INTRODUCTION:

Computerware® is making a large investment in the software future of the Color Computer. We are working on software products at both the assembly and Basic Language level, as well as both serious and entertainment oriented. To achieve this goal, we need your support... One of the problems that developers of software have is that it takes a lot of initial time and money to 'create' the product before any revenue from its sale is generated. All too often when it is finished, customers who are not familiar with the evelopment cycle for software products, see a cassette or disk and a manual and perceive that that is what the product cost. NOT TRUE!!

To be able to recover the development costs on inexpensive software, the manufacturer has to be able to sell a large number of copies. This is where you, the customer, can help by not giving away (or accepting from others) copyrighted software - actually any software product that is being offered for sale.

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Thank You, Computerware®

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If this program fails to load within 90 days of purchase, simply return your ORIGINAL cassette or disk along with a copy of the receipt for a free replacement. After 90 days, please also include $5.00 for cassette versions or $8.00 for disk versions. Since this program is not copy protected, we reccommend that you make a backup copy and use it for your work.

Computerware's 64K Screen Expander II™

This program will give the 64K Color Computer user the ability to use a 51 or 64 column by 24 line screen to improve the readability of any display that has lines longer than 32 characters. It will also allow the mixing of text and hi-resolution graphics on the same screen easily. A character set editor is included with the screen expander to allow you to create your own characters. 64K Screen Expander II™ does not stop there! Also included as standard features are automatically repeating keys, type ahead, both the standard PRINT @ and a much more powerful PRINT @ using X,Y coordinates. To make programming easier, Expander II™ also includes the ON ERROR command to trap program errors and AUTO line numbering. A 64K Color Computer or TDP-100 with Extended Basic is required to use the screen expander and character editor.

LOADING THE PROGRAM

To load Expander II™ from tape, put the cassette in the recorder and press the PLAY button. Then type CLOADM and press ENTER. To load from disk, put the diskette in drive 0 and type LOADM"EXPANDER and press ENTER. Once the program has loaded, type EXEC and press ENTER to start it up.

Once the program has loaded and executed, you will see a short copyright notice at the top of the screen. From now on, you are in the hi-res screen mode. The program is protected against RESET, and almost any other event, so you don't need to worry about it.

PRINT @ REDEFINED

One of the more noticable differences between normal BASIC and the now modified BASIC is the use of the 'PRINT @' command. To utilize the larger screen easily, another syntax is available. It is 'PRINT @(X,Y)'. X must be set to a number between 0 and 23, for the row number and Y is a number between 0 and 50 (or 63 for the 64 column mode) for the column number. The program defaults to the (X,Y) mode when it is executed. To change back to the original mode, just POKE &HF802,0. Also changed in the new format is the tab size. The tab field width is set to 10 columns. This gives 5 TAB fields in the 51 character mode and 6 in the 64 character mode.

AUTO-REPEAT AND TYPE-AHEAD

A less noticeable but very nice feature is that your keyboard has auto-repeat and type-ahead. To use auto repeat, simply hold down any key longer than normal and it will begin repeating. Type ahead means that you can type commands on the keyboard while the computer is working on something else. For example, load a BASIC program from tape or disk. While the program is being loaded, type RUN and press ENTER. When the program finishes loading, you will see that the word RUN has been entered and your program will start RUNning!

PMODE MODIFIED

Another enhanced feature is the 'PMODE' command. If you use PMODE 4,0 you can draw on the hi-res text screen in high memory. This means that you can mix text and graphics very easily. BASIC still requires you to have PCLEARed at least 4 pages of graphics memory to use PMODE 4,0. If you don't need these four pages, you can get around having them by using the following:

```
PCLEAR the number of pages you want
EXEC &HF812
```

AUTO LINE NUMBERING

When you are entering a long program, Expander II™ will automatically type each line number for you. To start auto line numbering, type:

```
AUTO[start],[increment]
```

'start' is the first line number to use and 'increment' is the number to add to each successive line. If you don't enter a start or increment, line numbering will start at 100 and increment by 10.

If the line number supplied by Expander II™ is currently in use, there will be an asterisk next to the new line number. If you enter a program line, the old one will be deleted. You can press BREAK or just enter a blank line to stop the AUTO line numbering.

PROGRAM ERROR TRAPPING

One of the major faults of Extended Color BASIC is the lack of error trapping. If there is an error, you get a criptic error message and are dropped into BASIC... The Screen Expander II™ implements a new command - ON ERROR - that will allow your program to deal with errors.

The following program should explain the operation of ON ERROR:

```
  100 ON ERROR GOTO 10000
  110 REM THIS IS A SAMPLE PROGRAM
  120 PRINT"THIS IS THE DIRECTORY":DIR
  130 END
10000 REM ERROR HANDLING ROUTINE
10010 SOUND 200,1
10020 ER=PEEK(&HF80B):EL=255*PEEK(&HF80C)+PEEK(&HF80D)
10030 IF ERROR<>40 GOTO 10100
10040 PRINT"I JUST GOT AN I/O ERROR."
10050 INPUT"PRESS ENTER TO TRY AGAIN",A$:RUN
10100 PRINT"I HAVE ENCOUNTERED A FATAL ERROR IN LINE";EL
10110 PRINT"PROGRAM TERMINATING...":END
```

PROGRAM ERROR TRAPPING continued...

If the program is run with the disk drive door open or a bad disk in the drive, an I/O error will occur. Without ON ERROR, the user of your program would see ?IO ERROR and the program would crash. With ON ERROR, the user would see the message 'I JUST GOT AN I/O ERROR. PRESS ENTER TO TRY AGAIN'. Of course, your error handling routine can be much more elaborate, making it easier to write more friendly programs. Below, you will find a list of the numbers associated with the errors generated by Color BASIC.

BASIC Error Numbers and Descriptions

#		Description	#		Description
0	NF	NEXT without FOR	2	SN	Syntax Error
4	RG	RETURN without GOSUB	6	OD	Out of Data
8	FC	Illegal Function Call	10	OV	Overflow
12	OM	Out of Memory	14	UL	Undefined Line
16	BS	Bad Subscript	18	DD	Redimensioned Array
20	/0	Division by Zero	22	ID	Illegal Direct Statemei
24	TM	Type Mismatch	26	OS	Out of String Space
28	LS	String too long	30	ST	String too Complex
32	CN	Can no: Continue	34	FD	Bad File Data
36	AO	Already Open	38	DN	Device Number Error
40	IO	I/O Error	42	FM	File Mode Error
44	NO	File not Open	46	IE	Input past EOF
48	DS	Direct Statement in File	50	UF	Undefined Function
52	NE	File does NOT Exist	54	BR	Bad Record Number
56	DF	Disk Full	58	OB	Out of Buffer Space
60	WP	Disk Write Protected	62	FN	Bad File Name
64	FS	Bad File Structure	66	AE	File Already Exists
68	FO	Field Overflow	70	SE	Set to Non Fielded Str
72	VF	Verification Error	74	ER	Write Past EOF

USER MODIFIABLE MEMORY LOCATIONS

The following is a list of variable and subroutine locations available with Screen Expander II™ and their functions. Many of these are 'toggle switches'. That is, the are used to enable or disable certain features. The default value is always 255.

POKE &HF800,X - HIRES SWITCH

This location in memory is used as a switch to select which screen will be used to display text. If X is 0, the original 32 x 16 display will be used. If it is 255, then the hi-res screen will be used. The default is the hi-res display.

USER MODIFIABLE MEMORY LOCATIONS continued...

POKE &HF801,X - DISPLAY MODE SWITCH

When in the hi-res mode, this switch selects inverted or normal characters. If X is 0, the characters will be displayed as light on a black background. If it is 255, you will get black characters on a light background. The default is dark characters with the light background.

POKE &HF802,X - PRINT @ MODE SWITCH

When in the hi-res mode, this switch selects the PRINT @ syntax and the tab field width. If X is 0, the original syntax will be used with two tab fields of 16 characters. If it is 255, the PRINT @(X,Y) syntax will be used with tab fields of ten characters. The default is the (X,Y) format.

POKE &HF807,X - 51 or 64 COLUMN DISPLAY SWITCH

This location acts as a switch between either a 51 x 24 display or the 64 x 24 display. If X is 255, text will be displayed with 51 columns. If X is 0 , 64 columns will be displayed. After poking to a different display width, it may be necessary to use CLS to clean up the screen. The default is 51 columns.

POKE &HF808,X - TYPE AHEAD SWITCH

This location acts as a switch to enable or disable the type ahead feature. If X is 255, type-ahead is enabled. If X is 0, the type-ahead feature is disabled. The default is type-ahead enabled.

POKE &HF809,X - Action on PAUSE or BREAK

Normally, the BREAK and PAUSE (shift-@) keys are NOT saved in the type-ahead buffer. Rather, they are acted upon immediately. If X is 0, the BREAK and PAUSE functions wait until anything typed before them has been processed. NOTE: this will make it impossible to break a program loop with the BREAK key (you will have to press RESET). The default is to act upon PAUSE and BREAK immediately.

POKE &HF80A,X - CLEAR TO EOL SWITCH (64 COL MODE ONLY)

If X is 0, and you are in the 64 column mode, anything printed on the screen will cause the rest of the line to be cleared. If X is 255, the part of the line after what was printed will be left alone. The default is to leave the line alone. This switch is only effictive when the screen is in the 64 column mode. When in the 51 column mode, the line is always left alone.

SAVE LOCATIONS AND USER SUBROUTINES

The following memory locations are to be looked at (with the PEEK command) by your programs or are subroutines that may be called from within your programs.

&HF80B ERROR NUMBER SAVE LOCATION

This location contains the value of the error when ON ERROR is being used and an error occurs. For example: ER=PEEK(&HF80B)

&HF80C - &HF80D ERROR LINE NUMBER SAVE LOCATION

These two locations contain the value of the bad line number when ON ERROR is being used and an error occurs. For example: EL=255*PEEK(&HF80C)+PEEK(&HF80D)

&HF80E SUBROUTINE TO COPY GRAPHICS TO TEXT

This is a subroutine that will copy current hi-res graphics screen to the hi-res text screen area in high memory. To call this subroutine, use EXEC $HF80E.

&HF810 SUBROUTINE TO COPY TEXT TO GRAPHICS

This is a subroutine that will copy the hi-res text screen to the current hi-res graphics screen. Use EXEC &HF810. This and the previous subroutine could be used, for example, to keep a help screen in low graphics memory and quickly display it in hi-res text mode when needed.

&HF812 SUBROUTINE TO SETUP PAGE 0 AS PMODE 4

This is a subroutine that will simulate PMODE 4,0 without checking the number of pages reserved for graphics. This way you can reserve less than 4 graphics pages and use the hi-res text screen in high memory for graphics display thus allowing more memory for your program.

THE CHARACTER SET EDITOR

On the back side of the cassette (or the front side of the disk) is a BASIC program named "CHRGEN". It is a character set editor which will allow you to redefine any of the 96 printable characters. It is loaded using 'CLOAD' from cassette or 'LOAD"CHRGEN' from disk. Before you RUN the program, POKE &HF807 to the mode (51 or 64 columns) that you want to edit. The top half of the screen will display the current character set. To change a character, type the hex number that corresponds with the ASCII code for that specific character. This number is the number to the far right of the character followed by the number or letter below it. For example, the ASCII code for the letter K is 4B.

Once you enter the code for the character, the 5 x 8 array of dots that make up the character will be displayed in expanded form (4 x 8 for 64 column characters). You can use either the right joystick or the keyboard to change the dot pattern. The following is a list of commands available:

To change from joystick to keyboard mode press 'J'

	Joystick ON	OFF
To move the cursor	Right joystick	Arrow keys
To change the dot	Joystick button	Spacebar
To erase the character	CLEAR key	CLEAR key
To store the character	ENTER key	ENTER key

You will notice that one of the dots is blinking. This is the cursor. By pressing the button or the spacebar (depending on what mode you are in), the dot under the cursor will be reversed. The cursor can be moved to another dot with the joystick or the arrow keys. Pressing the CLEAR key will erase all the dots. When the character looks the way you want it to, just press the ENTER key and it will be saved that way.

Once you have changed the character set to your liking, you can save it to tape or disk by typing S. You will need to select T for tape save or D for disk save and then enter the filename. Now, anytime you want to use your custom character set, just CLOADM the file from cassette or LOADM the file from disk after running the screen expander.

We hope you will find the 64K Screen Expander makes your Color Computer more useful as a programming tool and just plain more fun to use.