Sierra Data Sciences

CP/M 2.2 Version MV1.x Implementation

Users Guide

Revision 1.02

Software Disclaimer

This document describes the usage of Sierra Data Sciences MV1.0 implementation of CP/M 2.2. This manual assumes some familiarity with the CP/M operating system and the CP/M manuals supplied with every CP/M system. This manual also describes the various utility programs supplied with this release. First, some terms and symbols used in this manual:

<cr>	Carriage return key. Note that most of the utility programs will accept a <cr> to return you to the previous menu, or CP/M if at the main menu.
ƀ	One or more spaces.
▮	The current position of the cursor.
[text]	Optional text or command arguments.
text	"text" is printed by the computer.

Features of Sierra Data's CP/M Version MV1.x

The following is a list of features, enhancements and differences of SDS's MV1.x implementation of CP/M. When the phrase "Old version of CP/M" is used, it refers to the version of CP/M released prior to October, 1982.

Features

1) The smaller size of the boot/monitor program allows approximately 3K more TPA space for user programs. The largest possible system under the MV1.0 release is 61K, as opposed to 59K for the older version.

2) This version fully supports up to four 8-inch floppy disk drives. Single/double density and single/double sided drives are supported. 1024 byte disk sectors are used in double density format. 128 byte standard sectoring is used in single density. The motor on delay of certain disk drives (eg: Tandon) is fully supported.

3) This version fully supports up to three 5 1/4-inch floppy disk drives. Single/double density and single/double sided drives are supported. 512 byte disk sectors are used in double density format. Single density is not supported on the smaller diskettes. This is because single density format allows a maximum of only 72K.

4) A system disk may be created on a diskette of any format, not just a double density diskette as in the old version. This is due to the fact that all diskettes have the first two tracks formatted in single density.

5)   This version features port polled console/printer I/O. This
      allows interrupt driven application programs to be debugged
      easily. Experience with communication applications on the
      older system has shown that it is extremely difficult to
      debug an interrupt driven program while running under an
      operating system that uses interrupts for console and
      printer I/O. This does not mean that the interrupt system is
      unused.   The floppy disk controller and the real time clock
      system are fully interrupt driven.

6)   The interrupt table is set up, allowing over 60 user defined
      interrupt routines. Refer to the BIOS.MAC file supplied on
      your release diskette for the locations of the free vectors.

7)   The GENMOD utility allows almost all parameters to I/O
      devices to be dynamically altered.

8)   The SYSGEN utility eliminates the need to merge a new BIOS
      with DDT.

9)   Sierra Data Sciences is able to support this version much
      better than the older version. This is partially due to the
      programming standards adopted internally, allowing any of
      our staff to quickly determine the functions of a program
      even if it is the first time that person has seen the
      program.

10)   The release diskettes for this version are in single
      density, standard CP/M format. This is to reduce the amount
      of time needed to bring up a system intially. As soon as it
      is feasible, we recommend creating a double density system
      diskette. This will greatly increase disk I/O throughput due
      to the larger sector size used in the double density
      formats.

When you receive your SBC100 system and CP/M, it should include at least the following items. There may be additional items depending on the options you have ordered.

    1) An SBC100 Master processor card.
    2) This manual.
    3) An SBC-100 Hardware manual.
    4) A CP/M manual from Digital Research.
    5) A CP/M Registration form.
    6) A CP/M Floppy diskette.
    7) A Serial I/O cable.
    8) Two (2) spare shorting shunts.

In addition to these items, you will also need the following:

    A) An S100 power supply/mainframe (there are many mainframes available on the market, including Sierra Data's S100-SL and S100-MFL mainframes).

    B) A floppy disk subsystem with at least one and preferably two floppy disk drives. SDS manufactures a suitable subsystem as an integral component of the above mainframes.

    C) A cable for the floppy disk system (Sierra's part number SDS-SBC-CAB2 is suitable). If ordering this cable from SDS, specify whether your drives are mounted vertically or horizontally.

    D) A terminal of your choice. Any terminal that is capable of operation at 9600 baud will work satisfactorily.

    E) You may also wish to purchase the technical specifications manual for this implementation of CP/M. This manual is available through your distributor, or from SDS directly.

Putting it all Together

Assembling the above items is a relatively simple operation. Follow the checklist on the following pages to connect everything.

System Assembly Checklist

[1] Unpack everything, verifying that it is not damaged in any way. If it is damaged, contact the shipper immediately.

[2] Read this manual completely before doing anything else.

System assembly Checklist (Cont.)

[3] Make sure the mainframe, floppy disk subsystem and the terminal all have a relatively "clean" power line.

[4] Check the owner's manuals for the terminals and printers being used to see if they require any special cable or handshaking requirements. If so, refer to Section XIII, "Setting up Terminals and Printers".

[5] Check the configuration of your disk drives with the configurations listed in Appendix A. If the drive you are using is not included, please contact SDS for information regarding the proper configuration. Make sure that the terminating resistors are installed on the last physical drive of the chain if using more than one drive.

[6] With all power OFF, insert the SBC100 into the mainframe.

[7] Connect the RS232 cable to the CRT port of the SBC100. This port is the second connector from the left as you look at the front of the board. The ribbon cable should extend off the back of the board.

[8] If you are using a serial printer, connect it to the printer port of the SBC100. This port is the leftmost connector on the front of the board. The ribbon cable should extend off the back of the board.

[9] Connect the 50-pin ribbon cable for the floppy disk to the mating connector of the SBC100. This is a keyed connector, so it cannot be put in backwards. Connect the other connectors to the disk drives, making sure that Pin One (marked by a dark stripe) goes to Pin One of each drive.

[10] If you have purchased the Winchester Hard Disk Option, install the hard disk interface card per the instruction sheet supplied with the option; then connect the 36 pin ribbon cable to the PIO connector of the SBC100.

[11] Turn on the power to everything. The order in which you turn the equipment on is not important.

[12] Push the reset button on the mainframe. All the lights in the disk drives should glow dimly. This is normal and indicates that the floppy disk subsystem is connected correctly. If all the lights are on brightly, it usually indicates that one or more of the connectors for the floppy disk subsystem is connected backwards. If so, turn everything off, reverse the connector and go back to step 11.

System assembly Checklist (Cont.)

[13] Insert the diskette that is supplied with your board into the A drive. The drive will become active, and the CP/M operating system will be loaded from the diskette. The terminal should show a copyright notice, then the CP/M prompt "A>". At this point, your system is up and running. We STRONGLY recommend that the first thing you do is to make a copy of the distribution diskette and put the distribution diskette in a safe place. This avoids the time and expense of having SDS recreate the diskette in case of an error.

The DCOPY program is a disk-to-disk copy designed for easy backup of floppy disks. The format of the command is:

A>DCOPY<cr>

DCOPY will then prompt for the source and destination drive names:

SBC-100 Disk Copy Utility Program

Enter Source Drive Or <CR> To CP/M ▌

Any valid CP/M drive name may be entered. Note: there is no colon or carriage return after the drive name. DCOPY will then ask for the destination drive name:

Enter Destination Drive Or <CR> To Menu ▌

Again, any valid drive name may be entered, without a colon or carriage return. Finally, DCOPY will request verification before starting the copy:

Ready To Copy x: To y:
Enter Any Key To Proceed, Or <CR> To Menu▌

Where x: is the drive specified in the source drive question above, and y: is the drive specified in the destination drive question. If any key except <cr> is entered, the copy will begin. As DCOPY runs, it will display the track number being copied.

Copying & Verifying Track 00

After the copy has completed, you will be allowed to return to CP/M, or perform another copy:

Copy Completed
Enter Any Key To Return To CP/M,
Or <CR> To Menu▌

Entering any character except <cr> will return control to the CP/M command level.

Bad Drive Entry
Enter Any Key To Return To CP/M,
Or <CR> Retry█

This message indicates that the drive name specified is not recognized by the CP/M operating system. You may not have the drives defined in GENMOD (parameter 1), or may have mis-typed the name. Also note: this implementation of CP/M recognizes up to a maximum of four (4) floppy disk drives.

Source & Destination Drives Must Be Unique
Enter Any Key To Return To CP/M, Or <CR> To Menu█

This message indicates that you tried to copy a diskette to itself. Such action is meaningless, and will not be allowed. You may either abort the DCOPY program by entering any key except <cr>, or restart at the main menu by entering <cr>.

Verify Error Has Occurred
Enter Any Key To Return To CP/M, Or <CR> To Menu█

This error indicates that the copy was not successful. It may indicate a bad diskette. Refer to the Format Error Messages for possible remedies to this message.

Diskettes Incompatible
Enter Any Key To Retry, Or <CR> To CP/M█

This message indicates that the two diskettes are not the same format. Both diskettes must be the exact same format before you can copy one to the other. If you must transfer between densities, the PIP program must be used. You may also re-format the destination diskette using the FORMAT utility program.

Drive Not Ready
Enter Any Key To Retry, or <CR> To Menu █

This message usually indicates that there is no diskette in the drive specified. You may place a diskette in the drive and enter any key except <cr> to retry, or return to the menu with a <cr>.

Drive Write Protected
Enter Any Key To Retry, or <CR> To Menu ▉

This message can only appear after the destination drive question. It indicates that the destination diskette is write protected. Make sure that you are specifying the proper drives. A common cause for this error is specifing the source drive when asked for destination and vice versa. Note: the source diskette can, and in most cases, should be write protected. The destination diskette must never be protected or this error will appear.

Special note for 5 1/4" systems: The DCOPY utility will check the drive specifications in the system configuration record to determine if the diskettes are compatible. For example: If you have specified drive A to be double sided, and drive B to be single sided, DCOPY will generate the "Diskettes Incompatible" message even if you insert double sided diskettes into both drives. This may be corrected using the GENMOD utility.

The format utility program allows a disk to be readied for use by the CP/M operating system. Formatting consists of writing a set   pattern of data to the entire disk and verifying that the disk is ready for use by the system. Note: formatting a disk will destroy all data on the disk, so be careful with this program. To bring up the format utility, enter:

A>FORMAT<cr>

The   program will respond with a copyright notice and prompt for the drive name:

Enter Drive Number, or <CR> To CP/M ▮

Note: that there is no <cr> after the drive name. You may also enter just a <cr> to abort the program and return to CP/M. FORMAT then prompts for the density of the diskette:

(S)ingle or (D)ouble Density? ▮

Again note: there is no carriage return.   If the diskette inserted in the drive is a double sided diskette, you will not be prompted for the density. In such a case, FORMAT assumes that the diskette is to be formatted in double density, double sided format.   Next, you will be asked whether you wish to format the entire diskette, or just the system tracks. Note: formatting the system tracks does not alter any files on the diskette but does destroy the copy of the operating system on the diskette. Formatting the entire diskette will destroy all files as well as the copy of the operating system on the first two tracks.

(S)ystem Tracks Only, or (A)ll Tracks? ▮

If you enter S to format the system tracks only, the format will now take place without any additional prompting. If you enter A to format the entire disk, you will be prompted for confirmation of the format before beginning:

Ready To Format x:
Enter 'Y' To Proceed Or 'N' To Menu▮

Where "x:" is the drive name specified above. If any key except Y or N is entered, the terminal will beep, and you will be re-prompted. If a Y is entered, formatting will begin. As the format program executes, the track number will be displayed:

Formatting & Verifying Track 00

After complete formatting and verification, you will be asked if
you wish to format again. If you enter anything but a Y or N, an
error message will be printed and you will be prompted again.

      Format Completed - Format Again? (Y/N) ▊

Format error messages:

Drive Not Ready
Enter Any Key To Retry, Or <CR> To Menu █

This message usually indicates that the specified drive does not have a disk inserted. It may also indicate that the drives have not been configured properly. Refer to Appendix A of this manual for the drive configurations of some of the more common disk drives being used.

Drive Write Protected
Enter Any Key To Retry, Or <CR> To Menu █

This message indicates that the diskette in the specified drive does not have a write protect sticker on it. After verifing that the disk is indeed the one you wish to format, place a sticker over the cutout on the lower edge of the diskette and try again.

Verify Error Has Occurred
Enter Any Key To Exit To CP/M, Or <CR> To Menu █

This message indicates that the data written to the diskette did not match the data that was read back during the verify phase of the program. It may also indicate a faulty diskette or disk drive problems. If subsequent diskettes generate this error, suspect the drives. If one diskette will not format but others will, it generally indicates a bad diskette. Note: many "bargain" diskettes will format in single density format but a double density format generates this error.

The GENMOD utility program is designed to eliminate the need for extensive knowledge of the internal structure of CP/M when altering many commonly changed system parameters. By using this program, a variety of system configurations may be generated without having to perform assemblies, debugging or patching. All the information altered by GENMOD is contained in a configuration record on the boot diskette. This record is read into memory only during a cold boot. Therefore, once changes have been made with GENMOD, the system must be re-booted from the changed diskette in order for the changes to take place. The only exception to this is the Autostart command, which will become effective when GENMOD exits, provided the changes have been written to the currently logged disk. See options 19 and 24 for further details on the autostart command option. To bring up GENMOD, enter the following:

A>GENMOD<cr>

GENMOD will then respond with the following menu:

SBC-100 Generate System Parameters - Menu # 1

System Parameter	Current Value	New Value
1> Maximum Drives	4	4
2> FDC Step Rate	8	8
3> Number Of Retries	10	10
4> Head Load Time	1	1
5> Drive Motor Delay	3	3
6> SIO-A Baud Rate	9600	9600
7> SIO-A Stop Bits	2	2
8> SIO-A Parity	N	N
9> SIO-A Rx Bits/Char	8	8
10> SIO-A Tx Bits/Char	8	8
11> SIO-A Auto Enable Toggle	Y	Y
12> SIO-B Baud Rate	9600	9600
13> SIO-B Stop Bits	2	2
14> SIO-B Parity	Y	Y
15> SIO-B Rx Bits/Char	8	8
16> SIO-B Auto Enable Toggle	Y	Y
17> SIO-B Tx Bits/Char	8	8
18> Display Menu 2		

Enter Selection or <CR> to Refresh █

By entering option 18, the following menu is displayed:

SBC-100 Generate System Parameters - Menu # 2

       System Parameter   Current Value   New Value
19> Autostart Command   * Not Used *   * Not Used *
20> Printer Assignment   SIO   SIO
21> Log Disk Retries   N   N
22> Double Sided 5 1/4 Drives

23> Display Menu # 1
24> Exit system with Update Options

     Enter Selection or <CR> to Refresh #

Each option is described in more detail in the following pages.
       1> Maximum Drives   4   4

     This option allows you to alter the maximum number of
logical drives that are recognized by the system. The standard is
4, as shown, but this may be altered from one to four. After
entering 1<cr> for the selection, you will be prompted:

          Enter Number Of Drives In System #

After entering the number of drives, you will be returned to the
main menu prompt.

       2> FDC Step Rate   8   8

     This option allows you to alter the track to track stepping
rate of the floppy disk subsystem. The value shown is in
milliseconds. As delivered the step time is 8 milliseconds, which
is the longest step time used by most disk drives. After choosing
this option, you will be prompted for the new step rate:

          Enter FDC Step Rate #

Refer to the technical specification manual for your drives to
determine the minimum step time. Note: this is a global step
time and that all drives must step at the same rate. If you are
using mixed drives with varying step rates, the longest rate must
be used. It does no harm to run disks at a longer step time than
allowed. For greater I/O throughput however, the value should be
as small as possible. Also note that many drives will operate
erratically, or not at all if the step time is too small. When in
doubt, use 8 milliseconds.

3> Number Of Retries   10   10

     This option determines the number of times that the
operating system will try to recover from an error before "giving
up". Ten is the most common value, although it may vary from 1 to
255. After selecting this option, you will be prompted for the
new retry count:

               Enter Number Of Disk I/O Retries █

4> Head Load Time   4   4

     This option allows you to change the time that the floppy
disk heads are loaded after a disk operation. This value is in
seconds. By increasing this time, the drives will stay active for
a longer time. This will eliminate constant loading and unloading
of the drive head. Experience has shown that a time of 4 seconds
works well for most drives.

               Enter Head Load Increment █

The valid responses you may enter vary from 0 (No delay) to 99
(Maximum delay, about 1 and 1/2 minutes).

5> Drive Motor Delay   0   0

     This parameter controls the delay from the time a disk is
selected until a not ready condition is reported. With many
drives the motors are continuously running, so the minimum of 0
is used. Some drives (Tandon) have an automatic inactivity timer
that will turn the motors off after a specified time, usually 30
seconds. If using this type of drive, the drive motor delay must
be increased to allow the motors to reach operational speed
before an error is reported. Tandon disk drives work well with a
two (2) second delay. The values shown are in seconds. After
entering option 5, you will be prompted for the new motor delay:

               Enter Drive Motor Delay Increment █

The numbers 00 through 99 are valid arguments. Also note: if a 1
is entered, the time delay could vary from nothing to a full
second. This is because the first second of delay may or may not
be a full second depending when the delay is initiated.

6> SIO-A Baud Rate   9600   9600

    This option allows the user to alter the baud rate for the
first SIO port, which is normally the system CRT device. It is
set to 9600 baud, as delivered from the factory, but may be
altered to suit the terminal being used. Note: you will need a
CRT capable of 9600 baud operation for at least the time required
to change this baud rate. After entering option 6, you will be
prompted for the new baud rate:

Enter SIO-A Baud Rate █

The valid baud rates are 150, 300, 600, 1200, 2400, 4800, or 9600
baud. See the section on GENMOD2 for 19.2 kilobaud operation.

7> SIO-A Stop Bits   2   2

    This option allows you to change the number of bits used to
indicate the end of a character of data on the first serial I/O
port. Most terminals will operate with two stop bits, although
there are some terminals that require 1 or 1 1/2 stop bits. As
shipped, the system uses two stop bits. After entering option 7,
you will be prompted for the new number of stop bits:

Enter SIO-A Stop Bits █

The valid responses are 0 for one stop bit, 1 for one and one-
half stop bit, and 2 for two stop bits.

8> SIO-A Parity   N   N

    This option controls the parity of the first SIO channel.
When shipped, there is no parity checked or generated. After
entering option 8, you will be prompted for the new parity
setting:

Enter SIO-A Parity █

The valid responses are E for even parity, O for odd parity and N
for no parity. Note that both transmitted and received characters
use the same parity setting.

9>   SIO-A Rx Bits/Char   8   8

     This option   controls the number of bits in each character
received into the first serial port. As shipped, 8 bits are used
in each character. The prompt is as follows:

                  Enter SIO-A Rx Bits/Char █

The valid responses are 5, 6, 7 or 8 bits per character.

        10> SIO-A Tx Bits/Char   8   8

     This option is similar to the Rx Bits/Char option above,
only in regard to characters sent to the peripheral device.

        11> SIO-A Auto Enable Toggle Y   Y

     This option controls whether or not the Auto Enables feature
of the SIO chip is used. The Auto Enables feature is designed to
allow a hardware "handshake" with the peripheral device. If
enabled, the Clear To Send (CTS) line of the SIO must be true
before any characters may be transmitted to the peripheral, and
the Carrier Detect (CD) line must be true before any character
will be received. If these conditions are not met, all characters
sent (or received) will be lost. The prompt for option 11 is as
follows:

                  Enter SIO-A Auto Enable █

The valid responses are Y if auto enables is to be active, N if
it is not active.

             12> SIO-B Baud Rate   9600   9600

             13> SIO-B Stop Bits   2   2

             14> SIO-B Parity   Y   Y

             15> SIO-B Rx Bits/Char   8   8

         16> SIO-B Auto Enable Toggle Y   Y

         17> SIO-B Tx Bits/Char   8   8

     These options are identical to the options for SIO-A with
the exception that they affect the second serial I/O port. This
port is normally used for either a printer or a modem.

18> Display Menu # 2

This option will display the second menu. Note: the menu options shown on the second menu may be entered at the first menu and vice versa.

19> Autostart Command   * Not Used *   * Not Used *

This option allows the user to specify a command to be executed as part of the boot operation (either warm or cold boot). After entering option 19, you will be prompted for the name of the drive to get the current autostart command from:

Enter Drive To Get Current Command From ▮

At this point, you may enter any valid drive name, or Control-C to return to the menu. Note: using this option will also display the second menu when complete. After the drive name has been entered,   the current autostart command will be displayed, followed by a prompt for the new command. If no command is active, the message "Not Used" will be printed:

Current command is * Not Used *
Enter Autoload Command ▮

Any command that is legal at the CP/M prompt is allowed. If only a carriage return is entered for the new command, you will be asked if you wish to deactivate the autostart command:

Deactivate Autostart command (Y/N)? ▮

You must answer with either a Y for Yes or a N for No. If you answer No, the autostart command will not be changed on the disk. The autostart command is implemented by a patch to the CCP section of the CP/M operating system. This patch makes the CCP think that a command has already been entered when the system boots. This is the only option in GENMOD that does not change the configuration record. Rather, it changes the CCP image on disk. This change is not performed until the configuration record is re-written in option 24. Autostart commands are most often used in a "Turn-Key" system that is always running a single program such as a menu.

20> Printer Assignment   SIO   SIO

This option allows the user to select whether Serial Port B or
Parallel Port A is to be used for the CP/M LST device. Refer to
Section VII of this manual for details on configuring parallel
printers with the SBC-100. This option has one prompt:

Enter Printer Assignment (S/P) ▌

Valid responses are S for a serial printer, or P for a parallel
printer.

21> Log Disk Retries   N   N

When this function is active, a percent sign (%) will be printed
on the console every time the system must retry a disk operation.
This option is generaly not used unless the system has been
having disk problems.

22> Double Sided 5 1/4 Drives

This option is used to indicate which (if any) of the 5 1/4" disk
drives are capable of double sided format. If a drive is not
listed in the menu, it is a single sided drive. When the option
is entered, you will be prompted for the drive name:

Enter 5 1/4 Drive Number ▌

You will then be asked whether the drive is a single sided or
double sided drive.

Special Note: Option 22 is only applicable to systems that have
been configured to use 5 1/4" mini-floppy drives. It is included
in this manual only for completeness. If these options are used
on a 8" system, the menu will show the proper options; but the
system will ignore them. When ordering a 5 1/4" system, you must
specify the number of tracks and whether your drive is double
sided. This will alllow SDS to generate a release diskette that
is readable on your system. Also see Section XV, Mini-Disk
Configurations.

23> Display Menu # 1

This option will display the first menu of GENMOD.

24> Exit System With Update Options

This option will allow you to change the system track on any diskette in the system. It is also used to exit the GENMOD utility. After entering option 24, you will be prompted as follows:

Enter Drive To Contain New Options,
<CR> To Menu, or Ctl-C to CP/M ▮

At this point, you may enter any valid drive name. This will update the configuration record on the system tracks of the diskette specified. Also the image of the CCP on the disk is updated if the autostart command has been changed. After updating the system tracks, this message will be re-displayed allowing multiple disks to be updated in one session. You may also enter a <cr> to return to the main menu for additional changes, or a Control-C to exit the GENMOD program.

The GENMOD2 Utility

The GENMOD2 program is almost identical to the GENMOD program. The only difference is in the baud rates that are valid. In addition to the baud rates listed for the GENMOD program, GENMOD2 will allow the entry of 19200 for 19.2 kilobaud operation. NOTE: To use this feature, ECN number 4 must be applied to the SBC-100 board.

Section VI - The SYSGEN Utility

The SYSGEN utility is a multifunction program that allows the user to copy the system tracks of a disk, and/or install a new CBIOS (Customized Basic Input/Output System). This program totally eliminates the need to perform DDT patches. Any diskette may have a copy of the system, not just a double density diskette as is true with many single board implementations of CP/M. This is possible due to the fact that this implementation of CP/M has the first two tracks of every diskette formatted in single density. To invoke SYSGEN, enter the following:

A>SYSGEN<cr>

SYSGEN will then respond with the following menu:

SBC-100 System Generator

<CR> - Exit To CP/M

1   - Get System/Put System

2   - Merge New CPM/CBIOS

3   - Merge New CBIOS

Enter Selection ▮

By entering a carriage return <cr>, you will be returned to the CP/M operating system command level.

By entering a 1, you are in the system track copy mode. This may be used to copy the operating system to another diskette. After entering option 1, you will be prompted for the drive that contains the operating system to be copied:

Enter Drive To Get System ▮

Any valid drive name (A-D) may be entered here. Note: no <cr> is needed. After entering the source drive, the program will read the operating system from the specified disk. You will then be prompted for the destination drive name:

Enter Drive To Put New System ▮

Again, any drive from A to D may be specified, with no <cr> needed. When the drive name is entered, the operating system will be written to the specified diskette.

By entering option 2 of the main menu, the merge mode of the program will be entered. This option allows the user to merge a new CBIOS into a copy of the operating system that already exists on a diskette. The first prompt will ask for the drive name to read the system configuration record from.

Enter Drive To Get System ▮

After the configuration record is read into memory, you will be prompted for the name of the CP/M image file to be merged into the operating system. This file is the result of the MOVCPM program.

Enter MOVCPM File Name ▮

This file may be any valid unambiguous file specification. The default extention of COM is used if none is entered. Next, you will be prompted for the name of the CBIOS to be merged into the CP/M memory image:

Enter CBIOS File Name Or <CR> To Menu ▮

The response may be any valid CP/M unambiguous file specification, including a drive name if desired. If no extention is entered, COM is assumed. The file should be a completely assembled and linked program based at whatever location the final CP/M operating system will require. Refer to the BIOS.MAC file included on the distribution diskette for an example of how to setup the source file. The sample file, as is all of Sierra's software, was written for the MicroSoft M80 macro assembler system. After entering the CBIOS file specification, followed by a <cr>, SYSGEN will attempt to load the CBIOS into the previously loaded copy of the operating system. SYSGEN will then continue with the destination drive prompt exactly as in the put section of option 1.

Enter Drive To Put New System ▮

File Not Found
Enter MOVCPM File Name Or <CR> To Menu █

This message indicates that the file specified for the MOVCPM file prompt cannot be found. It may indicate a misspelling, or an incorrect drive specification. You have the choice of returning to the main menu by entering a <cr>, or re-entering the file specification.

Wrong File Size
Enter MOVCPM File Name Or <CR> To Menu █

This message indicates that the file specified for the MOVCPM file prompt is not the proper length to be a valid copy of a CPMxx.COM file. The responses are the same as in the file not found message above.

File Not Found
Enter BIOS File Name Or <CR> To Menu █

File Size Incorrect
Enter BIOS File Name Or <CR> To Menu █

These two message are similar to the two messages above, only dealing with the BIOS file as opposed to the MOVCPM file. The responses are the same.

Not A System Disk
Enter <CR> To Menu Or Any Character To CP/M █

This message indicates that the disk specified in a "get system" operation is not a valid system disk. The responses are either <cr> to return to the main SYSGEN menu, or any other character to return to the CP/M command level.

<< Disk Error Has Occurred .. Program Aborted >>

This message indicates that a fatal disk I/O error has occurred. SYSGEN will immediately abort returning you to the CP/M command level. This message may be caused by a damaged diskette or improperly configured drives. Generally you will receive this message after entering a <cr> or ignore error response to a disk I/O error message. The first thing you should do after receiving this message is to verify that the diskette in question is not damaged or improperly formatted. Many suppliers of diskettes will pre-format diskettes during manufacturing, but not all do. It is usually a good idea to format all diskettes before use, even if you know that they have been formatted by the manufacturer.

Drive Not Ready
Enter Any Key To Retry, or <CR> To Menu ▮

This message indicates that the drive specified for any disk operation is not ready. It usually indicates that the drive does not have a diskette in it. By entering any key except <cr>, the disk operation will be retried, or by entering a <cr> you will be returned to the main SYSGEN menu.

Drive Write Protected
Enter Any Key To Retry, or <CR> To Menu ▮

This message indicates that there is no write protect sticker on the specified diskette. Verify that the diskette is indeed the one you wish to write to, then place a sticker over the write protect cutout. You may then retry with the same or a different disk by entering any character except <cr>, or return to the main SYSGEN menu by entering a <cr>.

The TOD (Time Of Day) program allows the user to set and
display the current time and date. To invoke TOD, enter the
following:

A>TOD<cr>

The first message returned by TOD will vary depending whether the
time and date have been previously set or not. If the time and
date are not set, TOD will respond with the following series of
messages:

Date Time Not Set - Set? (Y/N) y<cr>
Enter Month of Year : 1<cr>
Enter Day of Month   : 6<cr>
Enter Year of Centruy: 83<cr>

If N is given for the Set? question, TOD will return to CP/M. All
prompts must have at least one non-blank character entered,
followed by a <cr>. If any entry is illegal, all three Enter
prompts will be re-issued. Once all responses are valid, TOD
prints the Julian Day and Date:

1/6/1983 Julian Day = 6
Julian Date = 836

The Julian day is the number of the day. In the example shown,
January 6th is given, which is the 6th day of the year. In a
similar manner, December 31st has a Julian Day of either 365 or
366, depending whether or not it is a leap year. The real time
clock routine will adjust the Julian date properly for a leap
year. If the time and date are already set, or after the above
prompts have been entered, you will be prompted as follows:

Set Time ? (Y/N) y<cr>
Enter Hour (0-23)   :9<cr>
Enter Minute (0-59) :33<cr>
Enter Second (0-59) :0<cr>

Again, at least one character must be entered for each promt,
terminated by a <cr>. Note: The hour is in military format,
ranging from 0 (just after midnight) to 23 (11:00 PM). If any
entry is invalid, you will be re-prompted starting with the hour
prompt. Once all entries are valid, you will receive the
following prompt:

Depress Carriage Return To Start Clock █

This allows you to synchronize the system clock with an outside
reference. After a <cr> is entered, the time will be displayed.
If you respond with an N to the Set time prompt, the time will
just be displayed as follows:

9:33:0

The FILCOM utility is used to perform a byte-by-byte comparision of two files. To run FILCOM, enter the following:

A>FILCOM file1 file2<cr>

where file1 and file2 are any legal unambigous file specifications. In addition to comparing the files, FILCOM will display the length of the file. If a byte does not match in both files, the location and the values will be displayed on the console. All numbers are in Hexadecimal.

The CRC utility program is used to compute a unique CRC (Cylic Redundancy Check) value for a file. This is done using the CRC-16 algorithm. Only identical files will have the same CRC. The file README.DOC contains the proper CRC values for almost all the files on the release diskette. The CRC of the files that do not have a CRC value listed will vary according to the serial number of the system you are using. To compute the CRC of a file, enter the following:

A>CRC file<cr>

where 'file' is any legal unambigous file specification.

The SCAN program is used to verify that a file is a legal text file. Any character that is not printable, with the exception of Carriage Return, Line Feed, and Tab will be displayed with it's location. This program may be used to verify that a program source file contains only valid characters. For example, WordStar (tm) may set the parity bit of some characters to one. Some compliers and assemblers ignore characters with the parity bit on. This can cause strange and elusive compilation errors. The SCAN program will indicate which characters have this bit set. SCAN will not alter the source file in any way. The PIP program may be used to clear the parity bits of all character using the [Z] option. To invoke SCAN, enter the following:

A>SCAN filename<cr>

where 'filename' is any legal unambigous file specification. All invalid bytes will be printed along with the location of the byte. All numbers are printed in Hexadecimal notation.

The BACKUP utility program is designed to perform backups of large capacity hard disks to floppy diskette. It may also be used to perform floppy backups on a file-by-file basis. To invoke BACKUP, Enter the following:

A>BACKUP filespec d<cr>

where filespec is any legal file specification. This specification may include the ? and * wildcard characters. d is any valid drive name, WITHOUT a colon. For example, to backup all the executable programs from the A: drive to the B: drive, you would enter the following:

A>BACKUP A:*.COM B<cr>

BACKUP will list each file as it is copied. If the destination diskette becomes full, you will be prompted to change the diskette:

Disk Full - Change disk, enter <cr> ▮

The RDALL (ReaD ALL) utility program is designed to assure that files on a diskette are readable. It reads each file specified, reporting any errors that are encountered. The format of the RDALL command is as follows:

A>RDALL filespec<cr>

Where filespec is any legal file name, which may include the ? and * wildcard characters. For example, to verify that all document files on disk B: are readable, you would use the following command:

A>RDALL B:*.DOC<cr>

This section describes the procedure for configuring terminals and printers for use with the SDS MV1.x version of CP/M. Some of the terminals that are known to work well are listed below:

                    ACT I, II, III, IV
                    ADDS Viewpoint
                    Hazeltine Modular One
                    Hazeltine 15xx series
                    Soroc IQ120, IQ135, IQ140
                    Televideo 920, 950
                    Visual 50

Some printers that are also known to work well:

                    Texas Instruments 810, 820
                    Okidata Microline 82A, 83A
                    NEC Spinwriter
                    Diablo Daisywheel

The release disk, as supplied by SDS, assumes the following configurations for both the terminal port and the printer port: 1) 9600 baud 2) 8 bits per character 3) No parity checked, outgoing parity is always 0 (space) 4) No handshaking is used. When configuring your terminal, insure that it is in Full Duplex mode and automatic line feed is disabled. The SBC100 serial configuration area should be set as shown below for this operation. This is also how the area is configured when shipped.

```
    +-+       +-+                                               +-+
 O  !O!  O   !O!   O   O   O   O   O   O   O    O    O   !O!
    ! !       ! !                                               ! !
    ! !       ! !                                       +-----+ ! !
 O  !O!  O   !O!   O   O   O   O   O   O   O   !O   O!  !O!
    +-+       +-+                                       +-----+ +-+
```

The interface cable between the computer and the printer should be constructed as shown:

```
     RS232C                          RS232C
     Computer                        Terminal

         1                                1
         2 ---------------------------- 2
         3 ---------------------------- 3
         4                                4
         5                                5
         6                                6
         7 ---------------------------- 7
```
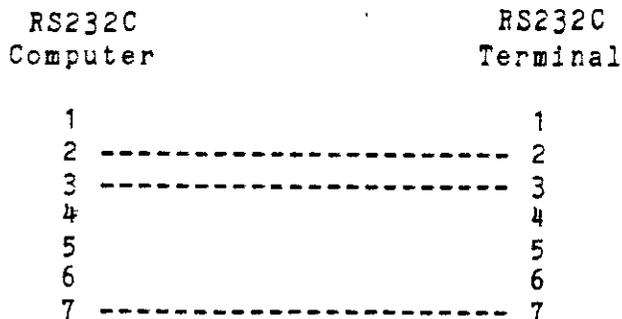
For a TI810/820 or Okidata Microline printer, use the following
configurations:

```
     +-+                   +-+                                     +-+
  O  !O!  O   O    O  !O!  O   O   O   O   O   O   O  !O!
     ! !                   ! !                                     ! !
     ! !                   ! !                           +------+  ! !
  O  !O!  O   O    O  !O!  O   O   O   O   O  !O    O!  !O!
     +-+                   +-+                           +------+  +-+


                    RS232C                    RS232C
                    Computer                  Printer

                      1               .          1
                      2------------------------------2
                      3                             3
                      4                           +-4
                      5------------+              +-5
                      6            !              6-+
                      7------------------------------7 !
                      8            !              8-+
                                   +------------11 !
                     20                           20-+
```
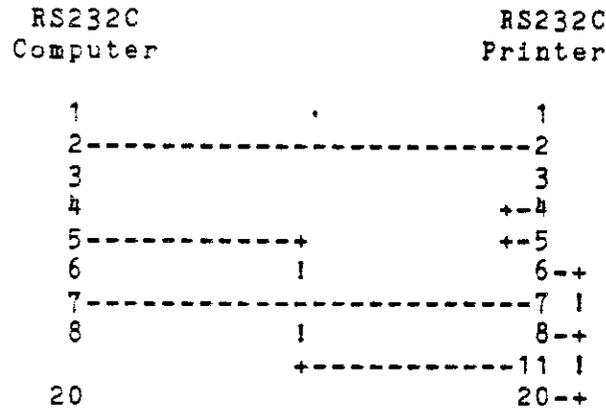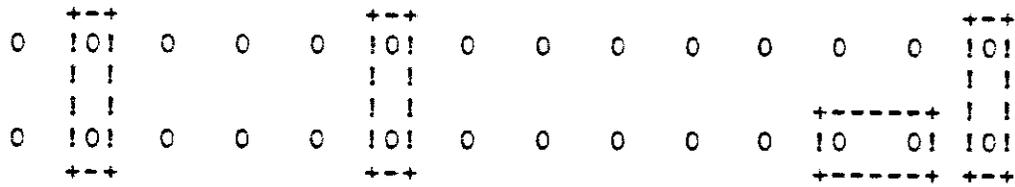
For a NEC Spinwriter, use the following diagram:

```
     +-+        +-+        +-+        +-+        +-+--+              +-+
  O  !O!   O  !O!   O  !O!   O  !O!   O  !*!  *!  O   O  !O!
     ! !        ! !        ! !        ! !        +-+--+              ! !
     ! !        ! !        ! !        ! !        ! !       +------+  ! !
  O  !O!   O  !O!   O  !O!   O  !O!   O  !*!   O  !O    O!  !O!
     +-+        +-+        +-+        +-+        +-+       +------+  +-+
```
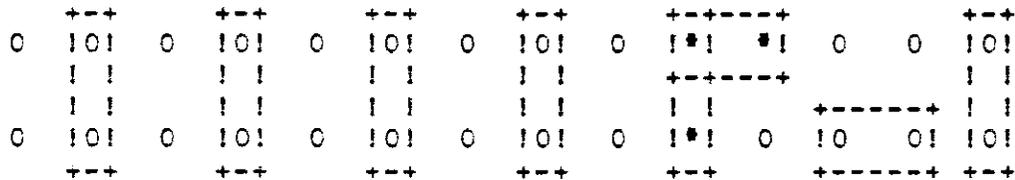
* - One of these connections must be made with wire.

A RS232 cable is generally not used with the NEC Spinwriters
since they have a cable built in. The above configuration assumes
that the Spinwriter is connected directly to the SBC100 printer
port. If an intervening cable is used, the three-way connection
can be achieved in the cable by shorting pins 6 and 20 together
on the computer end. In that case, insert the vertical shunt
shown above.

The following procedure should be used if the user wishes to use the Okidata Microline 83A printer through the SBC-100 parallel ports. A similar procedure is used for any parallel printer.

It is recommended that the parallel ports be connected to a 26 pin socket and terminated with a DB-25 crimp on connector. The last wire can be cut off since this wire is not used in the interface. After this is done the user can use the table below to make a printer cable. This cable is available from SDS, part number SBC-CAB5. The connector that mates with the Okidata Microline parallel interface is Amphenol part number 57-30360.

SBC-100 Pin assignment	Pin # on Microline Side	DB-25 Pin #
PIOB Bit 6	1, Data Strobe	4
PIOA Bit 0	2, Bit 1	13
PIOA Bit 1	3, Bit 2	12
PIOA Bit 2	4, Bit 3	11
PIOA Bit 3	5, Bit 4	10
PIOA Bit 4	6, Bit 5	9
PIOA Bit 5	7, Bit 6	8
PIOA Bit 6	8, Bit 7	7
PIOA Bit 7	9, Bit 8	6
PIOA AStrobe	10, ACK	25
PIOB Bit 7	11, Busy	3
GND	19 to 30, GND	14 or 22

After this hardware change is implemented, the user must use the GENMOD utility (option 20) to activate the appropriate software.

System Error codes:

The error processing routines within the SDS system have been designed to provide detailed information during a disk I/O error. In addition to optionally logging retries (See option #21 in the GENMOD utility), a status message is printed when the retry count has been exhausted. This message cannot be deactivated. The message appears as follows:

$$(ST0=xx, ST1=yy, ST2=zz)$$

These are the values of the uPD765 status registers when the error occured. All the numbers printed are in hexidecimal. Their meanings are explained below.

ST0 - This register gives a generalized reason for the error.

Register format is: IISE RHDD

         II is the interrupt code:
            00 - Normal completion
            01 - Abnormal completion
            10 - Invalid command
            11 - Drive changed state
                 (door was opened/closed during access)

         S - Drive has completed seek operation if 1

         E - Drive fault signal from drive

         R - Ready signal from drive

         H - Head address during access

         DD - Drive select code.

Format of ST1:   CxDO xNWA

         C - Attempt to access sector past end of track

         x - Not used - always 0

         D - CRC error detect in either ID or Data

O - Over-run. Processor did not respond in time

N - Sector not found or ID unreadable

         W - Write protected

         A - Sector not found

Format of ST2:   xCDW SFBA

        x - Not used - Always 0

        C - Deleted Address Mark found

        D - CRC error in data

        W - A sector was found, but its ID did not match
                its physical location on the diskette.

        S - Scan successfully compeleted

        F - Scan unsuccessfully completed

        B - Same as W

        A - No Data Address Mark found on track

For example, the message (ST0=40, ST1=40, ST2=10) indicates that
a sector error occured on drive A. This error was caused because
the ID of the sector on the disk did not match the physical
location of the sector. Refer to the uPD765 technical manual for
further information. NOTE: Under the MV1.x the scan errors will
not occur.

This section deals with the MV1.5 or greater implementations of CP/M running on 5 1/4 inch mini-disks. For the most part, the mini-disk system functions identically to the eight inch system. There are some changes to the disk utility programs DCOPY, FORMAT, GENMOD, GENMOD2 and SYSGEN. All the utilities are the same with the exception of the program names and the FORMAT program. All the 5 1/4" utility programs have a "5" appended to the name. Therefore the utility programs are called DCOPY5, FORMAT5, GENMOD5, GENMOD25 and SYSGEN5. Operation of the utilities is identical with the exception of the FORMAT5 program. If you answer the density prompt with D for double density, you will then be prompted again for double or single sided. You will also be prompted for the number of tracks. Other than these two prompts, operation of FORMAT5 is the same as the 8" FORMAT utility.

1. X - jumper

2. DC - not used

3. D - open

4. C - jumper

5. I - trace intact

6. R - trace intact

7. S - trace intact

8. DS1, 2, 3, 4 - select appropriate drive address

9. T1, 3, 4, 5, 6 - jumpered on last drive in system
    T2 - jumpered on all drives

10. HL - open

11. DS - open

12. RI - trace intact

13. RR - trace intact

14. Y - open

15. Z - jumper

16. 800 - jumper

17. 801 - open

18. A - jumper

19. B - open

QUME DT8/842/242 Configuration

The following shunts should be inserted:

    2S

    DC

    C

    DSx   (Drive select)

    U1E - All connections should be intact with the exception
          of E and HL.

    NOTE: The last drive in the daisy chain MUST have the
            terminator resistor packs installed. All other
            drives MUST NOT have the resistor packs installed.

Shugart 850/851 Drives

```
DS1 through DS4              Select Appropriate Drive
1B through 4B                All Open
RR                          Trace Intact
RI                          Trace Intact
*R                          Closed
2S                          Jumper
850/851                     850 Jumpered
*I                          Closed
*S                          Don't Care
DC              -           Don't Care
*HL                         Open
DS                          Open
WP                          Trace Intact
NP                          Open
D                           Don't Care
M                           Open
DL                          Open
*A                          Closed
*B                          Open
*X                          Closed
C                           Closed
*Z                          Closed
Y                           Open
S1                          Open
S2                          Closed
S3                          Open
TS                          Don't Care
FS                          Don't Care
**IW                        Closed
RS                          Closed
RM                          Open
HLL                         Open
IT                          Closed
HI                          Open
***F                        Open
***AF                       Closed
***NF                       Open
```

   * A 16-pin programmable shunt is provided for these
     eight signals.

  ** On some models, the IW shunt is replaced by IWG and IWI
     IWG should be open, IWI should be closed

 *** On some models, F, AF, and MF do not exist. On these
     models, you will find he following shunts: MFM - Closed,
     FM - Open, MF - Open

```
                        PJ1  - Closed
                        PJ2  - Closed
                        PJ3  - Closed
                        PJ4  - Open
                        PJ5  - Open
                        PJ6  - Closed
                        PJ7  - Closed
                        PJ8  - Closed
                        R    - Closed
                        I    - Closed
                        2S   - Closed
                        Z    - Closed
                        S2   - Closed
                        S3   - Open
                        IW   - Closed *
                        DC   - Don't care
                        1B, 2B, 3B, 4B - Open
                        RR   - Closed
                        RI   - Closed
                        WP   - Closed
                        NP   - Closed
                        A    - Closed
                        E    - Don't care
                        Y    - Open
                        STM1 - Open
                        STM2 - Closed
                        SF   - Closed
                        NSF  - Open
                        F    - Closed
                        HUN  - Open
                        HUD  - Closed
                        DLI  - Open
                        DLH  - Closed
                        DLM1 - Closed
                        DLM2 - Open
            DS1, DS2, DS3, DS4 - Shunt as appropriate.
```

This configuration is for Revision M drives. For Revision D drives, the configuration is the same with the following changes:

```
                        F - Open
                        A - Open
                        E - Open
                        DLM1 - Open
                        DLM2 - Closed
```

* The IW jumper does not appear on all drives. Don't worry if you can not find it.

Disk Drive Configurations

Tandon 848 Drives

DS1 - DS4   Select as required
U3 - All traces intact except 2 and 5

```
LV    Open
MC1   Closed
MC2, MC3 & MC4   Open
S1, S3   Open
S2    Closed
D1    Open
C     Closed
WP    Closed
NP    Open
HLL   Open
2S    Closed
DC    Closed
RI    Closed
M3    Closed
M4    Open
MR    Open
RR    Closed
DS    Open
M1    Closed
M2    Open
Y     Open
DL    Open
```

Install resistor pack on last drive in chain.

NEC 1175 Drives

DX   (Drive Selection)   Select as required.

HL	(Head Load)	1
RX	(Radial Ready)	1
SS	(Side Select)	1
PR	(Write Protect)	1
FR	(File Unsafe)	1
DR	(Door Lock)	1
DL	(Door Lock)	1
DH	(Door Lock)	1
BS, BU		2

Install resistor pack on last drive in chain.

PerSCI 277 Drive Configuration

Address DIP (U11) Connect:
                Pin 4 to Pin 11
                Pin 2 to Pin 13

        A-B   Closed
        D-BL   Closed
        E,F,G   Open
        J-Z   Closed
        K-L   Closed
        M,N,P   Open
        R,S,T   Open
        U-V   Closed
        W-X   Closed
        AB-AC   Closed
        AD-AE   Closed
        AH-AJ   Closed
        AM-AN   Closed
        AM-AL   Open
        AP-AR   Closed
        AS-AT   Closed
        AU,AV,AW   Open
        BA-BB   Closed
        BD-BE   Open
        BF,BH,BJ   Open
        BK-BM   Closed

Any jumpers not listed should be left as supplied by the factory.

The Step time for the 277 series drives is 2 ms.

Shugart 860/861 Drive Configuration

Revision 25249

```
     O                    D    - Open
    +-+                   SR   - Closed
    !O!    O              MT   - Open
    ! !                   MD   - Open
    !O!    O              13   - Open
    +-+                   26   - Open
     O     O    TR        12   - Open
    +------+              RR   - Closed
 2S !O    O!             RTR   - Closed
    +------+              TS   - Open
     O     O              PD   - Open
                          Z    - Open
           O              Y    - Closed
    +------+              XMO  - Open
 S2 !O    O!             MMO  - Open
    +------+              MS   - Closed
           O              WP   - Closed
                          NP   - Open
```

If you have any comments or suggestions, please send them to the following address:

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