

INSTRUCTION MANUAL

COMMODORE BIP FOR CITIZEN 120-D

Model S2 (Y8304)

CITIZEN®

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Preface

This Commodore BIP (Basic Interface Pack) transfers serial data from a Commodore host computer to the Citizen 120-D printer.

The Citizen 120-D Commodore contains a set of switches inside its interface cartridge that allows you to control the way the printer behaves. These internal switches determine the default condition for several of the 120-D Commodore's features.

Changing the Interface Cartridge

The interface cartridge has been exclusively designed for two purposes: for simple installation of an optional interface such as this Commodore one, and for quickly changing the internal switches.

WARNING

Never remove the interface cartridge when the power is on. Doing so may damage the printer and/or your computer equipment.

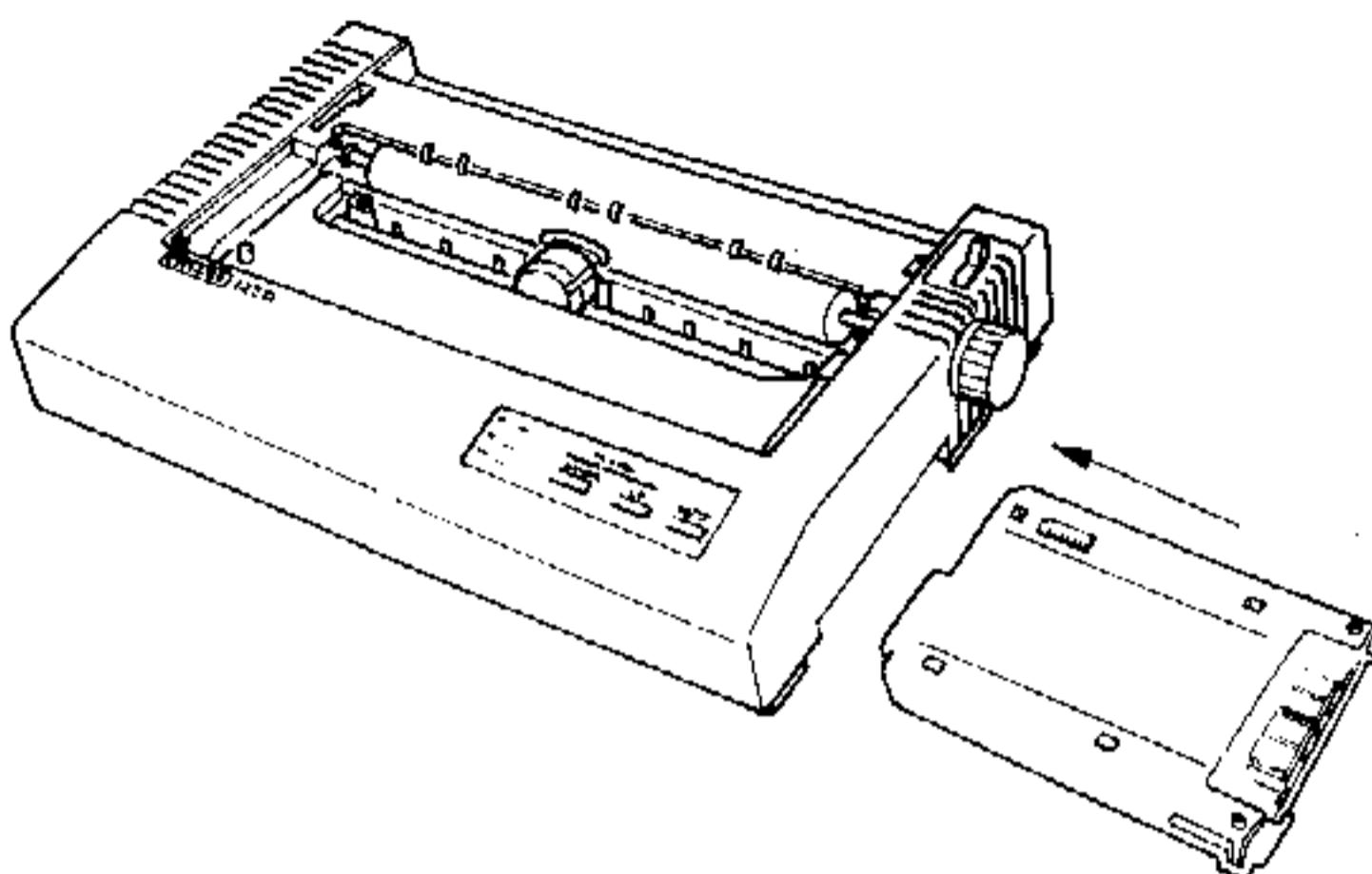
Chapter 1 Set-Up

1 Installation

The interface cartridge has been uniquely designed for two purposes: for simple installation of an optional interface such as this Commodore one, and for quickly changing the internal switches.

WARNING

Never remove the interface cartridge when the power is on. Doing so may damage the printer and/or your computer equipment.



The interface cartridge is located on the right side of the printer. To change the interface cartridge, first disconnect the interface cable. Then grasp the bottom edge of the cartridge and slide it out.

After setting the switches, simply slide the cartridge back into the slot. Be careful not to slam the cartridge or force it in any way. Slide the cartridge in until you feel the connector touch the plug inside. Then gently but firmly push the cartridge in the rest of the way to secure the connection. Connect the proper interface cable and you're ready to go!

2 Switch Setting

The internal switch is actually a set of eight switches labelled 1 through 8.

Switches SW1

SW No.	Function	ON	OFF
SW1-1	Cut-sheet feeder	Enable	Disable
SW1-2	Automatic line feed	Printer adds LF to CR	Computer supplies LF
SW1-3	DP/NLQ selection	NLQ	DP
SW1-4	Page length	12 inches	11 inches
SW1-5			
SW1-6	International character set selection	* Please refer to the table below	
SW1-7			
SW1-8	Device number	5	4

SW1-7	SW1-6	SW1-5	International character set
OFF	OFF	OFF	Commodore standard
OFF	OFF	ON	U.S.A.
OFF	ON	OFF	FRANCE
OFF	ON	ON	GERMANY
ON	OFF	OFF	ENGLAND
ON	OFF	ON	DENMARK
ON	ON	OFF	SWEDEN
ON	ON	ON	ITALY

Note: Only SW1-2 is set on when leaving the factory.

3 Self Test

The 120-D Commodore BIP contains a built-in program called a self test that prints all of the 120-D Commodore's characters. The self test assures you that everything is working correctly. Running the self test is very easy and you can even do it without being hooked up to your computer.

With paper loaded into the printer and the power switch off, plug the power cord into an electrical outlet.

Then, while holding down the LF switch, turn on the power switch. A printout sample is shown below. Please refer to the 120-D User's Manual for details.

The maintenance self test

The maintenance self test is run by turning the power on with both the LF and On-line buttons held down.

A printout sample is shown below. Please refer to the 120-D User's Manual for details.

< C I T I Z E N > 120-10 commodore *** TEST PRINT ***
Copyright (C) 1986 CITIZEN WATCH CO.,LTD. Tokyo Japan
* Y8304 COMMODORE Serial B.I.P.
* ROM Version No. : K403-0000(-03) APL-25-86/AB1-13-86

<CITIZEN> 128=D commodore *** TEST PRINT ***

Hex dump

Hex dump is not a feature that you will use for everyday printing. In this mode the 120-D Commodore prints the hexadecimal value of every code it receives as well as the character, or the control code each value stands for.

Hex dump mode is turned on by holding down both the LF and FF buttons on the control panel while you turn on the power.

A printout sample is shown below. Please refer to the 120-D User's Manual for details.

```
PRINT ZONE: 120-D commodore *** HEXA DECIMAL PRINT ***
(0000) 00 01 02 03 04 05 06 07 08 09 0A 0B 0C 0D 0E 0F 10 11 12 13 14 15 16 17 18 19 1A 1B 1C 1D 1E 1F
(0020) 20 21 22 23 24 25 26 27 28 29 2A 2B 2C 2D 2E 2F 30 31 32 33 34 35 36 37 38 39 3A 3B 3C 3D 3E 3F
(0040) 40 41 42 43 44 45 46 47 48 49 4A 4B 4C 4D 4E 4F 50 51 52 53 54 55 56 57 58 59 5A 5B 5C 5D 5E 5F
(0060) 60 61 62 63 64 65 66 67 68 69 6A 6B 6C 6D 6E 6F 70 71 72 73 74 75 76 77 78 79 7A 7B 7C 7D 7E 7F
```

Chapter 2 Using Your Printer

In this chapter we will show you a few fundamental BASIC commands so that you may print something on your printer. However, in order to write a BASIC program using the Citizen 120-D printer, some elementary knowledge of BASIC language and your Commodore computer is needed. Please refer to your computer's User' Manual for the information.

1 Special Printer-Associated Commands

The OPEN Command

```
OPEN <Logical File Number> <Device Number>
[<Secondary Address>]
```

This command creates a correspondence between the logical file number and the device number. File control following this command can be taken with the logical file number only.

Logical File Number:

The logical file number may be any number from 1 to 255. You can open up to 10 files at once.

Device Number:

The device number refers to data sent from your Commodore computer. With a Citizen 120-D printer, the device number is usually 4 or 5 and is selected by the DIP switch.

Secondary Address:

The secondary address designates the mode, one of the i/o device functions. A Citizen 120-D printer has two secondary addresses.

- 0: Graphic mode character set
- 7: Business mode character set

If there is no designation of secondary address, the printer automatically adjusts to 0, the graphic mode.

The CMD Command

CMD <Logical File Number>

When the printer is given the **CMD** command it is said to be "listening." This means that once you give the **CMD** command, your printer will print **READY** and will be open and waiting for further instructions. At this point, any **PRINT** or **LIST** command will go directly to the printer as output.

Unlike a **PRINT #** command (which is discussed next), the line to the receiving device (in this case your printer) is left open.

If you want to correct the program after giving the **CMD** command, you should intentionally cause a **SYNTAX** error and close the file with the **PRINT #** and **CLOSE** commands.

The PRINT # Command

PRINT <Logical File Number> <Data List>

This command directs the data to the designated logical file number. After the data you have sent to the printer is completed, the logical file number is automatically closed. This is called "unlistening."

In Commodore **BASIC**, the **PRINT** command can be abbreviated by using a "?". You cannot do this with **PRINT #**.

You must always type **PRINT #** in full or **P** **SHIFT** **R** (abbreviation of **PRINT #**).

The CLOSE Command

CLOSE <Logical File Number>

With this command you can always close a file once you have opened it with the **OPEN** command. The logical file number must be the same as the one you chose for the **OPEN** command.

Since the CMD command does not close the line to the printer, you must always follow a PRINT # command with the CLOSE command in order to properly close a file.

The following is an example of data using a PRINT command after the output channel to the printer is opened, and the printer is "listening" with the CMD command. The program in these two processes is different although the printout the same.

2 Printing in Command Applications

The following example illustrates the program and printout with the conditions:

- (1) Set the device number at 4
- (2) Output the data given a logical file number of 1 and a device number of 4

```
10 OPEN1,4
20 PRINT#1," CITIZEN 120-D ** COMMODORE **"
30 PRINT#1," TEST-PRINT"
40 CLOSE1
```

READY

```
CITIZEN 120-D ** COMMODORE **
TEST-PRINT
```

```
10 OPEN1,4
20 CMD1
30 PRINT" CITIZEN 120-D ** COMMODORE **"
40 PRINT" TEST-PRINT"
50 PRINT#1
60 CLOSE1
READY.

CITIZEN 120-D ** COMMODORE **
TEST-PRINT
```

The following example shows you the character mode switch using the secondary address set by the OPEN command. The printer has 2 secondary addresses (sa).

sa = 0: Select graphic character mode
sa = 7: Select business character mode

Business Mode Character Set

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0	Ø	Ø	P	—	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	—	—	—
A	:	:	j	z	J	Z					—	J	Z	—	—	—
B	+	;	k	l	K	L	+	+	+	+	—	K	L	+	+	—
C	,	<	l	£	L	M	*	*	*	*	—	L	M	*	*	*
D	-	=	m	J	M	I	—	—	—	—	—	M	I	—	—	—
E	.	>	n	↑	N	X	—	—	—	—	—	N	X	—	—	—
F	/	?	o	←	O	»	—	—	—	—	—	O	»	—	—	—

Graphic Mode Character Set

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0	Ø	Ø	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	X	—	—	—	—	—	—	—	—	—	—	—
8	)	8	H	I	Y	—	—	—	—	—	—	—	—	—	—	—
A	*	9	I	Z	C	—	—	—	—	—	—	—	—	—	—	—
B	+	:	J	K	L	—	—	—	—	—	—	—	—	—	—	—
C	,	<	L	M	J	—	—	—	—	—	—	—	—	—	—	—
D	-	=	M	N	N	—	—	—	—	—	—	—	—	—	—	—
E	.	>	N	↑	↑	—	—	—	—	—	—	—	—	—	—	—
F	/	?	O	←	↑	—	—	—	—	—	—	—	—	—	—	—

When using the LIST command within a program execution, you must type the PRINT # command to close the channel. To close the file after you have finished running it, type the CLOSE command; otherwise program execution will be interrupted.

Chapter 3 Printing Modes and Control Codes

1 Various Printing Modes

A Citizen 120-D Commodore covers various printing modes as well as the standard character mode. You can use these modes with the PRINT #, CMD and PRINT commands in conjunction with CHR\$ codes. These modes and codes are naturally unused in the IBM configuration. The following is a list of the commands of the Citizen 120-D Commodore.

Citizen 120-D Commodore

(see Page)

Print Style Commands

		COMMODORE	CITIZEN		
ESC x (n)	Sets/cancels correspondence print	42	ESC h	Sets vertical enlarged print	60
ESC P	Selects pica pitch	43	ESC u	Cancels vertical enlarged print	60
ESC M	Selects elite pitch	44	ESC ^1	Sets/cancels vertical enlarged print	60
ESC W (n)	Sets/cancels expanded print	45	ESC @	Initializes printer	62
CHR\$ (14)	Sets one line expanded print	25	ESC ^3	Selects character pitch	62
	Sets 1/6" line spacing		ESC I (n)	Selects print mode	63
	Cancels Commodore bit image mode				
CHR\$ (15)	Cancels expanded print	25			
	Sets 1/6" line spacing				
	Cancels Commodore bit image mode				
CHR\$ (20)	Cancels expanded print	26			
ESC P (n)	Sets/cancels proportional spacing	49	CHR\$ (13)	Carriage return	75
ESC (space) (n)	Increases proportional spacing	50	CHR\$ (10)	Line feed	76
ESC a (n)	Adjusts character position	51	ESC 0	Sets 1/8" line spacing	79
ESC E	Sets emphasized print	52	ESC 1	Sets 7/72" line spacing	80
ESC F	Cancels emphasized print	52	ESC 2	Sets 1/6" line spacing	78
ESC G	Sets doublestrike print	53	ESC 3	Sets n/216 line spacing	83
ESC H	Cancels doublestrike print	53	ESC A	Sets n/72" line spacing	80
ESC 4	Selects (Italic) character set	54	ESC ^0 (n)	Sets n/144" line spacing	82
ESC 5	Cancels (Italic) character set	54	ESC J (n)	Feeds n/216" line spacing with one line	85
CHR\$ (17)	Set one line business print	30			
CHR\$ (145)	Set one line graphic character print	30			
ESC -- (n)	Sets/cancels underlined print	54			
ESC r	Sets white-black reverse print	57	Page Design Commands		
ESC t	Cancels white-black reverse print	57	CHR\$ (12)	Form feed	86
ESC ^2 (n)	Sets/cancels white-black reverse print	57	ESC C (n)	Sets page length to n lines	87
CHR\$ (18)	Sets white-black reverse print	31	ESC C (0) (n)	Sets page length to n inches	88
CHR\$ (146)	Cancels white-black reverse print	31	ESC N (n)	Sets bottom margin at n lines	89
ESC S0	Sets superscript print	58	ESC 0	Cancels bottom margin	89
ESC S1	Sets subscript print	59	ESC 1 (n)	Sets left margin at column n	91
ESC T	Cancels superscript/subscript print	59	ESC Q (n)	Sets right margin at column n	92

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ESC h	Sets vertical enlarged print
ESC u	Cancels vertical enlarged print
ESC ^1	Sets/cancels vertical enlarged print
ESC @	Initializes printer
ESC ^3	Selects character pitch
ESC I (n)	Selects print mode

Line Spacing Commands

CHR\$ (13)	Carriage return
CHR\$ (10)	Line feed
ESC 0	Sets 1/8" line spacing
ESC 1	Sets 7/72" line spacing
ESC 2	Sets 1/6" line spacing
ESC 3	Sets n/216 line spacing
ESC A	Sets n/72" line spacing
ESC ^0 (n)	Sets n/144" line spacing
ESC J (n)	Feeds n/216" line spacing with one line

Page Design Commands

CHR\$ (12)	Form feed
ESC C (n)	Sets page length to n lines
ESC C (0) (n)	Sets page length to n inches
ESC N (n)	Sets bottom margin at n lines
ESC 0	Cancels bottom margin
ESC 1 (n)	Sets left margin at column n
ESC Q (n)	Sets right margin at column n

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Horizontal Tab Commands

CHR\$ (9)	Horizontal tab (htab)	93
ESC e (0) (n)	Sets horizontal tabs every n column	94
ESD D (n1) (n2) (n3) – (0)	Sets variable htabs at columns n1, n2, n3 – – –	95
ESC f (0) (n)	Moves print head n columns to right	96
ESC \$ (n1) (n2)	Sets absolute dot tab	98
ESC \ (n1) (n2)	Sets relative dot tab	99
CHR\$ (16) (n1) (n2)	Sets print position by n1, n2 columns	38
ESC (16) (n1) (n2)	Sets print position by n2, n1 dots	37

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CHR\$ (8)	Enters Commodore bit image mode	32
CHR\$ (14)	Cancels Commodore bit image mode	25
	Sets one line expanded print	
	Sets 1/6" line spacing	
CHR\$ (15)	Cancels Commodore bit image mode	25
	Cancels expanded print	
	Sets 1/6" line spacing	
CHR\$ (26)	Repetition of bit image data	35

Vertical Tab Commands

CHR\$ (11)	Vertical tab (vtab)	101
ESC e (1) (n)	Sets vertical tabs every n columns	102
ESD B (n1) (n2) (0)	Sets variable vtabs at lines n1, n2, – – –	102
ESC f (1) (n)	Advances the paper to n lines	103
ESD b (N) (n1) – (nn) (0)	Sets vtabs n1, – – – nn in channel N	105
ESC / (n)	Sets vtabs in channel n as current vtabs	105

Defined Character Commands

ESC : (0) (0) (0)	Copies standard characters set	130
ESC & (0) (n1) (n2) (a) (d0) – (d10)	Defines download characters	137

Graphic Commands

ESC K (n1) (n2)	Sets normal-density graphics	112
ESC L (n1) (n2)	Sets double-density graphics	112
ESC Y (n1) (n2)	Sets double-speed double-density graphics	112
ESC Z (n1) (n2)	Sets quadruple-density graphics	112
ESC . (m) (n1) (n2)	Selects graphics mode m	117
ESC ? n (m)	Changes from graphics mode n to m	118
ESC ~ (m) (n1) (n2)	Sets 9-pin graphics in single-density (m=0) or double-density (m=1)	119

Buffer Commands

CHR\$ (24)	Cancels line	140
ESC @	Resets printer to power on default	141
	Settings and clears buffer	

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Miscellaneous Commands

ESC U (n)	Sets/cancels unidirectional print	143
ESC <	Sets one line unidirectional print	144
BSC "4 (n)	Sets/cancels slashed zero feature	145
ESC 8	Disables paper-out sensor	146
ESC 9	Enables paper-out sensor	146
ESC >	Sets high-bit	147
ESC =	Sets low-bit	148
ESC #	Cancels high-bit/low-bit code conversion	149
CHR\$ (34)	Changes control code to reverse character	

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NOTE:

Since the command of Commodore BASIC is different from that of Microsoft BASIC, you need to change the LPRINT command to PRINT # command. (For further details, see Chapter 2) You cannot input the data of the program illustrated in the 120-D User's Manual. For the same command functions as the 120-D, you will refer to the 120-D User's Manual.

There follows an example of the change from LPRINT command to PRINT # command.

Example:

Using ESC W, expanded print mode

- The program and printout on page 46 in the 120-D User's Manual:

```
10 LPRINT CHR$ (27); "P"  
20 LPRINT CHR$ (27); "W1"; "Pica expanded"  
30 LPRINT CHR$ (27); "W0"; "Unexpanded pica"  
40 LPRINT CHR$ (27); "M"  
50 LPRINT CHR$ (27); "W1"; "Elite expanded"  
60 LPRINT CHR$ (27); "W0"; "Unexpanded elite"
```

Pica expanded
Unexpanded pica

Elite expanded
Unexpanded elite

- The changed program and printout with the Commodore PRINT# command:

```

10 OPEN 1,4,7
20 PRINT#1,CHR$(27);CHR$(80)
30 PRINT#1,CHR$(27);CHR$(87);CHR$(49); "Pica expanded"
40 PRINT#1,CHR$(27);CHR$(87);CHR$(48); "Unexpanded pica"
50 PRINT#1,CHR$(27);CHR$(77)
60 PRINT#1,CHR$(27);CHR$(87);CHR$(49); "Elite expanded"
70 PRINT#1,CHR$(27);CHR$(87);CHR$(48); "Unexpanded Elite"

```

READY.

Pica expanded
Unexpanded pica

Elite expanded
Unexpanded elite

NOTE:

Alphabetic characters in a command sequence should be changed to their corresponding character codes in the standard ASCII table, because character codes of the Commodore system are quite different from these of the ASCII. Please refer to the 120-D User's Manual.

2 Control Codes

In this section we will show you the Commodore speciality control codes and some different control codes to the 120-D.

2-1 Expanded Print Mode

Format	ON	OFF
BASIC	CHR\$(14)	CHR\$(15)
Hex	0E	0F

When CHR\$(14) is input, all data following this code is printed in double width characters. With the CHR\$(15) code you can reset the expanded print mode.

By suing the CHR\$(14) or CHR\$(15) code, you can reset the Commodore bit image mode and set the line feed spacing to 1/6 inch.

The expanded print mode can also be selected with the ESC! or ESC W code.

Example:

```
10 OPEN1,4
20 PRINT#1,CHR$ (14); "SET DOUBLE WIDTH"
30 PRINT#1, "MODE BY CHR$ (14)"
40 PRINT#1,
50 PRINT#1,CHR$ (15); "RESET DOUBLE WIDTH MODE BY CHR$ (15)"
60 CLOSE 1
```

READY.

SET DOUBLE WIDTH
MODE BY CHR\$ (14)

RESET DOUBLE WIDTH MODE BY CHR\$ (15)

2-2 One-line Expanded Print Mode

Format	ON	OFF
BASIC	CHR\$(27)CHR\$(14)	CHR\$(27)CHR\$(20)
Hex	1B 0E	1B 14

This command turns on the expanded print mode for one line only and the printer automatically returns to normal print for the next line. You can reset this one-line expanded print mode by sending the command CHR\$(27) CHR\$(20) instead of just the command CHR\$(20). This is the only difference of this mode from the standard ESC code sequence. Please refer to page 46 of the 120-D User's Manual for details.

2-3 Compressed Print Mode

Format	ON	OFF
BASIC	CHR\$(27)CHR\$(15)	CHR\$(27)CHR\$(18)
Hex	1B 0F	1B 12

This command compresses the character width to approx. 60% of the width (both characters and spaces are affected). Compressed print lets you print more characters per line. Compressed pica prints 17 characters per inch. You can reset this compressed print mode by sending the command CHR\$(27)CHR\$(18) instead of the command CHR\$(18). This is the only difference on this mode from the standard ESC code sequence. Please refer to page 47 of the 120-D User's Manual for details.

2-4 Accented (International) Character Set

BASIC	CHR\$(27)“R”CHR\$(n)	(n=0 to 11)
Hex	1B 52 nh	(nh = 01 to 1Bh)

The 120-D Commodore can print accented characters from nine languages by redefining up to 12 of the standard ASCII codes to accommodate the accented characters and special symbols used in each language. There are eleven international character sets available. To select a particular set of characters, send ESC R followed by the ASCII code number for the set you want. The values of n are shown in the table below.

<u>n</u>	<u>Country</u>	<u>n</u>	<u>Country</u>
0	U.S.A.	6	Italy
1	France	7	Spain
2	Germany	8	Japan
3	England	9	Norway
4	Denmark I	10	Denmark II
5	Sweden	11	Commodore standard

To print international characters, set the 120-D Commodore to Business Mode. If you select Graphic Mode, the Commodore standard character set ($n=11$) is selected automatically even if another number of n is input.

To print a character from the international character set selected, send its ASCII code number (or its equivalent character in standard ASCII).

International Characters

ASCII Code

Country	35	36	64	91	92	93	94	96	123	124	125	126	127
U.S.A.	#	\$	@	[	\	\]	^	'	f	i	}	-	
France	#	\$	à	°	ç	g	^	'	é	ù	è	..	
Germany	#	\$	ß	À	Ó	Ó	^	'	ä	ö	ú	ß	
England	£	\$	©	[	\	\]	^	'	{	i)	~	
Denmark I	#	\$	©	Æ	Ø	À	^	'	æ	ø	å	~	
Sweden	#	¤	É	À	Ó	À	Ó	é	å	ö	å	ü	
Italy	#	\$	©	°	\	é	^	ù	à	ö	è	í	
Spain	R	\$	©	í	Ñ	Ñ	^	'	ñ	~	ñ)	
Japan	#	\$	©	[	¥	]	^	'	{	i)	~	
Norway	#	¤	É	Æ	Ø	À	Ó	é	æ	ø	å	ú	
Denmark II	#	\$	É	Æ	Ø	À	Ó	é	æ	ø	å	ú	
Commodore standard	#	\$	©	[£]	↑	-	⌘	!	⌘	⌘	

The character code 127 (or 7FH) is a space when a country number n equals 0 to 10 is selected.

2-5 One-line Business Mode

Format	ON	OFF
BASIC	CHR\$(17)	CHR\$(145)
Hex	11H	91H

By sending the cursor down code, CHR\$(17), to your printer, all data following this code will be printed in business character mode. Input CHR\$(145) and the following characters will be printed in graphic mode.

These codes apply for one line only.

```
100 OPEN1,4
110 PRINT#1, "GRAPHIC CHARACTER SET"
120 PRINT#1, CHR$(145); " **** CITIZEN 120-D **** "; PRINT#1
130 PRINT#1, "BUSINESS CHARACTER SET"
140 PRINT#1, CHR$(17); " **** CITIZEN 120-D **** "; PRINT#1
150 CLOSE 1
160 END
```

READY.

GRAPHIC CHARACTER SET
***** CITIZEN 120-D *****

BUSINESS CHARACTER SET
SSSS citizen 120-d SSSS

2-6 Reverse Print Mode

Format	ON	OFF
BASIC	CHR\$(18)	CHR\$(146)
Hex	12H	92H

By selecting the CHR\$(18) code you have turned on a reverse print mode. This prints white letters on a black background. The code CHR\$(146) or carriage return can reset this mode.

Reverse print mode can also be selected with ESC ~2 or ESC r code.

```
100 OPEN1,4
120 PRINT#1, CHR$(18); "CITIZEN 120-D"
130 CLOSE1
```

READY.

CITIZEN 120-D

2-7 Commodore Bit Image Mode

BASIC `CHR$(8)`
Hex 8

By using the backspace code, `CHR$(8)` you can enter a bit image mode. This allows you to design and print bit image graphics by inputting data. Data bits 0 to 6 correspond to head pins 1 to 7 (direction: higher to lower). Head pins 8 and 9 are not used. All data with bit 7 as "1" will be printed as bit image data after this command is received.

When this mode is input, the line feed spacing is set to 7/72 inch. You can cancel this mode with the SO code (CTRL-N) or the SI code (CTRL-O).

Example:

Design Σ font with the following steps:

- (1) Design your bit image graphic in dot form (see the example).
- (2) Add together all the numbers from the column on the left, only whenever you placed a dot in a row. In our example, the first column has 2 dots located in rows 1 and 64. Added together they equal 65.
- (3) Now add 128 (reason: Bit 7 = 1) to the total you had for each column. In our example, we add 128 to 65 for a total of 193.
- (4) Put your final total for each column into a data statement in column order.

The data statement in your program will read:

`Data 193, 227, 213, 201, 193, 193`

1	●	●	●	●	●	●	○
2	○	●	○	○	○	○	○
4	○	○	●	○	○	○	○
8	○	○	○	●	○	○	○
16	○	○	●	○	○	○	○
32	○	●	○	○	○	○	○
64	●	●	●	●	●	●	○

+128

193 213 193

227 201 193

The following example is the program and printout.

```
100 FOR N = 1 TO 8
110 READ A
120 A$ = A$ + CHR$(A)
130 NEXT
140 OPEN 1, 4
150 PRINT#1, CHR$(8); A$; A$; A$;
160 PRINT#1, "CITIZEN 120-D"
170 CLOSE1
180 DATA 193, 227, 213, 201, 193, 193, 128, 128
READY.
```

*** CITIZEN 120-D

2-8 Repetition Print Mode

BASIC	CHR\$(26) n1, n2
Hex	1A, n1, n2

By selecting the sub code, **CHR\$(26)** you have turned on a repetition print mode. This prints repeatedly bit image graphics for one line only.

For the command format following:

BS---SUB n1 n2

* n1: number of repetitions
* n2: data of repetitions

Bit 7 = 0: Characters
Bit 7 = 1: Bit image graphics

Example:

```
100 BS$ = CHR$(8): SUB$ = CHR$(26)
110 TS$ = "100 TIMES REPEAT PRINT"
120 OPEN1,4
130 PRINT#1, BS$; TS$; SUB$; CHR$(100); CHR$(255)
140 CLOSE1
```

READY.

100 TIMES REPEAT PRINT

The Citizen 120-D Commodore allows you to print repeatedly character fonts with only the sub code, CHR\$(26).

```
10 BS$ = CHR$(8): SUB$ = CHR$(26)
20 OPEN 4,4
30 PRINT#4, "REPEAT 6 TIMES";
40 PRINT#4, SUB$; CHR$(6); "A"
50 CLOSE 4
60 END
```

READY.

REPEAT 6 TIMES AAAAAA

2-9 Print Start Position – Dot Address

BASIC CHR\$(27); CHR\$(16); CHR\$(n1); CHR\$(n2)
Hex 1B, 10, n1, n2

With the POS code, CHR\$(16) following the ESC code, CHR\$(27), you can determine the print start position in dot units.

The 2 bytes that follow the ESC and POS codes are binary data (n1, n2) and are used to indicate the absolute address away from the axe position at which the left margin is set. Applicable unit is 1/60 inch.

n1: Higher 8 bits
n2: Lower 8 bits

Example:

Print "Test Print" from the 60th dot position counting from the left margin position. (The left margin is not set on this example.)

```
100 PO$ = CHR$(16): LF$ = CHR$(10): ESC$ = CHR$(27)
110 OPEN1,4
120 FOR N = 1 TO 5
130 PRINT#1, "0123456789";
140 NEXT
150 PRINT#1, LF$;
170 PRINT#1, ESC$; PO$; CHR$(0); CHR$(60);
180 PRINT#1, "TEST PRINT"
190 CLOSE1
```

READY.

01234567890123456789012345678901234567890123456789
TEST PRINT

2-10 Print Position Determination

BASIC `CHR$(16) "N1 N2"`
Hex `10H, 30H + N1, 30H + N2`

With the 2-column numbers, N1 and N2 following the POS code, `CHR$(16)`, you can determine the print start position in column numbers from the left.

Example:

```
100 POS = CHR$(16): LF$ = CHR$(10)
110 OPEN1,4
120 FOR N = 1 TO 5
130 PRINT#1, "0123456789";
140 NEXT
150 PRINT#1, LF$;
170 PRINT#1, POS: "10TEST PRINT"
180 CLOSE1
```

READY.

01234567890123456789012345678901234567890123456789
TEST PRINT

2-11 Others

The following control codes except these are different from those of the 120-D:

Code	120-D	Commodore
DC3	<code>CHR\$(19)</code>	Sets Printer Off Line
DC4	<code>CHR\$(20)</code>	Cancels one line expanded print
ESC 6	<code>CHR\$(27)</code>	Sets accented character (IBM)
ESC 7	<code>CHR\$(27)</code>	Cancels "
ESC m	<code>CHR\$(27)</code>	Sets/cancels block graphics
ESC "5"	<code>CHR\$(27)</code>	EPSON/IBM
DEL	<code>CHR\$(127)</code>	Deletes Character
"	<code>CHR\$(34)</code>	Prints character
		Print character
		Reverse character

NOTE:

The `DEL` code, `CHR$(127)` as well as the `CHR$(127) + CHR$(128)` will function as a print character.