RF/EMI filter on the AC power line. HOWEVER, we strongly recommend that your machine and terminal be turned OFF during local electrical storms to prevent damage or data loss.

HELP!

Did something go wrong?

(If not, turn the page and learn about "Booting Up".)

THERE'S NOTHING ON THE TERMINAL. Check to see that the contrast knob on your terminal is properly adjusted. On the SAGE terminal, this control is located on the base in the front right-hand corner. Turn the knob clockwise to increase the intensity contrast.

THERE'S STILL NOTHING ON THE TERMINAL. Make sure the terminal is working. The SAGE terminal should beep when you turn it on or off. If it didn't, it may not be getting power. Check the plug. Check the fuse located in the back near the power cord.

IS THE SAGE II/IV WORKING? When you turned on the SAGE II/IV, you should have heard the fan start. If your unit is silent, check the connection to the AC outlet. The small light labeled PROCESSOR on the front panel should be glowing red or green. It changes from red-to-green while the machine is processing data, but it should always be lit while the SAGE II/IV is switched ON.

THE MESSAGE ON THE SCREEN IS GARBLED. Go back and review the section on DIP switch settings. Make sure each switch is correct. Re-check the Setup procedures for the SAGE terminal, the BAUD rate and Parity settings in particular.

DRIVE ERROR 08? This message might appear on SAGE IV Systems. It generally indicates that the machine is cold. Press the reset button at the back of the SAGE IV. If you receive another 08 error, let the machine warm up for approximately 15 minutes. Then press the RESET button.

STILL NOTHING? Review all the cable hookups described in the preceding pages. Then try pressing the RESET button located on the back of the SAGE II/IV. It is the small

button that is nestled between the right edge and the terminal connector. If that doesn't help, throw in the towel and call your nearest SAGE dealer.

III.02 THE RESET BUTTON :

On the rear panel of the SAGE II/IV, there is a small button located next to the TERMINAL plug marked RESET.

This is not a circuit breaker, but rather it resets or aborts the current process and begins the power-up procedure. This causes the SAGE II/IV to reboot. Diskettes do not need to be removed when using the RESET button.

It is STRONGLY ADVISED that you not be too hasty in using the reset button to get out of an unfamiliar procedure. Information that has just been typed in or is on RAM DISK will be lost! We suggest you try the following first:

1) Type the ESC key twice followed by a <cr>. If a new screen does not appear then go to step 2.

2) Type CTRL/Q. You may have accidentally typed CTRL/S which stops the terminal. Typing CTRL/Q will start it again.

3) Type CTRL/@. This should "break" out of the program you are in. This key may be different on other terminals. A message should appear on the bottom line asking you to type a space.

4) If you are working in the SAGE Multi-user system, type the "BREAK" key. This will allow you to reboot your system without disturbing the other users. You will lose any temporary information just as if you reset under the single-user system.

INITIAL POWER-UP
THE RESET BUTTON

Only as a last resort should you reset the system. (If you
are a Multi-user, it is a good idea to check with the other
users before hitting the button.)

In the next section you will learn about "Bootstrapping".
Once you have completed that section, you may wish to test
the RESET button.

IV BOOTSTRAP :

Once you've turned on your SAGE II/IV, it's like the proverbial character who's all dressed up with no place to go. Until you've "booted" an operating system into the machine, it really can't do much.

The term "boot" or "bootstrapping" most likely comes from the old saying: "Pull yourself up by your bootstraps." That's a reference to getting yourself started when you're down. In that sense, it's quite an accurate technical term as well; it gets the computer going.

When you boot your SAGE II/IV, you give it an operating system. The operating system in turn instructs the microcomputer how to process data, establish files, etc.

The SAGE II/IV is an extremely versatile machine, and allows you to boot to quite a few different operating systems. Our main operating system, however, is the p-System. SAGE II/IVs are shipped from the factory with the p-System either on the hard disk or on a separate floppy diskette.

The p-System, like other operating systems, includes many useful utilities ranging from editors to disk filers. But, your SAGE II/IV can be booted using only parts of the p-System. That's because certain programs or applications do not need all the features of the p-System to work. An example is our own BUSINESS diskette. While it includes some p-System files, it does not have them all, just those needed to run the word processing and spreadsheet programs. The SYSTEM diskette on the other hand is a complete version of the p-System and includes all files and utilities available.

Some of you may never need to use the operating system by itself other than to make backup copies of diskettes, but it is helpful to understand some of the terms associated with it, like bootstrap.

IV.01 BOOTSTRAPPING PROCEDURE :

The bootstrapping function is automatic on the **SAGE IV** .

When you turn on the power, the machine (after a brief
warmup) will automatically boot to Partition #1 of the disk
which has the p-System and BUSINESS files.

If you have the **SAGE II** , you must perform the
bootstrapping manually.   If you are unfamiliar with
microcomputers and floppy diskettes, please read the section
on "Diskette Care and Handling" on the next page before
proceeding.

The drawings opposite page 5 show how drives are numbered.
Insert the diskette marked BUSINESS into Drive #4.   This is
the left-hand drive as you face your SAGE II.   Close the
drive latch.   Press any key other than "Q".   **If your
terminal has NOT been pre-configured** , your screen
should now display the QUICK TERMINAL INSTALLATION MENU.
Select the letter for the terminal that you have.   If you
are using a terminal that is not shown on the menu, refer to
the INSTALLATION section of this manual.

```
QUICK TERMINAL INSTALLATION MENU

    S-  SAGE or QVT102

    T-  TELEVIDEO TV925

    F-  FREEDOM 100

    A-  ABORT

Select the letter for the terminal you have:
```

If your terminal has been pre-configured , your screen
should now display the SAGE logo.

V   DISKETTE CARE AND HANDLING :

The SAGE II/IV microcomputer uses 5-1/4-inch diskettes for storing programs and data outside of the computer.   These are also known as floppies, or floppy disks, or mini-diskettes.

The 80-track drives that are standard on all SAGE II/IV models use two-sided, double-density, soft sectored diskettes.   Each diskette is capable of holding 640K bytes of information, or over 650,000 characters.

Be sure and look for diskettes qualified for 96 tracks per inch.   There should be "96 TPI" stamped on these diskettes.

Label

Write Protect Notch
(Some diskettes do not
have this notch.)

Diskette in
Permanent
Jacket

Exposed Recording
Surface
(DO NOT TOUCH)

Head Slot

Protective
Envelope
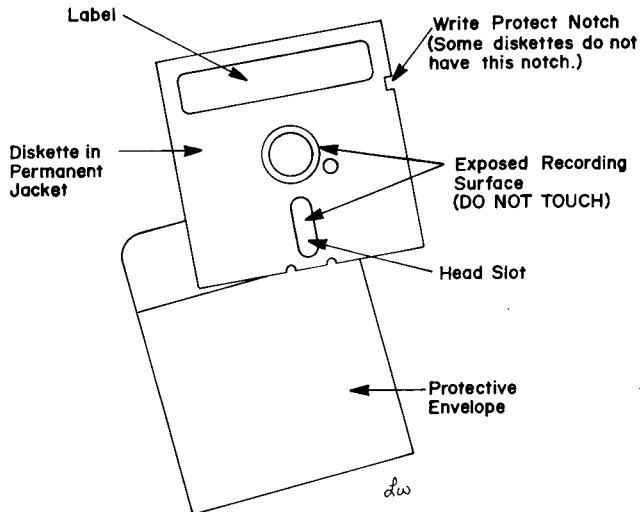
All diskettes should be handled with care. **DO NOT** touch the exposed record surfaces. They are extremely sensitive, and important data can be destroyed with just a fingerprint or a speck of dust.

The donut-like hole in the center is where the diskette drive attaches to spin the surface like a record. The long slot below the hole is where the head reads or writes data much like a tape recorder head. The small hole is for alignment purposes. Again, do not touch any of these areas.

Diskettes should be returned to their protective envelopes as soon as they are removed from the SAGE II/IV diskette drives. Your diskettes should be stored away from heat, dust and magnetic sources such as speakers, motors, calculators, telephones or magnets.

Physically, be sure that the diskettes are not damaged by placing heavy objects on them. During storage, insure that they are not sagging or bending. Be sure that you use only a soft-tipped felt pen to write on the diskette labels. Ball points or pencils will damage the surface of the diskette inside.

Notice the notch at the top right-hand edge of your diskettes. This notch may be covered with an opaque piece of tape or a sticker. It is known as a "write-protect notch". When this notch is exposed, you may read or write material to the diskette. When it is covered, you can only read data. In other words, you can tape over the notch to make sure that your material is not erased accidentally.

The four SAGE II/IV diskettes: **BUSINESS, SYSTEM, UTILITY, and BUILD,** should all be write-protected with small silver stickers. These stickers are removable, but we DO NOT recommend that you do so.

Even with the best of care, diskettes may fail for no apparent reason. Therefore, the only real protection is to keep a spare, or backup copy. We'll talk about that important process in just a moment.
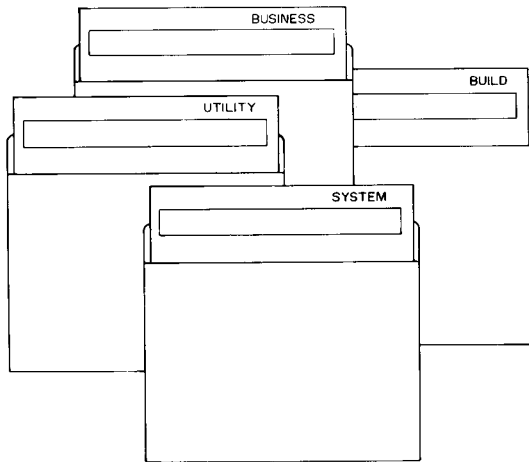
V.01   INSERTING AND REMOVING DISKETTES :

The diskette drives in your SAGE II/IV are quite easy to
use. To insert a floppy into the machine, first remove it
from the protective envelope. Next, with the label facing
up and toward you, insert the diskette into the drive slot.

Gently push the diskette forward with your finger until it
stops. You should hear a slight click as it reaches the
back of the drive. No force is required. Pushing too hard
could damage the diskette.

To prevent bending the front edge, make sure that the
diskette is firmly in before actually closing the top latch.
Once in place, press straight down on the top latch. It
will click into position and lock.

Before removing any diskette, make sure that the drive is
NOT in use. There is a small red indicator light located to
the left of the latch, below the diskette slot. If the
light is on, the drive is in use. IF IT IS OFF, you may
remove diskettes.

To remove one, push forward on the lower latch just below
the slot. The top latch should snap up, allowing the
diskette to pop out like bread in a toaster.

If it does not jump out, jiggle the top latch up and down.
This should free the diskette. Make sure that the diskette
is still firmly in, before actually re-closing the top
latch.

Slide the diskette straight out (pulling up might bend it)
and immediately replace it in a protective envelope.

VI   MENUS :

The computer industry has borrowed words from everyone.
BOOTSTRAP was stolen from the cowboys, and MENU was lifted
from the neighborhood restaurant.

At the diner, you select the item you want from the menu of
available dishes.   Same thing with computers.   A list of
options is presented, and you make a selection.   You'll find
that a great deal of the software in the industry uses some
form of "Menu Control" to choose options.

The SAGE Main Menu shown below is very typical.

SAGE II/IV Main Menu
_____

□ WORD/7 Word Processing

   TIMBERLINE Spreadsheet

   Demonstration

   Communications

   p-System

To display the SAGE Main Menu, anytime the SAGE logo is displayed on the screen, press any key. The menu will now appear. (See BOOTSTRAPPING PROCEDURE for details on displaying the SAGE logo)

Notice the cursor next to the item "WORD/7 Word Processing". You may move this up and down by either of the cursor keys shown below.
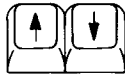
Try moving it up and down. This is how you select an item. To actually order that item, position the cursor next to the desired selection, and press <cr>. (That's the " ↵ " "RETURN" or "ENTER" key). DO NOT MAKE ANY SELECTIONS AT THIS TIME. Read the BACKING-UP information first.

VII BACKING-UP :

********** IMPORTANT – PLEASE READ **********

We know that you are anxious to use your SAGE II/IV right away, but it is important that you take a few minutes now and back up the diskettes that were shipped with your system. As we said in previous pages, diskettes DO die.

To insure that your main diskettes survive, you should back them up (make a spare copy) immediately before using any of the programs or operating system features of your SAGE II/IV.   If you are unfamiliar with the p–System, the following exercise will take you through a backup procedure step–by–step.

In addition, you may want to refer to this section anytime that you wish to make a copy of any diskette containing data or programs.

BackUp Exercise
_____

To complete this exercise you will need the following:

One blank two–sided, double–density diskette for each master to be copied [Four (4) total] Blank diskettes may be obtained from your SAGE .dealer or from computer/office   supply stores.

The four MASTER DISKETTES which came with your machine: BUSINESS, SYSTEM, UTILITY, AND BUILD.

There are three steps required to make a BackUp Copy. First

the blank diskette must be **FORMATTED** . This divides a new diskette into various sectors and tracks which the SAGE II/IV can access.

Next, the formatted diskette must be **ZEROED** . This essentially puts a table of contents, or directory, on the diskette and gives it a name. This procedure allows the SAGE II/IV to find certain files at various locations on different diskettes.

And finally, you will **COPY** the material from the master diskette to the new backup copy.

If your SAGE terminal is not currently displaying the SAGE logo on the screen, follow the procedures described earlier under INITIAL POWER—UP. If you have a standard machine, use the BUSINESS diskette to perform the boot procedure.

Press any key to get to the SAGE Main Menu. Select p—System from the list (See MENUS for details). Press <cr>. Answer the question to continue by pressing "y".

Follow the FORMATTING instructions on the following pages which apply **to your type of machine** . Then skip to ZEROING DISKETTES.

VII.01 FORMATTING DISKETTES :

SAGE II with 2 diskette drives

To begin the FORMAT procedure, select the "p-System" option
from the SAGE Main Menu. Press <cr>. Press "y". When the
Command Line appears, follow the instructions below step-by-
step:

(Note: <cr> denotes the " ↩ " or "ENTER" key.)

```
THE SCREEN SHOWS:                        YOU TYPE:

Command: E(dit, R(un, F(ile, C(omp....        x


Execute what file?                        sage4util


        SAGE4UTIL

A - On-line Configuration
B - BIOS file Configuration
C - Floppy Formatter
D - Bootstrap Copy

Select Menu item <CR exits, ! aborts>:        C
Floppy Diskette Formatter

Drive to be formatted - L(eft or R(ight?      R
```

INSERT A BLANK DISKETTE INTO DRIVE #5. (Right side)

```
    Is diskette ready for formatting in Right drive?  y
```

FORMATTING WILL AUTOMATICALLY BEGIN.
THIS TAKES APPROXIMATELY 90-120 SECONDS TO COMPLETE

THE SCREEN SHOWS: **YOU TYPE:**

Formatting
....
....
....
....
Verification
....
....
....
....

Format Complete
More diskettes to format?   y (if more)
                                                 n (if done)

      SAGE4UTIL

A - On-line Configuration
B - BIOS file Configuration
C - Floppy Formatter
D - Bootstrap Copy

Select menu item <CR exits, ! aborts>:   <cr>
Command: E(dit, R(un, F(ile,........   i

SAGE logo

If you had a problem, refer to HELP at the end of the FORMAT
section. Once you have formatted the diskettes necessary to
make copies, you will have to ZERO each of them. See
"ZEROING DISKETTES".

BACKING-UP
FORMATTING DISKETTES

SAGE IV

To begin the FORMAT procedure, select the "p-System" option
from the SAGE Main Menu. Press <cr>. Press "y". When the
Command line appears, follow the instructions below step-by-
step:

(Note: <cr> denotes the " ↵ " or "ENTER" key.)

```
THE SCREEN SHOWS:                          YOU TYPE:

Command: E(dit, R(un, F(ile, C(omp.....        x


Execute what file?                          sage4util


        SAGE4UTIL

A - On-Line Configuration
B - BIOS file Configuration
C - Floppy Formatter
D - Bootstrap Copy
E - Prepare Drives for Shipping

Select Menu item <CR exits, ! aborts>:         C
Floppy Diskette Formatter
Drive to be formatted - L(eft or R(ight?       L
```

INSERT A BLANK DISKETTE INTO DRIVE (#4:)
(Top drive if you have two)

```
    Is diskette ready for formatting in Left drive?    y
```

FORMATTING WILL AUTOMATICALLY BEGIN.
THIS TAKES APPROXIMATELY 90-120 SECONDS TO COMPLETE

```
THE SCREEN SHOWS:                          YOU TYPE:

Formatting
.......................................
.......................................
.......................................
.......................................
Verification
.......................................
.......................................
.......................................
.......................................


     Format Complete
     More diskettes to format?              y (if more)
                                            n (if done)


       SAGE4UTIL

A - On-line Configuration
B - BIOS file Configuration
C - Floppy Formatter
D - Bootstrap Copy
E - Prepare Drives for Shipping

Select Menu item <CR exits, ! aborts>:      <cr>
Command: E(dit, R(un, F(ile,.......         i


SAGE logo
```

Once you have formatted the diskettes necessary to make copies, you will have to ZERO each of them. See "ZEROING DISKETTES".

BACKING-UP
FORMATTING DISKETTES

SAGE II with 1 diskette drive

To begin the FORMAT procedure, select the "p-System" option
from the SAGE Main Menu. Press <cr>. Press "y". When the
Command Line appears, follow the instructions below step-by-
step:

(Note: <cr> denotes the " ↵ " or "Enter" key.)

```
THE SCREEN SHOWS:                           YOU TYPE·

Command: E(dit, R(un, F(ile, C(omp.....              x


Execute what file?                               sage4util


      SAGE4UTIL

A - On-line Configuration
B - BIOS file Configuration
C - Floppy Formatter
D - Bootstrap Copy

Select Menu item <CR exits, ! aborts>:
Drive to be formatted -L(eft or R(ight               L
```

    REMOVE BUSINESS DISKETTE FROM THE DRIVE.
    INSERT A BLANK DISKETTE


```
        Is diskette ready for formatting in Left  drive?        y
```


    FORMATTING WILL AUTOMATICALLY BEGIN.
    THIS TAKES APPROXIMATELY 90-120 SECONDS TO COMPLETE

```
THE SCREEN SHOWS:                        YOU TYPE:

Formatting
...................................
...................................
...................................
...................................
Verification
...................................
...................................
...................................
...................................

Format Complete
More diskettes to format?               y (if more)
                                        n (if done)
```

WHEN DONE, REMOVE FORMATTED DISKETTE
INSERT BUSINESS DISKETTE

```
        SAGE4UTIL

A - On-line Configuration
B - BIOS file Configuration
C - Floppy Formatter
D - Bootstrap Copy

Select Menu item <CR exits, ! aborts>:    <cr>
Command: E(dit, R(un, F(ile, C(omp......   i


SAGE logo ·
```

Once you have formatted the diskettes necessary to make
copies, you will have to ZERO each of them. See "ZEROING
DISKETTES".

BACKING-UP
FORMATTING DISKETTES

HELP!

Did you have trouble FORMATTING a diskette?

(If not, go on to the section on ZEROING a diskette.)

First, take the diskette out and put it back in, checking to
see that it "seats" properly. Try formatting again. Also
check to see that the center hole of the disk is centered in
the hole of the envelope before inserting the disk.

If the following message occurs as soon as you begin the
format:

```
Error 16 while formatting Cylinder 0 Head 0
Type <space> to continue
```

You are trying to format a diskette that is "write
protected". Be sure that you are not destroying a MASTER
diskette or other important data. You may continue the
procedure by removing the sticker from the write-protect
notch on the diskette. Once again, be sure you want to use
this diskette. FORMATTING will erase all information on any
diskette.

If the FORMAT or VERIFICATION pass failed to complete, you
will receive an error message similar to the one shown
below:

```
Error 1 while checking Cylinder 40 Head 0
Type <space> to continue
```

This message indicates that the SAGE found a problem on your
diskette. Try the format procedure one more time. If you
receive the same error message, your diskette is faulty.

VII.02 ZEROING A DISKETTE :

Zeroing is a way of naming a blank diskette and putting a
"directory" on it.   The directory serves as a table of
contents for each diskette so that the SAGE II/IV can find
the files in the proper places.   While you may vary the
procedure for special needs, we recommend that you use some
conventions.   When asked, you should select a "duplicate
directory" unless space needs on your diskette are critical.
This gives you some protection in case one of the
directories is damaged.   Also we recommend that you set up
your diskettes for 1280 tracks.   This is the ideal maximum
for the double-sided, double-density diskettes.

To ZERO your diskettes, follow the instructions below:

If your SAGE terminal is not currently displaying the SAGE
logo on the screen, follow the procedures described earlier
under INITIAL POWER-UP.   If you have a SAGE II, use the
BUSINESS diskette to perform the boot procedure.

Press any key to get to the SAGE Main Menu.   Select "p-
System" from the list (See MENUS for details).   Press <cr>.
Answer the question to continue by pressing "y".

Proceed using the chart below:

Note that any time the filer is used on a single floppy SAGE
II, it should be locked into memory with the "f" command
before removing the floppy disk.

```
THE SCREEN SHOWS:                      YOU TYPE:

Command: E(dit, R(un, F(ile, C(omp....     f
Filer: G(et, S(ave, W(hat, N(ew.....       f
Filer segments memlocked. [ ]

Filer: G(et, S(ave, W(hat, N(ew.....       z

Zero dir of what vol?                   #4: or #5:
```

INSERT A FORMATTED DISKETTE INTO DRIVE #4 or #5
(If you only have one drive, remove BUSINESS diskette)

The drawings opposite page 5 show how the drives are
numbered. Normally, SAGE II users leave their main diskette
in #4: and format and zero new diskettes in #5:. SAGE IV
users normally use #4:.

Duplicate dir?	y
# of blocks on disk?	1280
New vol name?	(Any name you choose. 7 characters maximum)
(Your choice): correct?	
(Your choice): zeroed	
F(iler:G(et, S(ave, W(hat, N(ew......	q
Command: E(dit, R(un, F(ile, C(omp...	i

If you had trouble, see the HELP section on the next page.

After completion of this procedure, your diskette is ready
for use.

HELP!

Did you have trouble ZEROING a diskette?

(If not, continue to COPYING A DISKETTE.)

When I tried to ZERO my diskette, I got the following
message:

    4: - No such vol on-line <source>

This error message indicates that the SAGE II/IV couldn't
find your diskette.   There are several reasons why this
might happen.   The diskette may not be properly seated on
the drive spindle.   Remove the floppy and re-insert it into
the drive.   If it doesn't work the first time, try it once
more.   You should hear a sharp "click", not a dull thud.

Is your diskette in the correct slot?   Drive #4 is on the
left as you face your SAGE II.

The diskette may not have been properly FORMATTED.   Re-
format your diskette.   This procedure will also detect a
faulty diskette.

VII.03   COPYING DISKETTES :

The following procedure may be used to make BackUp Copies of
any diskettes. It will result in an exact duplicate copy of
one diskette on another. This procedure will be helpful any
time you wish to make a spare copy of programs or data.

You should follow this procedure to make a copy of each one
of the SAGE II/IV Master Diskettes: **BUSINESS, SYSTEM,
UTILITY, and BUILD** .

To begin the **COPY** procedure, select the "p-System" option
from the SAGE Main Menu. Press <cr>. Answer the question
to continue by pressing "y". When the Command Line appears,
follow the instructions on the next few pages, **according
to your machine type** .

● SAGE II with 2 FLOPPY DRIVES

Insert the diskette to be copied into Drive #4 (left side). Insert the blank (formatted and zeroed) diskette into Drive #5 (right side).

```
THE SCREEN SHOWS:                        YOU TYPE:

Command: E(dit, R(un, F(ile, C(omp....       f
Filer: G(et, S(ave, W(hat, N(ew.....         f
Filer segments memlocked. [ ]
Filer: G(et, S(ave, W(hat, N(ew.....         t


Transfer what file?                        #4:,#5:


Transfer 1280 blocks?                        y
Destroy (Name of blank diskette)?            y
```

THE COPY PROCEDURE WILL AUTOMATICALLY BEGIN
(If you wish to remain in the p-System,
  do not type the "i" at the end of this procedure.)

```
    (Name of master): ---> #5:

    Filer: G(et, S(ave, W(hat, N(ew.........        q

    Command: E(dit, R(un, F(iler, C(omp......       i

    SAGE logo
```

(**Note:** This method makes a complete image copy of the left diskette onto the right diskette. Even the name that you gave your volume during zeroing will be erased and replaced by the name of the left diskette. Do not attempt to continue using the system with two diskettes which have the same name. The SAGE II is smart, but not that smart. Once an image copy is complete, one or the other diskettes should be removed.)

BACKING–UP
COPYING DISKETTES

● SAGE II with 1 FLOPPY DRIVE

Leave the BUSINESS diskette in the drive, and follow the
instructions below step–by–step:

(Note: <space> denotes pressing the long space bar on the
keyboard)

```
THE SCREEN SHOWS:                        YOU TYPE:

Command: E(dit, R(un, F(ile, C(omp.....       f
Filer: G(et, S(ave, W(hat, N(ew.......        f
Filer segments memlocked. [ ]
Filer: G(et, S(ave, W(hat, N(ew........       t
```

THIS PROCEDURE IS TIME CONSUMING. YOU WILL HAVE
TO SWITCH THE MASTER DISKETTE AND THE COPY DISKETTE
IN AND OUT OF DRIVE #4 ON THE SAGE II. THIS MAY
REQUIRE UP TO 20 SWAPS.

```
     Transfer what file?                      #4:,#4:
     Transfer 1280 blocks? (Y/N)              y
```

(SWITCH DISKETTES)

```
     Insert destination disk
     Type <space> to continue             <space>


     Destroy (Vol name of copy diskette):?     y
```

(SWITCH DISKETTES)

```
     Put (Vol name of master diskette) in unit #4
     Type <space> to continue             <space>
```

(SWITCH DISKETTES)

```
Put (Vol name of copy diskette) in unit #4
Type <space> to continue                    <space>
```

(SWITCH DISKETTES)
 AND SO ON...AND SO ON UNTIL....
(If you wish to remain in the p–System,
 do not type the "i" at the end of this procedure.)

```
(Vol name of master diskette): ---> #4:
Filer: G(et, S(ave, W(hat.......            q


Command: E(dit, R(un, F(ile, C(omp,.....    i


SAGE logo
```

BACKING-UP
COPYING DISKETTES

● **SAGE IV with HARD DISK**

This method of copying diskettes transfers all of the
information from the original floppy to the SCRATCH: area
on the hard disk and then back to a new diskette in the
floppy drive.   This is generally the fastest way to copy on
a SAGE IV with only one floppy drive.   If the SAGE IV has
two floppy drives, then diskettes can be copied using the
method for a SAGE II with 2 floppy drives.

Insert the diskette to be copied into Drive #4.

(TYPE THE FOLLOWING COMMANDS AS SHOWN)


```
THE SCREEN SHOWS:                      YOU TYPE:

Command: E(dit, R(un, F(ile,....            f

Filer: G(et, S(ave, W(hat.......            t

Transfer what file?                       #4:
                                          <cr>

To where?                                 #10:

Transfer 1280 blocks?   (Y/N)              y
Destroy volume:?                           y
                                          <cr>
```


TRANSFER TO A SCRATCH AREA ON THE HARD DISK WILL BEGIN
AUTOMATICALLY.   THE FILER LINE WILL APPEAR WHEN TRANSFER IS
COMPLETE.

NOW YOU WILL TRANSFER THE INFORMATION FROM THE HARD DISK
ONTO A BLANK DISKETTE.   REMOVE THE DISKETTE FROM DRIVE #4,
AND INSERT A BLANK (Formatted and Zeroed) DISKETTE IN DRIVE
#4.

```
THE SCREEN SHOWS:                 YOU TYPE:

Filer: G(et, S(ave, W(hat, N(ew....        t

Transfer what file?                      #10·
                                         <cr>
```

```
To where?                             #4:
Transfer 1280 blocks?                 y
Destroy volume:?                      y

                                      <cr>
```

THE COPY WILL AUTOMATICALLY BEGIN. THE FILER LINE WILL
APPEAR WHEN COPY IS COMPLETE. NOW YOU WILL RENAME YOUR
SCRATCH AREA FOR FUTURE USE.

```
Filer: G(et, S(ave, W(hat, N(ew....        z

Zero dir of what vol?                      #10:
                                           <cr>
Destroy previous volname:?                 y
Duplicate dir?                             y

Are there 1280 blocks on the disk?  (Y/N)  y

New vol name?                              scratch

SCRATCH correct?                           y
SCRATCH zeroed
Filer: G(et, S(ave, W(hat, N(ew....        q

Command: E(dit, R(un, F(ile, C(omp...      i

SAGE logo
```

Note that the steps above return you to the SAGE Logo. Do
not type the "i" to remain in the p-System command line.

VII.04   COPYING THE SAGE II/IV MASTER DISKETTES :

If you have not already done so, follow the COPYING
DISKETTES procedures for each one of the SAGE II/IV master
diskettes: BUSINESS, SYSTEM, UTILITY, and BUILD.

Upon completion, you will have a full set of Working Master
diskettes. One set of labels has been provided for the new
diskettes. At this time you should retire the originals to
a safe place, preferably away from your working diskettes.
Use the working copies for your day-to-day needs.

Should you experience a failure with a Working Master,
simply follow instructions on the preceding pages to make a
new copy from the original.

You needn't cover the write-protect notch on your copies, as
you may often wish to change some of the files or setups on
your Working Master, and this requires you to "write" to the
diskette.

VII.05 CONGRATULATIONS :

Your SAGE II/IV is running, you've made backup copies of
your master diskettes, and you know how to select items from
the Main Menu.

Now what?????

Before you begin to learn the specifics of an application
program (such as word processing or the spreadsheet), why
don't you try our demonstration program described in the
following section.

It has no real value and serves no purpose. But it is fun
to show friends and to dazzle small children.

After that you may head off in a number of directions. We
strongly suggest that you increase your skills with the p-
System as much as possible. While you may never have to use
it, it is handy to know and may save you a great deal of
time in certain situations.

You'll find the accompanying book, **"Personal Computing
with the UCSD p-System"** to be quite helpful. It was
written for microcomputers in general, so you may find some
differences while using the SAGE II/IV. If you're a
programmer, you'll want to spend a lot of time with this
book. For those with less demanding needs, you should at
least look at the sections dealing with the Command Line and
the Filer.

Additionally, we've made some notes on the p-System that you
might find helpful. You'll find them under p-SYSTEM PRIMER.
This section deals with some of the p-System features that
you will use on a regular basis, and contains some hints for
novices on how to stay out of trouble.

Regardless of your primary use for a computer, word
processing is an important and handy tool. Our WORD/7
package, which is bundled with each SAGE II/IV, is easy to
learn and easy to use. It is accessed from the Main Menu,

and you'll find complete instructions in the rear of this manual.

You should be able to produce the majority of your correspondence with an hour or two of practice on WORD/7.

Likewise, the TIMBERLINE Spreadsheet is not difficult to use. One note is that you may use the program by simply selecting it from the SAGE Main Menu. The TIMBERLINE manual suggests that you execute "TS:SS". This will result in an error. If you do use the X(ecute command, try typing "SS". Again, it is easier to simply select TIMBERLINE Spreadsheet from the Main Menu.

The Spreadsheet is somewhat more involved than word processing, but you should have it mastered in a day or two.

Finally, if you have purchased a separate software package, such as one from State of the Art or any of the other suppliers of programs, follow their recommendations for running these applications on SAGE microcomputers.

VIII   DEMONSTRATION :

One of a computer's greatest virtues is speed.   It can reduce time-consuming tasks to the blink-of-an-eye.   And when it comes to "FAST", the SAGE II/IV is leading the pack. It was designed with performance in mind and has become the fastest microcomputer for its price available today.

Speed is particularly important on data intensive tasks such as mailing lists, data bases, inventory control, spreadsheets and program compilation.   On many other jobs, you'll also notice a major reduction in the amount of time spent waiting for the computer to do its work.

Unless you are familiar with the characteristics of other microcomputers, you may have a hard time comparing the SAGE II/IV.   The following demonstration should help.   And it's fun to watch, even though it has no practical purpose.

There is an ancient Oriental puzzle known as the "Tower of Hanoi" or the "Tower of Bramah".   According to legend, at the Creation, God placed 64 gold, donut-like disks onto one of three diamond needles set upright like towers.   Each disk was a different size and stacked, in order, with the largest on the bottom to form a pyramid-shaped tower.

Reportedly, it was the task of a group of priests to transfer the stack to a different diamond needle.   However, there was a rule that they could move only one disk at a time, AND that they could never set a large disk on top of a smaller one.   Therefore, they had to use the extra peg to make interim moves.

Now, the legend says that once they completed their chore, the world would END!   Even if you do believe it, there's not much reason for panic.   The job requires 18,446,744,073,709,551,615 moves.   In other words if they worked extremely fast, both day and night, it would still take about 600 billion years!

DEMONSTRATION

We suspect you don't have that kind of time, but thought you
might enjoy seeing the SAGE II/IV tackle a smaller tower,
one with just 10 disks.

To run the DEMONSTRATION, select it from the SAGE Main Menu.
Press " ↵ " Enter.   You will see a graphic representation
of the three needles, with the 10 disks stacked on the left
tower.   When you press any key, the moving process will
begin with the SAGE II/IV trying to move the disks to the
center needle.   Depending on your computer set-up, the
problem will run from 47 to 90 seconds.   For comparison,
that's 4-to-15 times faster than the other leading micros
can accomplish the feat using the same programming code.
Not bad!

IX   p-SYSTEM PRIMER :

What is the p-SYSTEM and why is it on the SAGE II/IV?

As we explained earlier, a computer is little more than a mass of chips wired together until an operating system is installed to give it a purpose. When the SAGE II was in the planning stages in 1981, we searched for a suitable operating system (OS).

Building our own unique OS would have meant that there would be no software for the SAGE II. The other option was to use a popular, existing OS. There were many choices, but we decided on the p-System because it was the only OS that was highly portable.

In this context, portable means that programs developed on one machine in the p-System can be transferred to a completely different machine with very little trouble.

For the SAGE II/IV, this was an important factor. Many programmers bought SAGE's because they could develop packages using our high speed performance, and then sell those programs to users of the more popular microcomputers. Because of this feature, the bulk of the SAGE micros sold during our first year went to developers and programmers. We call these people the key influentials.

With their support, hundreds of applications have been, and are still being, written for the SAGE II/IV. Additionally, any money you invest in programs will not be wasted if you move to a different computer or perhaps some future SAGE product. Portability is the key.

Another advantage of the p-System is its menu line. Whenever you're in the OS, you'll notice that line across the top of the screen. This means that, unlike other operating systems, you needn't memorize several dozen key words or letters. All your choices are displayed where you may pick or choose. This is a wonderful feature when you're

new to a computer.

The only significant disadvantage we spotted with the p-System was that it was slow. However, since the SAGE II/IV works so fast, that problem becomes insignificant.

IX.01 USING THE p-SYSTEM :

The operating details of the p-System are contained in the book **"Personal Computing with the UCSD p-System"** . Technical considerations are listed in several of the owners manual shipped with your SAGE II/IV. If you're truly interested in the details of this OS, you'll find plenty of reading material.

But for many users, the OS is of no concern. They simply want the computer to work, whether that means it runs on CP/M or PDOS or any other of the alphabet-soup OS's on the market.

If you fall in that latter category, we'll offer some brief tips here to help you learn what you need to run the computer without going into any detail. There are two topics you should understand: The p-SYSTEM MENUS and the FILER. They are described in the following pages.

Many of you will be more interested in escaping from the p-System, instead of getting into it. By that we mean that you may accidentally stumble into a feature that you didn't want by hitting a wrong key. When you become more familiar with the system that shouldn't be a problem, but for now you may like to refer to the chart on the following page. It shows how to exit any of the features on the Command Line.

IX.02 EXITING FROM COMMAND LINE SELECTIONS :

(Note: <cr> denotes the " ↵ " or "ENTER" key.
         <esc> denotes the escape or "ESC" key.

YOU PRESSED:	THE SCREEN SHOWS:	TO RETURN TO COMMAND LINE:
E	Edit......	<esc> <esc>
R	Compile what text...	<cr>
F	Filer:	q
C	Compile what text...	<cr>
L	Host file?...	<cr> <esc>
X	Execute what file?...	<cr>
A	Assemble what text?...	<cr>
D	DEBUG [x17]	q
H (SAGE II)	>	if <cr>
H (SAGE IV)	>	ih <cr>
I	System re-initialized	
U	U not allowed	
M	Monitor:.......	s

If you were using a partial, or runtime p-System, such as
provided on the BUSINESS diskette, you may get slightly
different messages. For example, pressing "C" will result
in the message:

    Cannot find SYSTEM.COMPILER

However, these types of messages will automatically return
you to the Command Line.

IX.03   THE p-SYSTEM MENU LINE :

The menu for the p-System is slightly different than the
SAGE Main Menu. First it is displayed horizontally near the
top of the screen. And selections are made by typing the
first letter of a command. For instance, to use the
C(ompiler, type "c". Likewise, you press an "f" for the
F(iler.

There's another important point about the menus of the p-
System. You'll notice that many of them have a question
mark at the end. See the example below:

Command: E(dit, R(un, F(ile, C(omp, L(ink, X(ecute, A(ssem, D(ebug,?

That question mark after D(ebug means that there are more
menu items that wouldn't fit on one line. To see the rest
of the items, hold down the SHIFT key and press the "?"
key.

You should now see the following menu:

Command: H(alt, I(nitialize, U(ser restart, M(onitor

This time there is no question mark. That means there are
no more items. To return to the first part of the menu,
just hit the "?" key again. (Don't forget that a "?"
requires use of the SHIFT key.)

Some of the options on the Command: menu will take you to
other sub-menus. However, they work the same way. And
again, if there is a "?", there are more items off the
screen.

HOWEVER, you don't have to be looking at the right line to
select an item in the same menu. An example will clarify
that. Suppose you're seeing the first line of the Command
Menu. Even though I(nitialize is not shown, you may still
press "I" and the machine will initialize.

With frequent use, you'll know which commands are on the
different menus. For now, use the "?" anytime you're not
sure where things are located.

As mentioned earlier, many users will never need the
advanced features of the p-System. One you're certain to
use is the FILER. It is explained on the following pages.

X   THE p—SYSTEM FILER :

As the name implies, the p—System Filer is the File
Management program. It is used to transfer, change, list,
rename, condense, or examine the files. The Filer also
contains a utility to set the system Date.

Regardless of your use of the SAGE II/IV, you'll want to use
the Filer. We'll explain how the files are organized under
the p—System in the next few pages, but first let's take a
look at the Filer itself.

For the Filer examples you will need to do the following
steps (if you haven't already):

SAGE II user — Insert the BUSINESS disk in Drive #4:.
                Reset the system. Type "if" to boot
                to the SAGE Main Menu.

SAGE IV user — Insert the BUSINESS disk in Drive $4:.
                Reset the system. The machine will
                boot to the SAGE Main Menu.

Once it is on your screen, select the "p—System" option.
Press <cr>. Next press "y" to confirm your choice of the
"p—System". Almost immediately, you should see the Command
Line as shown:

```
Command: E(dit, R(un, F(ile, C(omp, L(ink, X(ecute, A(ssem, D(ebug,?
```

To use the Filer functions, simply press "f". You will soon
see the first line of the Filer Menu across the top of the
screen:

```
Filer:  G(et, S(ave, W(hat, N(ew, L(dir, R(em, C(hng, T(rans, D(ate?
```

We'll explain how this menu works, but first you may use the
following chart for reference in case you accidentally
selected a feature from the Filer that you did not want.

EXITING FROM FILER SELECTIONS

(Note: <cr> denotes the " ↵ " or "ENTER" key. <esc> denotes the "ESC" key. — denotes that no keystroke is required.)

YOU PRESSED:	THE SCREEN SHOWS:	TO RETURN TO FILER:
G	Throw away current workfile?	<cr>
S	Save as what file?	<cr>
W	not named (not saved)	--
N	Throw away current workfile?	<cr>
L	Dir listing of what vol?	<cr>
R	Remove what file?	<cr>
C	Change what file?	<cr>
T	Transfer what file?	<cr>
D	Date set <1..31>-<Jan..Dec>-<00.99> today is 25-Dec-83 New date?	<cr>
Q	Command: E(dit, R(un......?	f
B	Bad block scan of what vol?	<cr>
E	Dir listing of what vol?	<cr>
K	Crunch what vol?	<cr>
M	Make what file?	<cr>
P	Prefix titles by what vol?	<cr>
V	Volumes on-line:	--
X	Examine blocks on what vol?	<cr>
O	Subsidiary Volume: M(ount, D(ismount, Clear	<esc>
F	Filer segement memlocked. [xxxx words]	--

You may return to the Command Line from the Filer anytime by pressing "q" for Q(uit.

X.01 p-SYSTEM FILES :

Let's begin the discussion by looking at how the p-System
stores its files.

When the postal service sorts the mail, it starts with a
large unit, the zip code, and works down to smaller units,
like street, street number and name.

The p-System is accessed in a similar manner, first by
Device number or Volume name, then by File name, and finally
by Block.

References to Volumes and Devices are almost
interchangeable, except that devices generally are related
to the hardware, thus are fixed and seldom change.   An
example will clarify this point.   The Volume name of the
Business Diskette is "BUS4:".   When we want to find this
diskette, we can either call for BUS4:, or we can specify
the diskette drive where it resides, such as #4:. If we put
a different diskette, such as "ABC", into that drive, the
Device name remains #4:, but the Volume name changes from
BUS4: to ABC:.   Note that a ":" always ends the volume
name.

We'll continue the discussion of addresses in a few moments,
but first we'll use the Filer to examine the Volumes or
Devices that are "on-line", or available, to your SAGE
II/IV.

X.02 VOLUMES :

V(ols

The following exercise will show you how to use the V(ols option of the Filer to examine the Volumes "on-line" for your SAGE IV.

Follow the earlier instructions on page 64 to display the SAGE Main Menu. Once it is on your screen, select the "p-System" option. Press <cr>. Next press "y" to confirm your choice of the "p-System". Almost immediately, you should see the Command Line as shown:

```
Command: E(dit, R(un, F(ile, C)omp, L(ink, X(ecute, A(ssem, D(ebug,?
```

To use the Filer functions, simply press "f". Soon you will see the first line of the Filer Menu across the top of the screen.

```
Filer: G(et, S(ave, W(hat, N(ew, L(dir, R(em, C(hng, T(rans, D(ate,?
```

As we discussed earlier, whenever there is a "?" at the end of a p-System Menu, there are more items off the screen. Press the "?" to display the second line of the Menu. (Don't forget to use the SHIFT key to get the "?") The screen should now display:

```
Filer: Q(uit, B(ad-blks, E(xt-dir, K(runch, M(ake, P(refix, V(ols,?
```

Again, there is a "?", meaning that there is a third line to the Filer Menu. As you did above, press the "?" to see the remaining items.

```
Filer: X(amine, Z(ero, O(n/off-line, F(lip-swap/lock
```

Notice now that there is no "?". You are at the end of the Filer Menu. Pressing the "?" will now return you to the first line. Do that now, so your screen displays the first

line:

```
Filer: G(et, S(ave, W(hat, N(ew, L(dir, R(em, C(hng, T(rans, D(ate,?
```

Since we want to see which Volumes or Devices are "on-line",
press "v" for V(ols. When you are in the Filer, you may
press any of the options listed there, even if they are not
visible at the top of the screen. The V(ols is actually on
the second line of the Filer:

Once you have pressed "v" you should see:

```
Filer: G(et, S(ave, W(hat, N(ew, L(dir, R(em, C(hng, T(rans, D(ate,?

        Vols on line:

        1     CONSOLE:
        2     SYSTERM:
        4 #   BUS4:    [1280]
        5 #   DOC1B:   [1280]
        6     PRINTER:
        7     REMIN:
        8     REMOUT:
       11 #   RAMDISK:
              Root Vol is - BUS4:
              Prefix is  - BUS4:
```

Your screen may appear slightly different. You may not have
a #5:, for instance. You may have more device numbers, or
fewer, depending on the model of SAGE microcomputer you are
using.

The V(ols command from the Filer is useful in determining
what is or is not "on-line". For example, if you can't get
a diskette to work, you might see if it is listed in the
V(ols. If you had placed a diskette in Drive #4:, but the
V(ols did not show it, you have some sort of a problem. The
V(ols option is also handy to make sure the right diskette
is where you want it.

X.03 PREFIX :

P(refix

At the bottom of the V(ols listing are the words, "Prefix is
—". You'll recall from our discussion of how the SAGE II/IV
finds files and diskettes that the prefix allows you to call
for a file without having to list the Volume Name each time.

For example, suppose we wanted to X(ecute the file known as
WORD7. Also assume that the file "WORD7" is on the diskette
volume named BUS4:. Since our V(ols Listing told us that
the Prefix is already BUS4:, to execute the file, we would
simply type X(ecute from the p—System command line and then
respond with "WORD7" to the query "Execute what file?".

If the Prefix were set to something different, we would have
to type the Volume Name as well as the File Name. Thus, if
the Prefix were SAGE:, and we wanted to execute WORD7 from
the diskette named BUS4, we would have to type the full
name, "BUS4:WORD7", when the machine asked "Execute what
file?":

In summary, the Prefix saves us time by automatically
indicating the Volume Name. It's as though you bought
mailing envelopes that already had the City and State
imprinted on the address line. You would only have to type
in the name and the street address.

When you boot your SAGE IV to the operating system, the
Prefix is automatically set to the name of the Boot Volume,
(also known as Root Volume). What if you want to change it?
That is also quite easy and is part of the Filer Menu.

If the Filer Menu is on your screen, simply press "p" for
the P(refix option.

If you are not in Filer:, follow the directions listed under
"The Filer" on page 64 ; then press "p".

Once you've pressed "p", you should see the following:

```
Prefix titles by what vol ?
```

Now type in the letters "abc". You should see the following
message:

```
Filer:  G(et, S(ave, .............R(em, C(hng, T(rans, D(ate, ?
BUS4: ABC - File not found, Vol name expected <source>
```

This message indicates that you did not type a correct
Prefix name. All prefix names must have a ":" at the end
and have seven or less characters. Let's try it again.

Type "p". When the message, "Prefix titles by what vol",
appears, type "abc:".

The screen should now read:

```
Filer: G(et, S(ave, .............R(em, C(hng, T(rans, D(ate,?
Prefix is  ABC:
```

You can verify that you have changed the Prefix by selecting
V(ols. It should now indicate that the Prefix is - ABC:.

Follow the procedures above to change the Prefix back to
BUS4:

X.04 LISTING THE FILES :

L(dir

The next division in size below the Volume name or Device
number is the File. Files may contain either Code which is
a compiled program or Text which might be a program or
document or raw Data which might be used to prepare the
payroll or financial reports.

We can use the Filer to see just what files are stored on
each Volume, when they were stored, how big they are, and
what type of material they contain. This listing of the
files is also known as a Directory. To locate files, the
SAGE II/IV consults it like a Table of Contents. We'll show
you two different ways to list, or display, the Directory.

From the Filer Menu, (see page 64), press "1" (that's a
small L, not a 'one') for L(dir. You should now see the
following message:

> Dir listing of what volume ?

Type "bus4:". Press <cr>.

You should now see a screen similar to the one shown:

THE p-SYSTEM FILER
LISTING THE FILES

```
Type <space> to continue
BUS4:
SYSTEM.PASCAL       126  22-Dec-82
SYSTEM.MISCINFO       1  17-Mar-83
USERLIB.TEXT          4   8-Aug-83
SYSTEM.LIBRARY        7  13-Sep-82
SYSTEM.FILER         39  27-Aug-82
SYSTEM.EDITOR        50  14-Oct-82
SAGE4UTIL.CODE       67   5-Aug-83
ENDBOOT               1  13-Sep-82
SYSTEM.BIOS          33  21-Sep-82
SYSTEM.INTREP        23  24-Sep-82
WORD7.CODE          147  17-Sep-83
TS.CODE             184  22-Mar-83
TS.SPEC               1  22-Mar-83
SCREENOPS.CODE        8  16-Jun-83
SYSTEM.STARTUP       13  21-Sep-83
HDEMO.CODE            5  20-Dec-82
SS.CODE             146  22-Mar-83
```

Your screen may be different than the one shown, but it should be similar. If the Filer Menu is displayed at the top of the listing, you are looking at all the files on the designated Volume. If you see the "Type <space> to continue" message, there are files that would not fit on one screen. To see them, simply press the space bar. When the Filer Menu appears, there are no more files on the Volume.

Notice the title, "BUS4:" just above the example. This indicates the Volume name of the files you've listed.

Below that are the files themselves. The first item in the line is the name of the file. For example, "SYSTEM.PASCAL" is the name of the first file in our listing. The next item in the line is the number of blocks that this file occupies. In the example we've shown above, SYSTEM.PASCAL uses 126 blocks. The final item in the line is the date the file was last changed. In our example, SYSTEM.PASCAL was last changed on December 22, 1982.

When you reach the last file on the volume, you'll notice a notation similar to the one below:

    31/31 files<listed/in-dir>, 985 blocks used, 295 unused, 295 in largest

If you do not see such a line at the bottom of your listing, press the space bar(<space>) until such a line appears (and the Filer Menu is again at the top of the screen).

This line is a summary of the Volume. It tells how many files are listed and in the directory, the number of blocks used, and the number unused. With this information you can see how large a particular file is or determine if another file will fit on your diskette.

● EXTENDED DIRECTORY

E(xt-dir

The Extended Directory is similar to the L(dir, but more information is displayed. Using the "E" option, instead of the "L" option, from the Filer Menu, (see page 64), will result in a slightly different listing.

Here are some sample lines from an Extended Directory:

```
SYSTEM.PASCAL    126  22-Dec-82     6   512  Datafile
USERLIB.TEXT       4   8-Aug-83   133   512  Textfile
SYSTEM.EDITOR     50  14-Oct-82   183   512  Codefile
TS.SPEC            1  22-Mar-83   513   434  Datafile
```

Notice that two additional items are listed here that were not on the Directory Listing. The column following the date refers to the beginning location of the file within the directory. SYSTEM.PASCAL begins at block 6. SYSTEM.EDITOR begins at block 183, and so on.

The number 512 in the next column relates to the last byte filled in the last block used. Each block on our files has 512 bytes. So SYSTEM.PASCAL used all the bytes available in the last block it occupied. However, the file TS.SPEC used only 434 bytes of the last block.

The last item in the line describes the type of file listed. In our example, SYSTEM.PASCAL is a file containing DATA. USERLIB.TEXT is a file containing TEXT. And SYSTEM.EDITOR is a file that contains a compiled program or program code.

Much of this information is of interest only to programmers or developers, but feel free to use either the "L" or "E" options from the Filer. There is no penalty in seeing the Extended Directory Listing versus the shorter Directory Listing.

X.05   TRANSFERRING FILES :

T(rans

One of the most useful options from the Filer will be T(rans
or TRANSFER. This is used to move files from one Volume to
another Volume.   Transfer will also move files from one
device to another. For example, you could move a file from
diskette drive #4:   to the Printer: or the Console:
(Terminal Screen).

When you originally made backup copies of your SYSTEM
diskettes, we used the Transfer function. However, in that
case, we transferred the entire contents of the diskette to
another diskette.   Now we'll talk about how to transfer
single files.

So you needn't use a new diskette, in our example we'll
transfer a file from the BUSINESS Diskette right back onto
the BUSINESS Diskette, but we will give it a different name.
The procedure is exactly the same if you transfer it to a
different diskette or device.

Check that the Filer Menu is displayed at the top of the
screen (See page 64) Press "t" for Transfer.   You should
see the message:

    Transfer what file ?

Type the following: bus4:qstart.text

Press ⟨cr⟩. You should see this message:

    Transfer what file ? bus4:qstart.text
    To where ?

Type the following: bus4: xxx.text

Press ⟨cr⟩ You should see this message:

```
BUS4:USERLIB.TEXT    - -> BUS4:XXX.TEXT
```

This message indicates that the transfer has occurred
successfully. If you perform a directory listing (L(dir)),
you'll see that BUS4: now includes the file XXX.TEXT.

You'll notice that we included both the volume name and the
file name to make our transfers. We could have also used
the Device number to achieve the same results. For
instance, #4:qstart.text would have done the same thing if
QSTART.TEXT was in the #4 Diskette Drive.

Likewise, if you want to make a transfer to another
diskette, and have a machine with two drives, you will use
the Device number when asked "To where ?", as shown below.

```
Transfer what file ? bus4:qstart.text
To where ?  #5:xxx.text
```

When you transfer a File to another Volume , you can use the
same File name. Here's an example of the entries to
transfer the file:

```
Transfer what file ? bus4:qstart.text
To where ? #5:qstart.text
```

If you have a spare diskette, you may like to try a real
transfer. For the SAGE II the entries would be as shown
above. For those with a SAGE IV, use the example below:

```
Transfer what file ?  sys:qstart.text
To where ? #4:qstart.text
```

There are many shortcuts you can learn as you become more
familiar with the p-System and the Filer, but to insure
success, remember to always include the Volume name or
Device number and the File name of the File to be
transferred. For the destination (To where?) also include
the Volume name or Device number and the File name.

X.06 CHANGE :

C(hng

You may want to change the name of a File or Directory to
make it easier to recognize. To do so is a simple matter.
Press "c" and this message is displayed:

```
Change what file?
```

To change a File name, type the Volume name or the Device
number followed by the File name. When you do, the screen
will look like this:

```
Change what file? #4:xxx.text
Change to what? #4:notes.jfk.text
```

If you list the directory, you will find that notes.jfk.text
is listed and xxx.text is no longer there.

You can change the name of a Directory is the same fashion.
Press "c" to obtain the message:

```
Change what file?
```

Type just the Volume name or Device number and the screen
will look like this:

```
Change what file? #4:?
Change to what? LETTERS:
```

When you now list the directory--L(dir), you will see that
LETTERS: is now the Volume name. Now use C(hng to restore
the name of the volume. The BUSINESS disk was named BUS4:.

More details on this and other Filer functions are explained

in **"Personal Computing with the UCSD p–System"** .

X.07   REMOVE :

R(em

The Filer R(emove option is used to delete individual Files
you no longer need.   As in T(ransfer, this procedure
requires you to indicate the Volume Name or Device Number
and the File name.

When you press "r" to R(emove a File, you'll see:

```
Remove what file?
```

Type "#4:notes.jfk.text" and the screen will look like this:

```
Remove what file ? #4:notes.jfk.text
BUS4:NOTES.JFK.TEXT      --> removed
Update directory?
```

If you answer "n" to the Update directory question, the file
will not be removed.   This gives you a chance to reconsider
your decision and is a safeguard against losing a File you
might need.   An answer of "y" will remove the File called
notes.jfk.text and update the directory.   Go ahead and type
"y".

Again, more details on this and other Filer functions are
explained in **"Personal Computing with the UCSD p–System".**

X.08   WILDCARDS :

There are many shortcuts contained in the p-System that help
you save time. One of the most convenient is the the use of
special characters called "Wildcards". We'll show you one
and refer you to the p-System books to learn about the many
others.

When performing the Transfer option, we discussed moving a
file from one place to another. That required you to type
the name of the file twice as shown below:

```
Transfer what file ? bus4:qstart.text
To where ? #5:qstart.text
```

The "$" is a wildcard that means "same name". For example,
to transfer the file above we could have saved some typing
by making this entry:

```
Transfer what file ?  bus4:qstart.text
To where ? #5:$
```

This transfers the QSTART.TEXT file to #5, but it saves
typing the File name again. You'll find the other wildcards
equally helpful. If you will be using the p-System a lot in
your applications, we encourage you to become familiar with
all the wildcards.

XI   SYSTEM BASICS :

At this point a little background on various features of the SAGE is in order. These features are referred to throughout the rest of the manual and described in detail in the SAGE II/IV TECHNICAL MANUAL.

RAM
RAM stands for Random Access Memory.   Most of the SAGE computer's memory is RAM.   Information stored in RAM goes away if the power to the system is shut off.   However, information can be read and written to RAM much faster than any other device on a computer.   Programs are "loaded" (copied) from a disk or floppy into RAM where they are executed, that is they "run" in RAM.

RAM DISK
Since RAM is the fastest device on the system, and since the SAGE can have up to 1 Megabyte of RAM, it may make sense to take part of the RAM and make it look like a fast disk. This is called RAM DISK. Programmers especially like to use RAM DISK for development. Programs compile much faster from RAM DISK allowing the developer to produce more programs in less time.

RAM DISK is an option that can be specified by SAGE4UTIL or by MU.UTIL if you have a SAGE Multi-user system.

SINGLE–USER
A person who is using the entire resources of the machine is generally a "single-user". The "In the Beginning" sections dealt with single-user operation on the SAGE.

MULTI–USER
The SAGE computers can have up to six users at one time. This is the "Multi-User" system. A custom configuration can be "installed" by a knowledgable person or one of the standard configurations can be used.   Only one person can use the machine unless the Multi-User system is installed.

CONFIGURATION

The term "Configure" is one you will see a lot of in the SAGE manuals. It means to set up the software and hardware options of the machine. For example, several Multi-User systems have already been "configured" for you and are available on the BUILD diskette. See page 195.

PARTITIONS

The SAGE computers support hard disk with up to 40 Megabytes of storage. The hard disk is usually divided up into smaller areas called "partitions" and assigned to different jobs or to different users. The SAGE II/IV TECHNICAL MANUAL has specific information on how you can configure partitions on your disk. The standard Multi-User systems have the disk partitions already built into them.

XIII   P-SYSTEM TERMINAL CONFIGURATION :

Unless you have ordered your terminal from SAGE, you will
have to give the p-SYSTEM information on what kind of
terminal you have.   This is called "installing" the
terminal.   This process may be very easy or somewhat
difficult depending on the type of terminal you have.   This
section describes all the steps that may be necessary for
you to install your terminal.   If you have a QUME QVT102,
TELEVIDEO TV925, or FREEDOM 100 turn to the section on
BUSINESS MASTER TERMINALS.

XIII.01 COMMUNICATION PARAMETERS :

In order for your SAGE computer to start up properly, the
terminal and computer must be set to talk at the same speed.
This is called the "communication rate" or the "baud rate".
(Baud stands for the number of bits per second which can be
sent and is named for the French inventor J.M.E. Baudot.)

Check the figure on the next page to see how the switches
for the computer are set.   They must be set to the same baud
rate as your terminal.   Your terminal manual will show you
how to set up the terminal baud rate.   Sometimes there are
switches on the back of the terminal.   Some newer types of
terminals let you type in the parameters using a special
"mode".   You get into this mode by typing one of the keys
usually marked "SET UP" or "LOCAL".   An example of how the
SAGE terminal does this is given in the section called
"CONFIGURING THE TERMINAL" in this manual on page 10.

Other parameters such as parity, the number of data bits,
and the number of stop bits must be set to match on both the
computer and the terminal end.   As long as the parameter
settings match, you should be able to start your computer.
The SAGE terminal uses:

        19.2K baud   (Use 9600 for most others)
        8 bits of data
        1 stop bit
        parity disabled

XON/XOFF on

Note that if parity is enabled, you must also define it as even.

The standard switch settings for the computer are shown below.

SAGE II

GROUP A   GROUP B

SAGE IV

GROUP A   GROUP B
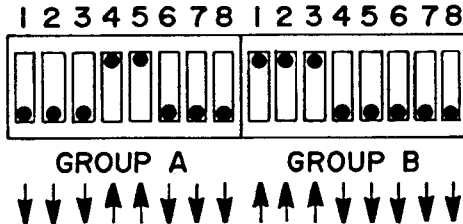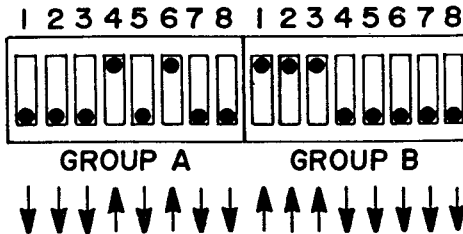
XIII.02   TERMINAL CABLES :

The kind of cable needed depends on where you physically
connect the terminal to the SAGE II/IV. Terminals can be
connected to:

1. The main terminal port. This is most common.
2. One of the auxiliary ports for a multi-user system.
   This cable is usually the same as 1 above.
3. The remote, or modem port. Usually only on a multi-user
   system.

All of these cables must have an RS232 connector on the SAGE
end. RS232 serial asynchronous transmission is the kind of
protocol used by most microcomputers to talk to terminals.
It is so common that you should be able to buy the
appropriate parts at your local hardware store if you are
going to the trouble of making your own cable.   It is,
however, usually easier to buy the cable you need.

Notice that while "RS232" is standard on almost every
terminal and computer, there are options in how the terminal
can be connected. This is why you should not use a cable
built for another computer without checking the wiring. You
can damage the computer with the wrong cable.

What kind of cable do you need? The following pages show
the wiring and SAGE Part number for these cables:

1. Standard cable for the TERMINAL port and AUX ports.
   Works for both Single User and Multi-user. For the
   Qume QVT102 and most others.

2. Standard cable for REMOTE port. Usually used in
   . Multi-user mode.

If one of these two cables does not work, you must study the
section on RS232 communication to figure out how your
terminal differs. Remember that the problem is usually not
the cable at all, but that you have not properly set the
COMMUNICATION PARAMETERS such as BAUD RATE, PARITY etc.

● **STANDARD TERMINAL CABLE**

Below is the wiring and SAGE part numbers for the standard
cable for the TERMINAL port and AUX ports. This cable
should work for both Single User and Multi-user modes for
most terminals.

```
SAGE PN#     LENGTH
CC0056A      10ft       (all are 5 connector cable)
CC0057A      25ft
CC0079A      50ft
CC0058A      100ft
CC0080A      200ft


SAGE          WIRE COLOR       TERMINAL
 1----470------BROWN----------> 1
 2----470------BLACK----------> 2
 3----470------RED------------> 3
 4-->9
 7----470------GREEN----------> 7
         |
         |
     470 Ohm resistor
```

AUX-470 is marked on the SAGE II/IV end of the cable.
TERMINAL is marked on the terminal end.
Dummy pins are inserted in positions 13, 14, 25.
This cable has a 470 ohm resistor in series with
each wire in the connector at the SAGE II/IV end.

● STANDARD REMOTE TERMINAL CABLE

The REMOTE port is slightly different from the other
TERMINAL ports since it is usually intended for use with a
MODEM and not a TERMINAL. However, with the proper cable as
shown below, a terminal will work very well. Most
installations leave the REMOTE port free for use with a
MODEM or printer unless they are running 6 users. (Note
that this cable may not work for talking to a printer or
MODEM.)

```
SAGE PN#      LENGTH

CC0038C       10ft      (5-cond wire)
CC0039C       25ft
CC0077C       50ft
CC0040C       100ft
CC0078C       200ft

SAGE        WIRE COLOR       TERMINAL
1----470-------BROWN----------> 1
2----470-------BLACK----------> 3
3----470-------RED------------> 2
4-->6-->9
7----470-------GREEN---------> 7

     |
     |
  470 Ohm resistor
```

Remote-470 is marked on the SAGE II/IV
end of the cable. TERMINAL is marked
on the terminal end. Dummy pins are
inserted in positions 13,14,25.
This cable has a 470 ohm resistor in
series with each wire in the connector
at the SAGE II/IV end.

● BUILDING A TERMINAL CABLE

If your terminal has options that require a different cable, this section may be of help to you. If some of the terms used in this section are unfamiliar to you, we suggest that you buy a reference book for RS232 communications.

"RS232 MADE EASY" by Martin D. Seyer
"DATA COMMUNICATIONS HANDBOOK" Signetics Corporation
"DATA COMMUNICATIONS, A USER'S HANDBOOK" Racal Vadic

Also see the section in this manual called RS232 PROTOCOL on the next page.

This TERMINAL port operates as RS232 Data Communication Equipment at software definable speeds from 50 - 19.2K baud in either interrupt-driven or polled mode. GROUP-A DIP switches on the back panel define the initial baud rate. The DB-25 connector is located at the rear of the machine and is marked "TERMINAL". Pin-outs for the signals are:

```
PIN#   1      Protective Ground
       2      Transmitted data  (from terminal) <---
       3      Received data     (to   terminal) --->
       5      Clear-to-send     (to   terminal) --->
       7      Signal Ground
       9      +12 VDC
      10      -12 VDC
      11      + 5 VDC
```

Compare these signals to the pin-outs given for your terminal. The terminal manual should also show the normal cable connection for that terminal.

Note that this port is normally configured for 19.2K baud with parity disabled, 8 bits of data, 1 stop bit and XON/XOFF on. This can be changed using the switches on the back of the SAGE™ II/IV.

CTS and DSR are explained in the section on TERMINAL PORT
OPTIONS.

XIII.03 RS232 PROTOCOL :

There always seems to be a lot of confusion involving the
interconnection of serial devices using the RS232 protocol.
This section is provided to clarify the hardware protocol
and terminology. Software configuration and conventions are
covered in the section describing SAGE4UTIL, SAGE's
configuration and utility program.

The RS232 standard was developed for the typical timesharing
scenario where a terminal is connected through a pair of
modems to a computer. The terminal and the computer are
referred to as Data Terminal Equipment (DTE) and the modems
are referred to as Data Communications Equipment (DCE).

```
    DTE                 DCE
  ----------        ----------
 |          | RS232 |          |
 | Terminal |<----->| Modem    |
 |          |       |          |
  ----------        ----.-----
                        |
                        |  Phone line
                        |
                        |
                    ----'-----        ----------
                   |          | RS232 |          |
                   | Modem    |<----->|Computer  |
                   |          |       |          |
                    ----------        ----------
                        DCE               DTE
```
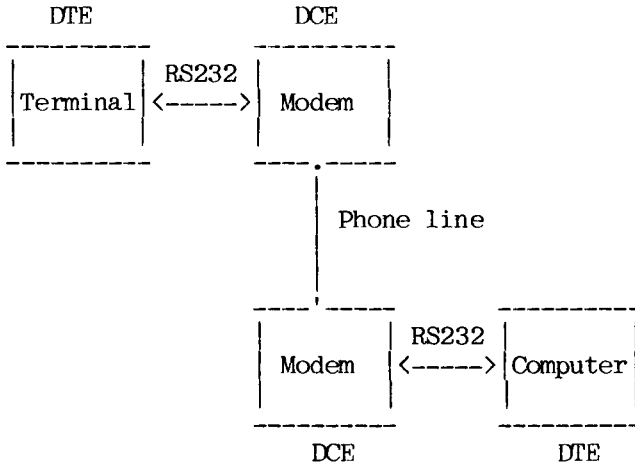
P-SYSTEM TERMINAL CONFIGURATION
RS232 PROTOCOL

A large source of the confusion comes from the fact that the
signal names are from the perspective of the Data Terminal
Equipment. The following diagram shows the relationship of
the typically used RS232 signals.

```
  2  ---> Transmitted Data     --->  2

  3  <--- Received Data         <---  3

  4  ---> Request to Send       --->  4

  5  <--- Clear to Send         <---  5

  6  <--- Data Set Ready        <---  6

  7  ----- Signal Ground        -----  7

  8  <--- Carrier Detect        <---  8

 20  ---> Data Terminal Ready --->  20

 22  <--- Ring Detect           <---  22

  DTE                            DCE
```
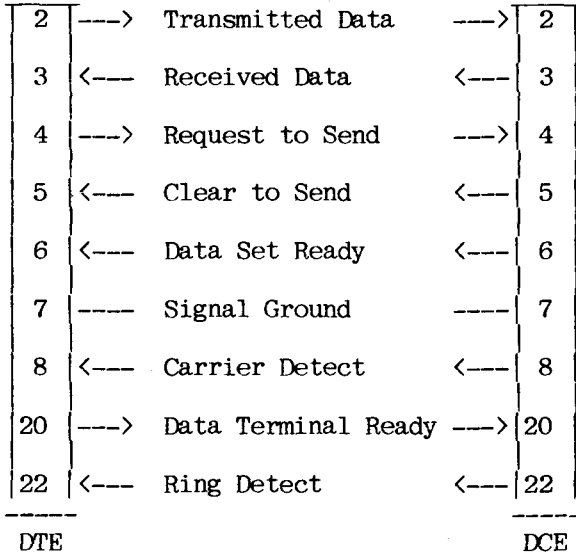
Notice that for the Data Communications Equipment connector,
pin 2 is called Transmitted Data but the signal is actually
an input to the device. Therefore, in order to know the
direction of the signal, it is important to know if the
device is considered Data Terminal Equipment or Data
Communications Equipment.   Conversely, if the signal
direction is known, it will be possible to determine if the
device is considered Data Terminal Equipment or Data
Communications Equipment.

A second complication arises because, in the typical microcomputer application, the terminal is connected directly to the computer without going through a set of modems. If the computer is considered Data Terminal Equipment this requires connecting two DTE devices back to back. To do this the signal lines on pins 2 and 3 must be cross connected with a non standard cable.

The **SAGE II/IV terminal port** has therefore been set up as **Data Communications Equipment** in order to allow a standard cable to interconnect the computer to a Terminal. If the SAGE II/IV terminal port is to be connected to a modem, then a special cable cross connecting pins 2 and 3 will be required. Notice that, because the SAGE II/IV terminal port is considered Data Communications Equipment, the Transmitted Data signal is an input and the Received Data signal is an output.

The **SAGE II/IV modem port** (Remote serial channel) is set up as **Data Terminal Equipment** to easily connect to a modem (DCE) with a standard cable. If the modem port is to be connected to a printer, a special cable will probably be required to interconnect two Data Terminal Equipment devices (cross connecting pins 2 & 3).

Another source of confusion is the signal levels on the RS232 lines. For the Transmitted Data and Received Data lines, a logic 0 level (called the Space state) is represented by a positive voltage between 3 and 25 Volts. A logic 1 level (called the Mark state) is represented by a negative voltage between - 3 and - 25 Volts. An idle data circuit will stay in the logic 1 (Mark) state. All of the other RS232 control signals have the opposite signal level. An active Clear to Send (logic 1) is represented by a positive voltage between 3 and 25 Volts.

XIII.04 Terminal XON/XOFF :

Some terminals cannot keep up with handling certain
functions when receiving information at a high baud rate.
Many terminals have an XON/XOFF protocol which allow them to
tell the computer when to stop sending and when to continue
sending.

The SAGE p–System is normally shipped with XON/XOFF enabled.
The p–System does not define a START character. However
when XON/XOFF protocol is being used, a CTRL Q (XON) must be
used to start the terminal instead of the CTRL S toggle. If
this option is unnecessary, the configuration utility
routine SAGE4UTIL.CODE should be used to turn off the
Terminal Option for XON/XOFF.

Note also that the p–System STOP character must be defined
as CTRL/S (XOFF). This is the normal assignment but it may
have been modified with SETUP. Also the XON/XOFF protocol
is normally a terminal option and may have to be enabled in
the terminal.

● **TERMINAL PORT OPTIONS**

The CTS (Clear to Send) function is normally always held
high (+12V). To change this remove the SAGE cover and find
the strap (S06) near the terminal connector at the rear
corner of the board.

The strap is normally set so that CTS is held high. To
drive CTS, the strap from [A] must be cut:

```
            1489-pin 10   (or 1489 pin 4)
                   |
  +12V [A]-------[ ]---[B]-------o J10-pin #5   CTS

         +12V  -----------o J10-pin #6   DSR
```
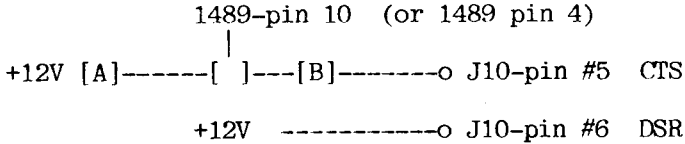
Note: Circuit boards issue CB002 are connected differently
as shown below. To drive CTS, cut the trace from pin 6 to
pin 5. Cut the trace from [B] to pin 6. Rewire pin 5 to
[B]. Also cut +12V from pin 6 and connect pin 6 to U59-1.

```
            U61-4
               |                o J10-pin #5. CTS
  + 5V [A]      [ ]---[B]----,   |
                             °--o J10-pin #6   DSR
                             |
                             - +12V
```
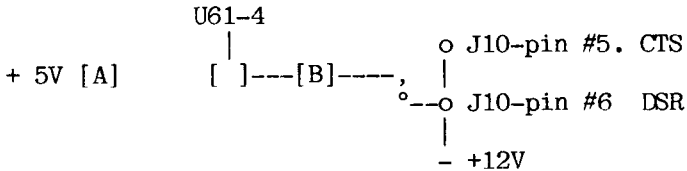
XIII.05   BUSINESS MASTER TERMINALS :

The business master is distributed configured for the Qume
QVT102 terminal.   However, it can be easily changed to
operate with either a TV925 or the Freedom 100 using a
SCRIPT file available on the diskette.

In order to change terminals on the BUSINESS MASTER:

1.   BOOT TO THE BUSINESS MASTER.   You should be at the
MENU.

2.   SELECT THE p-SYSTEM OPTION by moving the cursor in
front of it and typing <cr>, (The RETURN key).   You
should now be at the p-System command line.

3.   EXECUTE THE SCRIPT FILE FOR THE NEW TERMINAL:

"X TRM.SCRIPT"

A menu of terminals will display.   Choose your
terminal.   You will see various commands go by on your
screen.   When the SCRIPT file is finished, you will be
back at the p-SYSTEM command line.   Your terminal
files are now installed.

4.   Type "I" or "i" to get back to the MENU.

TECHNICAL NOTE: The SCRIPTs rename various files on the
disk so that SYSTEM.MISCINFO, WORD7 and the Spreadsheet are
also properly set up for the new terminal.   Because all
three of the terminals use the same GOTOXY file (GOTOXY will
be described in a later section, you can still boot the
BUSINESS disk and use the QVT102 configuration while
changing to one of the other terminals.   (TV925 or F100
terminals.)

XIV   BUILD A USER MASTER :

If your terminal needs a different configuration than the
three (Qume QVT102, TV925 and Free100) supplied on the
BUSINESS MASTER, you should build a USER MASTER diskette to
work from. Even if you have a hard disk system you should
build a diskette to serve as your archive master.

The following procedure expects the user to have a work area
called SCRATCH:. For a SAGE II user, this will be a floppy
in drive #4:. For a SAGE IV user, this will be volume #10:
on the hard disk. The example will work for both users in
exactly the same way if the following is done:

    SAGE II : Format and Zero a diskette naming it SCRATCH:
    SAGE IV : Format and Zero a diskette naming it NEW:

Refer to pages 38 and 45 for help in doing this.

The next sections will cover in detail how to do each of the
following necessary steps:

            1) Load the BOOT program on the diskette.
            2) Create/load the terminal's SYSTEM.MISCINFO
            3) Create/load the terminal's GOTOXY
            4) Transfer the system files.

XIV.01 VANILLA BOOT :

You should start-up your system using the "vanilla" SYSTEM
MASTER. It is called "vanilla" because there are no special
terminal functions, that is, no chocolate, no cherry etc.
The BUSINESS MASTER, on the other hand is flavored for a
SAGE (QUME QTV102) terminal.   The SYSTEM MASTER has been
specially created to help bring up various types of
terminals.

The following procedure treats the hard disk system and the
floppy based system in the same way. The only difference is
that a SAGE IV system having only one floppy drive will use
the SCRATCH: area on the hard disk instead of the second
(#5:) floppy drive.

1) Set switches 5 and 6 of GROUPA on the back of
   the system DOWN.

2) Reset (or power-up) the system. Insert the
   SYSTEM MASTER diskette.

3) Type "IF" to boot to the SYSTEM MASTER.

At this point you should have booted from the SYSTEM MASTER
diskette in drive #4: and the p-SYSTEM command line should
be on the screen:

Command: E(dit, R(un, F(ile, C(omp, L(ink, X(ecute, A(ssem, D(ebug?

XIV.02   LOADING BOOTSTRAP :

Next you must copy the floppy bootstrap program to the USER
MASTER.

The bootstrap program must reside on any diskette or
partition which "boots" or starts the p–System operating
system.   Data diskettes or partitions do not need it.   If
you try to start the computer using a diskette or partition
that does not have the boot program, you will get an error:

NOT BOOT DISK

Note that there are several bootstrap programs depending on
what kind of system you are building:

```
SAGE.PBOOT.CODE  -single user floppy boot to p-System
SAGE.WBOOT.CODE  -single user Winchester boot to p-System
MU.FBOOT.CODE    -Multi-user BIOS floppy boot
MU.WBOOT.CODE    -Multi-user BIOS Winchester boot
MU.PBOOT.CODE    -Multi-user boot to p-System
```

Here we are building a floppy diskette on a single–user
system so the file needed is SAGE.PBOOT.CODE.   The process
is nearly identical for any flavor of system being built,
only the file name and volume will be different.

BUILD A USER MASTER
LOADING BOOTSTRAP

EXAMPLE: Use SAGE4UTIL to copy the floppy boot from the
SYSTEM MASTER to your SCRATCH: area. (SCRATCH will
eventually become the USER MASTER.)


```
THE SCREEN SHOWS:                            YOU TYPE:

Command: E(dit,R(un,F(ile.................   X
Execute what file?                           SAGE4UTIL <cr>


SAGE4UTIL version 1.3
Initializing....

     SAGE4UTIL
A On-line Configuration
B BIOS file Configuration
C Floppy Formatter
D Bootstrap copy
E Prepares Drives for shipping

Select menu item <cr exits, !aborts>:
Select bootstrap Copy Utility.............  D
Source file or device <just CR quits>?....  SAGE.PBOOT.CODE
Ready to load bootstrap from file.........  Y
Bootstrap of 1008 bytes read successfully
Destination file or device<just CR quits>?  SCRATCH:
Ready to load bootstrap on volume #5?.....  Y
Bootstrap data written successfully
Type <space> to continue..................  <space>
Select menu item <cr exits, !aborts>:.....  <cr>
```


You are now back at the p-System command line. The SCRATCH:
volume now has a Bootstrap program on it.

XIV.03 SYSTEM.MISCINFO INSTALLATION :

SYSTEM.MISCINFO is a file used by the p–System operating
system which contains "miscellaneous" information about the
terminal and various system parameters.   It must hold the
correct information for your terminal or your application
programs will not run properly.

A "vanilla" SYSTEM.MISCINFO is shipped on the SYSTEM MASTER
disk.   Hopefully, this uncomplicated definition will work
well enough with your terminal at first to let you build a
good SYSTEM.MISCINFO for normal use.

SYSTEM.MISCINFO is maintained by using a program called
SETUP.CODE which is available on your SYSTEM MASTER disk.
As typing in all of the options for SETUP.CODE takes some
time, SAGE has proved MISCINFO files for many of the
terminals now sold. If your terminal is NOT one of those on
the following list or cannot emulate one of them, then you
must skip the following step and go the the next section
which discusses SETUP.CODE.

● **SYSTEM.MISCINFO FILES**

The following files are shipped on either the SYSTEM MASTER
or UTILITY MASTER diskette.

Terminal:	Change file to SYSTEM.MISCINFO	Install GOTOXY in SYSTEM.PASCAL
QUME QVT102	QVT102.MISCINFO	TV925.GOTO.CODE
TeleVideo 925/950	TV925.MISCINFO	TV925.GOTO.CODE
TeleVideo 912C/920C	TV912.MISCINFO	TV925.GOTO.CODE
Heath H19	H19.MISCINFO	VT52.GOTO.CODE
SOROC IQ120	IQ120.MISCINFO	TV925.GOTO.CODE
Hazeltine 1500	HZ1500.MISCINFO	H1500.GOTO.CODE
ADDS Regent 25	RG25.MISCINFO	VT52.GOTO.CODE
ADDS Viewpoint 60	ADDS60.MISCINFO	VT52.GOTO.CODE
ADM3A	ADM3A.MISCINFO	TV925.GOTO.CODE
Freedom 100	FD100.MISCINFO	TV925.GOTO.CODE
DEC VT52	VT52.MISCINFO	VT52.GOTO.CODE
VISUAL 550 in	VIS52.MISCINFO	VIS52.GOTO.CODE
VT52 emulation with		
33 lines		
VISUAL 550 (33 lines)	V550.MISCINFO	V550.GOTO.CODE
ANSI Standard Term	ANSI.MISCINFO	ANSIGOTOXY.CODE
(DEC VT100 series)		

Note that for ANSI terminals ANSI.CODE must be
installed in SYSTEM.PASCAL to replace the
existing SCREENOPS routines.

If your terminal is one of those shown in the previous list, use the FILER to transfer the correct MISCINFO file to the new disk.

EXAMPLE: Installing the correct miscinfo for the Hazeltine 1500.

```
THE SCREEN SHOWS:          YOU TYPE:

Command: E(dit,R(un,F(ile....  F
Filer:......................  T
Transfer what file?.........  H1500.MISCINFO <cr>
To where?...................  SCRATCH:SYSTEM.MISCINFO <cr>
```

BUILD A USER MASTER
SYSTEM.MISCINFO INSTALLATION

● **KEYBOARD assignments**

The MISCINFO files listed previously define the following
functions to the various terminal keyboards as follows.

Terminals: QUME QVT102   (SAGE Terminal)

EDITOR ACCEPT KEY   Ctrl C
EDITOR ESCAPE KEY   ESC
EDITOR EXCHANGE-DELETE KEY   Ctrl D
EDITOR EXCHANGE-INSERT KEY   Ctrl E
KEY FOR BREAK   Ctrl @
KEY FOR FLUSH   Ctrl X
KEY FOR STOP   Ctrl S
KEY TO ALPHA LOCK   Ctrl R
KEY TO DELETE CHARACTER   BACKSPACE
KEY TO DELETE LINE   DEL
KEY TO END FILE   Ctrl C
KEY TO MOVE CURSOR DOWN   down arrow
KEY TO MOVE CURSOR LEFT   left arrow
KEY TO MOVE CURSOR RIGHT   right arrow
KEY TO MOVE CURSOR UP   up arrow

Terminals: TV912C,TV920C ANSI Standard:
                                    TV925,TV950:   (VT 100 series)

EDITOR ACCEPT KEY	Ctrl C	Ctrl C
EDITOR ESCAPE KEY	ESC ESC	ESC ESC
EDITOR EXCHANGE–DELETE KEY	CHAR DELETE	Ctrl D
EDITOR EXCHANGE–INSERT KEY	CHAR INSERT	Ctrl E
KEY FOR BREAK	Ctrl @	NUL (see note 1)
KEY FOR FLUSH	Ctrl F	Ctrl F
KEY FOR STOP	Ctrl S	Ctrl S
KEY TO ALPHA LOCK	Ctrl R	Ctrl R
KEY TO DELETE CHARACTER	BACKSPACE	BACKSPACE
KEY TO DELETE LINE	DEL	DELETE
KEY TO END FILE	Ctrl C	Ctrl C
KEY TO MOVE CURSOR DOWN	down arrow	down arrow
KEY TO MOVE CURSOR LEFT	left arrow	left arrow
KEY TO MOVE CURSOR RIGHT	right arrow	right arrow
KEY TO MOVE CURSOR UP	up arrow	up arrow

Note 1: Determine which key will generate the
NUL ASCII value. On the VT102 this is Ctrl space. On
some terminals this is Ctrl @. This may be changed
with SETUP.

BUILD A USER MASTER
SYSTEM.MISCINFO INSTALLATION

Terminals: VT52:   Heath H19 (Note 2)

EDITOR ACCEPT KEY   Ctrl C   Ctrl C
EDITOR ESCAPE KEY   ESC ESC   ESC ESC
EDITOR EXCHANGE-DELETE KEY   Ctrl D   Ctrl D
EDITOR EXCHANGE-INSERT KEY   Ctrl E   Ctrl E
KEY FOR BREAK   Ctrl space   Ctrl @
KEY FOR FLUSH   Ctrl F   Ctrl F
KEY FOR STOP   Ctrl S   Ctrl S
KEY TO ALPHA LOCK   Ctrl R   Ctrl R
KEY TO DELETE CHARACTER   BACKSPACE   BACKSPACE
KEY TO DELETE LINE   DELFTE   DELETE
KEY TO END FILE   Ctrl C   Ctrl C
KEY TO MOVE CURSOR DOWN   down arrow   down arrow
KEY TO MOVE CURSOR LEFT   left arrow   left arrow
KEY TO MOVE CURSOR RIGHT   right arrow   right arrow
KEY TO MOVE CURSOR UP   up arrow   up arrow

Note 2: Consider using the Keypad Shifted
option so that the shift key is not necessary when
using the arrow keys.

Terminals:	IQ120:	Hazeltine 1500
EDITOR ACCEPT KEY	Ctrl C	Ctrl C
EDITOR ESCAPE KEY	ESC	ESC
EDITOR EXCHANGE-DELETE KEY	Ctrl D	Ctrl D
EDITOR EXCHANGE--INSERT KEY	Ctrl E	Ctrl E
KEY FOR BREAK	Ctrl underline	Ctrl ^
KEY FOR FLUSH	Ctrl F	Ctrl F
KEY FOR STOP	Ctrl S	Ctrl S
KEY TO ALPHA LOCK	Ctrl R	Ctrl R
KEY TO DELETE CHARACTER	BACKSPACE	BACKSPACE
KEY TO DELETE LINE	DELETE	RUBOUT
KEY TO END FILE	Ctrl C	Ctrl C
KEY TO MOVE CURSOR DOWN	down arrow	down arrow
KEY TO MOVE CURSOR LEFT	left arrow	left arrow
KEY TO MOVE CURSOR RIGHT	right arrow	right arrow
KEY TO MOVE CURSOR UP	up arrow	up arrow

Terminals:	ADDS Regent 25	ADM3A
EDITOR ACCEPT KEY	Ctrl C	Ctrl C
EDITOR ESCAPE KEY	ESC	ESC
EDITOR EXCHANGE-DELETE KEY	Ctrl D	Ctrl D
EDITOR EXCHANGE-INSERT KEY	Ctrl E	Ctrl E
KEY FOR BREAK	Ctrl ^	Ctrl ^
KEY FOR FLUSH	Ctrl X	Ctrl F
KEY FOR STOP	Ctrl S	Ctrl S
KEY TO ALPHA LOCK	Ctrl R	Ctrl R
KEY TO DELETE CHARACTER	BACKSPACE	BACKSPACE
KEY TO DELETE LINE	RUBOUT	RUBOUT
KEY TO END FILE	Ctrl C	Ctrl C
KEY TO MOVE CURSOR DOWN	down arrow	down arrow
KEY TO MOVE CURSOR LEFT	left arrow	left arrow
KEY TO MOVE CURSOR RIGHT	right arrow	right arrow
KEY TO MOVE CURSOR UP	up arrow	up arrow

Terminals: ADDS   Freedom 100
                                  Viewpoint 60

	ADDS Viewpoint 60	Freedom 100
EDITOR ACCEPT KEY	Ctrl C	Ctrl C
EDITOR ESCAPE KEY	ESC	ESC
EDITOR EXCHANGE-DELETE KEY	Ctrl D	Ctrl D
EDITOR EXCHANGE-INSERT KEY	Ctrl E	Ctrl E
KEY FOR BREAK	Ctrl ^	Ctrl]
KEY FOR FLUSH	Ctrl X	Ctrl F
KEY FOR STOP	Ctrl S	Ctrl S
KEY TO ALPHA LOCK	Ctrl R	Ctrl R
KEY TO DELETE CHARACTER	BACKSPACE	BACKSPACE
KEY TO DELETE LINE	RUBOUT	RUBOUT
KEY TO END FILE	Ctrl C	Ctrl C
KEY TO MOVE CURSOR DOWN	down arrow	down arrow
KEY TO MOVE CURSOR LEFT	left arrow	left arrow
KEY TO MOVE CURSOR RIGHT	right arrow	right arrow
KEY TO MOVE CURSOR UP	up arrow	up arrow

BUILD A USER MASTER
SYSTEM.MISCINFO INSTALLATION

Terminals:	VIS52	VI550
EDITOR ACCEPT KEY	Ctrl C	Ctrl C
EDITOR ESCAPE KEY	ESC ESC	ESC ESC
EDITOR EXCHANGE–DELETE KEY	DELETE char	DELETE char
EDITOR EXCHANGE–INSERT KEY	INSERT char	INSERT char
KEY FOR BREAK	Ctrl @	Ctrl @
KEY FOR FLUSH	Ctrl F	Ctrl F
KEY FOR STOP	Ctrl S	Ctrl S
KEY TO ALPHA LOCK	Ctrl R	Ctrl R
KEY TO DELETE CHARACTER	BACKSPACE	BACKSPACE
KEY TO DELETE LINE	DEL	DEL
KEY TO END FILE	Ctrl C	Ctrl C
KEY TO MOVE CURSOR DOWN	down arrow	down arrow
KEY TO MOVE CURSOR LEFT	left arrow	left arrow
KEY TO MOVE CURSOR RIGHT	right arrow	right arrow
KEY TO MOVE CURSOR UP	up arrow	up arrow

● **SETUP.CODE**

SETUP.CODE is used to define various parameters of the
p-System. Refer to the p-System OPERATING SYSTEM MANUAL for
details. An example follows which shows the setup for a
TeleVideo 925. (For those that are interested, the actual
position of the information in the MISCINFO file is given as
a word offset and bits used.)

The following Setup program information is for the TeleVideo
925 terminal. The items marked with a single '*' are
appropriate for any SAGE II/IV computer.

	FIELD FUNCTION	TV925	wrd:bits
	BACKSPACE	BS	34:0-7
*	CODE POOL BASE [FIRST WORD]	1	18:0-15
*	CODE POOL BASE [SECOND WORD]	H3400	19:0-15
*	CODE POOL SIZE	H4DFF	17:0-15
**	EDITOR ACCEPT KEY	ETX=^C	45:8-15
**	EDITOR ESCAPE KEY	ESC	44:8-15
	EDITOR EXCHANGE – DELETE KEY	W	24:0-7
	EDITOR EXCHANGE – INSERT KEY	Q	24:8-15
	ERASE LINE	NUL	35:0-7
	ERASE SCREEN	NUL	35:8-15
	ERASE TO END OF LINE	T	32:8-15
	ERASE TO END OF SCREEN	Y	32:0-7
**	FIRST SUBSIDIARY VOL NUMBER	13	13:0-15
*	HAS 8510A	FALSE	29:1
*	HAS BYTE FLIPPED MACHINE	TRUE	29:9
*	HAS CLOCK	TRUE	29:0
*	HAS EXTENDED MEMORY	TRUE	16:0
.	HAS LOWER CASE	TRUE	29:2
	HAS RANDOM CURSOR ADDRESSING	TRUE	29:3
	HAS SLOW TERMINAL	FALSE	29:4
note 1	HAS SPOOLING	FALSE	15:0

Note 1 This item should be marked TRUE only if the Printer

BUILD A USER MASTER
SYSTEM.MISCINFO INSTALLATION

Spooler is desired.

GETTING STARTED MANUAL

	FIELD FUNCTION	TV925	wrd:bits
*	HAS WORD ORIENTED MACHINE	FALSE	29:10
**	KEYBOARD INPUT MASK	127	46:0-7
**	KEY FOR BREAK	NUL	42:0-7
**	KEY FOR FLUSH	ACK#^F	41:8-15
**	KEY FOR STOP	DC3= S	42:8-15
**	KEY TO ALPHA LOCK	DC2= R	46:8-15
**	KEY TO DELETE CHARACTER	BS	43:0-7
**	KEY TO DELETE LINE	DEL	44:0-7
**	KEY TO END FILE	ETX=^C	41:0-7
	KEY TO MOVE CURSOR DOWN	SYN=^V	39:8-15
	KEY TO MOVE CURSOR LEFT	BS	40:0-7
	KEY TO MOVE CURSOR RIGHT	FF =^L	40:8-15
	KEY TO MOVE CURSOR UP	VT =^K	39:0-7
	LEAD IN FROM KEYBOARD	ESC	45:0-7
	LEAD IN TO SCREEN	ESC	31:0-7
**	MAX NUMBER OF SUBSIDIARY VOLs	4	23:8-15
**	MAX NUMBER OF USER SERIAL VOL	0	23:0-7
	MOVE CURSOR HOME	RS = ^^	31:8-15
	MOVE CURSOR RIGHT	FF =^L	33:0-7
	MOVE CURSOR UP	VT =^K	33:8-15
**	NON PRINTING CHARACTER	?	43:8-15
	PREFIXED[DELETE CHARACTER]	FALSE	36:5-5
**	PREFIXED[EDITOR ACCEPT KEY]	FALSE	47:12
note 2	PREFIXED[EDITOR ESCAPE KEY]	TRUE	47:9
	PREFIXED[EDITOR EXCHANGE - DELETE KEY	TRUE	47:15
	PREFIXED[EDITOR EXCHANGE - INSERT KEY	TRUE	47:14
	PREFIXED[ERASE LINE]	FALSE	36:7
	PREFIXED[ERASE SCREEN]	FALSE	36:6
	PREFIXED[ERASE TO END OF LINE	TRUE	36:2
	PREFIXED[ERASE TO END OF SCRN	TRUE	36:3

Note 2   If the LEAD IN FROM KEYBOARD is ESC then the
         PREFIXED[EDITOR ESCAPE KEY] should be TRUE.
         This will require that two Escape keys be typed
         for the EDITOR ESCAPE function.

BUILD A USER MASTER
SYSTEM.MISCINFO INSTALLATION

	FIELD FUNCTION	TV925	wrd:bits
	PREFIXED[KEY TO DELETE CHAR	FALSE	47:11
	PREFIXED[KEY TO DELETE LINE]	FALSE	47:10
	PREFIXED[KEY TO MOVE DOWN	FALSE	47:3
	PREFIXED[KEY TO MOVE LEFT	FALSE	47:1
	PREFIXED[KEY TO MOVE RIGHT	FALSE	47:0
	PREFIXED[KEY TO MOVE UP	FALSE	47:2
	PREFIXED[MOVE CURSOR HOME]	FALSE	36:4
	PREFIXED[MOVE CURSOR RIGHT]	FALSE	36:1
	PREFIXED[MOVE CURSOR UP]	FALSE	36:0
**	PREFIXED[NON PRINTING CHAR	FALSE	47:4
**	PRINTABLE CHARACTERS	13,32-126	48:0-7
	SCREEN HEIGHT	24	37:0-15
	SCREEN WIDTH	80	38:0-15
*	SEGMENT ALIGNMENT	0	20:0-15
*	STUDENT	FALSE	29:5
	VERTICAL MOVE DELAY	6	34:8-15

*   indicates proper setting for SAGE II/IV System
**   indicates suggested assignment (but not required)

XIV.04 GOTOXY INSTALLATION :

GOTOXY is a UNIT (a part of a program) that defines the
commands to position the cursor on the screen. The screen
is usually considered to have 80 characters across and 24
lines down. A point on the screen is found by sending
GOTOXY an X value to indicate how far across the screen to
move, and a Y value to show how far down to move. Almost
all p-System programs need GOTOXY to run properly.

A "vanilla" GOTOXY is shipped on the SYSTEM MASTER disk.
Hopefully, this uncomplicated definition will work well
enough with your terminal at first to let you build a good
SYSTEM.MISCINFO for normal use.

Note that SETUP does not use GOTOXY. Once a SYSTEM.MISCINFO
is configured, the vanilla GOTOXY routine attempts to use
the defined home and cursor movement commands to simulate
the GOTOXY function. In this manner, the screen editor may
be used to construct a correct GOTOXY routine for the
terminal. This means building a temporary system with the
new SYSTEM.MISCINFO but using the vanilla GOTOXY as shipped
in SYSTEM.PASCAL on the SYSTEM MASTER.

Choose a file from the list below which matches your
terminal. Remember that your terminal may be able to
EMULATE one of the terminals below. If your terminal is NOT
listed, you may have to write your own GOTOXY.

Terminal:	Install in SYSTEM.PASCAL
QUME QVT102	TV925.GOTO.CODE
TeleVideo 925/950	TV925.GOTO.CODE
TeleVideo 912C/920C	TV925.GOTO.CODE
Heath H19	VT52.GOTO.CODE
SOROC IQ120	TV925.GOTO.CODE
Hazeltine 1500	H1500.GOTO.CODE
ADDS Regent 25	VT52.GOTO.CODE
ADDS Viewpoint 60	VT52.GOTO.CODE
ADM3A	TV925.GOTO.CODE
Freedom 100	TV925.GOTO.CODE

BUILD A USER MASTER
GOTOXY INSTALLATION

DEC VT52   VT52.GOTO.CODE
VISUAL V550   VIS52.GOTO.CODE
(emulating VT52
 with 33 lines)
VISUAL V550   V550.GOTO.CODE

ANSI Standard Term   ANSIGOTOXY.CODE
(DEC VT100 series)

NOTE: For ANSI terminals, ANSI.CODE must be installed in
SYSTEM.PASCAL to replace the existing SCREENOPS routines.

If your terminal does not match any above, turn to the
writeup on WRITING A GOTOXY which is later in this section.
Once you have a GOTOXY, it must be loaded into the file
SYSTEM.PASCAL with LIBRARY.CODE.

● GOTOXY AND THE LIBRARIAN

LIBRARY.CODE acts like a librarian for p–System programs. Programs are made of UNITS. LIBRARY.CODE can add, remove or delete these UNITS from a program. At this point, you want to use LIBRARIAN to delete the old GOTOXY UNIT and add the new one to SYSTEM.PASCAL. SYSTEM.PASCAL is the operating system program itself. For details on how LIBRARY.CODE works refer to the p–SYSTEM OPERATING SYSTEM MANUAL.

EXAMPLE: If you have a Hazeltine 1500 terminal, you will install the H1500.GOTO.CODE unit in SYSTEM.PASCAL on the SCRATCH: volume that will become your USER MASTER.

```
THE SCREEN SHOWS:          YOU TYPE:

Command: E(dit,R(un,F(ile....... X
Execute what file?............. LIBRARY <cr>
Library: [z12]
Output file?................... SCRATCH:SYSTEM.PASCAL <cr>
Input file?.................... H1500.GOTO
```

The screen will show the single GOTOXY unit in H1500.GOTO.CODE.

Now type "T" (for toggle) so that the interface section of the units is not copied. Then transfer the GOTOXY unit in slot 0 (zero not "O") to slot 21 of the new file:

```
THE SCREEN SHOWS:          YOU TYPE:

Toggle interface section flag:.. T
Transfer unit 0 to slot 21...... 0 then 21
```

Slot 21 is where the old GOTOXY unit is in the current SYSTEM.PASCAL. The new GOTOXY unit for the H1500 will now replace it.

BUILD A USER MASTER
GOTOXY INSTALLATION

The screen should look like this:

```
Library: N(ew, 0-9(slot-to slot), E(very, S(elect, C(omp-unit?
From #?0    To Slot #? 21
 21 u GOTOXY      68
Output file is 2 blocks long
```

ANSI TERMINAL

Note that if you have an ANSI terminal you must now install
the new ANSI.CODE unit in place of the old SCREENOPS unit.
Skip this if you do not have an ANSI terminal.

```
THE SCREEN SHOWS:          YOU TYPE:

Library: N(ew, 0-9(slot-to slot) N
Input file?.................... ANSI.CODE
   0 u SCREENOP  590
   1 s SEGSCINI  489
   2 s SEGSCPRO  229
   3 s SEGSCCHE  126
Library: N(ew,0-9(slot-to-slot)  0
From #?0 To Slot #?............. 17
Library: N(ew, 0-9(slot-to slot)  1
From #?1 To Slot #?............. 18
Library: N(ew, 0-9(slot-to slot)  2
From #?2 To Slot #?............. 19
Library: N(ew, 0-9(slot-to slot)  3
From #?3 To Slot #?............. 20
```

OPEATING SYSTEM UNITS

Now transfer every unit from SYSTEM.PASCAL except the old
GOTOXY   unit   (and   the   old   ANSI   unit)   to   the   new
SYSTEM.PASCAL.

```
Library: N(ew, 0-9(slot-to slot) N
Input file?.................... SYSTEM.PASCAL <cr>
Library: N(ew, 0-9(slot-to slot  E
```

When finished the screen will show: As each unit is loaded,
it will be displayed on the screen:

```
Library: N(ew, 0-9(slot-to slot), E(very, S(elect, C(omp-unit?
     0 u KERNEL     1952
     1 u INITOPS    1680
     2 u GETCMD     5364
     3 u HEAPOPS     285
     4 u EXTRAHEA   ·747
     5 u PERMHEAP    192
     6 u COMMANDI    986
     7 u SMALLCOM    166
     8 u SOFTOPS     604
     9 u STRINGOP    236
    10 u PRNTERR     715
    11 u OSUTIL      244
    12 u CONCURRE    174
    13 u PASCALIO    928
    14 u EXTRAIO     358
    15 u USERPROG   1826
    16 u FILEOPS    2421
    17 u SCREENOP    582
    18 u SEGSCINI    508
    19 u SEGSPRO     229
    20 u SEGSCCHE    126
    21 u GOTOXY       64
    22 u DEBUGGER    490
    23 u EXTRALEX   5983
    24 u SPOOLOPS    184
    25 u SPOOLTAS    505
    26 u REALOPS    2189
```

When finished, you will see just the last units loaded.

```
       ----
       ----
    20 u SEGSCCHE    126
    21 u GOTOXY       64
    22 u DEBUGGER    490
    23 u EXTRALEX   5983
    24 u SPOOLOPS    184
    25 u SPOOLTAS    505
    26 u REALOPS    2189

Library: N(ew, 0-9(slot-to slot), E(very, S(elect, C(omp-unit?
```

Now quit and save the new SYSTEM.PASCAL file.

THE SCREEN SHOWS:	YOU TYPE:
Library: N(ew, 0-9(slot-to slot)	Q
Notice?........................	<cr>

The NOTICE is optional.

At this point, SCRATCH: will contain a new operating system,
(SYSTEM.PASCAL), which will handle the cursor positioning
requirements of the selected (Hazeltine) terminal.

BUILD A USER MASTER
GOTOXY INSTALLATION

● **GOTOXY PROGRAM**

If you are forced to write your own GOTOXY for your
terminal, you should start with the sample program shipped
on your SYSTEM MASTER diskette.   This program is called
SAMPLEGOTO.TEXT and is shown on the next page.

Editing the file to add your changes may be interesting
since you need the GOTOXY for the editor to work properly
and this is what you are trying to build.   If you have
access to another SAGE or another terminal that is already
set up, it is more convenient to use that system to bring up
the new one.

When trying to create your own GOTOXY, it is helpful to
install a proper SYSTEM.MISCINFO first.

Also, even if the "Vanilla" GOTOXY works for your terminal,
you should consider doing a customized version since it will
run much faster.

The TELL array is the part of the program that is usually
changed.   TELL defines the command sequence used to move the
cursor.   For example, the definition for the TV925 would be:

```
TELL[0] := 27;          {Value of ESC}
TELL[1] := ORD('=');     {Value of the equal sign}
TELL[TELL_LENGTH_MINUS_1 - 1] := Y + OFFSET;
TELL[TELL_LENGTH_MINUS_1] := X + OFFSET;
```

For the Hazeltine 1500 the command is different and the X and Y positions are reversed:

```
TELL[0] := 27;          {Value of ESC}
TELL[1] := 17;          {Value of CTRL/Q}
TELL[TELL_LENGTH_MINUS_1 - 1] := X + OFFSET;
TELL[TELL_LENGTH_MINUS_1] := Y + OFFSET;
```

If the command sequence is longer than 4 characters, the value of TELL_LENGTH_MINUS_1 must be changed. (SAMPLEGOTO has it set to 3.)

SAMPLEGOTO shows a very common way of calculating the movement. If, for example, X (the desired position across was 10), then the column character would be the 10th printable ASCII ")". Since the first 32 characters are non-printable characters, the value of the character is calculated by adding 32 to X. Thus 32 is the OFFSET. Your terminal may have a different offset or may use another method of calculation entirely.

Once you have edited the program as desired, COMPILE it and load the result into SYSTEM.PASCAL following the steps described on page 135.

Following is a listing of the sample GOTOXY routine contained in the file SAMPLEGOTO.TEXT.

```
{$U-}    { ALWAYS include this compiler directive. }
UNIT GOTOXY;
INTERFACE
  PROCEDURE AGOTOXY(X,Y: INTEGER);

IMPLEMENTATION
  USES {$U SCREENOPS.CODE} SCREENOPS (SC_TX_PORT, SC_PORT);
  PROCEDURE AGOTOXY;

  CONST  TELL_LENGTH_MINUS_1 = 3;
         OFFSET = 32;
  { You may have to change these, depending on your terminal. }

  VAR    TELL: PACKED ARRAY [0..TELL_LENGTH_MINUS_1]
                    OF 0..255;
  BEGIN
    IF X>79 THEN X:=79
       ELSE IF X<0 THEN X:=0;
    IF Y>23 THEN Y:=23
       ELSE IF Y<0 THEN Y:=0;
    {  This range-checking is necessary.  The actual
       screenwidth and height may be different for you. }

    WITH SC_PORT DO
      BEGIN
        CUR_X:=X-COL;
        CUR_Y:=Y-ROW;
      END;

    { These first elements of TELL must contain
       the characters which tell your terminal to
       position the cursor at (X,Y):
       fill in the blanks...      }
    TELL[0] := 0 {change this};
    TELL[1] := 0 {and this};
    { The actual X and Y values are usually the
       last things in the array;
       the order may be different on your terminal. }
    TELL[TELL_LENGTH_MINUS_1 - 1] := Y + OFFSET;
    TELL[TELL_LENGTH_MINUS_1] := X + OFFSET;

    UNITWRITE(1,TELL,TELL_LENGTH_MINUS_1 + 1)
  END {AGOTOXY};
END {UNIT GOTOXY}.
```

XIV.05   USER MASTER FILES :

The special installation for the terminal is now done. You are ready to transfer the rest of the system files needed to the SCRATCH: volume. The following files are the only ones commonly transferred. A short description of each file is given in the technical manual. If you have followed the steps given in the sections before this, then your SYSTEM.MISCINFO and SYSTEM.PASCAL should already be on the new volume.

```
MAIN:
SYSTEM.PASCAL      125 20-Dec-82 (already there)
SYSTEM.MISCINFO      1 17-Mar-83 (already there)
SYSTEM.LIBRARY       7 13-Sep-82
SYSTEM.SYNTAX       14 18-May-82
SYSTEM.FILER        39 27-Aug-82
SYSTEM.EDITOR       50 14-Oct-82
SYSTEM.COMPILER    107 16-Aug-82
SETUP.CODE          36  7-Jun-82
SAGE4UTIL.CODE      67  5-Aug-83
LIBRARY.CODE        13 10-Dec-82
SAGEDATE.CODE       32  5-Aug-83
ENDBOOT              1 13-Sep-82
SYSTEM.BIOS         33  8-Aug-83
SYSTEM.INTERP       23  8-Jun-83
```

Note that SYSTEM.PASCAL and SYSTEM.MISCINFO are the first files on the diskette. This is not really necessary BUT it does make booting faster.   Another reason for putting SYSTEM.PASCAL first is so that it does not get moved when a "Krunch" is done. (See Filer options.)   If SYSTEM.PASCAL is moved (in the "ROOT" volume which is the one you booted from) then the system will not be able to find all of its units (or segments) and it will stop.

BUILD A USER MASTER
USER MASTER FILES

Once you have loaded all of the files needed, the SCRATCH:
volume is complete. At this point the final steps differ
for SAGE IV users and SAGE II users:

If you have a SAGE II (or a SAGE IV with two floppies):

```
THE SCREEN SHOWS:              YOU TYPE:

Command: E(dit,R(un,F(ile.......... F
Filer.............................. F   (memory lock)
Filer.............................. C
Change what file?.................. #5:,USER:
```

If you have a SAGE IV with ONE floppy and built your area on
the SCRATCH: hard disk partition, then you should transfer
it to a diskette:

```
THE SCREEN SHOWS:              YOU TYPE:

Command: E(dit,R(un,F(ile.......... F
Filer.............................. F   (memory lock)
```

REMOVE THE DISK IN DRIVE #4:
INSERT A BLANK FORMATTED DISKETTE

```
Filer.............................. T
Transfer from...................... SCRATCH:,#4:
Filer.............................. C
Change what file?.................. #4:,USER:
```

USER MASTER diskette is complete. It should now be checked
to see if the terminal works correctly.

XIV.06   USER MASTER CHECKOUT :

If the USER MASTER installation (see previous "how to "
sections) has been done properly you should be able to boot
and run the diskette. Put the diskette in floppy drive #4:,
(Switch 5 and 6 of Group A are down) and reset the system.
The startup message should appear, then type "IF" to boot to
the p–System command line.

Now run the editor (type E from the command line) and try
all of the operations.

If everything is satisfactory, make a copy of your master
diskette (See the GETTING STARTED section) and save your
original as an archive master.

If you have a hard disk system, you will want to load the
single user partition with the new configuration. If the
volume already has system files on it you will only need to
transfer over the two new files: SYSTEM.MISCINFO and
SYSTEM.PASCAL .

```
THE SCREEN SHOWS:          YOU TYPE:

Command: E(dit,R(un,F(ile....... F
Filer........................... R
Remove what file?............... SYS:SYSTEM.PASCAL
Filer........................... R
Remove what file?............... SYS:SYSTEM.MISCINFO
Filer........................... T
Transfer from................... #4:SYSTEM.PASCAL,SYS:$
Filer........................... T
Transfer from................... #4:SYSTEM.MISCINFO,SYS:$
```

Check to see that the partition boots properly by setting
switch 6 of group A back up and reset. Try the editor and
various commands until you are satisfied that everything is
working.

XV   PRINTER INSTALLATION :

Almost any printer with a serial or parallel interface can
be connected to the SAGE.   The SAGE II/IV parallel printer
port "PRINTER" is usually used for the system printer. Most
Centronics-like printers will run on this port with few
software changes.   Also the "MODEM" port and AUX ports can
be used for printers with a serial interface.

The computer must be told which port has the printer.   This
is done using SAGE4UTIL (or in Multi-user, MU.UTIL.)
Execute SAGE4UTIL and select the printer option.   It will
then ask to to select one of six port options:

              Remote serial channel   (MODEM)
              Parallel port   (PRINTER)
              Extra serial channel #1 (AUX 1)
              Extra serial channel #2 (AUX 2)
              Extra serial channel #3 (AUX 3)
              Extra serial channel #4 (AUX 4)

Select the one you are going to use. Next, verify that your
printer needs a Linefeed sent after every carriage return.
Some printers, like the RADIO SHACK DAISY WHEEL, do this
function themselves.   Most do not so the option is normally
ON.

If you have selected one of the serial channels (ports), you
must   then   configure   that   port   to   match   your   printer
communications protocol.   Type <cr> to return to the main
menu of SAGE4UTIL and select the correct channel.   Then set
the BAUD RATE, number of bits, etc.   If you are not sure
what you should use here we suggest:

         ·   Data Set Ready check before transmitting ON.
              Computer baud rate to match printer baud rate = 9600.
              7 data bits
              1 stop bit

Refer to your printer manual to find out how to set the printer switches. Remember that the computer setting and the printer setting MUST match. Note that if you have more than one type of printer that will share the same port, it is a good idea to set up all printers the same way if possible.

To set up a printer on the parallel port, select that option from the SAGE4UTIL menu. You must then specify how the parallel port is accessed, with Interrupts on or in a Polling loop. If your printer manual indicates that it uses the BUSY signal to tell the computer when the next data is available then chose the Polling mode. Otherwise turn the Interrupt mode on. (The polling delay is only used in the Polling mode and rarely needs changing.)

To set up a printer in MULTI-USER mode, the program MU.UTIL is used instead of SAGE4UTIL. It works in much the same way. (Refer to the SAGE II/IV TECHNICAL MANUAL.) One important difference is that the REMOTE CHANNEL FLAG must be set ON if the printer is connected to a serial port. Access control for the port is usually set so that all users can write to the port. (Write allowed ON.) The Exclusive control flags must also be set On to prevent user printouts from becoming intermixed. It is also most common to set the "Hang and Wait" flags for all users ON with a timeout threshold of several seconds. Refer to the Multi-User section of the SAGE II/IV TECHNICAL MANUAL.

XV.01 PRINTER TYPES :

The following pages identify printers known to work on the SAGE II/IV and details of their configuration and cable needs.

● TI OMNI 810

The TI OMNI 810 is connected to the second serial port, "MODEM". Use SAGE4UTIL (Multi-user, MU.UTIL) to configure the printer option to the REMOTE channel. Then configure the remote channel for:

> Data Set Ready check before transmitting ON.
> Computer baud rate to match printer baud rate.
> 7 data bits
> 1 stop bit

SAGE cable part numbers are:

CC0003B	10ft	5-cond wire
CC0004B	25ft	5-cond wire
CC0071A	100ft	5-cond wire

The cable is wired:

```
SAGE    WIRE COLOR    PRINTER
 1 ------BROWN---------> 1
 2 ------BLACK---------> 3
 3 ------RED-----------> 2
 5-->9
                      6-->8-->9
 6 ------WHITE--------> 11
 7 ------GREEN--------> 7
```

Dummy pins are inserted in 13, 14, 25 as these positions are unused. The sage part # is marked on both ends of the cable. SAGE MODEM is marked on the SAGE II/IV end. The printer model is marked on the printer end.

● SIEMENS INKJET PRINTER

The SIEMENS INKJET printer is connected to the second serial port, "MODEM". Use SAGE4UTIL (Multi-user, MU.UTIL) to configure the printer option to the REMOTE channel. Then configure the remote channel for:

Data Set Ready check before transmitting ON.
Computer baud rate to match printer baud rate.
7 data bits
1 stop bit

SAGE cable part numbers are:

CC0062B	10ft	5-cond wire
CC0063A	25ft	5-cond wire
CC0064A	100ft	5-cond wire

The cable is wired:

```
SAGE   WIRE COLOR   PRINTER
 1 ------BROWN---------> 1
 2 ------BLACK---------> 3
 3 ------RED-----------> 2
 5-->9
 6 ------WHITE---------> 25
 7 ------GREEN---------> 7
```

Dummy pins are inserted in 13, 14, 25 as these positions are unused. The SAGE part # is marked on both ends of the cable. SAGE MODEM is marked on the SAGE II/IV end. The printer model is marked on the printer end.

Note: Max length of cable is 10 ft. at 9600 baud.

● **SIEMENS INKJET PRINTER (AUX PORT)**

The SIEMENS INKJET printer can also be connected to one of
the AUXILIARY serial ports.   Use SAGE4UTIL (Multi-user,
MU.UTIL) to configure the printer option to the AUX channel.
Then configure that channel for:

        Computer baud rate to match printer baud rate.
        7 data bits
        1 stop bit

SAGE cable part numbers are:

        CC0068B   10ft   5-cond wire
        CC0069A   25ft   5-cond wire
        CC0070A   100ft   5-cond wire

The cable is wired:

        SAGE   WIRE COLOR   PRINTER
         1 -------BROWN---------> 1
         2 ------BLACK---------> 2
         3 ------RED-----------> 3
         4 ------WHITE---------> 25
         7 ------GREEN---------> 7

Dummy pins are inserted in 13, 14, 25 as these positions are
unused.   The SAGE part # is marked on both ends of the
cable.   SAGE MODEM is marked on the SAGE II/IV end.   The
printer model is marked on the printer end.

Note: Max cable length for 9600 baud operation is 10 ft.

● **DEC LA50 PRINTER**

The DEC LA50 printer is connected to the second serial port
"MODEM". Use SAGE4UTIL (Multi-user, MU.UTIL) to configure
the printer option to the REMOTE channel. Then configure
the remote channel for:

> Data Set Ready check before transmitting ON.
> Computer baud rate to match printer baud rate.
> 7 data bits
> 1 stop bit

SAGE cable part numbers are:

CC0065A	10ft	5-cond wire
CC0066A	25ft	5-cond wire
CC0067A	100ft	5-cond wire

The cable is wired:

```
SAGE    WIRE COLOR    PRINTER
  1 -------BROWN---------> 1
  2 ------BLACK---------> 3
  3 ------RED-----------> 2
  5-->9
  6 ------WHITE---------> 20
  7 ------GREEN---------> 7
```

Dummy pins are inserted in 13, 14, 25 as these positions are
unused. The sage part # is marked on both ends of the
cable. SAGE MODEM is marked on the SAGE II/IV end. The
printer model is marked on the printer end.

● QUME SPRINT 9/45

The QUME SPRINT 9/45 printer is connected to the second
serial port "MODEM". Use SAGE4UTIL (Multi-user, MU.UTIL) to
configure the printer option to the REMOTE channel. Then
configure the remote channel for:

        Data Set Ready check before transmitting ON.
        Computer baud rate to match printer baud rate.
        7 data bits
        1 stop bit

SAGE cable part numbers are:

        CC0034A   10ft   5-cond wire
        CC0035A   25ft   5-cond wire
        CC0076A   100ft   5-cond wire

The cable is wired:

        SAGE   WIRE COLOR   PRINTER
          1 ------BROWN----------> 1
          2 ------BLACK---------> 3
          3 ------RED------------> 2
          5-->9
          6 ------WHITE---------> 20
          7 ------GREEN---------> 7

Dummy pins are inserted in 13, 14, 25 as these positions are
unused. The sage part # is marked on both ends of the
cable. SAGE MODEM is marked on the SAGE II/IV end. The
printer model is marked on the printer end.

● DIABLO #630 PRINTER

The DIABLO #630 printer is connected to the to the second serial port "MODEM". Use SAGE4UTIL (Multi-user, MU.UTIL) to configure the printer option to the REMOTE channel. Then configure the remote channel for:

Data Set Ready check before transmitting ON.
Computer baud rate to match printer baud rate.
7 data bits
1 stop bit

SAGE cable part numbers are:

CC0072A	10ft	5-cond wire
CC0073A	25ft	5-cond wire
CC0074A	100ft	5-cond wire

The cable is wired:

```
SAGE     WIRE COLOR      PRINTER
  2 -------BLACK---------> 3
  3 -------RED-----------> 2
  4 -------BROWN---------> 5-->6-->8
  5-->9
  6 -------WHITE---------> 11
  7 -------GREEN---------> 7
```

Dummy pins are inserted in 13, 14, 25 as these positions are unused. The sage part # is marked on both ends of the cable. SAGE MODEM is marked on the SAGE II/IV end. The printer model is marked on the printer end.

● NEC 3510 SPINWRITER

The NEC 3510 printer is connected to the to the second
serial port "MODEM". Use SAGE4UTIL (Multi-user, MU.UTIL) to
configure the printer option to the REMOTE channel. Then
configure the remote channel for:

Data Set Ready check before transmitting ON.
Computer baud rate to match printer baud rate.
7 data bits
1 stop bit

SAGE cable part numbers are:

NONE

This cable configuration was contributed by a
user. SAGE has no direct experience with this
printer.

The cable is wired:

```
      SAGE     WIRE COLOR      PRINTER
        2 ------BLACK----------> 3
        3 ------RED------------> 2
        4 ------BROWN----------> 4
        5 --------------------> 5
        5-->9
        6 ------WHITE---------> 19
        7 ------GREEN---------> 7
        8 --------------------> 8
        9 --------------------> 9
       15 --------------------> 15
       16 --------------------> 16
       17 --------------------> 17
       20 --------------------> 20
```

● MICROLINE SERIES

The MICROLINE series of printers uses the standard parallel printer cable shown on the next page. Use SAGE4UTIL (Multi-user, MU.UTIL) to configure the printer for the parallel port with interrupts.

● QUME SPRINT 11

The QUME SPRINT 11 uses the standard parallel printer cable shown on the next page. Use SAGE4UTIL (Multi-user, MU.UTIL) to configure the printer for the parallel port with interrupts.

● NEC SPINWRITER 5530 PRINTER

The NEC SPINWRITER 5530 uses the standard parallel printer cable shown on the next page. Use SAGE4UTIL (Multi-user, MU.UTIL) to configure the printer for the parallel port with interrupts.

● RADIO SHACK DAISY WHEEL PRINTER

The RADIO SHACK DAISY WHEEL uses the standard parallel printer cable shown on the next page. Use SAGE4UTIL (Multi-user, MU.UTIL) to configure the printer for the parallel port with scheduled polling and with Linefeed after carriage return inhibited.

● PARALLEL PRINTER CABLE

This is the standard cable used for all parallel printer connections. Use SAGE4UTIL (Multi-user, MU.UTIL) to configure the printer option for "Printer on parallel port with interrupts"

CC0006A	6ft	499116-8	Ribbon cable, AMP.
CC0025A	10ft	499571-9	34-pin ribbon cable conn, AMP.
CC0026A	25ft	552931-1	36-pin printer conn., AMP.

The parallel printer cable consists of 3 components. A 34 pin female header connector, A 36 Pin Centronics printer connector and the appropriate length of 34 conductor ribbon cable.

The 34 pin female header connector is placed on the cable such that the pin 1 identifier on the connector is on the same side as the pin 1 identifier on the ribbon cable. Also the connector is placed such that the polarizing tabs on the connector will be facing the ribbon cable.

The 36 pin centronics connector is placed on the cable such that pin 1 of the connector is on the same side as, and all the way towards, the pin 1 identifier of the ribbon cable. This means that pins 35 & 36 of the connector will be left blank.

If the cable is laid on the table such that pin 1 is to the right, the connector should be installed such that its main body is up.

XV.02   PRINTER PARALLEL PORT :

The parallel port is designed for interface to a printer.
It can also be used as a general purpose 14- bit software
output or control port. The connector on the back panel is
labeled PRINTER. Pin-outs for the signals :

J8 –1	STROBE'	–clocks the data from computer to printer on the high to low transition.
3	DATA0	–Bit 0 (lsb) of output data byte.
5	DATA1	–Bit 1 of output data byte.
7	DATA2	–Bit 2 of output data byte.
9	DATA3	–Bit 3 of output data byte.
11	DATA4	–Bit 4 of output data byte.
13	DATA5	–Bit 5 of output data byte.
15	DATA6	–Bit 6 of output data byte.
17	DATA7	–Bit 7 (msb) of output data byte.
19	ACK'	–acknowledgement from printer to computer that data byte was received.
21	BUSY	–High indicates that printer is busy.
23	PAPER EMPTY	–High indicates that printer is out of paper.
25	SELECT	–High indicates that device was selected.
26	PRIME'	–Computer sends to printer a low to clear buffer and reset printer logic.
27	.....	–Strap S05 allows connection to +5V or GND. [A] is +5V, [B] is Ground.
28	FAULT'	–Low indicates a printer fault: paper empty, deselect, etc.
2,4,6,8 10,12,14 16,18,20 22,24 31,33	GROUND	–common signal ground is every other pin to minimize noise on signals.
29,30,32 34	NC	–These pins are not connected.

XV.03   PRINTER SPOOLING :

The Print Spooler is a program that allows the user to queue
and print files concurrently with the execution of the p-
System.   The Print Spooling is documented in the p-System
OPERATING SYSTEM MANUAL.   In order to enable the Print
Spooling function the option 'HAS SPOOLING' must be set to
TRUE in the SYSTEM.MISCINFO file with the program SETUP.   In
order to take affect, the system must be rebooted.   Note
that the Spooling option occupies some permanently resident
memory and should only be specified if it is definitely
going to be used.

XV.04   PRINTER NOTES :

The printer configuration can be read and set via program
control using the BIOS calls to channel 6 in 68000 assembly
code and the CONFIGSAGE unit in PASCAL.   Refer to the SAGE
II/IV TECHNICAL MANUAL for details.

XVI SAGE4UTIL :

SAGE4UTIL is the utility program provided by SAGE which allows the user to redefine system parameters for the various devices: terminal, printer, disks, etc. Most of the parameters will rarely need to be changed. Changing the floppy format to read other diskettes is one of the most frequent uses. Changing the serial port characteristics to add new terminals or devices is also common.

SAGE4UTIL is used mainly on single user systems. MU.UTIL replaces it for most functions on multi-user systems. Both programs are very similar in format and the selections allowed the user.

A different version of SAGE4UTIL may exist for your operating system:

> SAGE4UTIL for the SAGE II/IV p-System, described here.
> SAGE4UTL.C for the SAGE II/IV CP/M-68K, see SAGE CP/M notes.

SAGE4UTIL has these major options:

> A- On-Line Configuration
> B- BIOS File Configuration
> C- Floppy Formatter
> D- Bootstrap Copy.
> E- Prepare Drives for Shipping.

SAGE4UTIL allows most options to be changed "on-line". For example, you can change the baud rate of your printer without rebooting. If SAGE4UTIL is being used in a Multi-user system then some options are restricted. Options that are restricted in the MU system have a note in their descriptions in this section.

SAGE4UTIL allows the SYSTEM.BIOS file on any volume to be changed. In this way, a new system can be built under a

working system.

Parameters which are not frequently changed and are of a very specific nature (such as the setup of the Winchester hard disk) are accessed by the The Low level Configuration menu.

XVI.01 MENU OPERATION :

Each menu in SAGE4UTIL has the general form:

```
        c   item   val
        c   item   val
        .......
```

        Select menu item <CR exits, ! aborts>

Normally the character (c) to the left of the desired menu
item is typed to select the item.

A carriage return will exit to the previous parent menu.

An exclamation character (!) will exit a number of levels
back to a logical point in the menu tree without making any
permanent changes.

A menu item may have a value associated with the item.   If
present, the value is displayed to the right of the item
field. Note that the initial menu that appears in SAGE4UTIL
does not have any value fields displayed.   Menu items
without value fields will either call another "subsidiary"
menu or are used to drive other functions of the program.

The On-Line Configuration selection in SAGE4UTIL immediately
goes to a subsidiary menu allowing configuration selection
for a variety of devices.   The BIOS File Configuration
selection goes to the same menu after stopping to query the
user for the name of the BIOS file to be configured.   The
Floppy Formatter, Bootstrap Copy, and Prepare Drives for
Shipping selections drive routines in SAGE4UTIL to perform
the specified functions.

NUMERIC fields

If a numeric (decimal or hex) value is displayed, selecting
the item will display the item field on the prompt line and
wait for the user to enter a new value. Typing just a
carriage return indicates that the item should not be
changed and the selection prompt will be re-displayed.

BOOLEAN fields

If a boolean value (On or Off) is displayed, selecting the
item will display the item field on the prompt line and wait
for the user to enter either "ON" or "OFF". Typing just a
carriage return indicates that the item should not be
changed and the selection prompt will be re-displayed.

TEXT fields

Some value fields are text strings which are selected on a
mutually exclusive basis in a subsidiary menu. Under the
Terminal Configuration Control menu, the Terminal Baud Rate,
Terminal Parity, Terminal Stop Bits, and Terminal Data Bits
fields are of this category. In the subsidiary menu, an
asterisk appears to the right of the current selection. If
another item is selected, the asterisk moves to indicate the
new item. When a carriage return is typed to return to the
previous menu, the new selection is displayed.

PRINTOUT OPTION

A built-in printout option lets the user save the
configuration in a file or print it out. Typing an '=' at
any main prompt will ask for the file name. Typing a '/' at
any main prompt will send the contents of the screen to the
output file. Menus without data can also be stored allowing
the user to build a record of a complete configuration
session. The output file is closed on exit from SAGE4UTIL
or when another '=' is typed.

XVI.02 RUNNING SAGE4UTIL :

This section defines how to access the various menus and options available to the user. The previous descriptions of the menu operation give general guidelines for entering and leaving menus. Briefly, all options are generally available by typing a single key. Use carriage returns to exit the menus.

When executed, SAGE4UTIL displays

```
SAGE4UTIL Version xx
Initializing............

      SAGE4UTIL

A - On-line Configuration
B - BIOS file Configuration
C - Floppy Formatter
D - Bootstrap Copy
E - Prepare Drives for Shipping

Select Menu item <CR exits, ! aborts>:
```

To select a Menu item, type the Character in front of the option. For example, type "A" to select "On-line Configuration".

Each one of the selections will be described in the sections that follow.

Only certain functions can be changed under "A" when SAGE4UTIL is run under the Multi-User environment.

A... On-line Configuration

Changes made "on-line" are effective only until the next
boot or system reset. This option should be used for
temporary changes that only affect the current computing
session. When typed, the option will call the configuration
menu. **After** the configuration has been set up, the system
will ask:

Make On-line Changes?

Type "Y" to accept the changes or "N" to forget the changes.

Changes made to memory involving the terminal configuration
are questioned by the utility before installing. This is
because the changes are applied immediately and may garble
the following terminal output until the corresponding
changes are made in the terminal.

B... BIOS file Configuration

To make permanent changes, use option "B" to change the BIOS file Configuration. This option will ask:

```
BIOS file name?
```

The user should specify the device and file name of the BIOS file to be modified (or examined), typically SYSTEM.BIOS. The device driver configuration parameters are located in the block 1 of the BIOS file. This data is read in for examination and/or modification by the configuration manager. The utility will report:

```
BIOS Version x.x header read successfully
Size including buffers: xxxxx bytes.

Type <space> to continue
```

Then the configuration menu will display. At the end of the session (use carriage returns to exit the menus), SAGE4UTIL will ask:

```
Ready to write changes to your file?
```

Type "Y" or "N" . The screen will display:

```
BIOS changes saved, Type space to continue.
            or
BIOS changes abandoned, Type space to continue.
```

BIOS changes made to a file will **not** take affect until the system is re-booted using the modified BIOS.

C... Floppy Formatter

The format function is necessary to initialize diskettes with address information so that the hardware floppy controller can determine where to read and write the user's data. **Caution : formatting a diskette will destroy any previous data recorded on the diskette.** The diskettes will be formatted according to the parameters set up in the configuration. The screen will display:

```
Floppy disk formatter
Drive to be formatted - L(eft or R(ight?
```

Insert the diskette to be formatted into the drive and type in L or R. The screen will display:

```
Is diskette ready for formatting in Right or Left drive?
```

The user should make sure that the wrong drive (typically containing the system diskette) has not been selected, and that the diskette to be formatted has been placed in the drive before answering "Y".

The utility will reply "Formatting" and print a dot for each track as it is formatted. The 96 TPI diskettes will print four lines of 40 dots. The 48 TPI diskettes, for 40 track drives only, will print two lines of 40 dots (each cylinder has two tracks, one on each side of the diskette).

After the formatting information has been written the utility displays "Verification" and reads back all the tracks, again printing a dot for each track.

```
Formatting
........................................
........................................
..:.....................................
........................................
Verification
........................................
........................................
........................................
........................................
```

After successfully formatting a diskette, the utility will display:

```
Format Complete
More diskettes to format?
```

Type "Y" to repeat the format for another diskette or type "N" to quit.

Problems that may occur while formatting are usually problems with the floppy diskette themselves.

● You cannot format a diskette that is "Write protected". Check to see if a small tab (like a label) is stuck over a notch in the diskette. This generally (but not always) means that the disk is write protected. Remove the label if you are sure that you want to destroy any information that is on the diskette.

● The diskette itself is damaged. Check for obvious scratches, dirt or other indications that the diskette is no good. Sometimes even brand new diskettes will not format.

● If none of the diskettes you have will format, you may have bought the wrong kind. Check to see if there is a 96/100 TPI or 100/96 TPI note on the label.

● Another common problem is that you have not seated the diskette properly in the drive. The latch should make a clear crisp sound as it closes. If not, open the drive and reseat the diskette.

D... Bootstrap Copy

The bootstrap program resides on blocks 0 and 1 of a device. This option allows a bootstrap to be copied from one device to another or from a file to a device. The routine insures that the data is a good SAGE bootstrap by checking the first four characters of the information for the characters "BOOT" or "MUBT".

Remember that the boot on the hard disk is not the same as the boot for the floppy disk. The master release diskette includes the file SAGE.WBOOT.CODE which is the Winchester bootstrap.

The Bootstrap Copy Utility will ask:

```
Source file or device <just CR quits>?
```

Once a file or device number (examples: SAGE.PBOOT.CODE, #4, #4:) is specified the utility asks:

```
Ready to store bootstrap from file xxxxxxxx
or                            volume x
```

If the reply is "Y" the utility will ask:

```
Destination file or device <just CR quits>?
```

Note that a transfer of a bootstrap TO a file is not currently supported.

Once the destination device number is specified the utility asks:

Ready to copy bootstrap on volume x?

If the reply is "Y" the utility will perform the transfer:

Bootstrap data written successfully

Type <space> to continue

The main menu will display.

SAGE4UTIL

A - On-line Configuration
B - BIOS file Configuration
C - Floppy Formatter
D - Bootstrap Copy
E - Prepare Drives for Shipping

Select Menu item <CR exits, ! aborts>:

Type a <cr> (carriage return) at this point to return to the p-System menu.

E... Prepare Drives for Shipping

The option can be done on a SAGE IV from either Multi-user mode or single user mode.

To ship the system, the Winchester drive heads are moved to a track beyond the normal range of the data. This "shipping track" is specified in the Winchester Information (see the menu in that section). This protects the data surface during shipping. Once the heads are positioned, no further accesses to the drives should be made. Power down the system when the messages below are displayed.

```
Drive x positioned for shipping
Drive y positioned for shipping
....
....

Ready to power system down.
```

At this point you can turn the power to the system off. The drives should be prepared for shipping anytime that the system is moved.

In case this item is entered accidentally, you can type a <space> to return to the main menu.

XVI.03 CONFIGURATION CONTROL :

The configuration control manager is called from either the
On-line option or the BIOS file change option.   The menu
offers several selections:

```
On-Line Configuration Control

A - Terminal
B - Remote channel
C - Left  Floppy
D - Right Floppy
E - RAM Disk
F - Printer
G - Extra Serial Port #1
H - Extra Serial Port #2
I - Extra Serial Port #3
J - Extra Serial Port #4
K - Parallel port
L - Time Adjustment
M - Low Level Configuration

Select Menu item <CR exits, ! aborts>:
```

Selecting one of the options on this menu will take you to
another menu which will allow you to configure the various
parameters for that device.   If you do not see the selection
you want, try "M" the Low level Configuration.

Selections "A", "B", "C", "D", and "G"-"K" can be accessed
under the Multi-User environment.

● A – Terminal configuration

The various options for the Terminal configuration are:

```
Terminal Configuration Control

Terminal Baud Rate        DIP Switch
Terminal Parity           DIP Switch
Terminal Stop Bits         1 Stop Bit
Terminal Data bits        8 Data Bits
Xon/Xoff on input                  On
BREAK to debugger                 Off

Select Menu item <CR exits, ! aborts>:
```

The DIP switch references the GROUP A switches on the back of the computer. Refer to the TERMINAL INSTALLATION section of this manual. Each of the options will present a menu of selections.   A star (*) after an option indicates the current selection.

Baud Rate

```
Baud Rate Selection

A - 19200 baud
B -  9600 baud
C -  4800 baud
D -  2400 baud
E -  2000 baud
F -  1800 baud
G -  1200 baud
H -   600 baud
I -   300 baud
J -   200 baud
K -   150 baud
L -   110 baud
M -    75 baud
N -    50 baud
O - DIP Switch*

Menu item <CR exits, ! aborts>:
```

Parity

```
Parity Selection

A - Even parity
B - Odd parity
C - Disabled parity
D - DIP Switch*

Select Menu item <CR exits, ! aborts>:
```

Note that the DIP switch selection (option D) is for display only and cannot be selected here. It is automatically used when the DIP switch option is selected under the Baud Rate menu.

Stop bit

```
Stop Bit Selection

A - 1 Stop Bit*
B - 1.5 Stop Bits
C - 2 Stop Bits

Select Menu item <CR exits, ! aborts>:
```

Data bits

```
Data Bit Selection

5 Data Bits
6 Data Bits
7 Data Bits
8 Data Bits*

Select Menu item <CR exits, ! aborts>:
```

XON/XOFF

The 'E' option will set the XON/XOFF handling mode for the terminal. If the XON/XOFF mode is enabled, the terminal driver will respond to XON and XOFF characters generated by

the terminal to slow down the data going to the terminal. When using this option, the p-System Start/Stop character must be set to XOFF (ASCII DC3, Ctrl/S) using the program SETUP. Manual control of the terminal output will also require typing Ctrl/S (XOFF) to stop the output and Ctrl/Q (XON) to restart the output.

BREAK KEY

The actual BREAK KEY on normal terminals generates a continuous signal which causes the receiving USART to detect framing errors. The normal option for the BIOS is to ignore framing errors. If a large number of continuous framing errors (>255) is detected the USART receive channel is turned off and checked only at one second intervals. This allows the terminal to be turned off (often causing continuous framing errors) without turning off the SAGE II/IV computer. The computer can continue to execute a program without being continuously interrupted by the powered down terminal.

The optional mode for the BREAK key (or framing errors) is to enter the PROM Debugger. This mode should only be selected when troubleshooting programs at a low level. All normal program information is preserved and the program may be resumed by typing 'GO' to the Debugger. Refer to the SDT manual.

● **B - Remote channel**

The Remote Channel is configured much the same way as the Terminal.

```
Remote Serial Channel Control

A - Remote Serial Baud Rate        9600 baud
B - Remote Serial Parity          Even parity
C - Remote Serial Stop Bits        1 Stop Bit
D - Remote Serial Data bits       7 Data Bits
E - Xon/Xoff for input                    Off
F - Xon/Xoff for output                   Off
G - DSR Polling                            On
H - DSR Polling interval                16384

Select Menu item <CR exits, ! aborts>:
```

The Baud Rate, Parity, Stop Bit and Data Bit menus for the Remote channel are nearly identical to that of the terminal except for the DSR options and that there are no DIP switch selections for the Remote Channel.

REMOTE PORT XON-XOFF

The XON/XOFF protocol is a method used to keep the receiving system from losing data if the incoming data cannot be processed fast enough and the input buffer fills up. A typical case would be where data is being transferred over the remote serial link to be stored on a diskette. The buffer could fill up and overflow while the program is writing the previously received data to diskette.

Using XON/XOFF protocol, the receiving system will send an XOFF character (13H) when the receive buffer is nearly full (240 out of 255 characters). This leaves some room for the transmitting end to respond to the XOFF by stopping transmission. The receiving program will then process characters in the input buffer. When the amount of room available is 1/2 of the buffer (128 characters) the XON character (11H) is sent to turn the transmitting driver back on. This protocol can only be used where the XON and XOFF characters are unique and are never contained in the data. Thus this method will not work for transmitting binary images of files.

The XON/XOFF protocol may be configured for either direction
of transmission or both directions of transmission. When
set up in the Input mode, the receiver will transmit XON and
XOFF characters to control the transmitting from the
opposite system. When set up in the Output mode, the
receiver will respond to XON and XOFF characters which are
received to start and stop the transmit direction.

REMOTE PORT DSR — DATA SET READY

The 'G' selection is provided to control a transmit check on
Data Set Ready. When low level signal handshaking is needed
on the Remote Serial channel, the Data Set Ready input
should be used instead of the Clear to Send input (see
writeup on Hardware–Printer Port). When a character is
transmitted the DSR bit is checked. If DSR is not active, a
delay is scheduled (value controlled by 'H' selection)
before the next test.

The 'H' option specifies the delay in 1/64000's second
between polling attempts of the Data Set Ready signal.

● **C & D - Right & Left Floppy**

In order to read (and write) as many different formats as possible, the floppy configuration sections allows considerable flexibility in setting the format parameters. The first menu presents commonly used formats (A-K) which are pre-defined.

The I option will refer you to the Low Level Configuration option in order to setup specific parameters. Option I is only for display and not for selection. If the low level parameters do not match a standard option then this line is displayed.

```
Right (or Left) Floppy Drive Selection

A - SAGE double side, 80 track (1280 blocks)          *
B - SAGE double side, 40 track ( 640 blocks)
C - IBM single side, 40 track Universal Media (320 blocks)
D - IBM double side, 40 track (640 blocks)
E - Network Consulting single side, 40 track (400 blocks)
F - Network Consulting double side, 40 track (800 blocks)
G - Network Consulting double side, 80 track (1600 blocks)
H - IBM double side, 80 track (1280 blocks)
I - Non Standard Drive Configuration
J - No drive equipped
K - SAGE 10 sector per track, 80 track (1600 blocks)

Select Menu item <CR exits, ! aborts>:
```

80 vs 40 TRACK DRIVES

The 80 track (96 TPI) diskettes may only be accessed on systems with 80 track drives. The 40 track (48 TPI) diskettes may be read on an 80 track drive but cannot be easily written. Note that only SAGE 80 track or 40 track diskettes may be used to start (bootstrap) the system. The PROM driver used for bootstrapping does not handle all the varied formats which are configurable by the BIOS.

IBM FORMAT

IBM initially provided only single sided drives on their personal computer. Therefore when they came out with double sided drives, they deviated from the optimum cylinder orientation so that the the same scheme would read both the

single sided and double sided drives. With the IBM track format, data is stored in ascending track order on side zero and then back in descending track order on side one. The normal SAGE II/IV method is to store data on side zero and then side one of each track before stepping the head to the next cylinder.

NCI FORMAT

A special sector numbering scheme was developed by Network Consulting Incorporated for their BIOS on the IBM Personal Computer. It allows their software to automatically distinguish between their 10 sector per track diskettes and the normal 8 sector per track IBM standard diskettes. The SAGE II/IV provides a compatibility mode to this format but does not attempt to automatically distinguish which format is being used.

SAGE 10 SECTOR

Note: SAGE also provides a 10 sector per track format allowing 1600 blocks of data. This generally works but does stretch the drive specifications. It is not recommended for a distribution format. The SAGE 10 sector format diskettes may be bootstrapped.

SOFTECH MICROSYSTEMS UNIVERSAL MEDIA

Softech Microsystems has chosen a format to standardize their 5 1/4" diskette distribution. This format is currently compatible with the single side, IBM, 40 track selection.

● **E - RAM Disk**

Typing 'E' to the Configuration Manager prompt displays:

```
RAM Disk Configuration

A - Base of Ram Disk (0 = disabled)    023400
B - Top  of Ram Disk (0 = to BIOS)     0FB490
C - Boot to Ram Disk flag                  On

Select Menu item <CR exits, ! aborts>:
```

This option allows the user to decide how to utilize extra
memory in the system which is not being used by the
p-System. Enabling the RAM Disk option allows use of all or
a part of the extra memory as device #11:. The Boot option
enables (on) or disables (off) the process of copying of
the boot disk to RAM and then booting the system from device
#11:.

When the RAM Disk is enabled, the bottom and top addresses
for the RAM Disk memory must be specified.

The base of RAM Disk is normally shipped as 23400. This
value is dependent on the setting of the CODE POOL area,
reference SETUP.

A value of zero for the Top of RAM Disk memory will default
to the first location available below the BIOS & Stack.
When displayed under the On-Line Configuration, this will
show the actual address for the top of RAM Disk.

● F - Printer

The 'F' option is used to set the printer to the proper channel. The channel must then be set to the proper configuration from its own menu.

```
Printer Configuration Control

A - Printer port assignment                     Parallel port
B - Linefeed after carriage return                    On

Select Menu item <CR exits, ! aborts>:
```

The linefeed option may be turned off for printers which automatically insert a linefeed after a carriage return.

Note that this option is currently only supported for the p-System. Most operating systems do not have the appropriate facilities necessary to inhibit the automatic generation of the line feed.

```
Printer Port Assignment

A - Remote serial channel
B - Parallel port                        *
C - Extra serial channel #1
D - Extra serial channel #2
E - Extra serial channel #3
F - Extra serial channel #4
G - Disabled

Select Menu item <CR exits, ! aborts>:
```

● **G–J – Extra Serial Ports #1–#4**

The extra serial ports are set up much like the terminal channel and the Remote channel.

```
Extra Serial Channel #1 Control

A - Extra Serial Channel Baud Rate      19200 baud
B - Extra Serial Channel Parity         Even parity
C - Extra Serial Channel Stop Bits        1 Stop Bit
D - Extra Serial Channel Data bits      7 Data Bits
E - Xon/Xoff for input                         Off
F - Xon/Xoff for output                        Off

Select Menu item <CR exits, ! aborts>:
```

Note: 200 baud is not a supported option for the extra serial channels.

● K - Parallel Port

This option controls how the parallel port is accessed, with
interrupts on or in a polling loop.

```
Parallel Port Control

A - Interrupt (vs Scheduled Polling)    On
B - Polling attempts before delay       500
C - Delay before re-polling             236

Select Menu item <CR exits, ! aborts>:
```

Scheduled Polling is used for printers which use the
Centronics parallel port definition but rely on the system
polling the Busy signal from the printer to determine when
the next transmission is possible.

Using this option, after a character is output the routine
will poll the Busy line for a selected number of times. If
the printer has an internal buffer it may be able to receive
the next character within a reasonably short time. If the
printer is still busy after the specified number of polling
cycles, a configurable delay (option "C") is scheduled
which releases the processor for other work. After each
delay interval the processor returns to check if the printer
is busy. In this manner a normally polled printer will not
completely tie up the processor.

● **L - Time Adjustment**

Selecting 'L' will allow changing a time adjustment factor which may be necessary to prevent the Real Time clock from drifting slightly over a period of several days. The Real Time Clock values are derived from the processor clock which does not have the precision required to keep accurate time over long periods.

The SAGEDATE utility displays both the current time and the last time that the Real Time Clock was set.

Integer values for the number of seconds to adjust over the number of days may be easily determined. If the Real Time gains, the seconds of adjustment value should be negative. If the Real Time loses, the seconds of adjustment value should be positive. The number of days cannot exceed 100 and the number of seconds cannot exceed + or -60. A zero number of days (or seconds) disables the adjustment. The program will ask:

```
Time Adjustment

A - Seconds of time adjustment    0
B - In number of days             0

Select Menu item <CR exits, ! aborts>:
```

This time drift factor is only important if the SAGE II/IV is to be left running without reset or power down for a period of over two weeks. Also, the factor is only important if an accurate time value is required from the SAGE II/IV by an applications program.

● **M — Low Level Configuration**

The Low Level Configuration manager defines parameters for the channel maps and disk formats.

```
Low Level Configuration

A - BIOS Channel Map ( 0 to 15)
B - BIOS Channel Map (16 to 31)
C - Left  Floppy Details
D - Right Floppy Details
E - Shared Floppy Details
F - Winchester #1
G - Winchester #2
H - Winchester #3
I - Winchester #4
J - Operating System Information
K - Auxiliary Device Information

Select Menu item <CR exits, ! aborts>:
```

Only selections "C", "D", and "E" can be run from the Multi-User environment.

BIOS Channel Map

The most common changes made to the Channel map are for the hard disk partitions.

For example, Channel 6 is the PRINTER: for the p–System. If you have a serial printer attached to the REMOTE port, the device number should be "8". If you have a parallel printer, the device number should be "6". Device numbers are also called "Physical channels" in the SAGE documentation.

Refer to the section called "BIOS CHANNEL MAP" in the SAGE II/IV TECHNICAL MANUAL for a discussion on how channels and devices are mapped together in the SAGE. Basically, each logical channel is assigned a physical device. The "channels" transport information from the routines to the physical device.

The printer is typically configured to its various options by selecting "Printer" from the main configuration menu,

rather than through the channel map.

The following map shows the default set up by the factory.

```
BIOS Channel Map (0 to 15)

A - Channel  0 device =   0     Q - Channel  0 subdevice =  0
B - Channel  1 device =   1     R - Channel  1 subdevice =  0
C - Channel  2 device =   2     S - Channel  2 subdevice =  0
D - Channel  3 device =   3     T - Channel  3 subdevice =  0
E - Channel  4 device =   4     U - Channel  4 subdevice =  0
F - Channel  5 device =   5     V - Channel  5 subdevice =  0
G - Channel  6 device =   6     W - Channel  6 subdevice =  0
H - Channel  7 device =   7     X - Channel  7 subdevice =  0
I - Channel  8 device =   8     Y - Channel  8 subdevice =  0
J - Channel  9 device =   9     Z - Channel  9 subdevice =  1
K - Channel 10 device =   9     0 - Channel 10 subdevice =  2
L - Channel 11 device =  11     1 - Channel 11 subdevice =  0
M - Channel 12 device =   9     2 - Channel 12 subdevice =  3
N - Channel 13 device =   9     3 - Channel 13 subdevice =  4
O - Channel 14 device =   9     4 - Channel 14 subdevice =  5
P - Channel 15 device =   9     5 - Channel 15 subdevice =  6

Select Menu item <CR exits, ! aborts>:




BIOS Channel Map (16 to 31)

A - Channel 16 device =   9     Q - Channel 16 subdevice =  7
B - Channel 17 device =   9     R - Channel 17 subdevice =  8
C - Channel 18 device =   9     S - Channel 18 subdevice =  9
D - Channel 19 device =   9     T - Channel 19 subdevice = 10
E - Channel 20 device =   9     U - Channel 20 subdevice = 11
F - Channel 21 device =   9     V - Channel 21 subdevice = 12
G - Channel 22 device =   9     W - Channel 22 subdevice = 13
H - Channel 23 device =   9     X - Channel 23 subdevice = 14
I - Channel 24 device =   9     Y - Channel 24 subdevice = 15
J - Channel 25 device =   0     Z - Channel 25 subdevice =  0
K - Channel 26 device =   0     0 - Channel 26 subdevice =  0
L - Channel 27 device =   0     1 - Channel 27 subdevice =  0
M - Channel 28 device =  13     2 - Channel 28 subdevice =  0
N - Channel 29 device =  14     3 - Channel 29 subdevice =  0
O - Channel 30 device =  15     4 - Channel 30 subdevice =  0
P - Channel 31 device =  16     5 - Channel 31 subdevice =  0

Select Menu item <CR exits, ! aborts>:
```

Right & Left Floppy configuration

The 'C or D' selection for Left or Right floppy configuration will bring up an alternate menu which allows changing low level parameters of the floppy disk driver. Note that most selections require knowledge of floppy disk recording protocols and possibly controller information. The Low Level parameters of the Floppy configuration are rarely changed from the factory setup unless the user is attempting to read or write to a non-standard format. The alternate menu is shown below:

```
Low Level Left Floppy Configuration

A - Number of sides              2
B - Number of cylinders         80
C - Sectors per track            8
D - Bytes per Sector           512
E - Retries                      3
F - Motor on delay factor     9600
G - Data length                255
H - Gap 3 parameter             42
I - Gap 3 for format            80
J - Pattern for format         229
K - Skew for format              0
L - IBM track format           Off
M - NCI 10 sects/trk           Off
N - Read 48 on 96 TPI          Off
O - Read after write            On
P - Ignore errors              Off

Select Menu item <CR exits, ! aborts>:
```

'A' asks for 0, 1 or 2 sides for the diskette. Zero should be specified if the drive is not equipped. This will return an early error without having to go through a timeout process.

'B' asks for the number of cylinders on the diskette. Cylinders and tracks are often used in the same context. A cylinder represents a head position which may access a track on each side of a double sided diskette.

'C' asks for the number of sectors per track. Typical values are 8 for 512 byte sectors or 16 for 256 byte

sectors. The Gap 3 parameter and the Gap 3 for formatting also must be modified for a specific Sectors per Track and Bytes per Sector combination. Also the density selection interacts with all these parameters.

'D' asks for the number of bytes per sector. Typically this is 512 for 8 sectors per track or 256 for 16 sectors per track. The Gap 3 parameter and the Gap 3 for formatting also must be modified for a specific Bytes per Sector, Sectors per Track, and density combination. Note also that selections of Bytes per Sector above 512 are not currently supported.

'E' asks for the number of retries. This question should be answered with the number of retries that the diskette driver should make before returning an error. The system is normally shipped with 3 retries specified but this may be increased to attempt to access data on a marginal diskette.

'F' asks for the Motor on delay factor. This should be given in hexadecimal as the number of 1/64000 ths of a second for the delay.

'G' asks for Data Length. This parameter is only used by the controller when the sector size is less than 256 bytes per sector. In these cases the Data Length is the number of bytes per sector (typically 128). For all other cases the Data Length is normally set to 255.

'H' asks for the Gap 3 parameter (in decimal). This parameter is required by the controller for Read and Write commands to avoid the splice point between the data field and the ID field of contiguous sectors. The value depends on the combination of Bytes per Sectors, Sectors per Track, and density selection. Suggested values from the controller documentation are:

Density	BPS	SPT	Gap 3	Gap 3 for format
Single	128	18	7	9
	128	16	16	25
	256	8	24	48
	512	4	70	135
Double	256	18	10	12
	256	16	32	50
	512	8	42	80

'I' asks Gap 3 for formatting. Values for this parameter are used when formatting a diskette and are contained in the Gap 3 table under selection 'H'.

'J' asks for a Pattern for formatting. This value (0 to 255) is written into each data byte during the formatting of a diskette. The normal default value is 229 (E5 hex). Note that certain operating systems (such as CP/M) may require a specific format pattern.

'K' asks for a Skew factor. This value is normally zero. The 10 sector per track formats generally specify a two sector skew to be formatted onto the diskette. This improves the performance when accessing the diskette over track boundaries. The IBM format is normally identical to the standard SAGE 8 sector per track format as the difference is only in where the data is written. On 10 sector per track diskettes with IBM format, the skew is reversed for head one because the tracks are accessed in decreasing order. The special NCI format also requires use of the IBM format selection.

'L' sets the IBM track format compatibility on or off. For double sided diskettes, data is stored in ascending track order on side zero and then back in descending track order on side one. The normal SAGE II/IV method is to store data on side zero and then side one of each track before stepping the head to the next cylinder.

'M' will set the option to use a special sector numbering scheme developed by Network Consulting Incorporated. This scheme was implemented by NCI for their BIOS on the IBM Personal Computer. It allows their software to automatically distinguish between their 10 sector per track diskettes and the normal 8 sector per track IBM standard diskettes. Sectors are numbered from 9 to 18 (except the first sector on the device which is numbered 1).

'N' controls the feature which allows reading of 48 TPI diskettes on a 96 TPI drive. Note that writing from a 96 TPI drive to a 48 TPI diskette is not allowed because the 48 TPI drives cannot read the data. The 96 TPI drive is stepped two physical tracks for every track normally requested by the driver.

'O' controls the option to perform a read of information from sectors which have just been written. This Read after Write feature verifies that the controller can read back the information without detectable errors. This option slows down the writing process but should be left enabled to insure valid operation.

'P' controls the option to ignore errors from the floppy controller. The controller errors should never be ignored in normal operation. This option is only provided to allow a head alignment procedure to be performed using a special alignment diskette which contains unreadable data. The driver must continue to read the diskette so that signals may be observed with test equipment, even though the controller is detecting errors.

Shared Floppy Configuration

These parameters are shared by the two floppies as they are set in the same controller. This means that the change will effect BOTH floppies and care should be taken to verify that this is really what the user wants.

```
Shared Low Level Floppy Configuration

A - Step Time (msec)        6
B - Head load               3
C - Head unload time        1
D - Double Density          On

Select Menu item <CR exits, ! aborts>:
```

'A' asks for the Step Rate. This is the number of milliseconds allowed between head step pulses by the controller. The value may be varied between 2 to 32 milliseconds (only even number values are supported).

'B' or 'C' is not advised. These parameters are set by the factory and should not be modified.

'D' will set the density option. The drives provided on the SAGE II/IV will normally be used in the double density mode. The single density option (Off) should only be required to access data from another system which provides only single density drives. The Sectors per Track, Bytes per Sector, and Gap 3 values must all be coordinated with the density selection.

Winchesters #1 - #4 Configuration

The low level Winchester configuration allows the format to be changed for different types of drives. Normally this is only done by the factory or service centers.

```
Winchester #1 Parameters

A - Number of Cylinders     306    L - High Read Counter     1140
B - Bytes per Sector        512    M - Header Count           400
C - Step Time               250    N - Number of Heads          6
D - Slew Time                20    O - Number of Retries       10
E - Step Counter             16    P - Sectors per Track       19
F - Head Settle Time        840    Q - Select Bit               1
G - Cylinder for Precomp    306    R - Write Sync Bit        4000
H - Special types             0    S - Extra Head Settle        0
I - Test flags                0    T - Rd after Wt Retries      4
J - Track for shipping      329    U - Write Cycle Retries      2
K - Low Read Counter       1100

Select Menu item <CR exits, ! aborts>:
```

XVI.04   Auxiliary Device Information :

The Auxiliary Device Information is not used for the p-System.

Under CP/M-68K, the auxiliary device information is used to represent certain CP/M disk drive characteristics. Only the Floppy and Winchester field are used. For historical, RAM disk drive characteristics are stored in the Operating System Information. This is the format of an auxiliary device information field:

```
 15      13│12      7│6      4│3      1│       0│
 ─────────┼────────┼────────┼────────┼───────┤
│ BLKSIZ  │ DIRSIZ │ OFFSET │ unused │ REMOV │
 ─────────┼────────┼────────┼────────┼───────┤
```

where

BLKSIZ   represents the allocation block size of the CP/M disk. This is encoded as follows:

$$0 = 1024 \text{ bytes}$$
$$1 = 2048 \text{ bytes}$$
$$2 = 4096 \text{ bytes}$$
$$3 = 8192 \text{ bytes}$$
$$4 = 16384 \text{ bytes}$$

DIRSIZ   represents the number of directory entries on the CP/M disk. DIRSIZ * 32 gives the number of directory entries.

OFFSET   is the track offset of the directory. This is the number of reserved tracks before the CP>M directory starts.

REMOV   if non-zero, marks the disk as removable. This should be normally set for floppy drives, but not set for removable hard drives.

```
        Auxiliary Device Information
A - Keyboard                 0000
B - Terminal                 0000
C - Left Floppy              0000
D - Right Floppy             0000
E - Parallel Printer         0000
F - Remote Input             0000
G - Remote Output            0000
H - RAM Disk #1              0000
I - RAM Disk #2              0000
J - RAM Disk #3              0000
K - RAM Disk #4              0000
L - Extra Serial Port #1     0000
M - Extra Serial Port #2     0000
N - Extra Serial Port #3     0000
O - Extra Serial Port #4     0000
P - Winchester #1
Q - Winchester #2
R - Winchester #3
S - Winchester #4
Select Menu item <CR exits, ! aborts>:
```

● **Winchester Aux Device Info**
Selecting "P" – "S" will allow the user to set the
Winchester Auxiliary Device information.

```
Winchester #1 Auxiliary Device Information

A - Partition  0    0000
B - Partition  1    0000
C - Partition  2    0000
D - Partition  3    0000
E - Partition  4    0000
F - Partition  5    0000
G - Partition  6    0000
H - Partition  7    0000
I - Partition  8    0000
J - Partition  9    0000
K - Partition 10    0000
L - Partition 11    0000
M - Partition 12    0000
N - Partition 13    0000
O - Partition 14    0000
P - Partition 15    0000

Select Menu item <CR exits, ! aborts>:
```

SAGE4UTIL
Auxiliary Device Information

Operating System Information

32 bytes of information are available for use by the
different operating systems. The information is displayed
in Hexadecimal and no attempt is made to define their use.
Refer to the specific operating system release to interpret
the values. The p-System does not use this area.

```
Operating System Information

A - Word  0     0000
B - Word  1     0000
C - Word  2     0000
D - Word  3     0000
E - Word  4     0000
F - Word  5     0000
G - Word  6     0000
H - Word  7     0000
I - Word  8     0000
J - Word  9     0000
K - Word 10     0000
L - Word 11     0000
M - Word 12     0000
N - Word 13     0000
O - Word 14     0000
P - Word 15     0000

Select Menu item <CR exits, ! aborts>:
```