DATA TECHNOLOGY

A DIVISION OF QUME CORPORATION

DTC6195-24
DTC6295-24

EISA ESDI CONTROLLER INSTALLATION GUIDE

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PREFACE

The DTC61/6295-24 installation guide provides complete instructions for installing the DTC61/6295-24 hard disk controller board in an EISA computer. The DTC6195-24 controller board supports two 10Mbit/sec to 24Mbit/sec ESDI hard disk drives. The DTC6295-24 controller board supports two 10 Mbit/sec to 24Mbit/sec ESDI hard disk drives and four floppy disk drives.

This guide is divided into easy-to-follow steps, providing the user with comprehensive instructions on installing and running the DTC61/6295-24 controller in the EISA computer system.

SYSTEM REQUIREMENTS

Installation of the DTC61/6295-24 controller board requires the following equipment:

- EISA Computer
- One 20-pin flat ribbon data cable (for each hard disk).
- One 34-pin twisted or flat ribbon cable for hard disk drives.
- One 34-pin twisted or flat ribbon cable for floppy disk drives (DTC6295 only)

Once the equipment listed above is available, begin the installation of the DTC61/6295-24 with STEP 1.

STEP 1: INSPECTION

Prior to installing the DTC61/6295-24 controller board into your computer, inspect the controller board for damage. If the controller board is damaged, call your vendor's customer service department for a return material authorization (RMA) number. Otherwise, proceed to STEP 2.

STEP 2: CONFIGURING THE HARDWARE SWITCHES

The DTC61/6295-24 controller board can be configured to your specific system requirements via hardware and software switches. The hardware switches define parameters that must be set prior to boot-up. The software switches are set while executing the configuration utility (STEP 5). The hardware switches must be configured prior to installing the DTC61/6295-24 controller board into the computer. Refer to table 1 for a summary of the hardware switches and to Figure 1 for the location of the hardware switches.

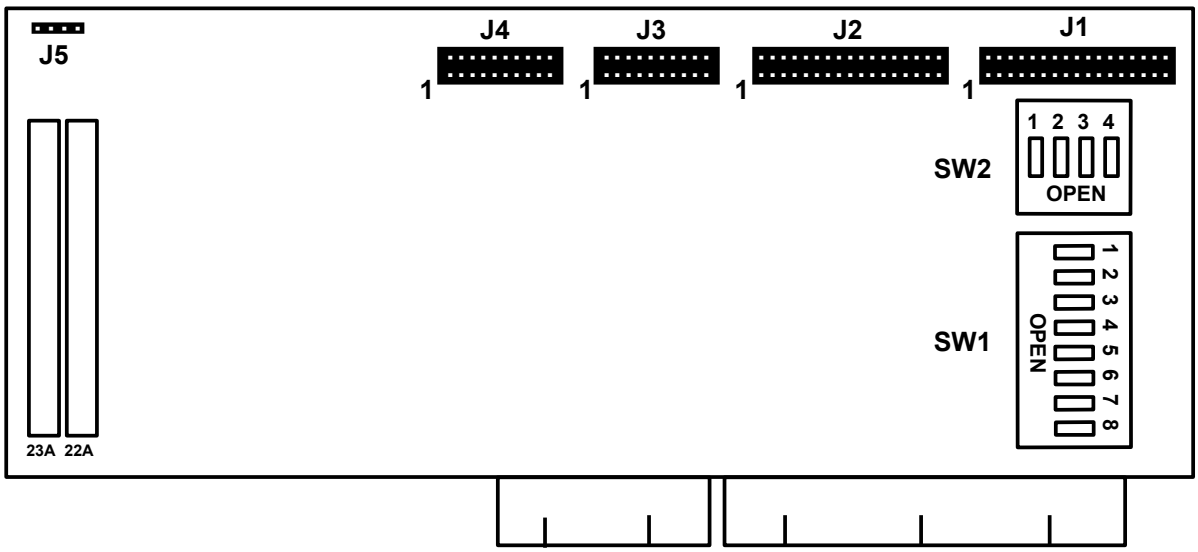
Table 1

DTC61/6295-24 Hardware Switch Summary

Switch Number	Function	Factory Setting	Default
SW1-1	BIOS Address	OPEN	C800
SW1-2	BIOS Address	OPEN	C800
SW1-3	Reserved	OPEN	----
SW1-4	Number of Default Defect Cyl	CLOSED	2 Defect Cylinders
SW1-5	BIOS Enable	CLOSED	BIOS Enabled
SW1-6	Floppy Enable (DTC6295 only)	OPEN	Floppy Controller Enabled
SW1-7	Access Mode	OPEN	Unrestricted
SW1-8	I/O Port Address	OPEN	Primary
SW2-1	Floppy Precompensation (DTC6295 only)	OPEN	Drive Determined
SW2-2	Floppy Speed (DTC6295 only)	OPEN	300KB/s,360RPM
SW2-3	Reserved	OPEN	----
SW2-4	Floppy Cable Select (DTC6295 only)	OPEN	DTC

Figure 1

DTC61/6295-24 Controller Board Outline



The function of each hardware switch is described in detail below. Review the hardware switch settings and make any appropriate changes. The factory default settings are suitable for most computer applications and typically do not need to be changed. After the hardware switches are properly set, proceed to STEP 3.

BIOS Address (SW1 – 1&2)

BIOS Occupies 16K of Memory Space

SW 1 – 1	SW 1 – 2			
OPEN	OPEN	(primary)	C800:0	(Default)
OPEN	CLOSED	(secondary)	D800:0	
CLOSED	CLOSED	(secondary)	D400:0	
CLOSED	OPEN	(primary)	D000:0	

Number of Default Defect Cylinder (SW1-4)

A list of the defective sectors is stored on the defect cylinder(s). The list of defective sectors is used during low-level formatting to map out the defective areas in the media. In ESDI disk drives, this list is held in the last cylinder, N-1 (where N equals the number of cylinders). A second identical copy of the defect list can also be held in the N-9 cylinder. The second copy of the defect list is kept in case the first copy becomes unreadable.

Selecting one defect cylinder reserves cylinder N-1 as the defect cylinder (open). Selecting two defect cylinders reserves cylinder N-1 and N-9 as the

defect cylinders (closed). It is recommended that two defect cylinders be selected to minimize the possibility of data loss.

BIOS Enable (SW1 – 5)

When closed, the on board BIOS is enabled and resides at the address defined by SW1-1&2.

Floppy Enable (SW1-6)

The DTC6295 controller board contains circuitry for supporting floppy disk drives. If the floppy disk drives are to be connected to the DTC6295 controller board, the floppy circuitry should be enabled (open). If the floppy disk drives are to be connected directly to the motherboard or to a separate floppy disk controller board, the floppy circuitry should be disabled (closed).

Access Mode (SW1-7)

Upon power-up or reset, EISA protocol is defined such that only the EISA slot specific registers are accessible. When only the EISA slot specific registers are accessible, the hard disk and floppy drives cannot be read or written. This can present a problem the first time a computer is powered-up. The system first initiates an ISA boot sequence before the EISA configuration is set. In order to alleviate this potential issue, the DTC61/6295-24 controller board can be configured to allow the hard disk, floppy disk, and EISA registers to be accessible upon power-up or reset.

When in the Unrestricted Access Mode, the hard disk, floppy disk, and EISA registers are accessible after power-up or reset (open). It is recommended that the DTC61/6295-24 controller board be set to the Unrestricted Access Mode unless otherwise noted by the system manufacturer.

Whenever the Access Mode switch is changed, the configuration utility must be updated (STEP 5).

I/O Port Address (SW1-8)

The addresses for the DTC61/6295-24 controller board registers can be set to either the primary port addresses or the secondary port addresses. On the DTC6295 controller board, the primary port addresses are 1F0H – 1F7H for hard disk registers and 3F2H – 3F7H for floppy disk registers. The secondary port addresses are 170H – 177H for hard disk registers and 372H – 377H for floppy disk registers. The DTC6195 controller board only has hard disk registers.

In most cases, the primary port addresses should be selected (open). When two hard disk controller boards are installed, one of the hard disk controller boards must be set to the secondary port addresses (closed).

Whenever the I/O Port Address switch is changed, the configuration utility must

be updated (STEP 5).

NOTE: All references to floppy switches are for the DTC6295 only

Floppy Precompensation Control (SW2-1)

The amount of precompensation is determined by the data rate of the floppy drive. To select the optional precompensation value of 125ns, regardless of the data rate, SW2-1 should be closed.

Floppy Data Rate Control (SW2-2)

This switch selects the desired data rate on high density floppy drives when using a low density floppy diskette.

SW2-2 OPEN: Floppy drives 1-4 low density mode is 300KB/s, used for single speed (ss) drives (360RPM) **(Factory setting)**

SW2-2 CLOSED: Floppy drives 1-4 low density mode is 250KB/s, used for dual speed (ds) drives (360/300RPM)

Floppy Drive Cable Option (SW2-4)

This switch is used to select either the standard cable interface method or the IBM flat cable interface standard. The standard method is the default when the switch is opened. To select the IBM flat cable option, SW2-4 must be closed. IBM method must be used when installing four floppy drives.

STEP 3: INSTALL THE DTC61/6295-24 CONTROLLER BOARD

The following steps are required to install the DTC61/6295-24 controller board into a computer:

- Power down the computer and all devices connected to it.
- Remove the cover from the computer. Refer to the computer manual for the proper procedure.
- Remove one of the metal brackets from an empty EISA expansion slot.
- Slide the connector of the DTC61/6295-24 controller board into the expansion slot on the motherboard and screw the mounting bracket onto the chassis.
- Connect the 4-pin drive light connector from the front panel of the computer to connector J5 on the DTC61/6295-24 controller board. Refer to Figure 1 for the connector J5 location.
- Install the ESDI and floppy disk drives.

After installing the DTC61/6295-24 controller board, proceed to STEP 4.

STEP 4: CONNECTING THE DISK DRIVES

The DTC6195 controller board supports up to two ESDI disk drives. The DTC6295 controller board supports up to two ESDI disk drives and four floppy disk drives. The ESDI disk drives can be any combination of 10Mbit/sec, 15Mbit/sec, and 24Mbit/sec ESDI disk drives. The floppy disk drives can be any combination of 5 1/4" and 3 1/2" floppy disk drives.

Follow the directions described below for connecting the hard and floppy disk drives to the DTC61/6295-24 controller board. All references to drive selection numbers throughout this manual assume that the Drive Selects are numbered 1 through 4. Refer to the disk drive manual(s) to verify the drive selection numbers. After connecting the disk drives, proceed to STEP 5.

CONNECTING ESDI DISK DRIVES

The ESDI disk drives are connected to the J2-J4 connectors. The connector locations and Pin 1 orientation for these connectors are shown in Figure 1. The colored edges of the ribbon cables must always be aligned with Pin 1 of both the controller board and the ESDI disk drive(s).

Proceed to the appropriate set of instructions for connecting one or two ESDI disk drives.

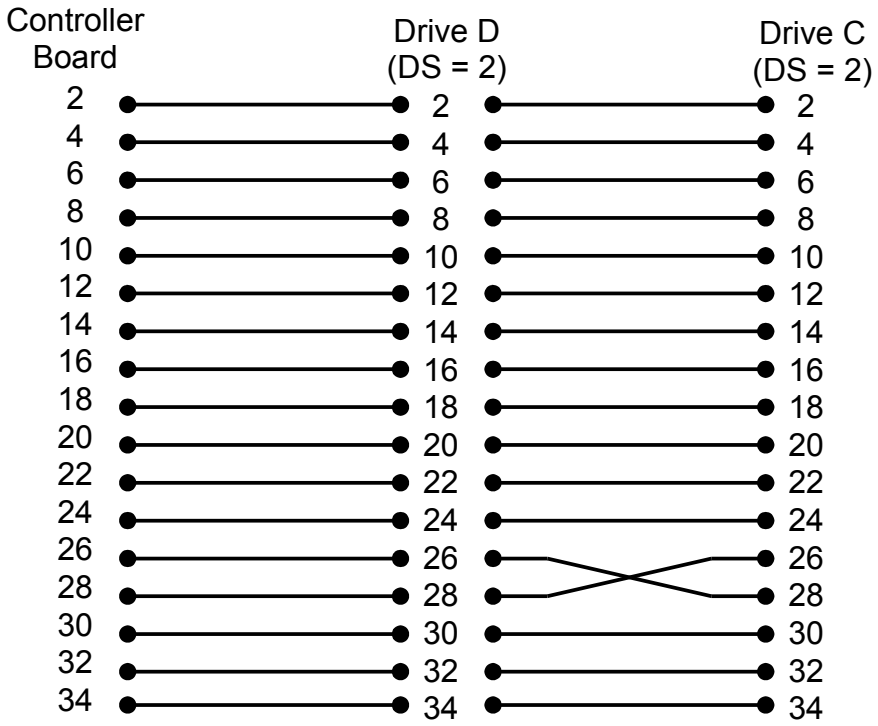
Connecting One ESDI Disk Drive

Installing one ESDI disk drive requires one 20-pin flat ribbon cable and either one 34-pin flat or twisted cable. Figure 2 shows a standard hard disk twisted cable. Follow the directions described below.

- Connect the header connector of the 34-pin ribbon cable to the J2 connector on the DTC61/6295-24.
- Connect the header connector of the 20-pin ribbon cable to the J3 connector on the DTC61/6295-24.
- Connect both the 20-pin and 34-pin ribbon cables to the edge connectors on the ESDI disk drive.
- Verify that the terminating resistor is installed on the disk drive.
- Set the Drive Select switches for Drive Select 1 when using a 34-pin flat cable.
- Set the Drive Select switches for Drive Select 2 when using the twisted cable connector of a 34-pin twisted ribbon cable.
- Proceed to the next section, CONNECTING FLOPPY DISK DRIVES.

Figure 2

Standard Hard Disk Cable



Connecting Two ESDI Disk Drives

Installing two ESDI disk drives requires two 20-pin flat ribbon cables and one 34-pin flat or twisted ribbon cable. Figure 2 shows a standard hard disk twisted cable. Follow the directions described below.

- Connect the header connector of the 34-pin ribbon cable to the J2 connector on the DTC61/6295-24.

- Connect the header connector of the 20-pin ribbon cables to the J3 connector on the DTC61/6295-24 for Drive 1 and to the J4 connector for Drive 2.

- Attach the connectors of the 20-pin ribbon cables and the 34-pin ribbon cable to the edge connectors of both disk drives.

- Verify that the last physical drive on the 34-pin ribbon cable has the terminating resistor installed. Remove the terminating resistor from the other disk drive.

- If a 34-pin flat ribbon cable is used, set drive 1 to Drive Select 1, and set drive 2 to Drive Select 2.

- If using a 34-pin twisted daisy-chained ribbon cable, set both drives 1 and

2 to Drive Select 2.

- Proceed to the next section, CONNECTING FLOPPY DISK DRIVES.

NOTE: The following section "Connecting Floppy Disk Drives" refers to the DTC6295-24 only.

CONNECTING FLOPPY DISK DRIVES USING STANDARD CABLE METHOD

The floppy disk drives are connected to the J1 connector on the main board. The connector locations and pin 1 orientation for these connectors are shown in Figure 1. The colored edges of the ribbon cables must always be aligned with Pin 1 of both the controller board and the floppy disk drive(s). If connecting a PS/2 type floppy disk drive, the PS/2 type floppy disk drive must be installed as Drive B. This method requires that SW2-4 be opened.

Proceed to the appropriate set of instructions for connecting one, two, three, or four floppy disk drives.

Connecting One Floppy Disk Drive

Installing one floppy disk drive requires one 34-pin standard twisted cable. Figure 3 shows a standard floppy disk drive cable. Follow the directions described below.

- Connect the header connector of the 34-pin ribbon cable to the J1 connector on the DTC6295-24.

- Connect the other end of the 34-pin ribbon cable to the edge connector on the disk drive.

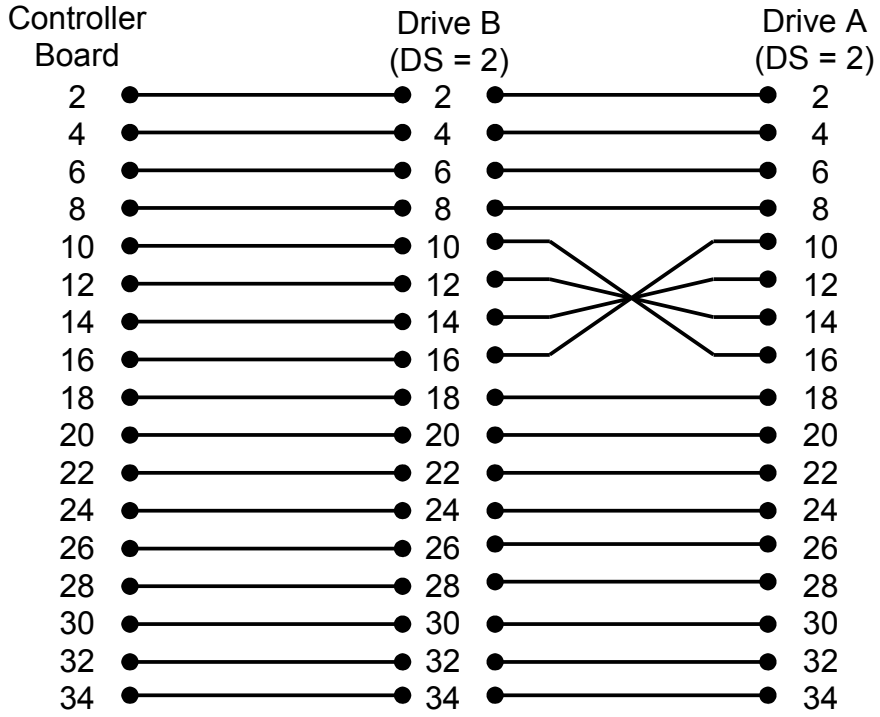
- Verify that the terminating resistor is installed on the floppy disk drive.

- Set the Drive Select switch to Drive Select 2.

- Proceed to STEP 5.

Figure 3

Standard Floppy Disk Drive Cable



Connecting Two Floppy Disk Drives

Installing two floppy disk drives requires one 34-pin standard twisted cable. Figure 3 shows a standard floppy disk drive cable. Follow the directions described below.

- Attach the header connector of the 34-pin ribbon cable to the J1 connector on the DTC6295-24.
- Attach the other end of the 34-pin ribbon cable to the edge connector on Drive A. Attach the connector in the middle of the cable to Drive B.
- Verify that the last physical drive on the 34-pin ribbon cable has the terminating resistor installed. Remove the terminating resistor from the other floppy disk drive.
- Set both drives to Drive Select 2.
- Proceed to STEP 5.

Connecting Three Floppy Disk Drives

Installing three floppy disk drives requires one 34-pin twisted cable as shown in

Figure 4. Most computers support a maximum of two floppy disk drives. In order to support three floppy disk drives, a floppy driver is required. A floppy driver is available from the following company:

MANZANA
P. O. Box 2117
Goleta, CA 93118
Phone (805) 968-1387

BASTECH
1018 Las Posas
San Clemente, CA 92672
Phone (714) 498-6269

Follow the directions described below.

- Attach the header connector of the 34-pin ribbon cable to the J1 connector on the DTC6295-24.

- Connect the three floppy disk drives to the 34-pin ribbon cable. Drive A should be attached to the middle connector. Drive B should be attached to the connector closest to the DTC6295-24 controller board. The third floppy disk drive should be attached to the connector at the end of the 34-pin cable.

- Verify that the last physical drive on the 34-pin ribbon cable has the terminating resistor installed. Remove the terminating resistors from the other floppy disk drives.

- Set all three drives to Drive Select 2.

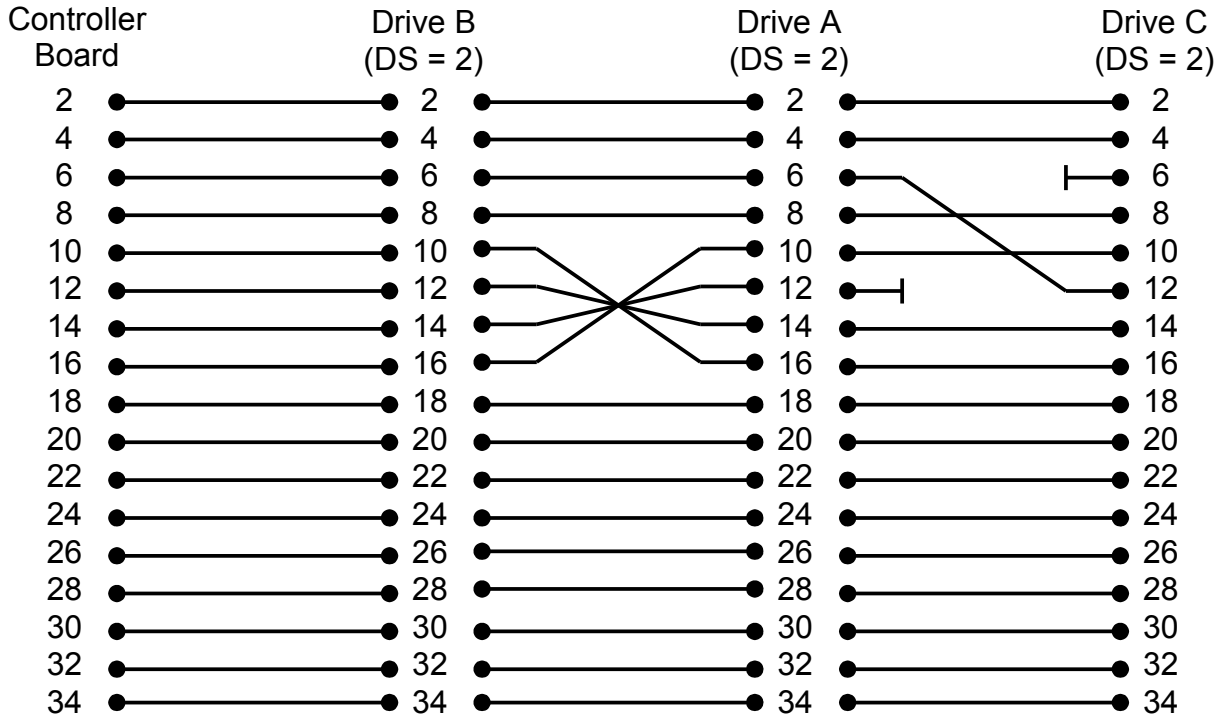
- Install the floppy driver after booting the computer.

- Proceed to STEP 5.

Figure 4

Three Floppy Disk Drive Cable

For standard Cable Method



CONNECTING FLOPPY DISK DRIVES USING IBM FLAT CABLE METHOD

The floppy disk drives are connected to the J1 connector on the main board. The connector locations and pin 1 orientation for these connectors are shown in Figure 1. The colored edges of the ribbon cables must always be aligned with Pin 1 of both the controller board and the floppy disk drive(s). If connecting a PS/2 type floppy disk drive, the PS/2 type floppy disk drive must be installed as Drive B. This method requires that SW2-4 be closed.

Proceed to the appropriate set of instructions for connecting one, two, three, or four floppy disk drives.

Connecting One or Two Floppy Disk Drives

Installing one or two floppy disk drives requires one 34-pin standard IBM flat cable. Figure 5 shows a standard IBM flat floppy disk drive cable. Follow the directions described below.

Connect the header connector of the 34-pin ribbon cable to the J1 connector on the DTC6295-24.

Use the edge connectors at the other end of the 34-pin cable to attach to one or two drives.

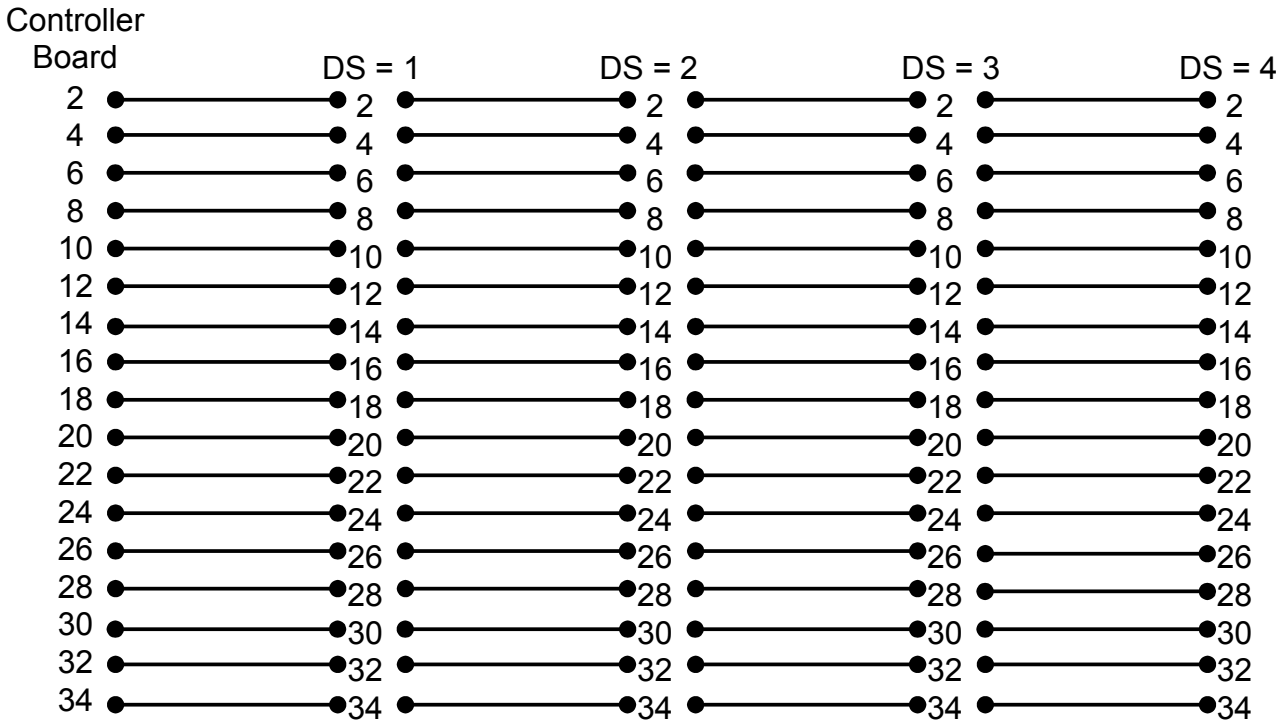
Verify that the last physical drive on the 34-pin ribbon cable has the terminating resistor installed. Remove the terminating resistor from the other floppy disk drive.

Set drive A: to drive select 1 and drive B: (if there are two) to drive select 2.

Proceed to STEP 5.

Figure 5

IBM Flat Floppy Disk Drive Cable



Connecting Three or Four Floppy Disk Drives

Installing three or four floppy disk drives requires one 34-pin IBM flat cable as shown in Figure 5. Most computers support a maximum of two floppy disk drives. In order to support three or four floppy disk drives, a floppy driver is required. A floppy driver is available from the following company:

MANZANA
P. O. Box 2117
Goleta, CA 93118
Phone (805) 968-1387

BASTECH
1018 Las Posas
San Clemente, CA 92672
Phone (714) 498-6269

Follow the directions described below.

- Attach the header connector of the 34-pin ribbon cable to the J1 connector on the DTC6295-24.

- Use any of the four edge connectors available at the other end of the 34-pin cable to attach the three or four drives.

- Verify that the last physical drive on the 34-pin ribbon cable has the terminating resistor installed. Remove the terminating resistors from the other floppy disk drives.

- Set drive A: to drive select 1, Drive B: to drive select 2, the third drive to drive select 3, and the fourth drive to drive select 4.
- Install the floppy driver after booting the computer.
- Proceed to STEP 5.

STEP 5: SOFTWARE CONFIGURATION

EISA computers provide the ability to define board parameters by executing a configuration utility. Execute the configuration utility as described in the computer manufacturer's user manual. The configuration file for the DTC61/6295-24 is called !DTC0180.CFG and is on the EISA Driver (DOS Format) diskette. The parameters that can be defined by executing the configuration file are described below. Refer to Table 2 for a summary of the software switches. The factory default settings are suitable for most computer applications and typically do not need to be changed. After executing the configuration utility, proceed to STEP 6.

Table 2

DTC61/6295-24 Software Summary

Function	Default
Floppy Subsystem	Standard Logic
Restricted Access Mode Enable	Unrestricted
I/O Port Address	Primary
Interrupt Request	IRQ14
Auto-Deselect Mode	Enabled

Floppy Subsystem

When standard AT-type floppy disk drives are connected to the DTC6295-24 controller board, select "Standard Logic" (default). When connecting a PS/2-type floppy disk drive, select "Reverse Logic". If the floppy controller is disabled (SW1-6 is closed), select "Disable Floppy Controller".

Access Mode

Set the mode to the same mode as defined by SW1-7. The default is Unrestricted Access Mode.

I/O Port Address

Set the address to the same address as defined by SW1-8. The default is Primary Port Address.

Interrupt Request

This allows the user to choose IRQ14 or IRQ15 for the hard disk controller interrupt. The default is IRQ14.

Auto-Deselect Mode

The Auto-Deselect mode controls the drive select light. When enabled, the drive select light is illuminated only when a disk drive is selected. When disabled, the drive select light will remain illuminated after selection.

STEP 6: SETUP AND FORMATTING

After executing the configuration utility, the next step is to setup and format the ESDI disk drives. Setup defines the parameters of the ESDI disk drives. Formatting prepares the ESDI disk drives for reading and writing. This is accomplished through the on-board BIOS. This same utility is used to enable/disable the BIOS based EISA driver for DOS.

SETUP

Use the system provided CMOS setup utility to enter the number and types of drives to be installed. If the DTC61/6295-24 on board BIOS is enabled, then set each drive to "Type 1". The DTC61/6295-24 BIOS will automatically provide the correct drive parameters to the system. If the DTC61/6295-24 BIOS is disabled, then the drive type must be set to either type 48 or 49. These drive types are typically referred to as user defined drive types. When using drive types 48 or 49 the user must enter the drive parameters.(# heads, # cylinders, # sectors)

NOTE: When installing two controllers in a co-resident system, only set up the CMOS for the drives attached to the primary controller.

LOW LEVEL FORMATTING AND VERIFICATION

The DTC61/6295-24 on-board BIOS contains a utility that can be used to low level format and verify ESDI disk drives. This utility allows the user to define the interleave factor, head skew, cylinder skew, and sector sparing. It also allows users to manually enter defect sectors and can automatically map out the defect sectors defined by the drive manufacturer. If the DTC61/6295-24 BIOS is disabled formatting can be done using the 2BDFMT.EXE program on the EISA Driver Diskette.

DATA TECHNOLOGY EISA ESDI HARD DISK FORMAT UTILITY

This utility can be accessed through the DOS DEBUG program. If the BIOS is disabled use the 2DBFMT.EXE low level format utility. To execute the utility through the BIOS routine, type "debug" at the DOS prompt. Type "g=C800:5" at the debug prompt and press "ENTER" when installing the board as the primary controller; use "g=D400:5" for the secondary controller if present. The utility is self explanatory after entering. Note the "C800" address must correspond to the selected BIOS Address, SW1 – 1&2. The BIOS must be enabled through SW1 – 5. The first screen displayed after entering the UTILITY is as follows. This screen displays the number of drives, drive parameters, and the BIOS EISA driver mode.

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EISA ESDI Hard Disk Format Utility VX.X

Current drive types selected are:

DRIVE 1 is (HARD-SECTORED, NATIVE MODE, 2 RESERVED CYLINDER)
CYL: xx HEAD: xx PRECOMP: xx CTRL: xx L-ZONE: xx SECTOR/TRK: xx

DRIVE 2 is NONE

Current access mode: Standard (AT Compatible Mode)
Change access mode to Extended (EISA Mode) ? (Y/N) : N

The BIOS driver mode can be changed between EISA and standard ISA mode. If a diskette based driver (DTCEISA.SYS) is used to boot up a higher performance system, set to EISA mode. After choosing the driver mode, the next question that appears is:

Change the drives mode ? (Y/N) : N

A "y" answer to this query will bring up a new screen and query the user on the following drive parameters:

Current drive types selected are:

DRIVE 1 is (HARD-SECTORED, NATIVE MODE, 2 RESERVED CYLINDER)
CYL: xx HEAD: xx PRECOMP: xx CTRL: xx L-ZONE: xx SECTOR/TRK: xx

0=Native, 1=17 Sec, 2=63 Sec, 3=Head Mapping-DOS ONLY (default=0)... :

NOTE: This option asks the user to select physical drive parameters (native) or 1 of 3 mapping modes for use as the drive setup to the system. For drives with capacity less than 528 MB it is recommended to use the 63 sector mapping mode. Head Mapping is recommended for drives over 528 Mbytes. This selection will allow the user to access up to 8 gigabytes under DOS.

(Manufacturer's Defect Table Cylinders.)
Enter reserve cylinders (1 or 2, default = 2) ...:

NOTE: The ANSI/ESDI spec recommends two defect cylinders be allocated.

After the selection of the mode, if the drive is greater than 1024 cylinders the utility will ask:

1024 cyl for DOS or OS/2 (Y/N)...:

If the answer is "y" the utility will limit the drive to 1024 cylinders maximum.

DRIVE 2 is NONE

Is this correct ? (Y/N) ...: Y

Reboot ? (Y/N) ...: N

If all drives attached have been configured then respond "Y". If an additional drive needs to be configured or added to the system, respond "N", and this will bring you back to the first screen.

DRIVE x is xx

CYL: xx HEAD: xx PRECOMP: xx CTRL: xx L-ZONE: xx SECTOR/TRK: xx

After the parameters are shown, the following question appears:

Change number of drives in the system ? (Y/N)...:

If you wish to change the number of ESDI disk drives, type "Y" and enter the number of ESDI disk drives. After entering the number of disk drives, the computer will reboot. Re-enter the format utility as before.

If the number of ESDI disk drives is correct, type "n" and the following message will appear on the screen:

Select drive to FORMAT/VERIFY (1,2 ,or "Q" for quit)...: 1

Enter the number of the drive to be low level formatted or verified and press "ENTER". The selected drives parameters will be displayed and the next question that appears is:

Format this drive ? (Y/N)...:

Type "Y" to low level format the selected drive. The selected drive will be low level formatted and verified. (To only perform verification, type "N". Verification performs a surface analysis on the selected disk drive). A series of questions will appear on the screen allowing the user to define low level formatting options. The next question that appears is:

Sector sparing ? (Y/N)...: N

Sector sparing allocates one sector per track to map out defect sectors. For example, if a defective sector is found, the spare sector is used in place of the defective sector. Sector sparing is recommended for use with disk drives that have a large number of media defects (50 to 100+). Sector sparing is not recommended for disk drives with only a few media defects. The next question that appears is:

Perform defect mapping ? (Y/N)...: Y

Defect Mapping automatically maps out all of the defective sectors defined in the manufacturer's defect table. Typing "Y" will cause all of the defect sectors to be mapped out. Typing "N" will cause none of the defect sectors to be mapped out. Defect Mapping is recommended for most computer applications. The next question that appears is:

Update the defect table ? (Y/N)...: N

The utility will now display the manufacturers defect list. The next statement that appears is:

Enter defect: (Y/N)... N

If you wish to manually update the defect table, type "Y". Otherwise, type "N". Only experienced users should manually update the defect table. The next statement that appears is:

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

The user is able to enter an interleave factor of 1 to 9. Maximum system performance is achieved with an interleave factor of 1. The next statement that appears is:

Enter cylinder skew (0-35, default = X)...: X

Cylinder skew is the offset between consecutive cylinders. Selecting the proper cylinder skew will optimize disk drive performance. The DTC61/6295-24 controller board automatically obtains the cylinder skew from the disk drive and uses the cylinder skew from the disk drive as the default value. If the disk drive does not report any cylinder skew, the default value will be equal to one third the number of sectors per track. Most users should select the default value by pressing "ENTER". The next statement that appears is:

Enter head skew (0-35, default = X)...: X

Head skew is the offset of the first logical sector from the index for each physical head. Optimum head skew maximizes system performance by allowing the ESDI disk drive to perform head switching without losing a revolution. The DTC61/6295-24 automatically obtains the head skew from the disk drive and uses the head skew from the disk drive as the default value. If the disk drive does not report any head skew, the default will be 1. Most users should select the default value by pressing "ENTER". The next statement that appears is:

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

This utility gives you two chances to cancel the low level format because this

operation will result in the loss of any data on the disk drive. If you type "Y" and press "ENTER" twice, the selected disk drive will be low level formatted and verified.

After low level formatting the ESDI disk drive, the following question appears:

Exit this program ? (Y/N)...:

If the computer system has multiple ESDI disk drives, type "N" and repeat this procedure for each drive. If the low level formatting for all ESDI disk drives is completed, type "Y" and proceed to PARTITIONING AND HIGH LEVEL FORMAT.

PARTITIONING AND HIGH-LEVEL FORMAT

After low-level formatting the ESDI disk drive, the user must partition the drive and perform high-level formatting. The primary operating systems (i.e. DOS, OS/2, Novell NetWare, and UNIX) all handle disk usage and system installation differently. Refer to the particular operating system manual in order to determine how to execute partitioning and high-level formatting. Repeat this step for each disk drive. After partitioning and high level formatting, proceed to STEP 7.

STEP 7: INSTALLING SOFTWARE DRIVERS

The DTC61/6295-24 controller board comes with a complete set of software drivers for the most popular operating systems, including DOS, Novell NetWare, ISC UNIX, OS/2, and SCO UNIX. Most computer applications will not require the use of all of these software drivers. Only install the drivers that correspond to the operating system(s) that are to be used.

The software drivers allow the DTC61/6295-24 controller board to operate in the EISA mode. If the software drivers are not installed, the DTC61/6295-24 controller board will operate in the ISA mode. In the ISA mode, the performance of the DTC61/6295-24 controller board will be significantly less than in the EISA mode. Therefore, in order to achieve maximum performance, the software drivers should be installed. After installing the software drivers, the DTC61/6295-24 controller board installation will be complete.

The diskettes included with the DTC61/6295-24 controller board contain the following files:

EISA Driver Diskette

2BDFMT.EXE	DOS Format Utility
DTCEISA.SYS	DOS Driver
!DTC0102.CFG	DTC6290-15C EISA Config. File
!DTC0110.CFG	DTC6290 EISA Config. File
!DTC0180.CFG	DTC6295 EISA Config. File
DISK01.SYS	OS/2 V1.21 Driver
EISA100.DSK	Novell V3.0 Driver
ALFV31_5.DKS	Novell V3.1 Driver

ISC UNIX Diskette

BUILDEISA	Installation script
DRIVER.202	ISC V2.02 Driver
DRIVER.22	ISC V2.2 Driver
BACKTOISA	Removal Script
SPACE.2.2	ISC V2.02 Configuration File
SPACE.22	ISC V2.2 Configuration File
README	Installation Description

SCO UNIX Diskette

ZDSMSC1	SCO V3.2.2 Driver V1.0.1

ISC UNIX DEVICE DRIVER INSTALLATION

Execute the following steps to install the ISC UNIX driver.

- Install the ISC UNIX 386ix V2.0.2 or V2.2 Operating System (include the core and kernel configurations). After completing the operating system installation, bring up UNIX and log in to the root directory.

- Insert the DTC ISC UNIX driver diskette into drive A: , type "tar xv" and press "ENTER". This extracts the EISA driver and installs the script file onto the hard disk.

- Type "./buildeisa" and press "ENTER".

- Enter the number corresponding to the appropriate version of ISC UNIX and press "ENTER". The script file will re-boot the system to load the newly built kernel that contains the EISA driver. If the EISA driver detects that the EISA controller has been installed in the system, the user will see the sign-on message "EISA controller in slot xx". The EISA ISC UNIX driver installation is now complete.

- Should the EISA driver need to be removed, insert the DTC ISC UNIX driver diskette in drive A:. Type "tar xv" and press "ENTER". When all files are extracted from drive A, type "./backtoisa" and press "ENTER". The driver will be removed from the operating system.

SCO UNIX DEVICE DRIVER INSTALLATION ON DTC61/6295-24 CONTROLLERS

The "**CUSTOM**" command is used to install the SCO UNIX "**ZDSMCS1**" driver. "**CUSTOM**" is executable only by the superuser.

1. To begin installation, login as super-user and type "**custom**" and press "**ENTER**". The CUSTOM main menu appears with the following options:

   Install Remove List Quit

2. To select an option, use the arrow keys to move the cursor to your selection and press ENTER. Select the "**Install**" option.

   The "**Install**" option allows a product or system to be added. After selecting the "**Install**" option, a window appears in lower-right corner of the screen. The options that appear in the window include:
   "**A New Product**" and a list of products that are currently installed on your system.

3. Using the arrow keys, select "**New Product**" and press "**ENTER**". After selecting "**A New Product**", the following choices are displayed:

   Choose an option: [Entire Product] Package Files

4. Using the arrow keys, select "**Entire Product**" and press "**ENTER**". The following prompt is displayed:

   Insert the requested volume and press <RETURN> to continue the installation

   Insert: Distribution
   Floppy Volume 1

   Continue Quit

5. Insert the disk containing the DTC ZDSMSC1 driver for SCO UNIX and press "**ENTER**" to continue the installation. A message appears on the screen:

   Executing ZDS MSC1 Driver Init Script

   Which release of SCO UNIX are you running?

   1. 3.2.2 Enter an option or 'q' to Quit:

6. If you are running a version of SCO UNIX listed in the menu, press the corresponding number and "**ENTER**". If you are running any other

version of SCO UNIX, press "**q**" to quit.

NOTE: This driver does not support versions of SCO UNIX other than those listed in the menu above.

After entering your selection at the prompt, the following messages are displayed:

Installing ZDS MSC1 Driver
Do you wish to build a new kernel at this time? (y/n)

7. Type "**y**" and press "**ENTER**". the following messages are displayed:

The UNIX Operating System will now be rebuilt.
This will take a few minutes. Please wait.

Root for this system built is /.

The UNIX kernel has been rebuilt.

Do you want this kernel to boot by default? (y/n)

8. Type "**y**" and press "**ENTER**". The following messages are displayed:

Backing up /unix to /unix.old
Installing new /unix

The kernel environment includes device node files
and /etc/inittab.
The new kernel may require changes to /etc/inittab or
device nodes.

Do you want kernel environment rebuilt? (y/n)

9. Type "**y**" and press "**ENTER**". The following messages are displayed:

The kernel has been successfully linked and installed.
To activate it, reboot your system.

Setting up new kernel environment
Press any key to continue

10. Press "**ENTER**" to continue. When installation is complete, the main menu is displayed:

Install Remove List Quit

11. Select "**Quit**" and press "**ENTER**". A Yes/No prompt is displayed.

12. Select "**Yes**" and press "**ENTER**" to exit the CUSTOM installation program.

    Reboot the computer to use the new kernel.

REMOVING THE ZDSMSC1 DRIVER FROM SCO UNIX

Use the "**CUSTOM**" command to remove the "**ZDSMSC1**" driver from your system.

1. To begin removal, type "**custom**" and press "**ENTER**". The CUSTOM main menu appears with the following options.

   Install Remove List Quit

2. To select an option, use the arrow keys to move the cursor to your selection and press "**ENTER**".

3. Select the "**Remove**" option and press "**ENTER**". The Remove option allows a product or system to be removed.

   After selecting the Remove option, a window appears in the lower-right corner of the screen. The options that appear in the window include a list of products that are currently installed on your system.

4. Using the arrow keys, select "**ZDSMSC1**" driver and press "**ENTER**". The following choices are displayed:

Name	Inst	Size	Description
*ALL	Yes	nnn	ZDS MSC1 Driver
ZDSMSC1	Yes	nnn	ZDS MSC1 Driver

5. Select "**ALL**" and press "**ENTER**". The following prompt is displayed:

   Please verify the removal of the following packages:

   ALL

   Do you wish to continue? [Yes] No

6. Select "**Yes**" and the following messages are displayed:

   Executing ZDS MSC1 Driver Removal Script

   Do you wish to remove the ZDS MSC1 Driver? (y/n)

7. Type "**y**" and press "**ENTER**". The following prompt is displayed:

   Removing the ZDS MSC1 Driver.

Do you wish to build a kernel at this time? (y/n)

8. Type "**y**" and press "**ENTER**". The following messages are displayed:

   The UNIX Operating System will now be rebuilt.
   This will take a few minutes. Please wait.

   Root for this system build is /.

   The UNIX kernel has been rebuilt.

   Do you want this kernel to boot by default? (y/n)

9. Type "**y**" and press "**ENTER**". The following messages are displayed:

   Backing up /unix to /unix.old
   Installing new /unix
   The kernel environment includes device node files and /etc/inittab.
   The new kernel may require changes to /etc/inittab or device nodes.

   Do you want the kernel environment rebuilt? (y/n)

10. Type "**y**" and press "**ENTER**". The following messages are displayed:

    The kernel has been successfully linked and installed.
    To activate it, reboot your system.

    Setting up new kernel environment
    Press any key to continue

11. Press "**ENTER**" to continue. After completing the removal of the ZDSMSC1 driver, the main menu is displayed:

    Install Remove List Quit

12. Select "**Quit**" and Press "**ENTER**". A Yes/No prompt is displayed

13. Select "**Yes**" and press "**ENTER**" to exit the CUSTOM installation program.

    Reboot the computer to use the new kernel.

INSTALLING ADDITIONAL HARD DRIVES

To install a second hard drive, you should use the "**mkdev hd**" command. To install a third or fourth hard drive, you should use the command "**mkdev ZDSMSC1**". For more information, refer to the "**mkdev**" command in the SCO UNIX System Administrator's Reference manual. This section takes you through

the step-by-step installation procedure.

In the following example, a third hard disk is being installed onto the system. If a fourth hard disk is being added, the following steps will be repeated except Step 3. In Step 3 the response will be "**4**".

1. Enter the following command line:

   "**mkdev zdsmsc1**"

   The following prompt is displayed:

   System V Hard Disk Initialization
   What type of disk controller will support this disk?
   1. ST506 (standard disk support)
   2. OMTI 8620 or OMTI 8627 (ESDI support)
   3. SCSI

   Enter 1,2, or 3 or enter q to quit:

2. Type "**1**" and press "**ENTER**". The following prompts are displayed:

   Will this disk be the first, second, third, or fourth disk on this controller?
   Enter 1 (first), 2 (second), 3 (third), 4 (fourth):

3. Type "**3**" and press "**ENTER**". The following prompt is displayed:

   Will this disk attach to the first or second ST506 controller?
   Enter 1 (first), 2 (second):

4. Type "**1**" and press "**ENTER**". The following prompt is displayed:

   During installation you may choose to overwrite all or part of the present contents of your hard disk.

   Do you wish to continue? (y/n)

5. Type "**y**" and press "**ENTER**". Instructions for the hard disk installation and menu are displayed.

   The hard disk installation program will now invoke two disk preparation utilities: fdisk and badtrack. Selecting 'q' at the main menu for each utility will exit that utility and continue with the hard disk installation.

   To exit the entire installation at these menus, press the <DEL> key.

1. Display partition Table
2. Use Entire Disk for UNIX
3. Use Rest of Disk for UNIX
4. Create UNIX partition
5. Activate Partition
6. Delete Partition

Enter your choice or q to quit:

6. Type "**1**" and press "**ENTER**". the partition table for your current hard drive will be displayed.

   You are prompted to press "**ENTER**" to continue. After pressing "**ENTER**", the menu is redisplayed.

   Type "**2**" and press "**ENTER**". The partition table is displayed with the following warning message and prompt:

   Warning! All data on your disk will be lost!
   Do you wish to continue? (y/n)

7. Type "**y**" and press "**ENTER**". The partition table is displayed and a prompt. Press "**ENTER**" to continue, and the menu is displayed.

   Type "**q**" and then press "**ENTER**" to quit. The following menu is displayed:

   1. *Print Current Bad Track Table*
   2. *Scan Disk (You may choose Read-Only or Destructive later)*
   3. *Add Entries to Current Bad Track Table by Cylinder/Head Number*
   4. *Add Entries to Current Bad Track Table by Sector Number*
   5. *Delete Entries Individually from Current Bad Track Table*
   6. *Delete All Entries from Current Bad Track Table*

   Enter your choice or 'q' quit:

8. Type "**1**" and press "**ENTER**". A table listing the bad tracks on the current hard disk is displayed. Press "**ENTER**" to continue and the menu is redisplayed:

9. Select "**Scan Disk**" by typing "**2**" and pressing "**ENTER**". The following is displayed:

   1. Scan entire UNIX partition
   2. Scan a specified range of tracks
   3. Scan a specified file system

   Enter an option or 'q' to quit:

10. Type "**1**" and press "**ENTER**". The following menu is displayed:

    1. Quick scan (approximately 7 megabytes/min)
    2. Thorough scan (approximately 1 megabyte/min)

    Enter an option or 'q' to quit:

11. Type "**1**" or "**2**" and press "**ENTER**". The following prompt is displayed:

    Do you want this to be a destructive scan? (y/n)

12. Type "**y**" and press "**ENTER**" after the prompt. The following is displayed:

    This will destroy the present contents of the region you are scanning.
    Do you wish to continue? (y/n)

13. Type "**y**" and press "**ENTER**" after the prompt. The following is displayed:

    Scanning in progress, press 'q' to interrupt at any time
    Destructively scanning track nn/nn, nn% of scan completed

    After the scan is completed, the following menu is again displayed:

    1. *Print Current Bad Track Table*
    2. *Scan Disk (You may choose Read-Only or Destructive later)*
    3. *Add Entries to Current Bad Track Table by Cylinder/Head Number*
    4. *Add Entries to Current Bad Track Table by Sector Number*
    5. *Delete Entries Individually from Current Bad Track Table*
    6. *Delete All Entries from Current Bad Track Table*

    Enter your choice or 'q' to quit:

14. Type "**q**" and press "**ENTER**" to quit. The following is displayed:

    xx bad tracks have been identified.
    Enter the number of bad tracks to allocate space for (or press <RETURN> to use the recommended value of yy):

15. Press "**ENTER**". The divvy table is displayed and its options.

    NOTE: You will need the name of the partition number "**0**" in the divvy table. The name of that partition will be used with the "**mkdev fs**" command later in this procedure.

16. You are prompted to select an option. Type "**c**" and press "**ENTER**" to create a new file system on this division. Type "**0**" and press "**ENTER**" at the prompt:

Which division?

17. A new file system table is displayed. Type "**q**" to quit and press "**ENTER**". The following options are displayed:

    i[nstall] Install the division set-up shown
    r[eturn] Return to previous menu
    e[xit] Exit without installing a division table

    Please enter your choice:

18. Type "**i**" and press "**ENTER**" to select install. The following messages will be displayed:

    Making filesystems

    Hard disk initialization procedure completed.

You must use the "**mkdev fs**" command to complete your hard disk installation and configuration. Refer to the SCO UNIX System Administrator's Reference manual for more information on the "**mkdev fs**" command.

DOS DEVICE DRIVER INSTALLATION

BIOS BASED

The Extended EISA driver resides in the on-board BIOS. It is enabled/disabled through the FORMAT utility (refer to STEP 6). The user only needs to do the setup once. At reset or power up the BIOS will install the driver automatically if enabled. If the system supports BIOS shadowing with read and write of shadow ram, it is recommended that the BIOS be shadowed. On most systems this will improve the overall performance of the controller. The disk based driver (DTCEISA.SYS) may be used instead if the user disables the BIOS on DTC61/6295-24.

DISKETTE BASED

(If DTCEISA.SYS is used, the BIOS utility needs to be set as EISA mode at STEP 6.)

The DTCEISA.SYS file is the DOS device driver for the DTC61/6295-24 controller board and supports up to two ESDI disk drives. Execute the following steps to install the DTCEISA.SYS DOS driver:

- Install the DOS Operating System.

- Insert the EISA Driver Diskette in drive "A". Copy the file DTCEISA.SYS to the root directory in drive "C".

- Add the command, DEVICE=DTCEISA.SYS to your CONFIG.SYS file and reboot the system. The following message is displayed when the EISA driver is installed:

COPYRIGHT (C) Data Technology a division of Qume Corporation
EISA EXTENDED DRIVER VERSION x.xx DATE
V20 REV: xx DTC269 REV: xx

NOTE: If this driver is to be used with the Windows Smart Drive device driver, then the placement of DTCEISA.SYS driver in the CONFIG.SYS file is important. The CONFIG.SYS file entry DEVICE=DTCEISA.SYS must come before the DEVICE=SMARTDRV.SYS entry

OS/2 DEVICE DRIVER INSTALLATION

Execute the following steps to install the OS/2 V1.21 driver.

- Copy the DISK01.SYS file from the EISA Driver diskette to the OS/2 V1.21 INSTALL diskette.

- Reboot the computer with the OS/2 INSTALL disk in drive A:. Follow the on-screen prompts to install OS/2. Refer to the OS/2 installation guide for the proper installation.

- When OS/2 installation is complete, each attached drive must be PARTITIONED and FORMATTED before usage. Refer to the OS/2 installation guide for each of these steps.

NOVELL NETWARE 3.0 DEVICE DRIVER INSTALLATION

When installing the DTC61/6295-24 controller board in a computer with Novell NetWare, the ESDI disk drives must be mapped to 63 sectors/track. If ESDI disk drives are not mapped to 63 sectors/track, STEP 6 must be repeated using 63 sector mapping for each ESDI disk drive.

Execute the following steps to install the Novell NetWare 3.0 Driver.

- Set the DTC61/6295-24 access mode to EISA mode through STEP 6.
- Install Novell NetWare as described in the Novell NetWare manual. Name the file server and enter the IPX number.
- Insert the EISA Driver diskette into floppy drive A, type "**LOAD A:EISA100.DSK**" at the system prompt, and press "**ENTER**".
- The system will ask you for the slot number. Enter the bus slot number in which the DTC61/6295-24 controller board is installed and press "**ENTER**".
- Proceed with loading other drivers, following the instructions in the Novell NetWare manual.
- Execute the Novell NetWare installation program by typing "**LOAD INSTALL**" at the system prompt. The system will ask a series of questions about the ESDI disk drives. Answer each question as appropriate for your computer application. Proceed with the Novell NetWare installation as described in the Novell NetWare manual.

Upon completion of the INSTALL program, the DTC61/6295-24 3.0 Novell NetWare driver will be installed.

NOVELL NETWARE 3.1 DEVICE DRIVER INSTALLATION

When installing the DTC61/6295-24 in Novell 3.1, the 63 sector mapping mode is not required as in Novell 3.0.

Execute the following steps to install the Novell NetWare 3.1 Driver.

- Set the access mode to EISA mode through STEP 6.

- Install Novell NetWare as described in the Novell NetWare manual. Name the file server and enter the IPX number.

- Insert the EISA Driver diskette into floppy drive A, type "**LOAD A:ALFV31_5.DSK**" at the system prompt, and press "**ENTER**".

- The system will prompt you for the I/O port address. Enter the 1F0 for primary or 170 for secondary controller I/O port address which the DTC61/6295-24 controller board installed and press "**ENTER**". (default is primary)

- The system will prompt you for the controllers interrupt number. Enter IRQ 14 for the primary or IRQ 15 for the secondary controller board installation and press "**ENTER**". (default is primary)

- Proceed with loading the other drivers, following the instructions in the Novell NetWare manual.

- Execute the Novell NetWare installation program by typing "**LOAD INSTALL**" at the system prompt. The system will ask a series of questions about the ESDI disk drives. Answer each question as appropriate for your computer application. Proceed with the Novell NetWare installation as described in the Novell NetWare manual.

Upon completion of the INSTALL program, the DTC61/6295-24 3.1 Novell NetWare driver will be installed.

Duplexing allows Novell to support two DTC6295-24 controllers for a total of four ESDI drives for greater server capacity or Mirroring of primary drives. In order to duplex, the secondary controller must be configured prior to installing Novell. See the Co-Residency section of this manual.

- Prior to accessing any drive on the secondary controller, with Novell in the EISA mode, the on board DTC BIOS utility must be run and the access mode set to EISA.

- The driver must be loaded a second time using the secondary I/O port and IRQ15 shown above before loading Novell NetWare 3.1.

EISA System Setup for Co-Residency

The EISA System setup utility varies from manufacturer to manufacturer. However, all utilities allow the setup of a secondary controller. For this example the CF.EXE EISA Configuration Utility is used. **Note: The utility must be run before installing the secondary controller due to default bus interrupts. The following assumes that the primary controller has been installed in the EISA configuration setup.**

1. Boot up with only the primary controller installed and only to a DOS boot floppy.

2. Switch to the EISA configuration floppy containing DTC configuration files.

3. Invoke the configuration utility by typing "CF "<ENTER> at the DOS prompt.

4. Hold the <Alt> key and Press <E>; a pull-down menu will display options.

5. Use the arrow keys to move to the "Add card "option and press <Enter>; the menu is displayed with card options.

6. Use the arrow keys to find the !DTC0180.CFG file and press <Enter>.

7. The utility will display the unused EISA slots. Use the arrow keys to select the proper secondary controller target slot for the secondary controller and press <Enter>.

8. The card name will now appear in the target slot on the screen. Use the arrow keys to move the highlighted line with the secondary controller target slot and press <Enter>.

9. The secondary controller information will be displayed. Use the arrow keys to find the BIOS address line and press <Enter>.

10. Select a secondary BIOS address of D4000H and press <Enter>. The changed BIOS address will be displayed on screen.

11. Move the highlighted line to the IRQ bus interrupt line and press <Enter>. The screen will display IRQ14. Move the highlight line to IRQ15 and press <Enter>; line will now reflect the IRQ15 setting.

12. Hold the <Alt> key and Press <S> and the system pull down menu will be displayed. Use the arrow keys to choose the exit option.

13. The exit menu will display several options. Choose the "Save

configuration and exit" option and press return.

14. Power off the system and set the jumpers on the secondary controller as follows:

Switch Number	Function	Setting	Default
SW1-1	BIOS Address	CLOSED	D400
SW1-2	BIOS Address	CLOSED	D400
SW1-3	Reserved	OPEN	----
SW1-4	Number of Default Defect Cyl	CLOSED	2 Defect Cylinders
SW1-5	BIOS Enable	CLOSED	BIOS Enabled
SW1-6	Floppy Enable (DTC6295 only)	CLOSED	Floppy Controller Disabled
SW1-7	Access Mode	OPEN	Unrestricted
SW1-8	I/O Port Address	CLOSED	Secondary

15. Install the secondary controller in the target slot.

MEMORY UPGRADES

The cache memory on the DTC61/6295-24 can be configured to be 512KB or 2MB. The optimum size of the cache memory is dependent upon the computer environment. In general, a larger cache memory will result in a higher "hit ratio", reducing average access time. However, the extent to which the average access time is reduced depends upon the operating system, the application, and the type of data being accessed.

The cache memory on the DTC61/6295-24 controller board is designed to be easily changed. Any change in the memory configuration is automatically detected by the DTC61/6295-24 controller board, eliminating the need to change any jumpers or switches. Also, industry standard SIMM modules are specified to allow users to find readily available sources of SIMM modules. The DTC61/6295-24 controller board supports SIMM modules with the following specifications:

256Kx9 or 1MBx9 (3 chip SIMMs only)
CMOS Technology
100ns Access Time Maximum
Page Mode

The DTC61/6295-24 controller board supports 256K SIMM modules and 1MB SIMM modules. Table 3 shows the memory configuration for each available cache memory size. It is recommended when replacing the SIMM modules, a SIMM module tool be used to remove the SIMM modules to avoid the possibility of damaging the SIMM module sockets.

Table 3

Cache Memory Configuration

	Sockets	
Memory Size	**22A**	**23A**
512K	256	256
2MB	1MB	1MB

TECHNICAL SUPPORT

Data Technology has a technical support staff that is available from 7:30am to 5:00pm (Pacific time) Monday through Friday to assist with any technical issues that may be encountered. Data Technology's technical support staff can be reached at (408) 262-7700.

Data Technology also has implemented an electronic bulletin board system (BBS) that contains application notes, installation guides, and driver file updates. The Data Technology BBS can be reached by calling (408) 942-4197. The Bulletin Board System requires the following setup:

1200 bps or 2400bps modem
8 data bits
1 stop bit
no parity

WARNING

This device complies with Part 15 of the FCC rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation. However, there is no guarantee that interference will not occur in a particular installation. Data Technology is not responsible for any television, radio, or other interference caused by unauthorized modifications of this product.

- If interference problems do occur, try to correct the problem by one or more of the following measures:
- Reorient the receiving antenna.
- Relocate the computer with respect to the receiver.
- Move the computer away from the receiver.
- Plug the computer into a different outlet so that the computer and receiver are on different branch circuits.
- If necessary, consult your dealer or an experienced radio/television technician.

For more information, consult the FCC publication, "How to Identify and Resolve Radio-TV Interference Problems", available from:

U.S. Government Printing Office
Washington, DC 20402
Stock No. 004-000-00345-4

NOTE: When interfacing with an external device, a shielded cable must be used to comply with FCC regulations.

Modifications to this equipment that are unauthorized by the manufacturer may void the user's right to operate this device according to FCC rules.

LIMITED HARDWARE WARRANTY

Data Technology warrants this product against defects in materials and workmanship for a period of one (1) year from the date of original retail purchase. Data Technology will, at its option, repair, replace, or refund the purchase price of the defective product if returned, with a copy of the bill of sale, shipping prepaid, during the warranty period. Data Technology will not be liable for special, incidental or consequential damages arising out of the use of this product and in no event shall the liability of Data Technology exceed the actual amount paid by purchaser for the product.