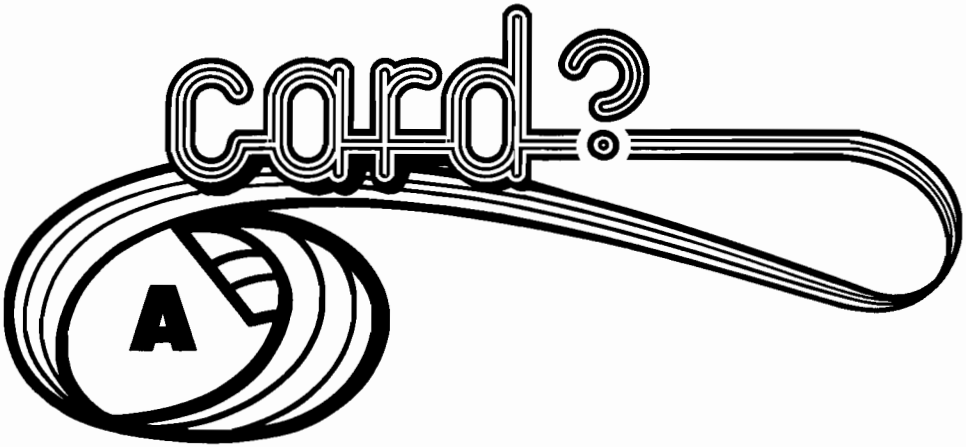
Instructions For



A Universal Centronics Parallel Printer Interface for the VIC-20® and C-64 Computers

313 Mathewson • Wichita, Ks 67214

PRINTER INTERFACE INSTRUCTIONS

GUARANTEE
****

For as long as this product is owned by its original owner, CARDCO, Inc. will repair or replace any defective parts or the entire unit if it should become inoperative due to a defect in manufacture or materials, providing the unit is returned to CARDCO, Inc. in undamaged condition with proof of purchase (purchase receipt).

This product was developed by:

CARDCO, Inc.
313 Mathewson
Wichita, Ks.
67214

PRINTER INTERFACE INSTRUCTIONS

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INTRODUCTION

The "CARD/?" (CARD/PRINT) printer interface was designed to allow you to add any parallel printer to your VIC-20 or C-64 computer. The design objective was to provide you with a system that would so closely duplicate the functions of the VIC printers that you would be able to run available software without any changes. To accomplish this task, and still allow you to make use of the special features available in today's high quality printers, required some special approaches to solving simple problems.

If you are planning to use this interface only to run pre-existing programs you should only have to read this booklet once over lightly; however, if you plan to write your own programs or customize existing software to enable the use of special features of your printer this manual should become your companion and best friend.

We have tried in this manual to document and fully explain each and every feature and function of our interface and how it will affect the operation of your system. We have provided examples and sample programs in an attempt to make each function understandable and useful to even a novice programmer.

PRINTER INTERFACE INSTRUCTIONS

HOOK UP PROCEDURES

1. TURN OFF YOUR COMPUTER AND PRINTER

2. INSERT THE SIX PIN PLUG ON THE END OF THE THICK ROUND CABLE INTO THE MATCHING PORT ON YOUR COMPUTER. (IF YOU ARE USING A DISK DRIVE THEN YOU WILL HAVE TO PLUG THE SIX PIN PLUG INTO THE BACK OF YOUR DISK DRIVE.

3. INSERT THE BIG BLUE PLUG ON THE END OF THE FLAT RIBBON CABLE INTO THE PORT ON YOUR PRINTER.

4. PLUG THE CONNECTOR ON THE END OF THE THIN WIRE INTO THE CASSETTE PORT ON THE COMPUTER BEING SURE THAT THE CONNECTOR FACES DOWN, AND THE SMALL CIRCUIT BOARD IS ABOVE THE CONNECTOR. IF YOU ARE USING A CASSETTE, ~~UNPLUG IT FROM THE COMPUTER~~. ~~NOW~~, PLUG ~~THE CASSETTE~~ IT ONTO SMALL CIRCUIT BOARD AND IT WILL OPERATE NORMALLY.

5. TURN ON THE PRINTER AND THE COMPUTER IN THAT ORDER. (ALWAYS TURN OF THE PRINTER FIRST WHEN USING THE "CARD/?")

6. NOW: YOU TYPE: OPEN 4,4 <RETURN>
VIC SAYS: "READY"
YOU TYPE: CMD4 <RETURN>

6. ONE OF TWO THINGS WILL HAPPEN:

**A. YOUR PRINTER RESPONDS BY PRINTING 'READY'. IN THIS CASE YOU HAVE FINISHED THE HOOK UP AND YOU ARE READY TO GO ON TO THE NEXT SECTION.

**B. IF YOUR SCREEN DISPLAYS "DEVICE NOT PRESENT ERROR" OR THE PRINTER DOES NOT PRINT READY SOMETHING IS WRONG. TURN YOUR PRINTER AND COMPUTER OFF AND REPEAT THE HOOK UP AGAIN, CAREFULLY.

IF ALL FAILS CONTACT YOUR DEALER, OR CALL US AT (316) 267-6525 BETWEEN 1 PM & 5 PM. CST MONDAY THRU FRIDAY.

REMEMBER THIS: WE WANT YOU TO BE TOTALLY SATISFIED WITH OUR PRODUCTS, AND WE WILL SPEND THE TIME NECESSARY TO HELP YOU GET YOUR SYSTEM RUNNING. OUR CUSTOMERS ARE OUR BEST ASSET YOU MAY BE SURE WE WILL DO WHATEVER IT TAKES TO MAKE YOU HAPPY.

RUNNING EXISTING PROGRAMS

Your interface was designed to allow you to run most standard programs available for the VIC-2Ø and COMMODORE-64 without any changes. For example, the QUICK BROWN FOX word processor package runs totally as it was designed to with the "CARD/?" interface and a Smith-Corona Daisy Wheel printer. So will most other programs on most other printers. A few programs might require some small changes, but after reading this manual you should be able to handle them. If you run into a severe problem, don't hesitate to call us. We want to get you on line!!!

WRITING YOUR OWN PROGRAMS

The rest of this manual is going to be devoted to explaining how to write and/or edit your own programs in order to make the best use of every part of your system. We will split this into three parts. In the first part we will tell you about your computer's command format. In the second we will deal with the "CARD/?"'s commands. And, in the third part we will relate all of this to your printer's abilities.

To make the most of this educational manual, we strongly suggest that you try the examples and see how they react on your printer. Some printers have features that others don't, but all the features of any printer can be accessed from a VIC-2Ø or a C-64 using the "CARD/?" interface.

BUT HOW DO I MAKE IT PRINT ?

****

If you have made it this far, you deserve a pat on the back for picking a system that works and getting it up and running. Now comes the fun part. Type in and run this sample program:

```
10   X = 32:OPEN4,4:CMD4
20   PRINT CHR$(X);:X = X+1
30   IF X = 127 THEN X = 160
40   IF X = 255 THEN CLOSE 4:END
50   GOTO 20
```

You have just printed the standard character set that comes with your printer. (There may be several alternate sets and we will describe how to access these later.) You may have noted that we did not use any characters less than 32 or between 128 and 160, this is because they are reserved for special printer functions. (See the appendix pege # A1) For example try this:

OPEN4,4:CMD4:PRINTCHR$(12) <RETURN>

If you just lost a sheet of paper then your printer (most do) honors chr$(12) as an automatic form feed to get to the top of the next page without your having to figure out where it is. This form of telling the printer what to do is accomplished by simply 'printing' a command code chr$. These codes are contained in the instructions that came with your printer. I would suggest at this time that you get to know them because these codes are the keys that will allow you to unlock all the special features contained in that printer of yours.

COMMODORE COMMAND FORMAT
??????????????????????

Commodore designed some really outstanding features into your computer but made a few normally easy things hard to do in the process. Getting the printer to print on paper what you print on the screen is not as easy as it should be, but with a little patience it can mastered.

Your computer calls everything connected to it a device, and each device has a number so the computer knows what type of accessory it is talking to. It sends information to different types of devices in different codes.

PRINTERS HAVE DEVICE NUMBERS OF 4, 5, 6 OR 7

To talk to a printer, you must open a channel. (Kind of like the President of the United States opening a channel of communication to the Russians.) This can be done either in the direct mode as a statement, or it can be done within a program as a program line. But it must be done or you will not be able to communicate with the printer.

One thing you must be careful of is that a channel can be opened only once. You can use it all you want while it is open; but if you try to open an already opened channel you will get a FILE OPEN ERROR. So it is good practice to close each channel as soon as you are done with it.

PRINTER INTERFACE INSTRUCTIONS

The format for opening a channel is:

OPEN(file number),(device number),(command)

The format for closing a channel is:

CLOSE(file number)

The "FILE NUMBER" can be any number that you choose to call that file. This number must be between 1 & 255. This is the number you will use whenever you want to communicate with your printer. This is also the number you must use to close the FILE (close the channel of communication). Additionally, any file number of 128 or greater will cause the printer to add a line feed <chr$(10)> after each carriage return <chr$(13)> causing some printers to double space and not permitting the use of some special printer functions that may be available with your printer.

The "DEVICE NUMBER" is simply the number of your printer as determined by the "CARD/?" interface. It is set at the factory to device 4, as this is the accepted standard. The device number can be changed to device 5 if desired so as to allow the use of two printers at the same time. For example, with a dot matrix printer as device #4 and a daisy Wheel type printer as device #5, you would be prepared to print reports and correspondance from the same program without any rewiring or changing around of printers or programs. (Refer to the proper section in the appendix of this manual for instructions to make the change.)

The "SECONDARY ADDRESS" or command number is the third and last number in the command. It may be omitted, and in that case, a secondary address of Ø will be inserted automatically by the computer. The secondary address is used by the computer to send information to the printer; or in the case of our product, to the microprocessor in the interface box. A complete listing of these commands and examples of how to use them starts on page # 15.

So, the command to open communications with your printer is:

The word OPEN followed by:

The FILE NUMBER (Ø to 255) and a comma
The DEVICE NUMBER (4 or 5) and a comma
An optional SECONDARY ADDRESS (Ø to 28)

And the command to end the conversation would be:

The word CLOSE followed by:

The FILE NUMBER (the same one used in open statement)

NOW THAT YOU CAN TALK TO THE PRINTER?

Now that we have an open file that we can use to tell the printer what to do, you have to make a choice between two formats to use to get the printer to listen to you.

CHOICE # 1:

CMD#
****

This format is generally the easiest to use to get the printer to print something. In this mode, everything that would normally would be sent to the screen is sent to the printer. This is usually a very easy mode to use because by now you are probably quite used to printing things to the screen and most of the same rules apply to printing things to the printer.

Let's try a simple sample. Enter and RUN:

```
10 OPEN4,4:CMD4:A$=""
20 PRINT A$;"THIS IS A TEST"
30 A$=A$+"                    ":A=A+1
40 IF A<4 THEN 20
50 PRINT#4:CLOSE4:END
```

I told you it was a simple sample, but it should give you an example of how to set up a program to print to the screen using the CMD statement.

Remember that in order to get back to printing to the screen you must redirect the information by closing the file, or opening a channel to the screen. Adding to the program to allow printing to the screen would result in the following:

```
10 OPEN4,4:CMD4
20 PRINT"TEST":I=I+1:IFI=5THEN40
30 GOTO20
40
OPEN3,3:CMD3:CLOSE4:PRINT"<CH>DONE":
    CLOSE3:I=0:GOTO10
```

OR LINE 40 COULD READ

```
40 PRINT#4 :CLOSE4:PRINT"<CH>DONE":
   I=0:GOTO10
```

NOTE: <CH> MEANS SHIFTED CLEAR/HOME KEY

As we stated earlier most of the print statements that you use to print to the screen also will print to the printer. However, there are some statements that just won't work no matter how hard you try. These statements are covered in the addendum of this book starting at page # A5.

One abnormality that must be covered now is the inability to respond to a print statement with no information after it. This is usually used to print a blank line, (ie. PRINT#4,:). To print a blank line you must print something so the computer will generate a CHR$(13). The best statement to print is <CHR$(10);>, but " " will work (not quite as fast however).

CHOICE # 2:

PRINT#
******

Printing using the "PRINT#" statement is similar to the CMD format except that you must use the "PRINT#" statement before every item you want to print. The "PRINT#" statement must be followed by the file number of an open file and a comma.

PRINT#(file number),

Again let's try a sample program:

```
10 PRINT"<CH>":OPEN4,4
20 PRINT#4,A
30 PRINTA:A=A+1:IFA=5THEN50
40 GOTO20
50 CLOSE4:END
```

Notice that using this format it is easier to print to both the screen and the printer. The disk drive can also be easily accessed using this format. But be sure to keep track of what files you have open and where you are sending the information.

As before, remember it is a good idea to close each file as soon as you are done using it. The "PRINT#" function has some strange properties just like the "CMD" function and these are covered in the same section as above starting on page # A5.

CARD/PRINT OPEN COMMANDS
****

This refers to the secondary command as used in each open statement (see page 11).

SECONDARY ADDRESS	FUNCTION
Ø (or null)	normal printing mode upper case only with line feed
1	normal printing mode upper case only no line feed
~~2~~	~~listing mode~~ ~~upper case only with line feed~~
~~3~~	~~listing mode~~ ~~upper case only no line feed~~
4	graphics mode, with line feed
5	graphics mode, no line feed
~~6~~	~~listing mode~~ ~~upper/lower case with line feed~~
7	normal printing mode upper/lower case with line feed
8	normal printing mode upper/lower case no line feed
20+ any of the above	lock mode, locks in the comand given. (ie. OPEN X,4,25 locks in the graphics mode without line feed.)

AUTO LINE FEED
****

Automatic line feed is an option available in most print modes and we will cover it only once because it will apply to all modes in the same way.

Most printers come from the factory set to print each line of characters when given the command from the computer to do so. This command is CHR$(13), after this command the printer returns to the start of the line to print more data. It will not advance to the start of the next line unless told to do so. To find out if your printer falls into this category, please consult your printer's instruction manual.

There is usually a method provided with most printers to add the necessary command data to automatically go on to the next line, but this method may require disassembling your printer, or at least turning the printer off and switching a switch. Aside from being time consuming this method usually cannot be accomplished from within a program.

There are many benefits of being able to return the printer to the beginning of the same line, but printing the command to advance the paper (the command by the way is CHR$(1Ø)) after each line can be time and memory comsuming. Also the VIC printers from Commodore do line feed automatically, so to use programs written for these printers an auto line feed function is necessary.

Fear not brave computerist, CARDCO, Inc., to the rescue. Within the command format of the "CARD/?" interface you may switch between several modes all of which offer the option of either automatically adding a line feed command 'CHR$(1Ø)' at the end of each line, or not adding it. This option may be selected at any time from within your programs so you can enjoy the best of both worlds.

First let's find out if your printer has its line feed function on or off. Try this sample program:

```
1Ø OPEN4,4,1:CMD4
2Ø PRINT"MY PRINTER WILL NOT PRINT
   ON THE SAME LINE TWICE."
3Ø PRINTTAB(16)"XXX"
4Ø PRINT#4,:CLOSE4:END
```

If your printer X'ed out the word "NOT" then it will allow a return without a line feed. If not, you may want to refer to your printer's instruction manual to see if there is a switch you can use to select this option, because this is the most flexible way to set up your printer.

So, in conclusion of this section, remember that the auto line feed function simply adds a line feed to each line. You choose this option in an "OPEN" statement. Referring to the chart on page # 15, to see which SECONDARY ADDRESS you need to use.

NORMAL PRINTING MODE
****

This is the mode of operation that you will use most of the time. This mode automatically changes Commodores unusual ASCII to the standard ASCII format which is understood by normal printers. A chart on page # A12 will show you exactly what characters are converted to what if you need to know what is happening, but it all takes place automatically and you needn't know what's going on to make use of this function. What you DO need to know is that there are four options available in this mode. They are:

1. OPEN x,4 - This option sets the printer to print in the upper case only mode with a line feed added as we talked about in the last section. (OPEN X,4,Ø may also be used.)

2. OPEN x,4,1 - This is the same as the above mode except that the line feed function is not implemented.

3. OPEN x,4,7 - This option sets the printer in the upper/lower case mode and adds a line feed as before.

4. OPEN x,4,8 - This is the same as above except this option is without the line feed function implemented.

NOTE: x is any file number (1 to 127)

Additionally, there are four other important statements that apply to this mode. You will have to be aware of these character conversions if you plan to write your own programs. If you are using commercially written programs however, these instructions will do their job without your even knowing they are there.

The first character change you should know about is CHR$(17). This character is produced by the cursor down key, and it will show up in a listing on your screen as a reversed Q. When you send this character to the printer it will shift you into the upper/lower case print mode without having to close and reopen the file. And, it has no affect on the line feed function, if it was on it'll stay on and visa-versa.

The second change is to CHR$(145). This is the cursor up key, and it does the opposite of the cursor down key - it shifts you into the upper case only mode.

Changes three and four involve the control codes sent to the printer to shift out of the expanded print mode and to shift into the condensed print mode. If your printer has these functions, then these codes will be important to you.

A brief explanation of how the VIC printer uses these codes will be helpful in understanding what we change and why. The reason we change these codes around is simply so that you can run existing programs written for your computer with the VIC printer without any modifications. It does,however, require you to remember what changes to make when you are writing your own programs.

The VIC printer is set into the expanded print mode (double size characters) by sending CHR$(14) to the printer. It stays in that mode until you send it a CHR$(15). Also, the vic printer has no provisions for condensed print (small characters) at all so there are no control codes to access this function.

On the other hand your printer (this applies to Star Micronics, Epson, Radio Shack and many others) probably will print only one line in the expanded print mode and then shift back to the normal print size automatically so you will have to send another CHR$(14) to print the next line in the expanded print mode. If you want to go back to normal size print in the middle of a line the normal VIC command of CHR$(15) would send you to a combination of expanded and condensed print because most printers use CHR$(15) to shift into the condensed print mode. So we change CHR$(15) to CHR$(2Ø) which is the code most printers use to shift back to normal size characters.

But that leaves us with the problem of what to send to the printer to get into the condensed print mode. If we send a CHR$(15) the "CARD/PRINT" changes it to a CHR$(20) so that won't work. But, if we changed CHR$(15) to CHR$(20) it would make sense to change CHR$(20) to CHR$(15) so that's what we did. By the way, CHR$(18) is the code to revert from condensed mode to normal mode and it is not changed in any way.

SPECIAL NOTE TO OKIDATA & PROWRITER USERS:

Your printer uses different control codes to access these functions, so please refer to your instruction manual for the correct codes. Because of these differences, your printer will not function properly with some commercial programs. However you can usually modify the programs to work. If,however, you require complete compatability CARDCO, Inc. can reprogram our chip to accomodate your needs at a charge of $20.

So remember, CHR$(17) shifts the printer into the upper and lower case mode; CHR$(145) shifts the printer into the upper case only mode; and CHR$(15) is swapped with CHR$(20). All of these things happen in the NORMAL PRINTING mode ONLY.

Try this program to see what your printer can do. Most printers honor all of these codes. If yours doesn't it will probably just ignore the code and go on.

```
10   OPEN 4,4 : CMD4

20   PRINT"THIS IS NORMAL UPPER CASE."

30   PRINT"THIS IS "CHR$(17)"LOWER
     "CHR$(145)"AND UPPER CASE"

40   PRINT"THESE ARE";

50   PRINTCHR$(14)" EXPANDED";

60   PRINTCHR$(15)" NORMAL";

70   PRINTCHR$(14)CHR$(20)
     " EXPANDED/CONDENSED";

80   PRINTCHR$(15)" AND CONDENSED";

90   PRINTCHR$(18)" CHARACTERS !"

100  PRINT#4,:CLOSE4:END
```

OKIDATA PRINTERS: Substitute CHR$(31) for CHR$(14), CHR$(30) for CHR$(15), CHR$(28) for CHR$(20) and CHR$(30) for CHR$(18).

SPECIAL LISTING MODE
****

The LISTING MODE is the mode you will want to use to list programs from your computer to the printer. A listing of a Commodore program usually contains some strange code symbols refering to functions such as color changes and cursor movements. These codes may mean other things to your printer however. For example if an Epson MX-80 printer was trying to list a program containing the home cursor symbol CHR$(19), it would stop dead because to the Epson CHR$(19) means stop printing until you are told to start again. So unless we make some changes I'm sure you would see how we could wind up with some strange looking program listings and unhappy programmers.

So, in the SPECIAL LISTING MODE we have not only prevented disasterous listings, we made them easier to read. Instead of symbolic representation with reversed hearts and weird graphics, we substituted letters enclosed in brackets which are much more understandable in a listing.

Page 7 of addendum

LISTING MODE ABBREVIATIONS
SECONDARY COMMANDS 2, 3 & 6

{CU}	CURSOR UP
{CD}	CURSOR DOWN
{CL}	CURSOR LEFT
{CR}	CURSOR RIGHT
{HM}	CURSOR HOME
{SC}	CLEAR SCREEN
{RV}	REVERSE ON
{RO}	REVERSE OFF
{IN}	INSERT
{DL}	DELETE
{SS}	SHIFTED SPACE
{SU}	SHIFT TO UPPER CASE
{SL}	SHIFT TO LOWER CASE
{??}	UNDEFINED CHARACTER
{BK}	BLACK
{WH}	WHITE
{RD}	RED
{CY}	CYAN
{PU}	PURPLE
{GR}	GREEN
{BL}	BLUE
{YL}	YELLOW
{OR}	ORANGE
{BR}	BROWN
{LR}	LIGHT RED
{LB}	LIGHT BLUE
{LG}	LIGHT GREEN
{G1}	GREY 1
{G2}	GREY 2
{G3}	GREY 3

By using these codes it should be easier to decipher the sometimes cryptic Commodore program listings. The SPECIAL LISTING MODE has three formats:

OPEN x,4,2	This format will give you a listing in the upper case only mode with auto line feed added.
OPEN x,4,3	This format is also upper case only but without the line feed function.
OPEN x,4,6	This format (my favorite) lists programs in the upper and lower case and adds the auto line feed function.

To list a program, Type

OPEN4,4:CMD4:LIST <RETURN>
PRINT#4:CLOSE4 <RETURN>

REMEMBER: THE GRAPHICS CHARACTERS PRINTED BY ANY PRINTER WILL BE THOSE CHARACTERS IN THE PRINTER'S MEMORY AND THOSE CHARACTERS MAY NOT BE THE SAME AS THOSE IN THE COMPUTER. SO UNLESS YOUR PRINTER HAS A SPECIAL COMMODORE GRAPHICS SET OR A PROGRAMABLE CHARACTER SET, OR DOT ADDRESSABLE GRAPHICS, THERE IS NO WAY IT CAN PRINT COMMODORE'S GRAPHIC CHARACTER SET.

GRAPHICS MODE
****

In this mode you have the ability to pass any character string to the printer unchanged. This mode is primarily intended for access to advanced graphics features available on some printers. In this mode whatever the computer sends the printer gets exactly as it was sent.

You do have the option of line feed in this mode if you should desire it. The commands to access this mode are:

OPEN x,4,4	Graphics mode with line feed.
OPEN x,4,5	Graphics mode no line feed.

There are several program examples in the appendix using the graphics mode. Examine these examples and see how we used the graphics modes of both the "CARD/?" and the printer at the same time.

Well that's all there is. Here's wishing that all your programs run the first time.

Our Best To You,
CARDCO, Inc.

PRINTER INTERFACE INSTRUCTIONS

APPENDIX

SPECIAL PRINTER CODES
****

We have found that most printer instruction manuals leave something to be desired in the area of informing the user about the use of special printer functions. For general use these guide lines should be of some help. (Please refer to your manual)

FUNCTION CODES.

These codes are always less than 32 (decimal) or between 128 and 160. These codes are usually listed as something like:

SO	14/142	ØE/8E	Double Wide Characters

This translates as:

SO — This is the name they call the function for short.

14/142 — This is the number (or numbers) that must be sent to the printer to enable this function. If two numbers are given you may send either of these numbers. This number must be sent as a character string (ie. CHR$(14))

ØE/8E — This is the hexidecimal value of the above number.

-- — This should explain what this function does.

APPENDIX

THE ESCAPE CODE and SPECIAL FUNCTION CODES.

****

THE ESCAPE CODE (IMPORTANT)

If your printer has any special codes that it honors other than the function codes which were covered above they will always be used in conjunction with this code. This code tells your printer that you are sending it a special code and that the printer is to act on this code and not treat it as a normal character and print it. This code is called the ESCAPE CODE. It is always sent to the printer as CHR$(27). Whenever you see ESC or ESCAPE that means send CHR$(27) and follow it with another code.

SPECIAL FUNCTION CODES.

These are the special function codes that your printer allows. These codes are always preceeded by the escape code which is always sent as CHR$(27). Because these codes usually are assigned the same values as the upper case alphabet you must be careful when sending them "THROUGH" our interface because in some modes the interface changes these values. These codes are usually listed in your printer manual in a cryptic format. We will try to explain how to use these codes.

APPENDIX

The codes are usually shown like this:

ESC E 69 45 emphasize print

This translates to:

ESC E	Send the printer the escape code CHR$(27) and then send it an E.
69	The decimal value of "E" which can be sent to the printer as CHR$(69).
45	The hexidecimal value of "E".
---	This should be an explaination of the special function that is done when this command is executed.

When sending these codes to the printer try to use this format:

```
PRINT#4,CHR$(27)"E"
```

The "E" must be upper case, if you are printing in the upper/lower case mode.

If you are using a word processor thet does not allow you to send letter codes to the printer, and requires only numbers you can send the correct number by adding 128 to the number shown in your printer manual if the letter is supposed to be an upper case character.

APPENDIX

Some controll codes require more than one character after the ESCAPE CODE for example:

ESC Q n 81 n 51 n Set Right Margin.

In this example the printer "sees" this as:

CHR$(27)"Q"CHR$(70)

** OR **

CHR$(27) - Ah Ha, This is an escape code, so I should not print the next character, because the next character will be an instruction for me.

"Q" This instruction tells me to set the right hand margin. But I need to wait for the next character to tell me where to set the margin.

CHR$(70) This tells me that the right margin is to be set to the 70th position. and that is all the information I need so I can go back into my normal operation and put the next character on the paper.

With a little practice and reading your printer's intsructions you should be able to make it do all of it's tricks for you.

APPENDIX

COMMANDS THAT DON'T WORK
??????????????????????

As we mentioned in the text of this manual, there are several abnormalities in the Commodore computers that affect printing functions. We will cover those that we know about and if you find any more please let us know so we can add them to updates of this manual for future Commodore owners.

#1.

One abnormality that must be covered is the inability to respond to a print statement with no information after it. This statement is usually used to print a blank line. To print a blank line you must print something. The best statement to print is <CHR$(1Ø);>, but " " will work (but not quite as fast however).

#2.

The next oddity is the format that must be used to close a file from the CMD# mode. It seems that the only statement that will work consistantly is:

PRINT#x:CLOSEx

Where "x" is the file number to be closed.

We have no idea why this is necessary, but a simple CLOSEx statement doesn't seem to work in all cases. This even seems to vary from computer to computer.

#3.

Another function that doesn't work right is the TAB function. IF you try to put this into a program:

```
PRINT#4,TAB(20)
```

you will get a syntax error. This is a bug in the Commodore computer because that should be a legal statement. THE ONLY WAY THIS STATEMENT WILL WORK IS:

```
PRINT#4,""TAB(20)
```

This allows the TAB function to work, but not very well.

There are three solutions to this problem and some will work with some printers while another may be required for your printer. Experimentation will provide the best solution for your system, so we will give you several options.

1. If your printer requires the line feed option then this is the easiest solution for you. To do tab functions; close the file you are using; reopen it without the line feed function and then print each item to be tabbed as a seperate print statement. But, be sure to remember to print CHR$(10) to advance the paper to the next line after the last item you want printed on each line. Try this:

SAMPLE TAB PROGRAM # 1
****

```
 10  OPEN 4,4: FOR I = 1 TO 4

20  PRINT#4,"THIS IS LINE #"I:NEXT I

30  CLOSE4:OPEN4,4,1

40  FOR I = 1 TO 4

50 REM  SEVEN TABS AT 10,20,30...

60  PRINT#4,""TAB(10)I*10

70  PRINT#4,""TAB(20)I*20

80  PRINT#4,""TAB(30)I*30

90  PRINT#4,""TAB(40)I*40

100 PRINT#4,""TAB(50)I*50

110 PRINT#4,""TAB(60)I*60

120 PRINT#4,""TAB(70)I*70

130 PRINT#4,CHR$(10)

140 NEXT I : CLOSE4:END
```

This will work with most Star, Epson, Okidata and Radio Shack printers.

2. If that doesn't work on your printer then try looking in your printer manual to see if the printer itself has the ability to provide the tab function.
In the Star GEMINI 1Ø the the tabs are preset to every tenth position and accessed by printing CHR$(9). But you can set your own if you like. The code to set the tabs is CHR$(27)CHR$(68) followed by your desired tab locations given as CHR$(x) as many times as you need tabs, and then ended with CHR$(Ø). This tells the printer there are no more tabs and to return to normal printing.

In the Epson printers tabbing is the same as the Star. Except that if you don't have GRAFTRAX you may have to add 128 to some of the numbers. Without GRAFTRAX, in the Epson MX-8Ø the horizontal tabs are preset to every eighth position and are accessed by printing CHR$(137). But you can set your own.
The code to set the tabs is CHR$(27)CHR$(68) followed by your desired tab locations given as CHR$(x+128) as many times as you need tabs, and then ended with CHR$(128). This tells the printer there are no more tabs, and to return to normal printing.

The Okidata Microline 82 & 83 series printers do not allow for horizontal tab, but the Microline 84, 92 and 93 do. These are implemented as above with CHR$(9), but are set with CHR$(27) CHR(9) then your tabs as three digit numbers IE. "ØØ2" or "ØØ2,Ø2Ø,Ø42"

3. As a last resort you can construct your own tab function by printing everything as a string and tabbing from the end of the last item printed the desired distance minus the length of the string just printed. This is a last resort but will always work.

Here is a sample of how to do it:

In this sample we will print a mixture of strings and numbers and tab for even spacing. Note that the numbers must be converted to string format for this to work unless the numbers are all the same length. If you use for next loops for your printing this is not as difficult as it would seem. And if you take the time to use this method it is fool proof and will work on any printer with any program.

APPENDIX

PROGRAM EXAMPLE TO DO TABBING # 2

```
10   OPEN4,4
20   FOR I = 0 TO 10
30   READ A$,B$
40   A=A+I*I
50   B=B+I*B
60   REM FOUR TABS AT 10,30,50,70
70   PRINT#4,""TAB(10)A$;
80   PRINT#4,""TAB(20-LEN(A$))A;
90   PRINT#4,""TAB(20-LEN(STR$(A)))B$;
100  PRINT#4,""TAB(20-LEN(B$))B
110  NEXTI:END
120  DATA THE,NEW,CARDCO,INTERFACE
130  DATA E.J. LIPPERT,PRES,CARDCO,INC.
140  DATA  BRECK RICKETTS,VP,CARDCO,INC.
150  DATA CARD/?,CARDBOARD/6,CARDETTE,A
160  DATA CARDBOARD/3,CARDRITER,KS.,MN.
```

APPENDIX

WORD PROCESSORS
****

Some word processors offer additional features and special codes when you specify that you are using a NON-Commodore printer. Since the "CARD/?" simulates a Commodore printer in normal print modes it will cause a conflict if you take this option. So to allow you to take advantage of special word processor functions you should use the following open command sequence before calling up your word processor:

```
OPEN4,4,25:CMD4:PRINT"LOCK":PRINT#4:CLOSE4
<RETURN>
```

This will lock the interface in the non-Commodore mode and allow the word processor to controll all ASCII conversion and line feed functions. You may now specify the type of printer you have when the word processor prompts you for this information.

This command is recommended for use with both "QUICK BROWN FOX" and "WORDPRO 3 Plus" word processors.

Be aware that once you are locked in a mode the only way to unlock the "CARD/?" is to power-down. The easiest way to power-down is to unplug the power line that goes to the cassette port.

APPENDIX

CARD/? ASCII CHANGES
****

Normal printing mode.
UPPER CASE ONLY
==========

CHR$(15) BECOMES CHR$(20)
CHR$(17) CHANGES TO UPPER/LOWER CASE
CHR$(20) BECOMES CHR$(15)

ALL OTHER CHARACTER STRINGS ARE SENT
UNCHANGED.

Normal printing mode.
UPPER/LOWER CASE
==========

CHR$(15) BECOMES CHR$(20)
CHR$(20) BECOMES CHR$(15)
CHR$(65) TO CHR$(90) HAVE 32 ADDED TO THEM
CHR$(145) CHANGES TO UPPER CASE ONLY MODE
CHR$(192) TO CHR$(218) HAVE 128 SUBTRACTED
FROM THEIR VALUE

ALL OTHER CHARACTER STRINGS ARE PASSED
UNCHANGED

APPENDIX

QUICK SCREEN DUMP WITH NO GRAPHICS.

****

This screen dump can be used in any basic program to copy the contents of the screen to any printer. It would work fine to copy a screen of numbers from a check book program or the instructions from a game or some other program.

To use this program simply put the statement "GOSUB 63999" in the program at the point (or points) at which you wish to dump the screen to the printer, and then add this to the program:

```
63000    GET A$ : IF A$ = "" THEN 63000

63010    IF A$ <> CHR$(133) THEN RETURN

63020    OPEN 4,4,4

63030    CG = PEEK (36869)

63040    SC = 4*(PEEK(36866)AND 128)+
         64*(PEEK(36869)AND112)

63050    FOR I0 = 0 TO 505

63060    C0 = PEEK(SC+I0)

63070    IF(CG = 240) OR (CG=192)THEN
         GOSUB 63300

63080    IF(CG = 242) OR (CG=192)THEN
         GOSUB 63200

63090    PRINT#4,CHR$(A0);:L0 = L0 +1
```

```
63100    IF L0 =22 THEN PRINT#4," ":L0 =
         0 :NEXT I0:CLOSE4:RETURN
63110    NEXT I0:CLOSE4:RETURN

63200    IF C0 < 27 THEN A0=C0+96:RETURN

63210    IF C0 < 32 THEN A0=C0+64:RETURN

63220    IF C0 < 91 THEN A0=C0:RETURN

63230    A0=32:RETURN

63300    IF C0 < 32 THEN A0=C0+64:RETURN

63310    IF C0 < 64 THEN A0=C0:RETURN

63320    A0=32:RETURN

63999    GOTO63000
```

To change this program to run on ths C-64:

```
63100    IF L0=40 THEN PRINT #4," ":
         L0=0:NEXTI0:CLOSE4:RETURN
63030    CG = PEEK(53272)
63040    SC = 1024
63050    FOR I0 = 0 TO 999
63070    IF CG = 21 THEN GOSUB 63300
63080    IF CG = 23 THEN GOSUB 63200
```

When the program comes to the "GOSUB 63999" it will stop. It will wait for a key to be pressed, pressing function key "F1" will cause the screen dump subroutine to run, pressing any other key will allow the program to continue as if nothing happened.

APPENDIX

VIC-20 HIGH RESOLUTION SCREEN DUMP

****

This is a very unusual screen dump. It may give you a new perspective on how your printer sees your Commodore computer. To use this screen dump just insert "GOSUB 63999", or "GOSUB 62999" for a reversed image, where ever you want a snapshot of your screen. This is in basic so it is somewhat slow but it'll get the job done. An examination of this program will probably teach you a few things about programming.

PROGRAM BY: E.J. LIPPERT II

```
62999    RV=1

63000    C0=PEEK(36869)

63010    SC=4*(PEEK(36866)AND128)
         +64*(PEEK(36869)AND112)

63020    IF C0 > 239 THEN C0=C0-240:
         GOTO63040

63030    C0=C0-192

63040    IF C0 < 3 THEN CG = 32768+
         (C0 * 1024): GOTO 63060

63050    IF C0 > 11 THEN CG = 4096+
         ((C0-12)* 1024): GOTO 63060

63060    OPEN4,4,5: PRINT#4,CHR$(10)
         CHR$(10)
```

```
63070   PRINT#4,CHR$(27)CHR$(64)

63080   PRINT#4,CHR$(27)CHR$(51)
        CHR$(16)" "

63090   FOR I1 = 0 TO 21

63100   PRINT#4,"           "CHR$(27)
        CHR$(76)CHR$(112)CHR$(1);

63110   FOR I2 = 0 TO 22

63120   C1 = PEEK(SC+(22*(22-I2))+I1)

63130   FOR I3 = 0 TO 7

63140   C2 = PEEK(CG+(C1*8)+(7-I3)):
        IF RV=1 THEN C2 = 255 - C2

63150   PRINT#4,CHR$(C2)CHR$(C2);

63160   NEXT I3

63170   PRINT#4,CHR$(10)

63180   NEXT I2 : PRINT#4,CHR$(10)

63190   NEXT I1

63200   PRINT#4,CHR$(10)

63210   PRINT#4,CHR$(27)CHR$(64)

63220   CLOSE4 : RETURN

63999   GOTO 63000
```

PRINTER INTERFACE INSTRUCTIONS

APPENDIX

This version was written for the STAR MICRONICS - GEMINI 10/15 & EPSON MX-80/100 printers with graftrax. To modify it for the Prowriter orC ITOH 8510 you will have to change these lines to read:

```
63070     DELETE THIS LINE
63080     PRINT#4,CHR$(27)CHR$(84)"14 "
63100        PRINT#4,"                "CHR$(27)
          CHR$(83)"0184"
63200     DELETE THIS LINE
```

And that should have you running on your printer.

A Radio Shack printer will obey the same commands as the Epson for the most part. And if there are any difficulties by now you should be a veteran programmer who can "patch" the program with ease.

THIS PROGRAM WILL NOT RUN ON AN OKIDATA PRINTER EVEN WITH OKIGRAPH. Due to it's ability to accept only 7 bit graphics codes the changes required would be to extensive to be included in this manual.

APPENDIX

Adding these lines will allow you to fill up a screen with text or graphics, and then press the 'f-1' key to print the screen or press the 'f-2' key (shifted 'f-1' key) to print a reversed image of the screen.

```
10   PRINT"<CH>"

20   GET A$: IF A$ = "" THEN 20

30   IF A$ = CHR$(133) THEN GOSUB 63999

40   IF A$ = CHR$(134) THEN GOSUB 62999

50   PRINT A$;:GOTO 20
```

You can also use this routine as a go-sub routine in a basic program using the VIC computer's high-res screen graphics capabilities. This will allow you to create a screen in high-res graphics and then print that screen to the printer in high-res mode.

APPENDIX

PRINTING COMMODORE GRAPHICS
****

This is another little subroutine. This one will allow you to print a COMMODORE graphics character where ever you need one. There are two requirements to use this sub routine. One is that file # 9 not be open at the time you call this routine, and two is that you must set the variable SC to equal the screen code value (look it up in the screen code table in your computer's instruction manual) before you call the subroutine. Then all you do is insert "GOSUB 63999" wherever you want the character to be printed.

PROGRAM BY BRECK RICKETTS

```
63000     OPEN9,4,5:PRINT#4,CHR$(27)
          CHR$(76)CHR$(16)CHR$(0)

63010     BT=0:CA=(PEEK(36869)AND15)*
          1024+32768+(8*SC)

63020     FOREP=7TO0STEP-1:EQ=7:FOR
          NA=CATOCA+7

63030     TT=PEEK(NA)AND(2↑EP):IF
          TT>0THENBT=BT+(2↑EQ)

63040     EQ=EQ-1:NEXTNA:PRINT#4,
          CHR$(BT)CHR$(BT);:BT=0

63050     NEXTEP:CLOSE9:RETURN

63999     GOTO63000
```

APPENDIX

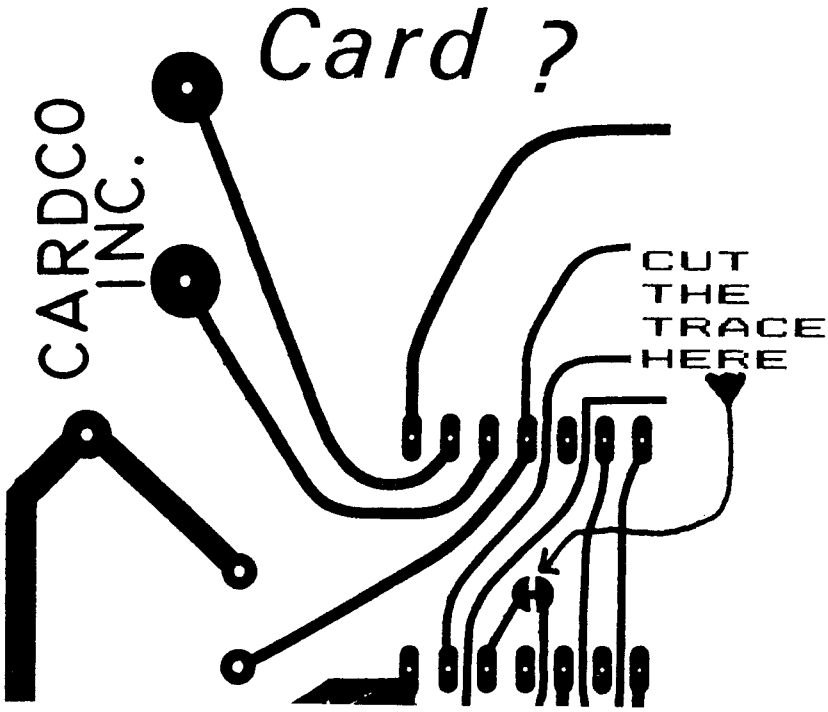
"CARD/PRINT PIN OUT DIAGRAM
****

This is a standard Centronics type parallel pin out.

Pin #	Function
1	data strobe (data ready to print)
2	8 bit ASCII - data bit Ø
3	8 bit ASCII - data bit 1
4	8 bit ASCII - data bit 2
5	8 bit ASCII - data bit 3
6	8 bit ASCII - data bit 4
7	8 bit ASCII - data bit 5
8	8 bit ASCII - data bit 6
9	8 bit ASCII - data bit 7
1Ø	not used
11	busy line (printer busy)
12-13	grounded
14	n/c
15-17	grounded
18	n/c
19-3Ø	ground returns
31	prime output (printer reset)
32	not used

DEVICE # SELECTION
****

This unit comes from the factory set to device # 4. If you want to change it to # 5, you should first remove the four screws holding the case together. Then remove the circuit board and locate the device select dot on the underside of the board. Now carefully scrape off the small trace connecting the two half circles. Put the unit back together and you are done.



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