

**DTC6280-15TX ESDI HARD AND FLOPPY DISK CONTROLLER
REV. C 07/90**

INSTALLATION MANUAL

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JUMPER	JUMPER FUNCTION	DEFAULT	INSTALLED Y/N OPEN/CLOSED
W1	Floppy Precompensation Control Jumper	Not Installed	No
W2	Wait State Enable Jumper	Not Installed	No
W3	SRAM Size Option	Not Installed	No
W4	Track Buffer Size Jumper	32K x 8 SRAM	W4 (1-2) closed
W5	Hard Disk Controller Interrupt Enable Jumper		W5 (1-2) IRQ14 W5 (2-3) IRQ15
SW1-1	Floppy Data Rate Switch	300Kb/s drives	Open
SW1-2	Reduced Write Current/ RPM Control Switch	Standard logic	Closed
SW1-3	Floppy Enable Switch	Floppy Controller Enabled	Open
SW1-4	Port Address Switch	Primary Port Address Enabled	Open
SW1-5	Auto Deselect Switch	Auto-deselect Disabled	Open
SW1-6	BIOS Enabled Switch	BIOS EPROM Enabled	Closed
SW1-7-8	BIOS Memory Address Switch	C8000	Open
SW1-9	Initial Interrupt Enable Control Switch	Interrupt Enabled After Reset	Closed
SW1-10	Track Buffer Enable Switch	Track Buffer Enabled	Closed

Floppy Precompensation Control Jumper – W1 (Not Installed)

The amount of floppy precompensation is returned by the data rate of the floppy drive.

Wait State Enable Jumper – W2 (Not Installed)

When installed, this optional jumper inserts a wait state to support systems with >16mhz I/O Bus speeds. The default setting is for no wait states to be added.

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SRAM Size Option Jumper – W3 (Not Installed)

This jumper is not installed on the controller. The SRAM Size Option is used to configure the board for either a 2Kx8 (6116) or 8Kx8 (6264) RAM chip used to store drive parameters. The 2Kx8 (6116) is the default setting.

Track Buffer Size Jumper – W4 (Not Installed)

The Track Buffer Size Jumper allows the system to use an 8Kx8 or 32Kx8 SRAM track buffer option. The 8Kx8 option can only be chosen by loading an 8Kx8 SRAM chip at location 14B, and by setting W4 (2-3) closed.

W4 (1-2) Closed: 32Kx8 SRAM is used.

Hard Disk Controller Interrupt Enable Jumper – W5

This three position jumper is used to select between either IRQ14 and IRQ15 as the hard disk controller interrupt. Normally IRQ14 is enabled on the primary controller and IRQ15 is enabled on the secondary controller.

W5 (1-2) On it enables IRQ14

W5 (2-3) On it enables IRQ15

Floppy Data Rate Switch – SW1-1

The Floppy Data Rate Switch selects the data rate for high-density disk drives when a low-density floppy diskette is being used. The DTC6280-15TX uses a low density 300Kb/s drive for single-speed drives running at 360RPM, as the default.

SW1-1 Open: 300Kb/s used for single-speed drives operating at 360RPM (default)

SW1-1 Closed: 250Kb/s used for dual-speed drives operating at 360/300RPM

Reduce Write Current/RPM Control Switch – SW1-2

The Reduce Write Current/RPM (RWC/RPM) Control switch allows floppy drives to be configured for standard and reverse logic. Most 3.5" floppy disk drives use standard logic where a "high" on pin 2 of the floppy disk drive defines high-density media. However, PS/2 drives use reverse logic, where a "high" on pin 2 defines low-density media, and a "low" on Pin 2 defines high-density media. Default setting is for standard logic floppy disk drives. In the standard default setting, drives can be configured as Drive 1,2,3, or 4.

When the reverse logic option is selected, floppy disk drives using standard logic can be configured as Drive 1, 3, or 4. Drives requiring reverse logic, such as PS/2 drives, can be configured as Drive 2.

SW1-2 Closed: Standard Logic (default)

SW1-2 Open: Reverse Logic

Floppy Disk Enable Switch – SW1-3

This switch enables the floppy disk controller support logic for the DTC6280-15TX. Closing SW1-3 will disable the floppy portion of the controller.

SW1-3 Open: Floppy controller enabled (default)

SW1-3 Closed: Floppy controller disabled

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Primary/Secondary Port Address Switch – SW1-4

The DTC6280-15TX provides user-definable port address locations. Two locations can be selected in order to eliminate potential conflicts with other boards in the system. Table 1-2 contains the primary port addresses for hard (and floppy) disk drives connected to the DTC6280-15TX.

Table 1-2

Primary Port Addresses		Secondary Port Addresses	
Hard Disk	Floppy Disk	Hard Disk	Floppy Disk
1F0H	----	170H	----
1F1H	----	171H	----
1F2H	3F2H	172H	372H
1F3H	3F3H	173H	373H
1F4H	3F4H	174H	374H
1F5H	3F5H	175H	375H
1F6H	3F6H	176H	376H
1F7H	3F7H	177H	377H

Auto Deselect Switch – SW1-5

The Auto-Deselect Switch is used to control the drive select light (LED). If set to the closed position, this switch causes the LED to be illuminated only when the disk drive is selected. Opening this switch causes the drive light to remain illuminated only when the disk drive is selected. Opening this switch causes the drive light to remain illuminated after selection.

SW1-5 Open: BIOS EPROM Disabled
 SW1-5 Closed: BIOS EPROM Enabled (default)

BIOS Address Switch – SW7-8

Switch SW (7-8) defines one of four BIOS memory starting addresses that can be selected. The on-board BIOS takes up 16KB of memory space when in use; the first 14KB of memory is used for BIOS PROM, while the last 2KB is used for RAM. Refer to Table 1-3 for BIOS addresses and switch settings.

Table 1-3

SWITCH		BIOS ADDRESS
7	8	Hard Disk
open	open	C8000 (default)
closed	open	D8000
open	closed	D0000
closed	open	D4000

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Initial Interrupt Enable Control Switch – SW1-9

The Initial Interrupt Enable Control Switch defines the interrupt status after reset.

SW1-9 Open: Interrupt disable after reset

SW1-9 Closed: Interrupt enabled after reset

Track Buffer Enable Switch – SW1-9

This switch will enable or disable the Track Buffer logic. With the Track Buffer disabled, the DTC6280-15TX will operate with a 2KB Dual Sector Buffer.

SW1-10 Open: Track Buffer disabled

SW1-10 Closed: Track Buffer enabled (default)

LOW-LEVEL FORMATTING OPTIONS

The DTC6280-15TX formatting utility allows the user several alternative types of low-level formatting, dependent on the specific needs of your system. The low-level formatting options are listed as follows:

NON-TRANSLATION FORMAT SUPPORT (NATIVE MODE)

This option uses the actual physical parameters of the drive. The DTC6280-15TX performs low-level formatting on the disk drive based on the number of reported cylinders, heads, and sectors-per track. Use this setting when the disk drive contains more than 1024 cylinders and the operating system (i.e. Novell NetWare, Unix) does not contain a 1024 cylinder maximum limitation. Consult your operating system manual to determine if a drive cylinder size limitation exists.

17 SECTOR PER TRACK TRANSLATION MODE

The DTC6280-15TX is compatible with software requiring 17 sectors per track formatting (i.e. Novell NetWare 2.0A). Consult your operating system or software user's manual to determine if there is a 17 sector per track format limitation.

60 SECTOR PER TRACK TRANSLATION MODE

The DTC6280-15TX overcomes the 1024 cylinder limitation imposed by DOS or OS/2 by activating a 60 sector per track mapping mode. This allows users to utilize the entire formatted capacity of an ESDI drive without violating the 1024 maximum cylinder limitation.

In this 60 sector mode, the DTC6280-15TX can support ESDI drives with up 480 MB of formatted capacity. Maximum capacity = 503,316,480 bytes (16 heads X 1024 cylinders X 60 sectors X 512 bytes).

TRUNCATE AT GREATER THAN 1024 CYLINDERS TRANSLATION

This option should be used when the disk drive reports more than 1024 cylinders in either the native mode or the 60 sector mode, and the operating system does not support disk drives greater than 1024 cylinders (i.e. DOS, OS/2).

NOTE

If your disk drive has a formatted capacity of less than 480MB, use the 60 Sector Per Track Translation Mode to obtain the full capacity of the disk drive in a DOS or OS/2 environment.

SURFACE VERIFICATION

The 6280-15TX can perform a surface verification of the ESDI drive and will compile a list of defective locations. In addition, the DTC6280-15TX will automatically map out these defects during low level format.

SOFT-SECTORED FORMAT SUPPORT

The DTC6280-15TX supports drives with soft-sectored format and will calculate the optimum number of sectors per track in this soft-sectored mode. During low-level formatting, the DTC6280-15TX will perform a sector per track calculation that maximizes capacity and provides this number as the default setting for the user to enter.

NOTE

It is recommended that the user enter the DTC6280-15TX default setting for soft sectors per track. The normal number of sectors per track using a 15MBit/sec ESDI disk drive in the soft-sectored mode is between 52-54 sectors per track.

SECTOR SPARING

The DTC6280-15TX supports sector sparing and allows one or no spare sectors per track. If the user is formatting a hard-sectored 54 sector per track ESDI drive and chooses sector sparing, then the ESDI drive will be formatted with 53 sector per track and 1 spare sector per track.

Sector sparing is useful for maintaining formatted capacity in ESDI drives with a large amount of media defects (from 50 to 100+). Sector sparing is not recommended for ESDI drives with few media defects.

UPDATE OF THE ESDI DRIVE DEFECT CYLINDER

The DTC6280-15TX allows users to append, delete, modify, view, and save the defect list that is stored in the ESDI drive. Any saved changes are automatically stored in the defect cylinder(s) and will be mapped out during low-level formatting. All defects are displayed as Cylinder/Head/Byte-offset/Bit length.

- Append – add additional defects
- Delete – delete a defect already entered
- Modify – change a defect already entered
- View – view defect table
- Save – store all changes into the defect cylinder

ENTRY OF DRIVE DEFECTS FROM MEDIA TABLE

The defect table printed on the outside of the ESDI drive should be identical to the list stored within the drive defect cylinders. If this is not the case, and new defects are discovered, or in the event a defect cylinder cannot be accessed, this utility will allow the user to enter these defects. The defects will then be mapped out during low-level format.

ENTRY OF INTERLEAVE FACTOR (Default = 1)

The DTC6280-15TX allows for a programmable interleave factor ranging from 1 to 9. Maximum system performance can be achieved when utilizing a 1:1 interleave factor. The 1:1 interleave performance is maintained for up to 54 physical sectors per track for most ESDI drives.

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ENTRY OF HEAD SKEW FACTOR (Default = 0)

The DTC6280-15TX allows for a programmable head skew factor. Head skew is defined by the amount of offset of the first logical sector from index for each physical head. Optimum head skew maximizes system performance by allowing the ESDI drive to perform head switching without losing a revolution. Choose the default setting "0" if you do not know the optimum head skew.

PROTECTION OF LAST (N-1) or (N-1 & N-8) DEFECT TABLE CYLINDERS

The DTC6280-15TX allows for protection of one or both ESDI drive defect table cylinders. By protecting the last cylinder (N-1) only, the (N-8) cylinder can be formatted for increased capacity.

LOW-LEVEL FORMATTING SET UP

After reviewing the low-level formatting options, use the DTC Utility to perform low-level formatting and surface verification of the media. The following steps are required to perform low-level formatting on your disk drive:

Load the DOS DEBUG file at the A> prompt. Type at the dash prompt G=c800:5 if the default BIOS address is selected. If an alternate BIOS address is selected (see SW1 7-8) type the same sequence using the selected alternative address. Press ENTER key. The screen will display:

```
(c) 1990 DATA TECHNOLOGY CORPORATION
ESDI Hard Disk Formatting Utility V1.6A FL
This program provides drive mode selection, format, verify and defect
mapping.
```

Current drive type selected are:

```
Drive 1 is (Hard Sectored, Native Mode, 2 Reserved CYL.)
CYL:___HEAD:___PRECOMP:___CNTRL:___L-ZONE___SECTOR/TRK:___
```

Drive 2 is NONE

Do you want to change drive mode? (Y/N):

* If all the drive information is correct and no changes are required, then proceed to section titled LOW-LEVEL FORMAT THE DRIVE. Continue with this procedure if any of the following questions pertain to your system environment:

1. You plan to use an ESDI drive with more than 1024 cylinders on operating system that does not support disk drives greater than 1024 cylinders.
2. You plan to truncate the cylinder count at 1024.
3. You plan to use an operating system that requires a 17 sector per track format (i.e. Novell NetWare 2.0A)
4. You plan to reserve only the last defect table Cylinder (N-1) and change the default setting of 2 reserved cyl.

To continue with low-level formatting set up, please type the following:

Y<cr>

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The screen will display:

```
Drive 1 is (HARD SECTORED, NATIVE MODE, 2 RESERVED CYL>)  
CYL:____HEAD:____PRECOMP:____CTRL:____L-ZONE:____SECTOR/TRK:
```

0 = Native mode, 1 = 17 Sector mode, 2 = 60 Sector Mode (default = 0)

- * You now have the option of choosing from three modes, as follows:

Entering 1: Use this only if you are planning to use an operating system that requires 17 sector per track formatting (i.e. Novell NetWare 2.0A). Consult your operating system users manual.

Entering 2: Use this only if the ESDI drive(s) has more than 1024 cylinders and the operating system is DOS or OS/2. The number of cylinders can be determined from the disk drive specification or by reading the above message that list CYL:____. This mapping mode is used to overcome the 1024 maximum cylinder limitation imposed by DOS or OS/2, and is only valid for ESDI disk drives with up to 480MB of capacity.

Entering 0: This is the default in all cases except the two previous mentioned (either 17 sectors per track, or drives with more than 1024 cylinders). Make your selection by entering 1 or 2, or 0 and pressing <cr>.

Then the screen will display:

```
(Manufacturer's Defect Table Cylinders.)  
Enter number of reserved cylinders (1 or 2, default=2):
```

Entering 2 will reserve the defect table cylinder (N-1) and the backup defect table cylinder (N-8). Entering 1 will reserve only the primary defect table cylinder (N-1). The backup defect table cylinder (N-8) will be erased during low-level formatting. Make your selection by entering 1 or 2, and pressing <cr>.

- * If the disk drive contains more than 1024 cylinders in either the native or the 60 sector mode, then the screen will respond:

```
Truncate cylinders at 1024 for DOS or OS/2 ? (Y/N): (default is N)
```

How to proceed will depend on the following:

- * If the operating system being used is compatible with disk drives with greater than 1024 cylinders, then press:

```
n <cr>
```

However, if the operating system being used does not recognize beyond 1024 cylinders, you must press:

```
y <cr>
```

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* After making this decision, the screen will display:

Is this correct? (y/n):

* Type the following:

y <cr>

The system will automatically reboot. Load the DOS DEBUG file using the same procedures noted in step 6. However, this time the physical parameters of the disk drives – based on your updates – will be correct. Proceed with the installation by answering the next question:

You are now ready to proceed with the next step **LOW-LEVEL FORMATTING THE DRIVE.**

LOW LEVEL FORMATTING THE DRIVE

After completing the previous step, you must perform low-level formatting of the drive using the following procedure:

Do you want to change the drive mode? (y/n):

n <cr>

The screen will display:

Do you want to change the number of drives in the system? (y/n):

Type the following:

n <cr>

The screen will display:

Select which drive to format or verify (1st drive=1, 2nd drive=2, or "Q" for quit):

* Type the following:

1 <cr>

The drive parameters will be displayed.

Do you want to format (low level) this drive? (y/n)

* Type the at the prompt:

y <cr>

NOTE

If you enter n <cr>, the response will be: Do you want to Verify? (Y/N). If you enter y <cr> to the verify question, a low-level surface verification will be performed and all defects discovered will be displayed on the screen.

The defects must be manually entered in order to map out the bad sectors.

The screen will display:

All data in drive 1 WILL BE ERASED. Are you sure? (Y/N):

* Type the following:

y <cr>

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At this point the parameters of the drive will be displayed. If the drive is in the soft sector mode the following request will appear:

Enter number of sectors per track (default = __):

The default is determined by the particular soft sector disk drive used. After typing your selection, press the enter key and system will respond:

Do you want to have sector sparing? (Y/N):

If you enter y <cr> the drive will be formatted with 1 spare sector per track.

Type either n <cr> or y <cr>

The screen will then display:

Do you want to perform defect mapping? (Y/N):

* Type the following at the prompt:

y <cr>

Enter n <cr> only if you do not want the defect table to be automatically read from the drive and mapped out during low-level formatting.

Do you want to update the defect table? (Y/N):

* Type the following at the prompt:

n <cr>

Only enter y <cr> to make modifications to the disk drive defect list cylinders. The system will respond by displaying all the defects stored within the drives defect cylinder. It will be followed by this message:

Do you want to enter defect list? (Y/N):

* Type the following at the prompt:

n <cr>

Only enter y <cr> to manually enter additional defects not already stored within the drives defect cylinder. These additional defects will be mapped out during low-level formatting, but not stored permanently in the disk drive defect cylinders. The screen will then display:

Enter interleave factor (1-9), default=1):

* Type the following at the prompt:

Enter the desired interleave factor. Choose the default setting of 1 for optimum performance in most situations.

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Enter the head skew factor (0-35, default=0):

Then enter the desired head skew factor. Choose the default setting "0" for no head if you do not know the optimum head skew. The screen will then display:

All data in drive 1 WILL BE ERASED. Are you sure? (Y/N):

* Type the following at the prompt:

y <cr>

The screen will then display:

This is your last chance. Are you sure? (Y/N):

* Type the following at the prompt:

y <cr>

The system will now perform low-level formatting of the drive. When formatting is complete, a verification of the surface media will automatically be performed. When the verify is complete the screen will display:

FORMAT COMPLETE

VERIFICATION COMPLETED. TOTAL NUMBER OF TRACKS ASSIGNED AS BAD:

Exit this program as indicated. The screen will display an (A>) prompt.

To add a second disk drive, the low-level formatting procedure must be repeated.

PARTITIONING AND HIGH-LEVEL FORMATTING THE DRIVE

After low-level formatting your drive by using the DTC6280-15TX BIOS utility, you will need to partition your drive and perform high-level formatting. The primary operating systems (i.e. DOS, OS/2, Novell NetWare, UNIX, XENIX, or other operating systems) all handle disk usage and system installation differently. Refer to your particular operating system manual in order to determine how to complete partitioning and high-level formatting for your particular system.