

PROGRESSIVE
PERIPHERALS
& SOFTWARE

MAXTRAK

by Scott Maxwell

INTRODUCTION

Welcome to Matrix, the first truly original program for the Commodore 128, and, we believe one of the most essential. As you probably know, there is a great deal of software for the C-64. So much, in fact, that it will take quite some time for the C-128 to catch up. Fortunately, Commodore put a C-64 inside the C-128, but unfortunately, C-64 mode does not allow you to use most of the marvelous features of this truly powerful machine. In fact, in the C-64 mode, the top row of keys, along with the numeric keypad, is non-functional.

At PP&S we decided that rather than re-write all of the C-64 software to take advantage of the new features, it would make more sense to introduce a product that re-enables those features in C-64 mode, thus allowing your old C-64 software to take advantage of:

- A) The 80 column screen.
- B) The complete 128 keyboard
- C) The Fast Mode that makes all software run twice as fast.
- D) The AUTOBOOT ability. Simply turn on your C-128 and the program loads itself.

For your convenience, we also added:

- A) Fastloaders.
- B) A disk utility menu.
- C) A one key 40 and 80 column screen dump.

To make these features as easy as possible to use, we gave the following keys these functions:

- A) TAB - Change between Fast and Slow (normal) modes.

- B) ALT - Change between 40 and 80 column screen.
- C) HELP - Enter disk utility menu.
- D) NO SCROLL - Print the current 40 or 80 column screen to paper.

These keys may be hit at any time, even when in the middle of running a program. That way, if you are sorting data, you can pop into Fast mode to sort twice as fast. Or, if you have just spent a couple of hours typing a document and you find your disk is full, simply hit **[HELP]** and Format a new disk (we even included a 10 second Format). This is transparent to the program in use.

We have included a super-deluxe "Autoboot Maker". Autobooters can be made for C-64 or C-128 mode. Simply enter the commands you would use to load the program and next time you turn your computer on with that disk in the drive, the C-128 will type all of those commands for you. You can select to have Fastloaders in your boot. So now, not only will your favorite programs load themselves, but they will load at five times their regular speed. If you know machine language, we have included a feature which will allow you to make your own custom machine language autobooters. These autobooters once created will work on any C-128 computer, independent of MATRIX.

MATRIX also has two fast disk copiers; one for the 1541 and one for the 1571 which takes advantage of that drives faster speed. These work in C-128 mode and store the data in a special "packed" format so that most disks can be copied with only one disk swap, and empty blocks are not copied, saving valuable time. The 1571 Burstcopier will copy single or double sided disks, and will even make double sided copies of single sided disks.

As if all this were not enough, we threw in a few useful little utilities that we will get to later.

GETTING STARTED

In response to our user's complaints about disk protection in the past, PP&S has decided to protect MATRIX with a protection key, or "Dongle". This dongle **must be in Joystick PORT 2** (the one closest to the power switch) at all times when using MATRIX.

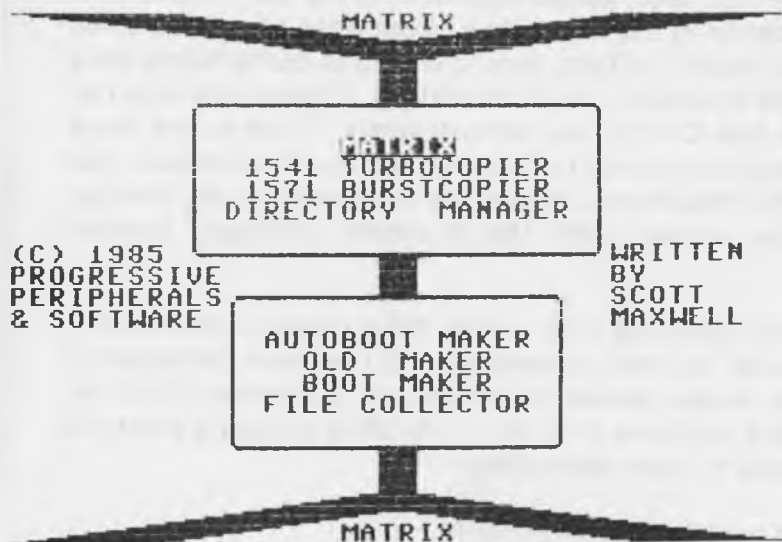
All of the different parts of MATRIX load through a common autobooter. Simply turn on your disk drive, insert the MATRIX disk, and turn on your Commodore 128 computer. If your computer is already on, simply insert the MATRIX disk in your drive and hit the reset button (the button between the power switch and the dongle port, Joystick Port 2).

Your computer should search the disk and then say:

BOOTING MATRIX. . .

If you do not have the dongle installed, the computer will remind you at this point and continue automatically after it is installed.

After a few seconds, the start-up screen will appear on both your 40 and 80 column screens. It looks like this:



To select one of the programs, use the cursor control keys to place the cursor (the reverse bar), over the desired program, then hit **[RETURN]**. Or, you can type the first letter of your selection ("c" for the copiers). If you want to use the copier, the cursor will move only to the one that your disk drive can use. If the program is from the top box it will be loaded and executed. If it is from the bottom box, MATRIX (the BASIC enhancement) will be loaded and executed in addition to the program you selected. Note that if the 40/80 DISPLAY switch is down, the selected program will print on the 80 column display (with the exception of the Directory Manager which works in 40 columns only.)

The first thing you should do when you get MATRIX is make a backup. As mentioned before, MATRIX is protected with a dongle, therefore, the disk can be copied. If you have the 1541 or 1571, move the cursor to the desired copier (as

mentioned above) and hit **[RETURN]**. If you have a 1541 compatible drive and the cursor jumps over both copiers, some other copier must be used (if you have an MSD dual drive, a DUPLICATE will do the trick; see the disk utility menu section of this manual.) If you have a 1541 compatible and you are able to select TURBOCOPY, give it a try. It may work.

Now turn to the appropriate section of this manual for details on how to use the program you have just loaded.

THE 1541 TURBOCOPIER

The TURBOCOPIER is for use on the Commodore 1541 drive, although it will work with some 1541 compatibles. It will copy most disks in under three minutes. At the time of MATRIX's release, the TURBOCOPIER did not work reliably with all 1571 drives for some reason, although it may be compatible with later versions of the drive. If you want to try it on you Commodore 1571 drive, turn your computer on, insert the MATRIX disk after the word READY appears on the screen, and type RUN "TURBOCOPIER". For all other drives, simply load the TURBOCOPIER through the main menu (see GETTING STARTED.)

- 1) You will be asked if you want to copy errors or not. Answer "N" for NO, and "Y" or **[RETURN]** YES. If your answer is NO, the copier will replace any errors it finds on the source disk with good data on the destination disk. This can have the effect of making a good copy of a disk that has gone bad, and can often salvage damaged disks. If you answer YES, the TURBOCOPIER will copy all of the errors it can. This will effectively make a backup of many protected disks. It is not a good idea to put an autobooter on a protected original. This is the only

reason we have provided this feature. We do not condone piracy and hope that you use this copier only for its intended purpose.

- 2) Now you will be asked to remove the disk from the drive and hit a key. Be sure to remove the disk before hitting the key.
- 3) The next prompt to appear on your screen will be:

INSERT SOURCE DISK

When you insert the source disk (the original), be sure not to take too much time getting it into the drive, although you do not really need to rush. The copier has an auto-detect that senses when you start to put the disk in the drive, and waits for about two seconds after that to start reading the disk. You do not have to hit a key.

When the TURBOCOPIER starts reading the disk, the 40 column screen is turned off. If you have an 80 column screen, you can see what track and sector the copier is reading. If you do not have an 80 column screen a cable may be purchased from PP&S for only \$14.95 to give you 80 columns on your current monitor. When the disk has been read, you will see this prompt:

REMOVE SOURCE DISK

- 4) When the source disk is removed, you will see this prompt:

INSERT DESTINATION DISK

Once again, do not take too long getting the disk into the drive. Once the destination disk is in the drive, the TURBOCOPIER will start copying data onto it. The TURBOCOPIER is intelligent and does not write empty blocks, so do not be alarmed if it seems to skip entire tracks. Note also that the copier formats the disk as it goes along so you can use blank disks. When the copier is done, you will see this prompt:

REMOVE DESTINATION DISK

- 5) After you remove the disk, one of two things will happen. If the source disk was very full, it may take two passes to copy the disk. In this case, the TURBOCOPIER will return to step 3) to finish the copy. If the disk was copied in only one pass, the following prompt will appear:

ANOTHER COPY OF THIS DISK? Y

If you answer yes, the TURBOCOPIER will return to step 4) and make another copy of the disk in memory. This way you can make as many copies as you want without having to read the original every time. This will only work if the disk can be copied in one pass.

- 6) Next you will see this prompt:

BACK UP ANOTHER DISK? Y

If you answer yes to this, the TURBOCOPIER will go back to step 3) and backup another disk. If you answer no, the computer will reset and autoboot any disk you put in the drive. This is a good way of testing the disk you just made if it has an autobooter on it.

THE 1571 BURSTCOPIER

The BURSTCOPIER is for use on Commodore 1571 drives only and takes advantage of the new fast serial bus to make very fast copies. It can copy single sided disks, as well as double sided disks, and can even make a double sided copy of a single sided disk.

Once the BURSTCOPIER has been executed, follow these simple steps:

- 1) You will be asked to remove the disk from the drive and hit a key. Be sure to remove the disk before hitting the key.
- 2) The next prompt to appear on your screen will be:

**INSERT SOURCE DISK
HIT A KEY TO CONTINUE**

After you insert the source disk (the original) and hit a key, the BURSTCOPIER will check the disk and see if it is double sided or single sided. If it is double sided, the copier will go on to step 3). If it is a single sided disk, however, the following prompt will appear:

**MAKE DOUBLE SIDED COPY
OF THIS DISK (Y/N)? N**

If you answer no to this question, the copy will simply be a single sided disk just like the original. If you answer yes, the copier will automatically format the second side of the disk and set up the necessary pointers.

- 3) The BURSTCOPIER will start reading the disk, and the 40 column screen will be turned off. If you have an 80 column screen, you can see what track and sector the copier is reading. If you do not have an 80 column screen, you can get an inexpensive cable to give you 80 columns on your current monitor from PP&S.
- 4) When the BURSTCOPIER is done reading, you will see this prompt:

**INSERT DESTINATION DISK
HIT A KEY TO CONTINUE**

After the destination disk is put in the drive and you hit a key, the BURSTCOPIER will start copying the data onto it. The BURSTCOPIER is intelligent and does not copy empty blocks. Note that the copier formats the disk the first time it gets to this step so you can use blank disks.

- 5) Now, one of two things will happen. If the source disk was very full, it may take two passes to copy the disk. In this case, the BURSTCOPIER will ask for the source disk again and return to step 3) to finish the copy. If the disk was copied in one pass, the following prompt will appear:

**MAKE ANOTHER COPY
OF THIS DISK (Y/N)? N**

If you answer yes, the BURSTCOPIER will return to step 4) and make another copy of the disk in memory. This way you can make as many copies as you want without having to read the original every time. Note that this will only work if the disk can be copied in one pass.

- 6) Next you will see this prompt:

BACK UP ANOTHER DISK? N

If you answer yes, the BURSTCOPIER will go back to step 2) and backup another disk. If you say no, the computer will reset and autoboot any disk you put in the drive. This is a good way of testing the copy you just made, if it has an autobooter on it.

USING THE MATRIX BASIC ENHANCEMENT

MATRIX, while being the name of the entire package, specifically refers to the Commodore 64 mode Basic enhancement. This enhancement includes seven major parts. These are:

- 6.1 The 80 column screen
- 6.2 The FAST (2MHz) Mode
- 6.3 The expanded keyboard
- 6.4 The Disk Utility Menu (the HELP Menu)
- 6.5 The Sector Editor (accessed through the HELP Menu)
- 6.6 The Printer Screen Dump
- 6.7 Fastloaders

The MATRIX is loaded through the main menu (see GETTING STARTED). It can either be loaded by itself (select MATRIX), or if one of the programs in the lower box is selected, it will be automatically be loaded and executed along with that program. When MATRIX is loaded by either method, the 80 column screen will automatically be the current screen if the 40/80 DISPLAY key is down.

6.1 The 80 Column Screen

The 80 Column Screen can be enabled in one of four ways:

1. Push the 40/80 DISPLAY down before starting MATRIX.
2. Enter the BASIC command **!C**. This command can be used in BASIC programs or from the READY prompt.
3. Print ESC or chr\$(27), followed by an x. This allows programs to change their screens in the middle of a

print statement and is the same method as used to change screens in the C-128 mode.

4. Hit the ALT key. This key may be hit at anytime to change between screens, even in the middle of running a program. It does not print anything on the screen.

To change back to the 40 column screen, simply repeat step two, three, or four.

The 80 column screen has a few extra features not available on the 40 column. These are accessed by printing certain control codes. If you are not familiar with programming, you can simply skip to section 6.2.

FEATURE	CHR\$(x)
Set Background Color	1
Turn Underline On	2
Turn Underline Off	130
Turn Flash On	15
Turn Flash Off	143
Make Background Color Same as 40 Column Screen	26

To set the screen color on the 80 column screen, simply print **CHR\$(1)** or **[CONTROL] a**, followed by the color code. The color codes are the same as those used to change the text color. For instance, to change the background color to green simply type **[CONTROL] a** followed by **[CONTROL] 6**. If you do not ever change the background color it will change automatically to match the background color of the 40 column VIC screen. Therefore, if your software changes the 40 column background to white, the 80 column screen is intelligent enough to change as

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6.1 The 80 Column Screen

The 80 Column Screen can be enabled in one of four ways:

1. Push the 40/80 DISPLAY down before starting MATRIX.
2. Enter the BASIC command **IC**. This command can be used in BASIC programs or from the READY prompt.
3. Print ESC or chr\$(27), followed by an x. This allows programs to change their screens in the middle of a

print statement and is the same method as used to change screens in the C-128 mode.

4. Hit the ALT key. This key may be hit at anytime to change between screens, even in the middle of running a program. It does not print anything on the screen.

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well. Imagine if your software changed the screen color to white and the text to black. If the 80 column screen remained black, it would be rather hard to read. The automatic background select feature solves this problem. If you have changed the background color with **[CONTROL] a**, you can reset the autoselect with **CHR\$(26)** or **[CONTROL] z**.

6.2 The FAST Mode

The FAST Mode will make your computer run at double speed. FAST Mode can be enabled in three ways:

1. Enter the basic command **!F**. This command can be used in BASIC programs or from the READY prompt.
2. Use the BASIC statement **POKE 53296,1**.
3. Hit the Tab key. This key may be hit at any time to change speeds, even in the middle of a running program. It does not print anything on the screen.

The FAST mode can be disabled in three ways.

1. Enter the BASIC command **!S**. This command can be used in BASIC programs or from the READY prompt.
2. Hit the TAB key. This key may be hit at any time, even during a running program. It does not print anything on the screen.
3. If you are in 40 column mode, the computer will automatically revert to SLOW (normal) mode when it finishes a program and returns to the READY prompt.

The FAST mode is very useful for such things as sorting or assembling data. However, the C-128 computer has the limitation that the 40 column VIC screen can not operate while in FAST mode. Therefore, the 40 column screen is turned off while in FAST mode. If you are already in 40 column mode and a program finishes and returns to the READY prompt, FAST mode will automatically be disabled and the screen will be turned back on (as mentioned above in Method 3 of disabling FAST mode.) The 80 column screen works fine in FAST or SLOW mode.

Another limitation is that the computer cannot talk to the disk drive while in FAST mode. This problem, however, is solved by MATRIX. When ever a disk command is executed, MATRIX automatically slows down for the disk command, and then speeds up afterwards. There are a few exceptions, though. If a program does not seem to talk to your disk drive properly, simply hit the TAB key right before the disk command. If you are a programmer, stay away from the non-vector disk commands (LISTEN, SECOND, UNLSN, etc.)

program was running and what all the important variables were when it was interrupted.

Now let's take a look at these functions one at a time.

1. Status— The status function will read the error channel on the disk drive and print an error message on the screen. Usually this should just say 00,0K,00,00. The drive indicates an error by flashing the drive light on and off at a constant rate. If you get an error where you should not, you can use this function to find out what the problem is. See your disk drive manual for more details.
2. Directory— This function allows you to find out what is on your disk. When it is selected, you will be prompted with:

Enter Search

If you simply hit **[RETURN]**, the entire directory will be displayed. If you only want part of the directory, you can type in the first few words of the names you want. For instance, if you had a drawing program called TABLET on your disk, you could enter TAB* and only those programs beginning with TAB would be displayed. This means that TAB CHECKER and TABLE would also be displayed if they were on the disk. This is called PATTERN MATCHING.

A few other special symbols you can use are the Question Mark (?), the Equal Sign (=), and the Comma (,). The Question Mark can be used to replace one letter only. So if the search string was MA?K, both MASK and MACK could be listed. The Equal

Sign can be used to list only one type of file. For instance, *=P would list only Program files, *=S would list only sequential, *=U means user files, and *=R means relative files. You can also list more than one group at a time. So, TAB*,MA?K, *=S would list all files beginning with TAB, as well as all four letter names that began with MA and end with K, plus all sequential files.

If all of this is too confusing, simply hit [RETURN]. If you want to stop listing in the middle of the directory, just hit the [RUN/STOP] key.

3. Erase File—This command allows you to easily remove unwanted files from your disk. When you select it, you will see this message:

Name of File(s) to Erase:

Now just type the name of file files (separated by commas) you want erased or **SCRATCHed** and hit [RETURN]. All the pattern matching described under DIRECTORY will also work, so you can delete everything beginning with TAB by typing TAB*. If you decide that you really do not want to erase anything after all, simply hit [RETURN] without typing anything.

4. Reset Drive—This command simply restarts your disk drive as though it was turned off and on again.
5. Initialize Disk—Reads important pointers from a disk into the disk drive. This command is mainly used when a new disk has been put into the drive, or when the directory of the current disk has been changed with the Sector Editor.

6.2 The Expanded Keyboard

Many people have expressed the desire to use the numeric keypad in the C-64 mode. In fact, before the C-128 came out, many people actually bought external keypads to hook up to their C-64. MATRIX restores the C-128 numeric keypad, as well as a number of other keys. The keys and their functions are as follows:

- | | |
|----------------------|---|
| 1. Numeric Keypad | — Standard |
| 2. Extra Cursor Keys | — Standard |
| 3. NO SCROLL | — Screen Dump |
| 4. LINE FEED | — Question Mark (?), PRINT for numeric keypad |
| 5. HELP | — Disk Utility Menu |
| 6. CAPS LOCK | — Standard |
| 7. ALT | — Change between 40 and 80 screens |
| 8. TAB | — Change between Fast and SLOW modes |
| 9. ESC | — Escape from quote mode |

The only key that is not used in C-64 mode is the 40/80 DISPLAY key. That key can not be accessed in the C-64 mode at all. A number of other keys have specialized functions. The HELP and NO SCROLL keys are described in sections 6.4 and 6.6, respectively. The LINE FEED key is the same as the question mark. This was included so that you can do calculations quickly with the numeric keypad. Simply hit the LINE FEED for PRINT. The ALT, TAB, HELP, and NO SCROLL are not normal keys. These keys take effect immediately and do not effect your output. So, for instance, if you are doing a sort, you

can touch the TAB key and the computer will enter FAST mode. When it is done, or any time while it is working, you can hit TAB again to slow back down.

6.4 The Disk Utility or HELP Menu

The HELP menu is a very powerful 12 function disk utility. When you hit the HELP key, MATRIX will immediately take control of your computer and the following menu should appear on your screen.

```

      Help Menu
      Status
      Directory
      Erase File
      Reset Drive
      Initialize Disk
      Rename File On Disk
      Copy File (dual drive)
      Clean-up Disk (VALIDATE)
      Prepare Disk For Use (FORMAT)
      Duplicate Disk (dual drive only)

      Return to READY
      Sector Editor

      .PC      .A      .X      .Y      .SP      NUXBD12C
      $a767   $08    $08    $0a    $e7    Z00100010
```

To select a function, simply use the cursor keys to move to the desired option. If you touch a key, the cursor will automatically jump to the next line beginning with that letter. Once the cursor is over the function you want, hit [RETURN].

When a function is done, MATRIX will automatically restore your screen and any important variables to what they were before the disk utility took over. Notice also, the bottom two lines of the HELP screen. These lines show where the current

If you are just erasing an old Commodore disk, you can hit **[RETURN]** here and do a quick (one second) NEW to erase the disk. If you enter an ID (two characters), MATRIX will do a complete Fast Format (10 seconds). The fast format only works on Commodore 1541 compatible disk drives. All other drivers will do their normal slow format.

10. Duplicate Disk (dual disk drive only)—This command is for making a copy of the entire disk, and is for dual disk drives only (MSD, 4040, 8050, 8250, etc.) When it is selected you will see:

Drive to Copy From (SOURCE Drive):0

If you hit **[RETURN]**, the drive will copy from drive 0 to drive 1. If you type 0 or 1, the drive will copy from that drive to the opposite drive.

11. Return To Ready—This is a way of getting out of many programs that you can not normally get out of. It **should not** be used for getting out of the HELP menu when it was entered by mistake. This command actually seizes control of the current program and returns to the READY prompt. When you select this function you will see:

Are you sure?

If you answer yes (or just **y**), you will be returned to the READY prompt and dropped out of the current program. If you say no (or anything else) you will be returned to the current program.

12. Sector Editor—This function will put you into the MATRIX Sector editor. For more details, see the next section (6.5).

6. Rename File on Disk—This command allows you to change the name of any file on your disk. When you select this command you will see:

New Name For Files

Type in the new name you want and hit [RETURN]. You will then see:

Old Name:

Now type in the current name of the file. When you hit [RETURN], the name will immediately be changed. You can hit [RETURN] by itself on either line and MATRIX will simply return to the current program without changing anything.

7. Copy File—This command allows you to make a copy of a file. It is mainly used for copying from one disk to another with a dual drive, but it may be used for making two copies of the same program on one disk. The first thing you will see when you select this command is:

Drive To Copy To (DESTINATION Drive):1

Enter the number of the drive to copy to (either 0 or 1), or hit [RETURN] to automatically copy to drive 1. Then you will see:

Drive To Copy From (SOURCE Drive):0

Now, enter the number of the drive to copy from or hit [RETURN] to copy from drive 0. Now you will see:

New Name For File:*

You may now type the new name of the copy or hit **[RETURN]** to make the copy the same name as the original. Finally you will see:

Old Name:

Here you can hit **[RETURN]** to cancel the copy, type in the name of the file to copy (or names, includes pattern matching described under DIRECTORY), or type ***** to copy the whole disk.

8. Clean-up Disk (VALIDATE)— This function eliminates all bad files from your disk (the ones that have ***** before the file type i.e. ***PRG**), and also release any blocks that don't seem to be in use any more. This will often increase the number of **BLOCKS FREE** on your disk. Be careful, however. If a program is using random files, these could be inadvertently destroyed by a **VALIDATE**.
9. Prepare Disk For Use (FORMAT)—This function will make brand new disks usable by your Commodore disk drive. It will also erase old disks. When you select this command you will see:

WARNING: IF YOU DO NOT WANT TO DESTROY ALL DATA ON THIS DISK, HIT [RETURN] !!!

New Name For Disk:

If you just hit **[RETURN]** at this point, **MATRIX** will leave without changing anything. Otherwise, type up to sixteen letters as a disk name. After you hit **[RETURN]** you will see:

Disk ID ([RETURN] FOR QUICK NEW):

If you are just erasing an old Commodore disk, you can hit **[RETURN]** here and do a quick (one second) NEW to erase the disk. If you enter an ID (two characters), MATRIX will do a complete Fast Format (10 seconds). The fast format only works on Commodore 1541 compatible disk drives. All other drivers will do their normal slow format.

10. Duplicate Disk (dual disk drive only)—This command is for making a copy of the entire disk, and is for dual disk drives only (MSD, 4040, 8050, 8250, etc.) When it is selected you will see:

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Are you sure?

If you answer yes (or just **y**), you will be returned to the READY prompt and dropped out of the current program. If you say no (or anything else) you will be returned to the current program.

12. Sector Editor—This function will put you into the MATRIX Sector editor. For more details, see the next section (6.5).

6.5 The Sector Editor

The Sector Editor is accessed through the HELP menu or disk utility (see previous section). The screen looks like this:

```

████████████████████████████████████████████████████████████████████████████████
1541/1571 Sector Editor
████████████████████████████████████████████████████████████████████████████████

Trk: $00
Sec: $00
Pos: 2
Dec: 32
ID1: $00
ID2: $00

Chk:
SID:

T=Text
H=Hex
J=Jump
R=Read
W=Write
A=Ascii
Q=Quit

F1=Trk+
F3=Trk-
F5=Sec+
F7=Sec-

D=????
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```

A Sector Editor can be a very powerful tool as it will actually allow you to change information directly on the disk itself. The MATRIX Sector Editor is very sophisticated and has a number of powerful and rather uncommon features. Most users will not need more than about half of these. Therefore, we have put an asterisk (*) next to the expert functions. If you do not wish to use the expert functions, you can simply skip over these sections.

First we will go over all of the indicators and controls. The big block of numbers in the middle of the screen is the numeric representation of the current sector being examined. The numbers are in base 16 or HEXADECIMAL

3. Write—Input Track and Sector number to write. These may be entered in either hexadecimal, by typing a dollar sign (\$) first, or in decimal. Once entered the block is written out. (Be careful with this or you might destroy something important.)
4. ASCII Toggle—This changes the character representation between ASCII conversion and direct screen storage.
5. Quit—Exit Sector Editor.
6. Text—When you turn on text mode, your border changes to blue. Then you can move around in the data block and type. Hit **[RETURN]** to exit.
7. Hex—When you turn on the Hex mode your border changes to blue. Then you can move around in the data block and change values in hexadecimal. Hit **[RETURN]** to exit.
8. F1-F7—These four keys add or subtract one from the either the Track or the Sector and read that block. This is convenient for scanning a disk.
- *9. Drive Type—If you have a 1571, you can change between 1541 and 1571 modes with this command. In 1541 mode, you have access to the BID and Checksum, while in 1571 mode you can read both sides of the disk.
- *10. Checksum—If your drive is a type 1541, you can read, write and edit blocks with 22, 23, and 29 errors. A bad Checksum is the cause of a 23 error and can be repaired by Reading the block and editing at least one byte. That will re-calculate

the checksum for the block. If there is a question mark (?) instead of a colon on this line, it indicates a bad checksum. You also have the option of changing the checksum yourself, thus creating 23 errors. Simply type "C" or move the command cursor to this line and hit **[RETURN]**. You can then enter the new Checksum in Hex or decimal.

- *11. BID—If your drive is a 1541, you can read, write, and edit 22 errors as mentioned above. A 22 error is caused by a byte called the Data Block Identifier having the wrong value. This value is usually a seven. This command will let you change that value, thereby fixing and creating 22 errors.

6.6 The Printer Screen Dump

The one key screen dump in MATRIX is very simple to use. Hit the **[NO SCROLL]** key and MATRIX will print your current screen to the printer. Your program will then continue on as if it were never interrupted. MATRIX will automatically figure out if you are using the 40 or 80 column screen and print the appropriate one. For the best results, you should either have the Commodore 1525 printer or a graphic interface with an emulate mode.

6.7 The Fastloaders

The Fastloaders built into MATRIX will only work on 1541 compatible drives. They are, however, intelligent and will automatically revert to standard loads for incompatible disk drives. If your device is a 1541 or compatible, your computer will say

hex for short). The section above it is the ASCII text representative of the block. Notice the flashing cursor in both sections. This cursor may be moved around in the data block using the standard C-64 cursor keys (not the new C-128 cursor keys). The home key will restore the cursor to the beginning of the block. Notice that the cursors move together. The character that the top cursor is over corresponds directly to the number that the bottom cursor is over. Notice also that the position counter changes to show where you are in the block. The decimal value of the current byte is right underneath the position counter.

Now try using the new C-128 cursor up and down keys. Notice the large cursor moving up and down on the right side. There are two methods of selecting a command. One is to position the cursor over the command with the new cursor keys and hit **[RETURN]**. The other is to hit the first letter of the command word.

The following is a list of meanings of each line in the command bar (the group of commands on the right side of the screen).

1. Trk:\$12 — Current Track Number
2. Sec:\$00 — Current Sector Number
3. Pos:0 — Position of cursor in block
4. Dec:18 — Decimal value of byte under cursor
- *5. ID1:\$00 — First ID value from current disk
- *6. ID2:\$00 — Second ID value

- *7. Chk:\$00 — Checksum of data block (1541 only)
- *8. BID:\$07 — Block identifier of current sector (1541 only)

9. T=Text — Enter text into data block
10. H=Hex — Enter hex numbers into data block

- 11. J=Jump — Jump to Track and Sector under cursor
- 12. R=Read — Read a sector from disk
- 13. W=Write — Write a sector to disk
- *14. A=Ascii — Change between ASCII and screen POKE modes
- 15. Q=Quit — Leave Sector Editor

- 16. F1=Trk+ — Add one to Track and then Read
- 17. F3=Trk- — Subtract one from Track and Read
- 18. F5=Sec+ — Add one to Sector and Read
- 19. F7=Sec- — Subtract one from Sector and Read

- *20. D=???? — Current drive type: MSD, 1541, 1571, ????

When you first enter the Sector Editor, there is a dummy data block on the screen and it is set up so that if you hit **[RETURN]**, you will automatically read the beginning of the directory. This is because the command cursor is positioned over the JUMP command.

1. Jump—Use value under cursor as the Track number and the next byte as the Sector number, then Read. This is very good for looking through a program. The first two bytes in all sectors of normal data contain a pointer to the next block in the file. Therefore, you can simply put the cursor at the start of the block and hit "J" to read the next block.

2. Read—Input Track and Sector number to read. These may be entered in either hex, by typing a dollar sign (\$) first, or decimal. Once both values are entered, the block is read in.

FASTLOADING FILE instead of LOADING FILE. The MATRIX Fastloaders will also count the blocks read in the upper left hand corner of the screen. So, for instance, if you load a 25 block program, you should see numbers in the corner count from 1 to 25 and then put the original characters back.

Also, it is no longer necessary to type the ,8 when loading from the disk. Simply type LOAD "file name". You can even use SHIFT [RUN/STOP] to load and run the first program on the disk.

Another useful command for programmers is the **SAVE "filename",8,1** command. When you load a machine language program, MATRIX automatically keeps track of the starting address. Then if you **SAVE "filename",8,1** MATRIX will start saving from the last load address. If you get an ?OUT OF MEMORY ERROR, you can POKE50,158 and get the memory you need.

THE AUTOBOOT MAKER

Commodore has never had a micro-computer with an autoboot ability. Therefore there are many Commodore users who do not know what an autoboot is. Basically, when you turn on your computer, it reads a block from the disk in the drive and checks for a certain code. If that code is found, the computer knows that an autobooter is present on the disk and **BOOTS** a loader. The MATRIX Autoboot Maker lets you create that loader.

The MATRIX Autoboot Maker is a Cadillac. It has every feature you could ever want plus a few you will probably never need to use. Don't be scared away by

this power. The Autoboot Maker has a multi-level structure. This means that if you are a basic user, you can stay at the very simple upper level (just hit **[RETURN]** six times). If you are an intermediate user, you can go to the second level which allows you to easily define a series of operations. From here, an advanced user can design his own machine language booter.

MATRIX has the only autoboot maker to date that will let you put autobooters on C-64 software (with optional fastloaders built in). It also fixes a couple of disk drive bugs that occur occasionally when entering C-64 mode.

The Autoboot Maker may be booted through the main menu. It loads in with the MATRIX BASIC Enhancement and will come up in 80 columns if the 40/80 DISPLAY key is down when the computer is turned on. Once it is loaded and run, this message will appear on the screen:

**Please insert disk for boot.
Then hit a key.**

After you have done this, the Autoboot Maker will check a number of things on your disk. If it finds an error on track 1, an autobooter is not possible. It will also check to see if there is room for an autobooter, as well as checking to see if there is a MATRIX autobooter currently on the disk. If it finds an autobooter, it will go to the edit autoboot section (described later).

If the Autoboot Maker determines that the blocks you need are being used, it will warn you with this message:

**Warning: Use of Autbooter on
this disk may cause data loss.**

Next, you will see:

Is this a 64 or 128 program? 64

This is the first of a number of **Selection lines**. All of the selection lines in the Autoboot Maker work on a toggle basis. Simply hit a key and the choices will be run through. Hit **[RETURN]** when the option you want comes up. Your options for this selection line are **64** or **128**. Regardless of whether you select 64 or 128 mode, the next prompt you will see is:

Name to display:

Type in any name or phrase (up to sixteen letters) that you want to appear on the screen during the autoboot. This message has nothing to do with what is on the disk and can include control codes (clear screen, change colors, etc.). This message is for display purposes only.

If you are creating a 64 autobooter, you will see this selection line:

Select Fast Loader: None

The options for this selection are:

None.

Cart.

\$0800

\$9000

\$9F00

\$C000

Again, just hit a key to toggle through your choices, and hit **[RETURN]** on the one you want. This is your fastloader selection line. Following is a description of each one. NOTE: All fastloaders, except Cart. (cartridge) will be put on your disk as a program file.

None.- Do not use any fastloaders.

Cart.- This fast loader loads in at the beginning of your BASIC area and moves the start of your BASIC programs up a little bit. It should work with most BASIC programs as long as you load them with **LOAD "name",8**).

\$9000- This fastloader loads into the top of your BASIC space and moves normal top down. This will work with many programs that are small to medium size.

\$9F00- This fastloader actually starts about 30 bytes from the top of the BASIC memory and is mostly contained under the BASIC ROMS. This will work with almost all BASIC programs, as well as with a great number of machine language programs.

\$C000- This fastloader is stored in the 4K text buffer of your computer. It will work with many programs of all sizes, but some programs use the same memory and will knock it out.

If you are creating a 128 autoloader, instead of the fastloader selection line you will see this prompt:

File to Load:

If you want to BLOAD a file, enter the name of the file here. Do not use this for loading BASIC programs because a BLOAD does not set up all the necessary pointers for a BASIC program.

The autoboot creation process will be the same for the 64 or 128 modes during the next few steps. The next selection line will be:

Autoload or Autotype? Autotype

The options are, of course, Autoload or Autotype. If you selected Autoload the autobooter will automatically load and execute the first program on the disk. There are three possibilities:

1. A BASIC program - this will be LOADED and RUN.
2. A standard machine language program - this will be LOADED and executed with a SYS to the start address.
3. A self-executing machine language program - this will simply be LOADED - as it runs itself.

If you selected **AUTOTYPE**, you will be put in the autoboot Editor. You can skip the following indented section if you did not select Autotype.

The Autoboot Editor

The Editor is where most of the Autoboot Maker's power lies. The idea is quite simple, really. All you do is type in everything you would type to load the program manually. For instance, if you wanted to load a game called MOUSE, you would type in:

```
]load "mouse",8  
]run  
]quit
```

The autobooter would type these commands for you, just as if they were being typed from the keyboard. Notice the last line says **quit**. This statement tells the editor and autobooter that you are finished. You can either type this word or hit **[RETURN]** on a blank line.

Now let's take a little more complex example. Let us say that you wanted to load an assembler. Let us also say that you wanted to load a DOS wedge and a printer dump utility. The autoboot maker might look

Intelligent autobooters are nice, but they are much more useful if they allow you to select different options from the keyboard. For instance, if you have three different programs on a disk that you may want to boot at different times, you need some way of selecting the program to load. This brings us to the **INPUT** command. Following is an example:

```
]10 Input "Load mouse, assembler, or graphix";a$  
]run  
]input  
]if a$ < > "mouse" then skip  
    ]load "mouse",8  
    ]run  
    ]quit  
]if a$ < > "graphix" then skip  
    ]load "graphix",8,1  
    ]sys 4096  
    ]quit  
]if a$="assembler" then skip  
    ]quit  
]load "dos 5.1",8,1  
]new  
]sys 52224  
]load "print util.",8,1  
]load "assembler",8,1  
]sys 20480  
]quit
```

This booter starts by typing in a one line BASIC program that asks which program you want to load. It then RUNs the program. In order to answer the question, the booter must turn control back over to you. The INPUT command turns control over to the keyboard until you hit **[RETURN]**. Therefore, you can

type in one line, and then the booter will take control again. The word INPUT must be on a line by itself.

After you make your selection, the booter checks to see if you selected MOUSE. If you did, it will load and execute it, and then do a QUIT to indicate that the boot is finished.

If you did not select MOUSE, it will SKIP that section and see if you select GRAPHIX. If so, it will load and execute this program and finally QUIT.

If you did not select either of these programs, the booter will see if you selected ASSEMBLER. If you did not, the booter will simply QUIT. Otherwise, it will load and execute the assembler, along with its helper programs.

There is one more special command that we have not covered yet. It is actually the simplest of the three. It is the OUTPUT command. This command lets you print information on the screen without having to execute a command. Here is an example:

```
]poke 53280,0:poke 53281,0:rem change screen  
colors to black  
]output[CLR][CYAN] Now Loading Super Graphix  
[BLACK]  
]load "sg",8  
]run  
]quit
```

not renumbered until you are finished, so if you want to delete more you don't have to worry about their line numbers changing like you do with the Insert command.

After the Editor

After you have typed in your booter (or done an Autoload), you will see:

Tie Autoboot to reset button? No

This message only appears if you are creating a 64 mode booter. The options are No and Yes. If you select Yes, the fake cartridge created by the autobooter will be left intact. Then, if you do a reset to C-64 mode (either with SYS 64738, or by hitting RESET and holding the Commodore key), the boot will be executed again. If you say no, the fake cartridge will be destroyed after the boot is finished. If you do not understand this selection line, just select no.

At this point, the Autoboot Maker rechecks your disk to make sure there is room to put the booter on the disk. The reason for the second check is that the booter may be exceptionally long or you may have switched disks (to make a copy of a booter from another disk).

Now you will be asked:

Allocate blocks? Yes

The options are Yes and No. If you select Yes, blocks will be designated in the directory as being used. If you will select No, the directory will remain unchanged and the blocks will be vulnerable.

If you are editing or replacing an existing 64 mode booter, you may be asked if you want to:

Delete Old Fastloader? Yes

If you are creating a 64 mode booter and you are using certain fastloaders (\$0800, \$9000, \$9F00, or \$C000) you may be asked to:

**Insert the Master Disk
Then hit a key.**

This is so the Autoboot Maker can read the fastloader from the MATRIX disk. Next you will be asked to:

**Insert disk for boot.
Then hit a key.**

This will make a copy of the fastloader that was just read.

You should now have an autobooter on your disk.

Editing an Autobooter

If when you insert your disk, the Autoboot Maker finds an existing autobooter, it will print:

**Booter found for 64 mode.
or
Booter found for 128 mode.**

This booter would (1) change the screen colors to black, 2) clear the screen, set the color to cyan, print the loading message and set the text color to black, 3) load SG, 4) run it, and 5) QUIT the booter. When this is executed you will simply see the screen turn to black, be cleared and then the output message will appear. The program will be loaded, but since that text color is black on a black background, you will only see the OUTPUT message, and not the LOAD and RUN commands.

The best way to get the hang of all these commands is with experimentation. There should be enough power here to get very creative.

After you have finished typing in your autobooter, the following selection line will appear:

All Lines OK? NO

The options here are NO or YES. If the answer is YES, the Autobooter will leave the Editor. Otherwise the lines you have just typed in will be listed with line numbers by them. You can hit RUN/STOP during a list to stop it part way through. Next, you will see this line:

Insert, Delete, or Edit? Edit

The options are:

**Edit
Insert
Delete**

If you select Edit, you will see:

Edit which line?

Type in the number of the line you want to change. The line will now be listed for you and the cursor will be put at the beginning of the line. Make any changes you need to and hit **[RETURN]** when finished. You will now be asked for the number of another line to Edit. If you do not want to edit any more lines, simply hit **[RETURN]**. The booter will now be listed with line numbers again and you will be returned to the selection line that asks if **All lines** are **OK** (see previous)

If you selected Insert, you will see:

Insert at which line?

Type the number of the line that you want to insert lines before. Now you will be put back into line entry mode and you can enter as many lines as you want. Hit **[RETURN]** on a blank line to quit insert mode. You will then be asked for the number of another line to add lines before. You should be aware that if you want to insert some more lines somewhere else, all of the lines below the area you just inserted lines, have been moved down and renumbered. Hit **[RETURN]** to relist the lines and return to the selection line that asks **All lines** are **OK** (see previous).

If you select Delete, you will see:

Delete which line?

Type in the number of the line to delete. It will now be removed from your list. You can delete multiple lines using the dash or hyphen (-). If you type 10-12, lines 10, 11, and 12 will be deleted. If you type -3, lines 0, 1, 2, and 3 will be deleted. If you type 7-, all lines after 6 will be deleted. After you select the line(s) to be deleted, you will be asked for the next line to be deleted. Just hit **[RETURN]** you do not want to delete any more and you will be returned to the selection line that asks if **All lines** are **Ok** (see above). The lines are

It will then read in the old booter and list it out (hit RUN/STOP to interrupt the listing part way). It will also list the Name to Display, and if it is a 128 booter, it will list the Name to Load. Then it will display the selection line:

Edit this or do new booter? Edit

The options are **Edit** and **New**. If you select Edit, you will be allowed to input the Name to Display, and either the Name to Load or the Fastloader. Then you will immediately be put into the Autoboot Editor. Selecting New will allow you to create a brand new booter, just as if one had not been on the disk already.

Expert Mode

The expert mode is for machine language programmers only. If you want to write a machine language booter, use your favorite assembler to create a loader. The acceptable entry points for a 64 mode program are:

\$8000 -Beginning of fake cartridge.

\$803D -Beginning of custom mode. All normal memory setup has been done and the fastloader has been executed.

If you use the entry point at \$803D and want to use the Cart. fastloader, your code must end before \$80CF to avoid overwriting part of the fastloader.

The only acceptable entry point for 128 mode booter is \$0B2B. This is the beginning of the custom boot and after the File to Load has been BLOADED. An RTS will return to BASIC.

After you have written your custom booter, save it on a disk. The start address must be a valid entry point or the file will not be accepted. In order to get MATRIX to use your custom booter, you need to select **Autotype** at the appropriate point. Then, hit **[RETURN]** on the first line and say that all lines are OK. You now appear to have an autobooter that does not do anything. After you are asked if you want to **Tie the autobooter to the reset button**, the Autoboot Maker will recognize that you do not have any lines in your booter yet and ask:

Custom ML booter? Yes

If you select Yes, you will be asked for:

File to Load:

Enter the name of the machine language file that you created. The Autoboot Maker will now check for a valid starting point and load the file. Continue as usual from this point.

Some Final Points about the Autoboot Maker

If for some reason you want to **remove** an autobooter, you can do this by using the sector editor. Simply read track 1, sector 0 and change any one of the first three bytes (CBM). Then write it back. Be aware though, that the blocks may still be allocated. Therefore, if you try to create another

something like this:

```
]load "dos 5.1",8,1
]new
]sys 52224
]load "print util.",8,1
]load "assembler",8,1
]sys 20480
]quit
```

As you can see, the autobooter would 1) load the wedge, 2) clear memory, 3) execute the wedge, 4) load the printer dump utility, 5) load the assembler, 6) execute the assembler, and finally, 7) determine that it is finished and turn control back over to you.

Let's take this booter one step further. Suppose you were working on the program and had to hit RESET for some reason. The way it is set up now, every time you reset your computer, the computer will re-load and re-start everything. This is great except it might take a little while to re-load all three programs. Since everything is still in memory, all you really need to do is re-start the DOS wedge and the assembler. What we need is an autobooter that is smart enough to load and start everything the first time and start everything without reloading each time after that. This brings us to the **SKIP** command. Following is an example of how the SKIP command can be used to accomplish this.

```
]if peek(40959)=12 then skip  
  ]load "dos 5.1",8,1  
  ]new  
  ]load "print util."8,,1  
  ]load "assembler",8,1  
  ]skip  
    ]quit  
]poke 40959,12  
]sys 52224  
]sys 20480  
]quit
```

The SKIP command jumps over all of the indented lines beneath it. When you first turn the computer on, the booter will check and see what value is in memory location 40959 (the end of BASIC). Since this hasn't yet been set, it will probably not be twelve. The booter would not do the skip, and would load the three programs. Notice that after all three are loaded, the booter forces a SKIP over the QUIT. The QUIT command tells the booter when it is finished with an indented section. If you do not want to SKIP over this, the booter will QUIT without doing the rest of the boot. The SKIP allows the booter to rejoin the non-indented section and finish the boot.

Now the booter sets location 40959 to a 12 as a flag that it has already been booted once, then executes both programs. If you now reset the computer, the booter will see that location 40959 does in fact equal 12 and skip over the load commands to the execution section.

If you do not understand this example, fear not. There are more examples to follow.

autobooter and receive a warning that you are about to destroy data, consider the source.

The Autoboot Maker disables RUN/STOP and RESTORE. If you need to escape, use the **Return to Ready** function in the HELP menu.

If the fastloader you select will load some of the programs in a booter, but gets destroyed before loading them all, determine which program is causing the program. You can disable the fastloader by inserting the following line before loading the rogue program:

]poke 816,165:poke 817,244

Licensing

If you want to use MATRIX to create an autobooter for a program that you plan to sell, we do not require any licensing fee. We do, however, ask that you include a credit in the manual.

A FEW MORE UTILITIES

There are four more utilities that have been put on the disk that you may find useful (or in some cases, essential). All four are unprotected and may be passed around freely. They include:

- 8.1 The Directory Manager — Delete, Undelete, Erase, and Protect files. The Directory Manager also allows you to change the sequence of file names in the directory. Try it.

- 8.2 The Old Maker — This utility puts a one block program on a disk, called **OLD**. If you accidentally **NEW** a program or have to hit **RESET**, you can simply **LOAD "OLD",8,1** and get the BASIC program back.
- 8.3 The File Collector — This utility allows you to put multiple file programs together into a single file. For instance, if you have a program called, **ROCKER** that plays music and it loads a machine language program called **ROCKER.EXE**. to make it fast, you can use the file collector to put both of these into a single file called **ROCKERS**. When this program is **LOAD**ed and **RUN**, all of the pieces will be put where they belong and the BASIC program will be executed.
- 8.4 The Boot Saver — Now that you have a great Autoboot Maker, you may find yourself writing very long and complex autobooters. The problem is that if you take your disk to a friend's house who only has a Commodore 64, your booter won't work. Boot Saver solves this dilemma by putting one more block program called **BOOT** on your disk. When you **LOAD "BOOT",8,1** your C-64 will simulate an autoboot.

A Little More About the Directory Manager

The Directory Manager is a very powerful **Directory Editor**. Following are details on the twelve commands.

- 1) Get — Read the directory of the current disk.
- 2) Save — Put the revised directory on the current disk.

- 3) Next — Show the next page of the current directory.
- 4) Previous — Show the previous page of the current directory.
- 5) Type — Show the file types of all of the files on the current page.
- 6) Len — Show the length of all of the files on the current page.

The next six commands all require that you select files. To use these you (1) select the command, (2) use the cursor and **[RETURN]** to select the file. You can continue selecting files with the same command indefinitely.

- 7) Protect — Protect or Unprotect selected file. When a file is Protected it can not be SCRATCHed.
- 8) Move — This command allows you to rearrange files on your disk. Simply select a program and move the cursor to a new location. The file name will move with the cursor. When you have it positioned hit **[RETURN]** to deselect it. NOTE: Files near the top of the directory LOAD fast than those toward the bottom.
- 9) Delete — This is the same as the SCRATCH command.
- 10) Undelete — This allows you to retrieve a file that was SCRATCHed or Deleted. Simply select the file and hit a key to toggle between the different file types. When you have the appropriate file type, hit **[RETURN]**. This can also be used for changing the file type of regular programs.

- 11) Erase — This command completely removes a file from the disk so that it cannot be Undeleted.
- 12) Rename — This lets you change the name of a program. It allows you to type in control codes by holding the [CONTROL] key and hitting the appropriate character. You can even enter SHIFTED control codes. Another nice feature of this command is that it allows you to rename the disk title. You can type all the way across the title line, including the ID and the 2A. I have changed my ID 2A to say PROGS.

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***The Matrix program gives
your C-128 capabilities
you could only dream about before!***