PROGRAMMER'S REFERENCE MANUAL

SYSTEM 800
CHARACTER GENERATORS

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INTRODUCTION

The 800 Series of Character Generators provides display of information in a television system. It is possible to place information for a page anywhere in the safe area of the video display. The height of the characters displayed is adjustable from 16 scan lines (about 3 percent of the height of the screen) per field to 120 scan lines (about 25 percent of the height of the screen) per field. The maximum number of lines on a page is 16.

There are three video configurations available.

1) The CG840 has full gen lock capability and provides for color characters and color backgrounds. It can be used as a titler, i.e. characters are keyed into the video signal supplied.

2) The CG830 is a stand alone color billboard generator, i.e. (color) characters are displayed against an internally generated color background.

3) The CG810 is similar to the CG840 but has no color capability, and can only key white characters (with or without black border) into an incoming video signal. It will not operate unless a video signal is supplied.

There are two types of display available.

1) A page oriented system.

2) A single line crawling message.

In the page systems you display messages which can occupy the full screen with many lines of text. When an automatic queue is run in a page system, you can have a single crawl message appear at the bottom while pages sequence.

In a crawl system you display the queue as a sequence of messages which crawl as a single line on the bottom of the screen. While this crawl is in progress, you can display a single page in the area above the crawl.

Characters are displayed by using any one of 4 internal fonts. Three of these fonts are proportionally spaced and one is fixed pitch. The standard fonts supplied are similar to:

1) Helvetica, providing approximately 30 characters on an average line,

2) Clarendon, providing approximately 26 characters on an average line,

3) Futura Black, providing approximately 16 characters on an average line. This font is supplied in upper case characters only.

4) provides exactly 41 characters per line.

The default font is font 1, Helvetica.

Unless otherwise specified all fonts provide the character set as illustrated below:

A	B	C	D	E	F	G	H	I	J	K	L		
M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z
a	b	c	d	e	f	g	h	i	j	k	l		
m	n	o	p	q	r	s	t	u	v	w	x	y	z
1	2	3	4	5	6	7	8	9	0				
(	)	-	$	?	°	/	%	:	;	!	'	"	
#	&	=	>	<	*	+	[	]	@	.	,		

Standard character set

All symbols are standard except for the degree symbol which is obtained with the SHIFT 6 key from the keyboard.

On special order, fonts can be made available with international characters.

Other fonts are available to replace any standard font, at additional cost.

Logos can be supplied at additional cost, contact the factory for details.

The user may enter a maximum of 99 different pages into the system memory. Pages will remain in memory for several days when power is removed from the system. The maximum total length of all pages is over 20,000 characters.

A page queue is provided so that the operator can randomly sequence pages. There are a maximum of 99 events that can be placed in the queue. Each event consists of a page number and the number of seconds to display that page. When a queue completes it's cycle it will restart at the beginning.

In the crawl system each event can be specified to repeat it's crawl consecutively a number of times before the next message begins.

An expiration time can be associated with each page so that it will be removed from the automatic display queue at a specific date, hour and minute.

There are permanent emergency type messages built into the system which can also be crawled in a page system.

DATA INPUT

There are two data input methods. Either an attached PC style keyboard, or a serial data line connected to a computer, terminal etc. Most functions specified from the keyboard could also originate from the serial input.

The local keyboard is a PC style 101 key unit. In the Gen Lock CG840 configuration when using local keyboard you may use an off-line monitor to view the results of the keystrokes entered. This monitor can be any monochrome composite video monitor. In the CG830 configuration there is no off-line monitoring.

When operating from the local keyboard certain functions discussed below are single key functions. The specific local keyboard function key required is indicated in braces { }. The syntax of the command from the serial port is enclosed in square brackets [ ]. Local keyboard data entry is only available when the automatic queue is not running. Serial port data entry is always available.

PAGE EDITOR

The edit area consists of up to 16 rows by about 30 characters (depending on the font chosen) per row.   There is a maximum of 1000 characters allowed on a page. Note: That if you change colors, fonts, etc. each change uses 5 characters of memory.

To the right of the typing array on the keyboard there is a set of 10 keys which are primarily used for positioning the cursor in the edit display area. The arrow keys move the cursor in the direction indicated. The **HOME** key places the cursor at the upper left of the screen, the **END** key places the cursor at the last character typed.

There are two modes of placing characters on the screen. The default mode of operation of the editor is in 'insert' mode. The light above the **INSERT/OVERWRITE** key is off when in insert mode and on when in overwrite mode.

In the insert mode when you type characters the entire text from right of the cursor to the end of the current display row moves right one position and the new character is inserted at the cursor position. If there is no room to add characters on that row and the cursor gets to the end of the row then additional characters you type will move the cursor to the beginning of the next row. If the cursor is in the middle of the row when current text is pushed to the right edge of the row, then the cursor will jump to the beginning of the next row and subsequent characters you enter will be placed starting at the left margin of that next row. In the overwrite mode characters may be pushed off the right margin if the width of the new character is greater than that of the original character.

In the overwrite mode the character struck on the keyboard will be placed at the current cursor position, if there is a character at that position it will be replaced by the new character.

There are two kinds of spaces. The space bar inserts a space character which is typically the width of the numeral 0 of the font selected. Moving the cursor to the right with the right arrow, or using any of the arrow keys to position the cursor over a previously blank area inserts a narrow space equal to about 1/3 of the space character of the default font. A Tab (hex 09) character from the serial port is the same as a narrow space.

{ INSERT OVER/WRITE } To change between insert and type-over mode use this key on the right side of the keyboard.

{ DELETE } The delete key always deletes one character at the cursor position from the current row and moves all text after that character until the end of the row one space to the left. A blank space is brought in at the end of the row. When there is nothing left to delete on the current row, the entire contents of the following row are brought up. This may result in some text not being visible. You can retrieve the invisible text by positioning the cursor and pressing **SHIFT + INSERT** to bring text to the right of the cursor down to a newly inserted line under the current line.

{ SHIFT DELETE } will delete the entire contents of the current row the cursor is on, all rows under the cursor will be moved up one to replace the deleted row.   **{ CTRL DELETE }** will delete the characters on the current row from the cursor position to the right margin.

{ INSERT } This key will place a blank space at the current cursor location and move all subsequent text ON THIS ROW ONLY one space to the right. Positioning the cursor before a character and then pressing the **{ SHIFT INSERT }** key will cause the text following the cursor to be brought down to a new row under the current row. Text below the current row is moved down one row until a maximum of 16 rows has been used on the page. When 16 rows have been used this key will do nothing. Depending on the row height selected you may appear to lose text at the bottom of the screen. The editor remembers up to 16 rows. These 'lost' rows can be retrieved by deleting rows above them, or by changing the row height so that they will become visible.

{ EDIT } To edit a specific page from memory press the **EDIT** key and then enter the number of the page you wish to edit. If that page had text on it, the text will appear on the edit screen. You may then make changes to the page. If the page was not used a blank screen will appear.

{ CLEAR PAGE } in a page unit clears the entire contents of the edit screen and places the cursor at the home position. All character/page attributes are also cleared to their default settings of:

Font = 1
Background color = light blue
Character color = yellow
Height = 32 scan lines per field
Upper and Lower additional spaces = 0

Clear page defaults

In a page unit, pressing **SHIFT+CLEAR PAGE** places the editor is a single line edit mode which is suitable for preparing crawling messages. This editing mode remains in effect until a **CLEAR PAGE** (without SHIFT) is entered.

In a crawl unit, **CLEAR PAGE** sets up the editor in a single line edit mode. The defaults are:

Font = 1
Background color = external video
Character color = yellow

Clear crawl defaults

In a crawl unit, pressing **SHIFT + CLEAR PAGE** places the editor in the page edit mode, suitable for editing complete pages. The defaults are the same as the chart above 'Clear page defaults'.

Whatever edit mode is in effect remains until you press **CLEAR PAGE** or **SHIFT + CLEAR PAGE**.

In single line edit modes, used for preparing crawls, the cursor starts off at the left side of the screen. As you type text the cursor moves right until it reaches the right margin. Further typing then moves text off the left side, the cursor remains at the right margin.

{ LEFT JUST } { CTR } { RIGHT JUST } These keys perform the indicated function on the line that the cursor is currently positioned. When you press these keys with the **SHIFT** key, they affect the entire page. These keys are meaningless when editing crawls.

CURSOR MOTION The cursor is moved using the arrow keys. To move to the beginning of the previous word use the **CTRL** key and the left arrow. To move to the beginning of the next word use the **CTRL** key and the right arrow key. To move the cursor to the left margin use **SHIFT** and left arrow. To move the cursor to the right margin use **SHIFT** and right arrow.

{ TOGGLE CURSOR } When in the edit mode the cursor is normally on the screen. You may use the Toggle Cursor key to change the state of the visible cursor on the screen. With the cursor off you will still be able to edit, you will just not see where the cursor is.

DISPLAY ATTRIBUTES

While editing a page you may select various attributes which affect the appearance of the page.

The function key version of the attribute selection is applicable when editing from the keyboard. The serial data stream version of the parameter is applicable when preparing text on a terminal/computer and then sending the data stream into the unit's memory for later display.

{ F1 } [@BKCOL,n;] will select one of the sixteen available colors for the background to be in effect from the first space after the position that the cursor is currently on until the next change is entered on that page. Thus background color is available for each word.

From the keyboard you will step through the colors. With the **SHIFT + F1** key you will step backwards through the colors.

From the serial data stream you enter a specific number for the color desired. An invalid number will return an error message.

In the System 840 **CTRL + F1** will set the background color to **external video**. The colors are numbered:

1 = black
2 = blue
3 = red
4 = magenta
5 = green
6 = cyan
7 = dull yellow
8 = gray
9 = black in stand alone,
     external video in gen lock
10 = bright blue
11 = bright red
12 = bright magenta
13 = bright green
14 = bright cyan
15 = yellow
16 = white

Color numbers

{ F2 } [@CHCOL,n;] will select character color similar to background color.   **SHIFT + F2** will step through the color list backwards. Character color is available on a character basis. The changed color takes effect on the next character typed onto the page.

{ F3 } [@PFONT,n;] will select one of the available fonts for the display. The selection will remain in effect from the position that the cursor is currently on until the next change is entered on that page. From the keyboard you will step through the available fonts. From the serial data stream you enter a specific number for the desired font.

Selection of a font also determines the vertical size of the text because all fonts, except 4, are proportionally spaced. The largest font selected on a row determines the height of a row.

{ CTRL F3 } This key will set the font to the default font, number 1.

{ F5 } [@FLON;] [@FLOFF;] From the keyboard the **F5** key will toggle the state of the flash for text beginning at the current cursor position. The selected state remains in effect until the next change is entered on that page. From the serial input the flash state is set at the specific point in the text stream that the **FLON** or **FLOFF** command is encountered.

{ F6 } [@SIZE,nn;] From the keyboard the **F6** key will increase the height of the row that the cursor is currently positioned on. The Shifted **F6** key will decrease the height. The minimum allowed height is 16 scan lines, the maximum is 120 scan lines. The selected height remains in effect for all rows on the display until another height parameter is entered. You may select height from any position on the current row. From the serial input you must supply a number of scan lines for the row height.

To set the height to the default size for the largest font on the row use **{ CTRL F6 }**

Size refers to how the current row is scaled relative to it's normal size determined by the font. The scaling size number should be divided by 32 to get the relative height. Thus, if you get the size to 64 you have doubled the natural height of the line. Setting size to 16 reduce the line to 1/2 it's natural height. When reducing a line you may lose certain borderline information. Not all scale factors are useful with all fonts.

{ F7 } [@UPPER,nn;] Sets the number of additional scan lines added to the top of the current text row. In the CG830 and CG840 these scan lines are always the same as the background color of the current row. Pressing this key increases the number of scan lines. The Shifted **F7** key decreases the number of scan lines. The selected state remains in effect until the next change is entered on that page. The cursor can be anywhere on the current row. From the serial data stream the number of scan lines is specifically entered and must be between 0 and 60. Use of upper and lower additional scan lines is similar to the concept of 'leading' used by typesetters to increase the space between printed rows.

To set the upper additional scan lines to the default of 0 use **{ CTRL F7 }**

{ F8 } [@LOWER,nn;] Sets the number of additional scan lines added to the bottom of the current text row. In the CG830 and CG840 these scan lines are always the same as the background color of the current row. Pressing this key increases the number of scan lines. The Shifted **F8** key decreases the number of scan lines. The selected state remains in effect until the next change is entered on that page. The cursor can be anywhere on the current row. From the serial data stream the number of scan lines is specifically entered and must be between 0 and 60.

To set the lower additional scan lines to the default of 0 use **{ CTRL F8 }**

When using colored backgrounds the additional scan lines on top of a row take on the last color of the row above. Those below a row take on the last color of the current row.

SERIAL PORT ALTERNATE ATTRIBUTE ENTRY

When preparing pages on your computer for sending to the unit do not use the ~ (tilde, hex 7e) character in your text. This character is interpreted internally to delimit the internal attribute data. It is possible to bypass the following commands by sending the interpreted attribute directly to the unit:

@FL

@BKCOL

@CHCOL

@PFONT

@SIZE

@UPPER

@LOWER

All of the above attributes are internally stored as a 5 character packet. The first and fifth character of the packet is the ~ (tilde). The second character is the attribute identifier, the third character is the specific value of the attribute starting at that text location, the fourth character is the attribute for the previous occurance of that attribute. If you do not plan to edit the text from the local keyboard, then you may make the third and fourth characters, i.e. the attribute value, the same. This will only become relevant when you use this sequence to change font. In such cases if the fourth character is not equal to the previous value of font, then when you delete a character using the keyboard the on screen cursor will not be correct. You may correct the cursor in such cases by first positioning the cursor at HOME.

Attribute	id	range (hex)	ASCII char range

background color	a	0 to f	'ab...no
character color	b	0 to f	'ab...no
font	d	0 to 3	'abc
height	e	4 to 1d	de...yz{|}
upper spaces	f	0 to 1d	'ab..no
lower spaces	g	0 to 1d	'ab..no
flash	h	0, 1	'a

Internal attribute codes

When calculating the character to send for the range, add the desired value to the hex value 60 (` character). Thus all range values will be lower case letters and the ASCII symbols above the z. If you should enter an invalid range for a parameter you may see unwanted side effects.

When sending data from computer files this is the preferred method of setting attributes.

Note that height is stored internally as actual height divided by 4, upper and lower spaces are stored internally as actual space divided by 2.

ACCESSING INTERNATIONAL CHARACTERS

On units with fonts that support lower case accented international characters you may access these characters by means of a two key stroke sequence. The first key stroke consists of pressing an accent identification key while the ALT key is pressed. The second keystroke is the unaccented letter. The keys are as follows:

ACCENT	ID KEY
aigu	ALT + comma
grave	ALT + period
circumflex	ALT + [
umlaut	ALT +]
cedilla	ALT + ' (apostrophe)

International character access

If the font supports an upper case E with accent aigu, it is accessible with the single keystroke of ALT + / (forward slash). The ñ is accessed with ALT + n. The ¿ is accessed with ALT + m.

The international characters currently supported are shown below with the decimal and hex values of their IBM code:

é	â	à	ê	è	î	û	ù	ó	ú	
130	131	133	136	138	140	150	151	162	163	(dec)
0x82	0x83	0x85	0x88	0x8a	0x8c	0x96	0x97	0xa2	0xa3	(hex)
"	#	%	(	*	,	6	7	B	C	transmitted to System 800
É	ç	ë	ô	á	í	ñ	¿	ï		
144	135	137	147	160	161	164	168	139		
0x90	0x87	0x89	0x93	0xa0	0xa1	0xa4	0xa8	0x8b		
O	'	)	3	@	A	D	H	+		

International characters can be placed in the data stream supplied to the serial port. However, it is necessary to use a two character sequence. Prefix each character, from the list above, with the | character.   Since the System 800 recognizes 7 bits of data it is necessary to add hex 020 to each international character sent.

Note that the fonts in the System 800 can not display the | character. The | character is hex 7C. From the serial port you would send the following sequence to send the a grave 0x7C 0x25.

DISPLAYING CLOCK

Any of the real time parameters, year, month, date, hour, minute, seconds may be placed anywhere on a text page. To tell the display that time is being shown we use a system of tokens. Each time parameter requires that two special characters be placed at the position of the text where you want that parameter to be shown. The following table shows the required tokens and their effects on the display.

TOKEN	displayed result
%X	shows the two digit year e.g. 91
%Y	shows the year e.g. 1991
%L	shows month name e.g. Jan Feb
%D	shows date of the month
%H	shows hours (see mil time setting)
%M	shows minutes
%S	shows seconds
%T	GMT hours
%U	GMT adjusted date

Clock display tokens

When time tokens are included in a page, the actual time parameter will ONLY BE SHOWN IF THE QUEUE IS RUNNING, or if the manual NEXT QUEUE ENTRY function is being done. While pages are being edited the time will NOT be displayed, the tokens will be displayed.

If you had the following on the page while editing:

%L %d, %y   %h:%M:%S

Then when the page is displayed as part of a queue you would see:

Jan 31, 1990 11:23:59

Note that the only spaces you should provide are those you require between the displays of the different fields. The case of the token character is not relevant.

You may place the tokens anywhere on a page, in any order. You may use each token more than once on a page. You may repeat tokens on any number of pages.

SPECIAL TIME FUNCTIONS

In addition to real time you may also display time remaining to a goal.

The following additional tokens are recognized for use in displaying time.

%A difference between goal hours and current hours, or, remaining count down hours.

%B difference between goal time and current minutes, or, remaining count down minutes.

%C difference between goal time and current seconds, or, remaining count down seconds.

%G sets the 'goal' that a count down clock is aspiring to. This format must be entered EXACTLY as %Ghh:mm:ss where hh is the goal hours, mm is the goal minutes, and ss is the goal seconds. The goal must be entered in 24 hour clock format. The difference between this goal and the real time will be displayed by the difference tokens. The %Ghh:mm:ss will not display when the queue is running. Each page of a queue can have a different goal time setting. If you do not wish to include the goal time in the page you may use the **CTRL G** to set the system goal time for all references to the difference tokens.

[@SET GOAL,hh:mm:ss;] This command will set the goal to the value of time indicated by hh = hours, mm = minutes, and ss = seconds. The goal can only be in the current day. Thus the maximum value of the goal is 23:59:59 equivalent to one second before midnight of today. When the goal time is reached the display will stop at 00:00:00. You do not have to display all difference parameters. If you wish you can use only seconds, or minutes, etc.

[@SET COUNT,hh:mm:ss;] This command sets the count down timer initial value where hh is the start number of hours to count down, mm is the start number of minutes, and ss is the start number of seconds. When entering a count down the goal is set to the value entered as the count down. Thus the difference tokens display a constantly decreasing time which will get to zero in hh:mm:ss.

{ CTRL C } From the keyboard, this key will allow setting of the count down clock to an initial time value.

{ CTRL G } From the keyboard this key will allow setting of the goal time to the termination value. Both of these functions use the additional keys indicated to set the individual parameters:

key	parameter affected
h	increment hours
H	decrement hours
m	increment minutes
M	decrement minutes
s	increment seconds
S	decrement seconds

Countdown and Goal set keys

The selected time value is accepted when the **ENTER** key is pressed. To abort this setting function and retain the old values press the **ESC** key**.**

The last function, goal or count down, that you set up will determine how the tokens %A %B %C are treated on the display.

SETTING THE CLOCK

{ CTRL TIME } Press this key to enable the setting of the real time clock in the unit. The clock is battery protected and keeps time even when power is turned off. Normally you should not have to set the clock. Pressing this key will cause the current time to appear on the bottom of the screen. The clock automatically adjusts for Daylight Savings Time.

Each key stroke will cause the parameter to increase in value. When the parameter reaches the maximum value the next keystroke will bring it to the minimum value.

The following keys are pressed to set individual time parameters:

CTRL Y = increment year
CTRL L = increment month
CTRL D = increment date of month
CTRL W = increment day of week
CTRL H = increment hours
CTRL M = increment minutes
CTRL S = increment seconds

Clock set keys

Pressing the **ENTER** key or the **ESC** key will exit the function. Clock display is updated once each second. If you strike the key more often than once per second then you may see a jump of several numbers when the next update completes.

To set the clock from the serial data stream use the command format:

[@SET CLOCK,yy,mo,dt,dy,hh,mm,ss;]

The numbers you insert for the characters shown above are interpreted as follows:

yy = year, numbers above 80 will be prefixed with 19, numbers below will be prefixed with 20,

mo = month, number must be in range of 1 to 12

dt = date, number must be in range of 1 to 31

dy = day of week, Sunday = 1, Saturday = 7

hh = hours, clock is set in 24 hour time, display is in 12 hour time

mm,ss = minutes, seconds, range is 0 to 59

If you do not specify a particular parameter, or specify an incorrect parameter, then the current value of time will be substituted.

You may set an individual clock with **[@CLOCK,f,nn;]** parameter from the serial data input.

Where f can be any of the following identifiers (upper or lower case) and nn is the value to set that parameter too. Parameters that are out of the proper range will cause the command to be disregarded.

Y	year
L	month
D	date of the month
W	day of the week
H	hour
M	minute
S	second

Serial port clock set codes

{ CTRL [} [@MIL TIME;] will set the time display for 24 hour clock display. Midnight is displayed as 00:00:00, the second before midnight is 23:59:59

{ CTRL] }[@STD TIME;] will set the time display to 12 hour mode. Midnight is displayed as 12:00:00, the second before midnight is 11:59:59.

The system 800 can display hours in GMT. To set the number of hours that GMT is ahead of local time, use **SHIFT + F9**. To insert GMT hours in a display use the token **%T**. To display date as adjusted from GMT use the token **%U**. GMT hours are always displayed in 24 hour format.

You can set the GMT offset from the serial port with **@GMT,xx;** where **xx** is the offset and is in the range of 0 to 12.

From the serial port you can request the time from the System 800 with the command **@TIME**.

SAVING EDITED PAGES

After a page has been edited it may be saved into the system memory. To save the page strike the **STORE** key (at the lower right of the keyboard) and you will see a message on the bottom of the monitor:

Save Page number:

The current page number will be provided. You can press **ENTER** to save the page. You may use the **UP/DOWN** arrow keys to advance/decrease the page number, or, you may use the number keys to enter a desired page number. Enter a number to save the page into. Press the **ESC** key to abort the Save operation.

Important Note: When saving pages be sure that no data is being input from the serial port.

When you press the **ENTER** key, if that page number is currently being used, you will be asked if you want the existing page to be over written by saving the new data. If there is insufficient memory in the system then part of your page may be truncated. Only that part which will fit in the memory is saved. If there is no available memory in the system then you will see a message indicating that fact.

Once a page has been stored then that page will always occupy a minimum amount of memory space even if it is subsequently cleared and stored as 'empty'. There will always be the default color information stored for that page. Such a page can be included in a page sequence as a 'blank' page with a solid (or external video) background color. Such a page will not crawl. The only way to obtain pages that are truly empty, i.e. that will not be included in the queue or be transmitted to a remote System 800 or computer, is after the memory initialization command.

EDITING EXISTING PAGE

To retrieve a page from memory for editing strike the **EDIT** key at the bottom right of the keyboard. You will see a message:

Edit Page Number:

The current page number will be provided. You can press **ENTER** to retrieve that page. You may use the **UP/DOWN** arrow keys to advance/decrease the page number, or, you may use the number keys to enter a desired page number. Enter a number of a page to retrieve and then press the **ENTER** key. Pressing the **ESC** key will abort the selection.

The monitor will then display that page. If the page number you asked for is not being used then you will see a blank screen.

You may scan through the entire memory of the system by using the **PAGE UP** and **PAGE DOWN** keys. Any text that was on the screen prior to pressing either of these keys will be lost so be sure to save any edited page first.

DISPLAY APPEARANCE

{ F9 } [@KEY ON;] Enables the keying of the text that the unit is producing into the incoming video signal in the CG810 and CG840.

{ F10 } [@KEY OFF;] Disables the keying of text into the incoming video. You may preview the information that would be keyed into the incoming video by connecting a monitor to the **MONITOR** connector on the rear of the unit (CG810 and CG840).

%K This token will cause the page that it appears on to always be in the **KEY OFF** state. Whatever text is entered the page will NOT appear on the main video output but (on the CG840 and CG810) will appear on the edit video out. This is particularly useful when you need to place a blank page in a queue because the queue list will ignore blank pages. Use the %K token on any page and insert that page into the queue at the places where you want blanks to appear.

{ F4 } [@VIDEO MODE,x;] sets the type of character that is displayed. There are 3 types of display available:

1 = Color characters
2 = Black characters
3 = Color characters with Black Border:

Video modes

Pressing the **F4** key will step through the choices. In the CG830 and CG840 the character color can be set to any one of 16 colors. In the CG810, the character color in modes 1 and 3 is white.

NOTE

The chosen display style is selected for the entire screen and will remain in effect until changed. This attribute is NOT available on a page basis.

From the serial data stream entering a number from 1 to 3 will cause that display style to be set and to remain in effect until changed. When using mode 3, in order to obtain full all around border, the character height must be 32 scan lines or greater.

PAGE DISPLAY FROM SERIAL INPUT

[@PAGE,nn;] From the serial input line you may request a specific page to be placed on the edit (output if KEY is ON) screen with this command where nn is the page number to be shown.

[@NEXTP;] The next numerical page may be displayed with this command.

[@LASTP;] The Previous page may be displayed with this command.

[@STEP;] If a queue has been set up, you can remotely control the appearance of pages on the display output by using this command. This command is functionally identical to pressing the **NEXT QUEUE ENTRY** key from the keyboard.

[@CUR OFF;] Since the cursor is normally on when in the editing mode, you can disable the cursor from the display with this serial input command .

[@CUR ON;] To re-enable the cursor from the serial input use this command.

CRAWL DISPLAY FROM SERIAL INPUT

In a crawl configuration unit with date codes after 9/19/95 you can crawl a single message anywhere on the screen a given number of times with the command **[@SHOW,nn,tt;]** where nn is the page number and tt is the number of times the message is to crawl. You can calculate the exact crawl time for a message by using the formulas described on page 27 under the discussion of the different crawl speeds.

Similarly in a page unit with date codes after 3/1/95 you can crawl a single message and have the screen background for the non crawl area take on the external video background by using the command **[@CRAWL,nn,tt;]**.

The upper screen position limit for positioning the crawl is at scan line 36. Use the command **[@CRAWL POSITION,nn]** to set this value.

Note that in the crawl configuration *before* you issue the **@SHOW,nn,tt;** command you should provide an @CURSOR OFF; command. Issuing **@CURSOR OFF;** after starting the crawl will remove the crawl message from the display as this command initializes the display format.

QUEUE CREATION

A queue is a list of pages that are to be sequenced on the display. In all units you can have up to 99 entries in a queue. You can use the same page number at more than one queue sequence position.

In a page unit **{ SET QUEUE }** will display information about each of the queue entries:

Seq# x Page# y Dwell z

The Seq refers to the order in the queue that the page will be displayed. Page# is the actual page number from memory, Dwell is the amount of seconds the selected page will appear before going on to the next queue entry. The dwell can be from 1 to 239 seconds. The queue does not have to be completely filled in, that is to say, you could have an entry for Seq 1, and then a blank entry for Seq 2, and an entry for Seq 3.

In a crawl unit **{SET QUEUE}** will display information about each of the queue entries:

Seq # x Page # y Times z

Seq and Page # are as above, Times refer to the number of consecutive times that a message will be repeated before the queue steps to the next entry.

If an entry is made for a non-existent page it will be skipped over. When the queue encounters the last entry, it will restart from the beginning.

The queue will repeat the number of times specified with the Set Queue Counter function which is available with the **CTRL + QUEUE END** key. Any number above 128 means the queue will repeat indefinitely. When the queue has cycled the number of times specified it will be terminated. From the serial port you would use the command **[@QCOUNT,n]** to set the repeat to n times. In the CG810 and CG840 all character generator data will be removed from the main video **(KEY OFF).** In a stand alone unit the last page displayed will remain on the screen.

The Seq number is advanced/decreased by using the **UP/DOWN** cursor arrow keys. The Page number is advanced/decreased by using the **PAGE UP/PAGE DOWN** keys. The Dwell time (or Times) is advanced/decreased by using the **RIGHT/LEFT** arrow keys. Parameters are adjusted by using the indicated keys until the desired number is displayed. The range of numbers available is restricted to only the allowable values for the parameter in question.

In order for a queue to operate, the first Sequence number must contain a valid page number (there must be data stored in that page number).

When the queue is running and a blank page is encountered it will be skipped over. If all pages of the queue are blank then the queue will not run. If you start a queue with a crawl message and all blank pages then the crawl message will run and the page area of the display will remain with the cursor available and you will indeed be able to edit 'live' while the crawl runs. If you want the crawl to run with no pages sequencing then you must place into the page queue a single page that you stored the desired background color on and at least one space on that page.

If you wish to insert a page into an already existing queue then you use the Insert key to create a 'hole' in the existing queue. The contents at the sequence number currently shown is moved upwards one position. All other sequence entries in the queue are also moved up one sequence number and an empty slot is made in the queue. If there was an entry in the last (99th) sequence number it will be lost. You can then place a new queue entry at the newly created hole.

The Delete key is used to remove the entry at the current sequence number that is being displayed. All entries above that one will be moved down to fill in the blank space. The last sequence number is forced to a blank entry.

To exit the queue setting function use the **ENTER** or **ESC** keys. The queue that you have just edited is available for use immediately.

{ DEQUEUE PAGE } Press this key and enter the number of the page that you wish to remove from the queue. All queue entries that are for that page will be deleted.

The current page number will be provided. You can press **ENTER** to dequeue the page. You may use the **UP/DOWN** arrow keys to advance/decrease the page number, or, you may use the number keys to enter a desired page number.

From the serial port to remove a page from all of it's occurrences in the queue use the command syntax:

@DEQUEUE,nn;

If you fail to supply a value for nn then nothing will happen.

From the serial input pages may be installed in the display queue with the command:

@ENQUEUE,nn,xx,yy;

where nn is the page number, xx is the queue position, and yy is the dwell time in seconds the page will remain on the display when that queue position is reached. If you leave out any of the parameters then they will default:

nn = last page input,
xx = first unused position,
yy = one second

@enqueue defaults

However, you must ALWAYS supply the commas and the semi-colon. Thus the command sequence:

@ENQUEUE,,,;

will enqueue the last page that you input, at the next queue position and cause it to display one second (or one time in a crawl unit) each time that queue position is reached. You may enqueue a page any number of times, randomly, in the queue. If you specify a dwell number of greater than

239 then 1 will be installed for that page.

You must disable the queue before changing anything in the queue.

From the serial port you can delete a message from the memory and all it's occurrences in the queue with the command **[@DELETE,nn]** where nn is the message number to be deleted. This is equivalent to storing a blank page from the keyboard and dequeueing that page.

QUEUE OPERATION

[@QUEUE ON;] or [@QUEUE OFF;] If you have set up a queue as discussed above, then you can start that queue running by pressing the **QUEUE START** key. Pressing the **QUEUE END** key will cause the currently running queue to terminate. The last page will remain on the display. The cursor will be off. If you were crawling a page along with the queue then the crawl message will be interrupted. The queue will not terminate until the last character crawls off the left margin of the display. When turning off the queue from the serial port the acknowledgement will not be sent to the host until the crawl, if any, completes.

ALTERNATE QUEUE CONTROL

There is a contact closure input available on the rear panel. You may connect any dry contact or TTL logic signal to this port. If you are supplying logic level input be sure that the GROUND input signal goes to the terminal marked G and the logic signal goes to the terminal marked IN. Any other connection will cause damage to either your logic source, the unit, or both and will terminate your warranty.

This input is used to control the queue operation. When the contact is closed automatic operation of the queue commences and will continue until the contact closure is removed.

You will be able to start queue operation from the keyboard with the contact either open or closed.

If the queue is running then closing the contact lets it continue to run, opening it stope the queue.

If the queue is off, closing the contact starts the queue, opening it stops the queue.

You may use the **NEXT QUEUE ENTRY** key to manually sequence pages of the queue. The first time you press this key any automatic queue operation that was in progress will be terminated and the next page from the queue list will be displayed. Each subsequent press of this key will advance the page to the next one from the queue list.

If a crawl is running when you press this key the crawl will continue until the **QUEUE END** key is used.

The queue will automatically restart after a power failure if it was running when the power failed.

When a queue is running the only keys that will be recognized are the **QUEUE END**, **NEXT QUEUE ENTRY**, and **CRAWL SPEED** settings. You may restart automatic page sequencing by pressing the **QUEUE START** key. The queue will restart at the current sequence entry number after the timeout period for that page.

REMOVING QUEUE ENTRIES

Each page stored in memory can be tagged with a time at which the page becomes invalid for display. This is called the expiration time.

When operating the queue a message will not display past it's expiration time.

Expiration time is only applicable if the power is on at the exact expiration time. If power should be off at the time then the page will not be deleted from the queue upon power restoration.

{ END TIME } [@EXPIRE TIME,DD,HH,MM,NN;] Allows changing of the expiration time that is associated with each page. This time is specified in date of the month (DD) , hour (HH) in 24 hour military time, and minute (MM). The page number (NN) is any editable page, i.e. you can not assign an expire time to the fixed emergency messages. When editing from the keyboard a line will appear on the bottom of the screen with information:

Page p Date d Time: hh:mm

PAGE UP/PAGE DOWN selects the page number, **UP/DOWN** cursor arrow keys select the hours, **LEFT/RIGHT** cursor arrow selects the minutes, **INSERT/DELETE** keys select the Date of the month. Home key brings up entry for first page in memory, End key brings up entry for last page of memory. The range of numbers available is restricted to only the allowable values for the parameter in question.

The entered number is automatically transferred into the system tables as you make changes. You can leave this function by either pressing the **ENTER** key or the **ESC** key.

Pages are programmed to be deleted from the queue at a specific expiration time. Pages are not deleted from memory.

When sending this command from the serial port if you omit the date then the current date is automatically supplied. You must include the comma separator. If you omit the page number, then the last page number that was received from the serial port is used. You must include the semi colon separator. There is no range checking on the date field. The time field is checked for proper values. Any errors will return an 'invalid parameter' error code. You will retrieve the expiration times for all pages that are in the current queue when you use the **@FETCHQ;** command. You can retrieve the entire list with the **@TLIST;** command.

To clear the expiration memory for all pages use **{CTRL + END TIME}** or **[@INIT TIMEOUT;]**.

From the serial port **@CANCEL,nn;** will remove page nn from the queue and leave it's contents in memory.

TIME DEPENDENT QUEUE OPERATION

The queue can be operated in a mode that is dependent on the current minute of the hour.

A timed queue operation is achieved by starting the queue with **SHIFT + QUEUE START** key. From the serial port the command **@AUTOQ ON;** will start the timed queue and **@QUEUE OFF;** will terminate the timed queue.

The parameters necessary for timing are:

Queue Sync Time is defined as the minute past the hour that the first timed queue operation is to commence. This parameter is set with the **CTRL + S** key. After entering the number press the **ENTER** key to store it in the system. If you enter a number greater than 59 the Sync Time will be forced to 0. From the serial port the command **@QSYNC,x;** will set the time to x.

Queue Interval Time is defined as the time interval that the queue will be restarted after it has completed. This parameter is set with the **CTRL + D** key. After entering the number press the **ENTER** key to store it in the system. If you enter a number greater than 59 the Interval time will be forced to 59. From the serial port the command **@QCYCLE,x;** will set the time to x.

The number of times that the queue is to run each time the cycle is started is set with the **CTRL + QUEUE END** key. Any number from 1 up may be entered. Numbers 128 and above will cause the queue to run continuously. Smaller numbers will cause the queue to run for that number of complete cycles and then terminate. After entering the number press the **ENTER** key to store it in the system. From the serial port the command **@QCOUNT,x;** will set the number of times to x.

For example: if you set the number of times the queue is to run to 1, the Queue Sync Time to 10 and Queue Interval Time to 3 then the queue will run one complete cycle at the following minutes of the hour: 10, 13, 16, 19, 22, 25, 28, ...52, 55, 58. Note that the queue will not start at the next hour until the 10th minute. Any combination of Sync Time and Interval time is allowed.

If you should have a timed queue running and the power should fail, when power is restored the time cycle will automatically restart with the previously stored parameters.

From the serial port you can set the number of minutes and seconds that the queue will be allowed to run. Use the command **[@tkey,mm,ss;]** to set the queue time to mm minutes, ss seconds. When that amount of time has expired from the start of the queue the queue terminates. This timeout must be set before each queue start command. If it is not set then there is no timeout. If you should abort a queue before it times out the remaining time is used to time the next queue.

EXAMPLE OF QUEUE OPERATION FROM TERMINAL

The following sequences of commands issued to the serial input port are meant to illustrate how to set up several pages of information on the System 840, 840 or 810 queue. The assumption is that you are issuing these commands, from a terminal where you view the results.

In order to make a blank page appear on the screen you must reserve one of the page numbers to be always blank. That page number is then used in the following way, assuming it is page 64:

```
@page,64;
```

The above command tells the system to place page 64 on the screen and since it is blank, the screen blanks. You can store a color background in the page if desired. Otherwise the color background will be the default of blue.

In the system 840, if an external video is being supplied to the unit then you can issue the command @key off; which will then remove any character information and allow only the external video to appear on the main video output. Characters will still appear on the edit video output.

Before you do anything with the queue you should initialize it with the commands:

```
@init queue;
```

```
@init timeout;
```

This will clear all items from the queue, and reset the timeout list.

If you want you can verify that the queue is cleared by issuing the command

```
@qlist;
```

which will return a listing of all queue entries and their status. All entries should be 0000 to indicate nothing present. Then verify the timeout list clear with

@tlist;

To send pages of information to the system you use the command

@begin,n; where n is the page number. Note that ANYTHING you type after the ; will be included in the text of the page except for commands beginning with the @ character. Every time you issue a line feed after the @begin command the display system will advance to the next line. You should
only issue a line feed after the @begin,n; if you want the first line of the page to be blank. When you are finished with the text for that page then use the command @end; That will cause the page to be completed and stored in the memory of the system. Note that if you start sending data to a page you will erase any previous data stored at that page number.

After a page has been stored you can verify it by using the command

@upload,n;

where n is the page number. Note that your terminal device must interpret line feeds as though they are carriage returns and line feeds in order to see the lines in the proper order.

You can then enqueue the page with the command

@enqueue,n,x,y;

where n is the page number you want to enqueue,
x is the position in the queue
and y is the number of seconds you want it to dwell

After sending several pages and enqueueing them as above you can start the queue with the

@queue on;

command. The pages will then sequence through the display until a command to terminate the queue is received.

When you want to update pages that are in the queue you must stop the queue with the command:

```
@queue off;
```

You can then update your data pages, dequeue what you do not want to be displayed and restart the queue.

If you want the screen blank while you are doing the update process you can use the @page,x; command discussed above where x is the blank page.

If you must keep the queue running while you update data pages then do not reuse the page numbers currently in the queue, send your new data down to other page numbers.

You should turn off the queue before you dequeue pages.

To demonstrate this operation from your computer, connect your System 840 character generator to COM1 on your computer, use the mode command to set the data speed as appropriate, usually with MODE COM1:96,n,8,2 and then send the script file.

The following statements were included in a script file that we send from a communications program, either Windows or DOS, that supports XON/XOFF handshaking:

```
@queue off;
@init queue;
@begin,1;This is page 1
line 2 of page 1
more lines on page 1
last line for page 1@end;
@begin,2;A second page of
information being sent
to the system 840@end;
@begin,3;There can be many
pages sent to the system 840@end;
@enqueue,1,1,5;
@enqueue,2,2,5;
@enqueue,3,3,5;
@queue on;
```

Note: In the above example it is required that your program support **XON/XOFF** flow control. This is particularly important for the **@QUEUE OFF**; command because the acknowledgement will not be sent to the host unit until any crawl in progress completes.

SECONDARY QUEUE

The System 800 maintains two distinct queue lists. The primary queue is the one normally used by the system and is the one maintained by the expiration timeout list. Both queues share the same memory data base, i.e. they use the same page numbered memory. Each queue can have 99 possible entrys. Normally the Main queue is active. You select the alternate queue by pressing **ALT + QUEUE SET** from the keyboard, or, from the serial port use the command **@QUEUE HOLD;**.. To restore the main queue you enter from the keyboard **SHIFT + QUEUE SET**. From the serial port use the command **@QUEUE RESTORE;** to restore the main queue. From the serial you can determine which queue is active by issuing the command **@WHICH QUEUE;**. The response will be M for main and A for alternate.

From the serial port, if you should issue the **@QUEUE HOLD;** command while the secondary queue is enabled you will get an error message EJ. Similarly if you issue the command **@QUEUE RESTORE;** when the primary queue is enabled you will get the same error message.

Any queue interrogation commands (such as **@FETCHQ;**) will apply to the currently active queue.

While the secondary queue is enabled the expiration time functions will NOT operate.

When editing a queue the letter M or A at the beginning of the prompt line indicates which queue you are editing.

BOTTOM ROW CRAWL DURING QUEUE

In a page unit any text message can be crawled while the page queue is operating. When editing pages which are to be crawled the character color, background and font parameters are applicable as discussed above in the Message Editor section. If you should change crawl messages and no color or font is specified in the new message then the default color selected by the editor will remain in effect. Fixed messages always use the default background color and font.

The information about crawl position, row height, and page number are entered from the keyboard or from the serial data port.

The number selected for crawl position becomes the last scan line allowed to build text pages when the queue is running, provided that the crawl message is valid. Thus you should be careful as to how your pages are sized so that you do not truncate desired information at the bottom of a page.

{ CTRL + E } [@CRAWL POSITION,nn] This key will request you to enter the starting scan line at which the crawl row is to appear. The current value is presented. You can enter a new number, or use the UP/DOWN arrow keys to adjust the number presented. Whatever number you may enter will be rounded to the nearest number divisible by 8. For example, if you enter 163 the system will force it to be 160. Use the **ENTER** key to accept the number on the screen, or the **ESC** key to cancel the operation and leave the original number selection. From the serial port you would enter a number in place of the 'nn'. Numbers are rounded as discussed above. A number out of the legal range will be rejected and the original number will be retained. The crawl position must be at scan line 160 or higher (lower portion of display). The number is relative to there being 262 lines in a frame.

{ CTRL + R } [@CRAWL SIZE,nn] This key will request you to enter the height of the crawl row. The current value is presented. You can enter a new number, or use the UP/DOWN arrow keys to adjust the number presented. Whatever number you may enter will be rounded to the nearest number divisible by 4. For example, if you enter 37 the system will force it to be 36. Use the **ENTER** key to accept the number on the screen, or the **ESC** key to cancel the operation and leave the original number selection. From the serial port you would enter a number in place of the 'nn'. Numbers are rounded as discussed above. A number out of range will be rejected and the original number will be retained.

{ CTRL + T } [@PC,nn] This key will request you to enter the number of the message to be crawled. The last used page number will be presented. You can enter a new number or use the

UP/DOWN arrow keys to adjust the number presented. Use the **ENTER** key to accept the number on the screen, or the **ESC** key to cancel the operation and leave the original number selection. From the serial port you would enter a number in place of the 'nn'. A number out of range will be rejected and the original number will be retained. If the message number is 0, or the message indicated is blank, then there will be no crawl when the queue is started. You may use fixed messages.

While a queue is running, or from the serial data input you may control the presence of the crawl message. In a crawl unit this function selects the page number to be used as the fixed background while the crawl queue is running. You may not use fixed messages in the crawl unit.

{ F12 } [@STOP CRAWL;] stop current crawl message. The message will completely crawl off the left margin before stopping. Note that restarting the crawl with the **SHIFT + F5** will only crawl the message once irrespective of what the prior repeat settings were.

{ SHIFT + F12 } [@RESUME CRAWL;] start last crawl message input to system from the serial input port, or, restart the last crawl message that was stopped. Message will crawl once.

{ CTRL + F12 } [@ABORT CRAWL;] will abort the currently crawling message. The message will stop adding new information on the right side and will crawl off the left side. All crawl operations will be terminated. If the queue is running it will be canceled.

If the crawl is running and the queue is terminated, the crawl message will be aborted. The cursor will not be presented for editing until the last character is crawled off the left margin of the display.

{ SPEED } [@FAST;] [@SLOW;] [@MED;] Pressing the **SPEED** key will set the crawl speed to slow. Pressing **SHIFT + SPEED** will set the crawl speed to medium. Pressing **CTRL + SPEED** will set the speed to fast. From the serial port the commands are **@FAST; @SLOW; @MED;**. The time it takes for a character to enter the right margin. crawl accross the screen and leave the left margin is 1.45 seconds for the fastest speed, 2.9 seconds for medium and 5.8 seconds for slow. You can calculate the actual time duration required for a crawl message to enter from the right and exit the last character from the left:

Font 1 averages 32 characters per line, crawls at 22 characters per second at fastest speed
Font 2 averages 28 characters per line, crawls at 19 characters per second at fastest speed.
Font 3 averages 18 characters per line, crawls at 12 characters per second at fastest speed.
Font 4 provides 40 characters per line, crawls at 28 characters per second at fastest speed.

The medium speed is 2x the fastest speed, the slow speed is 4x the fastest speed.

Add the number of characters per line for the font used to the number of characters in the message and divide by the number of characters per second for that speed. If you were crawling a message of 100 characters using font 4 at the fastest speed it would take ((40 + 100) / 28 =) 5 seconds from the time the first character entered the right until the last character exited the left. Note that the first 3 fonts are proportionally spaced and therefore the above calculation is a close approximation to the time. For font 4, which is fixed pitch, the calculation is exact.

FIXED MESSAGES

In addition to the messages that are entered by the user, there can be up to 32 fixed messages installed in the system. The maximum length of all fixed messages can not be greater than 2000 characters. These messages must be specified at time of order. Consult the factory for the charge to install the fixed message option. Fixed messages are referenced in the same fashion as operator entered messages. There are several fixed emergency warning messages built into the system memory which may be used.

Messages are referenced by number, 1 to 99 for operator entered messages and 100 and up for fixed messages. All units are shipped with the following fixed messages installed:

#100:   This is a test of the Video Emergency Alert System. If this was an emergency you would be able to get further information from this video channel. This is a test.

#101:   Please stand by for an emergency message.

#102:   Please stand by for an emergency weather bulletin.

#103:   Testing   Testing   Testing

#104:   Please tune to another channel for further emergency information.

#105:   We are having technical difficulties with the audio for this broadcast, please be patient.

#106:   We are having technical difficulties with the video for this broadcast, please be patient.

Built in fixed messages

FIXED PAGE DISPLAY DURING CRAWL QUEUE

In a crawl unit any text page can be displayed while the crawl queue is operating. The information for crawl position is entered as discussed above. The use of **{CTRL + T}** and **[@PC,nn;]** is changed. The page specified becomes the page that is displayed while the crawl queue runs. You may place tokens for time or weather display on the fixed page.

SYSTEM RESET

Certain parameters are remembered in non volatile memory when power is turned off. If any one of these parameters is found to be invalid then all of them are restored to the default conditions and the page memory is also assumed to be invalid and will be initialized.

Additionally, upon power on, a test is made of the system memory to ascertain whether it is valid. If it is valid, then all pages that were stored will be available. If the memory is found to be invalid, then the entire system memory is initialized. This test is independent of the restoration of display parameters.

A System Reset which will restore all settings to their default values and clear out all page memory can be accomplished from either the serial input or the local keyboard.

From the local keyboard Complete System Reset which will clear all memory is accomplished by pressing the left **CTRL** key and the left **ALT** key simultaneously and finally the right **ALT** key. All three keys must be held simultaneously for the reset to be performed.

A Complete System Reset is obtained from the serial port by sending 6 consecutive ! (exclamation mark) characters.

To soft reset to the original power on conditions (does not erase memory unless it is found to be corrupt) use the left **CTRL**, left **ALT** and right **CTRL** key.

From the serial input port Soft Reset is accomplished by sending 6 consecutive # characters. You can also use **@RESET;** from the serial port.

NOTE
If a unit has an address, any reset will de-select that unit.

After either System Reset the edit screen will be blanked. You will not be able to enter data from either input into the system for about 1 second after you initiate a System Reset.

When a Complete System Reset is performed the following default values are assigned to:

Font = 1
Mode = white characters with black border

Key = OFF

Queue cleared

Page memory cleared

echo = off

time display = standard 12 hour clock

Default settings after reset

Note that the KEY will be turned on at power application if the queue was running when the power was terminated.

{ CTRL END TIME } [@INIT TIMEOUT;] will reset the expiration time for all pages to 0, equivalent to never time out.

[@INIT MEMORY;] will clear the entire memory in the system. All pages are lost.

{ CTRL SET QUEUE } [@INIT QUEUE;] will clear the entire queue to all positions empty.

CLEAR MEMORY Use the **{ CTRL ALT ALT }** command discussed above to clear the entire system memory.

STATUS INFORMATION COMMANDS

{ CTRL ? } displays the status of the memory. A single line appears on the bottom of the monitor which shows the balance of memory available for pages. Strike any key to remove the message and resume editing.

{ CTRL EDIT } displays the current page number that has been selected for editing.

CONFIGURATION INFORMATION

{ CTRL V } The version of the software installed in the system is ascertained by pressing the CTRL V key. You will see a message on the bottom line of the monitor similar to:

```
(C) 04/15/90 11:30 V D S
```

If you are operating the unit from a host device connected to the serial input port, then issuing the command **[@VERSION;]** will cause the unit to respond with the same data stream shown above.

SERIAL INPUT/OUTPUT

If you are using a terminal as the input device to the unit then the only control key that will be operable is the backspace key. When entering a command you may backspace until the beginning of the command. When entering data you may backspace until the beginning of the current line of information as shown on your terminal.

[@ECHO ON;] will cause the system to echo back to the host all data received.

[@ECHO OFF;] turns off the echo. The default is echo off.

When sending data to the serial input port, using either a terminal or a computer the command to tell the unit when a page starts is:

@BEGIN,nn;

where nn is the page number to use. If you enter an illegal page number (e.g. not in the range of 1 to 99) then the page will be assigned the number 1. Note that everything entered after the ; of the @BEGIN command is included on the text page. Thus if you send a LF character you will cause the 'cursor' to move down one line on the page thus leaving the top line of the page empty. Your following text will then begin on the second line of the page.

To end a page you place the command:

@END;

at the end of your text.

To clear out a page that has been previously sent to the unit use the command syntax:

@DELETE,nn;

If you fail to supply a value for nn then nothing will happen. The page number will also be removed from the queue.

Retrieving Pages

[@UPLOAD,nn;] This command will retrieve page number nn from the memory of the unit and send it to the host terminal/computer. The page will be in the internal format used by the unit.

Thus, certain sequences of characters will represent how the unit wishes to see attributes for background color, font, size etc. At the end of the page there will be a line feed- carriage return and the character V followed by another line feed - carriage return. When international characters are included in a page they will be transmitted in the two character format discussed in the section "Accessing International Characters" above.

When using the serial input the unit receives data from a host device. The handshake protocol is XON/XOFF. A command can be given to the unit so that it echoes all data input back to the host. After a valid command has been acted upon by the unit, it will send a V response back to the host. If an invalid command is sent the response will be E and a code for the type of error. The 'bell' on the host device, if any, will sound. These responses are always sent without regard for the echo mode setting.

If you are using the responses in your software the exact format of the valid command response is <CR> <LF> V <CR> <LF> (in hex, 0D 0A 57 0D 0A). The exact format for the invalid response, or any other error, is in hex 0D 0A 07 45 xx 0D 0A where the xx is the specific error code.

Command and data files may be prepared with any standard word processor that is capable of creating a standard ASCII file. That file can then be transmitted direct by wire, or over a modem, to the unit where the data stream will be acted upon.

When operating from the serial port the error codes returned are:

EA	Bad command
EB	Bad command
EC	Bad position in annotation mode
ED	Bad time (for clock operations)
EE	Bad parameter
EF	Empty page requested
EG	Queue is empty
EH	Event List full

Serial port error return codes

Commands are sent by prefixing the command word with the @ character. The text of the command must be exactly as shown. Upper or lower case letters may be used for entering commands. When arguments are required they must be separated from the command text by a single non command character, the comma (,) is suggested. The only valid characters for a command are the alphabet characters in both upper and lower case, the space, the [and numerals 0 through 9. At the end of a command you must have at least one non command character, for clarity a ; (semi colon) is suggested.

INTERFACE PARAMETERS, SERIAL PORTS

There are two serial input configurations. RS232 is the standard configuration, available on the connector SERIAL-1 and SERIAL-2. Optionally an RS485 multidrop, 4 wire interface can be provided on the connector SERIAL-2 (functionally the RS485 is accessed via the SERIAL 1 data stream. Both RS232 and RS485 are NOT available at the same time. The desired setup must be specified at the time of order.

RS232 is good for operation over a modem line or short distances. RS485 is usable in a multidrop configuration and over long wire distances.

The RS232 serial data port is terminated in a DB9S connector (SERIAL-1) on the rear panel. The unit is connected as DTE (Data Terminal Equipment) which means that it transmits data on pin 3 and receives data on pin 2. Output data from the unit will obey XON/XOFF handshaking with the host. The internal buffer that receives serial data is 128 bytes long. When it reaches 100 characters that have not been internally evaluated it will cause an XOFF to be sent to the host. If the host does not recognize the XOFF and sends more than an additional 28 characters data will be lost. Once the XOFF is sent to the host the buffer will be emptied. When it has less than 32 un-evaluated characters it will send an XON signal to the host signaling it to start sending more data. Units with date codes before 0395XXXX that do not receive data for a period of 4 minutes will send an XON to the host.

TECHNICAL NOTE: If you should send an XOFF to a remote System 800 unit from a host computer or a host System 800, the remote System 800 will stop responding with command completion, error codes, or messages. Thus you may think that the remote unit that you sent the XOFF to has 'hung up'. In reality it hasn't, it is just waiting for an XON before it sends data out. As soon as the XON is received the remote unit will continue sending any waiting data stream. In the special case of the remote System 800 being in the echo mode, then all characters that have been sent by the host after XOFF will not be echoed back, but they will be inserted into the remote unit's local buffer, provided there is room, until the remote unit's buffer fills and the remote unit sends an XOFF to the host to tell it to stop sending data. When the XON is received by the remote unit, the contents of the buffer will be interpreted and any commands therein will be acted upon in their received sequence, but the input data received between the XOFF and the

XON will not be echoed.

Data rate can be selected, by means of an internal jumper, to be any standard data speed from 1200 to 9600 baud. Data speed is set prior to shipment to 9600 baud. The other communications parameters are fixed and are 8 data bits, 1 stop bit, no parity. The 8th data bit is never evaluated internally and can be in any state. If you have a choice it is recommended to place it in the marking state.

The RS232 configuration on the serial 2 connector is used with the optional weather instrument package.

The pins supported on the RS232 DB9S (SERIAL-1 and SERIAL-2) connector are:

3 = TXD (transmit data from System 800)
2 = RXD (receive data to System 800)
5 = Signal ground
4 = DTR (data terminal ready from System 800)

RS232 port connector pinouts

The pins supported on the RS485 DB9S (SERIAL-2) connector are:

6 = TXD HI (transmit data from System 800)
7 = TXD LO
8 = RXD HI (receive data to System 800)
9 = RXD LO
5 = Ground
all other pins must be left unconnected.

RS485 port connector pinouts

The transmit pair (pins 6 and 7) should be terminated in a 100 ohm resistor at the farthest receive location from the host device. The hosts receive pair should be terminated at the host. Cabling should be with twisted pairs.

RS232 units may be connected in parallel (broadcast mode) provided the TXD signal (from remote) is not used. In this mode of operation the host will not receive any responses, including the XON/XOFF. Under normal conditions the buffer rarely fills up at 9600 baud. If you intend to send the same data to every unit, then you can connect the TXD line of one of the units to the host unit to get full XON/XOFF response. Provided all units are in the same data state (i.e. running same queue with the same data). This is not a good practice but it will work in most cases.

You may place tokens on a text page to cause data from the page to be transmitted out of the serial 1 port.

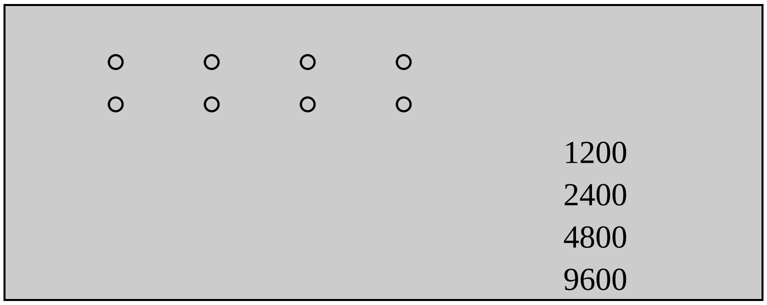
%E This token will cause all text following the token up to the first period or the end of the page to be sent out the serial port. When the end of a line is encountered a RETURN (hex 0D) and LINE FEED (hex OA) code will be transmitted. Each time the %E is found in a page the following text will be prefixed with a RETURN and LINE FEED. If there is any time display token on that page then the text destined for the serial port will be sent out once each second. Text that is transmitted will NOT appear on the display.

%F This token is the same as the %E described above except that the text will also appear on the page display.

Text is transmitted exactly as it appears except that a character prefixed with the ° (degree) symbol will be transmitted as it's control code equivalent. The ° will not be transmitted.

SETTING SERIAL PORT DATA SPEED

The data speed may be set by removing the top cover. At the rear of the printed circuit board you will see two jumper blocks with 2 rows of 4 pins each. The block closest to the rear panel is used to set speed for the serial communications port. Serial 1 in RS232 mode (and Serial 2 when in RS485 mode). the left most pair of pins is the default of 9600 baud. To change speed, move the jumper to the desired speed.



Serial port data speed jumpers

UNIT ADDRESSING

There are two different types of addressing used. These are dependent on the serial communications configuration option installed. For RS232 interfacing the address jumper in the 8th position as shown in the jumper configuration below must be provided. For RS485 multidrop this jumper must NOT be provided. The maximum number of addresses possible is 127. An address of 0, no jumpers installed except for the communications option selector, results in the unit always being addressed.

In order for the System to respond to input from the serial data line the proper address sequence must be provided to turn on an individual unit.

RS232 ADDRESSING

The command syntax to turn on a unit is:

@ON,x;

where x is the unit number and may be from 1 to 127. A unit address of 0 will turn on any unit. Omitting the x is equivalent to supplying a 0, and thus will turn on any unit.

When a unit has been turned on, if you are monitoring the return data line, you will receive the message V.

To turn a unit off use the command syntax **@OFF,x;**

where x is the unit number and may be from 1 to 127. A unit address of 0 will turn off any unit. Omitting the x is equivalent to supplying a 0, and thus will turn off all units. There is no response to the **@OFF,x;** command.

RS485 ADDRESSING

When the ASCII code SOH (CONTROL A) is received all units will be deselected. The next character received after this determines the address of the unit that will be selected. This character should be identical to the jumpers provided at J4. Thus if you want the unit address to be 'B' you would provide jumpers in the bit positions of J4 that correspond to the bits present in the ASCII code for the letter B which are the values of 2 and 64. The unit that is selected will be able to transmit data over it's transmit output pair. With this method only one unit can be in the transmit state at any time. All units are always receiving. Only the selected unit is looking at the total contents of the data stream. All other units are only looking for the SOH character.

Until a unit has been selected it will not recognize any data.

```
 value:

o o------1
o o------2
o o------4
o o------8
o o-----16
o o-----32
o o-----64
o o-------install for RS232, remove for RS485
o o------unused          (except master)
o o------unused
o o------unused
o o------unused
o o------unused
o o------unused
o o------unused
o o------unused
o o------unused
          (front of unit)
```

Address jumper block

The jumpers always go between the pin with the value indicated and the pin beside it.

If a unit is supplied with no jumpers than it will not respond to any address and will always be selected. Such a unit may not be deselected. Such units will respond with an error message if you use the **@ON** or **@OFF** commands. RS232 units must have the indicated jumper or they will not communicate.

The jumpers are accessed by removing the top cover. They are located in a block near the rear of the unit.

SERIAL PORT VIDEO CONTROL

The following description applies to the functioning of the video switching circuitry of the System 840 character generator provided the enabling jumper is applied to the lsbit of IN_PORT_2. This jumper position is the 9th position, from the rear of the unit, on the input control jumper block (the same one used to select address).

In Power Down mode, obtained either by removing power to the unit or by providing the jumper as above, the signal on the VIDEO INPUT connector is wire connected to the PROGRAM 1 output connector. With power applied to the unit the signals on the PROGRAM 2 and EDIT output connectors are as normally provided in an 830 character generator. With no power applied to the unit there will be no output on the PROGRAM 2 and EDIT output connectors.

The following commands apply to units with software versions later than 09/19/95.

@KEY NEVER; will force the power down relay to be de-activated. In this mode the input video of an 840 is ALWAYS routed to the program 1 output. The program 2 output will contain character video from the 840, however, no keying function is provided. The 840 is forced into a stand alone mode irrespective of the presence of a video signal on the INPUT connector.

@KEY ALLOW; will permit the use of the **@KEY ON;** and **@KEY OFF;** functions. When **@KEY ON;** is issued the power down relay is taken out of the power down mode, thus connecting the INPUT video signal to the video processing circuitry. If there is a video signal present then the 840 will key it's selected characters onto that signal. If no video is present on the VIDEO INPUT then the 840 behaves as a stand alone unit with the same video appearing on both the program output connectors. When the **@KEY OFF;** command is issued the 840 will be forced into the power down mode.

COMMUNICATING FROM PC

In order to communicate to any System 800 from a PC you must use the protocols discussed in this document. In the debug stages of your PC program you may find it useful to use a utility program available from Video Data Systems, TALK800. This program runs on any 286 or higher 100 % IBM compatible PC. You can only order this utility when you send in your completed warranty registration card. Contact the factory for pricing and availability.

With this utility you can issue any command from the DOS command line of your PC and view the results on the PC, if applicable, or the screen of a monitor connected to a System 800. When installing the program you can select the serial port and IRQ for the serial line connected to the System 800 with environment variables, e.g.

SET TALKPORT=n
  where n is the communications port
SET TALKIRQ=n
  where n is the irq vector for the serial port, MUST be either 3,4, or 5.

The default value for TALKPORT is COM1:, and TALKIRQ is irq 4.

If you call the program with a /? as the arguments you will get the following help screen:

```
Call this program with no arguments to get the version of
software installed
in the remotely connected System 800 character generator.

You may use standard System 800 '@' commands as command line
arguments in
order to perform remote System 800 functions.  For example, if
you use

             TALK800 @fetchm; @fetchq; @elist; "@cur on;"

you would get back the entire System 800 memory, followed by the
queue list
followed by the event list.  Then the cursor would be turned on.
 Note that
```

```
commands that have an embedded space MUST be enclosed in double
quotes.
You can redirect the received data to a file by using the DOS
redirection
symbol >filename as the last argument.  Use environment variable
SET TALKTIME=
to specify a timeout value other than the default value of 25
seconds.  The
timeout value applies to each occurance of an @ command in the
list, or a
single line of a submit file. A command line argument without an
@
is assumed to be the name of a submit file which contains a
list of commands to be sent to the remote System 800.  The
contents of the
submit file will be sent.  A line in the submit file must be less
than 120
characters.  The submit file MUST be a plain ASCII text file.
You should
not use double quotes to enclose commands with an embedded space
in a submit
file.
Default port is COM1: with IRQ4, or use environment variables
SET TALKPORT= for ports 1 to 4, and SET TALKIRQ= for irq 3,4,or
5.
```

REMOTE KEYBOARD DATA ENTRY

A keyboard that is capable of being remoted by means of a standard modem is available from Video Data Systems for any of the System 800 products. This keyboard functions exactly as the local keyboard, except that it can be connected via a direct wire line with a short haul modem, or by means of a telephone company supplied dial telephone line and standard communications modem. The modem must be capable of transmission at a data speed of 1200 baud. When using this keyboard you must have available to you a return video line so that you can see what is happening on the remotely located System 800 screen.

When using such a keyboard you will NOT have any of the other serial port functions discussed in this document.

The remote serial keyboard is connected to port SERIAL 1 at the rear of the unit.

The RS485 option is NOT available in such a configuration.

This option is available at time of order, or by factory upgrade only. It is NOT field upgradeable.

When locally connecting the remote keyboard use the connector supplied with the keyboard and directly connect it to the System 800 Serial 1 connector. Since both the connector on the keyboard and the connector on the System 800 are sockets, you will need a gender changer adaptor. Be sure to connect the power connector from the keyboard to the special power supply shipped with the keyboard. If you use an extension cable, then you can use the cable as shown below: Even though all 9 pins on the connector are not used, you may use a ribbon type cable or any other cable which provides all 9 pins. These cables are typically available at computer supply stores.

DB9P	DB9P
(Keyboard)	(System 800)
2	2
3	3
5	5

Remote keyboard to System 800

You will need the following cable to connect the keyboard to a modem with a 25 pin connector:

DB9P (keyboard)	DB25P (modem)
2	2
3	3
5	7

Remote keyboard to 25 pin modem

If your modem has a DB9S mounted on it then use the following cable:

DB9S (keyboard)	DB9P (modem)
2	3
3	2
5	5

Remote keyboard to 9 pin modem

When connecting the modem at the remote unit to the System 800 use the cables as shown on page 49

In order to dial the remote unit you must have a telephone set connected to the modem at the keyboard. This modem must have a manual switch to change over from VOICE to DATA modes. Most modems have two telephone connectors. One is marked LINE and goes to the telephone junction box supplied by the telephone company. The other jack is marked PHONE and goes to the phone you will use to dial. To dial into the remote unit you set the switch on the modem to the VOICE position, pick up the handset on the phone, wait for the dial tone and then dial your remote modems number. When you hear a shrill sound, which indicates that a connection is being made to the remote modem, you must then press the DATA/VOICE switch on the modem located at the keyboard to the DATA position. You will not hear anything from the phone any more, but the data connection is being made from this keyboard to the remote modem. When a complete connection has been made to the remote modem you will see the lights OH (Off Hook), CD (Carrier Detect) TR (Terminal Ready) and MR (Modem Ready) illuminated on your transmit modem. Each time you press a key on the keyboard the SD (Send data) light will flash momentarily. You may now type at the keyboard and the results will be seen at the remote System 800. You will normally have a method of viewing the remote System 800 video signal when in this mode of operation.

If you order your modems from Video Data Systems they will be shipped with the proper configuration information stored in them so that one modem will be a transmit modem and the other will be a receive modem. If you supply your own modems, then you will have to set the modems so that one is transmit and the other receive. To do this you will need a terminal or a terminal emulation program running on a PC. Your terminal must be set to operate at 1200 baud, 8 bits, 1 stop bit. Connect the terminal to the modem with a cable as shown above for connection of the System 800 to the modem.

From your terminal keyboard type AT followed by the ENTER key. You should see OK on your terminal screen. Virtually all modems have proper configuration information for the transmit unit stored in their factory default settings. To restore these settings as the power on defaults you retrieve them with the command AT&F and then press the ENTER key. You will see an OK at your terminal. Then you store this setting to the modems configuration memory power on default setting by issuing the command AT&W and then press the ENTER key. You will see an OK at your terminal. You then enter the command AT&Y, followed by pressing the ENTER key, to tell the modem to use the setting just stored as the power on default. The modem is now set so that it will transmit from the System 800 remote keyboard.

To configure the receive modem to be in the auto answer mode you initialize the modem as discussed above, except that before you type the save command, AT&W, you must first tell the modem to answer on 1 ring. To do this issue the command AT&S0=1 followed by the ENTER key. When you see the OK you should also see the AA light on the modem go on. That means that the modem knows that it must automatically answer the line on the first ring. Verify that the modem is in the auto answer mode by turning off the modem power switch and then turn it on again. The AA, TR and MR lights, should illuminate.

PC BASED EDITOR

An optional program is available for a DOS based PC which will permit you to edit pages, save them on your PC hard disk, edit queues, etc.

This program provides standard text editing functions that are available on a DOS based PC. The screen display on the PC is not in the format (character style, color, etc) of what you will see on your System 800. This program allows you to communicate using telephone lines, or direct wire, to one or more System 800 character generators.

Please contact Video Data Systems for current pricing and availability.

COMMUNICATING BETWEEN UNITS

Units with a software revision date after July 1, 1994 have the capability of communicating from one System 800 to another similar or later revision System 800. It is possible to connect two units together by means of their serial ports. Certain commands may be issued from a host unit to a remote unit so that the remote unit behaves identically to the host unit. All of these commands can also be used to communicate from a System 800 unit to a remote computer. Most standard communications software available for computers will allow you to capture the data sent from the System 800 and store it as a file in the computers memory. The remote computer can then retransmit this data to other System 800 units. All data sent with these commands from the System 800 is formatted properly for direct transmission to any System 800 unit. Make sure your computer is set for **XON/XOFF** handshake. If you should send an XOFF from the computer the remote System 800 will stop sending data. If the XON is not received within 6.5 seconds then the remainder of the transmission from the System 800 will be aborted.

To send a single page of memory use the **CTRL + L** key. You will see a message on the screen asking you to supply a page number. Enter a valid number and then press the **ENTER** key. The contents of the specified page will be sent. If the page is empty you will see an error message.

To send the entire contents of the page memory use the **CTRL + M** key. You will be asked to confirm transmission

Send memory? (Y/N)

If you respond with Y then the memory will be sent. Any other response will not send anything. When sending memory to another unit with this command all pages that have any information in the transmitting units memory will be sent out. Prior to transmitting the pages the following commands will be sent: @echo off, @queue off, @init queue, @init timeout, @pc,0; (initialize the crawl line), then all pages will be sent. While transmission is in progress you will see a message

Sending memory, wait...

When the transmission is completed you will see a count of the number of responses received by the transmitter unit in the format:

Responses: Valid = n Error = n

If the memory were completely empty, then you would get a Valid count of 5. For each page that had ANY data on it the count increases by 2. There should be no Error count. Note that a page will contain data even if a blank page has been stored at that location, that blank page may not contain characters, but it will contain background color information which is treated as data. The only way to get a truly blank page, i.e. which will not transmit, is after a memory initialization. In the case of transmitting data to a computer, since the computer does not respond to the @ commands with the responses specified in this document, you will see 0 for the Valid responses as well as the Errors.

To send the queue list of the host unit use the **CTRL + Q** key.
You will be asked to confirm transmission

Send queue? (Y/N)

If you respond with Y then the queue will be sent. Any other response will not send anything. The information transmitted consists of the commands @echo off, @queue off, @init queue, @init timeout, @set clock, for each valid entry in the queue list the timeout data for the page found in the queue list in the @expire time format and the queue entry in the @enqueue format, the commands @qcount, @qcycle, @sync, @crawl position, @crawl size, @pc. This represents all information about the automatic queue operation. The clock at the remote unit will be synchronized to the time of the clock at the host. Due to transmission delays and other factors, the remote clock will be set within about 2 seconds of the host's clock. While transmission is in progress you will see a message

Sending queue, wait...

When the transmission is completed you will see a count of the number of responses received by the transmitting unit in the format:

Responses: Valid = n Error = n

The valid response count is 10 plus the number of queue entries.

If you have the optional event list manager, then you can send the event list of the host unit to a remote unit by using the **CTRL + Q** key.

You will be asked to confirm transmission

Send event list? (Y/N)

If you respond with Y then the events list will be sent. Any other response will not send anything.

The information transmitted consists of the commands @echo off, @init event followed by the event list in transmission format. While transmission is in progress you will see a message

Sending events, wait...

When the transmission is completed you will see a count of the number of responses received by the transmitting unit in the format:

Responses: Valid = n Error = n

The valid response count is 2 plus the number of event list entries.

If you have a computer connected to a System 800 unit, then you can retrieve the entire memory in retransmission format by using the **@FETCHM;** command. To get the entire queue and it's control information use the **@FETCHQ;** command. To get the events list use the command **@FETCHE;**. When international characters are included in a page the **@FETCHM** and **CTRL + M** commands will transmit them in the two character format discussed in the section "Accessing International Characters" above.

From the keyboard of a unit you can send a message directly to the serial port by using the **CTRL + Y** key. You will see the message line on the edit screen with a single > character at the left margin. You may now type information into the message line.

You can send control characters from this command line by prefixing the letter value of the control character with ° (obtained with **SHIFT + 6)**. This is necessary if you are addressing RS485 connected units. For example, to select unit with address B (= hex 42) you would place on the command line

°AB

The °A sends the SOH character which is hex 01. See page 37 for details of how to set a unit's address. After you press the **ENTER** key for an address command you will see the message

Address sent, press any key

on the screen. There is no response from a remote unit to this command. You clear the message by pressing any key.

The maximum number of characters on this command line is 30. The backspace key is active to correct errors. When your message line is correct, you may then press the **ENTER** key to send the contents of the message line to the serial port. The text on the command line will be terminated with a **CR LF**.

Data sent from the connected unit will be displayed on the command line after you press the **ENTER** key. For example, if you should be connected to a modem and you place AT on the command line and then press **ENTER** you will see the modems response of OK on the command line.

If the remotely connected device should send an XOFF for more than 6 seconds then the transmission will time out and an error message will appear.

If you are in the XOFF state, you must either wait for the connected device to send an XON or you must soft reset your system with **CTRL+ALT+CTRL** or by cycling the power.

Any command that is not prefixed with @ will cause a timeout if no response is received within 6 seconds. Modem commands prefixed with AT will timeout in 36 seconds. Commands that are prefixed with @ will show the message

Message sent, press any key.

after you press the **ENTER** key. A subsequent key press will remove the message. Note that there is no response code displayed for any of the @ commands. Modem commands will immediately show the response from the modem, or if no response is received, the message

No response

You can press the **ESC** key to interrupt the timeout and return to normal operation. You can cancel the operation by using the **ESC** key.

With the **CTRL Y** function you are able to send commands to a connected modem. If you want to dial a modem you would enter the dial sequence, for example:

atdt 231 4400

and then press the **ENTER** key. The modem will then dial the number. When you hear the connection completed, usually the modems speaker will turn off, you may then send data from this unit to a remote unit. If you press the **ESC** key while on this 'command line' the data will not be sent to the serial port and the operation is aborted. Note that there is no cursor while on this command line. The only editing key that is operational is the backspace key, which will erase the last character typed.

You can also send any of the "@" commands from one System 800 to another System 800 from this command line. For example, to turn off the queue at a remote unit you would type @queue off; and then press the **ENTER** key, and the remote unit's queue would be terminated. To facilitate sending of standard commands which have key stroke equivalents you can use the built in macro capability of the System 800. See page 51 for the complete list of these macros.

If you wanted to retrieve the pages stored in memory at a remote unit into your unit you would first clear your units memory by restarting with the **CTRL + ALT + ALT** command, and then enable the command line with **CTRL Y**, and then issue the command **@FETCHM**;. The pages of memory at the remote unit will then be transferred to your unit. You could then edit, delete, or add to those pages and then send them back to the remote unit with the **CTRL M** command.

The commands sent using **CTRL +U**, **CTRL+Q** and **CTRL+M** will wait about 6 seconds for a response from the connected unit. If no response is received you will see a message on screen. A proper response will display a single V character on the command line. An error message will display an E followed by the error code. Modem commands sent from the **CTRL+Y** command line will display the modems response.

You can connect the remote unit by either wire or telephone modem. In all cases connection is made to the SERIAL 1 connector of the System 800 unit for RS232 and Serial 2 for RS485.

If you are connecting one host unit to a multiple of receiving units, then you must use the RS485 protocol on all units. The host unit must have the jumper installed in the location indicated as being used for RS232. The host unit must not have any address jumpers installed. Each remote unit is configured as discussed above with the desired address code jumpers. The cable that you would use is wired as follows:

HOST	REMOTE 1	REMOTE 2 etc.
6 (TXDHI)	8 (RXDHI)	8
7 (TXDLO)	9 (RXDLO)	9
8 (RXDHI)	6 (TXDHI)	6
9 (RXDLO)	7 (TXDLO)	7

RS 485 master to many remotes

Note that you should place a 100 ohm terminating resistor at the last remote unit across pins 8 and 9. There should also be a 100 terminating resistor at the HOST unit across pins 8 and 9.

If you are connecting a host unit to a modem, and then a multiple of remote units to a single modem, then you will configure the host unit as a standard RS232 unit and all remote units must be RS485. Since most modems support RS232 only you will need an RS232 to RS485 converter at the receive modem. The cable connecting the system 800 to the modem is a standard modem cable and it's pin connections are shown below. The RS232 to RS485 converter connects to the modem per manufacturer's instructions. Wiring from the RS485 output side is identical to that shown above except that most RS485 adapters have a screw terminal block instead of a connector. The connections of the RS485 converter will either be labeled as in the example above or sometimes they will be labeled as TX+ (the same as TXDHI), TX- (the same as TXDLO), RX+ (the same as RXDHI) and RX- (the same as RXDLO). Additionally, some RS485 converters have a built in 100 ohm termination resistor at the adaptor's receive connections.

If you connect units via wire, then RS232 units must be connected with a 'null modem' cable. The wiring for this cable is as follows:

DB9P (host)	DB9P (remote)
2	3
3	2
5	5

RS232 unit to unit

If you connect the System 800 to a modem, then you will need a cable as follows if your modem has a DB25S mounted on it:

DB9P (System 800)	DB25P (modem)
2	3
3	2
5	7
4	20
	4
	5

System 800 to 25 pin modem

If your modem has a DB9S mounted on it then use the following cable:

DB9P (System 800)	DB9P (modem)
2	2
3	3
5	5
4	4
	7
	8

System 800 to 9 pin modem

You can leave out the connection from pin 4 of the DB9P at the System 800 to the modem if you set your modem so that it does not require a DTR signal.

To connect a System 800 to a PC with a 9 pin serial port connector use the following cable:

DB9P (Sys 800)	DB9S (pc)
2	3 (TXD from PC)
3	2 (RXD to PC)
5	5 (GND)
	7 (CTS to PC)
	8 (RTS from PC)
	6 (DSR)
	1 (DCD)
	4 (DTR)

System 800 to 9 pin PC

To connect a System 800 to a PC with a 25 pin serial port connector use the following cable:

DB9P (Sys 800)	DB25S (pc)
2	2 (TXD from PC)
3	3 (RXD to PC)
5	7 (GND)
	5 (CTS to PC)
	4 (RTS from PC)
	6 (DSR)
	8 (DCD)
	20 (DTR)

System 800 to 25 pin PC

COMMAND MACROS

When communicating between System 800 units you can issue commands from the host's command line, obtained with the CTRL Y function. These commands are sent to the remotely connected System 800. The following list of commands can be quickly entered into the command line by pressing the indicated function key after the command line is enabled. These are the identical function keys used when implementing the function at the local System 800. In the cases where you must supply parameters to complete the command, the type of parameter needed is indicated.

FUNCTION KEY	**command text automatically typed:**
CTRL F12	@abort crawl;
SHIFT Queue Start	@autoq on;
CTRL E	@crawl position,<scan line>;
CTRL R	@crawl size,<height>;
F11	@cur off; c_off
Dequeue Page	@dequeue,<page number>;
Set Queue	@enqueue,<page number>,<position>,<dwell>;
End Time	@expire time,<date>,<hour>,<min>,<page>;
CTRL Speed	@fast;
CTRL U	@fetche;
CTRL M	@fetchm;
CTRL L	@fetchp;
CTRL Q	@fetchq;
SHIFT F9	@GMT,<hours>;
CTRL Queue Start	@init queue;
CTRL Switch	@init switch;
CTRL End Time	@init timeout;
F10	@key off;

F9	@key on;
Page Down	@lastp;
SHIFT Speed	@med;
CTRL [	@mil time;
Page Up	@nextp;
Edit	@page,<page number>;
CTRL T	@pc,<page number>;
CTRL 1	@port,<port number>,<hex value>;
CTRL 8	@pulse,<bit>;
CTRL Queue End	@qcount,<number>;
CTRL D	@qcycle,<seconds>;
CTRL S	@qsync,<minute>;
Queue End	@queue off;
Queue Start	@queue on;
CTRL Time	@set clock,<year>,<month>,<date>,<day>,<hour>,<min>,<sec;
CTRL C	@set count,<hour>,<min>,<sec>;
CTRL G	@set goal,<hour>,<min>,<sec>;
CTRL P	@set pulse,<number of fields>;
Switch	@set source,<channel>;
Speed	@slow;
CTRL 9	@start,<bit>;
CTRL]	@std time;
Next Queue Entry	@step;
CTRL 0	@stop,<bit>;
F4	@video mode,<mode>;

VIDEO PORTS

There are three video configurations available.

CG810 PAGE TITLER

The CG810 page titler provides down stream keyer type operation. There will be no video output from either the Program or the Monitor connectors unless there is a correct video input signal. The following video connections are provided:

Program Video In:
This is a standard BNC type connector. When power is applied to the unit there is an internal termination of 75 ohms applied to this signal. When power is disconnected this lead is directly connected to the Program Video output.

Program Video Out:
This is a standard BNC type connector. When power is applied to the unit this is connected to the video driver circuitry and characters are keyed into the incoming video depending on the current operational status of the unit. The internally supplied video signal is 75 ohm source terminated and is capable of driving a coaxial line with a 1 volt video signal when terminated in 75 ohms. If there is no video input there can be no video output.

When power is removed from the unit, this lead is directly connected to the Program Video In.

Monitor Out:

This is a standard BNC type connector. As long as there is a video input signal it contains a monochrome representation of the characters that would be required to be keyed into the supplied Video Input signal. This signal is not affected by the **KEY ON/OFF** control.

CG830 COLOR BILLBOARD

The CG830 page color billboard generator provides an internal color sync generator which is used to generate the background colors. The single video output connection is always a composite color video signal.

CG840 COLOR GEN LOCK

The CG840 provides an internal sync generator which is gen locked to the incoming video signal. When no video is present the internal sync generator will provide the proper NTSC color sync signals allowing the CG840 to operate in the stand alone mode. The video input connector is terminated in 75 ohms when power is turned on. When power is off, the video input is directly connected to the VIDEO 1 output line. Each output video connector is 75 ohm source terminated and is capable of driving a coaxial line with a 1 volt video signal when terminated in 75 ohms.

The EDIT video output is a gray scaled, monochrome representation of the characters that are to be keyed into the input video signal.

GENERAL PURPOSE INTERFACE FUNCTIONS

The unit is capable of controlling up to 12 external General Purpose Interface (GPI) lines. These lines will be driven with a TTL compatible logic signal. Commands to change the state of any of the lines can be issued in 3 different ways.

1. Include a command in any page of data that is being displayed in a queue.
2. Issue a command from the serial input port.
3. Issue a command from the keyboard.

The 12 lines are identified as lines A through L. Since some control functions require groupings of lines, each set of 4 lines is referenced as a port (1, 2, or 3). When setting data to a port the hexadecimal value of the port is used as the command value. The relationship of lines to ports and values is shown below.

PORT	Lines	LSB	MSB
1	a,b,c,d	a	d
2	e,f,g,h	e	h
3	i,j,k,l	i	l

GPI port identifications (hex)

The state of a line is defined as START = TTL LOW, STOP = TTL HIGH, or PULSE = change the state of the line from its original state to the opposite state for a predetermined time period.

The tokens used when embedding control information in a text page are:

TOKEN	FUNCTION
%(?	start line ?
%)?	stop line ?

%*?	pulse line ?
%1h	set port 1 to hex value h
%2h	set port 2 to hex value h
%3h	set port 3 to hex value h

Text tokens to control GPI ports

From the keyboard use the following keystrokes to perform the indicated function. You will get a message on screen which requires a response to perform the action.

CTRL 8 to pulse the desired line
CTRL 9 to start the desired line
CTRL 0 to stop the desired line

CTRL 1 to set port 1 to the desired value
CTRL 2 to set port 2 to the desired value
CTRL 3 to set port 3 to the desired value

Direct keyboard control of GPI ports

From the remote serial data connection use the following commands to perform the indicated function.

@start,?; to start line ?
@stop,?; to stop line ?
@pulse,?; to pulse line ?

@port,1,h; to set port 1 to value h
@port,2,h; to set port 2 to value h
@port,3,h; to set port 3 to value h

Direct serial port control of GPI ports

[@SET PULSE,nn;] The pulse width defaults to 16 video field times. It may be set to any value from 1 to 254 video field times. From the serial data stream use the command **@set PULSE,nn;** where n is the number of video fields.

From the keyboard press **CTRL P** and then enter the desired number of video frames. The current number will be provided. You can press **ENTER** to use that number. Pressing **ESC** will restore the original number and exit the function. You may use the **UP/DOWN** arrow keys to advance/decrease the number, or, you may use the number keys to enter a desired number.

Control signals are available on connector J located at the rear of the unit. This connector is a 34 pin ribbon type. All even numbered pins, the bottom row as you look at the rear, are connected to ground. The pins are numbered with number 1 at the upper right and progress to the left. Odd numbered pins are on the top row. The relationship of 'lines' discussed above and pin number is as follows:

Pin	Line	Port	
1	A	1	LSB
3	B	1	
5	C	1	
7	D	1	MSB
9	E	2	LSB
11	F	2	
13	G	2	
15	H	2	MSB
17	I	3	LSB
19	J	3	
21	K	3	
23	L	3	MSB

GPI connector pinouts

```
           (top)
    3           2         1
    3           1         1         1

    o o o o o o o o o o o o o o o o o
    o o o o o o o o o o o o o o o o o

    3           2         1         2
    4           2         2
```

GPI Output connector:

When using the port functions there are 16 possible combinations for the four allocated lines. The translation table to implement port functions:

port 1 lines		**D**	**C**	**B**	**A**
port 2 lines		**H**	**G**	**F**	**E**
port 3 lines		**L**	**K**	**J**	**I**
'hex' value	0	L	L	L	L
	1	L	L	L	H
	2	L	L	H	L
	3	L	L	H	H
	4	L	H	L	L
	5	L	H	L	H
	6	L	H	H	L
	7	L	H	H	H
	8	H	L	L	L
	9	H	L	L	H
	A	H	L	H	L
	B	H	L	H	H
	C	H	H	L	L
	D	H	H	L	H
	E	H	H	H	L
	F	H	H	H	H

GPI hex code translation

An example of how to use the different port commands to control a VCR Play, Stop and Rewind control lines. The assumption is that the respective VCR functions occur when a pulse to ground signal is received on the control line for a period of 250 milliseconds. For this illustration we are connecting the VCR Start line to control port A, the Stop line to control port B and the Rewind line to control port C. For illustration purposes control port line D is not used. Since the normal state for all of the lines is to be in the High state we must initialize these lines either from the keyboard with the command **CTRL + 1**, to set port 1, and supply the value F which according to the chart above will set all the lines of port 1, i.e. control lines A B C D, to a high state. You could also place the token command %1F on the first page to appear in a queue. Once the lines have been initialized then in order to cause the Play, Stop or Rewind actions you must pulse the respective line to the low state. This would be done by activating a single control line with the PULSE command. Thus to Play the tape issue the command %*A on a page in the queue list or from the keyboard use **CTRL + 8** and enter the letter A. Similarly to Stop the tape use **CTRL + 8** and enter the letter B, and for Rewind use **CTRL + 8** and enter the letter C.

The pulse width defaults to 500 milliseconds. It can be changed by using the **CTRL + P** command from the keyboard as discussed above.

Upon power on each control is set to the state it was at before power failed.

After a system reset each control line is set to the high state.

OPTIONAL ROUTING SWITCHER CONTROL

The Video Data Systems 8x8 routing switcher may be controlled from the System 800. In a typical configuration the routing switcher is connected to 7 different video sources and the System 800. Each of the 7 video sources is normally connected directly to an input of the switcher. Under control of the System 800 any one of the routing switcher inputs is used as the video source for the System 800, and the corresponding switcher output is then supplied with the video output signal from the System 800. In this way the messages of the System 800 can be made to appear on up to 7 different video channels. Only one channel at a time can contain System 800 information.

From the serial port you may issue the command **@SET SOURCE,n;** where n is the switcher input port that is to be intercepted and have data inserted into it. This command is valid for all configurations of the System 800.

In the Page and Crawl configurations of the System 800 you may use the keyboard command obtained from the **{ SWITCH }** key on the right side of the keyboard. (The large vertical key above the **STORE** key). After striking this key you will see a message on the screen:

Switch CG channel: 0

Type in any number from 1 to 7 to select that switcher input as the System 800 video source and then press **ENTER**. Pressing **ESC** will abort this function with not change the switcher configuration. If the number you entered was in the range of 1 to 7 the proper commands will be sent to the switcher and you will see the message:

Switch Command Done

on the screen. Strike any key to remove the message and return to normal editing.

From all configurations of the System 800 you may embed a token into your text that will cause the requested switcher input to be connected to the System 800 when that token is seen by the screen update functions. The token used is **%Rn** where you supply any number from 1 to 7 for 'n'. If you are using this command in a page or crawl queue, then when the requested page is displayed the switch function will take place. In the annotation configuration, when the line with the token is placed on display the requested switch function will take place.

When using this configuration the connections to the routing switcher must be made so that input and output 1 through 7 are wired as though the switcher were a loop through device. The input to switcher port number 8 is the output of the System 800. The output from switcher port number 8 is the input to the System 800. Refer to the drawing on page 61 for typical video circuit wiring.

The routing switcher is configured so that with no power applied there is a direct wire connection from input to output for each of the ports. When power is applied to the switcher each input line is terminated in 75 ohms and the output is driven from the driver built in to the switcher. This driver is 75 ohm source terminated and provides a unity gain (input to output) when terminated in 75 ohms.

NOTE:
All switcher outputs MUST BE TERMINATED even if they are unused.

The power for the switcher should be turned on prior to, or simultaneously with, the power for the System 800. This is necessary because the System 800 sends an initialization command to the switcher to force the 'loop through' connections. If this is not the case then all outputs will be at a ground level.

[@INIT SWITCH;] { CTRL SWITCH } The power on initialization command to the switcher can be forced with this command. The initial conditions are to connect inputs 1 through 7 to outputs 1 through 7 respectively and also connect input 1 to output 8 (which is normally applied to the input of the System 800).

NOTE
In this configuration there must always be a video signal present on input number 1.

If you should issue a command to the switcher which causes the video signal to be removed from the System 800, then after about 1 second the System 800 will automatically issue an initialization command to the switcher.

CONVENTIONAL ROUTING SWITCHER CONTROL

You may use the routing switcher in it's fully functional 8x8 mode under control of the System 800. In this configuration you can route any input to any output. The System 800 input does not have to be connected to the switcher but the video input to the System 800 must always be valid. This mode is available from the serial data stream or when a page with the appropriate command is sequenced in the queue.

@SET SWITCH,a,b,c,d,e,f,g,h; where the letters a through h represent the input video line that the sequential output is to be connected to. That is to say, the first argument position, 'a' in the example, represents output number 1 from the switcher. To connect input 4 to output 1 the 'a' would be replace by '4'. To connect corresponding inputs directly to outputs, resulting in a pass through connection, you would send the command:

```
@SET SWITCH,1,2,3,4,5,6,7,8;
```

To connect input 1 to output 8, input 2 to output 7, input 3 to output 6 etc. you would send the command:

```
@SET SWITCH,8,7,6,5,4,3,2,1;
```

To connect input 1 to all 8 outputs you would issue the command:

```
@SET SWITCH,1,1,1,1,1,1,1,1;
```

Omitting any of the arguments results in no change in where the specified output is currently connected. Supplying an invalid argument e.g. a number greater than 8, results in the corresponding output video line being set to the ground state.

All switch functions will occur at the 2nd vertical interval of the video that is connected to the input of the System 800.

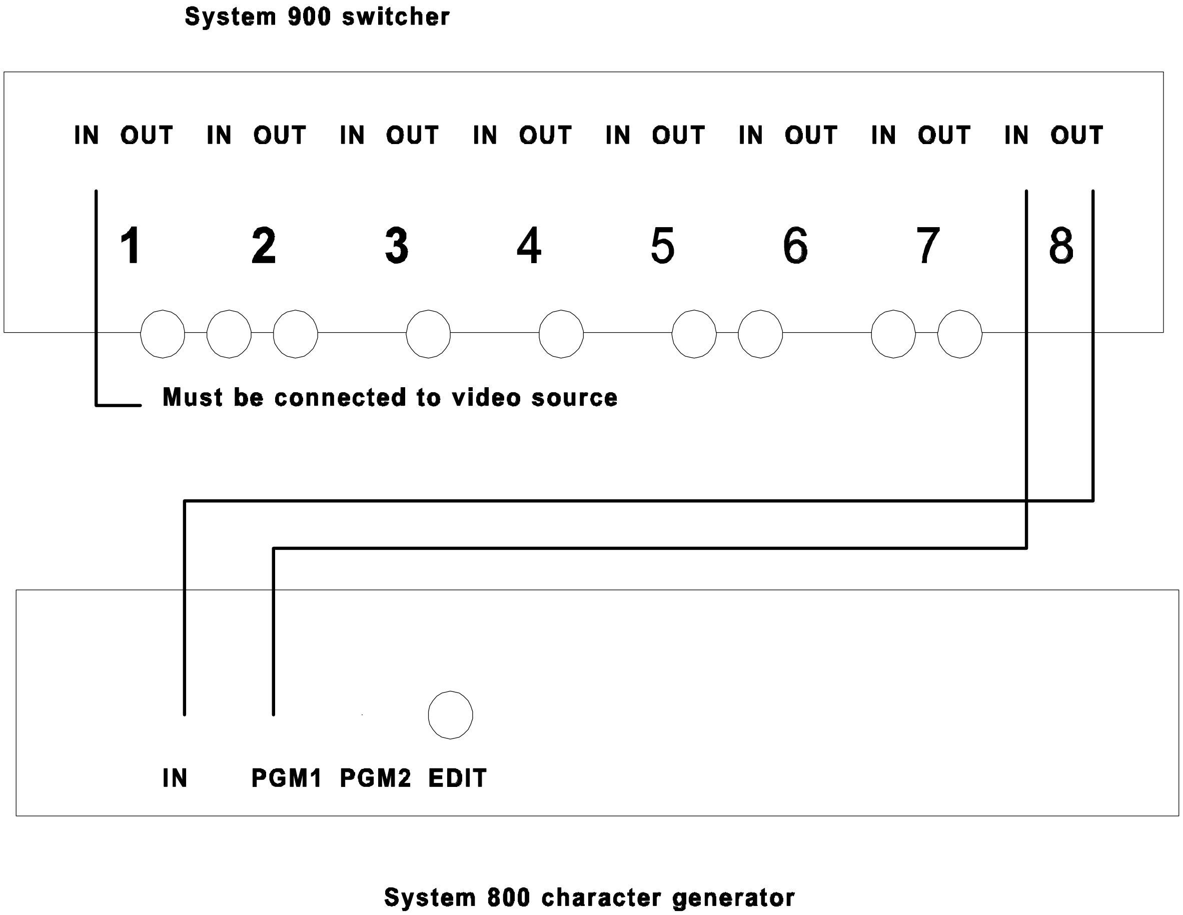
You may set the outputs of each position of the switcher using the token **%Vabcdefgh** where the numbers that you use in place of the letters abcdefgh shown are the respective input lines that are to be routed to the output line position. This is identical to the SET SWITCH command from the serial port.

The System 900 routing switcher is connected to the System 800 by means of a connector from the General Purpose Control Interface connector on the rear of the unit. This connector is a 34 pin header and the connector on the System 900 is a DB25S. The cable that you need to connect these units is as follows:

34 pin header (System 800)	DB25P (System 900)
26	7
25	21
27	13
29	25

System 800 GPI to System 900 switcher

Wiring diagram of how a System 800 character geenerator with switcher option is connected to the video system, refer to text above.


System 900 switcher
IN OUT IN OUT IN OUT IN OUT IN OUT IN OUT IN OUT IN OUT
1 2 3 4 5 6 7 8
Must be connected to video source
IN PGM1 PGM2 EDIT
System 800 character generator

REMOTE ACCESS OF SYSTEM LISTS

CONTENTS OF LISTS IN SYSTEM 800

You can get information about the System 800 lists back to a host computer or terminal.

All return packets are prefixed with a hex OD/OA (CR LF) and end with hex OD OA OD OA 56 OD OA (CR LF CR LF V CR LF).

The command **@PLIST;** will give you a list of all 99 pages in the system and their size (expressed in hex) in memory. A page length of 0 indicates nothing stored there.

The format of the return packet is

```
01 00FE 02 0104 03 00FF 04 00FF 05 005D 06 0050 07 007D 08 0043
09 004C 10 0000 11 0000 12 0000 13 0000 14 0000 15 0000 16 0000
17 0000 18 0000 19 0000 20 0000 21 0000 22 0000 23 0000 24 0000
.
.
97 0000 98 0000 99 0000

V
```

There are 8 bytes received for each page in the system.
The bytes are:

two bytes = page number,
one byte = space
four bytes = page size in hex
one byte = space.

At the end of each line is a hex OD OA (CR LF).

Note that the last packet has 3 entries.

The command **@QLIST;** will return the contents of the remote queue as:

```
01 0101 02 0000 03 0000 04 0000 05 0000 06 0000 07 0000 08 0000
```

```
09 0000 10 0000 11 0000 12 0000 13 0000 14 0000 15 0000 16 0000
17 0000 18 0000 19 0000 20 0000 21 0000 22 0000 23 0000 24 0000
.
.
.
97 0000 98 0000 99 0000

V
```

There are 8 bytes received for each queue entry in the system:
two bytes = queue entry number
one byte = space
two bytes = page at this queue entry
two bytes = dwell time at this queue entry
one byte = space
After each 8 queue entries a CR LF is transmitted

The command **@TLIST;** will return the contents of the timeout list:

```
01 08171500 02 00000000 03 00000000 04 00000000
05 00000000 06 00000000 07 00000000 08 00000000
09 00000000 10 00000000 11 00000000 12 00000000
13 00000000 14 00000000 15 00000000 16 00000000
17 00000000 18 00000000 19 00000000 20 00000000
.
.
97 00000000 98 00000000 99 00000000

V
```

There are 12 bytes received for each page in the system:
2 bytes = page number
1 byte = space
2 bytes = date of month to expire
2 bytes = hour of day to expire
2 bytes = minute of day to expire
2 bytes = not used (will be 00)
1 byte = space.

Note that the last packet has 3 entries.
After each 4 timeout list entries a CR LF is transmitted.

OBTAINING FONT PROPORTIONALITY TABLES

The tables which are used by the display generator to determine how many display elements each character occupies are available to a host computer by using the **@FLIST,n** command where n is the font number, 1 to 4. (See below for contents of standard fonts.)

The return packet received from the System 800 unit will consist of 265 characters which represent hex numbers and will be of the format:

<0D> <0A> followed by two digits representing the hex value of the first scan line number used when building the row to display the font four digits representing the hex value of the number of elements used by this font,126 pairs of characters representing the number of elements required for each character, followed by <0D> <0A> V <0D> <0A>.

A hex dump of a sample packet:

```
0D 0A 31 41 30 30 46 31 30 33 30 33 30 33 30 33  ..1A00F103030303
30 33 30 31 30 33 30 30 30 30 30 33 30 33 30 33  0301030000030303
30 33 30 33 30 33 30 33 30 30 30 30 30 30 30 30  0303030300000000
30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30  0000000000000000
30 30 30 30 30 33 30 31 30 32 30 34 30 33 30 34  0000030102040304
30 33 30 31 30 32 30 32 30 32 30 33 30 31 30 32  0301020202030102
30 31 30 32 30 33 30 33 30 33 30 33 30 33 30 33  0102030303030303
30 33 30 33 30 33 30 33 30 31 30 31 30 33 30 33  0303030301010303
30 33 30 33 30 34 30 33 30 33 30 33 30 33 30 33  0303040303030303
30 33 30 33 30 33 30 31 30 33 30 33 30 33 30 34  0303030103030304
30 33 30 33 30 33 30 34 30 33 30 33 30 33 30 33  0303030403030303
30 33 30 34 30 33 30 33 30 33 30 32 30 30 30 32  0304030303020002
30 32 30 30 30 30 30 33 30 33 30 33 30 33 30 33  0200000303030303
30 32 30 33 30 33 30 31 30 32 30 33 30 31 30 34  0203030102030104
30 33 30 33 30 33 30 33 30 32 30 33 30 32 30 33  0303030302030203
30 33 30 34 30 33 30 33 30 33 30 30 30 30 30 30  0304030303000000
30 30 30 30 0D 0A 56 0D 0A                       0000..V..
```

Starting with the 9th byte of the packet is the table of element numbers. The first number represents the number of elements allotted for the character that will be displayed with the SYSTEM 800 ASCII value of 2, etc. SYSTEM 800 ASCII values less than 0x20 are used to hold special characters, such as international characters. All standard ASCII characters are stored in their respective locations of the table.

Thus the number of elements needed for displaying an A (ASCII 0x41 = 65 decimal) is contained in the two characters starting at byte number (5 + (65*2))= 135 of the packet. The starting reference is the 5th byte of the packet because equivalent character locations 0 and 1 are not used.

The equivalent character location of the international characters in the font tables is as follows:

Location	Hex char	Int'l char
2	0x82	é
3	0x83	â
4	0x85	à
5	0x88	ê
6	0x8a	è
7	0x8c	î
8	0x96	û
11	0x97	ù
12	0xa2	ó
14	0x90	É
15	0x87	ç
16	0x89	ë
17	0x93	ô
18	0xa3	ú
19	0x8b	ï
20	0xa4	ñ
21	0xa8	¿
22	0xa0	á
23	0xa1	í

International character font locations

If international characters are not supported in the font then accessing the above characters will display the characters without the accents. There is no way for the host to know if international characters are supported or not.
In a C program you would use the structure below to store the packet from the remote:

```
struct  Tag800Fonts
        {
        char   Lead [ 2 ] ; // the 0x0d, 0x0a starting the packet
        char   StartScanLine [ 2 ] ; //MSchar first
        char   FontSize [ 4 ] ; // MSchar first
        char   FontData [ 126 ] [ 2 ]; //starting with char 0x02
        char   Trail [ 5 ] ; // the 0x0d 0x0a V 0x0d 0x0a
        } 800Fonts ;
```

After you read the packet you would get the width for character A with:

```
        int       Adata;
        Adata = 800Fonts . FontData [ 'A' - 2 ][1] & 0x0f +
                        10 * ( 800Fonts . FontData [ 'A' -2 ][0] & 0x0f );
```

In all current fonts the first digit of the font size will be a 0 and thus you could eliminate the use of FontData[][0].

FONT PROPORTIONALITY TABLES

The following list was obtained by using the **@flist,n;** command from the serial port of the System 800 and represents the font lists for the standard fonts supplied with the System 800 as shown on the font charts. Note that the data stream obtained from the @flist,n; command would be continuous. The lines have been broken for clarity. The first line represents the Start Scan line for building the row where the font will appear on the display as measured based on 64 scan lines for the row. The next line represents the number of elements required for the font in the internal font data base. The next line starts the font width descriptors, with the descriptor for display character code 0x02 being shown first. The next line shows the font descriptors for ASCII codes 0x20 thru 0x3f, next line for codes 0x40 thru 0x5f, last line for codes 0x60 thru 0x7f. Refer to the font charts in this section for a list of the characters that are mapped into the range of 0x02 thru 0x1f.

These tables can be used by your computer software in order to determine how much data will fit on a given display row. The total number of elements displayed on any row, except a crawl row, can not exceed 87. The ASCII TAB character, 0x09, will always display as a single blank element. Embedded attributes in a display line do not take up any element space, however, be aware that background color changes will not take effect until the next tab or space character after the color change. Character color and flash changes occur at the point of insertion of the color attribute.

```
@flist,1;
1A
00F1
030303030301030000030300030303030300000000000000000000000000
0301020403040301020202030102010203030303030303030303010103030303
0403030303030303030103030304030303040303030303040303030200020200
0003030303030203030102030104030303030203020303040303030000000000
V
@flist,2;
18
011D
030303030302040000040300040303030400000000000000000000000000
0302020403050402020203030202020203030303030303030303020203030303
0504040404040404040403030404050404040404030404040504040302000202
0003030303030303040202040205040303030303030403040403030000000000
V
@flist,3;
05
0121
040606040403050000050600040404060500000000000000000000000000
0503030605060603030303050303030405050505050505050505030305050505
0706050405040406050304050407050605060505040506070606050300030300
0006050405040406050304050407050605060505040506070606050000000000
V
@flist,4;
1D
00B0
020202020202020000020200020202020200000000000000000000000000
0202020202020202020202020202020202020202020202020202020202020202
0202020202020202020202020202020202020202020202020202020200020200
0002020202020202020202020202020202020202020202020202020000000000
V
```

Font parameter summary:

F	similar to:	char/row	height	rows/scree	crawl char/se	comment

				n	**c**	
1	Helvetica	32 (prop)	34	10	22	
2	Clarendon	28 (prop)	36	9	19	
3	Futura Black	18 (prop)	54	6	12	Upper case and # only
4	sans serif	40(fixed)	32	10	28	

VIDEO ANNOTATION MODE

The optional video annotation configuration is controllable from the serial input port only. Once this mode is entered the local keyboard has no effect on system operation. Prior to entering this configuration you may prepare crawl messages and place them into system memory for later display.

In this configuration the System 800 can be configured so that it can place data on the video screen in response to input commands from the serial data line. There is no storage of information other than the specifics of the current display and any crawl messages that are sent.

If the crawl row is not used, up to 16 rows of text information may be placed on the screen. Each row may be configured from 16 to 120 scan lines high and can be placed anywhere on the raster from vertical blanking to vertical blanking.

Horizontal resolution of character positioning is in multiples of 8 pixels. Each group of 8 pixels is referred to as an element. There are 120 elements from blanking to blanking for each row.

SETUP COMMANDS

@[INIT; Sets the System 800 to recognize further commands as being for the annotation configuration. The internal cursor (which is never visible) is placed at element 1 of row 1, the 'home' position. This command must be issued before any other annotation configuration commands will be recognized.

Once set in the annotation mode, the following commands will be recognized:

@[BLNK; Erases all built up rows on the screen. The data that was stored on the rows is retained in memory. Thus it is possible to rebuild the row in a different place and the original text will re-appear.

@[BLD,r,h,l; Create the scan lines necessary to display a row 'r' of text with the height of 'h' scan lines per field, starting at scan line 'l' as referenced from vertical drive. The fonts provided are designed with 32 scan lines of information. This is the optimum size to see all border information and for fully rounded fonts. Any size less than 32 scan lines may result in the border not being present for certain portions of the character. Sizes greater that 32 scan lines cause certain scan lines to be repeated.

@[SCREEN; Builds a full screen of the text rows using the height of the font specified with the **@[FONT;** command.

@[CHCOL ,n; Specifies the character color for future text entered. Refer to **@[CHCOL,n;** above.

@[BKCOL,n; Specifies the background color for future text entered. Refer to **@[BKCOL,n;** above.

@[FONT,n: Sets the current font to n. When **@[BLD** is called the starting scan line number is determined by the last font set up with this command. If you should build a row while a small font is in effect and then display a large character on that row, you will lose the upper part of the character.

CURSOR MOVEMENT COMMANDS

@[HOME; Move the cursor to the position of first element of first row. Note that you do not have to build rows in sequence. Home refers to the row actually numbered 1.

@[CR; Move the cursor to the element position 1 of the current row.

@[LF; Move the cursor to the next row number. The current element number is retained. Since rows do not have to be built sequentially, this display row can be anywhere on the display.

@[CRLF; Move the cursor to the next numerical row and at position 1.

@[UP;Move the cursor to the previous numerical row. The current element position is retained.

@[POS,r,e; Move the cursor to the row 'r' and the element 'e'.

@[RT; Move the cursor one character to the right from its current position.

@[LT; Move the cursor one character left of its current position.

@[BS; Move the cursor one character left and erase the character at that position.

@[SK; Move the cursor one element right of its current position.

MISCELLANEOUS COMMANDS

@[DEL,r; Delete the row 'r' from the display. The scan lines built for that row are eliminated from the display. The text for the row is retained in memory and can be restored by rebuilding the row.

@[CLR; Clear the text from the display. The display data for the rows built is retained.

@[RCL,r; Clear the row 'r' of all text on display. The scan line configuration is retained.

@[FON;Set the flash mode on for all subsequent text entered.

@[FOF; Set the flash mode off for all subsequent text entered.

@RESTORE; Restore the System 800 to its original condition. This will DISABLE the annotation configuration. The normal functionality of the crawl line (16) is restored.

ANNOTATION CLOCK DISPLAY

An externally controlled count down timer can be configured to appear on any of the 16 display rows. This counter only operates from the serial data input line. The commands applicable are:

@[CPOS,r,c; Sets the position where the count down will be displayed at where 'r' is the row number and 'c' is the element column number. This position is set at power up to be column 1 of row 1.

@[CSET,nn; Sets the initial value of the count down number where 'nn' is any number from 1 to 99. The count down will appear on the display at the position installed as above.

@[DC; Decrements the count down display by one count. This is the only way to decrement the count. When the count reaches 0 it is replaced by spaces. If the count is less then 10 then a single digit is displayed in the right most column of the 2 position area selected with the CPOS command.

@[IC; Increments the count down display by one count.

@[STOP; Removes the count down display from wherever it is being displayed. The area of the display where the count appeared is replaced with two spaces.

CLOCK ROW CONFIGURATION

The clock row may be specially configured from the serial input port in the annotation configuration. This row can contain fixed information, i.e. treat it as a normal annotation display row, or it may be fed with a data stream similar to that for a message in the crawl configuration. When treating the row as a crawl message it is assigned the message number 120. Thus to send data you would use the command **@BEGIN,120;** then send your text and terminate with **@END;**. A maximum of 64 characters may be sent to this special message. This limit includes characters used as discussed below for defining time tokens etc. No matter how many characters you send down to this row, the display will only show those that fit into the safe title area. The first character will always show at the beginning of the safe title area. Be sure to use **@TITLE OFF;** command before sending information for this line as the input data is immediately transferred to the display and can cause an erroneous display until the complete data is received.

In the annotation configuration any of the real time parameters, year, month, date, hour, minute, and seconds may be placed anywhere on the clock row. To tell the display that time is being shown we use a system of 'tokens'. Each time parameter requires that two special characters be placed at the position of the text where you want that parameter to be shown. When using time, the updating display of time will start after you issue the **@TITLE ON;** command after sending down the message which includes time tokens. You may issue the **@TITLE OFF;** command to remove the time display.

It is possible to build a row more than once on the display. If you should use the time/title row and also build a row number 15, then the additionally built row will display time/title information, but it will not update unless the TITLE ON command has been issued.

The following table shows the required 'tokens' and their effects on the display.

TOKEN	DISPLAYED RESULT
%X	year e.g. 92 (two digits only)
%Y	year e.g. 1992
%L	month number. e.g. Jan = 1, Dec = 12
%D	date of the month
%H	hours (dependent on the mil time setting)
%M	minutes
%S	seconds

Annotation mode time display tokens

If you had the following in the message for the clock row:

%L %d, %y   %h:%M:%S

Then when the **@TITLE ON;** command is issued you would see:

Jan 31, 1990 11:23:59

Note that the only spaces you should provide are those you require between the displays of the different fields. The correct amount of space is automatically allocated when the display is built.

You may place the tokens anywhere in the clock row, in any order. You may use each token more than once if you wish.

OPTIONAL REAL TIME EVENTS LIST MANAGEMENT

In the System 810, 830, 840 products, if you order this option, you may set up a list of events that are to be acted upon in real time. You may have up to 99 events in the list. Events can be specified to occur at a specific day of the week, hour and minute. You may specify an event to occur on every day of the week. You may specify an event to occur at any hour of the day.

The items that can be included in the event list are:

QUEUE ON
QUEUE OFF
KEY ON
KEY OFF
Set, reset or pulse general purpose control lines.
Set routing switcher lines.

Event list functions

The current event list is accessed by pressing **CTRL + A**.

You will see a display on the screen which shows 7 events:

```
             A B C D E F G H I J K L
01 MO 09:23 - H L P - - - - - - - -
02 MO 09:55 H - - - - - - - - - - P
03 ++ 12:30 ? ? ? ? ? ? ? ? SW
04 ?? ??:?? - - - - - - - - - - - -
05 ?? ??:?? - - - - - - - - - - - -
06 ?? ??:?? - - - - - - - - - - - -
07 ?? ??:?? - - - - - - - - - - - -
```

The first line is an index to specify the letter identification of the general purpose control lines and what states they will be changed to at the specified event time.

Each of the display events shows the first two characters of the day of the week it is to occur at. If the characters are ++ then the event will occur at every day. The next two characters are the hour the event is to occur at. This is expressed in 24 hour clock. If the hour value is 99 then the event will occur at every hour of the day specified. The next two numbers represent the minute that the event is to occur at.

An undefined event or field will have ?? on display. Events items with ?? anywhere will be ignored when the event list is evaluated.

If the event to be activated consists of setting the state of the general purpose control lines, and if the line is to remain in the state it was before, there will be - in the column representing that line. To set the line to a + voltage level there will be an H in the column, to set the line to a ground level there will be an L and to pulse the line from it's current state to the opposite state (refer to the Pulse commands in this manual) there will be a P.

If the event to be activated is not a general purpose control line change then you will see one of the following messages in place of the control line columns:

```
QUEUE ON
QUEUE OFF
KEY ON
KEY OFF
? ? ? ? ? ? ? ? SW
```

The event list is evaluated by the real time clock each minute, when the minute changes.

The event that is being edited is always on the top event line of the display, immediately under the general purpose control line list. The day of week and time fields of this event will be flashing to indicate that it is the one being edited. When editing a General Purpose control line field the field being edited will flash.

From the keyboard you may enter information in the event list by using the following keys:

CTRL + A will activate the event list setup function.

PAGE UP to display the previous 7 events.
PAGE DOWN to display the next 7 events.

UP ARROW to bring a line up to the top most edit line.
DOWN ARROW to bring a previous line down into the edit area.

LEFT ARROW to move the port being edited to the left
RIGHT ARROW to move the port being edited to the right
P to set the port to pulse
H to set the port to + state
L to set the port to ground state
- to set the port to no change from prior state

INSERT to increase the day of the week
HOME to increase the hour of the day
END to increase the minute of the day

DELETE to remove the event

BACKSPACE to step through the possible event types

START QUEUE to set the event type to start queue
END QUEUE to set the event type to end queue
KEY ON to set the event type to key on
KEY OFF to set the event type to key off
/ to set the event type to General purpose control type

ESC to exit the event list function.

All changes to events are stored as they are made from the keyboard.

To clear the event list to nothing use the **CTRL + '** (hold down the **CTRL** key and the apostrophe key at the same time). The display will place ?? in all day and time fields to indicate that the event list is empty.

The routing switcher control function is only effective when the System 900 routing switcher has been purchased. The switcher outputs will be set to the input switcher port number given. The outputs are represented by the physical position in the list, i.e. the number expressed for the left most field (under the A) is the input that will be applied to output 1.

The events list can be edited from the serial port with the following commands. All parameters must be valid or the command will be rejected and will return an error message to the host device. If you attempt to send too many events to the unit the host device will get an error message EH meaning event list full. The only other error message for this command is EE, invalid parameter.

@EVENT,ww,hh,mm,QY turns on the queue
@EVENT,ww,hh,mm,QN turns off the queue
@EVENT,ww,hh,mm,KY turns on the program key
@EVENT,ww,hh,mm,KN turns off the program key
@EVENT,ww,hh,mm,pxxxxxxxxxxxx sets the ports as indicated, x is one of H P L or -, see above. All 12 parameters after the p must be supplied or the command will be rejected.

@EVENT,ww,hh,mm,snnnnnnnn sets the routing switcher to the video inputs as indicated, n is a number from 1 to 8. All 8 parameters after the s must be supplied or the command will be rejected.

In all of the above:

ww = day of the week, 1 = Sunday, 7 = Saturday, 0 = any day

hh = hour of day, 0 or 24 = midnight, 12 = noon 13 = 1 pm etc. and 99 is the wild card representing any hour.

mm = minute, from 0 to 59

The host device can read back the entire event list with the command **@ELIST;**. The return packet you get back will have one line for each event possible and will be of the form:

```
01 ?? ??:?? ? ? ? ? ? ? ? ? SW
02 Su 12:30 H H L L H H L L H H L L
03 ++ 13:00 Start Queue
04 ++ 18:15 End Queue
05 ++ 13:30 Key Off
06 ++ 13:45 Key On
07 Fr 20:59 2 2 2 2 2 2 2 2 SW
08 Fr 21:01 1 2 3 4 5 6 7 8 SW
09 ?? ??:?? - - - - - - - - - - - -
10 ?? ??:?? - - - - - - - - - - - -
     etc....
98 ?? ??:?? - - - - - - - - - - - -
99 ?? ??:?? - - - - - - - - - - - -

V
```

In the above example note that events 09,10,11 etc. have not been set to anything because their time fields are ??.

Event 1 is invalid,

Event 2 will set the ports to the indicated values on every Sunday at 12:30 in the afternoon,

Events 3,4,5,6 will occur at the indicated time every day of the week.

Events 7,8 will occur on Friday and set the switcher as shown at the indicated time.

Each event returned with the @ELIST; command consists of a preamble of exactly 12 bytes:
two bytes = sequential event number, for reference only

one byte = space
two bytes = day of week (SU MO TU WE TH FR SA ++)
one byte = space
two bytes = hour of the day, 00 to 23 or 99
one byte = :
two bytes = minute of the day, 00 to 59
one byte = space

The following data represents the type of event that is to occur and can be:

```
Queue On
Queue Off
Key On
Key Off
H H L L P P - - H P L - (or other
                       GPI status)
1 2 3 4 5 6 7 8 SW   (or other
                switcher status)
```

All lines are terminated in a hex 0D 0A (CR LF).

The entire returned packet is terminated with 0D 0A 0D 0A 56 0D 0A (CR LF CR LF V CR LF).

Note that the events list is retained in memory when power is removed from the unit.

The host device can clear the entire events list with the command **@INIT EVENT;**

The unit can send it's entire event list to another System 800 unit or a host unit with the **CTRL + U** key. You will be asked if you really want to send the list, to which you can respond with Y to send it or any other character to abort the operation. The list that is sent to the host is in the proper command syntax to insert data into a remote unit's event list. If you send the data to a properly configured computer then you can capture the event list into a computer disk file for retransmission to other units. You can also get the event list with the **@FETCHE;** command from a host computer.

From the serial input the command **@EVENT DEL,nn;** will cancel the event nn from the event list. The order of the event list is not changed. You may obtain the event number from the information returned by the command **@FETCHE;**.

This example is meant to illustrate a typical control application for the events controller capabilities of the System 830 and 840 character generators.

The example shown is to control a Video cassette player (VCR) using three of the control lines. We wish to cause the VCR to start, stop and rewind at specific times of the day.

Before you start you must make the following decisions as to how you will wire up the connections from the System 840 to the VCR.

There are 12 interface control lines available on the System 840 identified as control lines A thru L. Each of these control lines can be set to deliver either a constant level or a pulse.

First you must choose which three lines you wish to use. For this example we will use the A line for START, B line for STOP and the C line for REWIND.

Before connecting to the System 840 be sure that the VCR can accept TTL level signals. If you are not sure, or you do not know what TTL level means, contact your dealer or Video Data Systems.

You must know the location of the control lines of your VCR.

Typically a VCR requires the pulsing of the control line from a high level to a low level for a period of 500 milliseconds (1/2 second) in order to perform the indicated function.

The first thing you must do is establish that the control lines are initialized to their off state. In the case where the line must pulse from HIGH to LOW then the OFF state is HIGH.

The system reset condition is for all control lines to be placed in the HIGH state. Power on restores the lines to their state before was removed.

Once you have established which control lines are going to be used to control the VCR you can then begin to lay out your real time events list.

For purposes of discussion let us assume that you wish to start your VCR at 9:00 am, and 1:pm. The tape that you are playing has a duration of 30 minutes and you have a switcher that is used to switch the tape video output onto your output channel. The switcher has a relay to control it and the relay must be closed to switch to the tape and open for the normal video. The rewind time for the tape and player is known to be always less than 1 minute.

In this example the switcher is being controlled by the control line L.

Your events list would look like:

```
             A B C D E F G H I J K L
1) ++ 08:59 - - P - - - - - - - - -
2) ++ 09:00 P - - - - - - - - - - L
3) ++ 09:30 - P - - - - - - - - - H
4) ++ 12:59 - - P - - - - - - - - -
5) ++ 13:00 P - - - - - - - - - - L
6) ++ 13:30 - P - - - - - - - - - H
```

Lines 1 and 4 show that we are pulsing the rewind line one minute before we want the tape to play.
Lines 2 and 5 show that we start the tape and tell the switcher to select the tape video.
Lines 3 and 6 show that we pulse the stop line and tell the switcher to select the normal video signal.

LIST OF DISPLAY TOKENS SUPPORTED BY SYSTEM 800

TOKEN	function
(	start specified bit (bring to low level)
)	stop specified bit (bring to high level)
*	pulse specified bit to opposite state
1	set port1
2	set port2
3	set port3
4	* Fahrenheit temp
5	* Wind Chill in Fahrenheit
6	* Maximum Temperature in Fahrenheit
7	* Minimum Temperature in Fahrenheit
8	* Heating Degree Days
9	* Cooling Degree Days
A	hours time difference
B	minutes time difference
C	seconds time difference
D	date of month
E	send text to serial port (no display on page)
F	send text to serial port and display it
G	set the goal time
H	clock hours
I	*today's Rainfall
J	*accumulated Rainfall
K	set program key off (only in System 840)
L	clock month
M	clock minutes
N	* Barometric pressure
O	* Humidity
P	* Wind Direction
Q	* Wind Speed
R	+ routing switcher
S	clock seconds
T	hours in GMT
V	+ routing switcher

W	clock day of week
X	two digit year
Y	four digit year

Functions prefixed with * require the optional weather transducer package.

Functions prefixed with + require the optional routing switcher package.

CONTROL KEY FUNCTIONS

Summary of functions available with control key pressed, refer to the text above for complete descriptions:

0	stop (set high) control line
1	set port 1
2	set port 2
3	set port 3
8	pulse control line
9	start (set to ground) control line
a	create (edit) the real time events list
c	set count down timer
d	set queue cycle interval
e	set page crawl position
g	set goal time
l	send single page to remote unit
m	send entire memory to remote unit
p	set width of control pulse
q	send queue list to remote unit
r	set page crawl size
s	set queue sync time
t	set crawl page number
u	send event list to host
v	show version
w	reset weather instruments (when supplied)
y	send line of data to serial port 1
z	show safe title area
?	show remaining memory
[	set 24 hour clock display
]	set 12 hour clock display
F3	set font to number 1
F5	abort crawl in progress
F6	set default height (32)
F7	set default upper spaces (0)
F8	set default lower spaces (0)

F12 terminate crawl in progress
EDIT get current page number
END TIME clear timeout list
QUEUE END set queue counter
QUEUE clear entire queue
SPEED super fast crawl
SWITCHER init optional 8x8 routing switcher
TIME set clock
When setting the clock (with **CTRL TIME**):

D increment clock date
H increment clock hours
L increment clock month
M increment clock minutes
S increment clock seconds
W increment clock day
Y increment clock year
[set 24 hour clock mode
] set 12 hour clock mode

A remote computer can read the current value of the System 800 time with the command **@time;**. You will get time back as a character string: www lll dd, yyyy hh:mm:ss.

SUMMARY OF COMMAND KEY WORDS

(in the following table the characters in italics denote the type of unit the command is applicable to, e.g. C= crawl, P= page, A= annotation)

@abort crawl;	*CPA*	abort crawl in progress
@autoq on;	*CP*	Enable Auto Queue
@begin,nn;	*CPA*	start receiving message nn
@bkcol,nn;	*CP*	set current background color for the page to nn
@chcol,nn;	*CP*	set current character color for the page to nn
@clist;	*CPA*	sends a list of allowed serial port commands to host
@clock,f,nn;	*CPA*	set clock parameter f to value nn
@crawl position,nn;	*CP*	set crawl row position to scan line nn (of a field)
@crawl size,nn;	*CP*	set crawl row size to nn scan lines (per field)
@crawl,nn,tt;	*P*	crawl message nn for tt times, key crawl area only
@cur off;	*CP*	cursor off
@cur on;	*CP*	cursor on
@delete,nn;	*CPA*	delete message nn from memory (and queue)
@dequeue,nn;	*CP*	remove message nn from queue
@echo off;	*CPA*	clear echo flag
@echo on;	*CPA*	set echo flag
@elist;	*CPA*	retrieve the real time events list
@end;	*CPA*	end message
@end run	*CA*	end transmission and crawl message
@enqueue,nn,xx,yy;	*CP*	install message nn in queue position xx, dwell yy
@event del,nn;	*CPA*	delete the event nn
@event,....;	*CPA*	set a timed event, see discussion above
@expire time,dd,hh,mm,nn;	*CP*	set page nn expiration time to date dd, hour hh minute mm
@fast;	*CPA*	fast crawl
@fetche;	*CPA*	get entire event list in transmission format
@fetchm;	*CPA*	get entire memory in transmission format
@fetchp,nn;	*CPA*	retrieve page nn
@fetchq;	*CPA*	get entire queue in transmission format
@flist,n;	*CPA*	get the proportionality tables for font n
@floff;	*CP*	set flash off
@flon;	*CP*	set flash on
@gmt	*CPA*	sets difference from GMT hours

@init event;	*CPA*	clear the event list
@init memory;	*CPA*	message memory initialize
@init queue;	*CP*	queue init
@init switch;	*CPA*	initialize the System 900 switcher
@init timeout;	*CP*	init timeout list
@key allow;	*CP*	in 840 allows gen loc if video present
@key never;	*CP*	in 840 forces local only mode (not gen lock)
@key off;	*CPA*	program key off
@key on;	*CPA*	program key on
@lastp;	*P*	display previous page from memory
@lower,nn;	*CP*	set lower background spaces for this row to nn scan lines
@med;	*CPA*	medium speed crawl
@mil time;	CPA	set mil time on
@nextp;	*P*	display next numeical page from memory
@off;	*CPA*	disable further data reception
@on,nn;	*CPA*	enables unit with address nn to receive data
@pc,nn;	*CP*	crawl message nn when the queue is enabled
@pfont,nn;	*CP*	set current font for the page to nn
@plist;	*CPA*	upload the page list with sizes
@port,n,X;	*CPA*	set control lines of port n to hex value X
@pulse,?;	*CPA*	pulse bit ? (bits are identified by letter)
@qcount,x;	*CP*	set queue to run for x times
@qcycle,x;	*CP*	set Queue Cycle Time to x seconds
@qsync,x	*CP*	set Queue Sync Time to minute x after the hour
@qlist;	*CP*	get the queue list
@queue off;	*CP*	off queue
@queue on;	*CP*	on queue
@reset;	*CPA*	re init (same as power on)
@restore;	*CPA*	restore unit to original jumper selected configuration
@resume crawl;	*CPA*	start current crawl message
@set clock,yy,mo,dt,dy,hh,mm,ss;	*CPA*	set clock
@set count,hh:mm:ss;	*CPA*	set count down timer start value to hh:mm:ss
@set goal,hh:mm:ss;	*CPA*	set goal time to hh hours, mm minutes, ss seconds
@set pulse,nn;	*CPA*	set pulse width to nn video field times
@set source,n;	*CPA*	set System 900 video source to input n
@set switch,1,2,3,4,5,6,7,8;	*CPA*	set System 900 routing switcher

@show,nn,tt;	*CA*	crawl message nn for tt times
@size,nn;	*P*	set current for this row to nn scan lines (per field)
@slow;	*CPA*	slow speed crawl
@start,?;	*CPA*	start bit ? (bits are identified by letter)
@std time;	*CPA*	set mil time off
@step;	*P*	sequence the next queue list entry to the display
@stop crawl;	*CPA*	stop current crawl
@stop,?;	*CPA*	stop bit ? (bits are identified by letter)
@time;	*CPA*	get the current System 800 time
@title off;	*A*	disable dislay of fixed title row
@title on;	*A*	enable display of fixed title row
@tkey,mm,ss;	*CP*	set key timeout to mm minutes, ss seconds
@tlist	*CP*	get the timeout list
@upload,nn;	*CPA*	upload page nn from remote System 800 to host
@upper,nn;	CP	set upper background spaces for this row to nn scan lines
@version;	*CPA*	send version to host
@video mode,nn;	*CPA*	set video mode to nn
@wx init;	*CP*	reset weather instruments monthly parameters (when supplied)

SUMMARY OF ANNOTATION CONFIGURATION COMMAND KEY WORDS

Commands that are used for the annotation configuration are all of the above commands with the *A* identifier and the following functions that are specific in syntax or implementation to the annotation configuration:

@[bkcol,nn;	set background color to nn
@[bld,r,h,l;	build row r, of height h starting at scan line l
@[blnk;	clear scan memory
@[bs;	back space writing position
@[chcol,nn;	set character color to nn
@[clr;	clear screen
@[cpos,r,c;	set count down clock position to row r, column c
@[cr;	place cursor at left side of this line
@[crlf;	place cursor at left side of next line
@[cset,nn;	set initial count down value to nn
@[dc;	decrement count down
@[del;	remove row n from the display
@[fof;	flash off
@[fon;	flash on
@[font;	select font prior to building a text row, change current font
@[home;	place cursor at row 1, left margin
@[ic;	increment count down timer
@[lf;	move cursor to same column, next row number
@[lt;	move cursor one position left
@[pos,r,c;	position cursor at row r, column c
@[rcl,r;	clear row r
@[rt;	move cursor one position right
@[screen	build entire screen with text rows for current font
@[sk;	skip cursor one element
@[stop;	stop count down
@[up;	move cursor to next lower row number (up)

WEATHER DISPLAY

The Weather option for the System 800 family of products includes the capability of displaying the following weather parameters on any page while the queue mode is in operation.

Temperature
Wind Chill
Maximum Temperature for this day
Minimum Temperature for this day
Accumulated Heating Degree Days
Accumulated Cooling Degree Days
Rainfall this day
Accumulated Rainfall
Barometric Pressure in inches of mercury
Relative Humidity
Wind Direction
Wind Speed in miles per hour

All temperature related parameters are in degrees Fahrenheit.

The parameters heating degree days, cooling degree days and accumulated rainfall will accumulate until manually reset at the weather sensor interface. Refer to the manual from the weather sensor vendor (Rainwise) for the reset procedure. You may optionally reset these parameters by using the **CTRL + W** key from the local keyboard, or issuing the command **@WX INIT;** from the serial data port.

The parameters Max Temp, Min Temp, and Rainfall this day will be reset by the System 800 at midnight.

Wind direction is displayed on the System 800 as N, NNE, NE, ENE, E, ESE, SE, SSE, S, SSW, SW, WSW, W, WNW NW NNW. The wind direction on the display panel will be in degrees of compass, 10 to 360.

Numeric display of other weather parameters will be exactly as they are displayed on the display panel.

The weather sensors must be mounted properly according to the instructions supplied by the manufacturer (Rainwise). Weather sensors are warranted by Rainwise, and not by Video Data Systems.

It is imperative that the vertical mast for the weather sensors be GROUNDED, refer to page 2 of the Rainwise manual. Please note that lightning damage to the System 800 is not covered by warranty.

The weather sensors connect to the Rainwise display panel which contains a selector switch and a display. The time of day on this display is for local use only and is not used by the System 800. The System 800 maintains it's own time display. After the sensors are connected properly you should set the time on the display and initialize the various parameters with the switches provided as described in the Rainwise manual.

The serial data cable is then connected from the rear of the Rainwise display panel to the System 800 input.

In order to display the weather information on the System 800 a system of 'tokens' is used. On any text page that is in the queue if you placed the % symbol followed by an appropriate token when that page is displayed the display will replace the % and token with the required weather parameter.

Tokens used are as follows:

Token	Parameter
4	Temperature
5	Wind Chill
6	Maximum Temperature
7	Minimum Temperature
8	Heating Degree Days
9	Cooling Degree Days
I	Rainfall
J	Accumulated Rainfall
N	Barometric Pressure
O	Relative Humidity
P	Wind Direction
Q	Wind Speed

Weather display tokens

When you start the queue in operation the weather sensors are read and their data is placed in the memory of the System 800. Thereafter at each minute the weather sensors are read again and the System 800 is updated. When the queue starts there will be a delay until all the information is gathered from the weather sensors.

The data cable from the System 800 to the weather display panel is wired as follows:

System 800		Weather display	
DB9P		DB9S	
2	from weather	2	
3	to weather	3	
5	ground	8	
	RTS	4	jumper
	CTS	5	4 to 5
	DTR	6	jumper
	DSR	9	6 to 9

System 800 to weather interface

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