Z-100 LifeLine
Since 1989

May 2022

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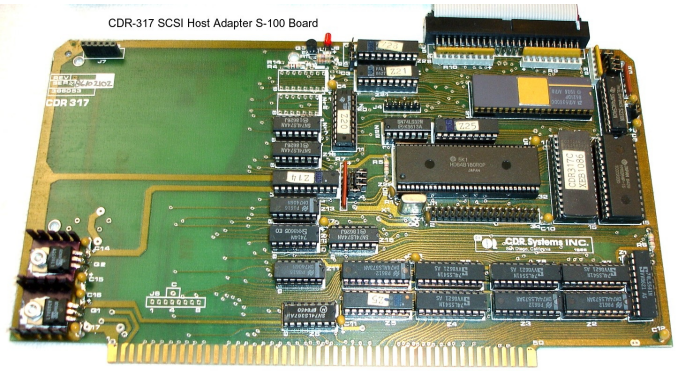

CDR-317 Host Adaptor User Manual

by Steven W. Vagts
Editor, "*Z-100 LifeLine*"

CDR-317 Host Adaptor User Manual

Introduction

The CDR-317 SCSI Host Adaptor was developed by Controlled Data Recording (CDR) Systems, Inc. It was for use in S-100 bus computers. Their address at the time (circa 1986) was:

Controlled Data Recording Systems
7210 Clairmont Mesa Blvd
San Diego, CA 92111

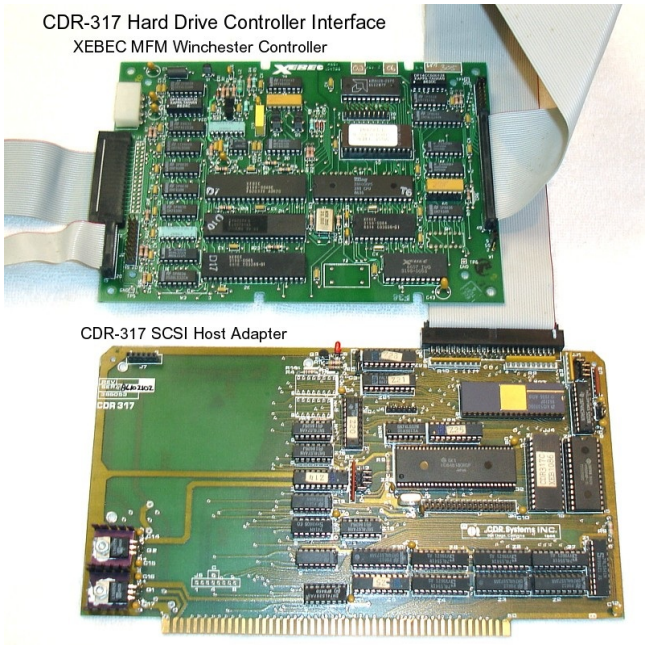

Photo 1 - CDR-317 and XEBEC Controller

The CDR-317 SCSI Host Adaptor (title picture) and an industry standard Winchester hard drive controller are the two-board set (Photo 1) which would allow owners of the Z-100 Series Computers to add and control up to two rigid 5-1/4" Winchester Drives using the Small Computer Systems Interface (SCSI).

This also allowed the use of standard MFM hard disk controllers such as the OMTI 3100, or, with CDR-317 firmware changes, the XEBEC 1410A.

The first board, the MFM Controller, resided on the rigid Winchester Drive. The second board, the CDR-317 SCSI Host Adaptor was located in any of the vacant S-100 bus connectors in the Z-100's card cage. A single 50-conductor cable connected the two boards together.

Two other cables were used for data and control signal transmission to and from the Winchester MFM Hard Drives. Two cables were used per drive. The control cable was daisy-chained and the data cables were separate when using two drives.

The power for the Winchester Drive and the Controller was derived from the Drive Power Connector via a "Y" power adaptor cable.

The CDR-317, alone, was capable of using common SCSI hard drives and the removable cartridge hard disk drives, such as the SYQUEST SQ312 or the IOMEGA BERNOULLI drives. The CDR-317 was also capable of being set to allow use of SCSI compatible tape back up units, CD-ROMs, Laser Printers and SCSI Local Area Networks (LANs).

When used with an MFM Controller, such as the OMTI 3100, or, with CDR-317 firmware changes, the XEBEC 1410A, the CDR-317 was capable of using the standard ST506/412 Winchester MFM Hard Drives.
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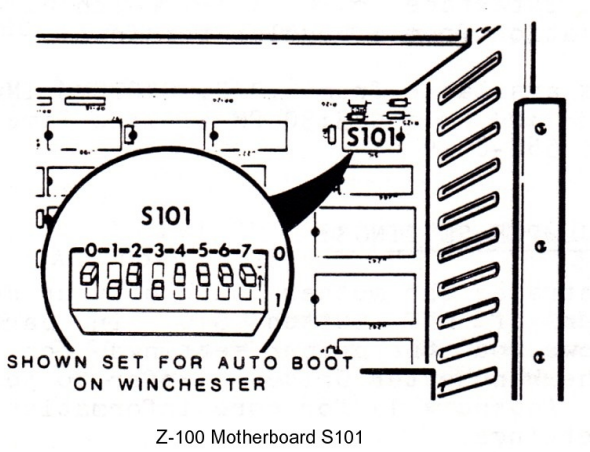
System Operation

To use the two board CDR-317 Winchester System, a Winchester-compatible version of the Operating System was required. Refer to your Operating System Manual(s) and the Z-100 User's Manual Winchester Supplement for additional Set-up and operating information. The CDR-317 used all of the Heath/Zenith software for PREP, PART, FORMAT, etc.

Z-100 Switch and Jumper Settings

Pictorial 1 illustrates the location of DIP switch S101 on the Z-100 motherboard, just forward of the right side of the card cage.



Z-100 Motherboard S101

Pictorial 1 - Motherboard S101 Switch

The illustration shows the proper settings for Autoboot (section 3) upon power up from the Winchester Hard Drive (section 1).

DIP Switch S101 is an eight section switch which determines which drive your computer boots from when you apply power. You can select the drive and whether or not you desire to have the computer Autoboot when you power up:

Section	Description
0	}
1	} Default Boot Device *
2	}
3	1 = Autoboot; 0 = Manual Boot
4	Not used
5	Not used
6	1 = Dvorak; 0 = Qwerty Keyboard (Requires ROM v3+)
7	0 = 60 Hz, 1 = 50 Hz Operation

* Sections 0, 1, and 2 should be set to reflect the type of drive that the system is to be booted from:

Section: 0	1	2	Device Type:
0	0	0	5-1/4" Floppy Disk Drive
1	0	1	8" Floppy Disk Drive (ext)
0	1	0	5" Winchester Disk (int)
1	1	0	Boot from EEPROM device (LLSCSI) (Reqs ROM v3+)
1	1	1	Boot from NVsRAM device (LLIDE) (Reqs ROM v4+)

Note: Do NOT put the switch in Autoboot mode until the Winchester drive is bootable. For the present, place ALL sections to 0 or ON (to the rear) until all programming is completed.

CDR-317 Host Adaptor Addressing

The lower eight address lines are decoded for port addressing by a PAL (programmed Integrated Circuit(IC). Eight vectored interrupts are used, any one of which can be addressed and used by the Controller by installing a Vectored Interrupt (VI) jumper at J6.

The desired vector is selected by soldering a jumper between "C" and the desired vector position, VI number.

VECTOR	JUMPER "C"
VI0*	to 1
VI1*	to 2
VI2*	to 3
VI3*	to 4
VI4*	to 5
VI5*	to 6
VI6*	to 7
VI7*	to 8

Master Interface - Temporary Master Access (TMA), previously referred to as Direct Memory Access (DMA) performed by the CDR-317 Host Adaptor conforms to all IEEE-696 (S-100 Bus) requirements. One wait state is automatically added during read cycles to allow it to work in the Z-100 series computer.

The arbitration level (all sixteen priority levels are available) for the TMA is selected by the jumpers JJ3. Twenty-four bit addresses are used for TMA across 64K memory boundaries.

Interrupt Handling - Neither the H/Z-217 nor the CDR-317 respond to interrupts.

If INT* is asserted, your interrupt service routine should check for a TMA in progress.

If a TMA is in progress, you should first halt the TMA by sending a PAUSE command to the CDR-317 before acknowledging the interrupt and servicing it. Once the interrupt has been serviced, your interrupt service routine should send a CONT command to the CDR-317 so the TMA may be resumed.

In the Byte Mode, the PAUSE and CONT commands are still executed by the CDR-317, but they are not needed unless software timing loops are being used or critical real-time processing is being performed.

Also, the CDR-317 will not arbitrate for the Bus when INT* is asserted in the Byte Mode.

Data Tranfers

All data transfers take place via TMA. Programmed Input-Output is not allowed. A 2K x 8 buffer on the CDR-317 handles entire sectors of data at a time.

When transferring from the disk to memory, the buffer is used to correct any errors detected by the Error Correction Code (ECC) before the data is transferred to system memory.

When writing to the disk, the buffer is used to make an entire sector of data available for the disk.

The system can handle a minimum interleave of three to one.

Direct Access Registers

The CDR-317 Host Adaptor Controller occupies two I/O Ports (Command and Reset) in the system.

Writing to the command port places commands in the Controller's Command Register. Reading this port yields the Controller's hardware status.

Writing to the reset port causes the Controller to execute a hardware reset. Reading this port is used for interrupt acknowledge and resets the interrupt latch and causes the status to be read.

Command Philosophy

There are two levels of commands associated with the CDR-317 Controller.

First level commands are direct commands that are written directly into the Controller's command register and executed immediately. They are used to call second level commands.

Second level commands are used for the primary communication mode between the Controller and the operation system. They are placed in a memory buffer until fetched by the Controller executing a first level (direct) command.

The Controller uses a TMA to transfer commands into its internal command buffer. Once a command has been completed, an interrupt is generated to notify the host processor and status is returned to the memory buffer via TMA.

DIRECT MODE COMMANDS (First Level)

The Controller responds to the following Direct Mode Commands:

08 SET-UP Set-up uses the following three bytes to specify the TMA address for commands (MSB is first, least significant last). You MUST use this command before the first EXECUTE command is sent to the Controller.

10 EXECUTE Causes the Controller to fetch a command from the memory buffer.

18 PAUSE Halts any TMA in progress until a CONT command is received.

20 CONT Restarts any TMA that was stopped by a PAUSE command.

CONTROL BLOCK COMMANDS (Second Level)

The Controller responds to the following commands when they are the first byte in the control block of system memory.

TYPE 0

00 RECAL Causes the selected drive to step outward one Cylinder at a time until Cylinder Zero is reached. No data is transferred.

01 STATUS Returns the status for the selected drive to the TMA address. The format of the status is shown.

TYPE 1

10 WRITE Writes the specified number of sectors (up to 256) from the TMA address to the specified drive. Error Correction Code (ECC) is generated and written to the disk at this time also.

11 READ Reads the specified number of sectors (up to 256) from the specified drive to the TMA address. Any errors detected by the ECC are corrected (if enabled).

13 SEEK Positions the heads of the specified drive to the specified logical address.

TYPE 2

20 FORMAT TRACK Formats only the specified track.

22 SET DRIVE Sets drive parameters.

TYPE 3

30 WRITE ABS Writes one sector using absolute addressing.

31 READ ABS Reads one sector using absolute addressing.

32 SEEK ABS Positions the heads of the specified drive to the specified cylinder.

Format of Commands

TYPE 0 and TYPE 1

	Byte	Bit 7	6	5	4	3	2	1	0
	1	Command OP Code							
C	2	Drive Select	Logical Sector # (MSB)						
	3	Logical Sector # (MB)							
O	4	Logical Sector # (LSB)							
M	5	Sector Count							
	6	Data TMA Address (MSB)							
M	7	Data TMA Address (MB)							
A	8	Data TMA Address (LSB)							
	9	Next Command Address (MSB)							
N	10	Next Command Address (MB)							
	11	Next Command Address (LSB)							
D	12	Flags							
	13	Error Code							
S									
T	14	Drive Select	Logical Sector # of Error (MSB)						
A									
T	15	Logical Sector # of Error (MB)							
U									
S	16	Logical Sector Number of Error (LSB)							

Where:

MSB - Most Significant Byte
MB - Middle Byte
LSB - Least Significant Byte

Format of Status Register is shown under TYPE 3

FLAG Byte:

BIT #	IF SET
7	Interrupts Enabled
6	Use Burst Model TMS
5	Ignore PAUSE and CONT commands
4	
3	
2	Disable Entries
1	Disable ECC
0	Chain next command immediately

Note: Only TYPE 0, 1, and 3 commands can be chained. Bytes 9, 10, and 11 are the starting address of the next command block to be executed. These three bytes must be valid or a new Set-up command must be issued before the next execute command. Also, this address must be bvalid if the chain flag (Bit 0) is set.

TYPE 2

	Byte	Bit 7	6	5	4	3	2	1	0
	1	Command OP Code							
C	2	Drive Select			N/A		Max Head #		
	3	Max Cylinder # (MSB)							
O	4	Max Cylinder # (LSB)							
M	5	Reduced Write Current (MSB)							
	6	Reduced Write Current (LSB)							
M	7	Precomp Cylinder (MSB)							
A	8	Precomp Cylinder (LSB)							
	9	Step Rate (LSB + or - 20 ns.)							
N	10	ECC Span							
	11	N/A	*	N/A		Interleave Factor			
D	12	Fill Character							
	13	Error Code							
S	14	Head # of Error					Sector # of Error		
T A T U S	15	Cylinder # of Error (MSB)							
	16	Cylinder # of Error (LSB)							

Where:

* - Cell Size: 0 = 512 Bytes / Logical Sector
1 = 1024 Bytes / Logical Sector

MSB - Most Significant Byte
LSB - Least Significant Byte

Format of Status Register is shown under TYPE 3

TYPE 3

	Byte	Bit 7	6	5	4	3	2	1	0
	1	Command OP Code							
C	2	Drive Select			N/A	Head Select			
	3	Cylinder # (MSB)							
O	4	Cylinder # (LSB)							
M	5	N/A			Sector #				
	6	Data TMA Address (MSB)							
M	7	Data TMA Address (MB)							
A	8	Data TMA Address (LSB)							
	9	Next Command Address (MSB)							
N	10	Next Command Address (MB)							
	11	Next Command Address (LSB)							
D	12	*				Flags			
	13	Error Code							
S									
T	14	Head # of Error					Sector # of Error		
A									
T	15	Cylinder # of Error (MSB)							
U									
S	16	Cylinder # of Error (LSB)							

Where:

```
       *      - 0 = Disable Interrupts
              - 1 = Enable Interrupts

       MSB    - Most Significant Byte
       MB     - Middle  Byte
       LSB    - Least Significant Byte
```

Format of Status Register

BIT #	IF SET
7	Interrupt
6	Busy
5	Burst Mode
4	TMA in Progress
3	Error
2	Immediate Mode Error
1	Paused
0	Done

Format of Status Returned By 01 Command

Byte	Bit 7	6	5	4	3	2	1	0
1	Reserved				B3	B2	B1	B0
2	Max Cylinder # (MSB)							
3	Max Cylinder # (LSB)							
4	Reduced Write Current Cyl # (MSB)							
5	Reduced Write Current Cyl # (LSB)							
6	Precomp Cylinder # (MSB)							
7	Precomp Cylinder # (LSB)							
8	Current Cylinder # (MSB)							
9	Current Cylinder # (LSB)							
10	Step Rate							
11	Span							
12	Interleave Factor							
13	Cell Size							
14	Max Head #							
15	Fill Character							
16	Reserved							

Where:

B0 = Drive Ready
B1 = Accessed
B2 = Seek Complete
B3 = Track 0

Step Rate = Value Times 20 ns.
Cell Size 1 = 512 Bytes / Sector
Cell Size 2 = 1024 Bytes / Sector

Fill Character = The character used during FORMAT to fill the data fields

MSB - Most Significant Byte
MB - Middle Byte
LSB - Least Significant Byte

Note: Bytes 8 and 9 will not be recognized unless Bit 1 of Byte 1 (B1) is set.

CDR-317 Host Adaptor Drive Preparation

PREP Entry for Drives:

	Heads:	Cylinders:		Reduced Write Cylinder:		PreComp Cylinder:		Step Rate:	Ship Cyl:
		OMTI	XEBEC	OMTI	XEBEC	OMTI	XEBEC		
ST225	4	268h	243h	26h	0	100h	126h	* 2	275h
ST225N*	4	243h	243h	0	0	0	0	* 2	275h
Syquest 312	2	243h	243h	6000h	6000h	0	0	* 2	269h
MiniScribe 612	4	133h	122h	99h	99h	200h	200h	* 2	138h

Figure 1 - PREP Entry for Drives

Notes:

***** The Seagate ST225N, ST251N, ST277N, and other Seagate drives with the 'N' suffix are different from the standard ST506 MFM compatible drives in that they have SCSI interfaces already built into the drives. If you are using a drive with an 'N' suffix, please read the section, **Special Information on the Seagate 'N' Drives**, provided later.

***** For XEBEC Step Rate, the system will operate faster if a step rate of 70 is used. A step rate code of 60 and 50 are also usable. If your drive is an 85 millisecond average access drive, then a step rate code of 50 should be used.

1. When power is first applied to the CDR-317, the hand prompt will not appear until the connected Winchester Drives are up to speed.

2. The indicator light on the CDR-317 normally pulses at a slow BRIGHT-DIM-BRIGHT-DIM Cycle. The light will pulse a series of quick BRIGHT-DIM-BRIGHT-DIM etc., then PAUSE and repeat the code if there is a problem, such as drives not ready or board failure. The LED does not normally ever turn completely OFF. This allows confidence that the LED is OK!!

3. The hard disk in the Winchester Drive needs to be prepared before it can be used. Briefly, this will require that you run Zenith's **PREP** Utility (using the Entry Parameters of Figure 1), **PART** Utility, and then **FORMAT** each partition, in that order, following the procedures provided for your Zenith disk operating system (DOS, CP/M, etc.).

Proceed to Page 11 of your Z-100 User's Manual Winchester Supplement and perform the PREP Utility steps, then return to this manual. Note that PREP /Q or FASTPREP /Q should be used (The /Q option) to insure that the proper drive parameters will be placed on the drive.

Note: FASTPREP was provided by CDR Systems when a drive was purchased through them.

The MFM Hard Drive Controllers

The CDR-317 SCSI Host Adaptor (CDR317-SCSI) was shipped with one of two MFM Hard Drive Controller Boards, the OMTI 3100, or the XEBEC 1410A Controller (with CDR-317 firmware changes). The following is a discussion of the changes between the two controllers.

- The XEBEC 1410A is physically larger than the OMTI 3100. It is the same form factor as a 5.25" hard disk drive. The OMTI 3100 is the form fac-tor of the 3.5" hard disk drive. The mounting brackets have a mounting hole pattern to accept the 1410A board with the Board facing UP-SIDE DOWN on the mounting standoffs.

The board will mount sideways for the Z-110 'Low-profile' computer and in line for the Z-120 'All-in-one ' computer (examine the pictorials).

- The XEBEC 1410A formats a drive with a maximum of 17 sectors per track with 512 byte sectors. This is the number of sectors/track that drives are formatted when used with Heath /Zenith-150, H/Z-200, and IBM-PC Computers. The SCSI built-in drives, like the Seagate ST225N 20 Mb drive have also standardized on 17 sectors /track.

However, the Heath/Zenith Z-217 MFM Hard Disk Controller formats drives with 18 sectors/track, which can inhibit the use of imbedded servo drives since the extra gap area needed for that type of drive is not available. Most of the larger capacity drives are imbedded servo type.

The CDR-317 Host Adaptor, with the XEBEC 1410A can handle the imbedded servo drive type.

The 17 sector/track formatting also tends to allow for a higher drive reliability. The one drawback to the 17 sector/track format is that there is a 5.6% lower formatted capacity on the drive than when formatted with 18 sectors/track.

- The Heath/Zenith PREP Utility is expecting to format drives with 18 sectors/track. The CDR-317-IIB S-100 Bus board controls the drive sectoring for the XEBEC 1410A so that the Zenith software still thinks it has 18 sectors/track even though it is actually being formatted with 17 sectors/track.

The one thing that is required in using PREP that is different than the standard in the Zenith MS-DOS or CP/M85 Manuals is that the number of cylinders to be formatted must reflect the smaller number of sectors per track.

The number of cylinders as given by the drive manufacturer for the drive to be prepared MUST be multiplied by 17 (11 hex) then divided by 18 (12 hex). The result can be incremented by 1 to get the correct NUMBER OF CYLINDERS to use in the PREP utility. The HEADS, REDUCED WRITE, PRE-COMP, and SHIP information all follow the Manufacturer's specifications. The STEP rate should be set at 80 for fastest operation.

The number of cylinders may be calculated as follows:

```
NUMBER OF CYLINDERS = 1 +  [(CYLINDERS ON
 DRIVE) * 17/18]
```

The CDR-317 Host Adaptor will format the full drive and logically allow the H/Z software to think that the 18 sectors are there.

If the total number of cylinders are specified when using PREP, the PREP utility will come back with a **'TOO MANY BAD SECTORS'** error for the drive. This is because it is trying to access sectors beyond the capability of the drive. The Seagate 225 drives will use 243 cylinders for PREP!

- To use SYQUEST Drives with the XEBEC 1410A, the reduced write current field is used to specify the type of SYQUEST Drive.

The following HEX numbers are used in specifying SYQUEST Drives:

```
SYQUEST 612 10 Mb Drive:
     REDUCED WRITE CURRENT = 6000
SYQUEST 306 5 Mb Drive:
     REDUCED WRITE CURRENT = 4000
MICRO STORAGE 212 10 Mb:
     REDUCED WRITE CURRENT = 2000
```

For Standard Drives use the Manufacturer's R/W Number.

- The three small terminating resistor packs supplied with the CDR-317 are for use on the Board I (CDR317-IIB) S-100 bus Board. They are normally already installed.

When the XEBEC 1410A, the OMTI 3100 or the ST225N (Built-in SCSI Drive) are used, the terminating resistors MUST be installed.

Each resistor has a tiny dot near one end of the terminator. That dot represents GROUND. The resistors should be plugged into sockets R8, R9, and R10 with the dot (GROUND end) away from the + symbols on the S-100 Bus Board (CDR317-IIB).

Special Information on Seagate 'N' Drives

The Seagate ST225N, ST251N, ST277N and similar drives are different from the standard ST506 compatible drives in that they have the SCSI Interface built into the drives. The advantage to this type of drive is that it eliminates the need for an ST506/412 Controller Board. This is not only cost effective, but saves space since there is one less board.

The Seagate 'N' Drives can be used in the Heath /Zenith Computer with the CDR-317 Hard Disk Controller Package. Only Board 1 (CDR317-IIB) of the package and a 50-pin cable are needed to use one of these drives if the drive is used as a replacement for one of the existing floppy drives. These drives are half-height, so it can be doubled with a half height floppy drive in the same full height slot.

PREP.COM or FASTPREP.COM (was available from CDR with drive purchase) notes:

- FASTPREP was CDR's version of PREP, and was provided with drive purchase.
- When using a Seagate 'N' drive in the Z-100 computer, the standard H/Z PREP utility will work.
- Using PREP or FASTPREP, the ST225N drive formats out to a little over 20 Mb.
- To go beyond **32 Mb**, with the PREP or FASTPREP utilities, the **/K** option MUST be used.
- CP/M does not work with the **/K** option.
- The ST225N does not use the **/K** option.
- The **/Q** option forces PREP to ask **Q**uestions for parameters. It **MUST** be used for all drives.

To invoke PREP, use the commands:

PREP /K/Q For drives larger than 32 Mb.
PREP /Q For drives less than 32 Mb.

The following HEXadecimal (h) parameters should be used with PREP or FASTPREP:

	ST225N	ST251N	ST277N
Number of Heads:	4	4	4
Number of Cylinders:	243h	486h	6DFh
Reduced Write Cylinder:	0	0	0
Pre-Comp Cylinder:	0	0	0
Step Rate Code:	1	1	1
Parking Cylinder:	280h	4D2h	6EDh

Notes:

- The Seagate ST251N drive was tested with 486h cylinders. It is possible that the cylinder count can go up to 4A2h cylinders.
- The above parameters are different than those used for the ST506 compatible drives. These drives run through the CDR-317 Controller with the standard Heath/Zenith Operating Systems and software.
- The ST251N and ST277N drives have more physical heads and fewer physical cylinders than specified. SCSI drives use only logical Sector numbers. The heads and cylinders are ONLY used to get a sector count total for the PREP software.

PREP100.COM

When using PREP100.COM, the parameters are entered in **DECimal** (d). Do not enter the 'd'. Drives over 32 Mb still retain the 512 byte sectoring. With PREP100.COM, there is no 62 Mb drive limitation.

Drive Parameters for PREP100.COM

	ST225N	ST251N	ST277N
USE DEFAULT DRIVE PARAMETERS?	N	N	N
ARE YOU USING AN RLL CONTROLLER?	N	N	N
ENTER MAX NUMBER of HEADS (4TO16)	4	4	6
ENTER MAX NUMBER OF CYLINDERS	579d	1158d	1249d
ENTER REDUCED CURRENT CYLINDER	0	0	0
ENTER PRECOMPENSATION CYLINDER	0	0	0
ENTER PARKING CYLINDER ADDRESS	640d	1234d	1251d
ENTER STEP RATE CODE (1 TO 7)	1	1	1
ENTER INTERLEAVE FACTOR (1 TO 7)	4	4	4
USE FASTPREP - BYPASS MEDIA TEST, WILL NOT DETECT BAD SECTORS!!	N	N	N

MiniScribe 8425S SCSI 20 Mb Hard Drive

To prepare this drive in a H/Z-100 series computer with the CDR317-IIB (Intelligent SCSI Host Adaptor), use the Zenith PREP or the CDR modified FASTPREP Utilities.

PREP/Q or FASTPREP/Q Parameters: (in HEX)

Number of Heads:	4
Number of Cylinders:	23Ah
Reduced Write Current:	0
Write Pre-compensation:	0
Step Rate:	4
Park Cylinder:	24Ah

Use With the GEMINI PC Emulator Board

The Gemini PC Emulator Board requires that the Z-100 must be powered down at various times when setting up the hard disk system.

Note: The standard, native Zenith Z-100 MS-DOS will be referred to as Z-DOS (All versions). The Zenith Z-150 MS-DOS for PCs (required) will be referred to as PC-DOS.

Note: Unless you ONLY change the name of an existing partition on the hard drive to "GEMINI", the following procedures WILL **destroy all existing data** on the entire hard drive. Please back up all contents you wish to save. Any other partitions that were changed in size or position when you created the "GEMINI" partition will require reformatting with the Z_DOS FORMAT command!

Preparation of a "GEMINI" Partition:

1. Boot to the **Z-100 Mode** with Z-DOS.

2. Run Z-DOS **PREP**.
Note: For fastest operation of the hard disk systems, the XEBEC board requires a step rate of 80 to be used during **PREP**.

3. Run Z-DOS **PART** to create a **"GEMINI"** partition (with that name) as the **first partition**.

4. Create any other partitions, as you need.

5. Turn **OFF**, then turn **ON** the Z-100 computer.

6. Boot to the **Z-100 Mode** with Z-DOS.

7. Run Z-DOS **FORMAT** on whatever Z-DOS partitions were changed while creating the **"GEMINI"** partition. It would not hurt to run **FORMAT** on the **"GEMINI"** partition also, just for grins. Reload Z-DOS and COPY software as necessary.

8. Turn **OFF**, then turn **ON** the Z-100 computer.

9. Boot to the **IBM Mode** with PC-DOS on a Floppy.

10. Run PC-DOS **PREP** per the PC-DOS instructions.
Note: This PREP will ONLY recognize the **"GEMINI"** partition, and prepare it for use. NO OTHER partitions will be recognized. After exiting PREP, you may notice keyboard "BEEPS". This is normal.
Note: For fastest operation of the hard disk systems, the XEBEC board requires a step rate of 80 to be used during **PREP**.

11. Turn **OFF**, then turn **ON** the Z-100 computer.

12. Again, boot to the **IBM Mode** with PC-DOS on a Floppy Drive.

13. (Optional) IF YOU WISH to create up to 4 sub-partitions within the **"GEMINI"** partition, run PC-DOS **PART**. See the Gemini Article on the "*Z-100 LifeLine*" Website for additional information. If you do not run PC-DOS **PART**, proceed to step 16.

14. Turn **OFF**, then turn **ON** the Z-100 computer.

15. Again, boot to the **IBM Mode** with PC-DOS on a Floppy Drive.

16. Run the PC-DOS **FORMAT** utility to format the **"GEMINI"** partition or, if created, any sub-partitions. Each sub-partition will have a separate drive letter.

17. You can now access the drive. **Copy PC-DOS** and other files, as needed.

Note: The Gemini System is ONLY available on a Cold Start (Power-up). The Z-100 Reset, {**CTRL**}-{**RESET**}, operation will NOT allow moving between IBM and Z-100 Modes.

CDR-317 Error Codes

TYPE 0

00 No Error
01 Drive Not Ready
02 No Seek Complete
03 No Track 0
04 No Index
05 No Drive Selected

TYPE 1

10 Header Address Mark Not Found
11 Seek Error (Bad Cyl # in header)
12 Sector # Not Found
13 ECC Error in Header
14 Data Address Mark Not Found
15 Non-correctable ECC Error in Data Field
16 Correctable ECC Error in Data Field
17 Write Fault

TYPE 2

20 Illegal OP Code
21 Illegal Disk Address
22 Format Protected
23 Write Protected

TYPE 3

30 Miscellaneous Error

TYPE 4

40 Error During Diagnostic

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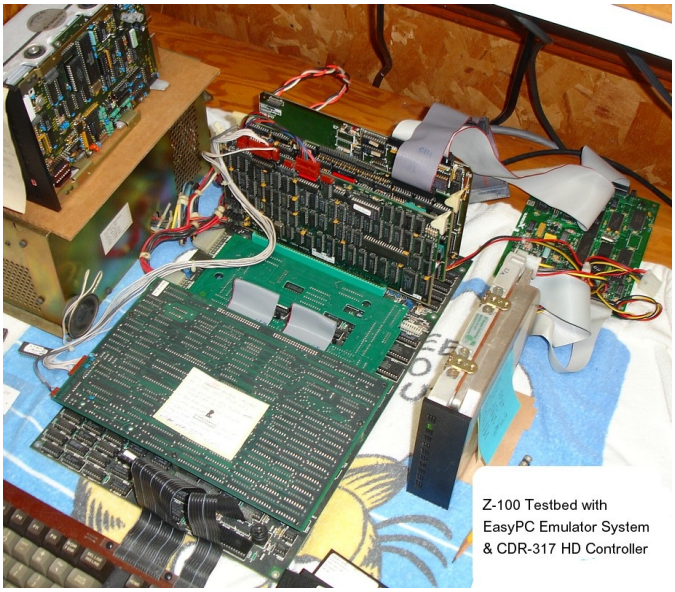
My Z-100 test bed setup included an EasyPC PC-emulator system that had three boards; the EasyPC Controller mounted horizontally over the motherboard and the first two S-100 boards - a Video Master board in front, and its own Floppy Controller card next. The CDR-317 was third, with a 50-conductor cable running to the XEBEC controller and MFM hard drive on the right.



Z-100 Testbed with
EasyPC Emulator System
& CDR-317 HD Controller

CDR-317 Specifications

Drives Supported:
Two Winchester MFM Disk Drives, each up to 65 Mb, per Controller Board (Limited by Z-100 MS-DOS)

Drive Interface:
Seagate standard (ST506) Interface or SCSI.

Interface to Host:
Via S-100 Bus (Compatible with IEEE std 696).

Sector Size:
Two Sector Sizes, 512 or 1024 bytes, with programmable Interleave

Buffering:
Buffers all transfers to and from Host via on-board, multiple-sector Buffer (only in non-DMA mode. DMA Mode is standard for higher performance)

Data Transfers:
All transfers made via TMA with programmable mode of Transfer-Burst or byte. Data transfer can be halted by Host using PAUSE command. CONTINUE command resumes the transfer.

I/O Ports:
Controller uses two I/O Ports. Port address is set by a PAL and is not user selectable.

Error Detection:
Detects and corrects (if enabled) data errors. Reports logical errors and also issues a HOME command if the drive was not previously accessed.

Power Requirements:
+5 Volts, 1.1 Amps maximum (Host Adaptor)
+5 Volts, 1.0 Amps (OMTI 3100)
+12 Volts, 6 mA maximum (XEBEC)

Appendix A

Appendix A (next) provides schematics, pictures and drawings to assist in installation.

If you have any questions or comments, please email me at:
z100lifeline@swvagts.com

Cheers,

Steven W. Vagts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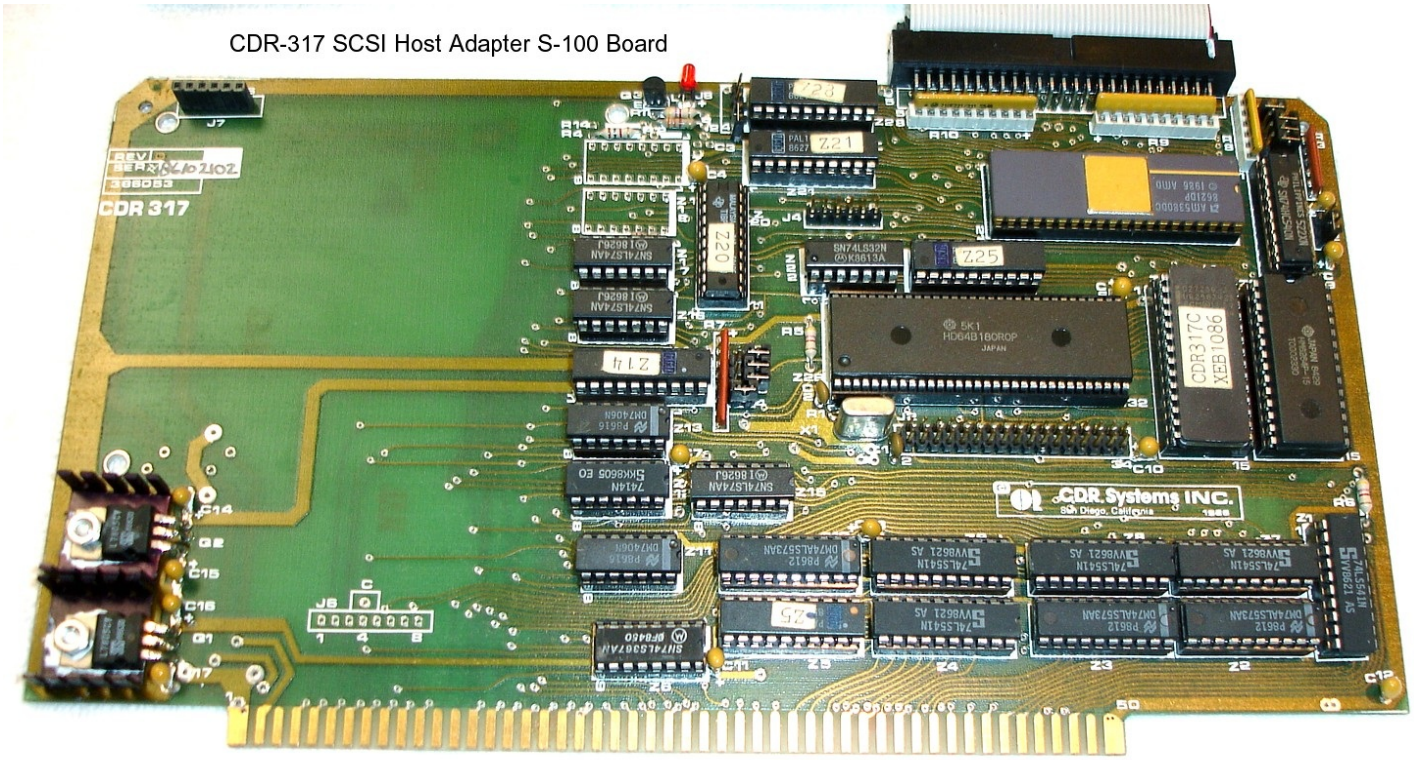
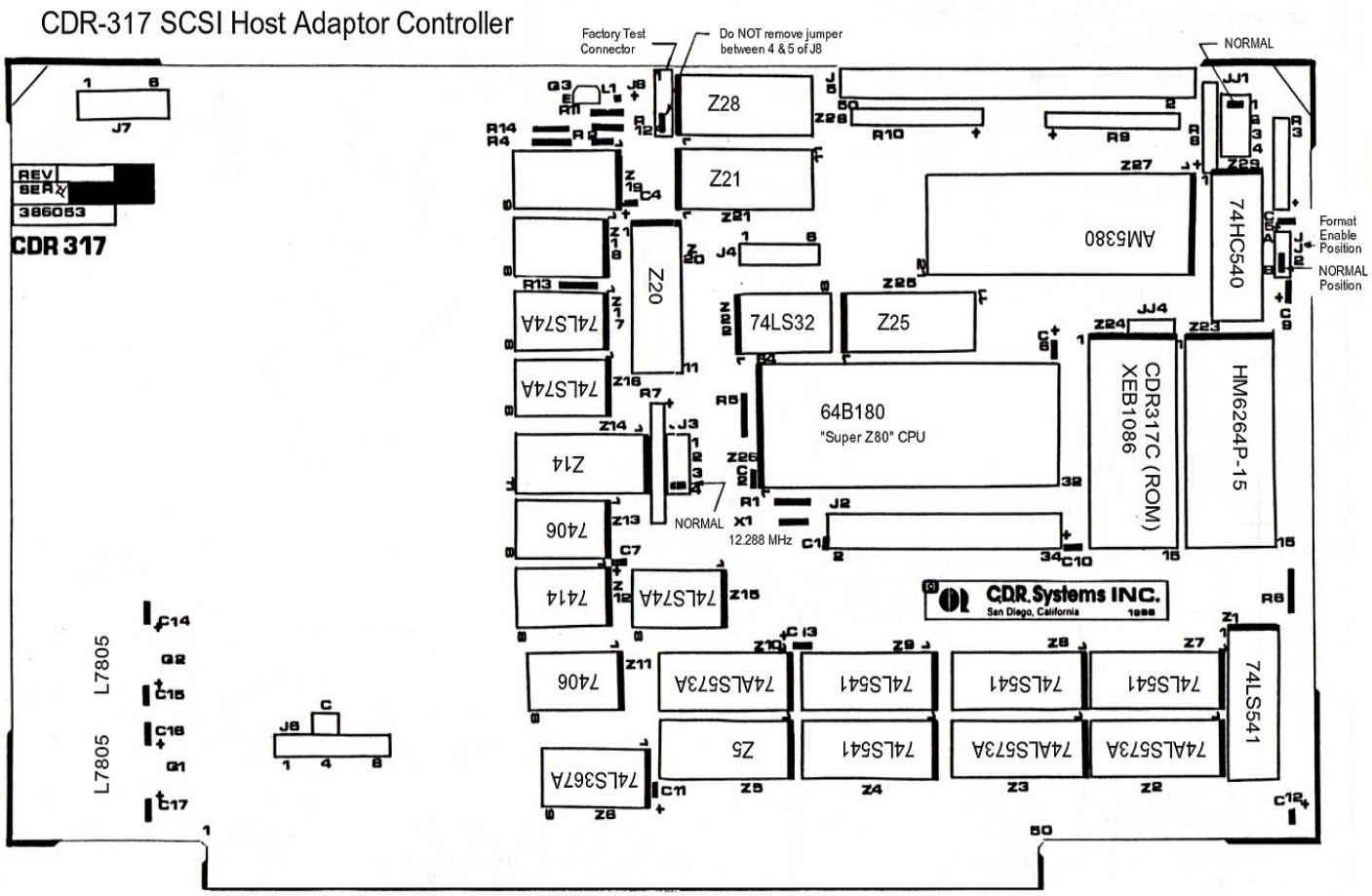
APPENDIX A:

CDR-317 SCSI Host Adapter S-100 Board

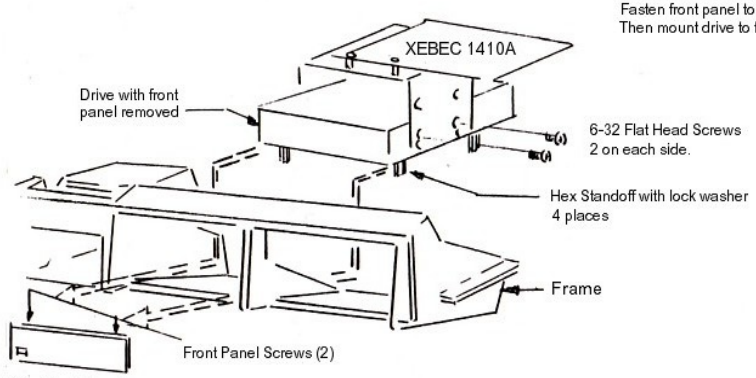


CDR-317 SCSI Host Adaptor Controller



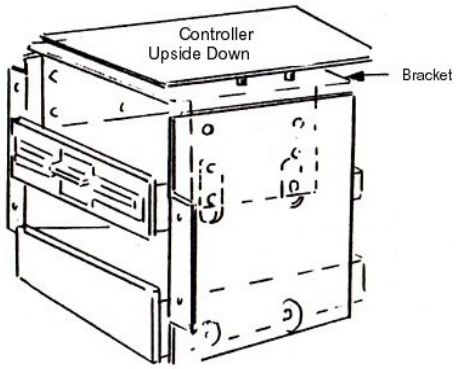
For Z-110 'Low-profile'

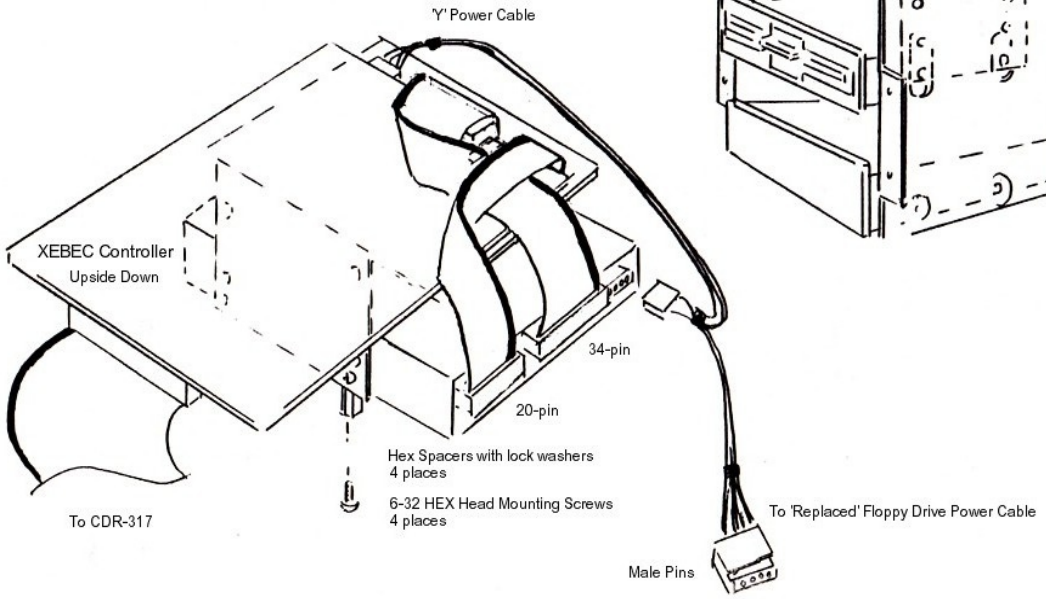
Insert Assembly from rear,
Insert beyond plastic mounting frame.
Fasten front panel to drive.
Then mount drive to frame.

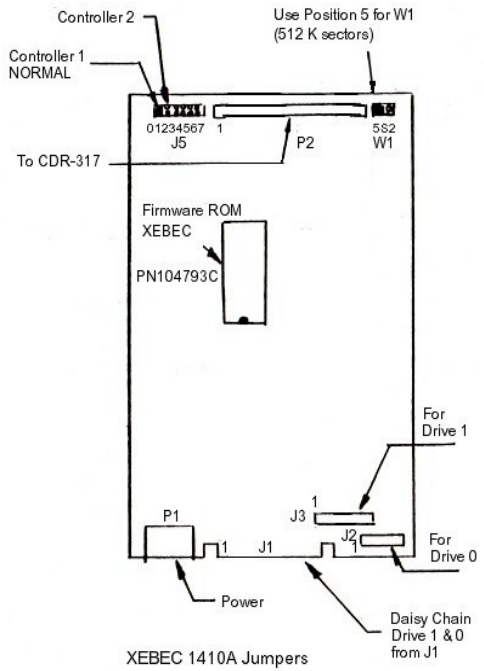


For Z-120 'All-in-one'

Brackets should mount with 'legs' inside the Z-120 drive cage. Loosen mounting screws on the lower drive, mount & fasten bracket, and upper drive with the same screws.



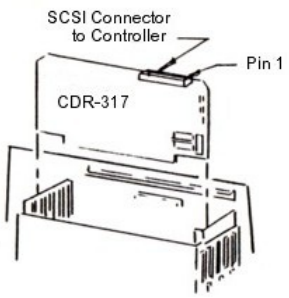




XEBEC 1410A Jumpers

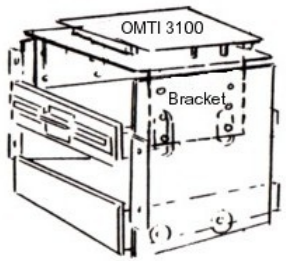
PICTORIAL 3a

TOLERANCES UNLESS OTHERWISE SPECIFIED FRACTIONS DEC ANGLES ± ± ±		CDR Systems San Diego, California
APPROVALS	DATE	Suggested Controller Mounting Methods
DRAWN		
CHECKED		SCALE / SIZE B / DRAWING NO.



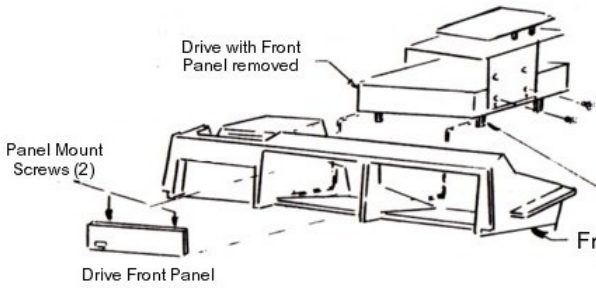
For Z-120 'All-in-one'

Brackets should mount with 'legs' inside the Z-120 drive cage. Loosen mounting screws on the lower drive, mount & fasten bracket, and upper drive with the same screws.

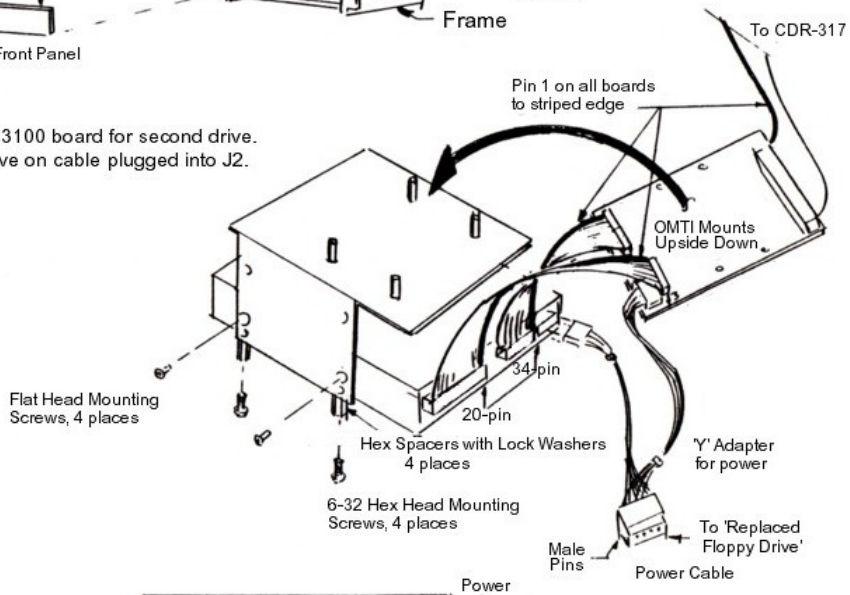


For Z-110 'Low-profile'

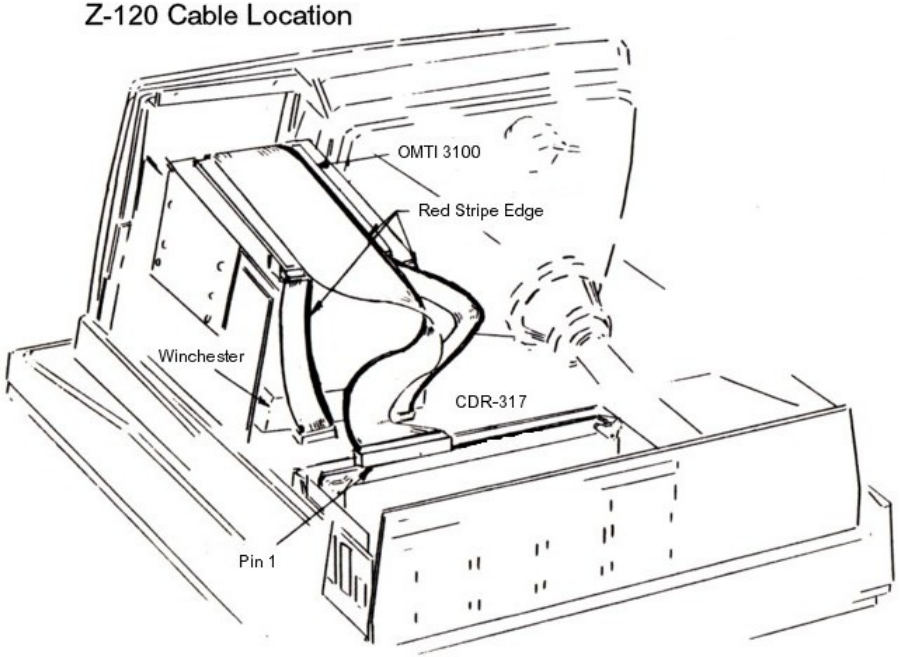
Insert Assembly from rear,
Insert beyond plastic mounting frame.
Fasten front panel to drive.
Then mount drive to frame.

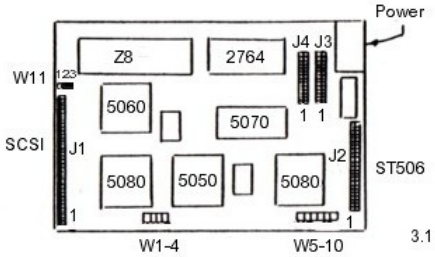


Note: Use J4 on OMTI 3100 board for second drive.
Daisy chain second drive on cable plugged into J2.



Z-120 Cable Location





OMTI 3100 Controller

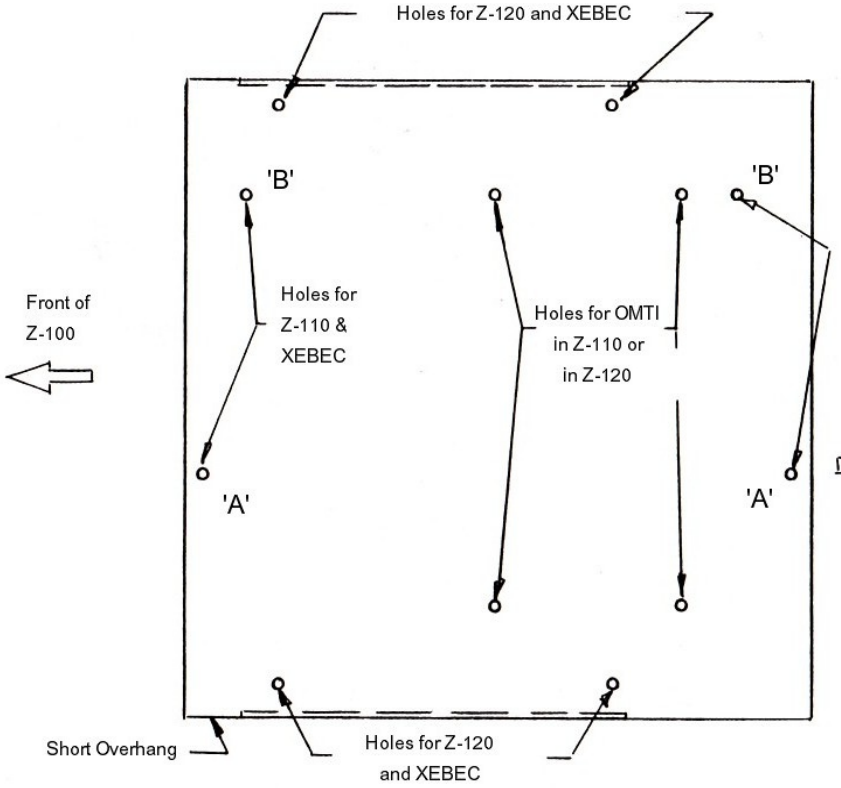
PICT 3

3.1 Jumper W11 only between pins 2-3, others not used.

3.2 Leave Terminators in.

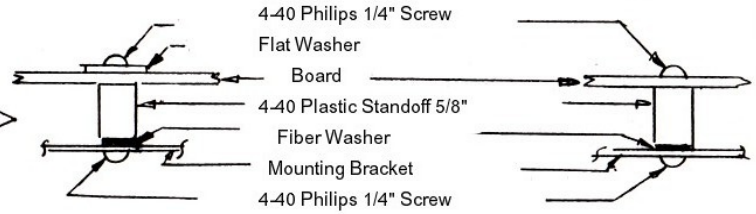
3.3 J3 used for drive 0.

3.4 J4 used for drive 1.



Top View of Mounting Bracket

Refer to 'Suggested Controller Mounting Methods' Drawing for proper board orientation for XEBEC and OMTI in the Z-100 series computer.



1. Hardware setup for holes marked 'A'

2. Hardware setup for holes marked 'B'

3. This setup without the fiber washer is used for mounting the XEBEC Controller in the Z-120 and for mounting the OMTI Controller in all computers.

TOLERANCES UNLESS OTHERWISE SPECIFIED FRACTIONS ±	DEC ±	ANGLES ±	CDR Systems San Diego, California
APPROVALS	DATE		Mounting Bracket Hardware Assembly
DRAWN			
CHECKED			SCALE / SIZE B / DRAWING NO.