

IDEplex

SCSI-to-IDE Converter

OEM Integration Manual

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FCC Class B Certification Statement

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.

WARNING: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from the one which the receiver is connected to.
- Consult the dealer or an experienced radio/TV technician for help.

The user may find the following booklet prepared by the Federal Communications Commission helpful: *The Interference Handbook*

This booklet is available from the U.S. Government Printing Office, Washington, D.C. 20402. Stock No. 004-000-00345-4.

NOTE: In order to maintain compliance with the limits of a Class B digital device, Alcita Technologies, Incorporated requires that you use quality interface cables when connecting to this device. Changes or modifications not expressly approved by Alcita could void the user's authority to operate this equipment. Refer to the manual for specifications on cabling types.

CE Notice

Marking by the symbol **CE** indicates compliance of this equipment to the EMC directive of the European Community. Such marking is indicative that this equipment meets or exceeds the following technical standards:

- EN 55022-"Limits and Methods of Measurement of Radio Interference Characteristics of Information Technology Equipment."
- EN 50082-1-"Electromagnetic compatibility -Generic immunity standard Part 1: Residential, commercial, and light industry."
- A "Declaration of Conformity" in accordance with the above standards is being made and is on file at Alcita Technologies, Incorporated.

A1 - Contacting Alcita Technologies

We can be reached a number of ways. Our contact information is as follows:

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Woburn, MA 01801 USA

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Daytona Beach, FL 32114 USA

Email Addresses:

sales@alcita.com	Sales Department
tech@alcita.com	Technical Team

World Wide Web:

Our latest drivers and product literature can be found on the Internet at the following URL:
<http://www.alcita.com>

Telephone Numbers:

1-781-376-0000	Main Number
1-781-376-0010	Fax

Sales and Administrative Offices

1-904-248-0940	Sales & Product Information
1-904-248-2881	Fax

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A2 - General Overview and Features

IDEplex, the latest innovation in mass storage integration, overcomes a number of technical and economic challenges through the simultaneous utilization of various technologies. Integrate IDEplex into a storage system and provide a more competitive offering with greater function, reliability and performance.

Lower component costs for OEMs and system integrators

SCSI CD-ROM drives are expensive. It's that simple. IDEplex allows integration of far less expensive, more available, IDE CD-ROM or DVD-ROM drives. Why pay for 7 or 8 expensive SCSI controllers, one per drive, when one is needed for an entire tower?

Faster than SCSI systems

IDEplex utilizes an Ultra-SCSI interface, which supports up to 20 MB/second transfer rates on each drive, instead of the slower Fast-SCSI only controllers.

LUN expansion cuts SCSI host adapter costs

IDEplex, a full-featured SCSI LUN expander, allows 7 or 8 CD-ROM drives to occupy one SCSI address. LUNs are part of the SCSI specification, which means existing hardware works with IDEplex. Since no modification is required, 56 SCSI devices (drives) can be attached on each SCSI host bus. It is functionally independent of the host computer's hardware and operating system since IDEplex performs its LUN to device translations completely in the hardware and in strict accordance to the SCSI specifications.

High speed RISC processing – translation without sacrifice

Transfers occur at the full speed of the drives attached due to the embedded Intel i960™ processor.

Product to market faster

IDEplex removes the delay and lets your company beat the competition to market, often by many months. What's that worth? IDE interface drives are available before their SCSI counterparts. It takes time for the drive manufacturers to incorporate the SCSI controller onto each new drive. Whether it's the latest "x" speed or new designs such as DVD, SCSI CD-ROM drives are last to market as the technology changes.

Completely transparent, no integration issues

IDEplex operates transparently to the system and device bus. The host system never knows there are IDE drives connected. The IDE CD-ROM or DVD-ROM drives look exactly like their SCSI counterparts. All SCSI commands are transparently converted and transmitted to the drives as IDE commands.

Fault-tolerant design – increased reliability and reduced down-time

When a drive develops a fault it will not affect system operation beyond its own IDE bus. The drive can be removed or replaced using the optional SureSwap hot-swap feature without requiring the host to be powered down.

An OEM building block

IDEplex is unique among OEM equipment. It is the platform for an integrated system of components that can be customized around your needs. IDEplex's versatility allows customization to meet even the most diverse customer requirements from connections for LEDs to switchable active termination to custom firmware and hardware. Customize hardware design with an optional alphanumeric display and control keypad for setting SCSI IDs, termination and other features. Or connect multiple IDEplex processors together and control them from a single keypad. Add SureSwap and end users can replace drive mechanisms on the fly.

Most operations are implemented and controlled by the RISC processor's firmware. Additional enhanced control features and various operating versions can be developed with no change in the hardware design. Example: the firmware provides the SureSwap feature which monitors/controls bus traffic when devices are hot-swapped and insures that the host computer does not lock-up or crash during the swap. This manual describes operation of all of the optional features including keypads and displays. Different firmware implementations and customized operating characteristics can be developed easily and quickly upon request.

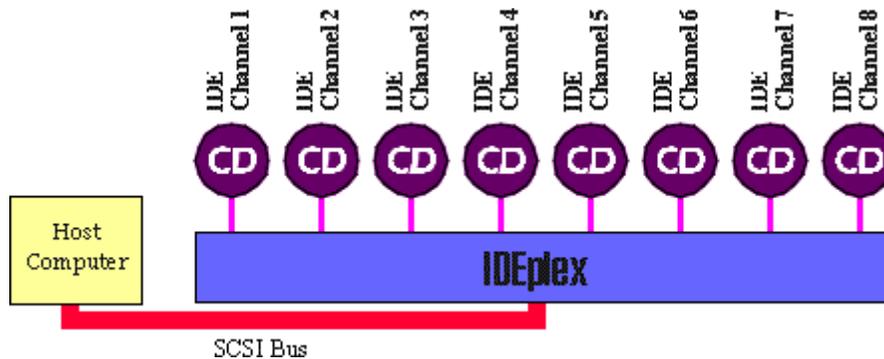
FEATURES (Some of the features listed are model dependent)

- Supports virtually all ATAPI CD-ROM drives, DVD-ROM drives and SCSI host adapters
- Supports 7 or 8 IDE CD-ROM or DVD ROM drives
- Allows up to 56 SCSI devices per SCSI bus
- High speed RISC processor
- 100% SCSI-2 compliant
- Ultra SCSI speeds up to 20 MB/second
- Optional 8 drive IDE SureSwap backplane
- Transparent to system hardware
- Transparent to host system OS
- Supports multiple block sizes
- Device drivers on host system need only be LUN aware for the system to work
- SCSI disconnect/reconnect and synchronous SCSI support for all devices
- Real-time clock and/or calendar
- Battery-backed (non-volatile) memory
- Standard IDE cables, extended-length IDE cables
- Wide and/or narrow SCSI connectors
- Firmware is on flash EEPROMs so it can be upgraded in the field without hardware replacement
- Mounts in a standard 5.25" disk drive bay or anywhere inside the tower
- Supports SureSwap hot swapping technology for all online drives
- Up to 8 LEDs (drive activity, power, mode, etc.)
- Alphanumeric display connector
- Optional SCSI terminators (active, passive, narrow, wide)
- Optional RS-232 compatible serial port for advanced functionality

A3 Technical Overview

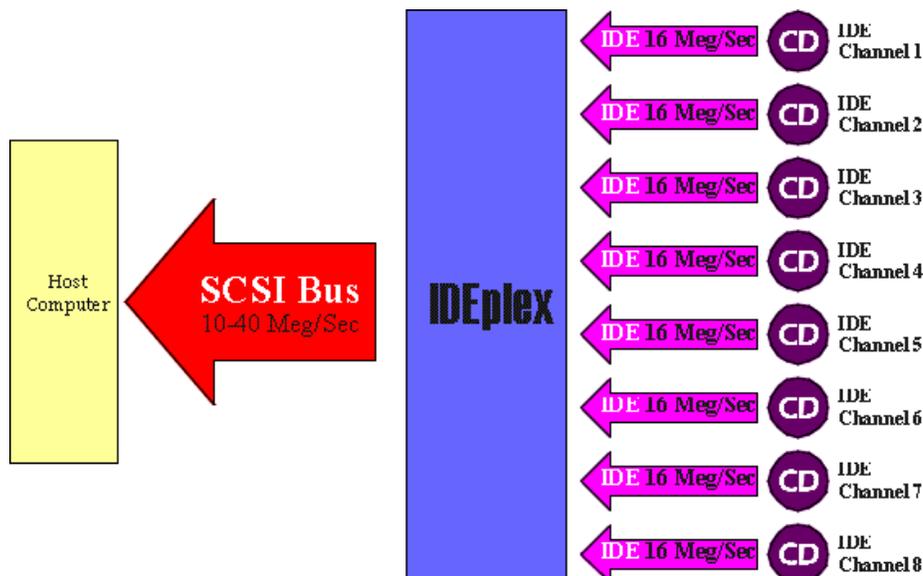
IDEplex Fundamentals

IDEplex resides on the SCSI bus taking only one SCSI ID. The IDEplex has up to 8 IDE channels. Each channel has one ATAPI CD-ROM or DVD-ROM drive connected to it. The IDEplex transparently takes commands from the host computer, and passes them to the appropriate drive on the appropriate channel. Individual drives are addressed by the SCSI host as a LUN (Logical Unit Number). The IDEplex translates the LUN to an IDE channel. Since LUNs are a standard part of the SCSI specification, the IDEplex achieves maximum compatibility with a vast majority of operating systems and host adapters. The host operates and performs as if the attached drives were standard SCSI devices.



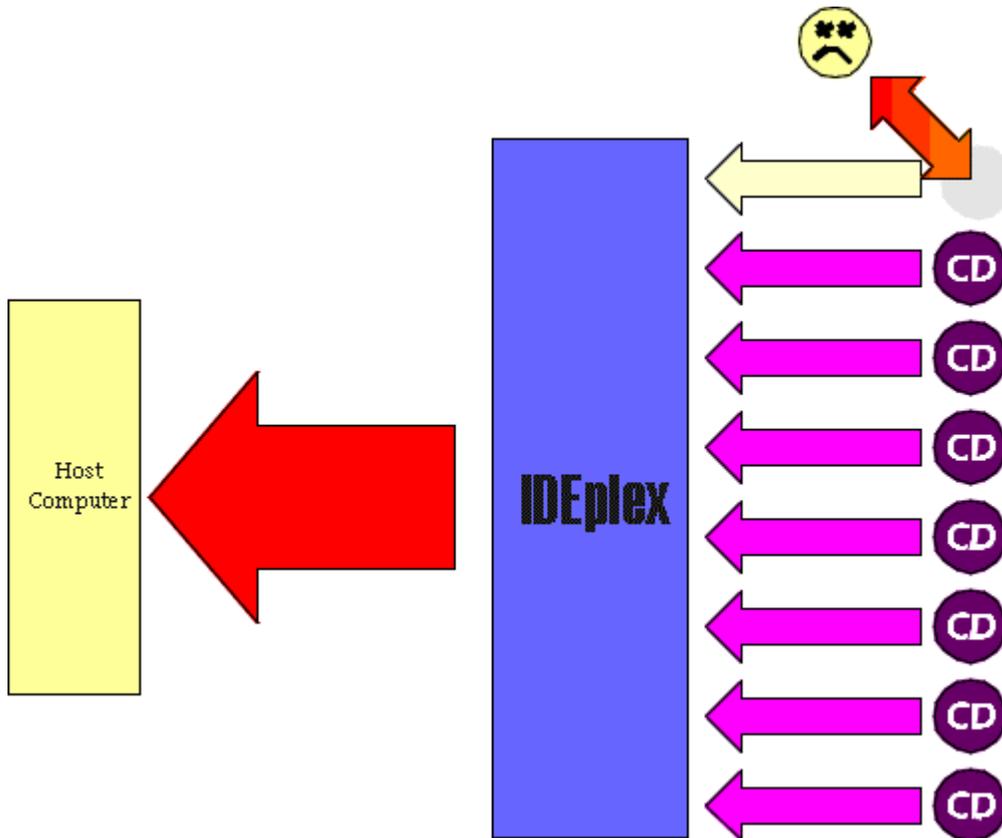
Performance

Most current ATAPI drives are capable of transferring data at up to 16 Meg/Sec. The IDEplex can route data from multiple 16 Meg/Sec. drives and pass this data onto the faster Ultra-Speed SCSI bus of the IDEplex. The result is up to twice the overall throughput when using the IDEplex with ATAPI drives compared to a tower using the same speed drive mechanism from manufacturers with a SCSI interface.



SureSwap

With SureSwap the IDEplex temporarily disables activity on one or more of your IDE channels allowing drives to be removed and replaced. Depending upon the configuration, from one to 8 switches, activity can be “paused” for all the drives in the tower or just the one channel without disrupting the operation of other drives or SCSI devices on the host system.

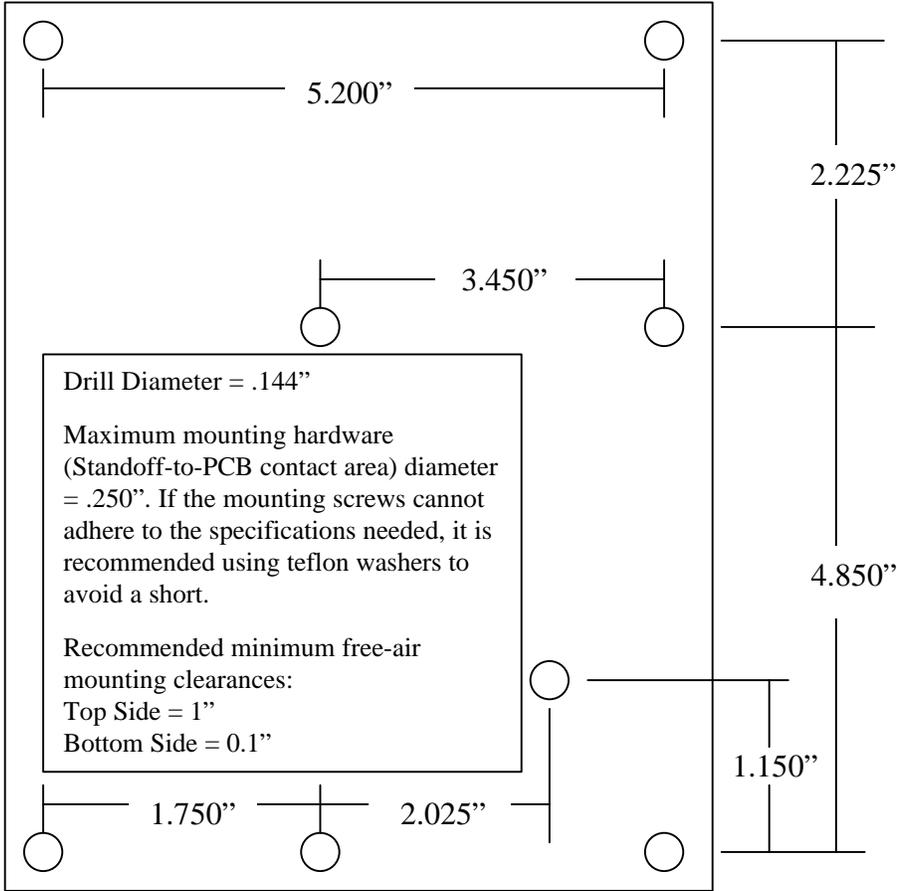


When entering “SureSwap” mode the IDEplex holds all new SCSI commands in abeyance while cueing existing requests. When current executing commands have been completed the LED output will change informing the user it is safe to swap a device. During this swapping the host OS always sees a device as available even if it is not currently in the system. This feature makes certain higher level NOS, such as NT or Novell, acceptable of drive swapping and deters host bus resets or crashes during drive swapping. Once the SureSwap switch is reset normal activity can continue.

Section B – Mounting & Dimensions

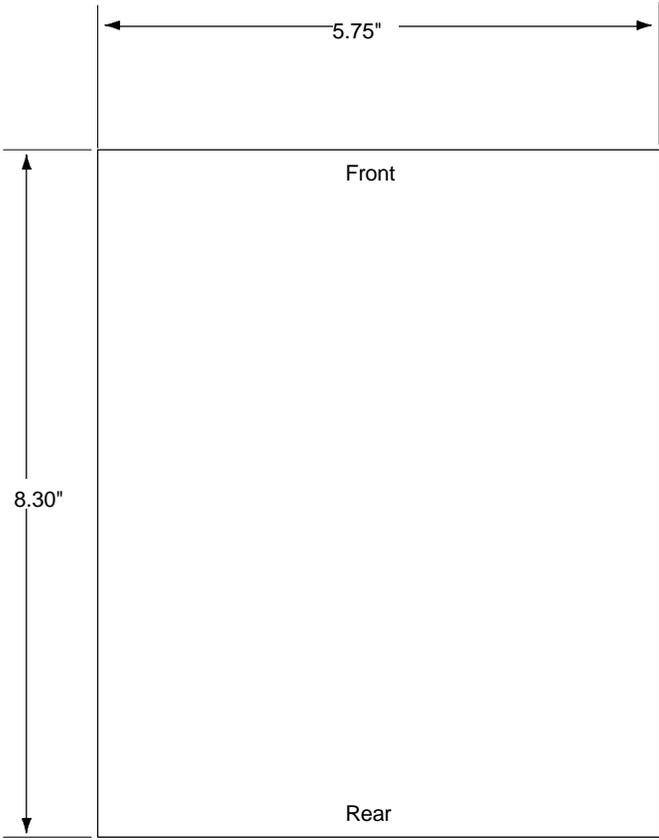
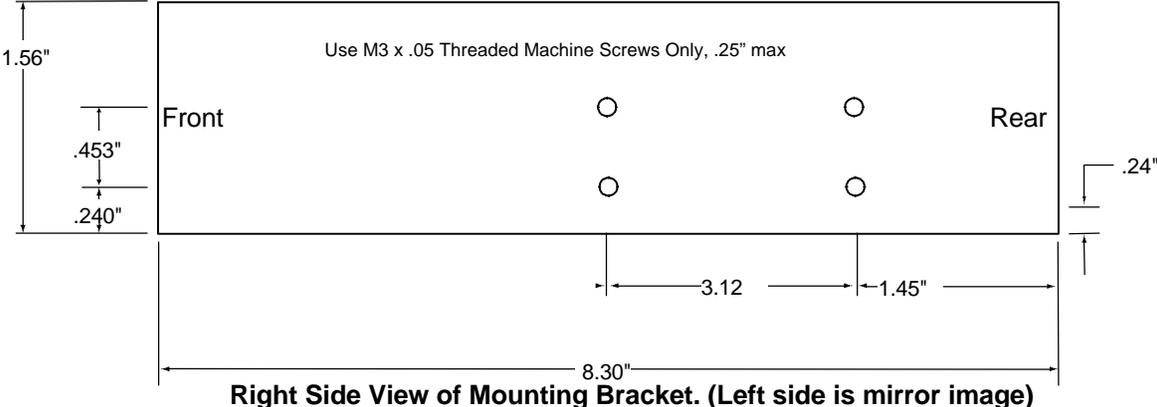
B1 Board Mounting Installation

The following diagram contains all the information needed to mount the IDEplex in an enclosure. The IDEplex can be mounted on standoffs inside the drive enclosure or with the optional 5.25" mounting bracket. In either case the IDEplex should be mounted as close to the drives as possible to minimize cable lengths.

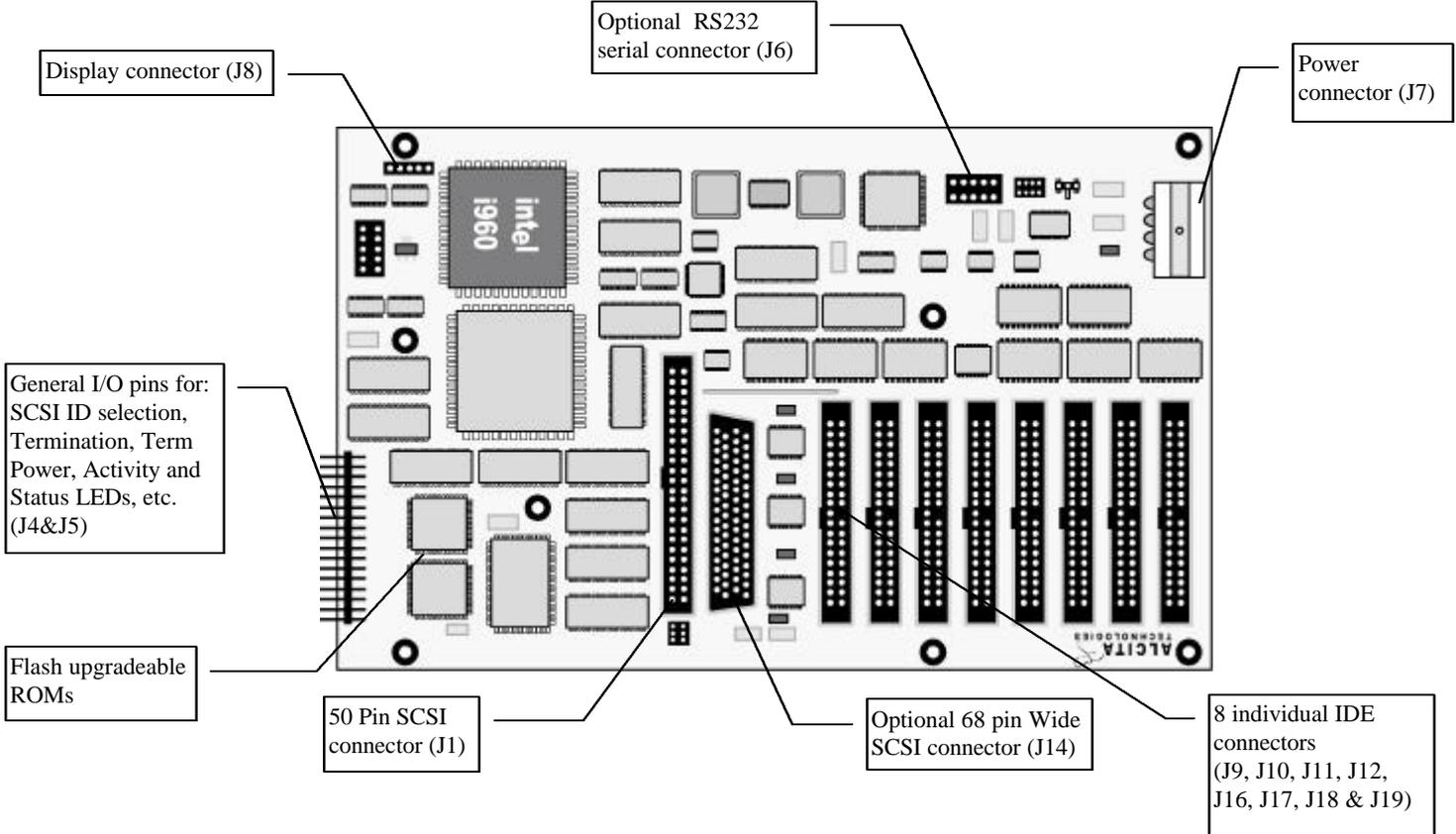


B2 Optional Mounting Bracket Dimensions & Installation

A bracket is available for mounting into a standard 5.25" half-height disk drive bay. There are holes pre-drilled and tapped to facilitate all popular hard drive mounting schemes in use today. The mounting screws cannot be more than .25" long and must not interfere with the IDEplex circuit board.



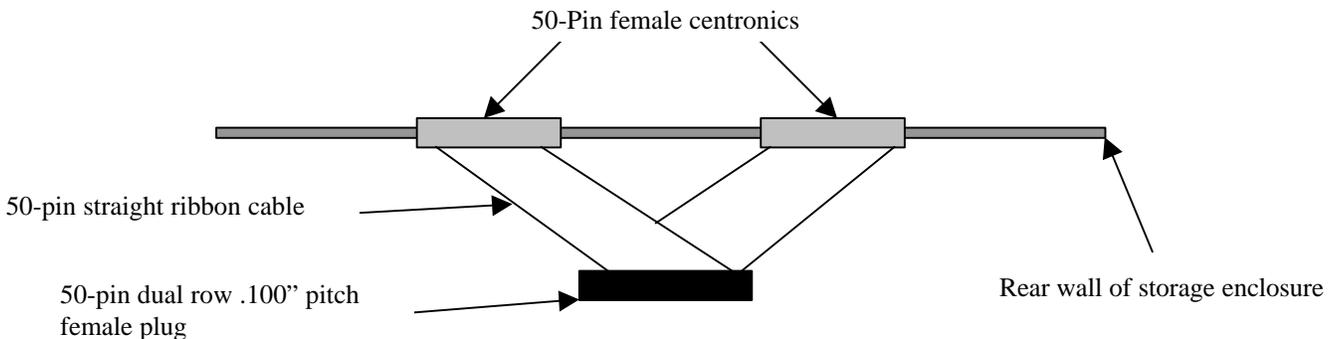
Section C – Connections and Settings



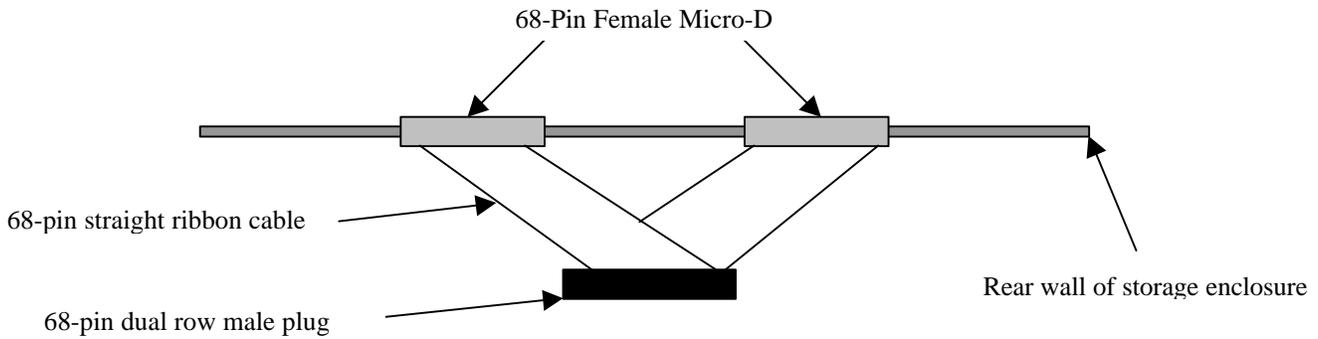
C1 SCSI Connections

Either the 50 pin connector (J1) or the 68 pin connector (J14) should be used, never both at once.

SCSI (J1) This connector is a 50 position (dual-row) .100" pitch male connector, built to ANSI SCSI-2 specifications. This connector, in most applications, will be connected to a cable, whose *center* connector (plug) is a mating female version of the board connector. At each end of this cable, are two 50-pin female Centronics-type connectors (same ANSI SCSI-2 spec.) to be mounted to the rear of the case, for external connection. The cable length should be kept to an absolute minimum. See the following diagram for cabling details.



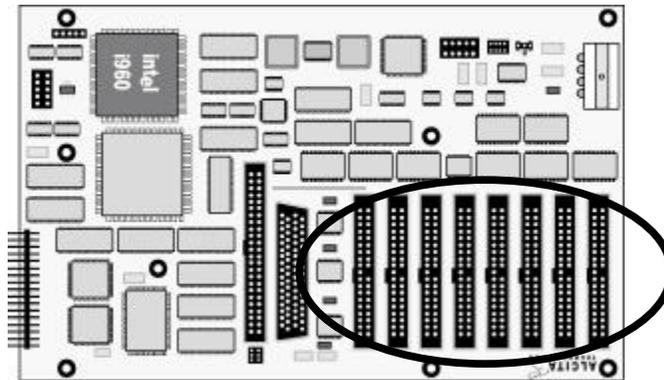
Wide SCSI (J14) This optional Wide SCSI connector can be used instead of the regular (narrow) SCSI (J1). In this scenario, the cabling topology is the same as the 50 pin connectors though the cable and connectors themselves are different. J14 is a 68-pin, dual-row, male “Micro-D” or “SCSI-2” connector. The cable uses a plug similar to the female version of this connector (68-pin, dual-row, male plug, “Micro-D”). The ribbon cable must be a 68-conductor cable. Each end of the cable has two case-through-mounted 68-pin dual row female connectors, used for external SCSI cabling connections. The cabling and connectors are all defined in the ANSI SCSI-2 specifications. See the following diagram.



C2 IDE Connections

All IDE cables (J9, J10, J11, J12, J16, J17, J18 & J19) are standard 40 position, dual-row .100" pitch ribbon cables, with pin #20 optionally plugged and/or a top-center notch for position keying per ATA specifications. For a 7-drive configuration do not connect a cable to J19.

All IDE cables can not exceed a MAXIMUM of fifteen (15) inches in total length. Cable length should be kept as short as possible and allow space for connections between the IDEplex and the drive. IDE cables must have one connector on one end, which plugs into one of the IDEplex IDE ports, and one connector on the opposite end.

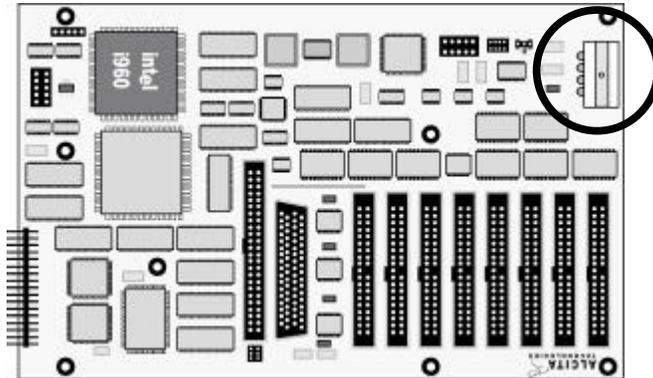


- IDE1 (J9)** The Channel one IDE cable connects between the IDE1 port at location J9, and the uppermost drive in the enclosure, in adherence to the “IDE cable” rules defined above.
- IDE2 (J10)** The Channel two IDE cable connects between the IDE2 port at location J10, and the second drive down in the enclosure, in adherence to the “IDE cable” rules defined above.
- IDE3 (J11)** The Channel three IDE cable connects between the IDE3 port at location J11, and the third drive down in the enclosure, in adherence to the “IDE cable” rules defined above.
- IDE4 (J12)** The Channel four IDE cable connects between the IDE4 port at location J12, and the fourth drive down in the enclosure, in adherence to the “IDE cable” rules defined above.
- IDE5 (J16)** The Channel five IDE cable connects between the IDE5 port at location J16, and the fifth drive down in the enclosure, in adherence to the “IDE cable” rules defined above.
- IDE6 (J17)** The Channel six IDE cable connects between the IDE6 port at location J17, and the sixth drive down in the enclosure, in adherence to the “IDE cable” rules defined above.
- IDE7 (J18)** The Channel seven IDE cable connects between the IDE7 port at location J18, and the seventh drive down in the enclosure, in adherence to the “IDE cable” rules defined above.
- IDE8 (J19)** **8 Drive systems only:** The Channel eight IDE cable connects between the IDE8 port at location J19, and the eighth drive down in the enclosure, in adherence to the “IDE cable” rules defined above.

Note: The cabling strategy may be modified to reduce cable overlapping or tangling depending upon IDEplex placement. The physical cabling order can be varied.

C3 Power Connections

Power (J7) The power connector at location J7 must be a standard ISA PC hard drive/CD-ROM drive type power connector, supplying +5, +12 with dual ground signals. Power must be supplied from the enclosure to the IDEplex. The power supply in the enclosure must provide the IDEplex sustained current of 1.75 amps (7.5 watts) from the 5 volt supply. 12 volts is not used during normal operation of the IDEplex.



Pin	Voltage
1	+5 Volts
2	Ground
3	Ground
4	+12 Volts

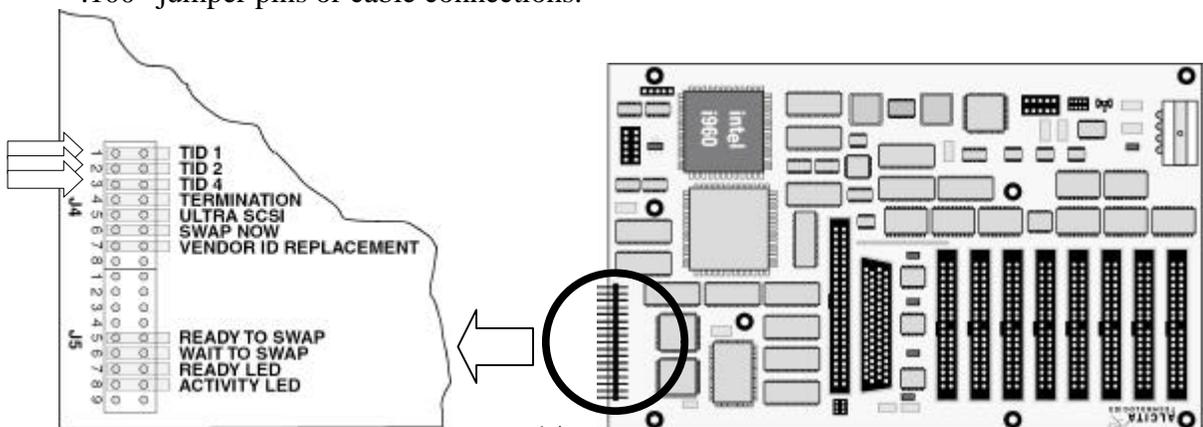
(Note: +12 Volt line is only used during EEPROM programming.)

C4 Setting the Host SCSI ID

SCSI ID (J4, pins 1-3)

The functionality of this pin-set may vary with custom configurations. Unless otherwise noted, the settings described within are for the standard configuration.

J4/J5 are standard .100" pins located at the front edge of the board and take standard .100" jumper pins or cable connections.



The first three jumper pairs control the SCSI-ID selection for the host SCSI interface. When the jumper is present, this pin pair is CLOSED. The three pairs can be jumped or connected to a rotary SCSI-ID selection switch on the rear of the storage enclosure. The output of any selection switch must be routed to the open/closed signal pins on the top of each pair and the bottom pins, closest to the circuit board, connected to the common leg of the switch.

	ID1	ID2	ID4
SCSI-ID 0	Open	Open	Open
SCSI-ID 1	Closed	Open	Open
SCSI-ID 2	Open	Closed	Open
SCSI-ID 3	Closed	Closed	Open
SCSI-ID 4	Open	Open	Closed
SCSI-ID 5	Closed	Open	Closed
SCSI-ID 6	Open	Closed	Closed
SCSI-ID 7	Closed	Closed	Closed

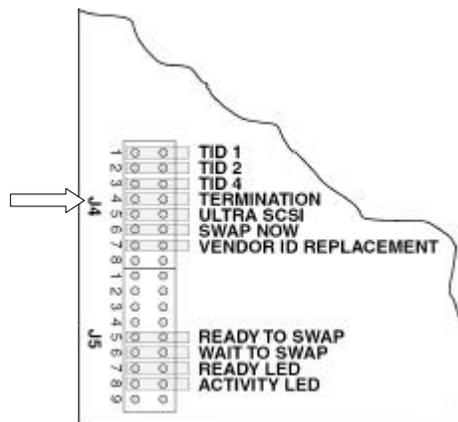
SCSI-ID Selection Diagram

C5 Setting the Optional Active Termination

Termination (J4, pin 4)

Active Termination for the SCSI host bus is an option on the IDEplex. In this configuration it is possible to build a storage tower and wire a switch to the IDEplex to provide active termination to the SCSI bus.

The termination feature can be turned OFF or ON by installing or removing the jumper from J4 pair 4. The presence of a jumper indicates that Active Termination is set to ON.

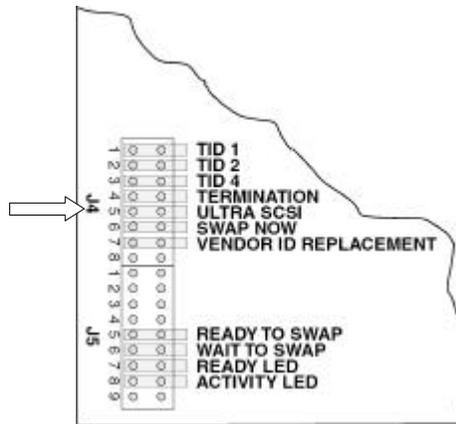


C6 Ultra SCSI Mode Selection

Ultra Mode (J4, pin 5)

Ultra SCSI mode enables the IDEplex to sustain transfer rates up to 20 Megabytes per second between the IDEplex and the host computer. By default the IDEplex operates in Fast SCSI mode which is rated at 10 Megabytes per second.

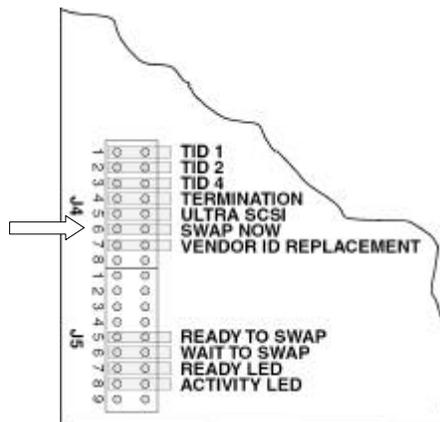
Ultra mode requires more stringent cabling and SCSI termination requirements. Per the SCSI specification: The total bus should not exceed more than 2 Meters or about 6 feet and Active Termination should be utilized. The OEM integrator needs to specifically be aware that the system they are offering can run in Ultra Mode and the End User documentation needs to reference the Ultra SCSI mode cabling requirements.



C7 Sure-Swap Request Switch

SureSwap (J4, pin 6)

The SureSwap feature is activated by closing pin pair #6 on J4. See the LED connections section for information on LED activity while the SureSwap feature is activated.

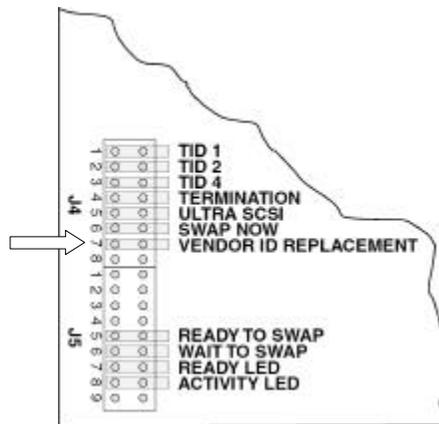


C8 Setting up Vendor ID Replacement

ID Replacement (J4, pin 7)

When closed this feature provides two functions:

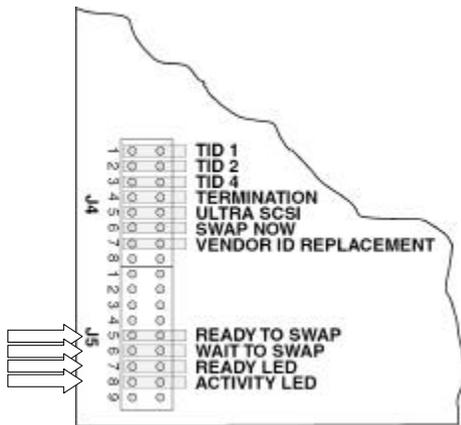
1. If an OEM utilizes custom firmware, which reports the Vendor ID of the IDEplex as their name, then an inquiry to the devices connected to the IDEplex returns a Vendor ID of this same name and not that of the device. For standard firmware, the Vendor ID shall be “Alcita”.
2. This feature can also solve very specific, and rare, driver incompatibilities with certain devices if the driver mistakenly recognizes the device as a particular vendor’s SCSI model. Since IDE drives don’t necessarily support the same command set as their SCSI counterparts, the driver may behave in an improper manner. Setting this jumper should cause the driver software to handle the drive mechanism as a universal CD-ROM drive instead of a specific device type.



C9 LED Connections

LED's (J5, pins 1-8)

J5 has eight (8) pairs of pins that drive current limited LEDs or other comparable devices. With the board laying flat and the drive connectors facing up, the bottom row of J5 is at +5 Volts and the top row is switched between +5 Volts and Ground. In the OFF state, both pins are at +5 Volts. It is recommended that cables run from LEDs at the front of the storage tower to the appropriate plugs – connected to these pairs. The six (6) pin-pairs to the left of the activity are ready LEDs and may be used for additional LEDs in some configurations.



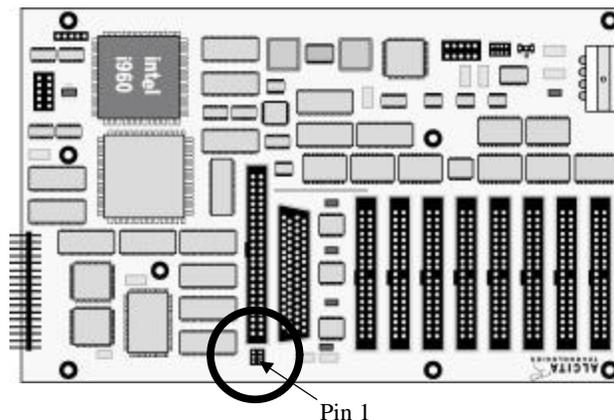
J5 Pin Pair	Standard	Optional (contact Alcita)
1	N/A	LUN 0 Activity
2	N/A	LUN 1 Activity
3	N/A	LUN 2 Activity
4	N/A	LUN 3 Activity
5	Ready to Swap	LUN 4 Activity
6	Wait to Swap	LUN 5 Activity
7	Ready LED	LUN 6 Activity
8	Activity LED	LUN 7 Activity

SCSI ID Selection Diagram

C10 Setting Termination Power

Termination Power (E1, pin 1)

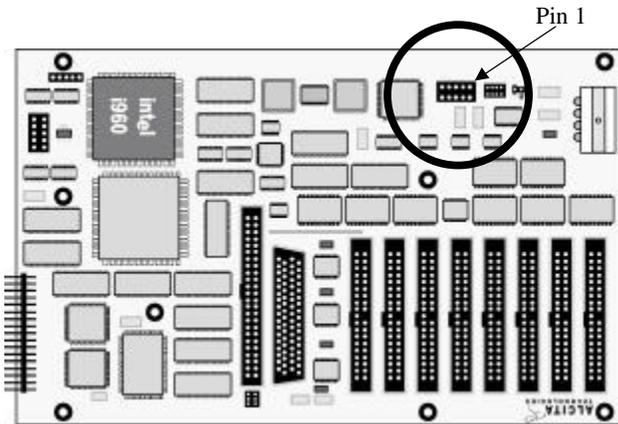
Every SCSI bus has a source of termination power known in the SCSI specifications as TERMPWR. The accepted standard is to use the SCSI host (computer) TERMPWR supply. Normally, the standard configuration for the IDEplex is to have TERMPWR set to OFF for the SCSI Host Bus. The TERMPWR can be set to ON by the presence of a jumper and OFF by the absence of a jumper. SCSI Host Bus's TERMPWR is controlled by E1 pin 1. On most configurations this jumper is missing and the TERMPWR is therefore set to OFF.



C11 Serial Connections and Setup

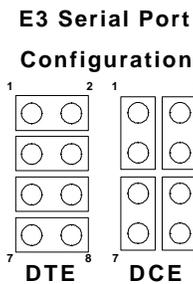
Serial Connection (J6)

J6 is an optional RS-232 connector for connecting a serial device to the IDEplex. This port is useful for diagnostics and testing or used for OEM specific requirements. The baud rate for this port is 9600. The connector was designed to easily accommodate a cable made with a 9-conductor flat ribbon cable with a 10 pin female header on one end, and a DB-9 on the other. The exact pinout for J6 changes depends upon whether the port is configured by E3 for DCE or DTE use.



Pin #	DTE	DCE
1	To Pin 4	To Pin 4
2	Transmit Data	Receive Data
3	Receive Data	Transmit Data
4	To Pin 1	To Pin 1
5	Signal Ground	Signal Ground
6	NC	NC
7	Clear To Send	Ready To Send
8	Ready To Send	Clear To Send
9	NC	NC
10	NC	NC

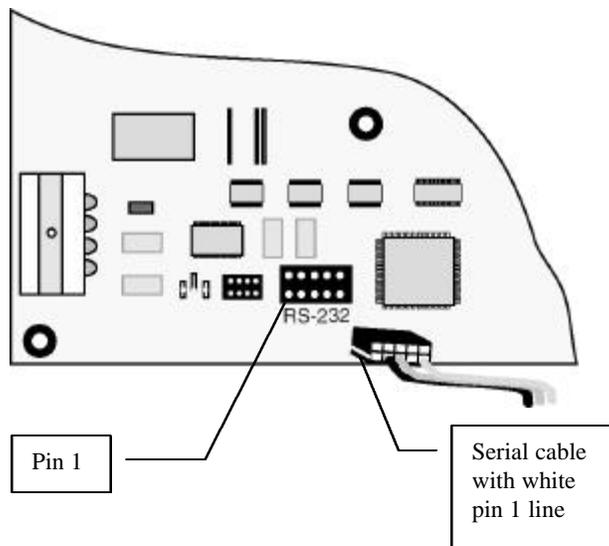
The serial port on J6 can be configured as either a DTE or DCE device depending upon the settings of the jumpers on E3. Under normal circumstances configure E3 for DTE and attach a dumb terminal or a computer running terminal software. Configure the port for DCE if connecting a DCE device such as a modem to the port to run remote diagnostics. The illustration below shows the jumper settings for the two different configurations:



C12 Serial Debugging

Once you have your serial cable, connect one end of it to the PC and the other to the IDEplex's RS-232 serial port. The cable should be keyed for Pin #1. Connect this end of the serial cable to the RS-232 serial port on the IDEplex referencing Pin #1. The RS-232 serial port is located behind the power connector. Use a terminal program like "HyperTerminal" (or equiv.) to connect to appropriate serial port. Configure port as follows:

Baud Rate..... 9600
Data Bits 8
Parity..... None
Stop Bits 1
Handshaking..... None



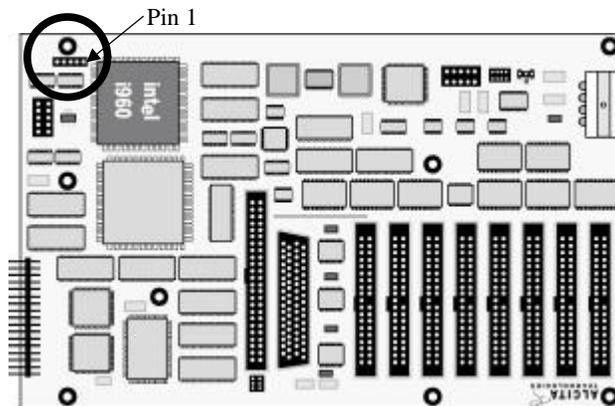
The IDEplex should send a large amount of text to the screen when turned on. **Note:** Boards with a serial port use a slightly modified version of firmware. Make sure you do not put "normal" firmware on them or the serial port will not be recognized. It is generally advisable to set your terminal program to use a large "scrollback" buffer. This will allow you to capture information and scroll-back to it when it scrolls off the screen. The bigger the scrollback, the more old information you can retain.

The following is an on-screen example of text you may see when you power cycle the IDEplex:

```
IDEplex ----- MindcrOS Build #2484 - 02-17-1999
04:44pm
--Vendor: Alcita   Product: IDEplex
Revision: 4.01   Revision Date: 02/17/99
Options: CUSTOM_XXX IDERA EIGHTDRIVES LEDTYPE_ONE
HOTSWAP_TOGGLE HSCONTROL_SWITC
H SCSI_ULTRA HIMEM_128K SERIAL
--
Ram start at 0xA000E528 Heap at 0xA0010ACC
Heap Start alligned to 0xA0010AD0
Heap ends at 0xA0020000 - 72408 Bytes of RAM 62768
Free in heap
ROM checksum calculated to be 38507514
SCSI ID on channel zero set to 1
[AUTOBOOT]
Device at LUN 0 map to Bus:1 Device:0
Device at LUN 1 map to Bus:2 Device:0
Device at LUN 2 map to Bus:3 Device:0
Device at LUN 3 map to Bus:4 Device:0
Device at LUN 4 map to Bus:5 Device:0
Device at LUN 5 map to Bus:6 Device:0
Device at LUN 6 map to Bus:7 Device:0
Device at LUN 7 map to Bus:8 Device:0
[RUNNING]
```

C13 VFD Connections

VFD (J8) If an optional Vacuum Florescent Display (VFD) device is used, a cable must run from J8 to the VFD display. The VFD is typically located either in the front-face of the storage enclosure or in the bezel faceplate in which the IDEplex is mounted. J8 is a 5 position (one-row) .100" header; its mate is on the VFD unit itself. The cable is a 5-conductor straight through, with the applicable female connectors on both ends. As always, keep the cable length as short as possible.



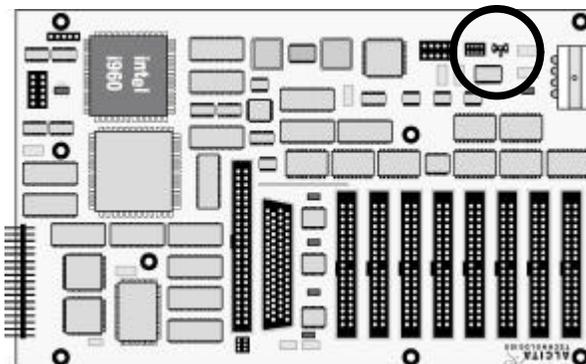
C14 Keypad Connections

Keypad (J4) Connector J4 Pin Pairs 2-7 may be connected to an optional keypad used to set configuration items, LEDs, and a menuing system for greater control of the IDEplex.

C15 EEPROM Write Protection

EEPROM Security (E4)

A jumper across E4 Pins “com” & “+12” or “com” & “+5”, “varies depending upon the make and model of EEPROM installed on the board”, will allow for flash upgrading of firmware. To Write Protect the EEPROM, remove the jumper. Models with 5V EEPROMs have the pin marked “+12” removed. **Note:** On most configurations this header is removed allowing for flash upgrading.



Section D - SCSI LUN to IDE Device Mapping

D1 SCSI LUN to IDE Device Mapping and SCSI Inquiry Description

A scan of the IDE buses occurs during the IDEplex power on sequence and determines which devices are present and dynamically maps them into a LUN conversion table. This table determines which LUN each device appears on. The LUN table starts at 0 and devices are assigned sequentially with no gaps. It also allows some operating systems, such as Windows 95, to see all devices on a tower even if a drive is missing and stops the search when an unused LUN is encountered.

When no devices are attached, the inquiry data for LUN 0 contains the vendor product, revision information for the IDEplex and a device type of 0x03 (Processor). Each LUN will respond with inquiry data representing the device mapped to that LUN if one or more IDE drives are connected. The device type returns as 0x7F (No Device) if nothing is mapped to that LUN.

SureSwap Effects on LUN Mapping

1. Removing a Drive with SureSwap

When a drive is removed with the SureSwap mechanism, the LUN is disabled and commands issued to that LUN appear as “Logical Unit Not Supported” sense response. Inquiries return a device type of 0x7F (No Device). No other LUN mappings are affected.

2. Reconnecting a Drive with SureSwap

When a drive is removed and later reconnected with SureSwap, the previously assigned LUN will be reactivated and all commands passed to the drive. Inquiries will respond with the appropriate inquiry data for the drive. No other LUN mappings are affected.

3. Adding a New Drive with SureSwap

A drive added after the last power on, and after activating SureSwap, is given a new LUN, one higher than the highest assigned LUN. Note: The drive may not be immediately available to the OS; some operating systems only recognize devices present at power on. No other LUN mappings are affected.

Gaps and Out of Sequence Drives

Removing a drive may cause a gap in the assigned LUN sequence. This gap is maintained by the IDEplex until the drive is replaced or the unit power cycled. **Note:** Some devices may disappear if the host computer is restarted without power cycling the IDEplex. Out of sequence drives may be created when drives are added to the system with SureSwap. Drives will remain out of sequence until the IDEplex is power cycled. No other adverse effects are caused by out of sequence drives.

Section E - SCSI Spec. & Command Tables

E1 Firmware Update

	7	6	5	4	3	2	1	0
0	Write Buffer OpCode = 0x3B							
1	LUN = 0x00			Reserved = 0x00		Mode		
2	Reserved = 0x00							
3	Offset (MSB)							
4	Offset							
5	Offset (LSB)							
6	Buffer Length (MSB)							
7	Buffer Length							
8	Buffer Length (LSB)							
9	1	1	Reserved = 0x00				Link	

Mode

0=Entire Buffer

4=Multi part transfer (not last part)

5=Multi part transfer (last part)

Multi-part transfers must occur sequentially and short word aligned.

Firmware Update Result Codes:

Status	Sense Code	Qualifier	Explanation
0x00 (No Error)	0x00	0x00	Firmware Update Completed Normally
0x02 (Check Condition)	0x80	0x01	Erase Error
0x02 (Check Condition)	0x80	0x02	Blank Check
0x02 (Check Condition)	0x80	0x03	Program
0x02 (Check Condition)	0x80	0x04	Verify
0x02 (Check Condition)	0x80	0x05	EEPROM Write Protection
0x02 (Check Condition)	0x80	0x06	Unidentified EEPROM

E2 Set VFD Display

	7	6	5	4	3	2	1	0
0	Write VFD OpCode = F0							
1	LUN=0x00			Reserved = 0x00				
2	Reserved = 0x00							
3	Reserved = 0x00							
4	Reserved = 0x00							
5	Reserved = 0x00							
6	Reserved = 0x00							
7	Buffer Length (MSB)							
8	Buffer Length (LSB)							
9	1	1	Reserved = 0x00				Link	

- Note: It is not recommend to use more than 20 bytes as you may encounter buffer overflow problems.

VFD Display Result Codes:

Status	Sense Code	Qualifier	Explanation
0x00 (No Error)	0x00	0x00	No Error
0x02 (Check Condition)	0x05	0x20	IDEplex Does Not Support VFD

E3 Reboot

	7	6	5	4	3	2	1	0
0	Reboot IDEplex OpCode = 0xF1							
1	LUN = 0x00			Reserved = 0x00				
2	Reserved = 0x00							
3	Reserved = 0x00							
4	Reserved = 0x00							
5	Reserved = 0x00							
6	Reserved = 0x00							
7	Reserved = 0x00							
8	Reserved = 0x00							
9	1	1	Reserved = 0x00				Link	

Section F - VFD Command Codes

F1 Codes List

The VFD module control code commands are used to control the display. The command characters are as follows. Details of each command are explained on the following pages. Column 1 represents the hexadecimal number which must be written to execute the command.

(00H)	NP	:	No Operation
(01H)	CD	:	Clear Entire Display
(02H)	SC	:	Set Cursor Position
(03H)	CM	:	Set Cursor Mode
(04H)	SB	:	Set Display Brightness Level
(05H)	IO	:	Set Input / Output Mode
(06H)	FP	:	Set Flash Positions
(07H)	FM	:	Flash Mode
(08H)	FR	:	Set Flash Rate
(09H)	FO	:	Select Character Font
(0AH)	DC	:	Load User Defined Characters
(0BH)	BM	:	Set Buffered Mode
(0CH)	PB	:	Print Message Buffer
(0DH)	R	:	Reserved
(0EH)	R	:	Reserved
(0FH)	R	:	Reserved
(10H)	R	:	Reserved
(11H)	R	:	Reserved
(12H)	R	:	Reserved
(13H)	R	:	Reserved
(14H)	R	:	Reserved
(15H)	R	:	Reserved
(16H)	R	:	Reserved
(17H)	R	:	Reserved
(18H)	C1	:	Print User Defined Character 1
(19H)	C2	:	Print User Defined Character 2
(1AH)	C3	:	Print User Defined Character 3
(1BH)	C4	:	Print User Defined Character 4
(1CH)	C5	:	Print User Defined Character 5
(1DH)	C6	:	Print User Defined Character 6
(1EH)	C7	:	Print User Defined Character 7
(1FH)	C8	:	Print User Defined Character 8

F2 Code Descriptions

- (00H) NP No Operation
Reception of this character will result in a no operation. If the module is looking for a command parameter, the command is set to its default value.
- (01H) CD Clear Entire Display
The display and message buffer are cleared of all characters and the cursor position is set to position 1. Also, the Flash Mode and Flash Positions are set to their respective default values.
- (02H) SC Set Cursor Position
The cursor position is set to one of the 32 positions of the display. The position is chosen by sending a parameter byte within the following ranges:

<u>Parameter</u>	<u>Character Position</u>
01H	Top row, left most character
10H	Top row, right most character
11H	Bottom row, left most character
20H	Bottom row, right most character

- (03H) CM Set Cursor Mode
The cursor mode determines the cursor position for the next character. Auto Increment moves the cursor position to the right after each character write. Auto Decrement moves the cursor left after each character writes and Non Increment keeps the cursor position stationary. The cursor position wraps between the 32nd and 1st positions. The mode is chosen by one of the following parameter bytes:

(01H)	Auto Increment (default)
(02H)	Auto Decrement
(03H)	Non Increment

Note: that the cursor position is determined by last character entered. Changing between modes is not retroactive to the last character entry. A change in mode is effective with the next character entry.

- (04H) SB Set Display Brightness Level
The Set Display Brightness Level command sets the brightness of the entire display to one of 255 levels. It is performed by sending the Set Display Brightness Level command and a parameter byte to determine the brightness level. Brightness ranges are shown below.

(01H) 10%	Minimum
(FFH) 100%	Maximum (default)

(05H) IO

Set Input / Output Mode

The Input / Output Mode determines how the communication between the host and module is performed. Mode 1 is unidirectional from the host to the module. Mode 2 is bi-directional (a handshake is performed before and after data is sent).

In Mode 1 -8 bit data and control codes are written to the module with the MSB first on the high to low transition of the clock. After all 8 bits have been written, the clock must be returned to a high level for a minimum of 20µS for the controller to process the received data.

In Mode 2 -data is written to the display as in Mode 1, with the exception that a handshake is performed before and after the data is sent to the module. The process is performed as follows. Before data is sent, the host must pull the clock line low. The module responds by pulling the data line low. The host then returns the clock line high and the module returns the data line high. Eight bits of data are then sent as in Mode 1. After the LSB is received, the host pulls the clock line low. The module responds by pulling the data line low. Finally the host sets the clock line high, and the module returns the data line high.

The mode is chosen by a parameter byte sent after the command byte. The values are shown below.

(01H) I / O Mode 1 (default)

(02H) I / O Mode 2

If the I / O Mode is changed, the host must delay 1ms before its next data write.

(06H) FP

Set Flash Positions

The Set Flash Positions command enables any range of characters to be flashed. The positions are chosen by sending two parameter bytes; a start flash character position and an end flash character position. Different ranges can be chosen and can overlap. The default is all flash positions cleared.

(07H) FM

Flash Mode

The flash mode is used to enable and disable display flashing. This is performed by sending the Flash Mode command followed by a parameter byte. The byte values are shown below.

(01H) Disable Flashing (default)

(02H) Enable Flashing

(08H) FR Set Flash Rate
 The rate of the flash is determined by sending the Set Flash Rate command, followed by a parameter byte in the range of 01H to FFH. The range of the flash rate is shown below.

- (01H) 50 Hz
- (30H) 1 Hz (default)
- (FFH) 1 / 10 Hz

(09H) FO Select Character Font
 The character font is chosen by sending the Select Character Font command followed by the parameter byte.

(01H) Font #1 West / Euro (default)

Level	0010	0011	0100	0101	0110	0111	1000	1001	1010	1011	1100	1101	1110	1111
xxxx0000	0	1	2	3	4	5	6	7	8	9	A	B	C	D
xxxx0001	!	@	#	\$	%	&	'	()	*	+	,	-	.
xxxx0010	:	;	<	=	>	?	0	1	2	3	4	5	6	7
xxxx0011	8	9	:	;	<	=	>	?@	AB	CD	EF	GH	IK	LM
xxxx0100	0	1	2	3	4	5	6	7	8	9	A	B	C	D
xxxx0101	E	F	G	H	I	J	K	L	M	N	O	P	Q	R
xxxx0110	S	T	U	V	W	X	Y	Z	[	]	^	_	0	1
xxxx0111	2	3	4	5	6	7	8	9	A	B	C	D	E	F
xxxx1000	G	H	I	J	K	L	M	N	O	P	Q	R	S	T
xxxx1001	U	V	W	X	Y	Z	[	]	^	_	0	1	2	3
xxxx1010	4	5	6	7	8	9	A	B	C	D	E	F	G	H
xxxx1011	I	J	K	L	M	N	O	P	Q	R	S	T	U	V
xxxx1100	W	X	Y	Z	[	]	^	_	0	1	2	3	4	5
xxxx1101	6	7	8	9	A	B	C	D	E	F	G	H	I	J
xxxx1110	K	L	M	N	O	P	Q	R	S	T	U	V	W	X
xxxx1111	Y	Z	[	]	^	_	0	1	2	3	4	5	6	7

(02H) Font #2 Katakana”

Upper nibble Lower nibble	0010	0011	0100	0101	0110	0111	1000	1001	1010	1011	1100	1101	1110	1111
xxx0000	0	a	P	˘	p	e	e	—	ア	三	十	サ		
xxx0001	!	1	A	a	a	P	S	。	ア	サ	シ	フ		
xxx0010	"	2	B	b	r	E	E	’	イ	ウ	エ	オ		
xxx0011	#	3	C	c	s	A	R	。	ウ	エ	オ	ア		
xxx0100	*	4	D	d	t	e	I	’	エ	ト	フ	ド		
xxx0101	%	5	E	e	u	a	U	’	オ	サ	シ	フ		
xxx0110	&	6	F	f	v	a	A	’	カ	コ	サ	フ		
xxx0111	’	7	G	g	u	u	K	’	カ	コ	サ	フ		
xxx1000	<	8	H	h	x	M	’	カ	コ	サ	フ	ド		
xxx1001	>	9	I	i	y	M	’	カ	コ	サ	フ	ド		
xxx1010	*	:	J	j	Z	P	’	カ	コ	サ	フ	ド		
xxx1011	+	;	K	k	C	O	’	カ	コ	サ	フ	ド		
xxx1100	.	<	L	l	i	r	’	カ	コ	サ	フ	ド		
xxx1101	—	三	M	m	)	’	カ	コ	サ	フ	ド			
xxx1110	.	>	N	n	’	O	’	カ	コ	サ	フ	ド		
xxx1111	/	?	O	o	■	’	カ	コ	サ	フ	ド			

Figure H2
Font #2 Katakana”

(0AH) DC Load User Defined Characters

The user definable characters are loaded by sending the Load User Defined Character command followed by 6 bytes of parameter data.

Byte 2: Which character is to be loaded. (1 - 8)

Bytes 3-7: 5 bytes of character data with bit zero of each byte set to 1.

	Byte				
	3	4	5	6	7
DB0	1	1	1	1	1
DB1	•	•	•	•	•
DB2	•	•	•	•	•
DB3	•	•	•	•	•
DB4	•	•	•	•	•
DB5	•	•	•	•	•
DB6	•	•	•	•	•
DB7	•	•	•	•	•

Figure H3
5x7 Character Map

- (0BH) BM Set Buffered Mode
 The module has a 32 character input message buffer that can be enabled or disabled using the Set Buffered Mode command. When the Non-buffered Mode is enabled, (display buffer only), character data is transferred to the display as it is received. When the Buffered Mode is enabled, incoming characters are moved to the display by overflowing the message buffer, or the host can perform the Print Message Buffer command. Note: The flash positions must be set for the message buffer before transferring to the display buffer. After the transfer from the message buffer to the display buffer, the message buffer is cleared and the cursor position is set to 1. The modes are chosen by the parameter byte:
- (01H) Non-buffered Mode (default)
 (02H) Buffered Mode
- (0CH) PB Print Message Buffer
 The Print Message Buffer command transfers the data from the message buffer to the display buffer. The message buffer is cleared and the cursor is then placed at position 1.
- (0D-17) Reserved
- (18H) C1 Print User Defined Character 1
 User defined character 1 is printed at the present cursor position.
- (19H) C2 Print User Defined Character 2
 User defined character 2 is printed at the present cursor position.
- (1AH) C3 Print User Defined Character 3
 User defined character 3 is printed at the present cursor position.
- (1BH) C4 Print User Defined Character 4
 User defined character 4 is printed at the present cursor position.
- (1CH) C5 Print User Defined Character 5
 User defined character 5 is printed at the present cursor position.
- (1DH) C6 Print User Defined Character 6
 User defined character 6 is printed at the present cursor position.

(1EH) C7 Print User Defined Character 7
User defined character 7 is printed at the present cursor position.

(1FH) C8 Print User Defined Character 8
User defined character 8 is printed at the present cursor position.

Section G - Technical Specifications

G1 Electrical Specifications

Voltage:

+5V +/- 10%
+12V +/- 10%

Amperage:

5V 2000 mA Maximum Peak
 1350 mA Maximum Sustained
 770 mA Typical

12V 60 mA Maximum Peak
 16 mA Typical

(Note: +12 volt power supply used only during EEPROM programming.)

G2 SCSI Specifications

Termination: Active Termination on all SCSI channels is selectable with jumpers
Host Bus SCSI ID: Adjustable from 0 to 7 via jumpers
SCSI Connectors: Standard 50-pin fast-narrow and optional 68 pin wide ribbon connectors
Disconnect Mode: Supports SCSI disconnect/reconnect
Synchronous Mode: Supports synchronous SCSI transfers
Termination Power: Can be set via jumpers to ON or OFF
Term Power Fuses: 1.5 Amp

G3 IDE Specifications

of IDE channels: 8
Support: Supports most ATAPI-4 single CD-ROM and DVD-ROM devices
Throughput: Up to 16 Meg/Sec. on each of 8 channels

G4 Reliability and Environmental Specifications

MBTF: 200,000 Hours (100% Duty)
Repair Time: <10 minutes
Temperature: 38-110F (4-42C)
Humidity: 10-85% RHG, non-condensing

G5 Sources for Additional SCSI-2 Information

For additional information on SCSI-2 Specifications request a copy of the ANSI X3.131-1986, SCSI Spec and Common Command Set Specifications from:

American National Standard Institute
11 West 42nd Street
New York, NY 10036

Or via the Internet using a World Wide Web Browser pointed to:

<http://abekas.com:8080/SCSI2/>

This is Gary Bartlett's unofficial transcription of the SCSI-2 Spec. It is a great place to start and has hypertext links to other useful SCSI-2 sources.

G6 Sources for Additional ATAPI Information

For additional information on ATAPI (AT Attachment with Packet Interface Extension (ATA/ATAPI-4)) Specifications, request a copy of the ANSI X3.***-199x, ATAPI Spec and Common Command Set Specifications from:

American National Standard Institute
11 West 42nd Street
New York, NY 10036

