Diamond Systems
Hercules II Single Board Computer
FastStart Guide

DSC Document #7460001 Rev A

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This document describes a series of quick steps to bring up and verify correct operation of your new Hercules II EBX Single Board Computer. All the elements you will need to complete this assembly are provided in the Hercules II Development Kit (Diamond Systems #DK-HRCEBX-02). Once you have your Hercules II SBC up and running, you can make further adjustments using additional elements that you supply.

The set of steps involve unpacking and identifying each part in the Hercules II Development Kit, attaching a minimum subset of cables required to verify operation, and powering the board.

Quick List of Assembly Steps

1. Install the IDE FlashDisk Drive with bootable Linux binary on primary IDE connector J16
2. Install the Utility Board (#8611002) on connector J7
3. Install the VGA cable (#6981024) and monitor on connector J25
4. Install either the PS/2 keyboard / mouse cable (#6981022) on connector J6 or one USB cable (#6081012) on connector J21 or J22 and the keyboard / mouse
5. Connect the AC Adapter to the power connector J29
6. Turn on the monitor and plug in the AC Adapter. The Hercules II board will boot to a Linux prompt.

The Hercules II EBX Development Kit

The Hercules II Development Kit contains all the pieces necessary to bring up and verify correct operation of your Hercules II EBX SBC. The following table lists the elements of the Hercules II Development Kit and each is shown in Figure 1. Please unpack and identify each item at this time. If any item is missing, please contact Diamond Systems Technical Support at 1-800-36-PC104.

Photo No.	DSC Number	Description
1	HRC800-5A512	Hercules II SBC, 800MHz, 512MB RAM, with data acquisition
2	C-HRCEBX-KIT	Hercules II Cable Kit
3	6712042	512MB FlashDisk with bootable Linux and CD
4	PS-12V-01	AC Adapter, 100-240VAC in, 12VDC / 4A out
5	6710010	Diamond Systems CD with driver software and manuals
6	MTG104	PC/104 Mounting Hardware Kit
7	ACC-IDEEXT	FlashDisk Programmer Board with 40-pin and 44-pin IDE Cables (not shown)
8	7460001	Hercules II FastStart Guide (this manual, not shown)

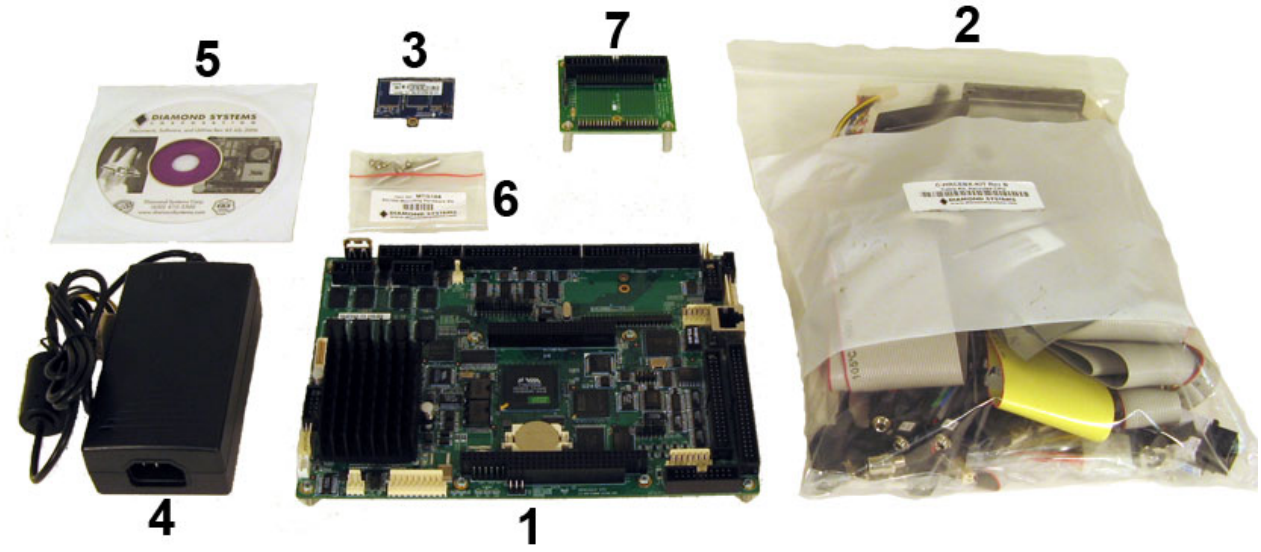

Figure 1. Hercules II Development Kit

Hercules II Cable Kit (C-HRCEBX-KIT)

Photo No.	DSC No.	Description
1	**C-PRZ-02**	Alternate 6-wire Ethernet cable with panel-mount RJ-45 connector
2	**6981022**	PS/2 Connector for Mouse and Keyboard
3	**6981025**	Audio I/O Cable (for line-level and microphone audio)
4	**6981017**	TV out cable (S-Video mini-DIN and Composite RCA jack output) NTSC-only
5	**6981018**	Amplified audio output (Speaker out), with volume control signals with stripped/tinned leads
6	**6981024**	VGA Ribbon cable to VGA Female DB15 for monitor out
7	**C-20-18**	18-inch ribbon cable for “Utility” connections (includes power and reset contacts)
8	**C-40-18**	40-wire data acquisition ribbon cable (Analog I/O)
9	**C-50-18**	50-wire data acquisition ribbon cable (Digital I/O)
10	**C-DB9M-4**	40-pin ribbon cable to 4-serial port male DE-9 connectors
11	**6981026**	UDMA/ATA-100 cable for 1 or 2 IDE drives
12	**6981004**	44-wire IDE cable for 1 or 2 laptop-style drives
13	**6981015**	Standard (low-voltage) input power cable with stripped/tinned leads for connection to external power source
14	**6981016**	Alternate High-Voltage DC power input cable
15	**6981001**	External (3V) Battery power cable
16	**6981006**	4-wire output power cable for external drives
17	**6981012**	Dual USB cable
18	**8611002**	Utility Board (used instead of **C-20-18** for development)

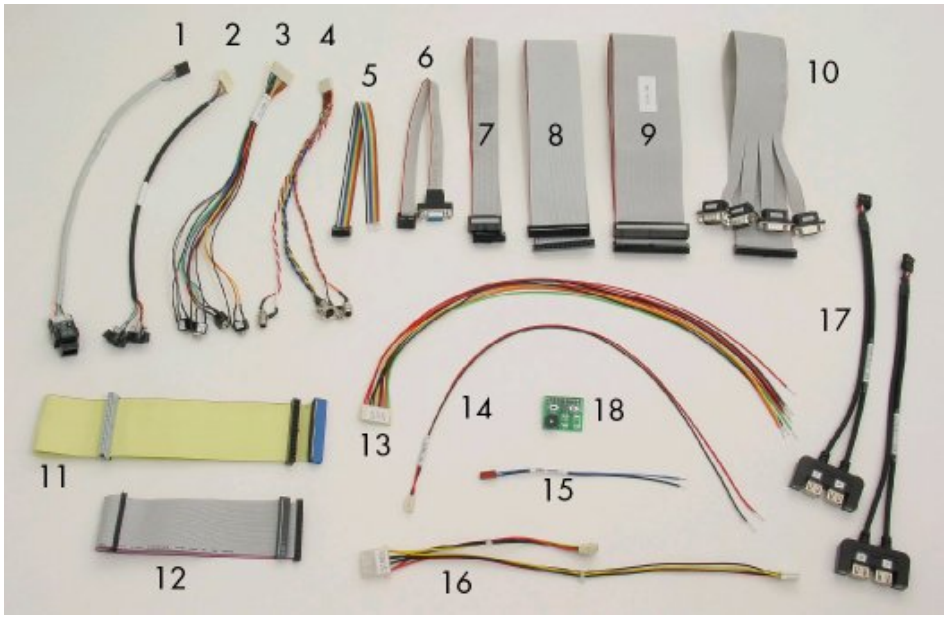

Figure 2. Hercules II Cable Kit

Other Development Kit Contents

512MB FlashDisk with bootable Linux

The Hercules II Development Kit contains a 512MB IDE FlashDisk with a bootable Linux binary providing a quick-boot compact Linux environment based on the Slackware 2.46 kernel. It is preconfigured for Hercules II and includes our Universal Driver for the Hercules II data acquisition features. Flash Linux utilizes the Minix file system for enhanced file protection during power loss or improper shutdown, and the Lilo bootloader for a quick 15 second boot time.

The Hercules II Development Kit also includes a CD which provides a binary image of the FlashDisk files that you may copy freely for use on Hercules II SBCs.

Diamond Systems Linux is also available on a hard drive (DSC# DK-LINUX-HD20) which includes all the features of the CD plus a current desktop Linux distribution, including a full set of software development tools ready to run. This can be used to create an instant development system running on the target SBC, so you can develop application code and run it immediately on the same system. Please contact your Diamond Systems representative for more information and a price quotation.

ACC-IDEEXT FlashDisk Programmer Board

In the event that you wish to connect both a FlashDisk and an IDE hard disk drive or CD-ROM drive to your Hercules II SBC, the Hercules II Development Kit comes with a FlashDisk Programmer board. When connected directly to the Hercules II board, the FlashDisk occupies the primary IDE interface connector which does not allow for a second drive to be attached to the primary IDE connector. The FlashDisk Programmer Board enables both the connection of the FlashDisk drive and a second, slave IDE device, using either a 40-pin or 44-pin IDE connector.

PS-12V-01 AC Power Adapter

The Hercules II Development Kit contains an AC Adapter with a connector that plugs directly into the power input connector of the Hercules II board. Operating with 110VAC to 240VAC input current, the AC Adapter provides sufficient current at 12VDC to power the Hercules II SBC.

Diamond Systems Software and Documentation CD

The Hercules II Development Kit contains the Diamond Systems Software and Documentation CD which provides Hercules II manuals (including this manual) and software. Software includes drivers for components specific to the Hercules II board for Windows XP and Linux along with a demonstration binary of Windows CE and Wind River's VxWorks Operating System. The CD also contains full documentation and software for Diamond Systems Universal Driver Software that supports the analog and digital I/O capabilities of Hercules II. This Universal Driver Software will operate under DOS, Windows XP/2000, Linux, Windows CE, VxWorks and QNX.

Assembling your Hercules II System

Install the FlashDisk

The flashdisk module installs directly on the IDE connector J16 and is held down with a spacer and two screws onto a mounting hole on the board. Mounting hardware is provided in the Hercules II Development Kit in the packet marked with DSC #6801008.

1. The FlashDisk module contains a jumper to determine master or slave mode. The FlashDisk must be in master mode for the BIOS to automatically detect the FlashDisk at boot time. Insure that the jumper is over pins 3-4 to set master mode (See Figure 3).

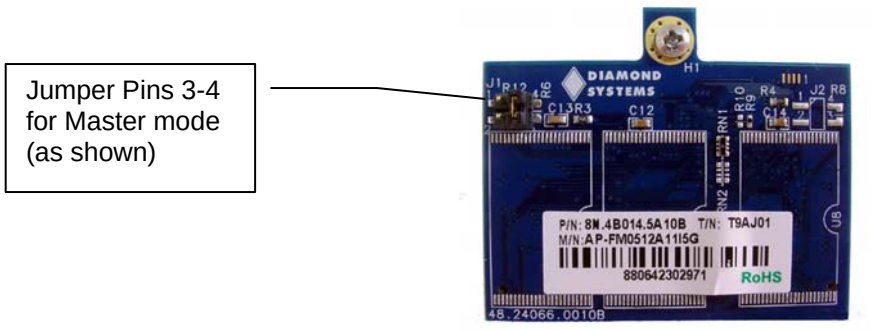

Figure 3. Layout of FlashDisk Module showing Master/Slave jumper

2. Connect round spacer DSC# 6841002 to the FlashDisk module using one 2-56x pan head screw and one #2 flat washer. The spacer should be on the side of the FlashDisk module with the female IDE connector. The washer should be on the top of the spacer. See Figure 4.
3. Attach the female IDE connector on the FlashDisk to the IDE connector J16 on the Hercules II board.
4. Fasten the FlashDisk in place by inserting one 2-56x pan head screw from the solder side of the Hercules II board into the round spacer.

Figure 5 shows the appearance of the Hercules II board with the FlashDisk attached.

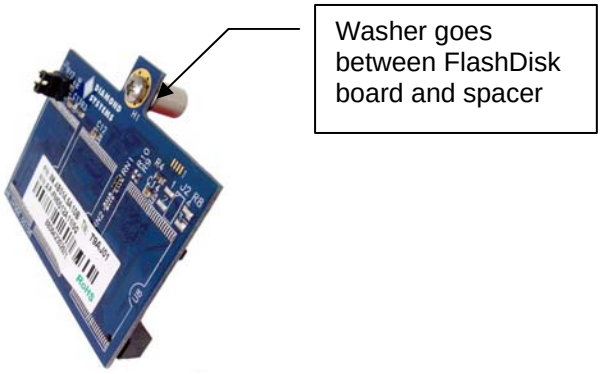

Figure 4. FlashDisk Installation

Figure 5. FlashDisk Installed on Hercules II

Install the Utility Board for Reset and Power Buttons, LEDs and PC Speaker

The Hercules II Cable Kit provides a Utility Board accessing the reset and power button signals as well as activity LEDs and the PC Speaker supported on the Hercules II connector J7. The Utility Board is shown in Figure 6. Install the Utility Board directly onto connector J7. Be sure to match pin 1 on the Utility Board female connector with pin one on connector J7 on the Hercules II board. The Utility Board should hang outside the footprint of the Hercules II SBC. *NOTE: This is not a rugged interface and is recommended for development purposes only*!

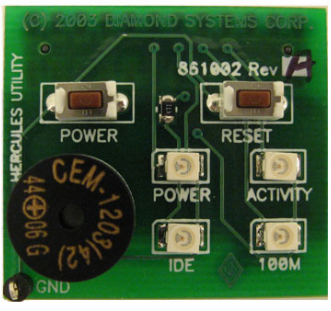

Figure 6 : Utility Board (for J7)

Install the Video Display

Hercules II SBC supports both a VGA Monitor and an LVDS flat panel interface. Because of the complexities required in interfacing the flat panel, this FastStart Guide will assume usage of a VGA-compatible Monitor.

1. Connect the video cable (DSC #6981024) provided in the Hercules II Cable Kit to the VGA connector J25 on the Hercules II board.

2. Connect a VGA-compatible CRT display to the female DB15 connector at the other end of the video cable.

Install the Keyboard and Mouse

The Hercules II SBC supports either a legacy PS/2 keyboard and mouse interface or a USB keyboard and mouse interface. For the PS/2 interface, connect the PS/2 Keyboard / Mouse cable (DSC #6981022) provided in the Hercules II Cable Kit to the Keyboard / Mouse connector J6 on the Hercules II board. Connect a PS/2 keyboard to the mini-DIN connector with KB labeled on the connector. Connect a PS/2 mouse to the mini-DIN connector with MS labeled on the connector.

For the USB interface, connect one of the two USB cables (DSC#6981012) provided in the Hercules II Cable Kit to one of the two USB connectors (either J21 or J22) on the Hercules II board. Connect a USB keyboard to one of the Type A USB connectors at the other end of the USB cable. Connect a USB mouse to one of the Type A USB connectors at the other end of the USB cable.

Note that a mouse is NOT required to prove correct operation of the Hercules II board.

Connect Power

Connect the PS-12V-01 AC Adapter provided in the Hercules II Development Kit to connector J29 on the Hercules II Board

When the FlashDisk, all cables and the AC Adapter are connected as required, your set up should appear as shown in Figure 7.

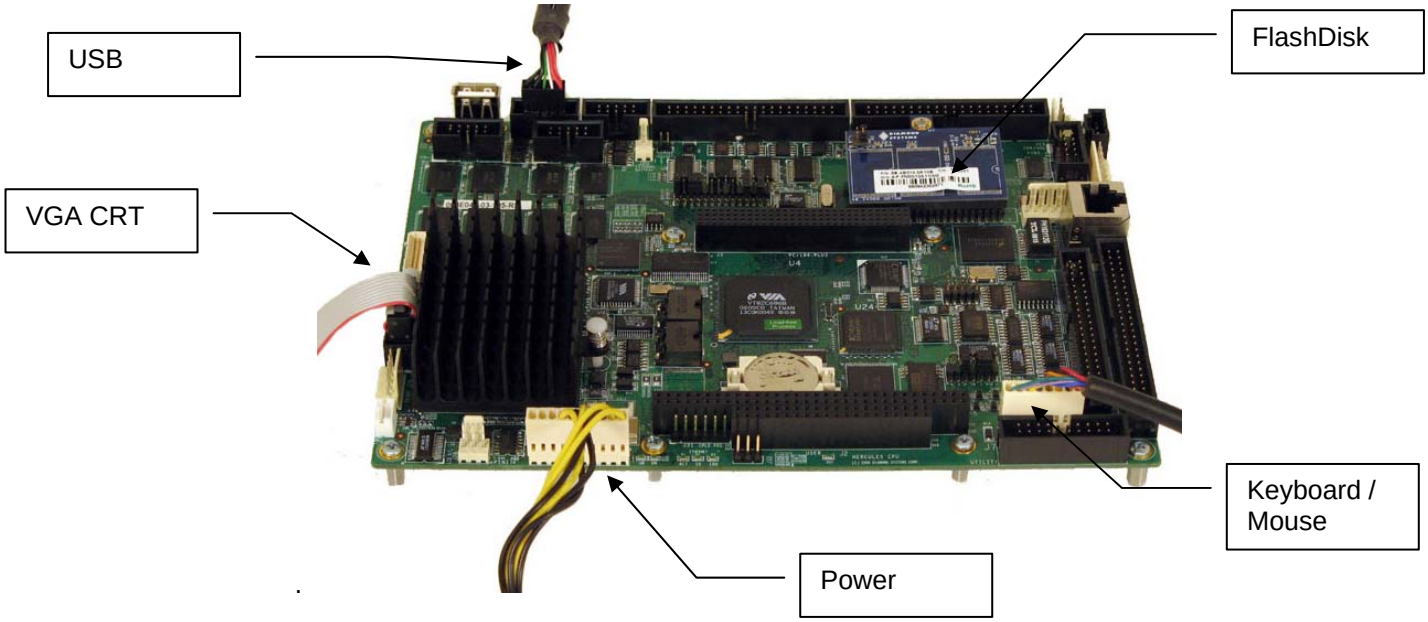

Figure 7. Hercules II with all cables installed

Apply Power to Boot the Board

Plug in the video monitor and turn it on.

Attach the power cord provided to the PS-12V-01 AC Adapter and plug the power cord into the wall. The Hercules II board will power up immediately. After the BIOS information display, you should see the Diamond Systems' linux information display and receive a prompt.

Demonstrate the Data Acquisition Operation

The Diamond Systems' linux installed on the FlashDisk contains software demonstration programs for Hercules II's data acquisition features. You may access the directory of these programs by typing:

```
>cd /root/HERC_DEMO
```

In this directory resides the source code, makefile and executables of the demonstration programs. Each demonstration program executable and source code is contained in its own directory. A good first demonstration program to run is the DSCADAutoCal program.

The DSCADAutocal program will calibrate the A/D data acquisition circuitry to guarantee accurate A/D input readings. To run the program type the following while in the demonstration programs directory:

```
>./DSCADAutoCal/DSCADAutoCal
```

The program will ask the user to input the following values:

- Base address: This is the base address of the board determined by jumper settings JP2. For demonstration purposes type 0x300.
- Range to calibrate: This is the A/D modes users would typically calibrate. The modes are 0-3, 8-15. For demonstration purposes type 255.
- Range to boot: This is the A/D mode users typically boot up the board in. The modes are 0-3, 8-15. For demonstration purposes type 0.

Once initiated the program will calibrate the mode the user specified. The process may take up to 15 seconds, after which the error values will be printed on screen for each mode; values less than +-2 are within tolerance.

For more details regarding A/D modes refer to section "Input Ranges and Resolutions" in the Hercules II User's Manual. For more information regarding the software API and functions please refer to the DSCUD software manual at http://docs.diamondsystems.com/dscud/manual_Main+Page.html.

Adding an IDE Hard Disk Drive or CD-ROM to your system

There are two methods to attach an additional IDE device such as a hard disk drive or CD-ROM to your system while continuing to use the provided FlashDisk as a primary boot device.

1. Attach the IDE device to the secondary IDE controller J17. This is a 40-pin interface and does not provide power to the IDE device. You can power the device by using the Auxiliary Power Cable (DSC #6981006) provided in the Hercules II Cable Kit connected to the External Power Connector (J15) on the Hercules II Board. You may configure the device as either master or slave. You may need to make changes to the BIOS setup to access this device.
2. Attach the IDE device to the primary IDE controller using the FlashDisk Programmer Board to provide a simultaneous connection of both the FlashDisk module and the IDE device. Instructions are provided below to install and use of the FlashDisk Programmer Board.

Install the FlashDisk Programmer Board (FDPB)

The Flash Disk Programmer Board (DSC# ACC-IDEEXT) provided with the Hercules II Development Kit enables the simultaneous connection of both a FlashDisk module and a standard IDE hard drive or CD-ROM drive to the primary IDE connector on the Hercules II board.

1. Install the FlashDisk to connector J2 on the FlashDisk Programmer Board using the instructions provided above.
2. Connect the J1 connector on the FDPB to the primary IDE connector (J16) on the Hercules II SBC with a 44-pin ribbon cable (DSC#6981004) provided in the Hercules II Cable Kit.
3. Connect your IDE device to either the 40-pin .1” spacing J4 connector on the FDPB or the 44-pin 2mm spacing J3 connector on the FDPB. A FlashDisk and any second IDE device (i.e. HDD or CD-ROM) may be connected simultaneously using this board with proper master / slave jumper configurations on both the FlashDisk and the IDE device. To boot from the FlashDisk, insure that your IDE device is configured as a slave.

Note: The 44-pin connectors (J1, J2, and J3) and mating cables carry +5V power, but the 40-pin connector (J4) and mating cable do not. J5 and J6 on the FDPB or J15 on the Hercules II may be used to provide power to an IDE device when the device is attached to the 40-pin J4 connector on the FDPB using the Auxiliary Power Cable (DSC#6981006) provided with the Hercules II Cable Kit. If +12V power is required, it must be provided externally.

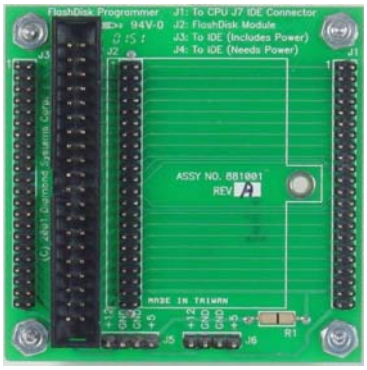

Figure 8 : ACC-IDEEXT *FlashDisk Programmer Board*