

Diamond Systems Helios Single Board Computer FastStart Guide

DSC Document #7461030 Rev A

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This document describes a series of quick steps to bring up and verify correct operation of your new Helios PC/104 single board computer (SBC). All the elements you need are provided in the Helios Development Kit (Diamond Systems #DK-HLV800A-01). Once you have your Helios SBC up and running, you can make further adjustments using additional elements that you supply.

The steps involve unpacking and identifying each part in the Helios 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 module with bootable Linux binary on primary IDE connector J12
2. Install the VGA cable 6981084 and monitor on connector J10
3. Connect the keyboard and mouse
 - a. For PS/2 connections install combination cable 6981083 on connector J3 then connect a PS/2 keyboard and mouse
 - b. For USB connections install USB cable 6981082 on connector J15 for USB ports 0/1 or on connector J16 for USB ports 2/3 and connect a USB keyboard and mouse
4. Connect the AC Adapter to the power connector J4
5. Turn on the monitor and plug in the AC Adapter. The Helios board will boot to a Linux prompt.

Helios Development Kit (DK-HLV800A-01)

The Helios Development Kit contains all the pieces necessary to bring up and verify correct operation of your Helios SBC. The following table lists the elements of the Helios 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	C-HLV-KIT	Helios Cable Kit (all cables pictured below)
2	6712022	128MB FlashDisk with bootable Linux
3	ACC-IDEEXT	FlashDisk Programmer Board with 40-pin and 44-pin IDE Cables (not shown)
4	PS-5V-04	AC Adapter, 100-240VAC in, 5VDC / 8A out
5	6710010	Diamond Systems CD with driver software and manuals
6	MTG104	PC/104 Mounting Hardware
7	HLV800-256AV	Helios SBC, 500MHz LX800, 256MB RAM, built-in data acquisition and video
	7461030	Helios FastStart Guide (this manual, not shown in photo)

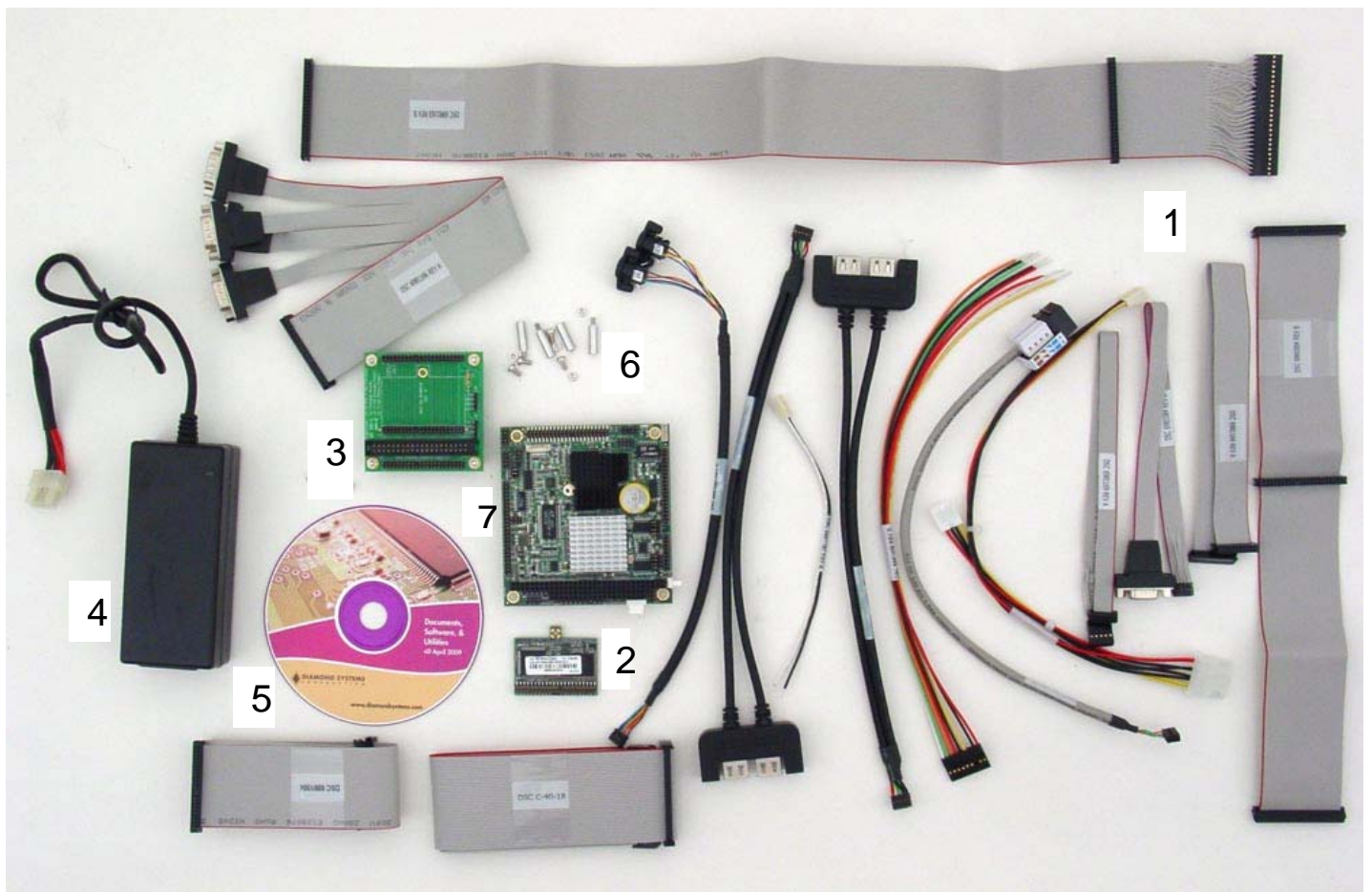


Figure 1. Helios Development Kit

Helios Cable Kit (C-HLV-KIT)

Photo No.	DSC No.	Description
1	6981083	PS/2 keyboard / mouse cable
2	6981084	VGA cable
3	6981169	Crimp 10xIDC10F, 2mm, 12" cable
4	6981004	HDD 44-pos ribbon cable
5	6981161	RJ45PNL-Crimp2x5, 2mm, 12" cable
6	6981164	IDC20FxIDC20F, 2mm, 12" cable
7	6981180	External battery cable
8	6981166	IDC40F 2mm-DB9Mx4, 12" cable
9	6981163	Crimp50xIDC50FxIDC50F, 21 0.1"x2MMx2MM cable
10	6981006	Auxiliary power cable
11	6981082	Dual USB cable (2 cables in kit)
12	6981009	Power I/O cable

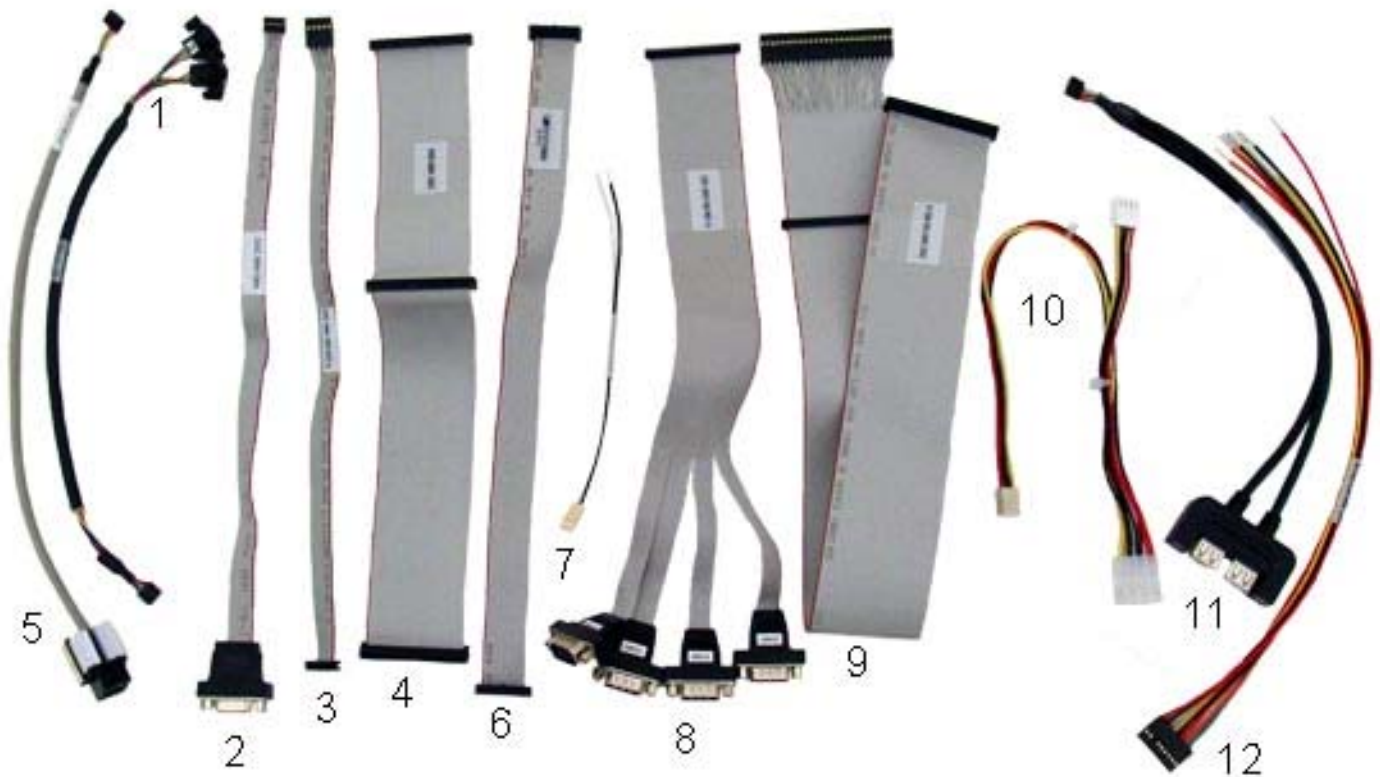


Figure 2. Helios Cable Kit

Other Development Kit Contents

128MB FlashDisk with bootable Linux

The Helios Development Kit contains a 128MB IDE flashdisk with a bootable Linux binary which provides a quick-boot compact Linux environment based on the Slackware 2.6.23 kernel. It is preconfigured for Helios and includes Diamond Systems' Universal Driver Software for the Helios 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.

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 Helios board, the Helios Development Kit comes with the ACC-IDEEXT FlashDisk Programmer Board. When connected directly to the Helios 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-5V-04 AC Power Adapter

The Helios Development Kit contains an AC Adapter with a connector that plugs directly into the power input connector of the Helios SBC. Operating with 110VAC to 240VAC input voltage, the AC Adapter provides sufficient current at 5VDC to power the Helios single board computer.

Diamond Systems Software and Documentation CD

The Helios Development Kit contains the Diamond Systems Software and Documentation CD which provides Helios manuals and software. Software includes drivers for components specific to the Helios board for Windows CE, Linux and DOS. The CD also contains full documentation and software for Diamond Systems' Universal Driver Software that supports the analog and digital I/O capabilities of Helios. This Universal Driver Software will operate under DOS, Windows XP/2000, Linux and Windows CE.

Assembling your Helios System

Install the FlashDisk

The flashdisk module installs directly on the IDE connector J12 and is held down with a spacer and two screws onto a mounting hole on the board. Mounting hardware is provided in the Helios 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 4).

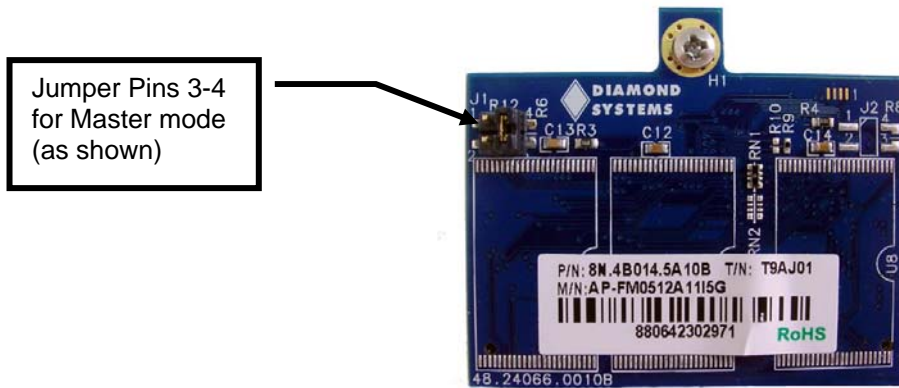


Figure 4. FlashDisk Module Showing Master/Slave Jumper

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 5.
3. Attach the female IDE connector on the flashdisk to the IDE connector J12 on the Helios SBC.
4. Fasten the flashdisk in place by inserting one 2-56x pan head screw from the solder side of the Helios SBC into the round spacer.

Figure 6 shows the appearance of the Helios SBC with the flashdisk attached.

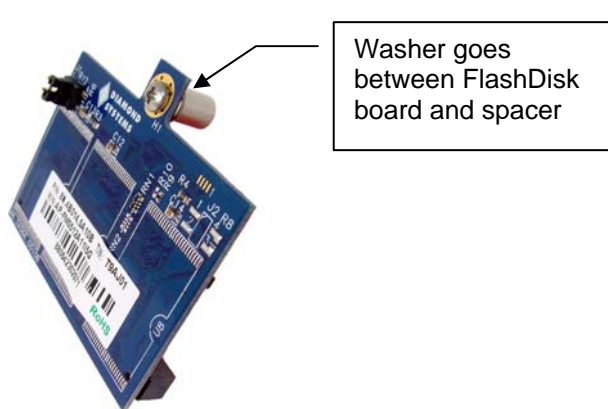


Figure 5. FlashDisk Installation



Figure 6. FlashDisk Installed on Helios

Install the Video Display, Keyboard and Mouse

Helios 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. Connect a VGA-compatible CRT display to Helios, installing cable 6981084 into connector J10 on Helios.

The Helios SBC supports either a legacy PS/2 keyboard and mouse interface or a USB keyboard and mouse interface. Install cable 6981083 into connector J3 on Helios and connect the PS/2 keyboard and mouse. For a USB connection, install cable 6981082 into connector J15 or J16 on Helios and connect the USB keyboard and mouse to one of the USB connectors.

Note that a mouse is NOT required to prove correct operation of the Helios SBC.

Connect Power

Connect the PS-5V-04 AC Adapter provided in the Helios Development Kit to connector J4 on the Helios Board.

Apply Power to Boot the Board

Plug in the video monitor and turn it on.

Attach the power cord provided to the PS-5V-04 AC Adapter and plug the power cord into the wall. The Helios SBC will power up immediately. After the BIOS information display, you should see the Diamond Systems' Linux information display and receive a prompt.

Demonstrate Data Acquisition Operation

The Diamond Systems' Linux installed on the flashdisk contains software demonstration programs for Helios's data acquisition features. You may access the directory of these programs by typing:

```
>cd /root/HLV_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 Helios User's Manual. For more information regarding the software API and functions please refer to the Universal Driver Software manual at http://docs.diamondsystems.com/dscud/manual_Main+Page.html.

Adding a Hard Disk Drive or CD-ROM or any 40-pin IDE device to Your System

There are two methods to attach additional devices such as an IDE hard disk drive (40 pin or 44 pin interface) or CD-ROM to your system while continuing to use the provided flashdisk as a primary boot device.

Attach a second IDE device to the primary IDE controller using the ACC-IDEEXT 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 the FlashDisk Programmer Board.

Install the FlashDisk Programmer Board (FDPB)

The FlashDisk Programmer Board (DSC# ACC-IDEEXT) provided with the Helios 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 Helios SBC.

Install the flashdisk to the FlashDisk Programmer Board using the following instructions.

1. Attach the female IDE connector on the flashdisk to the IDE connector J2 on the FDPB.
2. Fasten the flashdisk in place by inserting one 2-56x pan head screw from the solder side of the FDPB board into the round spacer. Figure 9 below shows the ACC-IDEEXT FlashDisk Programmer Board.
3. Connect the J1 connector on the FDPB to the primary IDE connector (J12) on the Helios SBC with a 44-pin ribbon cable 6981004 provided in the Helios Cable Kit.
4. 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. Any two devices (i.e. flashdisk and HDD) may be connected simultaneously using this board with proper master / slave jumper configurations on the devices. Ensure 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 J12 on Helios 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 6981006 provided with the Helios Development Kit. If +12V power is required, it must be supplied externally.

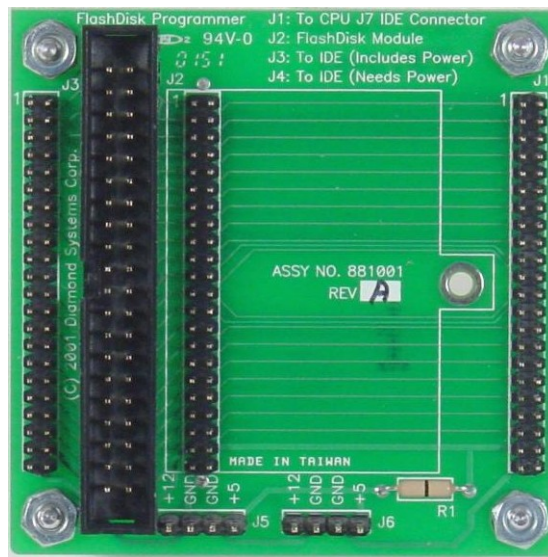


Figure 9. ACC-IDEEXT FlashDisk Programmer Board