G-Wiz

A Parallel Printer Interface with Graphics for Commodore Computers

cardco, inc.

300 S. Topeka • Wichita, Ks 67202

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This equipment generates and uses radio frequency energy and if not installed and used properly, that is, in strict accordance with the manufacturer's instructions, may cause interference to radio and television reception. It has been type tested and found to comply with the limits for a Class B computing device in accordance with the specifications in Subpart J of Part 15 of FCC rules, which are designed to provide reasonable protection against such interference in a residential installation. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient the receiving antenna
- Relocate the equipment with respect to the receiver
- Move the equipment away from the receiver.
- Plug the equipment into a different outlet so that the equipment and receiver are on different branch circuit

If necessary, the user should consult the dealer or an experienced radio/television technician for additional suggestions. The user may find the following booklet prepared by the Federal Communication helpful:

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This product was developed by:

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G WIZ - INSTRUCTION MANUAL
CARDCO, Inc. - (316) 267-6525

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SPECIAL NOTE TO ALL
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Within the text of this manual references are made to many printers and printer types. The G-Wiz interface was intended to be used only with printers that conform to certain standards. There are four groups of printers that are intended to be used with the G-Wiz interface. The four groups are the Epson group, the Prowriter group, the Okidata group and the Seikosha group. A listing of the most common printers in each group is on page A1 of the appendix of this manual. When, in this manual, we refer to one of the printers in a group the statement will refer to all printers in that group.

If your printer isn't listed in one of those groups it may still be in one of them, we just aren't aware of it. If this is the case and you find that your printer works when set up like one of the printers in one of the groups, please let us know so we can pass on the information to other users.

Any parallel printer can be used with the G-Wiz, but the special Commodore functions and Commodore graphics will not be available.

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INTRODUCTION

The G-WIZ printer interface was designed to allow you to add most parallel printers to your Commodore 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 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.

HOOK UP PROCEDURES

1. SEE APPENDIX PAGE A1 FOR INSTRUCTIONS ON SETTING THE DIP SWITCHES IN YOUR INTERFACE.

2. TURN OFF YOUR COMPUTER AND PRINTER. INSERT THE DIN 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 DIN PLUG INTO THE BACK OF YOUR DISK DRIVE.)

3. INSERT THE BIG BLACK PLUG INTO THE PORT ON YOUR PRINTER. IF THIS BLACK PLUG WILL NOT FIT INTO THE PRINTER, BREAK OFF THE BOTTOM OF THE CASE. BREAKING THE CASE WILL NOT VOID YOUR WARRANTY, NOR SHOULD IT CAUSE AN ELECTRICAL HAZARD.

4. PLUG THE CONNECTOR ON THE END OF THE THIN WNIRE INTO THE CASSETTE PORT ON THE COMPUTER BEING SURE THAT THE WIRE FACES DOWN, AND THE SMALL CIRCUIT BOARD IS ABOVE THE CONNECTOR. NOW, PLUG THE CASSETTE UNIT (IF USED) ONTO THE SMALL CIRCUIT BOARD AND IT WILL OPERATE NORMALLY.

5. TURN ON THE PRINTER AND THE COMPUTER IN THAT ORDER. (ALWAYS TURN ON THE PRINTER FIRST WHEN USING THE G-WIZ.)

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

7. 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. 1ST TYPE "NEW."

**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. (PLEASE BE SURE ALL THREE CONNECTIONS ARE SECURED.)

IF ALL FAILS CONTACT YOUR DEALER, OR CALL US AT (316) 267-6525 BETWEEN 9 AM & 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.

RUNNING EXISTING PROGRAMS

Your interface was designed to allow you to run all standard programs available for the Commodore without any changes. After reading this manual you should be able to handle any program. If you run into a severe problem, don't hesitate to write or 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 G-WIZ'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 Commodore using the "G-WIZ" 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 PRINT#4:CLOSE 4:END
50   GOTO 20
```

You have just printed the standard character set that comes with your printer. 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 page # A4) For example try this:

```
OPEN4,4:PRINT#4,CHR$(12) <RETURN>
```

If you just lost a sheet of paper then your printer 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 of your printer.

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 be mastered.

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

PRINTERS HAVE DEVICE NUMBER OF 4, 5, 6 & 7

To talk to a printer, you must open a channel. 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.

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$(1Ø)> after each carriage return <CHR$(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 "G-WIZ" 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 correspondence from the same program without any rewiring or changing around of printers or programs. (Refer to the appendix which deals with the DIP switch settings for your G-WIZ interface).

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 # 13.

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)

COMMODORE SPECIAL PRINTER CODES

****

Commodore printers use some special codes to accomplish tabbing, graphics and other functions that are unique to Commodore. To allow total compatibility with pre-existing Commodore programs we have implemented these functions in the G-WIZ interface. These functions should be considered as a bonus you got when you bought the G-WIZ, because they will give you another way to accomplish some special printing chores.

Most of these commands are probably available in your printer, but in some cases the Commodore printer versions may be easier to use. In other cases, however, the Commodore versions may interfere with what you want to do. So we only implemented these commands in the normal printing modes (secondary addresses Ø,1,7 & 8) to allow you to turn them off if desired.

A detailed list of these commands can be found in the appendix of this manual. Be sure to read this section if you want to get the most out of your system.

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 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 use 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$="  <16 spaces>  "+A$: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  GOTO 20
40  OPEN3,3:CMD3:CLOSE4:PRINT"<CLR>DONE":
    CLOSE3:I=0:GOTO10
```

OR LINE 40 COULD READ

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

NOTE: <CLR> 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 # A7.

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:

```
1Ø  PRINT"<CLR>":OPEN4,4
2Ø  PRINT#4,A
3Ø  PRINTA:A=A+1:IFA=5THEN5Ø
4Ø  GOTO2Ø
5Ø  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 # A7.

G-Wiz OPEN COMMANDS
****

This refers to the secondary command as used in each open statement (see page 10).

SECONDARY ADDRESS	FUNCTION
0 (or null)	normal printing mode (upper case/graphics mode) also called the **CURSOR UP mode** upper case only with line feed
1	normal printing mode (upper case/graphics mode) also called the **CURSOR UP mode** upper case only no line feed
2	reserved
3	hexadecimal mode all characters sent from your computer to the printer will be printer out in their hexa-decimal equivalent.

CONTINUED ON NEXT PAGE

4	transparent mode, w/ line feed
5	transparent mode, no line feed
6	reserved
7	normal printing mode (upper/lower case mode) also called **CURSOR DOWN** mode upper/lower case with line feed
8	normal printing mode (upper/lower case mode) also called **CURSOR DOWN** mode upper/lower case no line feed
2Ø+ any of the above	lock mode, locks in the command 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 consuming. 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 "G-WIZ" 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
2Ø  PRINT#4,"MY PRINTER WILL NOT
    PRINT ON THE SAME LINE TWICE."
3Ø  PRINT#4,""TAB(16)"XXX":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. Refer to the chart on page # 13 to see which SECONDARY ADDRESS you need to use.

G-WIZ DIP SWITCH #4
****

This dip switch manually controls the auto line feed function. It will allow you to manually override the software selection of this function provided by the previously mentioned open commands.

With switch #4 in the on position, no auto line feeds will be sent to your printer under any circumstances. The interface will ignore the line feed information sent in the secondary addresses. For example, an open command of OPEN 4,4,7 will have the same effect as OPEN 4,4,8.

When switch #4 is off, the interface will honor the auto line feed software selection as described in the previous section. An open command of OPEN 4,4,7 would provide printing with auto line feed and OPEN 4,4,8 would print without line feed.

We would normally recommend that if you can turn off the line feed on your printer you should do so, then turn on off dip switch #4. This will provide you with the most flexible system. If you can't turn off the line feed function on your printer, then you should turn dip switch #4 on. This will prevent double line feeds when using your printer with existing programs like word processors.

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 # A40 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$(20) 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$(15) the "G-Wiz" changes it to a CHR$(2Ø) so that won't work. But, if we changed CHR$(15) to CHR$(2Ø) it would make sense to change CHR$(2Ø) to CHR$(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.

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$(15) is swapped with CHR$(2Ø). 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:OPEN5,4,5
 20  PRINT#4,"THIS IS NORMAL UPPER CASE."
 30  PRINT#4,"THIS IS "CHR$(17)"LOWER
     "CHR$(145) " AND UPPER CASE"
 40  PRINT#4,"THESE ARE";
 50  PRINT#4,CHR$(14)" EXPANDED";
 60  PRINT#4,CHR$(15)" NORMAL";
 70  PRINT#4,CHR$(14)CHR$(20)
     "EXPANDED/CONDENSED";
 80  PRINT#4,CHR$(15)" AND CONDENSED";
 90  PRINT#5,CHR$(18);
100  PRINT#4," CHARACTERS !"
110  PRINT#4,:CLOSE4:END
```

QUOTE MODE
****

The QUOTE MODE is automatically in operation whenever you are in the normal printing mode (secondary addresses Ø,1,7 and 8). The quote mode is of most value when listing programs. A listing of a Commodore program usually contains some strange code symbols referring 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-8Ø 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 QUOTE MODE we have not only prevented disastrous 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.

If you look at a typical program listing you will see that whenever a cursor control code (cursor up, for example) is listed it is always part of a group of characters enclosed in quotation marks. When you are listing a

program the quotation marks tell the G-Wiz that the group of characters enclosed is a string to be printed during the operation of a program. And the interface should list them as such and include the special listing codes as they are needed.

It is possible to fool the program into thinking it is listing a program during the running of a program by sending a CHR$(34) to the printer as part of a print statement thus enabling the QUOTE MODE. This will cause any control codes to be converted to special listing codes. This can be good or bad depending on your intentions. The QUOTE MODE is disabled either when another CHR$(34) (quotation mark) or when a CHR$(13) (RETURN) is sent to the printer. So be careful when you are printing using CHR$(34) and quotation marks.

This can create a bothersome situation especially when sending dot addressable graphics to the printer or using some word processors. If you are sending dot graphics to the printer we highly recommend using the secondary address commands of ,4 or ,5 to enable the TRANSPARENT MODE. When the interface is in the TRANSPARENT MODE the QUOTE MODE will be disabled.

Codes Used in Program Listings

CHR$ SENT	LISTING SYMBOL	SYMBOL DEFINITION
CHR$(1)	"{$1}"	Unknown Character
CHR$(2)	"{$2}"	Unknown Character
CHR$(3)	"{$3}"	Unknown Character
CHR$(4)	"{$4}"	Unknown Character
CHR$(5)	"{WHT}"	White
CHR$(6)	"{$6}"	Unknown Character
CHR$(7)	"{$7}"	Unknown Character
CHR$(8)	"{DISH}"	Disable Shift/ Commodore Key
CHR$(9)	"{ENSH}"	Enable Shift/ Commodore Key
CHR$(11)	"{$11}"	Unknown Character
CHR$(12)	"{$12}"	Unknown Character
CHR$(14)	"{SWLC}"	Shift to L/C
CHR$(15)	"{$15}"	Unknown Character
CHR$(16)	"{$16}"	Unknown Character
CHR$(17)	"{C/DN}"	Cursor Down
CHR$(18)	"{RVON}"	Reverse On
CHR$(19)	"{HOME}"	Home Cursor
CHR$(20)	"{DEL}"	Delete
CHR$(21)	"{$21}"	Unknown Character
CHR$(22)	"{$22}"	Unknown Character
CHR$(23)	"{$23}"	Unknown Character
CHR$(24)	"{$24}"	Unknown Character
CHR$(25)	"{$25}"	Unknown Character
CHR$(26)	"{$26}"	Unknown Character
CHR$(27)	"{$27}"	Unknown Character
CHR$(28)	"{RED}"	Red
CHR$(29)	"{C/RT}"	Cursor Right
CHR$(30)	"{GRN}"	Green
CHR$(31)	"{BLUE}"	Blue

Codes Used in Program Listings (continued)

CHR$(128)	"{$128}"	Unknown Character
CHR$(129)	"{ORNG}"	Orange
CHR$(130)	"{$130}"	Unknown Character
CHR$(131)	"{$131}"	Unknown Character
CHR$(132)	"{$132}"	Unknown Character
CHR$(133)	"{F1}"	F1 Function Key
CHR$(134)	"{F3}"	F3 Function Key
CHR$(135)	"{F5}"	F5 Function Key
CHR$(136)	"{F7}"	F7 Function Key
CHR$(137)	"{F2}"	F2 Function Key
CHR$(138)	"{F4}"	F4 Function Key
CHR$(139)	"{F6}"	F6 Function Key
CHR$(140)	"{F8}"	F8 Function Key
CHR$(141)	"{SHRT}"	Shifted Return
CHR$(142)	"{SWUC}"	Shift to U/C
CHR$(143)	"{$143}"	Unknown Character
CHR$(144)	"{BLK}"	Black
CHR$(145)	"{C/UP}"	Cursor Up
CHR$(146)	"{RVON}"	Reverse Off
CHR$(147)	"{CLR}"	Clear/Home
CHR$(148)	"{INS}"	Insert
CHR$(149)	"{BRN}"	Brown
CHR$(150)	"{LRED}"	Light Red
CHR$(151)	"{GRY1}"	Grey 1
CHR$(152)	"{GRY2}"	Grey 2
CHR$(153)	"{LGRN}"	Light Green
CHR$(154)	"{LBLU}"	Light Blue
CHR$(155)	"{GRY3}"	Grey 3
CHR$(156)	"{PURP}"	Purple
CHR$(157)	"{C/LF}"	Cursor Left
CHR$(158)	"{YELO}"	Yellow
CHR$(159)	"{CYAN}"	Cyan

TRANSPARENT 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 and dedicated word processors. 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	Transparent mode with line feed.
OPEN x,4,5	Transparent mode no line feed.

There are several program examples in the appendix using the transparent mode. Examine these examples and see how we used the transparent modes of both the G-Wiz and your printer's special functions at the same time.

DIP SWITCH #2
****

Turning dip switch #2 on will force the interface into the transparent mode and all software commands requesting other modes will be ignored. With the switch off, however, you will be allowed to use the software selections covered above.

This feature can be very useful when you are using some word processing programs that allow you to send corrected ASCII codes to the printer in conjunction with printer special function codes.

The TRANSPARENT MODE can also be locked in by the use of the LOCK MODE which is discussed in the next section. This software function can be used in place of the dip switch.

Experimentation will provide you with the best answers as to when and what programs to use the transparent mode with. Most of the time this switch should be turned off, but some graphics and word processing programs will work better with it on. In general, the preferred position is off.

LOCK MODE
****

The lock mode is provided to allow you to lock out any unwanted secondary address commands that might be sent to the interface by programs written to be used with only Commodore printers. Using this mode you will be able to prevent, for example, a program from sending a secondary address that adds an automatic line feed if your printer doesn't require one.

To use the lock mode all you need to do is add 2Ø to the secondary address that you want locked in. For example, if you want to lock in the TRANSPARENT MODE without line feed, you would add 2Ø to the secondary address normally used for that mode and send the command OPEN x,4,25. After sending the lock command you must send a print statement to complete the lock. For example you might send PRINT#4,"O.K."

There is only one way to quit the lock mode. You must "power down" the printer interface; this can be done by either turning your computer off for a moment or by momentarily unplugging the power cord that comes from the G-Wiz and goes to the cassette port on your computer.

HEXADECIMAL MODE

This mode will allow you to see exactly what character values are being sent from the computer to the interface. This mode will be of most value when debugging a program that is sending special characters to the printer. For example, if you wrote a routine that sent a formatted output including hi-res graphics and other escape codes.

To use this optional feature all you need to do is use the appropriate open command and then run the program as you normally would. Your printer will then print the hexadecimal value of all characters sent by your program. Even escape code sequences will be translated to hex values and printed out (instead of being acted upon) so you can see if you are sending the right combination of characters.

For example, here are some possible characters that you might send, compared to what you would see printed if you used the HEXADECIMAL MODE. (Secondary address # 3)

```
CHR$(27)CHR$(69)"EMPHASIZED"
1B 45 45 4D 5Ø 48 41 53 49 5A 45 44 ØD

CHR$(27)CHR$(66)CHR$(2)"12 CPI"
1B 42 Ø2 31 32 2Ø 43 5Ø 49 ØD

CHR$(27)CHR$(75)CHR$(Ø)CHR$(1)CHR$(255)
1B 4B ØØ Ø1 FF ØD
```

Note: Hex mode can also be activated by turning on only G-Wiz DIP switches 2 & 6.

COMMAND REGISTER
****

The G-Wiz has a special secondary address. When you use the secondary address of 31, you can examine and change, if you desire, the current DIP switch setting on the interface.

We call the special secondary address of 31 the command register, because it allows you to see what commands the G-Wiz is currently sending to your printer. When a channel is opened and a secondary address of 31 is issued with a PRINT# command, like

OPEN4,4,31:PRINT#4 <RETURN>

A two digit hexadecimal number will be printed; this hexadecimal value will correspond to the DIP switches that are in the X or on position. The command register decimal (base 1Ø) values for each DIP switch are shown in TABLE 1.

TABLE 1
Command Register Values

Switch #	Command Register Value	
	Decimal	Hexadecimal
1	No Value	No Value
2	4	4
3	2	2
4	1	1
5	8	8
6	16	1Ø
7	128	8Ø
8	32	2Ø

For example, if the interface were set for a C.itoh printer (DIP switches 1 and 7 are on -- all other DIP switches are off) then when you type in the open statement on the previous page, your printer will respond by printing 8Ø. 8Ø is hexadecimal and this equals 128 in decimal. So if you look at TABLE 1, you'll see that DIP switch 7 corresponds with 128 decimal and 8Ø hexadecimal. Since an 8Ø is printed, we know that DIP switch 7 is on. TABLE 1 does not give a value for DIP switch 1, so there's not a way to tell if it is on using the command register or secondary address 31.

Now you know how to tell which DIP switches are in the on position. That's great. But maybe you want to turn another switch on. Well it's easy to turn a switch on, just flip the switch. Flipping the switch is easiest. But you can also change the status of a DIP switch through software or without changing the actual switch on the interface. Look, and run it if you want, at the following program. When you see the number 64 following a CHR$ command, you'll know that we're changing the status of one of the DIP switches. 64 plus the corresponding decimal value in TABLE 1 allows the software change. Here's the program listing in lower case (if you see a capital letter, press the shift key when you press the letter key):

```
10 open4,4,31:print#4,chr$(64+128+1);:rem
   turn off c.itoh line feed
20 close4
30 open4,4,7
40 print#4,"Cardco's"
50 print#4,chr$(16)"10G-Wiz!":rem tab 10
   spaces
60 close4
70 open4,4,31:print#4,chr$(64+128);:rem
   turn on line feed for c.itoh
80 close4
90 end
```

Remember that this program is for the C.itoh type printer. If you have another type of printer, the values on lines 10 and 70 will change according to the type of printer you have -- these values are listed in TABLE 1.

Line 1Ø of the program opens the command register and tells it that DIP switch 7 needs to be on, so 64 plus 128 leaves 7 in an on position. (See TABLE 1 -- switch 7 has a decimal value of 128.) Line 1Ø also tells you that you're turning DIP switch 4 on, and 64 plus 1 turns DIP switch 4 on. (See TABLE 1 -- switch 4 has a decimal value of 1.) The first idea here is to examine the command register with the secondary address of 31. Secondly, we can control the command register by adding 64 to the decimal values listed in TABLE 1. Finally, after we've done what we want to do with the command register, the channel is closed (See line 2Ø). Notice that after the values are added to 64 there is a semi-colon (;) after the right parenthesis. Placing a semi-colon after the right parenthesis of the CHR$ value suppresses the printing of the hexadecimal value. The command register is still effected, but the hexadecimal values are not printed.

The exception to software control of the command register occurs with DIP switches 1 and 5. DIP switch 1 has no hexadecimal or decimal value, so that explains its exception. DIP switch 5 controls the printer device number and you can read the switch (to determine if it's on) using the command register; however, the printer device number cannot be changed using the command register. You must change this DIP switch the easy way, and that's by manually flipping the switch on the interface.

PRINTER CONFIGURATION
****

Before using the G-Wiz, it must be configured to the printer it is to be used with. Setting the G-Wiz's DIP switches for a particular printer will assure proper configuration. The DIP switch settings for various printers are as follows:

TABLE A
Various Printer DIP Switch Settings

Printer Type	Switch #	1	2	3	4	5	6	7	8
Epson, Star Panasonic		O	O	O	O	O	O	O	O
Mannesmann, Legend, BMC		X	O	O	O	O	O	O	O
Okidata		O	O	O	O	O	O	O	X
C.itoh, NEC, Prowriter		X	O	O	O	O	O	X	O
Seikosha & Banana		O	O	O	O	O	X	O	O
Daisy Wheel		O	X	O	O	O	O	X	O

O means the G-Wiz DIP switch is OFF
X means the G-Wiz DIP switch is ON

So if you are using an Epson printer, you would leave all the G-Wiz DIP switches in the OFF position.

Table B gives the various functions of the G-Wiz DIP switches.

TABLE B

DIP Switch Functions & Settings

Switch #	Function	Settings
1	Character sets	O - 6 bit X - 8 bit
2	Transparent mode	O - ASCII X - Transparent
3	Character swap	O - Swap X - No swap
4	Auto line feed	O - On X - Off
5	Printer Device #	O - #4 X - #5
6	Configuration	
7	Configuration	
8	Configuration	

O means the G-Wiz DIP switch is OFF
X means the G-Wiz DIP switch is ON

NOTE: Turning on DIP switches 2 & 6 only will activate HEX mode. (See page 30)

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 printer's instruction 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	0E/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))
08/8E	This is the hexadecimal value of the above number.
--	This should explain what this function does.

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 preceded 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.

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 hexadecimal value of "E".
---	This should be an explanation 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 (secondary address 7 or 8).

If you are using a word processor that 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.

Some control 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$(27)"Q"CHR$(7Ø)

** 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$(7Ø) This tells me that the right margin is to be set to the 7Øth position. And that's all the information I need, so I go back into my normal operation and put the next character on the paper.

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

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. The first 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 consistently is:

```
PRINT#x:CLOSEx
```

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

We have no idea why this is necessary, but a simple CLOSE(x) statement doesn't seem to work in all cases.

#2. Another function that doesn't work right is the SPC function. If you try to put this into a program:

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

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

```
PRINT#4,TAB(2Ø)
```

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(2Ø)
```

This allows the TAB function to work, but not very well. All that will happen is that the printer will move over 2Ø spaces from the last printed character.

There are four 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. This is the simplest form of tabbing and it works on all printers that are specified for use with the G-Wiz. Commodore provides a simple tab function in their printers which we have duplicated in the G-Wiz. This tab function has its limitations, but should work for most applications. The command to move to a tab position is CHR$(16) followed by a two digit decimal number of the desired tab location.

The tab location is an absolute value. That means, no matter where you are on a specific print line if you tell the printer to tab to location 17 (PRINT#4,CHR$(16)"17";) it will move the print head and start printing at position 17 even if you have already printed past that position. A sample program to do tabbing using this command can be found in the section on COMMODORE SPECIAL PRINTER CODES later in this appendix.

Remember, the CHR$(16) must always be followed by a two digit decimal number (ie. CHR$(16)"Ø5" or CHR$(16)"2Ø"). The string of characters you want to print may then be sent right after the two numbers.

(ie. CHR$(16)"Ø8HI BILL").

If you wish to tab to a calculated position you will need to do a little extra work. An example of this form of tabbing also will be shown in a sample program later in this manual.

2. 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 separate print statement. But, be sure to print CHR$(1Ø) 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 other printers.

3. 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 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.

   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").

4. 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:

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=I*I
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.
```

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.

WORD PROCESSORS
****

Some word processors offer additional features and special codes when you specify that you are using a NON-Commodore printer. Since the G-Wiz 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 loading your word processor:

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

This will lock the interface in the non-Commodore mode and allow the word processor to control 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 "EASY SCRIPT", "SCRIPT/64" and "WORDPRO 3 PLUS" word processors.

Be aware that once you are locked in a mode the only way to unlock the G-Wiz is to power down. The easiest way to power down is to momentarily unplug the power line that goes to the cassette port.

QUICK SCREEN DUMP WITH COMMODORE GRAPHICS

****

This screen dump can be used in any basic program to copy the contents of any screen (except hi-res screens) 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 function add these lines to the program then 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 :

```
63000   REM * * * SCREEN DUMP

63010   REM * * * BY E.J. LIPPERT II

63030   OPEN4,4:CG = PEEK (36869)

63040   IF(CG=242)OR(CG=194)THEN
        CLOSE4:OPEN4,4,7

63050   SC = 4*(PEEK(36866)AND 128)+
        64*(PEEK(36869)AND112)

63060   FOR I0 = 0 TO 999

63070   C0 = PEEK(SC+I0):IFC0>128THEN
        C0=C0-128:CR=1

63080   GOSUB63300

63090   IFCR=1THENPRINT#4,CHR$(18)
        CHR$(A0)CHR$(146);:CR=0:GOTO
        63110
```

```
63100    PRINT#4,CHR$(A0);
63110    L0=L0+1
63200    IF L0=22 THEN PRINT#4," ":L0=0

63210    NEXT I0:CLOSE4:RETURN


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

63310    IF C0<64 THEN A0=C0:RETURN

63320    IF C0<96 THEN A0=C0+32:RETURN

63330    IF C0<128 THEN A0=C0+64:RETURN
63340    A0=32:RETURN

63999    GOTO63000
```

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

```
63030    OPEN4,4:CG = PEEK(53272)

63040    IFCG=23THENCLOSE4:OPEN4,4,7
63050    SC = 1024

63060    FOR I0 = 0 TO 999

63200    IF L0=40 THEN PRINT #4," ":
         L0=0
```

Adding these lines will allow you to fill up a screen with text or graphics, and then press the {F1} key to print the screen.

```
10      PRINT"<CH>"

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

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

40      PRINT A$;:GOTO 20
```

You can use this program to fill the screen with characters and graphics, then whenever you press the {F1} function key it will go to your subroutine and dump your screen contents to your printer.

G-Wiz 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

COMMODORE SPECIAL PRINTER CODES

****

These codes are the same format as the Commodore VIC 1515/1525/MPS 801 printer codes. The G-Wiz honors and obeys all these Commodore special functions only when in the NORMAL PRINT MODE (secondary addresses 0,1,7 & 8).

CHR$(8) - DOT ADDRESSABLE GRAPHICS MODE

Sending this code will cause all data following the code to be printed as dot addressable graphics characters until it is terminated by sending a CHR$(14) or CHR$(15). This function is identical to the Commodore dot graphics format. All character string (CHR$) values must be greater than 127. Sending a CHR$(128) to the printer in this mode will result in a blank (null character) being printed at the current character position. Sending a CHR$(255) to the printer in this mode will result in a solid vertical line 7 dots high being printed at the current character position. Other CHR$ values will result in other combinations of dots being printed at the current character position. See the next page for an example program and an explanation of how hi-res dot graphics are constructed.

```
EXAMPLE PROGRAM:
    10 OPEN4,4: PRINT#4,CHR$(8);:FORJ=0TO4
    20 FORI=128TO255:PRINT#4,CHR$(I);:NEXT
    30 PRINT#4," ";:NEXT:PRINT#4,CHR$(15):
       CLOSE4
    50 OPEN4,4: PRINT#4: PRINT#4,CHR$(8);
    60 READA:IFA=-1THENPRINT#4,CHR$(15):
       CLOSE4:END
    70 PRINT#4,CHR$(A);:GOTO60
    80 DATA 156,162,201,213,213,213,208,
       208,219,195,187,-1
```

This program will print some hi-res dot graphics, then line feed and print a hi-res custom character five times. The information used to make this hi-res character is contained in the data statements in line 80. Compare these data bytes to the chart below and you will see how to create your own hi-res graphics.

BIT VALUE											
1			X	X	X	X			X	X	X
2		X							X	X	X
4	X			X	X	X					
8	X		X						X		X
16	X			X	X	X	X	X	X		X
32		X									X
64			X	X	X	X	X	X	X	X	
TOTAL	28	34	73	85	85	85	80	80	91	67	59
+128	128	128	128	128	128	128	128	128	128	128	128
CHR$ VALUE	156	162	201	213	213	213	208	208	219	195	187

In the example chart on the previous page you should notice that each vertical row of dots corresponds to one of the data statement values in line 80 of the example program. The Commodore printer uses a seven dot vertical pattern and each dot position in the pattern corresponds to a power of two as shown in the chart. Adding the numbers up for each position you want a dot at and then adding 128 to the total will give you the correct CHR$ value to send to the G-Wiz to obtain the dot pattern you want.

CHR$(14) - DOUBLE WIDTH CHARACTER MODE

This code puts your printer into the DOUBLE WIDTH CHARACTER MODE. The printer will print double wide characters until this mode is cancelled by sending a CHR$(15).

EXAMPLE PROGRAM:

```
10 OPEN4,4: PRINT#4,"THIS IS A ";
20 PRINT#4,CHR$(14)"DOUBLE WIDE";
30 PRINT#4,CHR$(15)" TEST":CLOSE4
```

CHR$(15) - RETURN TO NORMAL PRINT MODE

This code cancels the DOUBLE WIDTH CHARACTER MODE and the DOT ADDRESSABLE GRAPHICS MODE. (See the above example.)

PROGRAMMERS NOTE: These functions are accomplished by translation inside the interface. The position of the dip switches tell the interface what printer you are using, and the interface sends it the required code. The chart below will tell you what codes are being sent to what printers.

DESIRED FUNCTION	CHR$(14)	CHR$(15)
EPSON/STAR PANASONIC BMC/MANNESMAN	CHR$(14)	CHR$(20)
PROWRITER C-ITOH/NEC AXIOM/BANANA	CHR$(14)	CHR$(15)
OKIDATA	CHR$(31)	CHR$(30)

CHR$(16) - CHARACTER TAB MODE

This is the control code that enables the Tab function. This code works identically to the Commodore Tab Function. After sending the CHR$(16) you should send a two character (numeric) tab position. This two character code will tell the printer what character position (from 1 to 255) to start printing at.

EXAMPLE PROGRAM:

```
10 OPEN4,4:PRINT#4,CHR$(16)"40TEST"
20 FORJ=1TO7:READ A$,B$
30 PRINT#4,CHR$(16)A$B$;:NEXT:PRINT#4
40 FORJ=1TO7:READ B$
50 PRINT#4,CHR$(16)CHR$(J+48)"0"B$;:NEXT
60 DATA 30,TAB,60,OR,20,CAN,70,RIGHT
70 DATA 50,LEFT,10,WE,40,TO
80 DATA OR,WE,CAN,TAB,BY,THE,NUMBERS
90 PRINT#4:CLOSE4
```

This will cause the word TEST to be printed starting at the 40th character position from the left edge of the paper, and demonstrate two additional methods of tabbing.

PROGRAMMERS NOTE: To perform this function the G-Wiz sends the printer a CHR$(13) to move the print head to the start of the line, then it sends the required number of spaces (CHR$(32)) to move the print head to the position requested by the next two character strings. The formula used to determine the number of spaces to be sent is # = ((VAL(C1)-48)*10) + VAL(C2)-48. Where C1 and C2 are the first and second characters following the CHR$(16).

CHR$(17) - UPPER/LOWER CASE PRINTING MODE (CURSOR DOWN MODE)

This code puts your printer into the UPPER/LOWER CASE PRINTING MODE the printer will print upper and lower case with business graphics until this mode is cancelled by sending a CHR$(145).

EXAMPLE PROGRAM:

```
10 OPEN4,4: PRINT#4,"THIS IS A TEST ";
20 PRINT#4,CHR$(17)"OF LOWER CASE ";
30 PRINT#4,CHR$(145)"PRINT MODE":CLOSE4
```

PROGRAMMERS NOTE: To do this function the G-Wiz sismply swaps the secondary address it uses to either 0 or 7.

CHR$(18) - REVERSE CHARACTER PRINT MODE

This code puts your printer into the REVERSE CHARACTER PRINT MODE. The printer will print reversed characters until this mode is cancelled by a CHR$(146).

EXAMPLE PROGRAM:

```
10 OPEN4,4: PRINT#4,"THIS IS A TEST ";
20 PRINT#4,"OF "CHR$(18)"REVERSE";
30 PRINT#4,CHR$(146)" PRINTING":CLOSE4
```

PROGRAMMERS NOTE: Reversed characters are sent from the character ROM inside the C/?+G. They are sent as 8 byte long hi-res graphics characters using the hi-res function of your printer. (See CHR$(8) function for a description of these codes.)

CHR$(26) - REPEAT GRAPHICS DATA MODE

This code can only be sent when in the CHR$(8) graphics mode. This code, when sent, must be followed by a value sent as a character string value (CHR$(Ø) to CHR$(255)). The code will cause the next character string value sent to be repeated the number of times specified by the character string value up to 255 times.

EXAMPLE PROGRAM:

```
1Ø OPEN4,4,:PRINT#4,CHR$(8);
2Ø PRINT#4,CHR$(26)CHR$(1ØØ)CHR$(255)
3Ø PRINT#4:PRINT#4:PRINT#4,CHR$(8)
4Ø FORI=1TO6:PRINT#4,CHR$(26);
5Ø PRINT#4,CHR$(I*8)CHR$(127+(2↑(I+1)));
6Ø NEXT:PRINT#4,CHR$(15):CLOSE4
```

This program will cause the character string 255 to be printed one hundred times (this is done in line 2Ø) as a dot graphics character. This will result in a horizontal bar being printed by your printer. Then on the next line it will do a progression of graphics data (this is done in lines 4Ø and 5Ø) to demonstrate other uses of the CHR$(26) COMMAND.

PROGRAMMERS NOTE: This function is done totally inside the G-Wiz. It is done by simply storing the ASCII value that follows the CHR$(26) in a temporary buffer and then sending the next character received to the printer as many times as requested by the number stored in the buffer.

CHR$(27) - DOT GRAPHICS TAB MODE

Sending this code puts your printer into the hi-res graphics tab mode. This allows you to position the print head at a specific dot addressed print position. This code must be followed by a CHR$(16) and then followed by two other CHR$ values. The two character strings that follow the CHR$(27) CHR$(16) series will be the high byte and low byte of the desired dot position. Your printer will print a line up to 80 characters wide, and each character is 8 bytes wide, so there are (80X8=640) up to 640 potential dot locations on each line. The format for this command is:

CHR$(27) CHR$(16) CHR$(C1) CHR$(C2)

To calculate the values that should be sent after the CHR$(27) use the following formula:

C1 = INTEGER (Desired Position/256)
C2 = Desired Position - <minus> (C1*256)

EXAMPLE PROGRAM:

```
10 OPEN4,4:PRINT#4,CHR$(27)CHR$(16)CHR$(1)
   CHR$(35)"HERE":PRINT#4
20 FORI=1TO25:PRINT#4,I;CHR$(8);:READA
30 PRINT#4,CHR$(27)CHR$(16);
40 C1=INT(A/256):C2=A-(C1*256)
50 PRINT#4,CHR$(C1)CHR$(C2);A
55 NEXTI
60 DATA 50,52,88,89,90,100,135,186,232,
   233,234,235,237,240,244,249,254,261
70 DATA 270,280,290,300,360,380,400
```

This program will cause the print head to move to the ((1*256)+35) 291st dot position and print the word HERE starting at that point. Then it will print a simple example of a dot graphics tab mode.

PROGRAMMERS NOTE: This function is done in a similar manner as the CHR$(16) character tab function. Instead of the two digit numeric value, this function uses the next two byte values as the position indicator. The G-Wiz then sends a CHR$(13) to position the print head at the start of the line. Then it sends the proper number of CHR$(Ø)s to position the print head at the desired print position. Be aware that because we print a string of CHR$(Ø)s you can send a value greater than 64Ø. By sending, for example, CHR$(255) CHR$(255 you can tab 65535 (265*256-1) dot positions. This will place you 1Ø2 lines down and on the 256th dot position on that line. (By the way the two digit number used in the CHR$(16) character tab function can also be used to exceed the number of character positions on a line by using characters other than decimal digits.)

Also, unlike most tab functions both G-Wiz tab functions will allow you to tab backwards to a print position to the left of your present print position. We're not quite sure what you might need this feature for, but at least you know it exists.

CHR$(145) - UPPER CASE/GRAPHICS PRINT MODE (CURSOR UP MODE)

This code puts your printer into the UPPER CASE/GRAPHICS PRINTING MODE. The printer will print upper case with full graphics until this mode is changed by sending a CHR$(17). (See CHR$(17) for the example program.)

CHR$(146) - REVERSE OFF - NORMAL PRINT MODE

This code puts your printer into the NORMAL PRINT MODE cancelling the REVERSE CHARACTER PRINT MODE. The printer will print non-reversed characters until this mode is reinstated by sending a CHR$(18). (See CHR$(18) for an example program.)

TROUBLE SHOOTING
****

This section is here to help you solve the most common problems you may have with the G-Wiz interface. Please consult the following pages before you pull your hair out. Cardco wants you to be satisfied with the G-Wiz, and we want to help you if you'll let us. This section is written in a question and answer format to make solving your problem easier. If after you have tried all the following suggestions and your interface still will not do what you want it to, please feel free to write or call us at:

CARDCO, Inc.
300 So Topeka
Wichita, Ks.
67202

PHONE - (316) 267-6525

It is possible to get an interface that doesn't work. If you have a defective unit we will replace it for you or you may wish to return it to the store from which you purchased it for an immediate replacement. If you suspect that our product is defective and wish to return it to us for replacement send it to us at the above address with your purchase receipt. We will send your replacement to you by UPS. Under no circumstances will a replacement be sent before the defective unit is received.

IMPORTANT - READ THIS PAGE
****

We have found that over 90% of all problems are a result of improper installation of the interface. Please be sure that the following three items have been properly complied with.

FIRST, be sure that the dip switches inside your printer are set properly. Refer to the charts on the next two pages for assistance.

SECOND, be sure that the G-Wiz DIP switches are set properly for your printer. Refer to the section on setting the DIP switches starting on page A1 of this appendix.

THIRD, Be sure that the interface has been properly installed on your system and that the power supply line is properly inserted into the cassette port on the rear on your computer. Refer to the HOOK UP PROCEDURES section at the beginning of this manual.

FOURTH, be sure that you have turned on the components of your system in the proper order. The proper sequence is: printer first, computer second, pause and wait for the screen to come up with the CBM basic message, last turn on your disk drive(s) and any other accessories.

Question:

Why can't I get my Prowriter/C-Itoh 8510/NEC-8023 to print what I want it to or do the correct line feed functions?

Answer:

The first thing you have to do is to make sure the dip switches inside your printer are set properly. The proper settings are as follows:

Bank #1

8	7	6	5	4	3	2	1
off	on	on	off	off	off	on	off

Bank #2

8	7	6	5	4	3	2	1
off	on	off	off	off	off	off	on

NOTE: Some dip switches are marked OPEN and CLOSED. A switch is OFF if it is OPEN and ON if it is CLOSED.

NOTE: The preceding dip switch settings are for the internal dip switches in the Prowriter, C-Itoh 8510 and NEC 8023 printers only.

Question:

In what position should the dip switches in my printer be set?

Answer:

Normally you should leave your printer DIP switches in their original position, most printers will work with the G-Wiz. But if for some reason you printer won't work with the G-Wiz then you should try the switch positions listed below. (**NOTE:** These are settings for the DIP switches in your printer, not the G-Wiz interface.)

Bank #1	Epson (all)	Star Gemini 1ØX
switch 1	off	on
switch 2	either	off
switch 3	off	off
switch 4	off	off
switch 5	off	n/a
switch 6	on	n/a
switch 7	on	n/a
switch 8	on	n/a
Bank #2		
switch 1	either	n/a
switch 2	either	n/a
switch 3	off	n/a
switch 4	off	n/a
switch 5-8	n/a	n/a

If your printer is not listed then please read your printer manual to get the proper dip switch settings.

Question:

My printer isn't listed in your manual, what dip switch settings do I use?

Answer:

If your type of printer is not listed do not despair. Refer to the instruction manual that came with your printer to set the dip switches in the printer. These switches should be set for standard parallel operation without line feed.

Even if your printer isn't listed on our printer configuration, there's still a good chance it will talk with your printer. If your printer is a letter quality or daisy wheel type printer, it is best to turn on the G-Wiz DIP switches 2 and 7. With switches 2 and 7 on, the G-Wiz operates as a standard text interface without graphics (similar to Cardco's C/?B interface). If your printer is a dot matrix, thermal, etc., then you may want to try all the different printer configurations. Chances are you will find one that will work for your type of printer. (But we only guarantee that the G-Wiz will work with the printers listed in our printer configuration.) Turning DIP switches 2 and 7 on will also work with any dot matrix printer but this mode does not allow for any Commodore graphics characters or special Commodore print command functions.

Question:

My G-Wiz is not working properly with my printer and I can't get it to do everything I want it to do. What do I do?

Answer:

Assuming that you have followed the instructions on the previous page, the thing you may need to look at is which secondary address you are using. You need to make sure that you are using the proper address to achieve your desired result. For example if you want upper/lower case printing without line feed you want a secondary address of seven (7). If you're not using a secondary address at all then we may have solved you problem.(Check the section in this manual that deals with secondary addresses.) Also you should refer to the sections on special printer codes, escape codes and Commodore special printer codes in this appendix.

Question:

Why can't I get my cursor back?

Answer:

If you are sure that you have followed the IMPORTANT information at the beginning of this section and are sure your printer is **ON LINE** then you probably have a defective interface.

Question:

Why won't my G-Wiz print in upper and lower case?

Answer:

Assuming that the dip switches inside the interface are set properly, what you need to check is which secondary address you are using. If you're not using a secondary address, you probably need one and that should solve you problem. (Check the section in this manual that deals with secondary addresses.)

Question:

I can't seem to get rid of line feed when I need two! AND/OR I keep getting double line spacing on all (some) of my printing!

Answer:

Assuming that the dip switches inside the interface are set properly, the first thing you need to look at is which secondary address are you using. You will need a secondary address that will control your line feed. If you're not using a secondary address at all then this should solve your problem.(Check the section in this manual that deals with secondary addresses.)

Question:

I can't seem to get all the special CHR$ values or Commodore characters to print on my printer.

Answer:

The first thing you need to look at is which secondary address you are using. You will want a secondary address of either null(Ø), one(1), seven(7) or eight(8) to get the Commodore special functions and Commodore graphics characters you want. If you want to use some special functions of your printer you may wish to use secondary addresses four(4) or five(5) so that no changes are made to your codes by the interface. (Check the section in this manual that deals with secondary addresses.)

If you need to use both Special Commodore functions and graphics as well as your printer's special features in the same program it may be necessary to open several files to your printer. See the next two questions for an example of this.

Question:

How do I get into the condensed printing mode with an Epson/Star type printer?

Answer:

To accommodate the standardized Commodore commands CHR$(15) and CHR$(2Ø) are swapped inside the G-Wiz. If you send a CHR$(15) the printer gets a CHR$(2Ø) and if you send a CHR$(2Ø) the printer gets a CHR$(15) (see the caharcater conversion chart at the rear of the appendix.) An Epson/Star type printer requires a CHR$(15) to enter the condensed mode so you should send a CHR$(2Ø) from your program. NOTE: This conversion is not done in the transparent mode.

Question:

How do I get back to normal printing from the condensed printing mode?

Answer:

If you are using an Epson/Star type printer and you are printing in the normal print mode (secondary addresses Ø,1,7 & 8) and you try to send a CHR$(18) which is normally used to turn off the condensed printing mode of your printer you will have a problem. The problem centers around the fact that a Commodore printer doesn't have a condensed print mode and it used CHR$(18) to shift into the reverse printing mode. So if you try to get out of condensed mode you might wind up in reversed printing mode.

There are several solutions that may solve your problem. First, try sending a CHR$(146) instead of the CHR$(18). Second try sending both CHR$(18)CHR$(146) - this combinaton usually works. This last solution always works, open another file to your printer using a secondary address of 4 and send the CHR$(18) out to your printer using that file number.

EXAMPLE:

```
10 OPEN4,4:PRINT#4,"NORMAL "CHR$(20);
20 PRINT#4,"CONDENSED ";:OPEN5,4,4
30 PRINT#5,CHR$(18);:PRINT#4,"NORMAL"
40 CLOSE4:CLOSE5
```

Question:

What do I do if I've tried everything and my interface still doesn't appear to be working?

Answer:

If you have read this manual and tried all of our suggestions and your G-Wiz still doesn't seem to be working you have two options:

Your first option is to send us a letter explaining your problem. We answer all of our mail and you should have a response to your question within a week or so.

Your second option is to call our customer service lines at 316-267-6525 and speak to one of our customer service agents about your problem. These lines are often very busy so keep trying.

We want you to be satisfied with your interface and are willing to help you in any way that is possible. If for some reason your interface has to be returned to us, we will try to rush you a new interface within 24 to 48 hours of receipt of your defective interface and a copy of your original purchase receipt.

Question:

My system is locked up and I don't want to shut everything off and lose all of my data or text, what do I do?

Answer:

Generally not much can be done. The best thing we would recommend would be to totally disconnect the printer interface, then disconnect the disk drive and try to clear the system. Next, reconnect the disk drive then connect the 4 pin connector on the printer interface and last plug in the power

connector to the cassette port. Now if the system is still hung up you should try to clear it again. If these procedures didn't work, give up! Turn off your system and start all over.

Question:

When I try to do a printout from my program, the characters don't seem to line up properly. Why?

Answer:

Well, you may have done something wrong like putting in too many spaces or you might be using the wrong characters. If so, do the best you can to examine the spaces or characters and correct if necessary. However, you may be asking about an aspect ratio problem. If an aspect ratio problem is occurring, you are using the wrong bit set. The G-Wiz DIP switch 1 allows you to use two different character sets. Switch 1 in the off position, recommended for Epson/Star and other 6 bit printers, gives the printer the six bit character set. Switch 1 in the on position, recommended for C.itoh/Prowriter and other 8 bit printers, gives the printer the 8 bit character set. Try switch 1 in both positions to see if either will allow proper positioning of characters.

G-Wiz ASCII Conversion Chart
****

The charts to follow will show you the exact character the G-Wiz prints for each character string. Each optional secondary address has its own set of conversion procedures but for these particular charts only the addresses Ø (Null), 1, 7, and 8 apply. As discussed earlier, a secondary address of 3 will produce a hexadecimal dump and a secondary address of 4 or 5 will place the interface into a transparent mode. If these charts don't give you the characters you're looking for, chances are you'll have to go into the transparent mode or create the character in a hi res mode -- CHR$(8). Refer to these sections in the manual if you need additional character information. Within most secondary addresses, the QUOTE MODE will change the conversions in some cases.

The following consists of one six bit chart, giving examples of the cursor up mode and the cursor down mode. And one eight bit chart, also with one graph representing cursor up mode -- the other representing cursor down mode. If you have questions about these modes, consult the sections in the manual devoted to them.

Cardco recommends the Epson, Star/Gemini, and Panasonic dot matrix type printers use the six bit character set. Dot matrix printers like C.itoh, Prowriter and NEC should use the eight bit character set.

First, let's cover the six bit character set. It's nice to know this character set so closely resembles the actual Commodore character set that a Gorilla Banana print out of the printer test, from Commodore's VIC-1541 test/demo disk, can not be distinguished from a VIC 1525 copy of the same test. If you're looking for 1525 emulation, the G-Wiz has got it.

The first chart of the six bit character set will be in cursor down mode. The next chart will, of course, be in cursor up mode.

If you know how to add, these charts are easy to read. On a horizontal axis you'll see numbers ranging from Ø to 24Ø, and on a vertical axis you'll see numbers ranging from Ø to 15. So how do you read these two axes? For example, you want to know what a character string value of 115 will print. To find the answer read the horizontal axis from left to right until you come to the number 112. Now move down the vertical axis until you reach number 3. Where the axes meet you'll read an S. The S will be printed in the cursor down mode. Finding the same character string value in the cursor up mode results in a different character -- the heart graphic character.

But what if you just know the character, not the value? Okay, here's how to tell the CHR$ value of the £. First find the £ character on the chart. The horizontal axis has it set in the 8Ø column while the vertical axis has it set on the 12th row. 8Ø plus 12 is 92, so the CHR$ value of the £ is 92.

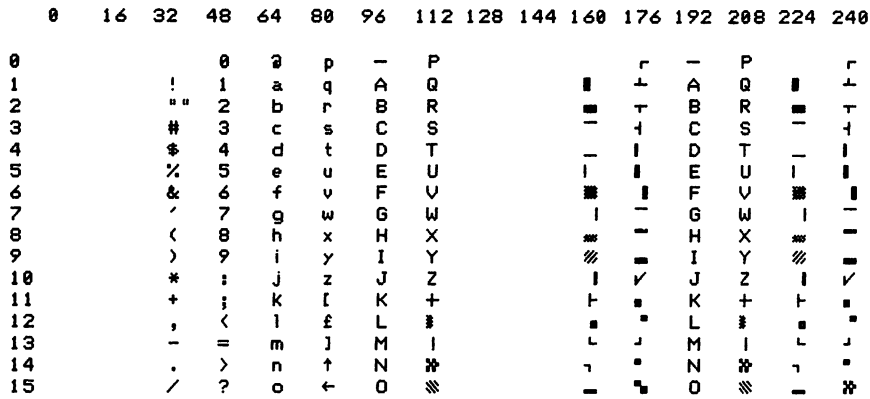
SIX BIT CHARACTER SET
CURSOR DOWN MODE

	0	16	32	48	64	80	96	112	128	144	160	176	192	208	224	240
0				0	@	P	—	P				┌	—	P		┌
1			!	1	a	q	A	Q			▮	┴	A	Q	▮	┴
2			" "	2	b	r	B	R			▬	┬	B	R	▬	┬
3			#	3	c	s	C	S			¯	┤	C	S	¯	┤
4			$	4	d	t	D	T			_	▏	D	T	_	▏
5			%	5	e	u	E	U			▏	▌	E	U	▏	▌
6			&	6	f	v	F	V			▒	▐	F	V	▒	▐
7				7	g	w	G	W			▕	¯	G	W	▕	¯
8			(	8	h	x	H	X			▔	▬	H	X	▔	▬
9			)	9	i	y	I	Y			▒	▬	I	Y	▒	▬
10			*	:	j	z	J	Z			▕	▽	J	Z	▕	▽
11			+	;	k	[	K	+			├	▪	K	+	├	▪
12			,	<	l	£	L	▒			▪	▪	L	▒	▪	▪
13			-	=	m	]	M	▕			└	┘	M	▕	└	┘
14			.	>	n	↑	N	▚			┐	▪	N	▚	┐	▪
15			/	?	o	←	O	▒			▁	▪	O	▒	▁	▚

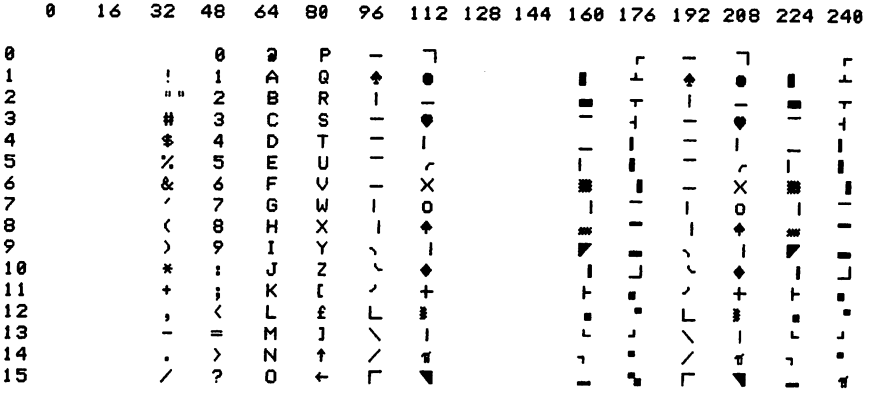
SIX BIT CHARACTER SET
CURSOR UP MODE

	0	16	32	48	64	80	96	112	128	144	160	176	192	208	224	240
0				0	@	P	—	┐				┌	—	┐		┌
1			!	1	A	Q	♠	●			▮	┴	♠	●	▮	┴
2			" "	2	B	R	▕	—			▬	┬	▕	—	▬	┬
3			#	3	C	S	—	♥			¯	┤	—	♥	¯	┤
4			$	4	D	T	¯	▕			_	▏	¯	▕	_	▏
5			%	5	E	U	¯	╱			▏	▌	¯	╱	▏	▌
6			&	6	F	V	—	╳			▒	▐	—	╳	▒	▐
7			'	7	G	W	▕	○			▕	¯	▕	○	▕	¯
8			(	8	H	X	▕	♣			▔	▬	▕	♣	▔	▬
9			)	9	I	Y	╲	▕			◤	▬	╲	▕	◤	▬
10			*	:	J	Z	╲	♦			▕	┘	╲	♦	▕	┘
11			+	;	K	[	╱	+			├	▪	╱	+	├	▪
12			,	<	L	£	L	▒			▪	▪	L	▒	▪	▪
13			-	=	M	]	╲	▕			└	┘	╲	▕	└	┘
14			.	>	N	↑	╱	π			┐	▪	╱	π	┐	▪
15			/	?	O	←	┌	◥			▁	▚	┌	◥	▁	π

EIGHT BIT CHARACTER SET
CURSOR DOWN MODE



EIGHT BIT CHARACTER SET
CURSOR UP MODE



In most cases **one** character (or CHR$ value) received by the interface will generate **one** character (or CHR$ value) sent to the printer. There are three exceptions to this general rule:

1. Character string values (CHR$ values) 1 to 31 and 128 to 159 in the QUOTE MODE are represented by groups of characters. These are the SPECIAL LISTING CODES that are described earlier in this manual.

2. In the normal printing mode some cases show a function being performed by the G-Wiz instead of a character being sent. In these cases some of the functions are performed within the G-Wiz interface and no characters are sent to the printer. The actual output to the printer from the G-Wiz interface for each of these codes may be different for different printer types. You should refer to the section on COMMODORE SPECIAL PRINTER CODES for information on exactly what is sent to accomplish each function for your printer type.

3. In all modes whenever a Commodore graphic character is shown, it is sent to the printer as a series of hi-res graphics characters (not simply as one character string value). The sequence of characters required to shift your printer into the graphics mode (refer to the CHR$(8) COMMODORE SPECIAL PRINT COMMAND for an explanation of this function) is sent and then that is followed by the proper graphics character string data required to construct the character shown.

G-WIZ INDEX

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This entire manual was composed using the **WRITE NOW!/64** word processor. This high performance word processor is available from your local CARDCO dealer. **WRITE NOW!** is available on quick loading and reliable cartridges for both the VIC-2Ø ($39.95) and the Commodore 64 ($49.95).

Because the **WRITE NOW!** word processor was designed by the same people that designed your **G-Wiz** printer interface, you can be assured that all of the advanced features of your printer and interface will be fully available for your use.

Additional features of **WRITE NOW!/64** are:

8Ø column output to the screen
Full header and footer capability
Cut & Paste buffer
Full block functions.
Full disk drive commands included
(FORMAT, LOAD, SAVE, SCRATCH & RENAME disk files from within the program)
Full search and search/replace functions
Prints text directly from disk files
Full formatting commands
Single key non-distructive disk directory
Four on-line HELP screens available
Prints up to 99 copies of each document
Prints complete or partial documents
User defined tab stops
Page numbers can be located anywhere
Page number in standard or Roman numerals
Wait for keyboard input anywhere in text
Optional conditional page command available
Fully links with other NOW! series programs
Keyboard overlay included

NOW! Series programs for the Commodore 64

SPELL NOW!/64 is a full featured spelling checker with a 30,000 word dictionary and as many specialized dictionaries as you wish to create. Specialized dictionaries are defined by you using your special applications words and can be as large as you need. **SPELL NOW!/64** allows you to change words, view them in context, add them to a dictionary or mark them to be reviewed at a later time within the **WRITE NOW!/64** word processor.

MAIL NOW!/64 is a full function mailing list program that allows you to generate customized mailing labels and create files that can be used by the **WRITE NOW!/64** word processor to send personalized form letters.

FILE NOW!/64 is a 255 record per disk capacity data base program. It is very easy to use and not confusing to entry level users. The program has any number of fields within each record and features an attractive index card format. Special files can be created that will allow data to be included in documents and reports written with the **WRITE NOW!/64** word processor.

GRAPH NOW!/64 is a graphics and chart designer that creates all kinds of business charts for you and allows you to create custom designed graphics. All of the graphics can then be stored on a disk file that will work with **WRITE NOW!/64** and your dot matrix printer to include this information right in the text of your documents.

Well, that's all there is. I hope this manual helped you to understand more about your printer, your interface and your computer. Here's wishing that all your programs run the first time.

Our Best To You,

CARDCO, Inc.
300 S. Topeka
Wichita, Ks.
67202