2536DW Workstation
Hardware Specification

(Preliminary)

Rev 0.0

By

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Date : Feb. 12, 1988

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1. Overview

The 2536DW workstation is a new design low cost workstation for 2200/CS line of computer. The 2536DW workstation consists of an adjustable video display and a separate detachable keyboard (model 720). The workstation 4230A cabinet assembly is used as a basis for this product. It will support 17 kinds of keyboard by installing the appropriate character sets which is selected by user during power on.

2. The Z80A CPU & CTC

Clock Frequency - 3.84 MHz ; T cycle - 266 ns

Interrupts - Vectored (Z80A mode 2) through Z80A-CTC

- Priority:

a. Recieve Ready data send from MXE
b. Transmitter Ready from Terminal
c. CTC CH2 VSYNC
d. CTC CH3 VSYNC Select P

- Non-Maskable Interrupt (NMI)

Keyboard input data ready

3. Memory Map

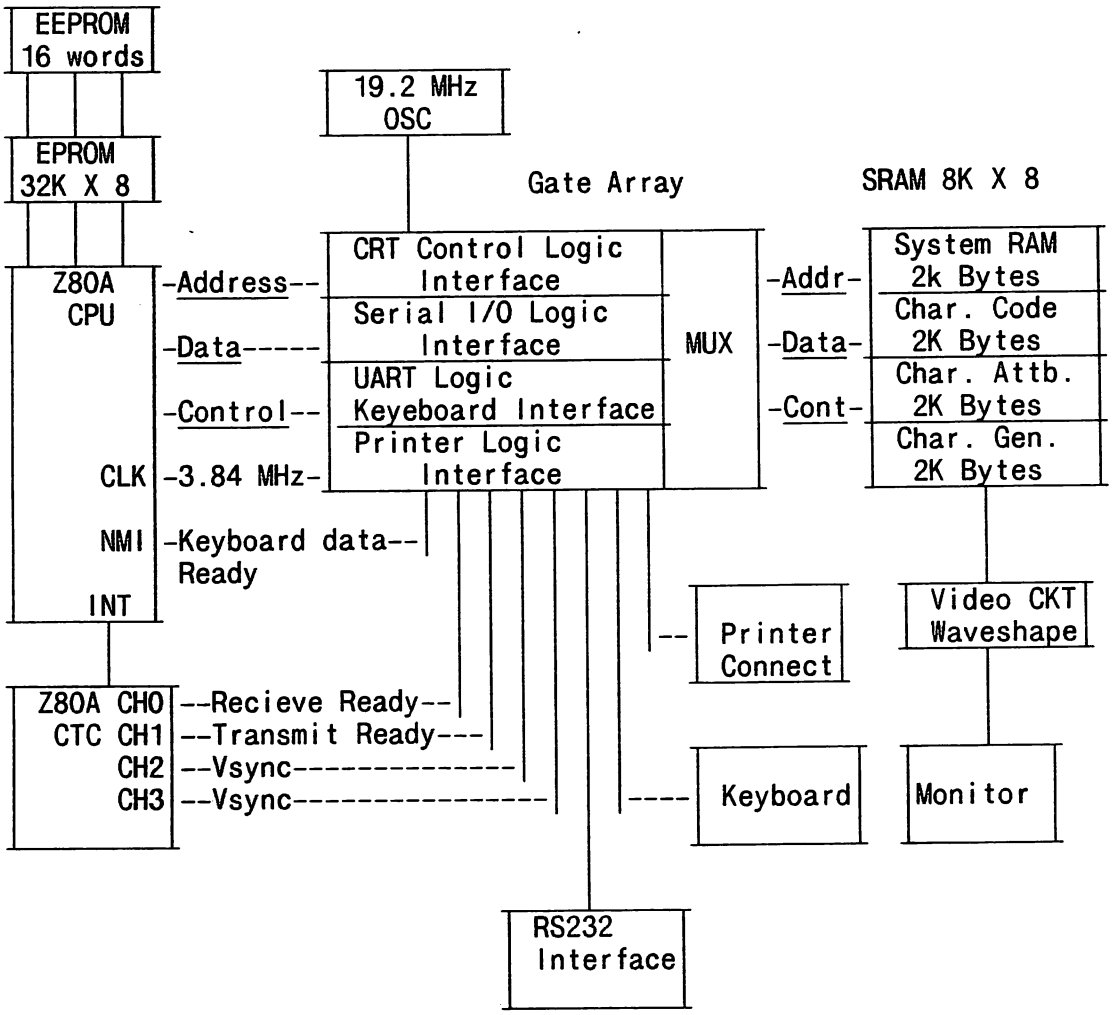
Main memory has separated into five basic sections:

EPROM, 32K bytes for ucode, diagnostics and Fonts
System RAM, 2K bytes for Buffers and Registers
Character Code, 2K bytes for display characters
Character Attributes, 2K bytes
Character Generator RAM, 2K bytes for English Font
EEPROM, 16 words(16 bits) for initial selection

Memory Address Table

Function	From	To	Bytes	(MSB)A15	A14	A13	A12	A11
EPROM	0000	7FFF	32K	0	X	X	X	0
System RAM	8000	87FF	2K	1	0	0	0	0
Character Code	9000	97FF	2K	1	0	0	1	0
Character Attb	A000	A7FF	2K	1	0	1	0	0
Character Font	B800	BFFF	2K	1	0	1	1	0
EEPROM	C000	FFFF	16words	1	1	X	X	X

. 4. Block Diagram



5. The Gate Array

The gate array consists of five major logics

A. The CRT controller
B. The Serial I/O interface for terminal to MXE communication
C. The UART for keyboard interface
D. The Multiplexing logic between CPU and CRT controller
E. The printer interface for printer

The gate array will use 2 UM technology, PLCC package, 84 pins for I/O pins.

6. Display control

6.1 CRT control

The heart of CRT control circuitry is to generate the timing signals necessary to present video data on the CRT monitor. Since the related timing parameter has been fixed in the gate array during power on, the following ports stands for the features of this circuitry:

I/O Address	Output Data (Hex)	Function
'10'	'65'	Horizontal Character Count (=102)
'11'	'6F'	Mode (non-interlaced) Hor. Sync Width (=16) Hor. Sync delay (=6)
'12'	'55'	Scans/Data Row (=11) Character/Data Row (=80)
'13'	'98'	Skew Rate (=1) Data/Row Frame (=25)
'14'	'1D'	Scans/Frame (=311)
'15'	'11'	Vertical Data Start

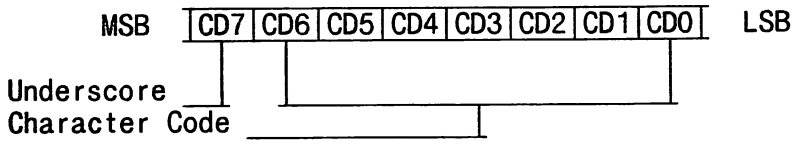
The I/O address from '10H to '15H' will be fixed in hardware and will not be programmable.

Address	CPU I/O	Function
'16'	Input	Start Scan Register
'18'	Input	Read Cursor Row Address (Cursor address is placed on data bus LSB justified)
'19'	Input	Read Cursor Column Address
'1B'	Output	Up Scroll
'1C'	Output	Load Cursor Column Address (Cursor address is read from data bus LSB justified)
'1D'	Output	Load Cursor Row Address

By using the 'Up Scroll' and 'Last Displayed Data Row' command, it is very easy to shift the entire screen up. When scrolling, software must maintain a last displayed data row count as a memory pointer. Upward scrolling is accomplished by issuing an 'Up Scroll' command, or loading the incremented data row count, then changing the data of the last displayed data row. When downqard scrolling, the decremented data is loaded, then the previous last displayed data row data is changed. The data row count must be modulo 24 when using this scolling command. Therefore, the horizontal line graphics in the 25th row cannnot be used.

6.2 Character code

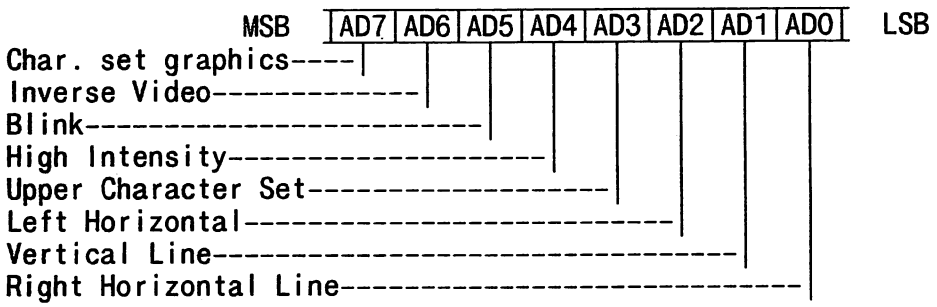
The Character code RAM has the following bit assignment:



The CD7 bit normally cause the character to be displayed with an underline.

6.3 Character Attribute

The Character Attribute RAM has the following bit assignment:



6.4 Character Generator RAM

The 2536DW workstation provides multi-language font. During power on user can select their own language which will be automaticlly loaded into the character RAM. Upon this requirement, user must match the keyboard layout with the font may choose. The character generator RAM has 2k bytes which can be loaded with any of 11 different kinds of fonts from EPROM. As the language has been selected it will never be changed unless user need to require another configuration.

Note: Underscore is used to underline a character; it should not be used as part of the box graphics.
The 25th line on the display is used to specify the set up manual for the users. i.e. selection of the Languages, Baud rate, Enven/Odd Parity, Word length.

7. Communications

The 2536DW workstation communicates with the MVP CPU via the standard 2236 async protocol. The workstation may be located up to 2000 ft. away from the MXE terminal controller. The data is transferred to the serial I/O through an OUT '31H', and the incoming data is input from the serial I/O port IN '31H'. The recieve ready and transmit ready will cause interrupt to CPU. Through CTC with CH0 and CH1, it will provide the vector addresss to Z80A for interrupt operation.

Since the transmission line has certain options to select the different combination of word length and even/odd parity bit, the serial I/O will provide this alternative.

The baud rate for the communication line also provide 8 kinds of different ranges for selection during power on. The 2536DW workstation will default set the baud rate at 19.2kHz(it can be set up to 38.4kHz), this configuration will be saved in the EEPROM all the time unless user need to change its baud rate. The baud rate ranges from 300 bps to 38.4k bps. In case that user may change the baud rate in the workstation, the baud rate selection on the MXE board must also be changed simultaneously.

8. Keyboard

The model 720 is a low profile universal detachable serial keyboard. The keyboard communicate to the host on a two wire full duplex asynchronous 62.5 Khz baud buffered serial TTL link with one start and one stop bit no parity. The serial TTL data is logically inverted with respect to typical RS232 signals. The data ready signal send from keyboard will directly connect to Non-Maskable Interrupt (NMI) of Z80A. Z80A then can retrieve keyboard data from I/O port '30H'.

Power requirements : + 5VDC +-5% @ 20ma

9. Printer

The printer interface is a standard Centronics interface. It is used to hard copy the data from screen. The printer data is output to a 1 byte buffer register, I/O address is '0XH'. Each time a byte is loaded, a strobe signal will generate to start a printer operation. As printer recieve 1 character from terminal it will repond with a acknowledge to terminal which set up as a handshake to each other. The CPU is using polling method to operate with the local printer.

10. I/O control & status registers

I/O Address	CPU I/O	Function and Bit Definition
0XH	IN/OUT	Printer data input and output
1XH	IN/OUT	CRT control coomand
2XH	OUT	Data bit 6 -- Printer reset Data bit 4 -- Cursor Blink on
30H	IN/OUT	Keyboard data read and write
31H	IN/OUT	Serial data in and out between MXE and terminal
32H	IN	Read Status
	@	Data bit 7 -- Transmit Ready Data bit 6 -- 50 Hz operation(Low) Data bit 5 -- Recieve Ready Data bit 4 -- Transmit Buffer Empty Data bit 3 -- Printer Acknowledge Data bit 2 -- Printer Busy Data bit 1 -- Logic Low Data bit 0 -- Serial I/O Error
32H	OUT	Control Register Data bit 7 -- Request to Send = 1 Data bit 6 -- Parity Even = 1 Parity Odd = 0 Data bit 5 -- Word Length Select 8 Bit = 1 7 Bit = 0 Data bit 4 -- No parity = 1 Parity needed = 0 Data bit 3 -- Data Terminal Ready = 1 Data bit 2 -- 1 -- 0 Baud Selection 0 0 0 -- 300 bps 0 0 1 -- 600 bps 0 1 0 -- 1200 bps 0 1 1 -- 2400 bps 1 0 0 -- 4800 bps 1 0 1 -- 9600 bps 1 1 0 -- 19200 bps 1 1 1 -- 38400 bps

@ There will be no 50 Hz option for the monitor.

I/O Address	CPU I/O	Function and Bit Definition
80H	IN/OUT	CTC timer channel 0 Serial I/O Recieve Ready
81H	IN/OUT	CTC timer channel 1 Serial I/O Transmit Ready
82H	IN/OUT	CTC timer channel 2 Vsync
83H	IN/OUT	CTC timer channel 3 Vsync Select P

11. System Specifications

2536DW Monitor Dimensions and Weight:	Height:	11.5 inches (29.2 cm.)
	Width:	13.0 inches (33.0 cm.)
	Depth:	10.8 inches (27.0 cm.)
	Weight:	15.0 pounds (6.8 kg.)
2536DW Keyboard Dimensions and Weight:	Height:	1.70 inches (4.3 cm.)
	Width:	18.3 inches (46.5 cm.)
	Depth:	7.8 inches (19.8 cm.)
	Weight:	4.5 pounds (2.0 kg.)
Environmental Requirements:	Ambient Operationg Temperature: 60°F. to 90°F (16°C to 32°C)	
	Relative Humidity: 20% to 80% (non-condensing)	
CRT:	12 inch diagonal, black on white 80 column by 25 row	
Keyboard Interface:	62.5 k Hz Baud, Asynchronous	

Power Requirements:	100 Watts maximum, 60 watts Typical

Input Power Line:

Minimum	Norminal	Maximum	Frequency
95 Vac	115 Vac	132 Vac	47 - 63HZ
185 Vac	230 Vac	264 Vac	47 - 63HZ

AC Voltage Selection: 115/230 Vac selection accomplished via switch accessible one rear of workstation.

Output Voltage:

+5 Volts +/- 0.2 Volt (adjustable)
+5 Volts Dc at 3.0 A/Max, 2.0A/Min
+12 Volt +/- 0.1 Volt (adjustable)
+12 Volt DC at 2 A/Max
-12 Volt +/- 2.0 Volt
-12 Volt DC at 0.1 A

Major differences between 2536DW and 2436DW :

	2536DW	2436DW
1.	CPU Z80A 3.84MHz	CPU Z80 2MHz
2.	Z80A-CTC 3.84MHz	Z80-CTC 2MHz
3.	Model 720 Keyboard	Model 2436DW Keyboard
4.	Two major packages : CRT cabinet + Keyboard	Three major packages : CRT + Electronics Box + Keyboard
5.	P192 Paper White Phospher	P42 Green Tube Phospher
6.	With in one Gate Array " " " " " " " " " " " "	Z80-SIO CRTC 5037 UART 1602 Printer Interface
7.	16 words EEPROM	No
8.	38.4KHz /Max for Baud Rate	19.2KHz /Max for Baud Rate
9.	4230A cabinet	4200 cabinet
10.	No need to replace EPROM in logic board with different Font, must match with Keyboard	Must replace EPROM on logic board with different country kits
11.	I/O port different between each other	
12.	Cost of 2536DW is much lower than 2436DW	

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* 2536DW terminal software design spec *
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Preliminary

Version: 00.00.01

By: Jack Hwang

Date: 03/01/1988

Introduction

The design spec. includes 4 parts as follows:

(1) Operation of Set-Up.

(2) Multiple Language Fonts.

(3) Multiple Language Keyboard Translation Tables.

(4) The 2436DW Spec.

Part (1) describes the set-up operation (the new features of the 2536DW W/S). Please refer to 2536DW diagnostic plan & functional spec.

Part (2) & (3) describe the compression method and the data organization of the multiple language fonts & keyboard translation tables.

Part (4) is the spec of 2436 w/s for reference.

Multiple Language Fonts

(1) Original fonts structure.

(a) 2k bytes per language.

(b) 8 bytes per pattern.

(c) 256 patterns per language.

(2) Compression Method.

(a) Pick any language font to be the Base-Font.

(b) Comapre the Base-Font with the other language fonts to calculate the total different count in the same pattern position.

(c) Select the language font (with the minimum total different count) to be the compressed Base-Font.

(d) Append a set of the patterns which is different from the Base-Font in the end of each language.

(e) Create the control index (256 bits) of each language font.

control index

1. Bit-position (1 to 256) indicates the pattern position.

2. Bit=0 :Indicates that the pattern located at Base-Font part.

   Bit=1 :Indicates that the pattern located at Append part.

(3) Data organization.

```
Bottom (2 bytes) .../The Bottom address of the compressed font.
Total Number (2 bytes) ... /Total number of fonts.
Location-1   (2 bytes) ... /Base position of the append part 1.
                           .
                           .
                           .
                           .
Location-N   (2 bytes) ... /Base position of the append part N.
Control Index-1 (256 bits)  ... /Control Index of Language-1.
                           .
                           .
                           .
                           .
Control Index-N (256 bits)  ... /Control Index of Language-N.
Base-Font (2k bytes)   ...  /Base-Font area.
Append Font -1              /Append font (Language 1).
                           .
                           .
                           .
                           .
Append Font -N              /Append font (Language N).
```

(4) Compression rate : 20%.

Multiple Language keyboard translation table.

(1) Original keyboard translation table occupys 1k bytes memory each language.

(2) Compression Method.

(a) Convert keyboad translation table to be 2436DW hard key table each language.

Format of hard key table.

1. Size: 512 bytes.
2. 256 key cells. (each cell occupys 2 bytes, byte-1: key attribute, byte-2: key code).

(b) Pick any language hard key table to be the Base-Table.

(c) Comapre the Base-Table with the other language hard key table to calculate the total different count in the same key cell position.

(d) Select the language hard key table (with the minimum total different count) to be the compressed Base-Table.

(e) Append all the key cells which different from the Base-Table in the end of each laguage.

(f) Create the control index (256 bits) of each language hard key table.

Control index

1. Bit-position (1 to 256) indicates the key cell position.
2. Bit=0 :Indicates that the key cell located at Base-Table part.

   Bit=1 :Indicate that the key cell located at Append part.

(g) Create 720 keyboard hard key translation table.

1. Size: 256 bytes.
2. Byte No. (00H - FFH): indicates the code of the hard key.
3. Byte contents: indicates the position of the relative key cell position.

(3) Data organization.

```
Bottom (2 bytes) . /The Bottom address of the compressed table.
Total Number (2 bytes) ... /Total number of translation table.
Location-1   (2 bytes) ... /Base position of the append part 1.
                        .
                        .
                        .
                        .
Location-N   (2 bytes) ... /Base position of the append part N.
Control Index-1 (256 bits)  ... /Control Index of Language-1.
                        .
                        .
                        .
                        .
Control Index-N (256 bits)  ... /Control Index of Language-N.
720 keyboard hard key translation table area (256 bytes).
Base-Table (512 bytes) ...  /Base-Table area.
Append Table-1              /Append table (Language 1).
                        .
                        .
                        .
                        .
Append Table-N              /Append table(Language N).
```

APPENDIX

Definition of EEPROM for set-up parameters.

(a) 1st byte : Type of languages.

(b) 2nd byte : Baud rate.

0 .... 300 bps.
1 .... 600 bps.
2 .... 1200 bps.
3 .... 2400 bps.
4 .... 4800 bps.
5 .... 9600 bps.
6 .... 19200 bps.
7 .... 38400 bps.

(c) 3rd byte : Word length.

0 ... 7 bits.
1 ... 8 bits.

(d) 4th byte : Parity.

0 ... Non parity.
1 ... Odd parity.
2 ... Even parity.

Display buffer organization.

(1) Code area (9000H - 97FFH) ... 2k bytes

25 rows by 80 columns .. 25 x 80 =2000 bytes.

(2) Attribute area (A000H - A7FFH) ... 2k bytes

25 rows by 80 columns .. 25 x 80 =2000 bytes.

EPROM organization.

Part-1 : 8k bytes program. (0000H-1FFFH)
part-2 : 6k bytes multiple language font. (2000H-37FFH)
part-3 : 4k bytes multiple language keyboard translation table. (3800H-4800H)

To: Eugene S. Schulz MS014-A31/LOWELL
From: Chris Nevin
Subject: 2536 Specifications Date: 03/21/88

Distribution:
William Hsien
HAILIN LEE
JIA-LUNG HU
M. L. Lee

Software Specfications Review

1) Is the compression rate of 20% on the character fonts estimated or actual? If you compared bit patterns other than in 8 byte blocks, would the compression make up for the difference of the increase in size of the control index? Do you know that the base font plus the append area will fit in 6K?

2) What compression rate have you achieved with the keyboard tables? Will this fit in the 4K allocated?

3) Does your keyboard plan include dead key sequences? Does it include provisions for multiple key sequences (functionally as well as space)?

4) Bruce designed a Setup screen for the self-configuration menu. I will give a copy of this to H.L. when he comes to pass along to you.

J.L. - Attached is a document with questions etc... on the specs for the 2536DW. Please distribute the various sections to the appropriate people. If you have any questions, please let me know.

Chris

By the way, I did not receive any office mail last week. My configuration was changed, so I am receiving copies of my mail from Gene and reviewing them now. If there was any mail sent to me that Gene was not cc'd on, I will not get it. Please re-send if this is the case. Thanks.

TO: J.L. Hu

FROM: Chris Nevin & Roger Kirk

DATE: March 21, 1988

RE: 2536DW Specifications Review

Here is the long awaited review of the specifications for the 2536DW workstation. We have reviewed all of the specs and will address them individually.

Hardware Specfications Review

1) Can the 2200 terminal cable be cost reduced? We have seen customers using non-WANG cables that are less expensive and less bulky.

2) Can video memory be swapped with RAM to do screen save/restore?

3) Are there any Z80 wait states for any function?

4) What is VSYNC vs VSYNC Select P (page 1 - para 2)?

5) Can NMI's be disabled via hardware (port)?

6) In the memory address table, for EPROM, does A11 have to be a zero?

7) Under CRT control, what happens if an OUT is done to ports 10 - 15 (which are supposed to be non-programmable)?

8) For ports 18 and 1C, please explain comments in more detail.

9) In regards to the underscore bit for the character codes, bit 7 does not produce an underscore for HEX(80) through HEX(8F) for the normal character set, and HEX(80) through HEX(FF) for the alternate character set.

10) The printer description says that the terminal printer is used to hard copy the data from the screen. The terminal printer should have all the capabilities of a system printer, plus a local screen dump.
Also, will the polling method allow the same throughput as the interrupt method?

11) Please explain the absence of the 50 Hz option.

12) Is port 32 bit 1 unused?

13) When doing reverse video, how are you going to handle dark black? Also, there needs to be an area of dead space around the perimeter of the CRT which is unaffected by the display so the characters don't run into the border.

14) Please explain the functionality and/or limitations of the 25th row in greater detail.

15) The configuration should not be altered once its initial selection following power up. To re-configure, the terminal must be powered off and back on again.

Diagnostic Specfications Review

1) In talking about the power-on sequence of events, the BIT should run in its entirety (BIT mode) before the self-configuration menu is displayed. The menu should be displayed for a set length of time (Time-out mode), unless the operator strikes a key. If the cancel/edit key is depressed, this should be a quick bypass to enter terminal mode. If any other key is pressed, the terminal should go from time-out mode to self-configuration mode and stay in that mode until the operator enters terminal mode via the execute (and save changes) or cancel/edit (don't save changes) key.

2) Can you define a sequence of keystrokes which would put the terminal back into BIT mode without having to do a power off/on.

3) How are you going to test the EEPROM without destroying the contents? Should the EEPROM have a checksum in it to be tested by the BIT? If the EEPROM has a bad checksum, what defaults will be used?

4) Is the Burn-in test the same as the BIT test but continuous? How do you tell the workstation to perform the Burn-in test vs the BIT test?

5) The configuration setting does not need a front end menu to choose between examine, modify and exit. The SPACE bar and BACKSPACE keys should move you between items within a category (e.g. Character Set). The item highlighted by the cursor block should be the one selected (selection should not be driven by entering characters). The RETURN or TAB key should get you to the next category, and EXECUTE to save or CANCEL/EDIT to exit without change. This is a WANG standard for menu operation.

6) Is figure B-3 going to be displayed anywhere? We have a standard self-identification message format, which can be obtained from an "02" sequence as well as Remote Screen Dump. This is detailed in our Functional Specification.

To: Gene Schulz

Fr: J.L. HU Date: 03/24/88

CC: Roger Kirk
Chris Nevin
H.L. Lee
J.D. Lee/Mike Tsai
M.L. Lee/Jack Hwang
F.S. Lee

Subject: 2536DW Reverse Video H/W spec. recognition

Gene,

I would like to applogy that I forgot to write the reverse video spec. onto 2536DW H/W spec. In the past few days, we try to make some examples to show the reverse function on our prototype. By referancing the features of 2436DW we would like to put the following spec. on our next version of H/W spec. Followings are the proposal which we would request you to recognize them ASAP.

Since we will use paper white Phospher on CRT, We defined that normal video mode stands for white on black, and the reverse video mode represents black on white. Combining 4 kinds of attributes which are high intensity (HI), reverse, blinking, and underline, we have 16 different combination in each of different video mode displayed on the screen.

1)The normal video mode-white on black(Refer to 2436DW display function):

1.Video with all attributes off/ Blk backgnd, white char.
Video + reverse / White backgnd, Blk char.
Video + underline / Blk backgnd, white char. and white underline
Video + reverse + underline / White backgnd, blk char. with blk underline.

2.HI + video / Blk backgnd, HI white char.
HI + reverse / White backgnd, blk char.
HI + underline / Blk backgnd, HI white char. with white underline.
HI + reverse + underline / White backgnd, blk char. with blk underline.

3.Blink + video / Blk backgnd, white char., with blinking
Hl white char.
Blink + reverse / White backgnd, blk char., with blinking
white backgnd.
Blink + underline / Blk backgnd, white char., with blinking
Hl white char., and
white underline(without blinking).
Blink + reverse + underline / White backgnd, blk char.
with blk underline(without blinking),
and blinking white backgnd.

4.Hl + blink + Video / Blk backgnd, white char.,
with blinking Hl white char.
Hl + blink + reverse / White backgnd, blk char., with
blinking Hl backgnd.
Hl + blink + underline / Blk backgnd, white char. with
white underline(without blinking),
and blinking Hl white char.
Hl + blink + reverse + underline / White backgnd, blk char.,
blk underline(without blinking),
and blinking Hl backgnd.

Note;Backgnd:background, blk:black, Hl:High Intensity

2)The Reverse video mode-black on white :

1.Video with all attributes off/ White backgnd, blk char.
Video + reverse / White backgnd, blk char.
Video + underline / White backgnd, with blk char., blk underline.
Video + reverse + underline / White backgnd, with blk char.,
and blk underline

2.Hl + video / White backgnd, Hl white char.
Hl + reverse / White backgnd, Hl white char.
Hl + underline / White backgnd, Hl white char., blk underline
Hl + reverse + underline / White backgnd, Hl white char., with
blk underline.

3.Blink + video / White backgnd, blinking Hl white char.
Blink + reverse / White backgnd, blinking Hl white char.
Blink + underline / White backgnd, blinking Hl white char.,
with blk underline(without blinking).
Blink + reverse + underline / White backgnd, blinking Hl white char
blk underline(without blinking).

4.HI + blink + Video / White backgnd, HI white char., with
blinking HI white char.
HI + blink + reverse / White backgnd, HI white char., with
blinking HI white char.
HI + blink + underline / White backgnd, HI white char., with
blk underline(without blinking),
and blinking HI white char.
HI + blink + reverse + underline / White backgnd, HI white char.,
blk underline(without blinking),
and blinking HI white char.

Note; Backgnd:background, blk:black, HI:high intensity

3) One output port 33H will be added into hardware to support the selection of black on white function.

User can depress both 2nd & EDIT keys at the same time on Keyboard, then one may select to have black on white or white on black at anytime. This is purely local edit mode no connection with the host.

Under this condition the S/W and Diagnostic spec. will all be affected. Once we get your approval, all related spec. will update.

Since we all know that black on white video mode and 72 Hz are almost fit to Europe specification. However we really don't know much about the Europe's regulation on the characteristic of black on white mode. Would you please collect their spec. for our referance?

We wish to have your opinion very soon and thank you for your support.

Best Regards
J.L. Hu

Send Wednesday 03/30/88 08:09 am

To:
Subject: 2536DW Dead Key Response

March 30, 1988

J.L. & Jack -

In response to your memo regarding dead key response:

1. The dead key on the US keyboard (the underline key) repeats when held down. When released, the next key struck is modified by the dead key. If you depress the dead key and then hold down another key, the key held down will produce a character modified by the dead key and will repeat that character until the key is released or another key is depressed. If a third key is depressed before the second key is released, it will repeat, but not modified by the dead key.

2. There is no written list of dead keys for the international keyboards. The information is, however, contained in the keyboard tables of the workstation microcode PROMS. Perusing the PROM files (using algorithms in the workstation Z80 code) should give you the information you need.

Roger Kirk

Major differences between 2536DW and 2436DW:

2536DW	2436DW
1. CPU Z80A 3.84MHz	CPU Z80 2MHz
2. Z80A-CTC 3.84MHz	Z80-CTC 2MHz
3. PC Type Keyboard	Model 2436DW Keyboard
4. Two major packages : CRT cabinet + 1 Keyboard	Three major packages : CRT + Electronics Box + 3 Keyboards
5. P192 Paper White Phospher	P42 Green Tube Phospher
6. With in one Gate Array " " " " " " " " " " " "	Z80-SIO CRTC 5037 UART 1602 Printer Interface
7. 16 words EEPROM	No
8. 38.4KHz /Max for Baud Rate	19.2KHz /Max for Baud Rate
9. 4230A cabinet	4200 cabinet
10. No need to replace EPROM in logic board with different Font, only match with country kit	Must replace EPROM on logic board with different country kits