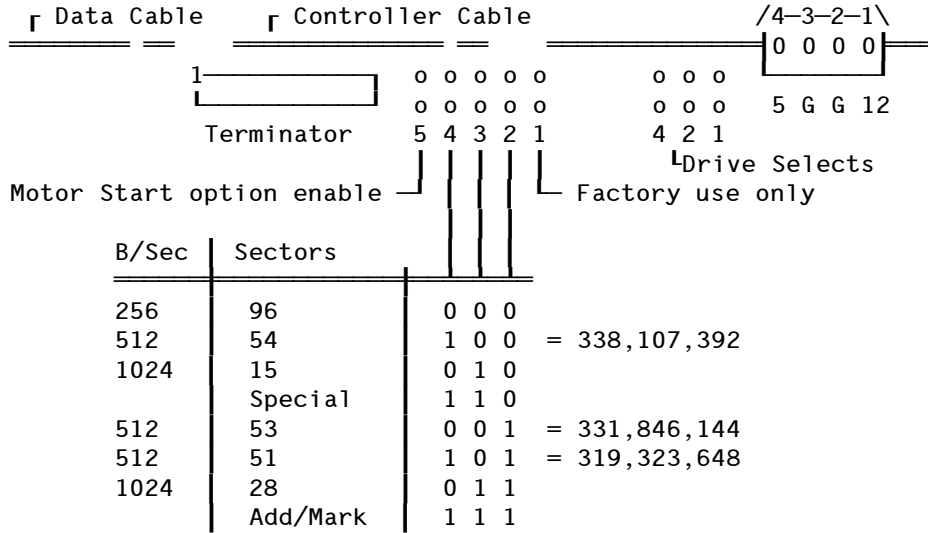


CDC Imprimis 94246-383 Wren 6 / ST-2383E Product Specification

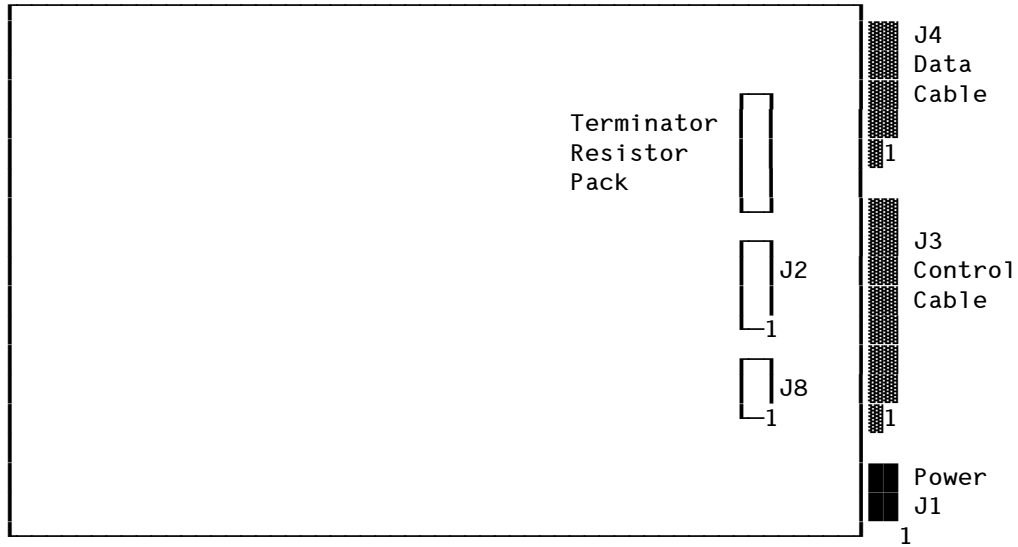


ST-2383E
94246-383 WREN 6 HH

UNFORMATTED CAPACITY (MB) _____383
 FORMATTED CAPACITY (54 SECTORS) (MB) _____337 **
 ACTUATOR TYPE _____VOICE COIL
 TRACKS _____12,229
 CYLINDERS _____1,747
 HEADS _____7
 DISCS _____4
 MEDIA TYPE _____THIN FILM
 RECORDING METHOD _____RLL (2,7)
 TRANSFER RATE (mbytes/sec) _____1.875
 INTERNAL TRANSFER RATE (mbits/sec) _____15
 SPINDLE SPEED (RPM) _____3,600
 AVERAGE LATENCY (mSEC) _____8.33
 INTERFACE _____ESDI
 TPI (TRACKS PER INCH) _____1,459
 BPI (BITS PER INCH) _____31,699
 AVERAGE ACCESS (ms) _____16
 SINGLE TRACK SEEK (ms) _____3
 MAX FULL SEEK (ms) _____33
 MTBF (power-on hours) _____100,000
 POWER REQUIREMENTS: +12V START-UP (amps) _4.5
 +12V TYPICAL (amps) __0.85
 +5V START-UP (amps) __1.0
 +5V TYPICAL (amps) __0.75
 TYPICAL (watts) _____14
 MAXIMUM (watts) _____59
 BUFFERED STEP PULSE RATE (micro sec) _____N/A
 WRITE PRECOMP (cyl) _____N/A
 REDUCED WRITE CURRENT (cyl) _____N/A
 LANDING ZONE (cyl) _____AUTO PARK
 IBM AT DRIVE TYPE _____*

* MAY REQUIRE A CONTROLLER WITH BIOS SUPPORT, OR FORMATTING AND PARTITIONING SOFTWARE. ALSO, CHECK TO SEE IF YOUR CMOS SETUP HAS A "CUSTOM" OR "USER DEFINABLE" DRIVE TYPE AVAILABLE.

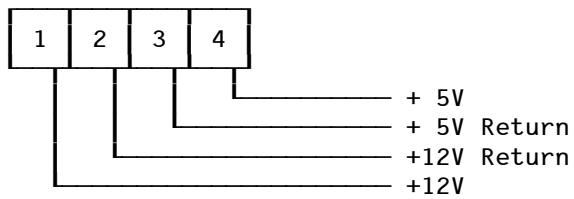
** ESDI controllers which offer an Alternate/Spare sector per track option will format to a capacity = Cyl*Hd*(SPT-1)*512 bytes



Jumper setting

■ = Jumpers are set at factory

J1 Power Connector



J2 Reserved

1 OPEN RESERVED for factory test

J2 Sector Configuration

To implement the hard sectored format operation configure the jumpers on the option select header to one of the configurations flagged by the note (4) in the table. The number of sectors chosen should correspond to the same number of sectors per track that the host controller is set up to send when it formats the drive or tries to write or read data to/from the drive.

Bytes/Sect	Sectors	4	3	2	
256	96	OPEN	OPEN	OPEN	} 4
512	54	CLOSED	OPEN	OPEN	
	15	OPEN	CLOSED	OPEN	
***Custom	N/A	CLOSED	CLOSED	OPEN	
512	53	OPEN	OPEN	CLOSED	
512	51	CLOSED	OPEN	CLOSED	
*	Special	OPEN	CLOSED	CLOSED	
**	Address mark	CLOSED	CLOSED	CLOSED	

* Special sector switch setting that can be factory configured to customer requirements. Default is 1024 B/Sect. and 38 Sectors

** Soft Sector operation selection.
The WREN 6 HH supports the use of the soft sector format. To implement the optional soft sectored format operation select "Address Mark" mode in the WREN 6 HH by installing option jumper plugs 2, 3, and 4.

*** Custom setting is reserved for factory configuration to customer requirements.

J2 Motor Start on command

- 5 OPEN Spindle motor starts on power-up
- CLOSED Spindle motor start command required to start motor

J8 Drive select

Drive	1	2	3	
0	OPEN	OPEN	OPEN	Not Valid
1	CLOSE	OPEN	OPEN	
2	OPEN	CLOSE	OPEN	
3	CLOSE	CLOSE	OPEN	
4	OPEN	OPEN	CLOSE	
5	CLOSE	OPEN	CLOSE	
6	OPEN	CLOSE	CLOSE	
7	CLOSE	CLOSE	CLOSE	

Pins on the drive ID select and configuration select header are provided to facilitate manual drive configuration. No devices other than jumpers should be connected to these pins. Connection made to external devices (Switches, Connectors, etc.) could result in adverse affect drive performance. Exact location of these pins and header may be changed without notice.

Drive Select

The following characteristics apply to the Drive Select lines:

1. Logical unit designation for up to 7 drives is performed during installation by installing jumpers on pins on a connector header on the main PWA. The jumpers are installed in a 1 through 7 position configuration to select device addresses 1 through 7. Zero is not a valid address.
2. The controller shall not attempt to select the drive until 1 second after DC power is applied. The Ready output will be valid (whether asserted or negated) within 1 us after the drive is selected.
3. The drive will be selected (and the Drive Selected Signal asserted) within 1 us after the Drive Select lines contain that unit's select address. The drive will be deselected (and the Drive Selected signal negated) within 1 us after the Drive Select lines contain another unit's select address.
4. The Drive Select lines must remain asserted for 1 us after a write operation.
5. When the Drive Select lines are asserted, a head change will occur, requiring a delay before a read or write operation can be initiated.

Notes on installation

Drive Orientation

The balanced rotary arm actuator design of the Wren 6 HH allows it to be mounted in any orientation. All drive performance characterization however, has been done with the drive in horizontal (disc level) and vertical (drive on its side) orientations, and these are the two preferred mounting orientations.

WREN 6 HH is designed, manufactured, and tested with a "Plug-in and Play" installation philosophy. This minimizes the requirements for highly trained personnel to integrate the WREN 6 HH into an OEM's system, whether in a factory or field environment.

Mounting Holes

Mounting Holes (6-32 UNC-2B). Four on bottom, four on each side. Max. screw length into chassis 0.125 in.

Front Panel

The WREN 6 HH is available with a black front panel. The panel has a window through which a single red* LED shows from its mounting on the Main PWA. The LED, when glowing, indicates the drive is selected. A flashing LED indicates the presence of a nonrecoverable fault. A fault indication is displayed irrespective of Drive Select status.

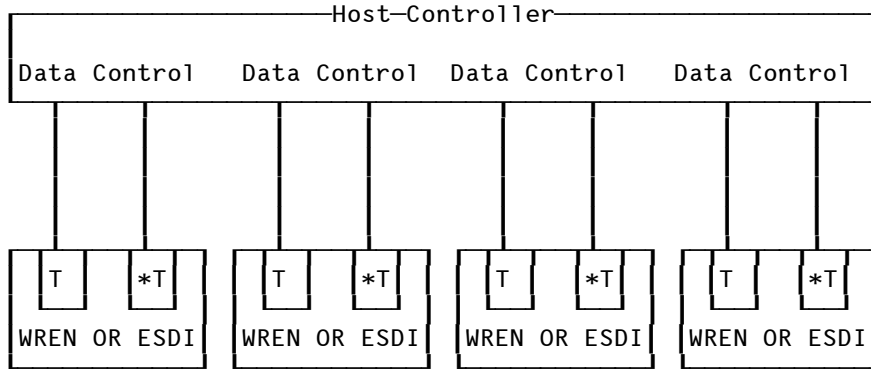
*Green or Amber LED indicator will be available, but must be specified when ordering units.

Cooling

Cabinet cooling must be designed by the customer so that the ambient temperature immediately surrounding the WREN 6 HH will not exceed temperature conditions. Specific consideration should be given to make sure adequate air circulation around the components on the PWAs.

Interface Cabling Options

View A



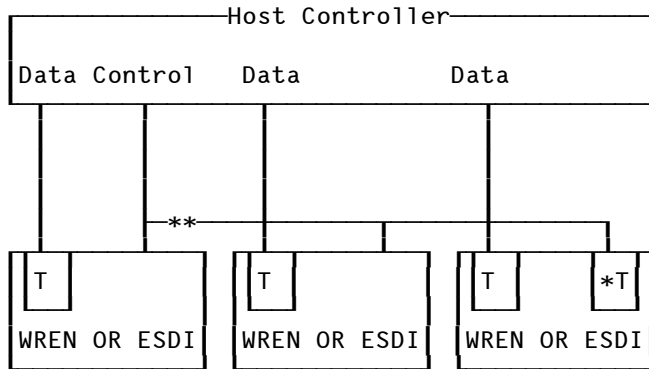
Each control cable length must not exceed 10 feet (3.00m). Each data cable length must not exceed 10 feet (3.00m).

*T indicates removable terminator resistor pack. WREN data cables are permanently terminated.

Radial Configuration

View A shows each drive interfaced to its own control cable, which allows interfacing an arbitrary number of drives and a variety of system operational techniques. Each drive has its data cable and control cable radially connected to the host controller. The length of each individual cable must not exceed 10 feet (3.00 meters). Terminator resistors must be installed in the host controller for each data cable and for each control cable. For this configuration, a terminator resistor pack must be installed in each WREN 6 HH Disc Drive.

View B



Total control cable length must not exceed 10 feet (3.00m). Each data cable length must not exceed 10 feet (3.00m).

*T indicates removable terminator resistor pack. WREN data ports are permanently terminated.

** A maximum of 7 devices may be interconnected

Daisychain Configuration

A daisychain configuration incorporates a maximum of seven drives in parallel on a common control cable. Only the drive selected by the host system has its control and data signals enabled through this common interface. View B illustrates a daisy-chain of WREN 6 HH Disc Drives or other ESDI devices. A terminator resistor pack is required in the host controller for each data cable. Only the last ESDI device in the daisychain requires a terminator resistor pack for the control cable. Terminator resistor packs for the control cable or other drives must be removed. The total combined control cable length (from the controller to the first drive, to the second and subsequent drives) must not be more than 10 feet (3.00 meters).

DC Cable and Connector

The WREN 6 HH receives DC power through a 4 pin right angle connector mounted on the main circuit board. Recommended part number for the mating connector are provided, but equivalent parts may be used.

Type of cable: 18 AWG
Connector: AMP 1-480424-0
Contacts: AMP 60619-4 (Loose Piece); AMP 61117-4 (Strip)

Data Cable and Connector

The I/O connector for the data interface is a 20 pin board edge connector. The odd pins are located on the back side of the printed circuit board. The even pins are on the front side (down) side of the printed circuit board. A key slot is provided between pins 3 and 5. Seagate recommends keying this connector to prevent installing it upside down. However, the WREN will not be damaged if the connector is installed upside down.

Recommended part numbers for the mating connector are included below, but equivalent parts may be used.

Connector: 20 pin, 3M-3461-0001, AMP 88373-6

Cable: Flat Cable (Stranded AWG 28) 3M-3365-20
Flat Cable (Stranded AWG 28) 3M-3517-20 (Shielded Cable)
Key: AMP 583274-1, 3M-3439-0000

Control Cable and Connector

The I/O connector for the control interface is a 34 pin board edge connector. The odd pins are located on the back (up) side of the printed circuit board and are connected to the ground plane. The even pins are on the front (down) side of the printed circuit board. A key slot is provided between pin 3 and 5. Seagate recommends keying this connector to prevent installing it upside down. However, the WREN will not be damaged if the connector is installed upside down.

Recommended part numbers for the mating connector are included below, but equivalent parts may be used.

Connector: 34 pin, 3M-3463-0001, AMP 88373-3
Key: AMP 583274-1, 3M-3439-0000
Cable: Flat cable (Stranded AWG 28) 3M-3365-34
Flat cable (Stranded AWG 28) 3M-3517-34 (Shielded Cable)
Spectra Strip Twist'n Flat 455-248-34 (Stranded AWG 28 Twisted Pair)

Interface Drivers/Receivers

The WREN 6 HH uses two types of signals; single ended and balanced differential. The data and clock signals use balanced differential drivers and receivers. All other signals use single ended drivers and receivers.

Single Ended Drivers/Receivers

Transmitter Characteristics

The WREN 6 HH uses the 74F38 open collector buffer/driver to transmit status to the host. This driver is capable of sinking a current of 48 mA with a low-level output voltage of 0.7V.

Receiver Characteristics

The WREN 6 HH uses the 74LS14 Hex Inverter with hysteresis gate as a line receiver. The input of each receiver is terminated in a 150 ohm pullup resistor.

Terminator Characteristics

The terminator is a resistor module that plugs into a socket in the last drive in a daisychain. Each drive is furnished with a terminator. Terminators must be removed from all except the last drive on the cable prior to daisychain operation. An equivalent terminator must be provided in the controller on each input signal line from the drive to the controller. Only the control cable resistor module is removable.

Balanced Differential Drivers/Receivers

Transmitter Characteristics

The WREN 6 HH uses 8923 balanced differential driver. An assertion on the interface is defined when "+" output is more positive than the "-" output.

Receiver Characteristics

The WREN 6 HH uses 8923 type balanced differential receivers. An assertion one on the interface is defined when the "+" input is more positive than the "-" input.

Terminator Requirements

Each differential receiver in the drive is terminated with a 100 ohm resistor. An equivalent terminator must be provided in the controller on each input signal line from the drive to the controller.

General Description

The WREN 6 HH is a member of a family of low cost, high performance, highly reliable, random access storage devices designed to meet the needs of the OEM marketplace.

The Model 94246 WREN 6 HH supports the Enhanced Small Device Specification (77738076). This product specification was created to be used in conjunction with this industry standard interface specification.

Standards

The WREN 6 HH has been developed as a system peripherals to the highest standards of design and construction. The WREN 6 HH depends upon its equipment to provide adequate power and environment in order to achieve optimum performance and compliance with applicable industry and governmental regulations. Special attention must be given in the areas of safety, power distribution, shielding, audible noise control, and temperature regulation.

The WREN 6 HH complies with Seagate standards.

The WREN 6 HH, as delivered, is designed for system integration before use.

The Head/Disc/Actuator Assembly (HDA) is environmentally sealed at the factory. Air is recirculated within the HDA through a nonreplaceable filter to maintain a contamination free HDA environment.

The WREN 6 HH uses a dedicated landing zone at the innermost radius of the media thus eliminating the possibility of destroying or degrading data by landing in the data zone.

The WREN 6 HH incorporates an automatic shipping lock which prevents potential damage to the heads and discs caused by movements during shipping and handling. The shipping lock is automatically disengaged when power is applied to the drive.

The WREN 6 HH decodes Track 0 location from the dedicated servo surface thereby eliminating mechanical transducer adjustments and related reliability concerns.

The WREN 6 HH uses a high performance actuator assembly consisting of a low inertia, balanced, patented, straight arm design which provides excellent performance with minimum power dissipation.

Media Description

The media used on the WREN 6 HH has a diameter of approximately 5 ¼ inches (130 mm). The aluminum substrate is coated with a thin film magnetic material, overcoated with a proprietary protective layer for improved durability and environmental protection. Each data surface has a total of 1747 tracks and is capable of recording 54,716,040 bytes of unformatted data.

Media defects are characterized as correctable or uncorrectable depending on the type and magnitude of the media flaw. Various error correction codes may be implemented. The code chosen should be consistent with Seagate media testing and certification methods. WREN 6 HH media certification is performed using the following standards:

An error burst of 11 bits or less is a correctable error.

An error burst greater than 11 bits in length is an uncorrectable error.

Host systems using the WREN 6 HH should have, as a minimum, resident capabilities to recognize and map defective tracks and perform track reallocation routines.

At the time of shipment from the point of manufacture, the WREN 6 HH recording surfaces meet the following requirements.

1. 1747 total tracks per surface.
2. Tracks 0 to be error free on each data surface.
3. 50 defects per surface maximum.
4. Cumulative defects not to exceed 1 per megabyte, based on total available unformatted drive capacity.

Defect and Error Management

The WREN 6 HH, as delivered, complies with specification. The read error rate and specified storage capacity are not dependent upon use of defect management routines. However, a carefully chosen defect management plan can significantly enhance overall system performance.

Identified defects are recorded on the defects list tracks per ESDI specification. It is recommended that these known defects be reallocated during the initial format operation. Sector reallocation is suggested because, in general, it is more efficient and may offer significant performance improvement. Error Correction Code (ECC) should be used to correct additional flaws as they occur. ECC is recommended since most of the defects are recoverable with ECC. If ECC is not used, defects are usually unrecoverable and need to be re allocated as they are discovered.

The WREN 6 HH defect list is written on maximum track, maximum track minus eight and a special track 4095 (OFFF)

Custom Formatting

The WREN 6 HH is formatted during production. Seagate maintains custom formatting capability which can incorporate many of the unique formats used in the Winchester marketplace. A majority of special format requirements can be implemented as specified.

Drive/Receiver Characteristics

Logic Level	Drive Output	Receiver Input
High (negated) (0)	$\geq 2.5 \text{ V}; \leq 5.25 \text{ V}$	$\geq 2.0 \text{ V}; \leq 5.25 \text{ V}$
Low (asserted) (1)	$\leq 0.7 \text{ V}; \geq 0.0 \text{ V}$	$\leq 0.8 \text{ V}; \geq 0.0 \text{ V}$

The difference in the voltages between input and output signals is due to the losses

in the cable.

Seek Time

		WREN 6HH
Track-to-Track	msec. typ.	3
	msec. max.	5
Average	msec. typ.	16
	msec. max.	18
Latency	msec. avg.	8.35

Seek time is defined as the elapsed time from the receipt of a seek command until the drive signals the controller that it is ready to perform another seek or a read/write function on the new cylinder.

Average seek time is determined by dividing the sum of the time for all possible movements by the total number of movements.

Spindle Speed and Latency

The spindle speed is $3592 \pm 0.5\%$ r/min. The speed tolerance includes motor performance and motor control circuit tolerances.

The average latency time is 8.35 milliseconds, based on a nominal disc speed of 3592 r/min. The maximum latency time is 16.79 milliseconds based on a minimum disc speed of 3574 r/min.

Read Data Transfer Rate

The nominal read serial data transfer rate is 15.0 Mbits per second.

Power Sequencing

Power sequencing is not required for the WREN 6 HH. The drive protects against inadvertent writing during power up and down. Daisychain operation requires that power be maintained on the terminated WREN 6 HH to ensure proper termination of the peripherals I/O cables.

Temperature

50°F to 122°F (10°C to 50°C) operating ambient with a maximum gradient of 18° F (10° C) per hour. Above 1000 feet (305 metres) altitude the maximum temperature is derated linearly to 122°F (44.4°C) at 10,000 feet (3048 metres). Cabinet packaging designs must provide ample air circulation around the WREN 6 HH to ensure environmental limits are not exceeded as a result of heat transfer from other system components. Operating ambient specifications purposes is defined as the environment immediately surrounding the WREN 6 HH. The temperature of the HDA is restricted to a maximum of 142°F (61.4°C) during operations. System cooling consideration should avoid large (>5°F or 2.8°C) thermal gradients between points A and B.

Reliability

The following reliability specifications assume correct host/drive operational interface, including all interface timings, power supply voltages, and environmental conditions.

MTBF	40,000 hours
Service Life	5 years
Preventive Maintenance	None required

ESDI (Enhanced Small Device Interface)

2 Cables: 1 each 34-pin Command Cable and 1 each 20-pin Data Cable

ESDI INTERFACE SPECIFICATIONS

CONTROL CABLE (J1/P1 PIN ASSIGNMENTS (Disk Implementation - Serial Mode))

Command Cable Description

SIGNAL NAME	SIGNAL PIN	GROUND PIN
-HEAD SELECT 2(3)	2	1
-HEAD SELECT 2(2)	4	3
-WRITE GATE	6	5
-CONFIGURATION/STATUS DATA	8	7
-TRANSFER ACK	10	9
-ATTENTION	12	11
-HEAD SELECT 2(0)	14	13
-SECTOR/BYTE CLOCK/ ADDRESS MARK FOUND	16	15
-HEAD SELECT 2(1)	18	17
-INDEX	20	19
-READY	22	21
-TRANSFER REQ	24	23
-DRIVE SELECT 2(0)	26	25
-DRIVE SELECT 2(1)	28	27
-DRIVE SELECT 2(2)	30	29
-READ GATE	32	31
-COMMAND DATA	34	33

DATA CABLE (J2/P2) PIN ASSIGNMENTS
(Disk Implementation - Serial Mode)

SIGNAL NAME	SIGNAL PIN	GROUND PIN
-DRIVE SELECTED	1	
-SECTOR/BYTE CLOCK/ ADDRESS MARK FOUND	2	
-COMMAND COMPLETE	3	
-ADDRESS MARK ENABLE	4	
GROUND		5
+/-WRITE CLOCK	7/8	6
+/-READ REF CLOCK	10/11	9/12
+/-NRZ WRITE DATA	13/14	15/16
+/-NRZ READ DATA	17/18	19
-INDEX	20	