Avionics Interface Computer
Test & Development Platform

Hardware Manual

Models: BU-67121W

ETHERNET
MIL-STD-1553
ARINC 429
ARINC 717
DISCRETE
ACEXTREME®

DDC's Avionics Interface Computer (AIC) provides a scalable, programmable, and portable platform to develop and test MIL-STD-1553 and ARINC 429 system applications via an Ethernet network... eliminating the need and cost of long cabling/wire runs from the test lab to the onboard 1553/429 interfaces under test.

Applications

- Systems Integration Labs
- Simulators
- Production Test Stands
- System Troubleshooting
- Software Development
- Data Recording

Need a Custom Solution? DDC can customize designs for all controllers, ranging from simple modifications of standard products to fully customized solutions for commercial, military, aerospace, and industrial applications.

For more information: www.ddc-web.com/BU-67121W

DDC's Data Networking Solutions

MIL-STD-1553 | ARINC 429 | Fibre Channel | Ethernet

As the leading global supplier of data bus components, cards, and software solutions for the military, civil, and aerospace markets, DDC's data bus networking solutions encompass the full range of data interface protocols to support the real-time processing demands of field-critical data networking between systems and subsystems on military vehicles. These products, along with our traditional MIL-STD-1553 solutions, represent a wide and flexible array of performance and cost solutions, enabling DDC to support multi-generational programs.

Whether employed in increased bandwidth, high-speed serial communications, or traditional avionics and ground support applications, DDC's data solutions fulfill the expanse of military requirements including reliability, determinism, low CPU utilization, real-time performance, and ruggedness within harsh environments. Our use of in-house intellectual property ensures superior multi-generational support, independent of the life cycles of civil devices. Moreover, we maintain software compatibility between product generations to protect our customers' investments in software development, system testing, and end-product qualification.

MIL-STD-1553

DDC provides an assortment of quality MIL-STD-1553 rugged embedded and lab grade cards and components to meet your data conversion and data interface needs. Our 1553 data bus board solutions are integral elements of military, aerospace, and industrial applications. Our extensive line of military and space grade components provide MIL-STD-1553 interface solutions for microprocessors, PCI buses, and simple systems. Our 1553 data bus solutions are designed into a global array of aircraft, helicopter, unmanned vehicles, and missile programs.

ARINC 429

DDC also has a wide assortment of quality ARINC 429 embedded and lab grade cards and components, which will meet your data conversion and data interface needs. DDC's ARINC 429 components ensure the accurate and reliable transfer of flight-critical data. Our 429 interfaces support data bus development, validation, and the transfer of flight-critical data aboard civil aerospace platforms.

Fibre Channel

DDC has developed its line of high-speed Fibre Channel network access controllers and switches to support the real-time processing demands of field-critical data networking between sensors, computer nodes, data storage, displays, and weapons, for air, sea, and ground military vehicles. Fibre Channel's architecture is optimized to meet the performance,reliability, and demanding environmental requirements of embedded, real time, military applications, and designed to endure the multi-decade life cycle demands of military/aerospace programs.

Ethernet

DDC offers a convenient solution to convert MIL-STD-1553, ARINC 429, and Ethernet protocol in any direction, in real-time, without a host computer.

Extensions to MIL-STD-1553

DDC offers a wide variety of solutions based on extensions of MIL-STD-1553 for emerging aerospace applications. Turbo 1553 increases the data rate of 1553 from 1 Mbps to 5 Mbps while maintaining the architectural features of MIL-STD-1553. Hyper 1553 provides high speed communication (50 to 100+ Mbps) over MIL-STD-1553 buses while operating concurrently with legacy 1 Mbps 1553 (similar to ADSL for telephone networks).

Form Factors, Software, & Drivers

DDC supplies MIL-STD-1553 and ARINC 429 board level products in a variety of form factors including USB, PCI-Express, PCMCIA, ExpressCard, AMC, PMC, XMC, PCI-104, PC/104-Plus, PC/104, PCI, cPCI, VME, and ISAbus boards. Our laboratory simulation and in-flight products include multi-function and single-function for system integration and production test environments. Our extensive line of military and space grade components provide MIL-STD-1553 interface solutions for microprocessors and simple systems. Our software is supplied in the form of menus, libraries, and drivers. We also offer additional software to expand our data networking range of options.

BU-67121W
AVIONICS INTERFACE COMPUTER
HARDWARE MANUAL

MN-67121W-001

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Revision	Date	Pages	Description
Pre Rev A	1/2015	All	Preliminary Release
Rev A	5/2015	All	Initial Release
Pre Rev B	6/2016	17	Added Section

1 PREFACE

This manual uses typographical conventions to assist the reader in understanding the content. This section will define the text formatting used in the rest of the manual.

1.1 Text Usage

- BOLD–indicates important information and table, figure, and chapter references.
- Courier New–indicates code examples.
- <…> - indicates user-entered text or commands.

1.2 Standard Definitions

PMC PCI Mezzanine Card

Mini PCI-e Small form factor Peripheral Component Interconnect Express

1.3 Special Handling and Cautions

The BU-67121Wx uses state-of-the-art components, and proper care should be used to ensure that the device will not be damaged by Electrical Static Discharge (ESD), physical shock, or improper power surges and that precautions are taken to avoid electrocution.

It is recommended to power off the device safely by pushing the power button. Not by pulling out the power adaptor.

Do not store disks in environments exposed to excessive heat, magnetic fields or radiation.

1.4 Trademarks

All trademarks are the property of their respective owners.

1.5 What is included in this manual?

This manual contains a complete description of the Avionic Interface Unit's hardware installation and use.

1.6 Technical Support

In the event that problems arise beyond the scope of this manual, you can contact DDC by the following:

US Toll Free Technical Support:
1-800-DDC-5757, ext. 7771

Outside of the US Technical Support:
1-631-567-5600, ext. 7771

Fax:
1-631-567-5758 to the attention of DATA BUS Applications

DDC Website:
www.ddc-web.com/ContactUs/TechSupport.aspx

Please note that the latest revisions of Software and Documentation are available for download at DDC's Web Site, www.ddc-web.com.

2 OVERVIEW

DDC's Avionics Interface Computer (AIC), (or as it's known by its part number BU-67121Wx) is a development system for lab and production test applications which provides a scalable, programmable, and portable platform to develop and test MIL-STD-1553 and ARINC 429 system applications via an Ethernet network. By utilizing the Ethernet network with the AIC's Remote Access or Protocol Conversion modes eliminates the need and cost of long cabling/write runs from the test lab to the onboard 1553/429 interface under test. The AIC's use of a Linux OS provides the ability to customize the AIC as it allows for the integration of DDC line of cards as well as 3rd party PMC and PCIe cards.

The AIC comes with Fedora Core 20 installed on its Solid State Drive and has an Intel® Q7 Processor and 2 GB of DDR3L SDRAM, which enables the AIC to serve a broad range of data conversion and unique application needs. The AIC includes one 10/100/1000 Ethernet channel, two USB 2.0 ports, one RS-232 port, and one VGA port. The AIC operates over an ambient air temperature range of 0°C to +55° C, and includes an internal fan.

The AIC has two PMC and two mini PCIe sites providing hardware flexibility for additional hardware components such MIL-STD-1553, ARINC 429, ARINC 717, Avionics and Discrete I/O, AFDX and many other configurations. For other configurations not mentioned, please see the Configuration Options or Ordering Information sections for additional details on customizing the AIC. Please also contact the factory with custom requirements that is not seen on the ordering information tables.

The AIC offers a high degree of flexibility, and is therefore suitable for a wide range of lab applications. The AIC has three modes of operation Remote Access Mode, Protocol Conversion Mode and Stand Alone Mode.

In Protocol Conversion Mode, the AIC is configured to provide autonomous communication from any input channel(s) to any other channel(s). To minimize setup time and provide turnkey operation, the AIC includes a high-level protocol conversion API. Alternatively, users may develop their own conversion applications by means of DDC's AceXtreme MIL-STD-1553 and/or ARINC 429 APIs, along with Linux TCP/IP and UDP/IP socket interfaces for the AIC's Ethernet channel.

In Remote Access Mode, users are able to develop applications running on a remote computer communicating over Ethernet to the AIC's MIL-STD-1553 and/or ARINC 429 channels. In the remote access configuration, the user is able to write applications running on a remote host invoking the AceXtreme MIL-STD-1553 and/or ARINC 429 APIs. As an alternative to developing application software, in Remote

Access Mode, the user is able to operate the AIC using any of DDC's GUI software programs. These include:

- **BusTrACEr**, a simple menu program for generating and monitoring MIL-STD-1553 messages. Further, BusTrACEr includes an option for the automatic generation of ANSI 'C' source code.
- ***dataSIMS*****,** a software GUI tool for test and simulation applications. *dataSIMS* converts data to engineering units, allows the creation of graphical display formats, and may be used for either passive monitoring and/or simulation.
- **LabVIEW® and LabVIEW® Real-Time Support**. The **BU-69093S0-XX0** software operates in conjunction with National Instruments' LabVIEW® or LabVIEW® Real-Time system design software to provide a simple interface and easy programming of the AIC's MIL-STD-1553 and/or ARINC 429 interfaces. Users can either create their own custom interfaces "from scratch" or may modify the samples that are provided.
- **Commercial Avionics Utilities Software Package. The DD-42999S0-XX0 Data Bus Analyzer and Data Loader GUI software** is for ARINC 429 data bus analysis and simulation. This GUI provides advanced filtering, message scheduling, and triggering. In addition, it includes a graphical ARINC 615 data loader, providing a software interface to load data to and from airborne computers.

Standalone mode allows a user to operate the AIC as a user programmable computer system. Software Development Kits (SDKs) are provided for MIL-STD-1553 and ARINC 429 to facilitate the development of applications requiring communication on these avionics I/Os. Onboard video, a Serial port and USB ports can also be utilized to further enhance Standalone mode. The user will not need to depend on a host PC.

2.1 Features

General

- Bridging Ethernet, MIL-STD-1553, and ARINC 429
- Development Computer
  - Intel® Atom™ E3845 Quad Core 1.91GHz Processor
  - 2GB DDR3L SDRAM
  - 30 GByte SSD
  - 10/100/1000 Base-T Ethernet, USB 2.0, RS-232
  - Linux Operating System
  - Lab Grade, Rack-Mountable Chassis
  - 2 PMC and 2 Mini-PCIe Expansion Slots

- Various PMC and Mini-PCIe Modules Support a Range of Avionics Interfaces
  - MIL-STD-1553
  - ARINC 429
  - ARINC 717
  - Avionics Discrete I/O
  - Custom I/O
- Three Modes of Operation, Using DDC's Hardware and Software
  1. **Remote Access Mode** Uses Ethernet as a Virtual Backplane Between Applications Running on a Host Computer and 1553/429 Interfaces Located Within the AIC, Eliminating the Need and Cost of Long Cabling to Onboard 1553/429 Connections from the Test Lab
  2. **Protocol Conversion Mode** Uses Bridging SDK, Which Allows Userts to Easily Create Embedded Software on the AIC that will Autonomously Forward Data Between MIL-STD-1553, ARINC 429, and Ethernet Interfaces
  3. **Standalone Mode** Allows the AIC to Operate as a User Programmable Computer System

Software

- Linux Operating System and BSP
  - Ethernet Stacks, with UDP/IP and TCP/IP Sockets, Telnet, FTP, TFTP, SSH, and HCTP.
- DDC Protocol Conversion API, Providing Turnkey Conversion From Any Ethernet, 1553, or ARINC 429 Port to Any Other Port(s)
- DDC AceXtreme MIL-STD-1553 API, Including Sample Programs
- DDC ARINC 429 API, Including Sample Programs
- Built-in Editor, Allowing Editing and Saving Files Over Telnet
- Built-in 'C' Compiler
- Can transfer internal files to a host computer, edit remotely, and transfer files back to the AIC before compiling.

2.2 Top-Level Block Diagram

Figure 1 is the top-level functional block diagram of the Avionics Interface Computer (AIC). The AIC's CPU, an Intel E3845 Atom processor, mounted on a Qseven Module, interfaces through three 1x PCI Express interfaces to the AIC's other major functional blocks for Mini PCI-e and PMC site connections.

One 1x PCIe interface services the AIC's Mini PCI-e Site A. While a second PCIe link interfaces the Mini PCI-e Site B. A third PCI Express interface connects between the Qseven module and a PCI-e to PCI Bridge which then services the two PMC slots.

Other interfaces from the Qseven module include a UART for the onboard Serial port. As well as two USB interfaces for the USB 2.0 ports. There is also the Ethernet interface for the 10/100/1000 Ethernet channel. An onboard Solid State Disk has a link via SATA from the Qseven module. A SPI interface will service where the BIOS is located. Video is also available through the VGA display port.

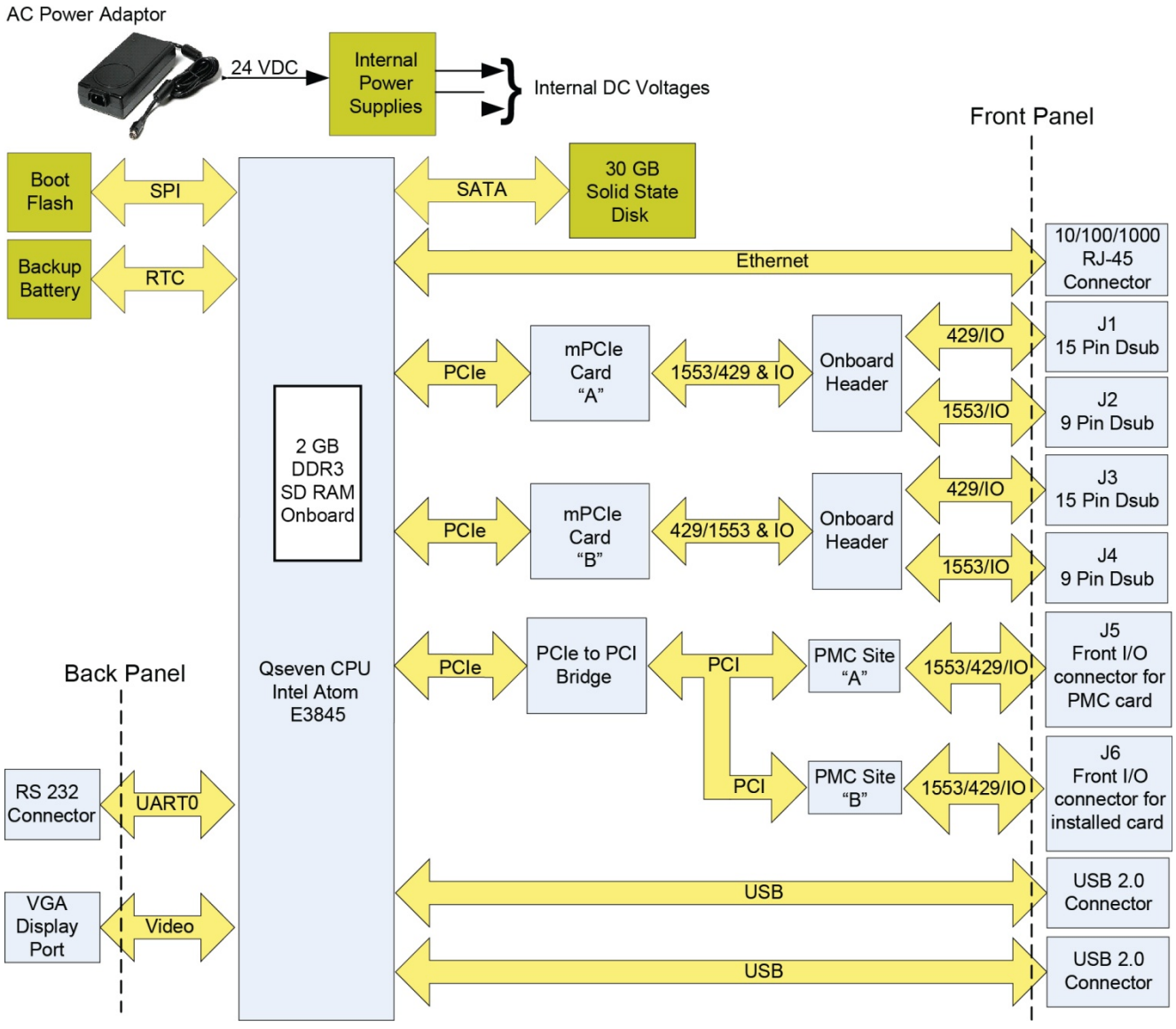

Figure 1. Avionics Interface Computer Block Diagram

2.3 System Requirements

2.3.1 System Requirements for Protocol Conversion Mode

- Remote computer with Ethernet interface and Telnet.

2.3.2 System Requirements for Remote Access Mode

- Remote computer with Ethernet interface.
- Windows XP, Windows Vista 32/64-bit, Windows 7 32/64-bit, Windows 8 32/64-bit, Linux, or VxWorks Operating System
    - Workbench software development environment for VxWorks platforms
- An appropriate compiler or development environment.
- Contact factory for additional operating systems

2.4 Applications

The BU-67121Wx lab module is a valuable tool for design and test teams involved with MIL-STD-1553, ARINC 429 interfaces, etc.. The Avionics Interface Computer is the ideal solution for any application requiring an Ethernet-to-MIL-STD-1553 and/or ARINC 429 interface in a lab or production test environment.

The design of the Avionics Interface Computer leverages the full capabilities of DDC's AceXtreme MIL-STD-1553 Architecture. Features include a highly autonomous BC with expanded instruction set, an RT or Multi-RT providing a wide variety of buffering options, a selective message monitor, IRIG-B time code input, and a 48-bit, 100 ns resolution Time Tag. Each AceXtreme channel contains up to 1 MB of RAM.

2.5 Configuration Options

- Generic P/N: BU-67121W000R
    - R = RoHS
- Mechanical/Environmental Options:
    - BU-67121W000-JL0 Lab box, RoHS only.

Note: Contact the Factory for more channel configurations.

2.6 Mechanical Design and Qualification Testing

The BU-67121Wx board (Figure 2 and Figure 3) is intended for applications operating in a lab or other commercial environment.

Front view

Rear view

Figure 2. BU-67121Wx Avionics Interface Computer

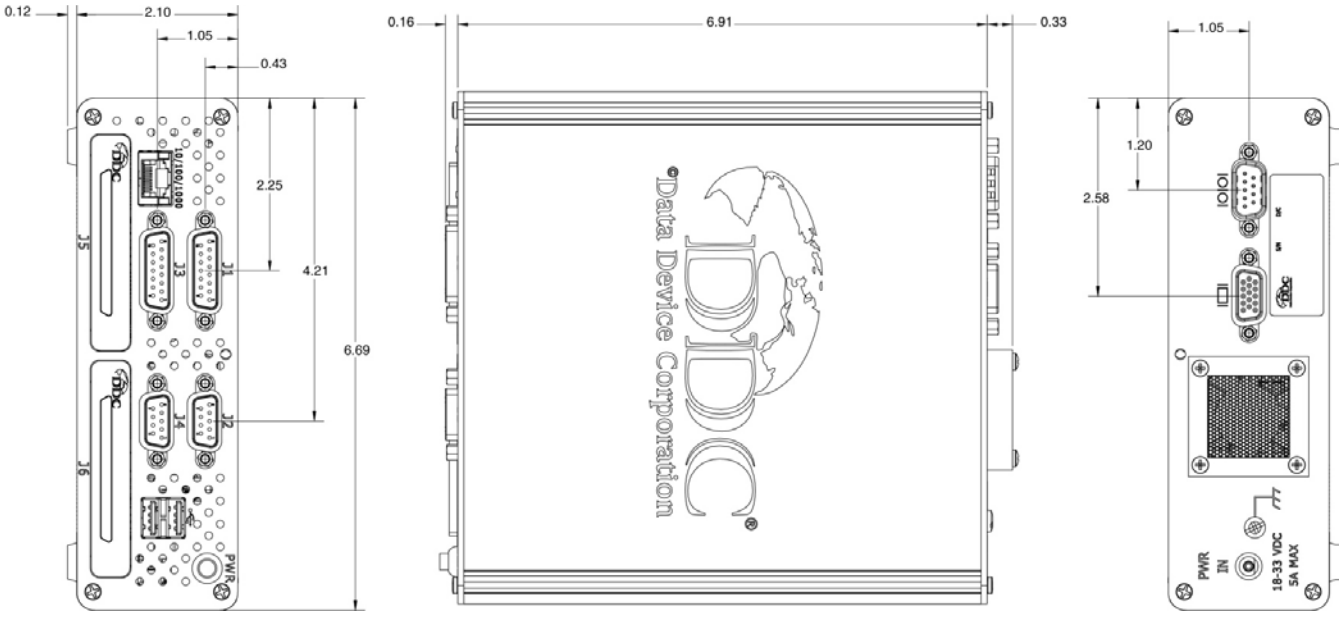

Figure 3. BU-67121Wx Mechanical Outline

2.7 Power Adaptor

The BU-67121WX Avionics Interface Computer is powered by means of a SL Power Electronics CENB1080A2403F01 100/240 VAC-to-24 VDC (3.25 Amp) power adaptor. This comes with separate line cords for operation in the US, UK, Europe, and Japan. The power adaptor is included with every model of the AIC.

2.8 Specifications

Table 1. BU-67121Wx Specification Table				
PARAMETER	**MIN**	**TYP**	**MAX**	**UNITS**
ABSOLUTE MAXIMUM RATINGS				
AC Voltage Input	90		262	VAC
DC Power Input	18	24	33	VDC
Logic Inputs				
• RS 232				
• VGA		Industry Standard		
• Ethernet				
POWER SUPPLY REQUIREMENTS (NOTE 8)				
Using External AC Power Supply				
• Voltage	90		264	VAC
• Frequency	47		63	Hz
Using Direct DC Power Input				
• Input Voltage				
- Steady state range	22.8		25.2	V
ENVIROMENTAL CHARACTERISTICS				
THERMAL				
Operating Temperature				
BU-67121W (ambient temperature, includes internal fan)	0		55	°C
Non-Operating Temperature				
BU-67121W	0		65	°C
HUMIDITY				
Operating Humidity (non-condensing)				
BU-67121W	5		70	%
Non-Operating Humidity (non-condensing)				
BU-67121W	5		70	%
PHYSICAL CHARACTERISTICS				

Table 1. BU-67121Wx Specification Table				
PARAMETER	**MIN**	**TYP**	**MAX**	**UNITS**
Size				
• *BU-67121W*		6.69 x 6.91 x 2.10		in.
		169.9 x 175.5 x 53.3		mm.
Weight				
• *BU-67121WM03-JL0*		43.5 (1233)		oz. (g)

3 MODES AND OPERATION

The AIC includes basic modes of operation, Protocol Conversion Mode, Remote Access Mode, and Stand Alone Mode.

3.1 Standalone Mode

Standalone mode allows the AIC to operate as a user programmable computer system. Software Development Kits (SDKs) are provided for MIL-STD-1553 and ARINC 429 to facilitate the development of applications requiring communication on these avionics I/Os. Onboard video, a Serial port and USB ports can also be utilized to further enhance Standalone mode. The user will not need to depend on a host PC.

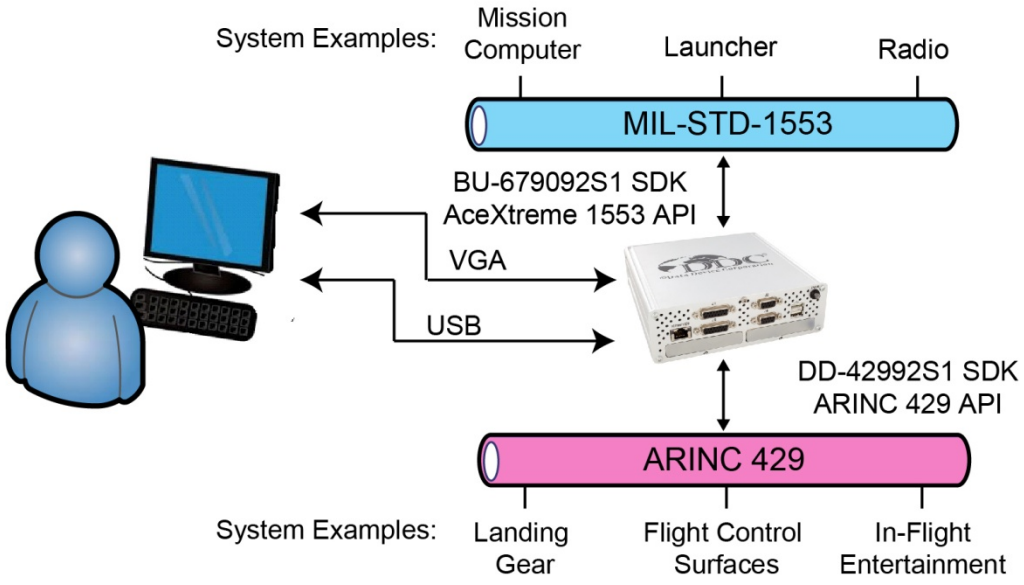

Figure 4. Example of Avionics Interface Computer Used in Standalone Mode

3.2 Remote Access Mode

Remote Access Mode is a capability of the Avionics Interface Computer.

Figure 5 shows an example of the Avionics Interface Computer operating in Remote Access Mode. In Remote Access Mode, users are able to develop applications running on a remote computer that communicates over Ethernet to the AIC's MIL-STD-1553 and/or ARINC 429 channels. In the remote access configuration, the user is able to write applications running on a remote host that invoke the AceXtreme MIL-STD-1553 and/or ARINC 429 APIs. For use in Remote Access Mode, DDC offers

AceXtreme software drivers for Windows XP, Vista, 7, and 8; Linux kernel version 2.6.x; and Wind River VxWorks versions 6.x.

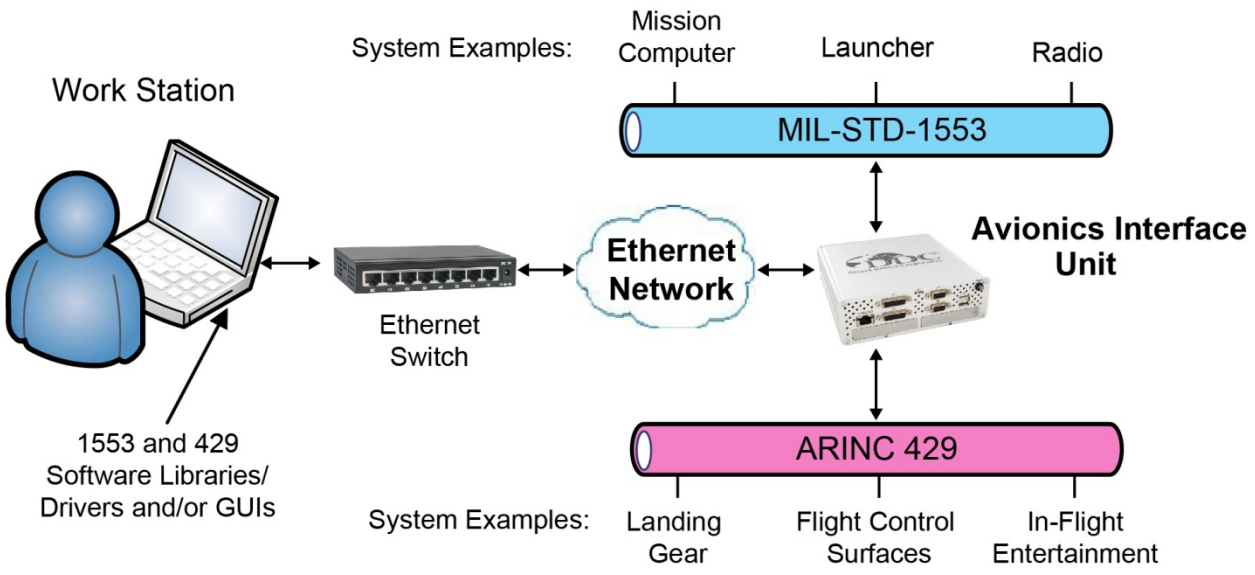

Figure 5. Example of Avionics Interface Computer Used in Remote Access Mode

3.2.1 Optional Software Tools – BusTrACEr, *dataSIMS*, etc.

For the Remote Access Mode, as an alternative to developing application software, the user may operate the AIC using any of DDC's GUI software programs. These include:

- **BusTrACEr.** The BU-69066S0-XX0 BusTrACEr allows a user to generate and monitor MIL-STD-1553 messages. It allows rapid creation and setup of custom applications and includes an option for the automatic generation of ANSI 'C' source code.
- ***dataSIMS*.** The BU-694X4DS-64VM *dataSIMS* is a software GUI tool for accelerating software development for test and simulation applications. It includes capability to display data in a variety of graphical formats, and may be used for either passive monitoring, or both monitoring and simulation of real time systems with MIL-STD-1553 and/or ARINC 429 interfaces.
- **LabVIEW® and LabVIEW® Real-Time Support**. The BU-69093S0-XX0 software operates in conjunction with National Instruments' LabVIEW® or LabVIEW® Real-Time system design software to provide a simple interface and easy programming of the AIC's MIL-STD-1553 and/or ARINC 429 interfaces. Users can either create their own custom interfaces "from scratch" or may modify the samples that are provided.

- **Commercial Avionics Utilities Software Package.** The DD-42999S0-XX0 Data Bus Analyzer and Data Loader GUI software is for ARINC 429 data bus analysis and simulation. This GUI provides advanced filtering, message scheduling and triggering. In addition, it includes a graphical ARINC 615 data loader, providing a software interface to load data to and from airborne computers.

3.3 Protocol Conversion Mode

Figure 6 shows an example of the Avionics Interface Unit operating in its Protocol Conversion Mode. In its Protocol Conversion Mode, the AIU may be configured to provide autonomous communication conversion between any channel and any other channel(s). To minimize setup time and provide more “turnkey” operation, the AIU includes a high-level protocol conversion API. Alternatively, users may develop their own protocol conversion applications invoking DDC’s AceXtreme MIL-STD-1553 and/or ARINC 429 APIs, along with the Linux socket interfaces for the Ethernet channel.

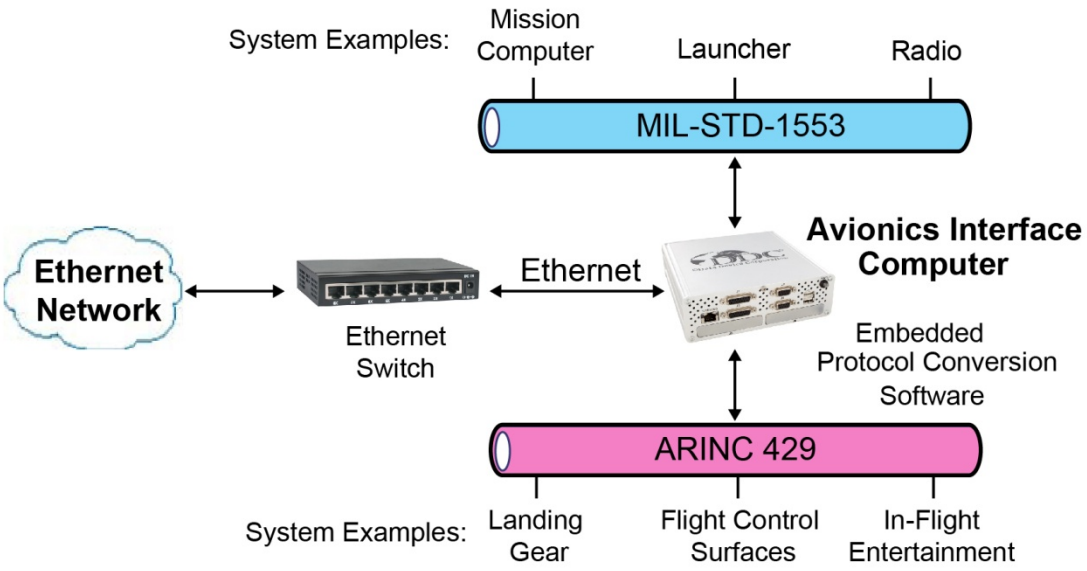

Figure 6. Example of Avionics Interface Unit Used in Protocol Conversion Mode

4 START UP

See the BU-69094SX-002 Software manual.

5 DETAILED ARCHITECTURE

If using DDC cards, additional details for the ARINC 429 and MIL-STD-1553 portions can be found in the hardware manuals for the cards installed in the AIC. The DDC card's manuals can be found on the DDC website at www.ddc-web.com.

5.1 USB Interfaces

The AIC include two USB 2.0 ports. The AIC follows the USB standard for 2.0 ports. This means that they are backwards compatible to USB 1.1/1.0. The AIC will recognize most generic Keyboards and Mice. Transfer speeds follow the USB standard.

5.2 Ethernet Interfaces

The AIC includes one Ethernet interface. The Ethernet interface is capable of operating over 10 BASE-T, 100 BASE-T, or 1000 BASE-T physical layers, with auto-negotiation capability. The Linux stack running on the AIC's Atom processor supports TCP/IP and UDP/IP protocols.

5.3 VGA & Serial Interfaces

The AIC has a VGA connector and Serial port on the rear panel. The VGA connector follows the video standard. Same with the Serial port. Both interfaces can be used to view command prompts of the AIC.

5.4 AIC Mainboard

The AIC mainboard is an Arbor Q7 EmQ-i2301-E3845-2G. This supports a QSeven processor module with two gigabytes of RAM soldered on board.

It utilizes an Intel Atom E3845 Quad core 1.91 GHz. Processor. As noted in previous sections, it also supports a mSATA drive that is replaceable, as well as two Mini PCI-e and two PMC slots. The Q7 module itself will be replaceable with future revisions of the AIC Arbor mainboard.

6 HARDWARE INSTALLATION

This section will describe the procedures and precautions to follow when installing IO cards into the AIC.

Note: Be sure to power down the AIC before attempting to open and install cards into the AIC. Please follow safe power down procedures.

Please ensure that you are following ESD protection protocol, so that your AIC will not be damaged.

6.1 Tools Needed

This section includes a list of tools needed for Assmebly, disassembly, and installing PMC cards, and mini PCI-e cards.

- Torx head driver size #10 – For the chassis screws

- Phillips head screw driver size #2 – rear panel Grounding screw
- Driver for M3 hex nut standoffs – rear panel VGA/Serial standoffs
- Small Phillips head screw driver – Mini PCI-e mounting screws
- Small Flathead screw driver – PMC card standoffs

- Needle Nose Pliers (optional) – PMC card standoffs may be secured tightly

6.2 Avionics Interface Computer Disassembly

In order to access the internals of the AIC, you will need to unscrew a set of screws and standoffs.

The type of screws used on case of the AIC are Torx type screws Size 10.

There are five screws on the front of the AIC. The four corners and one in the top-middle. See Figure 7 below.

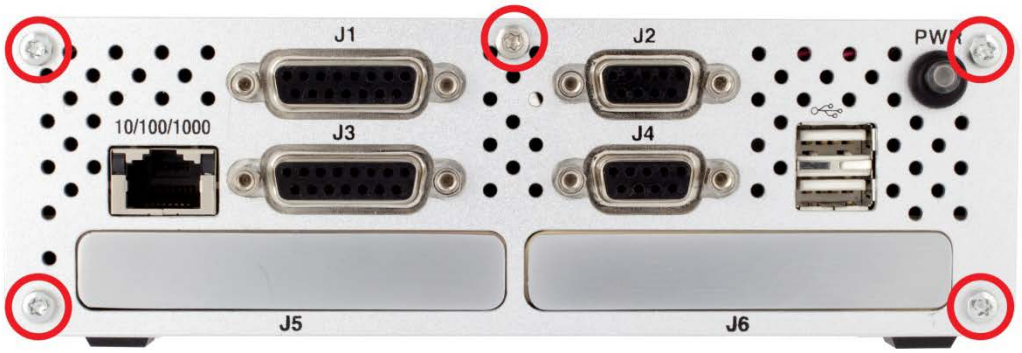

Figure 7. Front Panel Screws

There are five Torx screws on the back panel along with four standoffs for the VGA and Serial connectors that will have to be removed. See Figure 8 below.

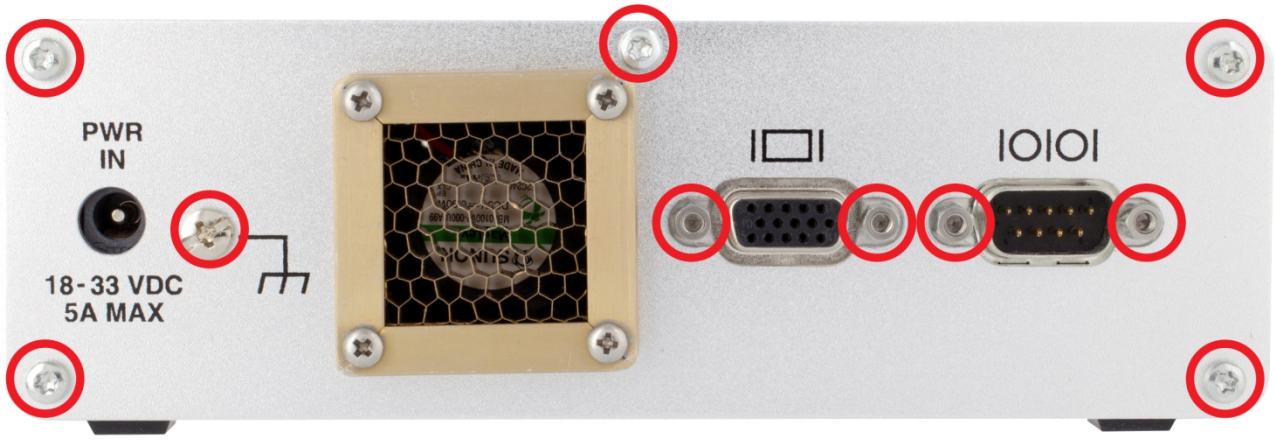

Figure 8. Rear Panel Screws

Note: Before proceeding to slide out the main board, please disconnect the rear fan plug from the board. Failing to do so, may damage your AIC.

See Figure 9 and Figure 10 Disconnecting Fan Plug below.

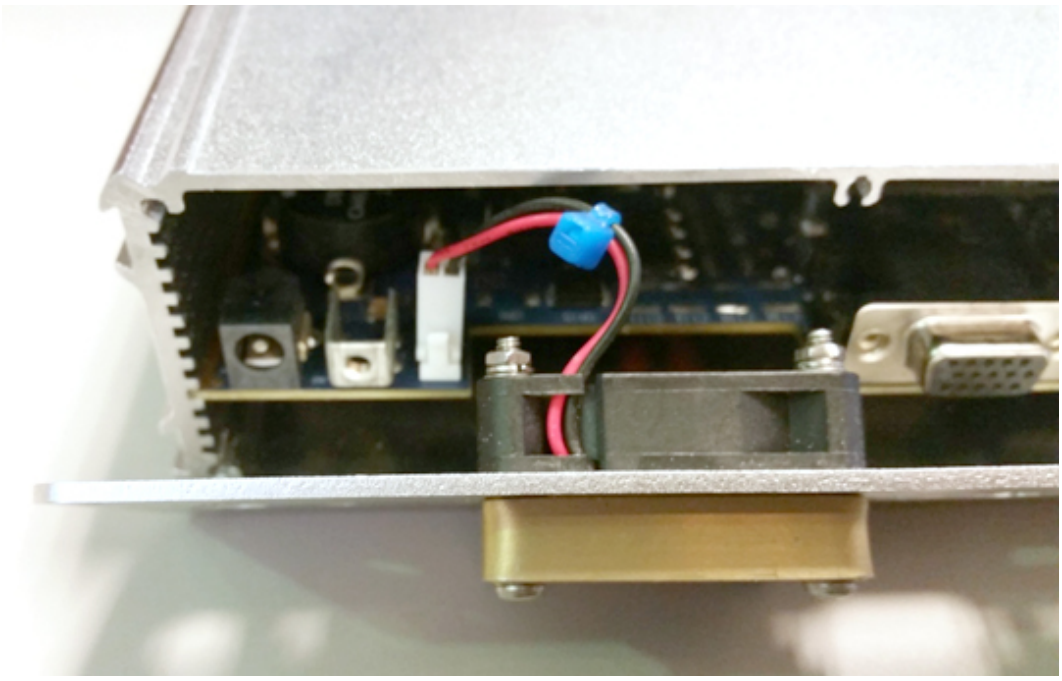

Figure 9. Disconnecting Fan Plug

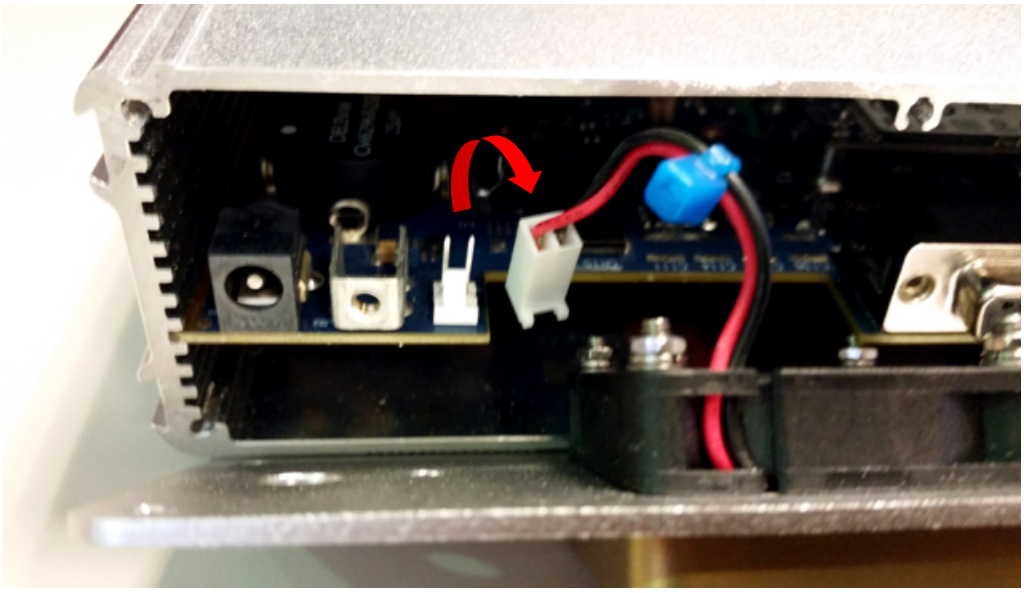

Figure 10. Disconnecting Fan Plug con't

Now you can freely slide out the main board to access the various slots on board.

You can take the front panel bezel by the sides and start sliding the main board out.

The board sits on grooves in the inside of the chassis, be careful sliding out the board too fast. It may slide out of its grooves and hit your working surface.

See Figure 11. Sliding Out Main Board, below.

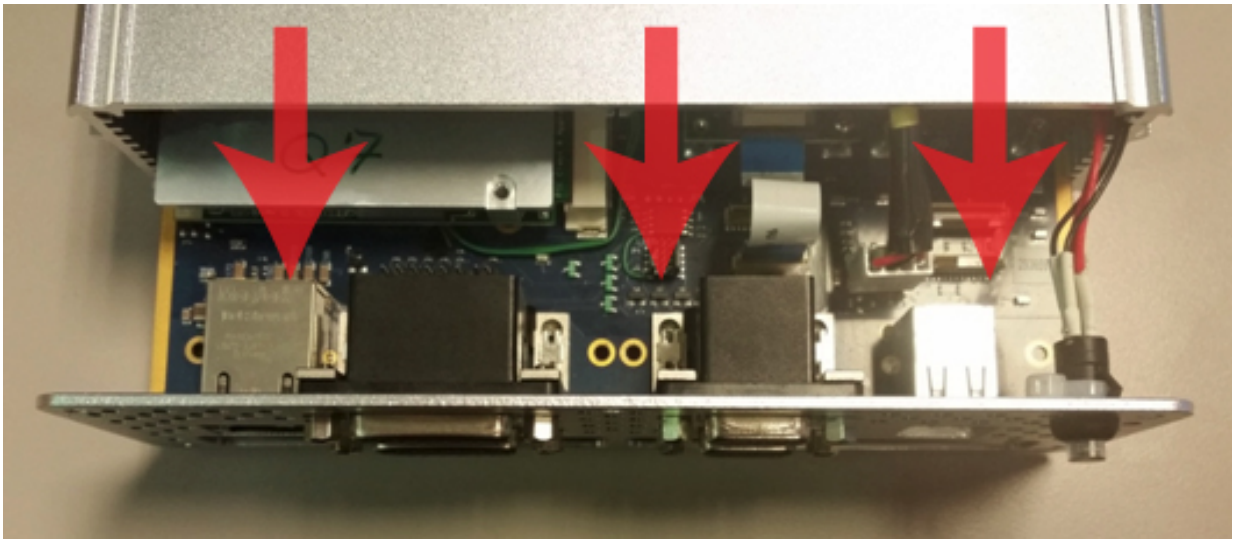

Figure 11. Sliding Out Main Board

6.3 AIC Main Board

Figure 12 and Figure 13 depict the AIC main board, top and bottom.

The onboard connectors and card slots are numbered. Refer to Table 2 and Table 3. to see what the numbers correspond to.

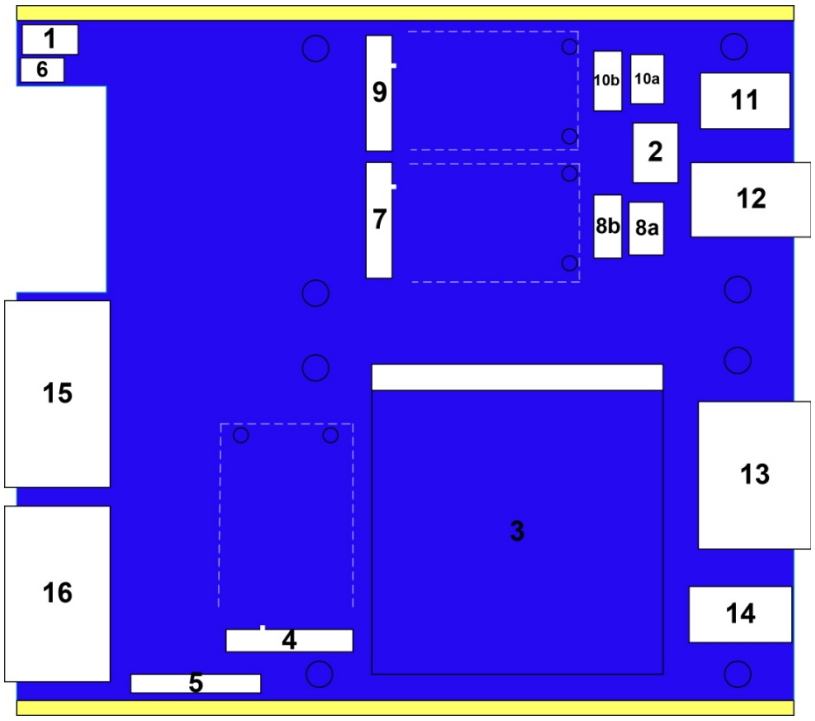

Figure 12. AIC Mainboard – Top View

Table 2. AIC Mainboard - Top VIew	
1. DC Power jack	9. Mini PCI-e Slot B
2. Power button header	10a. 20 pin Onboard header to route Mini PCI-e slot B signals to J3 and J4.
3. Q7 module	10b. 24 pin Onboard header to route Mini PCI-e slot B signals to J3 and J4
4. mSATA Slot	11. USB ports
5. Internal Battery	12. DB-9 ports, J2 & J4
6. Cooling fan header	13. DB-15 ports, J1 & J3
7. Mini PCI-e Slot A	14. 10/100/1000 RJ-45 jack
8a. 20 pin Onboard header to route Mini PCI-e slot A signals to J1 and J2.	15. VGA port
8b. 24 pin Onboard header to route Mini PCI-e slot A signals to J1 and J2.	16. Serial port

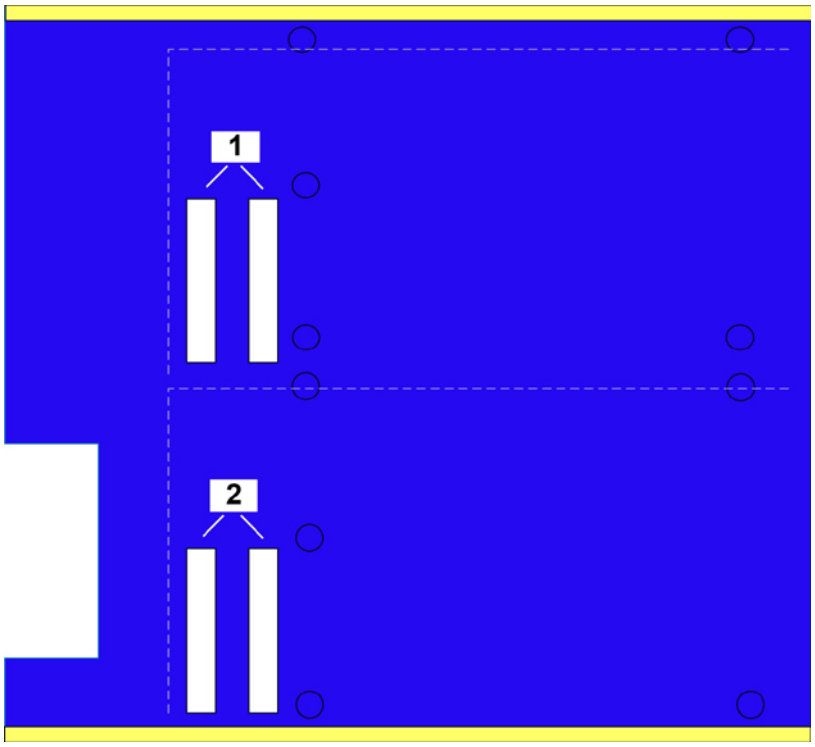

Figure 13. AIC Mainboard – Bottom View

Table 3. AIC Mainboard – Bottom View	
1. PMC Site A	2. PMC Site B

6.4 AIC Mini PCI-e Sites

The two Mini PCI-e sites are in accordance with standards. The sites are designed for full size Mini PCI-e cards. Although, with an adaptor, half size mini PCI-e cards will also fit.

In Figure 12, labels 8a & 8b represent the onboard headers in which the signals from the Mini PCI-e cards in slot A are routed to the front panel D-Sub connectors, J1 & J2

Headers 8a and 8b are designated on the AIC mainboard PCB as J23 and J14 respectively. See Figure 14 below.

Also in Figure 12, labels 10a & 10b represent the onboard headers that the signals from cards in slot B will be routed to the front panel D-Sub connectors, J3 & J4.

Headers 10a and 10b are designated on the AIC mainboard PCB as J18 and J17 respectively. See Figure 14 below.

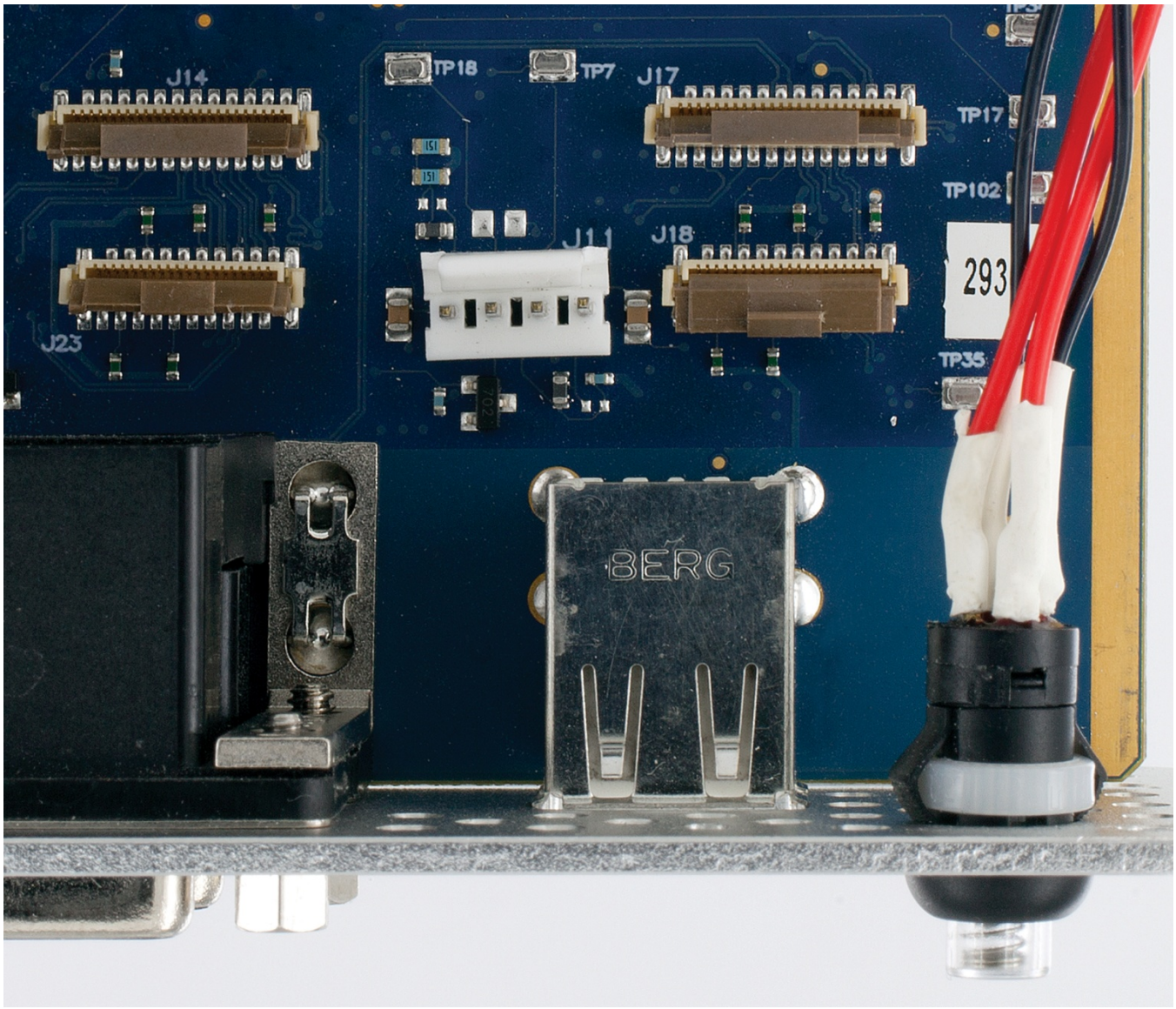

Figure 14. Mini PCI-e headers PCB labels

6.4.1 Installing a Mini PCI-e card

To install a Mini PCI-e card. Slide the card in to the desired slot. Use the included screws to secure the card.

6.4.1.1 For installing a DDC card

Included with your AIC are a set of Flat Flex Cables to interface your DDC cards with the front panel connectors..

6.4.1.1.1 Flat Flex Cables

The figures below represent the 20-Pin and 24-Pin FFC cables that are included with the AIC.

Figure 15 is the 20-Pin FFC. It is longer and thinner compared to the 24-Pin FFC.

The Blue side (left hand side) represents the top side of the cable, where the bottom side (right hand side) shows the leads of the connector.

Figure 15. 20-Pin FFC

Figure 16 is the 24-Pin FFC. It is shorter and wider compared to the 20-Pin FFC.

Again, the Blue side (left hand side) represents the top side of the cable, where the bottom side (right hand side) shows the leads of the connector.

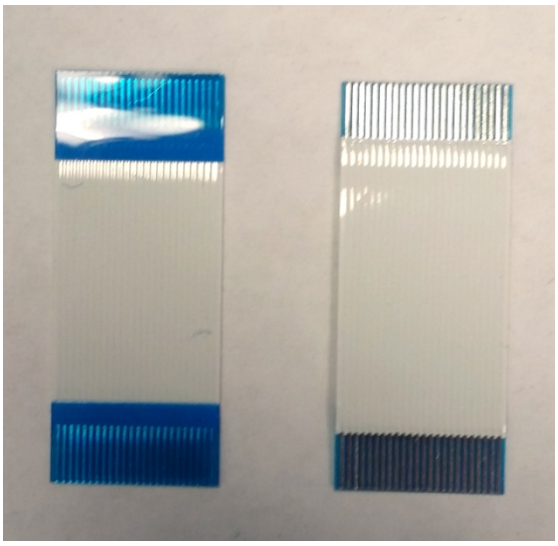

Figure 16. 24-Pin FFC

If installing the BU-67114H 1553 card, use the 20-pin flat flex cable and connect to one of the 20-pin sockets. Either 8a or 10a from Figure 12.

If installing a DD-40001H ARINC 429 card, use the 24-pin flat flex cable and connect to one of the 24-pin sockets. Either 8b or 10b from Figure 12.

When connecting the FFC cable into a Mini PCI-e card, the blue side should be facing up when inserting the cable into the cards connector.

On the AIC mainboard side, the blue side of the FFC cable should face towards the front panel of the AIC, since the onboard header is a vertical slot. See Figure 14 To see the onboard headers.

6.4.1.2 For installing a 3rd party card

In order to utilize the front panel connectors of the AIC with your Mini PCI-e card, you will have to create/purchase a FPC flex cable.

Refer to Table 9 and Table 10 for Slot A pin outs and Table 13 and Table 14 for Slot B pinouts.

The FFC Flat Flex Cables provided with the AIC are the following:

- Molex 21020-0207 20-pin cable
- Molex 15266-0249 24-pin cable

These can be used as a reference to create a custom cable.

The sockets on the AIC mainboard PCB are the following:

- Hirose Electric FH12-20S-0.5SV(55) 20 pin socket
- Hirose Electric FH12-24S-0.5SV(55) 24 pin socket

6.5 AIC PMC Sites

The two PMC sites are in accordance with today's standards. They are of 3U size. The sites allow any front I/O card to be used.

In Table 3, you will see the PMC sites labeled on the AIC mainboard.

Label 1 is for Slot A which is AIC J5. And Label 2 is Slot B which is AIC J6.

6.5.1 Installing a PMC card

To install a PMC card into the AIC, please follow the instructions listed in this section.

The AIC mainboard requires spacers in order to prevent the PMC card from touching any onboard components.

Note: Please make sure the spacers are still in place and are used, to prevent any damage to the AIC or your PMC cards.

The PMC card a user is installing should have standoffs pre-installed on itself. The user will have to remove the standoffs **closest to the 'Pn' connectors**. This is because the AIC will have the standoffs installed on the motherboard in those spots. See Figure 17. Removing PMC card standoffs, and Figure 18. Pre-installed spacers on AIC motherboard.

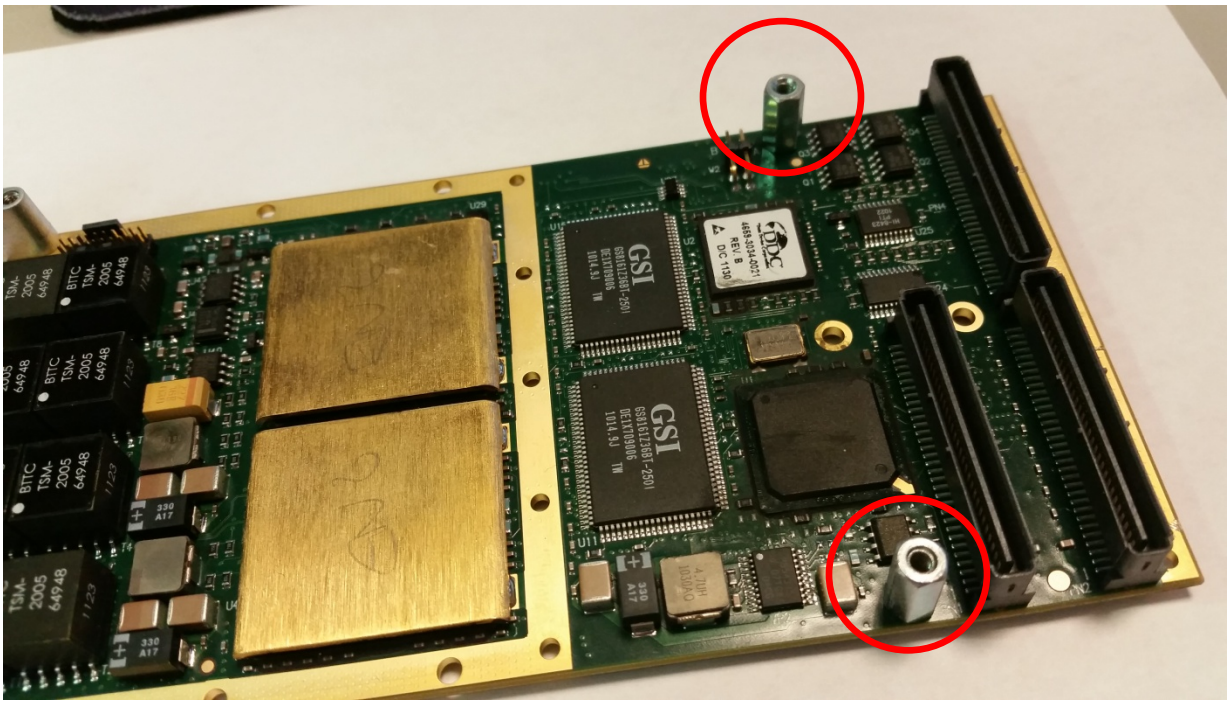

Figure 17. Removing PMC card standoffs.

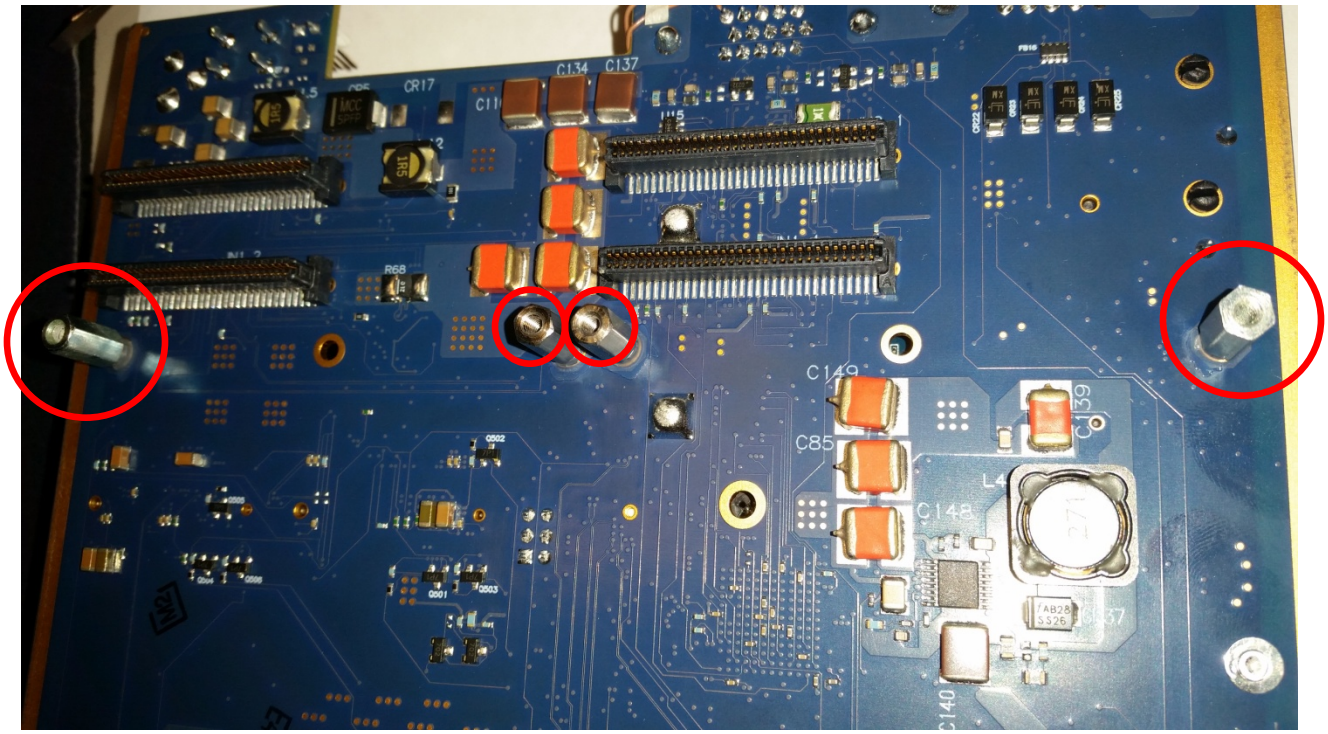

Figure 18. Pre-installed standoffs on AIC motherboard.

The front bezel covers on the AIC have spacers installed, lightly glued on the AIC motherboard. The PMC card will utilize the bezel pre-installed on itself and the spacers installed on the AIC motherboard. See Figure 19. Front bezel spacers.

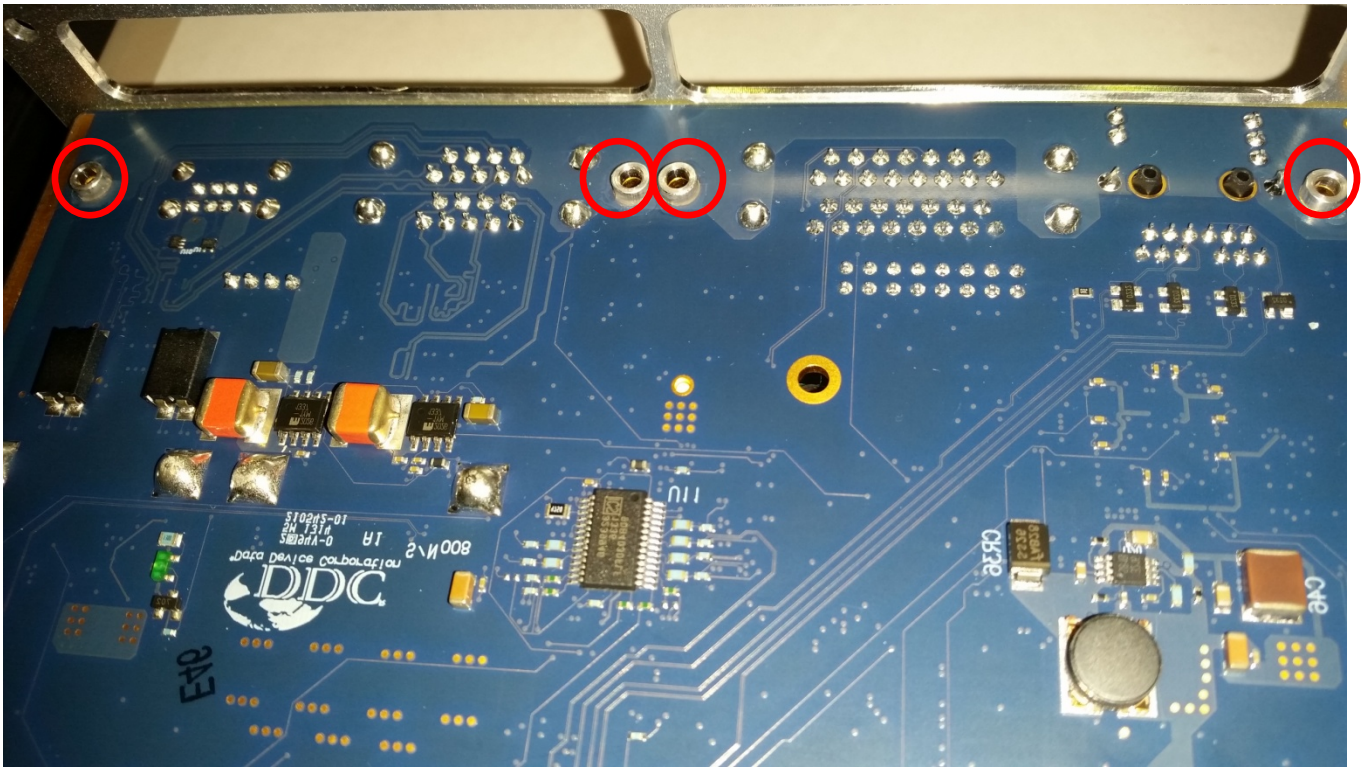

Figure 19. Front bezel spacers.

The front panel spacers are lightly glued down.
Please see **Warning Note!** above.

To secure the PMC card a user will have to screw in screws on each side of the AIC motherboard. See Figure 20. and Figure 21.

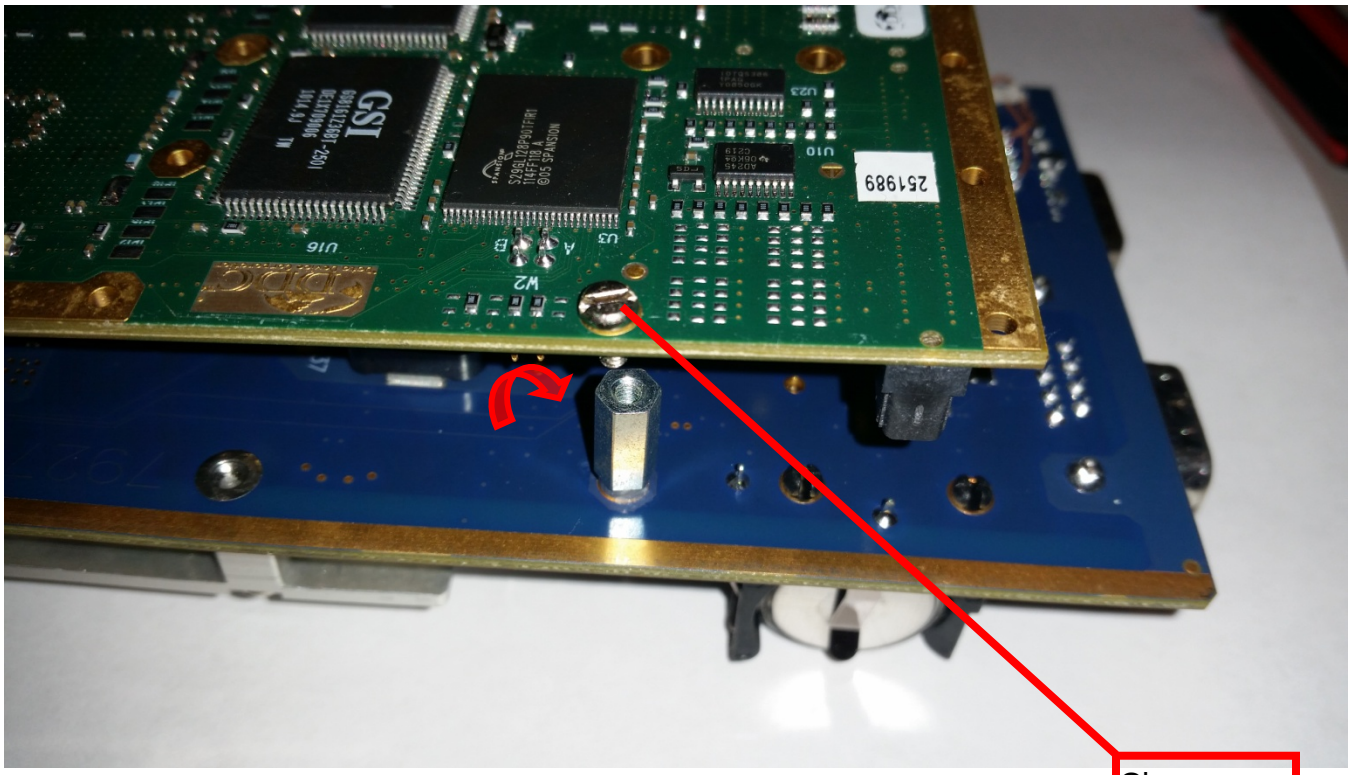

Figure 20. Rear positioned PMC screws.

This is on the bottom side of the motherboard.

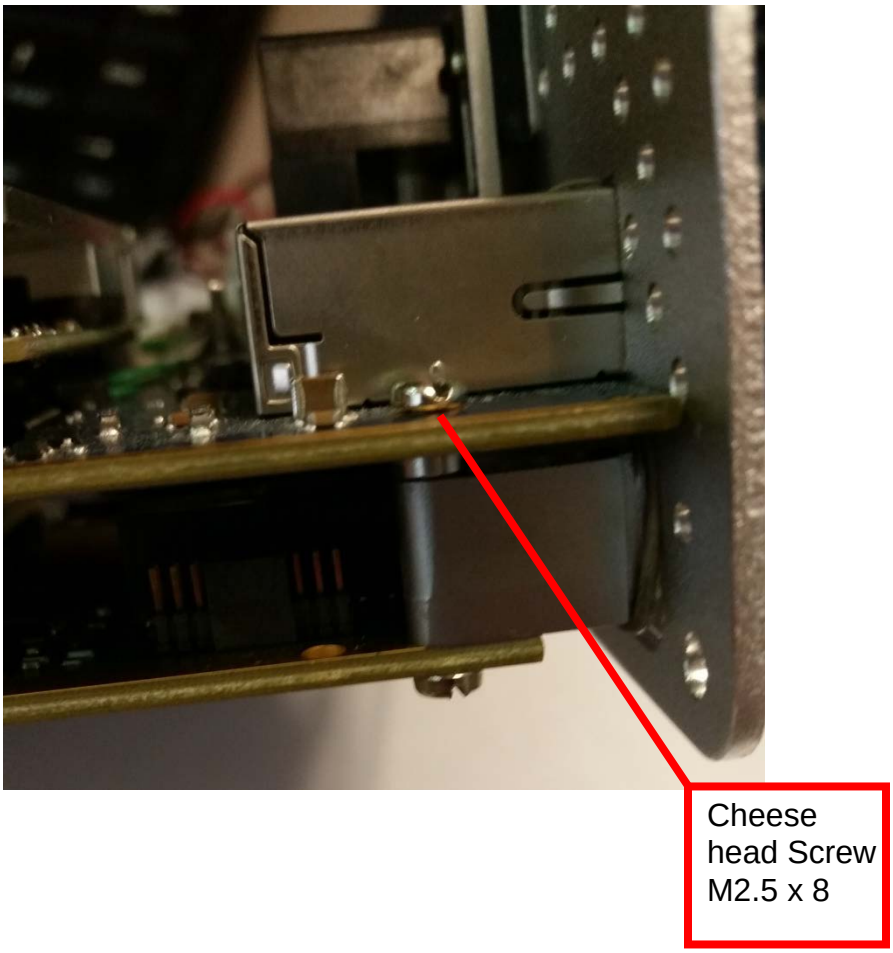

Figure 21. Front positioned PMC screws.

This is on the Top side of the motherboard.

Once the user screws the PMC card down it should be safe, secure and ready for operation.

When using DDC PMC cards, The user may want to install a jumper on to the correct jumper block so that the firmware will be able to be flashed in case a problem or update arises. See Section 7.2 for firmware instructions.

7 SOFTWARE INSTALLATION

For information about AIC software, refer to the BU-69094SX Protocol Conversion SDK Software User's Manual and the AceXtreme SDK Software Manual.

7.1 OS Restore USB Flash Drive

A bootable USB flash drive will be supplied with every model of the AIC. The flash drive will serve the purpose of restoring the OS on the device in case of a corruption or failure occurs.

The USB drive will also be able to clone (backup) your OS and your files.

The part number for the restore package will be BU-69094R1 v2.0.

For more details about the restore flash drive and procedure please see the BU-69094SX Protocol Conversion SDK Software User's Manual.

7.2 Updating The Flash Firmware

These firmware sections are associated with DDC devices only.

Updating the firmware on the AIC can be done in a couple of ways. It can be done through the web server via browser or it can be done by logging into the device itself using telnet or utilizing the VGA port with a monitor and using Standalone Mode.

7.2.1 Updating the firmware via telnet or Standalone Mode (VGA).

When choosing to update the firmware using this method, the steps taken will be similar to the way you would flash firmware on a Desktop linux system scenario, running DDC software packages.

Figure shows the login screen via Telnet. You can login to the AIC with the following default credentials (If you haven't changed them to your own credentials):

RUN login: **root**

Password: **ddc**

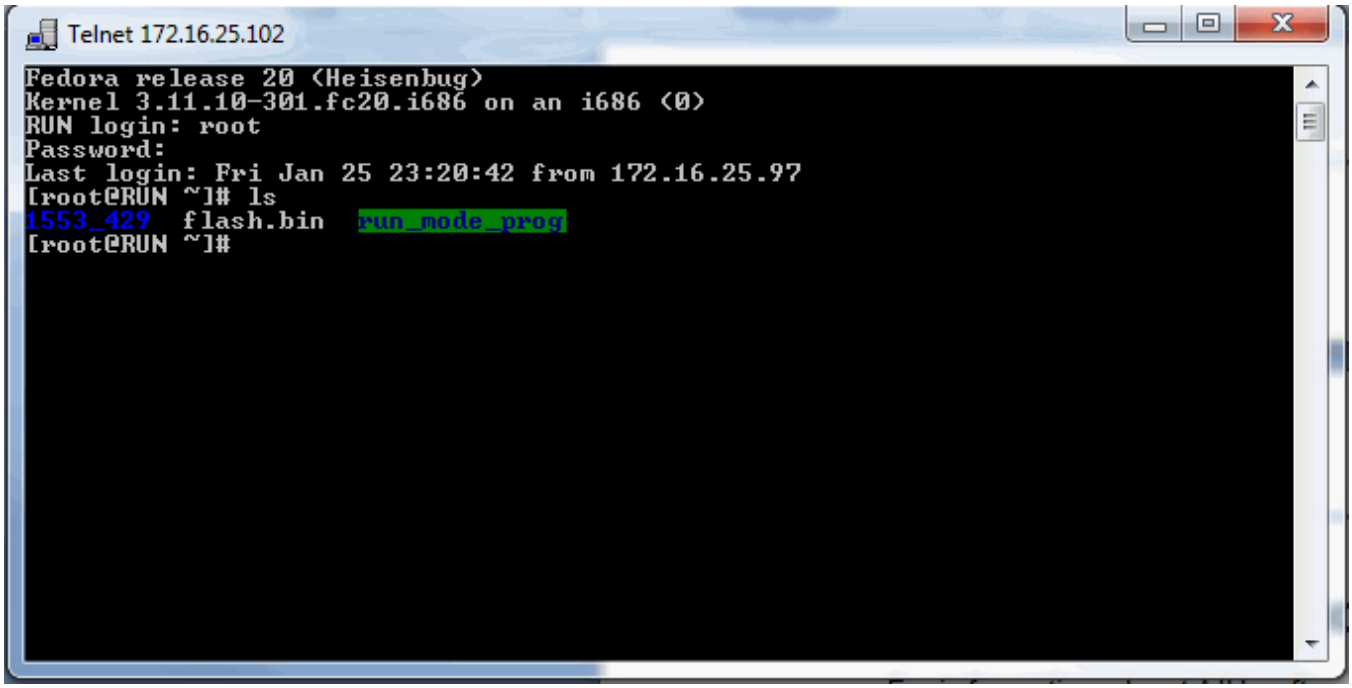

Figure 22. Telnet Login

An **ls** command will allow you to see what directories are in your AIC. You will see the directory **1553_429**. Within that directory you will see a **firmware** directory. See Figure below.

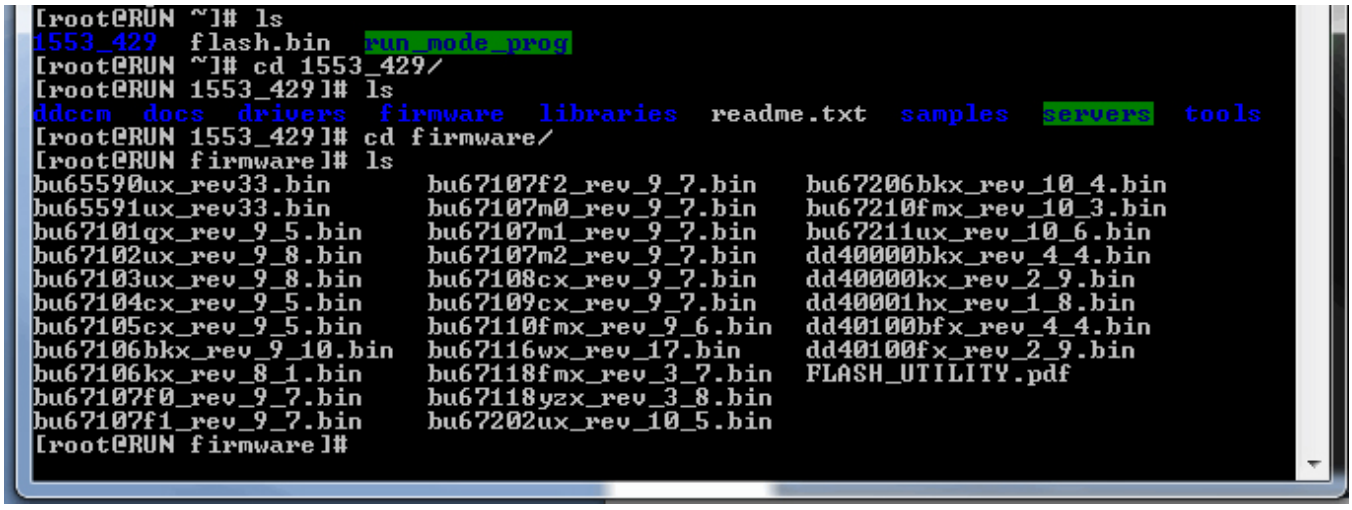

Figure 23. Firmware directory on AIC

A **pwd** command will display the path where you currently are in the AIC. This path and the firmware file name will be needed to flash the firmware on a card installed in the AIC.

Figure 24. Location path for firmware files

You can launch **ddccm**, the DDC card manager application at any point, and in any directory to view your installed devices and have the ability to update the firmware.

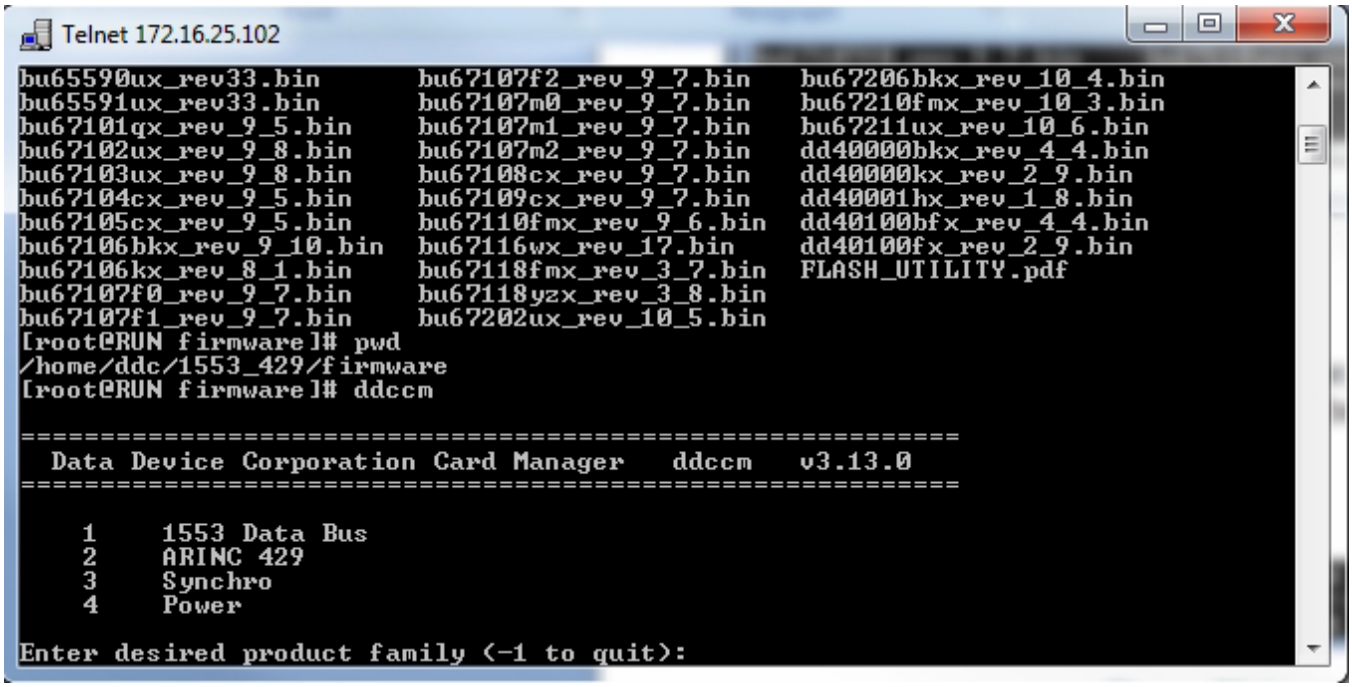

Figure 25. DDCCM application launched

In this example, the DD-40001H mini PCI-e ARINC 429 card will be used to demonstrate an update to the firmware.

In Figure 22 below, I have selected product family **2** ARINC 429 to list the devices I am able to flash.

The entry **f** should be used to allow a user to begin the process of flashing firmware.

In the Figure 22, there is only one device to be flashed, so **1** being entered will select that device for flashing.

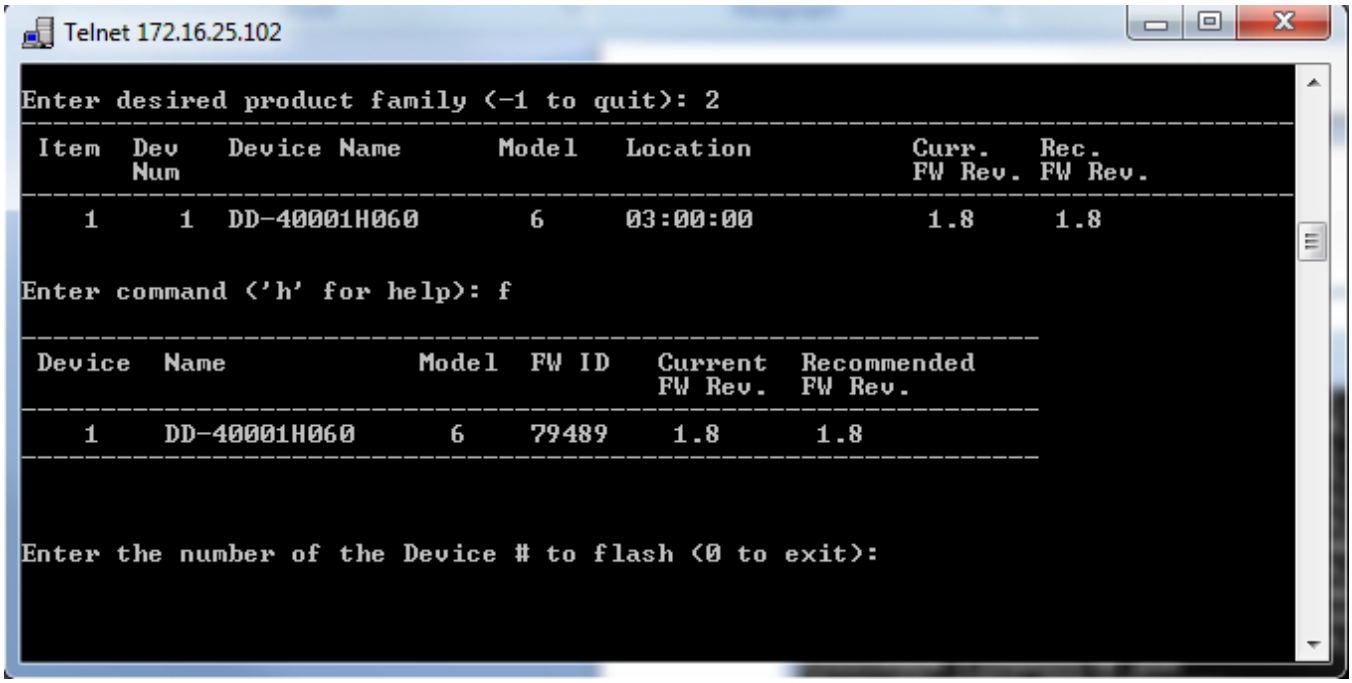

Figure 22. Selection of the device to be flashed

After selecting the device to be flashed you will be prompted to “Enter the filename to program”.

This is where you need that path and filename from Figure and Figure .

See Figure 23 below.

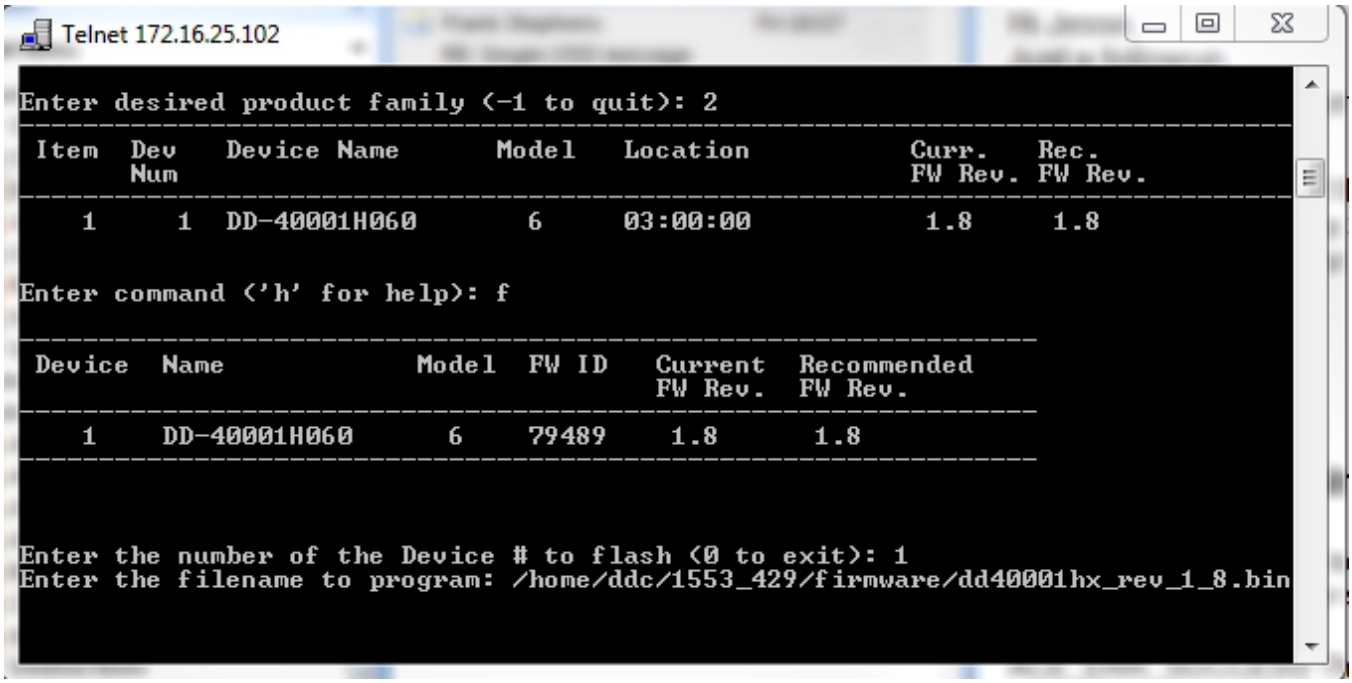

Figure 23. Entering the firmware path and name to start flashing.

After entering the correct path and filename and hitting enter, you will see the device and file attributes. It will also ask you to confirm if you want to flash the device or not.

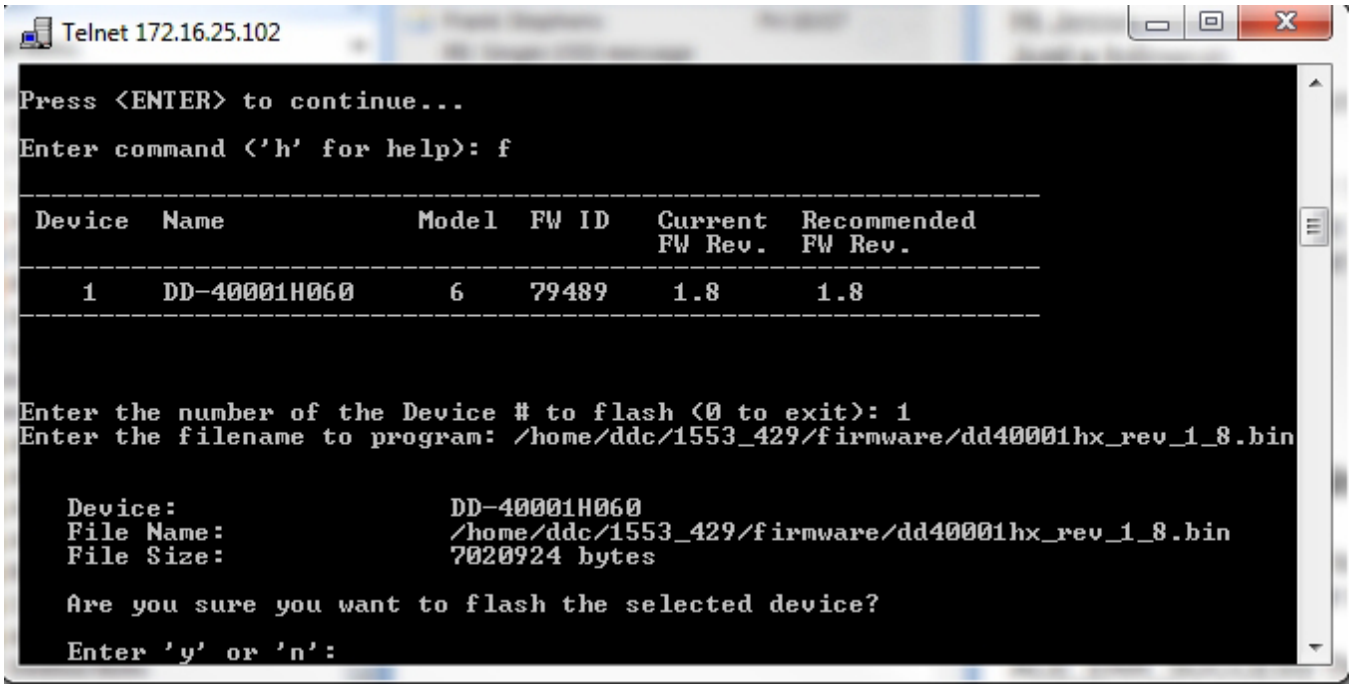

Figure 24. Confirming to flash the firmware

If you have selected yes, then you will start to see prints that say “Erasing Flash Sector” with a certain number of sectors. Once that portion has completed, the prompts will start to say “Programming” and a percentage with hex addresses will be displayed.

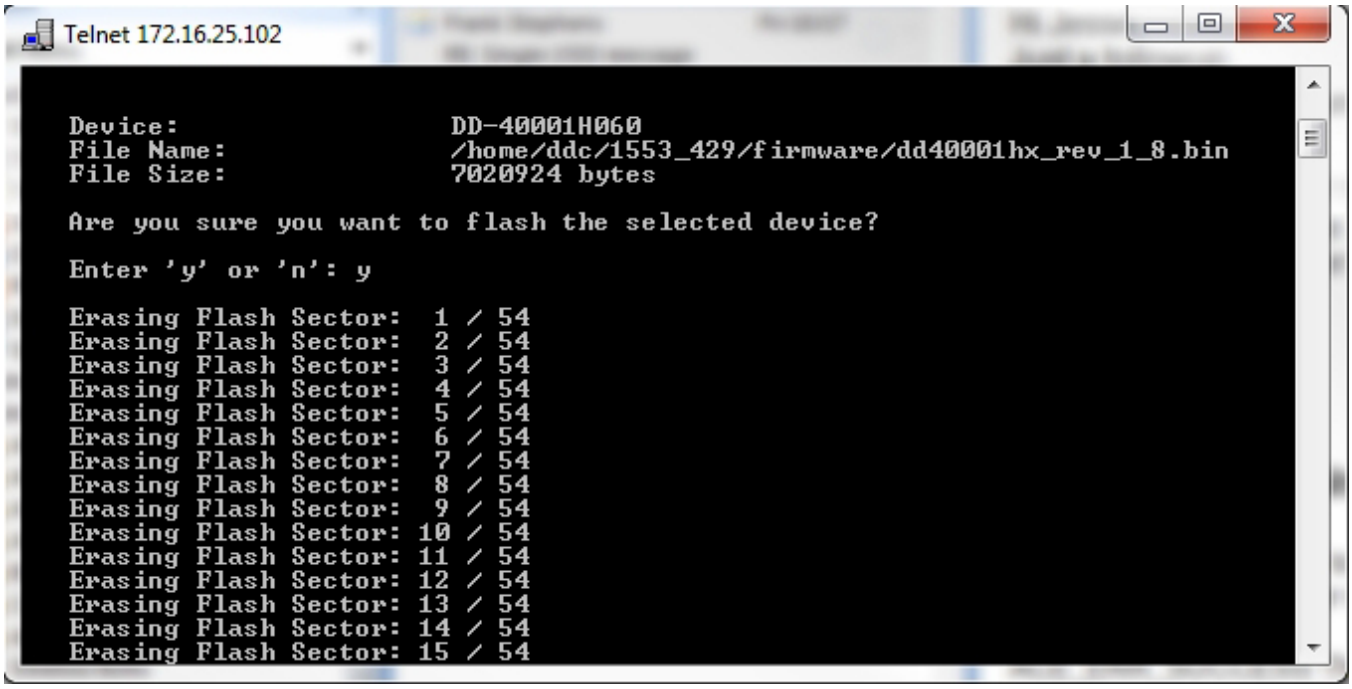

Figure 25. Flash process started, Erasing Flash Sectors

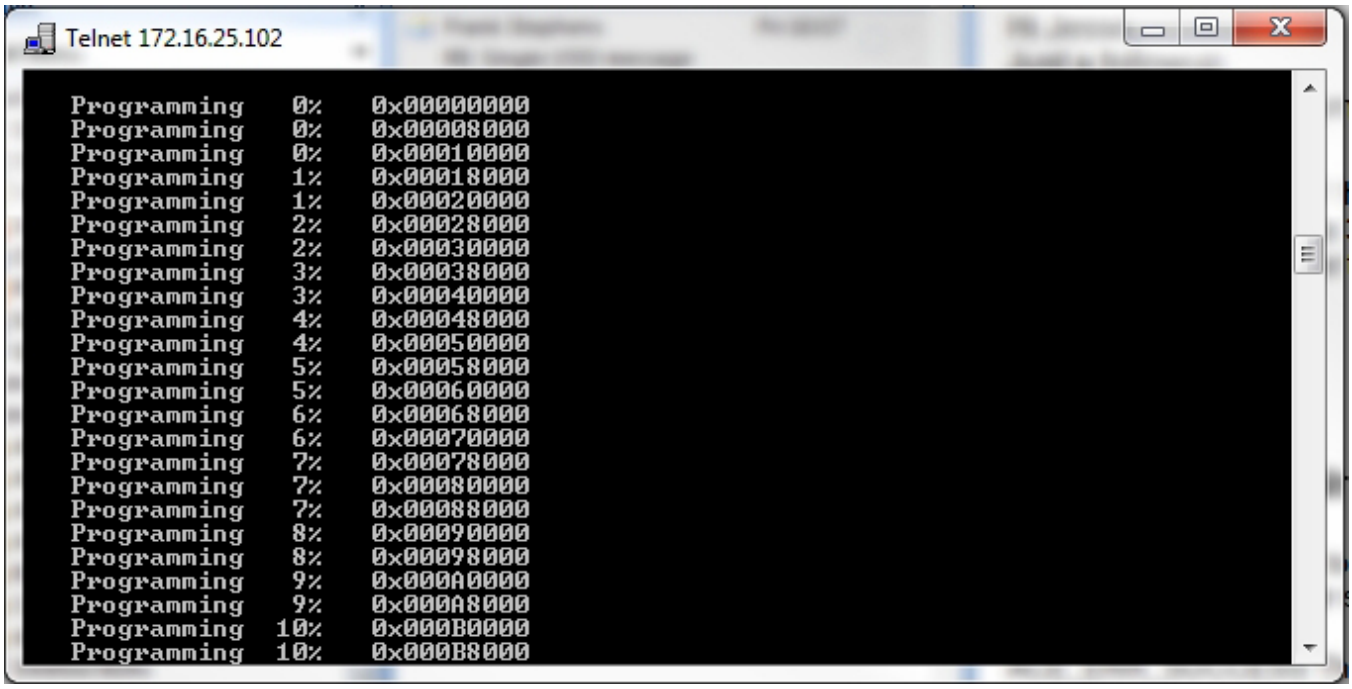

Figure 30. Programming new firmware

Once the firmware has completed you will see a success message and it will ask you to **Power cycle** the device in order for the firmware to complete.

You can use the **shutdown –h now** command to safely turn off your AIC.

7.2.2 Updating the firmware via Web browser

You can also update the AIC via the web browser. By going into your browser of choice, you can enter the IP address of your AIC into the url bar.

This will bring up a prompt and ask you for credentials to access the AIC's web page. Log in using your credentials.

Default Credentials:

Username: **ddc**

Password: **ddc**

Upon entering the web page, you will see a menu on the left hand side.

Choose Device Information.

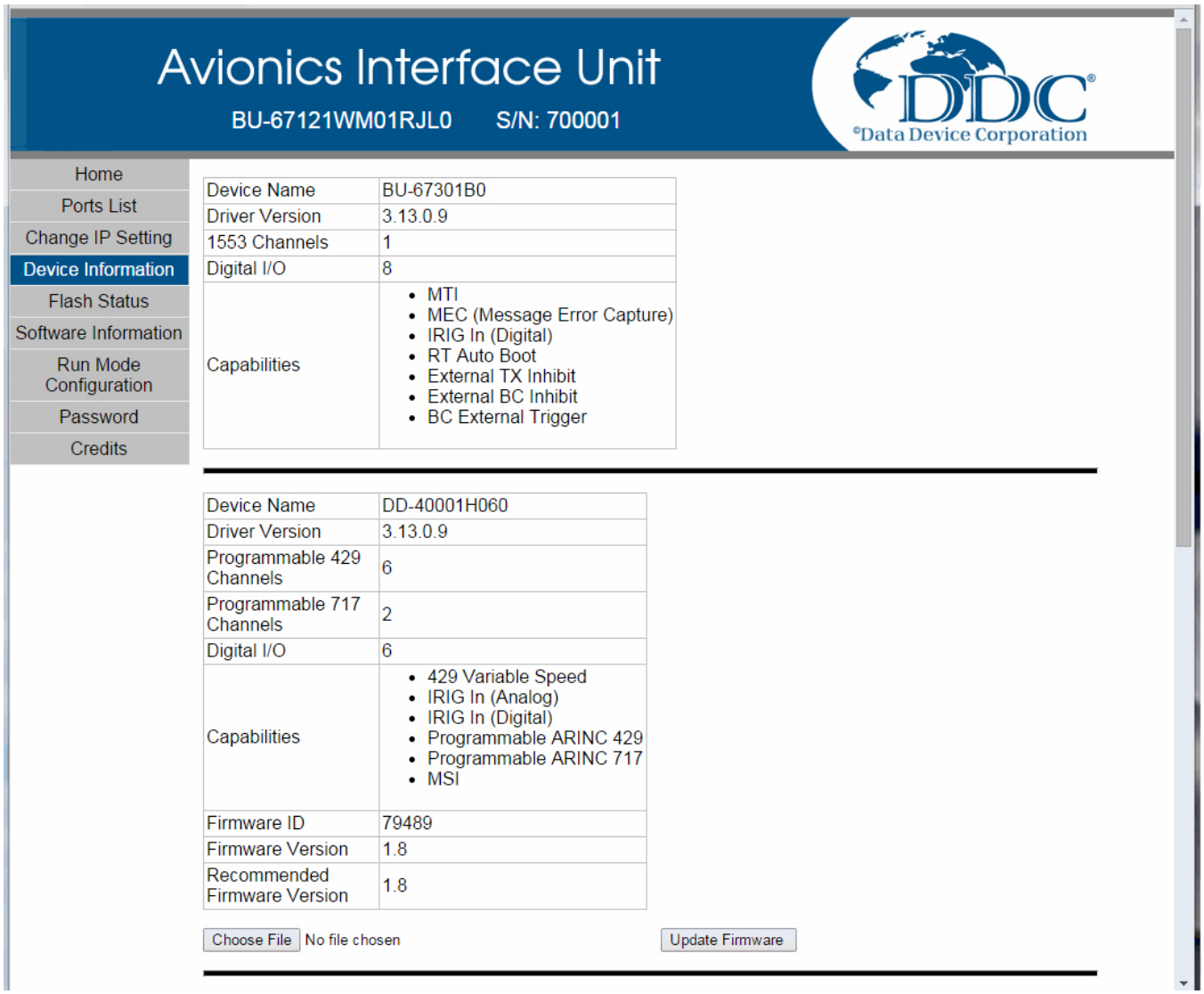

Figure 31. AIC web page Device Information

You will see the devices that are installed in your AIC. In this case the DD-40001H mini PCI-e card is installed and can be re-flashed.

Click on Choose File, and a window will pop up where you will need to navigate to the correct location and choose the correct firmware file.

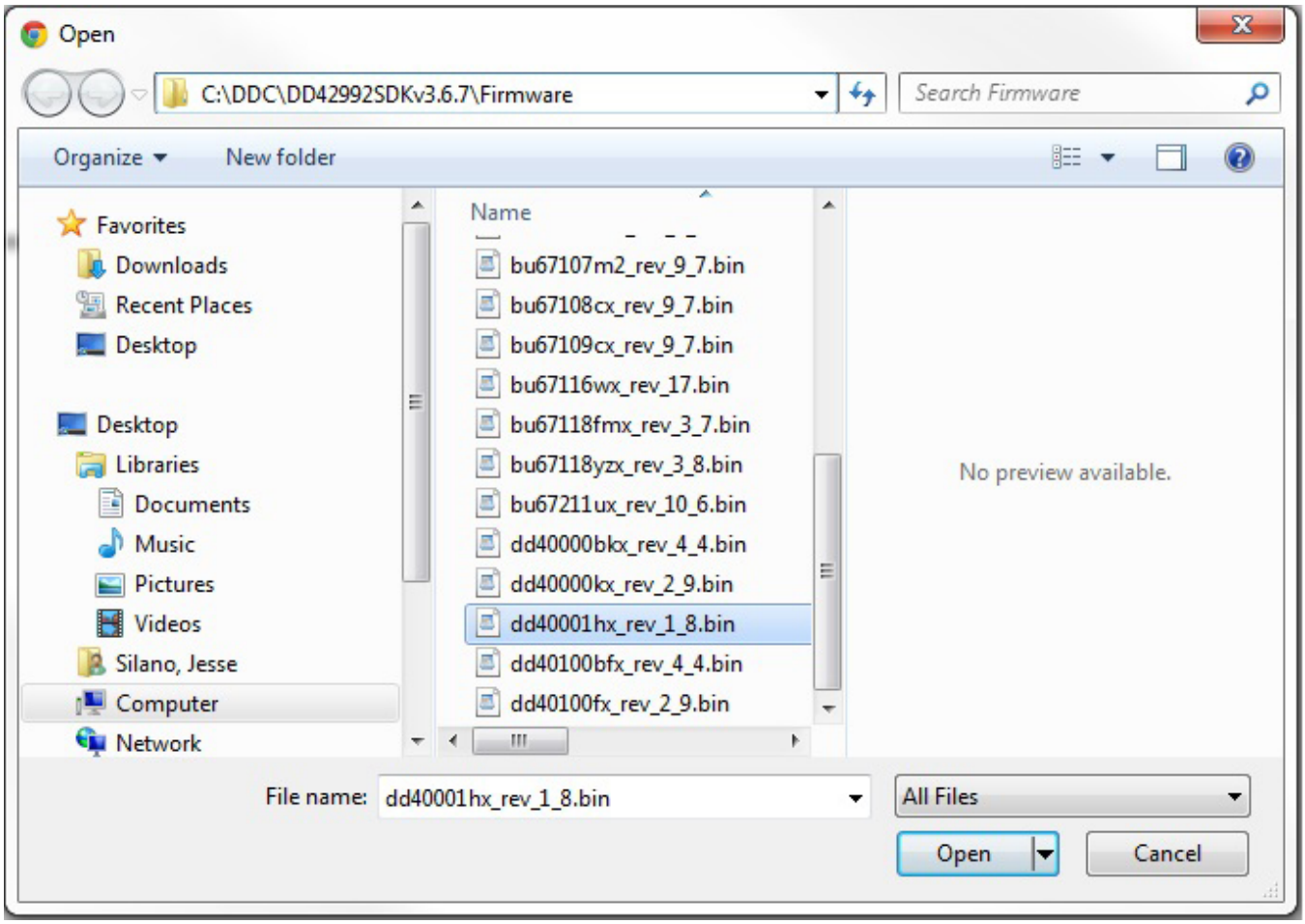

Figure 32. Locate firmware file window

Once you choose the correct firmware file, you can click **Update Firmware**.

Your browser will update and display a prompt for you to confirm you want to flash the device.

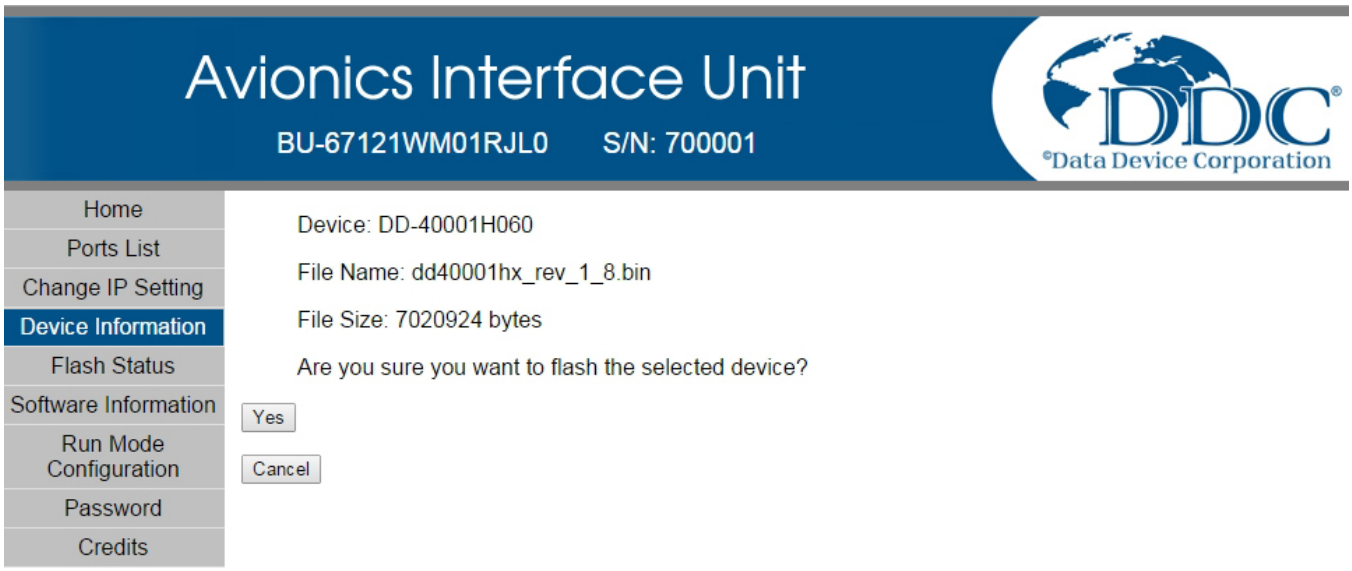

Figure 33. Browser page updated to ask for confirmation

Once you have selected **Yes**, you will then jump to the **Flash Status** menu where you will see the progress of your flashing process.

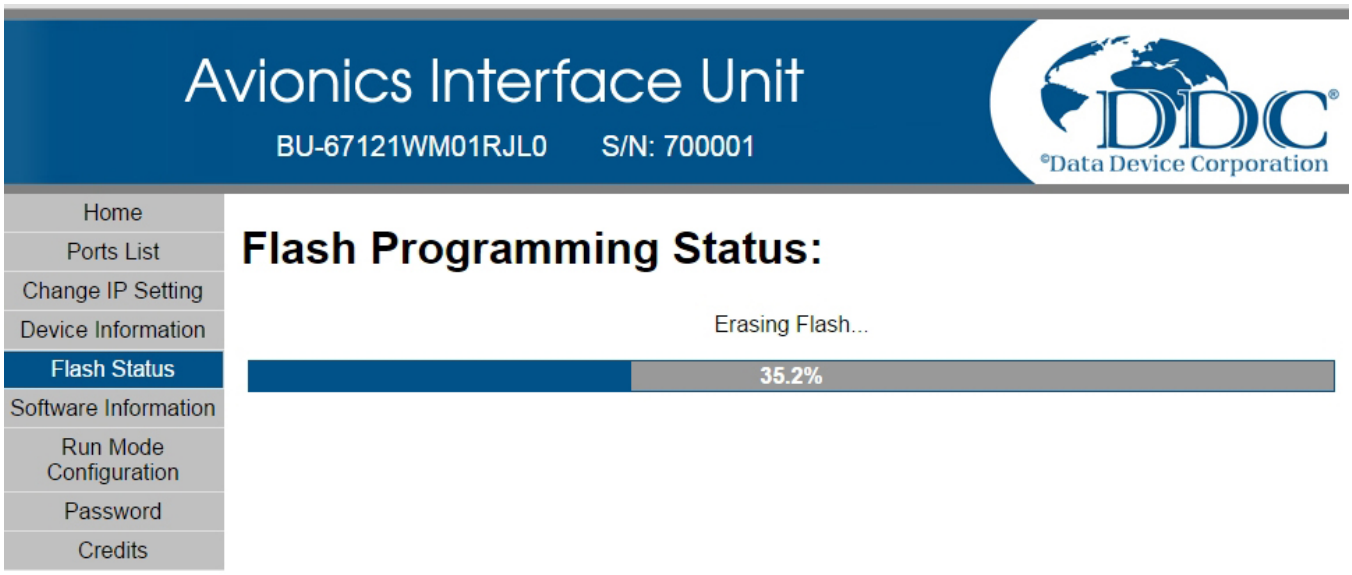

Figure 34. Erasing flash sectors

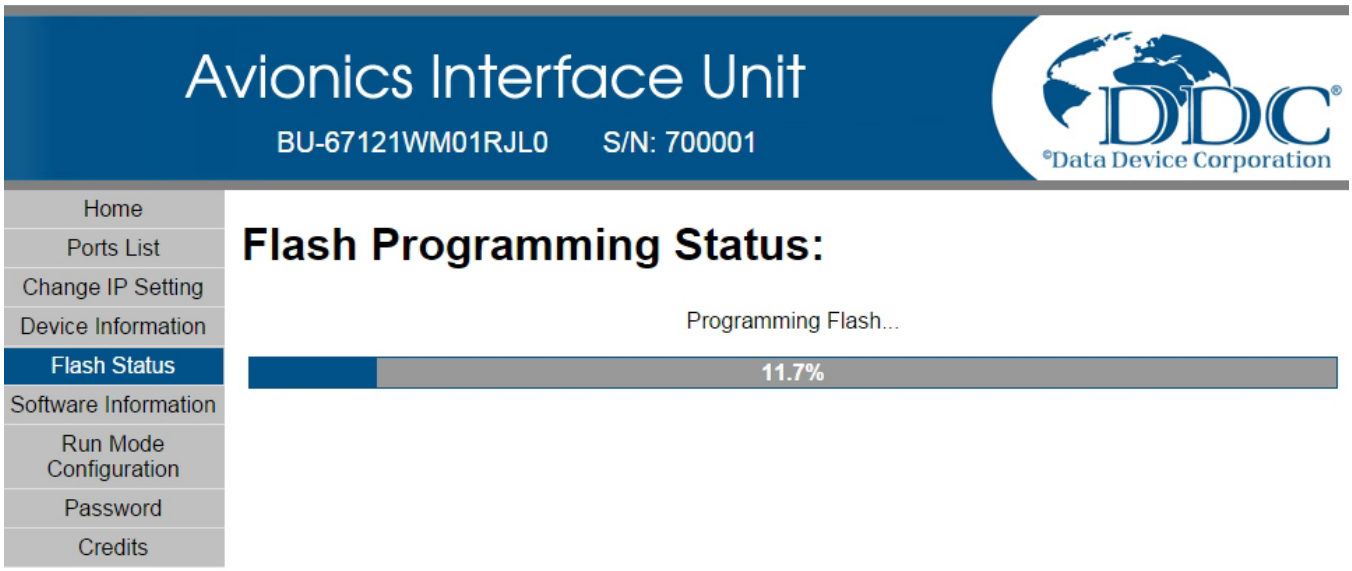

Figure 35. Programming firmware

Once the firmware is done programming, you will be asked to **power cycle** the AIC.

You will see a successful 100% for the progress bar as well as it entirely highlighted in green.

You can now press the power button on the AIC until it has turned off completely.

After the device has been powered off and is to be powered back on, do **NOT** hit the refresh button on your browser to refresh the AIC web interface.

Simply click the Home option on the web interface screen or restart your browser and type in the IP address again.

Hitting refresh will cause the browser to reload the last known saved form data.

In this case the form data would be the firmware .bin file.

This will cause the device to restart the flash programming again

8 CONNECTORS AND PINOUTS

The BU-67121Wx is a lab grade box. When using the BU-67121Wx, the following should be observed:

- **ALWAYS** take proper precautions to guard against static damage.
- **ENSURE** power adaptor is properly connected to device.

8.1 Introduction to the I/O Connectors

As seen in Figure , the AIC includes six front-panel I/O connectors, J1 through J6. As well as a 10/100/1000 Ethernet port and two USB 2.0 ports.

Depending on how you configure your AIC, each connector may include a different set of signals for the cards installed in the device.

J1, a 15-pin D-Sub, includes the signals for the Mini PCI-e Site A.

J2, a 9-pin D-Sub, also includes signals for the Mini PCI-e Site A.

J3, 15-pin D-Sub, includes signals for the Mini PCI-e Site B.

J4, 9-pin D-Sub, also includes the signals for the Mini PCI-e Site B.

J5 and J6 will have a closed bezel (as pictured in Figure .) until user chooses to install PMC cards. The user can unscrew the bezels exposing a slot for a front I/O PMC card to interface with.

Figure 36. BU-67121WX Front Panel Connectors

On the rear of the AIC, as pictured in Figure ., There is a 15-Pin VGA display port as well as a 9-Pin D-Sub used for RS-232 serial communication.

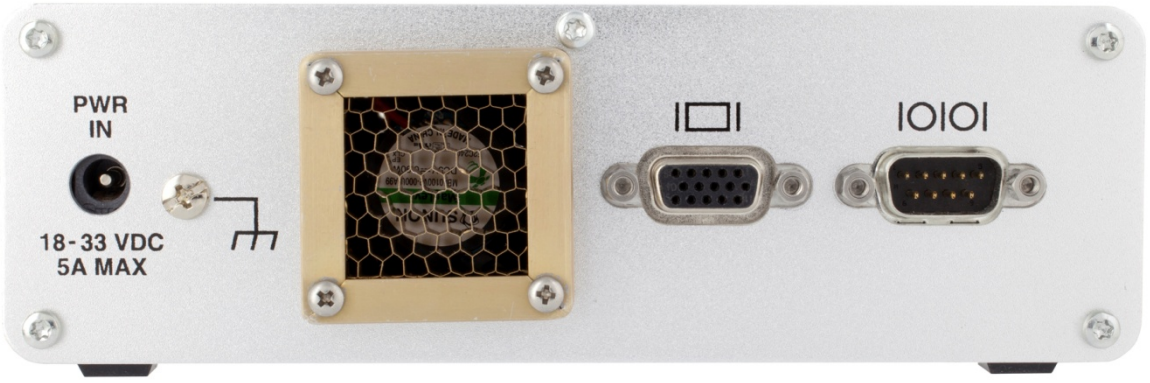

Figure 37. BU-67121WX Rear Panel Connectors

8.1.1 Connectors

The connector and mating connector part numbers for the front panel of the AIC are as follows:

- J1 and J3 15-Pin D-Sub Connector: NorComp 189-015-513R571
  - J1 and J3 Mating Connector: NorComp 171-015-102L001
  - J1 and J3 Mating Connector Backshell: Amphenol 17E-1657-15
- J2 and J4 9-Pin D-Sub Connector: NorComp 189-009-513R571
  - J2 and J4 Mating Connector: FCI DEM09P
  - J2 and J4 Mating Connector Backshell: Amphenol 17E-1657-09

  J5 and J6 will beopen PMC slots. If you choose to populate the slots with DDC PMC cards, then you will be able to use the cables that are provided with those cards . Please refer to those device's hardware manual for additional connector information.
- RJ-45 Ethernet receptacle: BEL L829-1J1T-43
- USB 2.0 receptacles: FCI 72309-8034BLF

The connector and mating connector part numbers for the back panel of the AIC are as follows:

- VGA connector: Sullins Connector Solutions SDS108-PRW1-F15-SN13-1
- RS-232 Connector: FCI D09P33E4GX00LF

The BU-67121WX includes an ON/OFF button on the front of the box.

The power button includes an LED to provide status of the boot sequence. The following charts show what each sequence means.

Table 4. Power ON Sequence	
Description	**Expected Operation**
Power button pushed for ON	LED flashes fast
After BIOS completes loading	LED flashes slower
After OS completes loading	LED is solid ON

Table 5. Power OFF Sequence	
Description	**Expected Operation**
Power Button Pushed	LED flashes fast
Power OFF completed	LED solid OFF

8.2 Signal Lists

Below is Table 6. AIC Signal Lists, which mentions and describes the labels of the various signals that will be used to interface with the AIC.

8.2.1 AIC Signals J1 – J4 & Ethernet, USB, VGA, RS-232

Table 6. AIC Signal List J1 – J4 & Ethernet, USB, VGA, RS-232		
Signal Name	**Dir**	**Description**
J1 through J4 signals will depend on which cards are installed. If using DDC cards, then please refer to the individual card's manual for signal lists.		
Ethernet Signals		
E1 TXRX 1+	I/O	Ethernet Tx/Rx 1 Signal (Positive)
E1 TXRX 1-	I/O	Ethernet Tx/Rx 1 Signal (Negative)
E1 TXRX 2+	I/O	Ethernet Tx/Rx 2 Signal (Positive)
E1 TXRX 3+	I/O	Ethernet Tx/Rx 3 Signal (Positive)
E1 TXRX 3-	I/O	Ethernet Tx/Rx 3 Signal (Negative)
E1 TXRX 2-	I/O	Ethernet Tx/Rx 2 Signal (Negative)
E1 TXRX 4+	I/O	Ethernet Tx/Rx 4 Signal (Positive)
E1 TXRX 4-	I/O	Ethernet Tx/Rx 4 Signal (Negative)

Table 6. AIC Signal List J1 – J4 & Ethernet, USB, VGA, RS-232		
Signal Name	**Dir**	**Description**
USB Signals		
VBUS	I	Voltage Signal for the USB bus
D-	I/O	Data Signal for the USB bus (Negative)
D+	I/O	Data Signal for the USB bus (Positive)
Video Signals		
Red	O	Red Video (75 ohm, 0.7 Vp-p)
Green	O	Green Video (75 ohm, 0.7 Vp-p)
Blue	O	Blue Video (75 ohm, 0.7 Vp-p)
HSync	O	Horizontal Sync
Vsync	O	Vertical Sync
Serial Signals		
SERIAL_RTS	I/O	Serial Request to Send Signal
SERIAL_CTS	I/O	Serial Clear To Send Signal
SERIAL_RX	I/O	Serial Receive Data Signal
SERIAL_TX	I/O	Serial Transmit Data Signal
Ground Signals		
RGND	G	Red Ground
GGND	G	Green Ground
BGND	G	Blue Ground
SGND	G	Sync Ground
GND	G	Ground Reference
DGND	G	Digital Ground
CHASSIS GND	G	
NC	NC	No Connect. Do NOT Connect.

8.2.2 J5 Signal List

J5 will be an open PMC slot. If using a DDC card, please refer to the card's manual for the signal list.

8.2.3 J6 Signal List

J6 will be the second open PMC slot. If using a DDC card, please refer to the card's manual for the signal list.

8.3 Connector Pinouts

Refer to Table 6. AIC Signal List J1 – J4 & Ethernet, USB, VGA, RS-232 for names and descriptions of the various pins.

Mini PCI-e Site A will route it's signals to J1 and J2. Mini PCI-e Site B will rout its signals to J3 and J4.

When using DDC cards, a FPC cable will allow a user to route the DDC card signals to the front connectors.

If using a non-DDC card then you will have to create your own cable that connects to the onboard header. Section 4.3.3 and 4.3.6 will show you the pins for the onboard header and how they map to the front connectors.

8.3.1 AIC J1 Connector

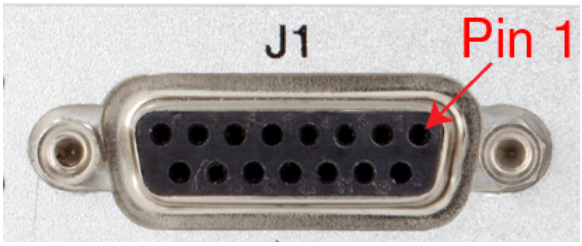

Figure 38. AIC J1 15-Pin D-Sub Connector

When populating the Mini PCI-e site A with DDC cards, the following table shows which signals come out of each pin on the connector.

Table 7. J1 15-Pin D-Sub Connector Pinout		
J1 15-Pin D-Sub	**1553 Mini PCI-e Site A**	**429 Mini PCI-e Site A**
1	CHASSIS GND	CH1A_717/429_RX_TX_IO
2	CH1_TX_INH	CH1B_717/429_RX_TX_IO
3	CH1_BC_DISABLE	CH2A_717/429_RX_TX_IO
4	CH1_EXT_TRIG_SS_FLAG#	CH2B_717/429_RX_TX_IO
5	IRIG_DIG	CH3A_429_RX_TX_IO
6	CH2_TX_INH	CH3B_429_RX_TX_IO
7	CH2_BC_DISABLE	CH4A_429_RX_TX_IO
8	CH2_EXT_TRIG_SS_FLAG#	CH4B_429_RX_TX_IO
9	DGND	DGND
10	NC	CH5A_429_RX_ONLY_IO
11	NC	CH5B_429_RX_ONLY_IO
12	NC	CH6A_429_RX_ONLY_IO
13	NC	CH6B_429_RX_ONLY_IO
14	NC	DIGITAL_IRIG_IN
15	NC	SPARE (CHASSIS GND)

8.3.2 AIC J2 Connector

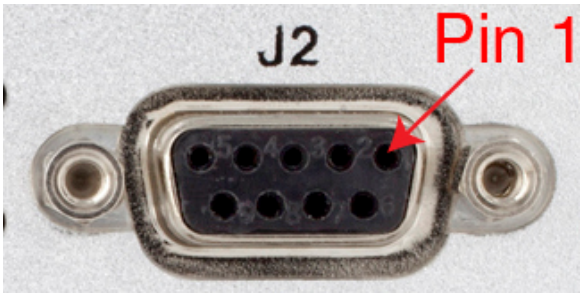

Figure 39. AIC J2 9-Pin D-Sub Connector

When populating the Mini PCI-e site A with DDC cards, the following table shows which signals come out of each pin on the connector.

Table 8. J2 9-Pin D-Sub Connector Pinout		
J2 9-Pin D-Sub	**1553 Mini PCI-e Site A**	**429 Mini PCI-e Site A**
1	MIL_STD_1553_A1-	D_IO_2
2	MIL_STD_1553_A1+	D_IO_1

Table 8. J2 9-Pin D-Sub Connector Pinout		
J2 9-Pin D-Sub	**1553 Mini PCI-e Site A**	**429 Mini PCI-e Site A**
3	MIL_STD_1553_B1+	D_IO_3
4	MIL_STD_1553_B1-	D_IO_4
5	CHASSIS GND	CHASSIS GND
6	MIL_STD_1553_A2-	D_IO_6
7	MIL_STD_1553_A2+	D_IO_5
8	MIL_STD_1553_B2+	FLASH_WRITE_ENABLE
9	MIL_STD_1553_B2-	BOOT_FROM_BACKUP_L

8.3.3 Mini PCI-e Site A with non-DDC Card

J1 and J2 can be used with a non-DDC mini PCI-e card. The user will have to create their own cable to connect from their card to the onboard header to route the signals to the front connectors. The tables below shows you the pins of the onboard header.

Table 9. AIC D-Subs to 20-pin onboard header pin out	
AIC J1 9-Pin D-Sub	**20-pin header (J23 on PCB)**
1	2
2	1
3	4
4	5
5	3,6,9,12
6	8
7	7
8	10
9	11
AIC J2 15-Pin D-Sub	**20-pin header (J23 on PCB)**
1	-
2	13
3	14
4	15
5	16
6	17
7	18
8	19
9	20

Table 9. AIC D-Subs to 20-pin onboard header pin out	
10	-
11	-
12	-
13	-
14	-
15	-

Table 10. AIC D-Subs to 24-pin onboard header pin out	
AIC J1 9-Pin D-Sub	**24-pin header (J14 on PCB)**
1	2
2	1
3	4
4	5
5	6
6	8
7	7
8	10
9	11
AIC J2 15-Pin D-Sub	**24-pin header (J14 on PCB)**
1	12
2	13
3	14
4	15
5	16
6	17
7	18
8	19
9	20
10	21
11	22
12	23
13	24
14	9
15	3

8.3.4 AIC J3 Connector

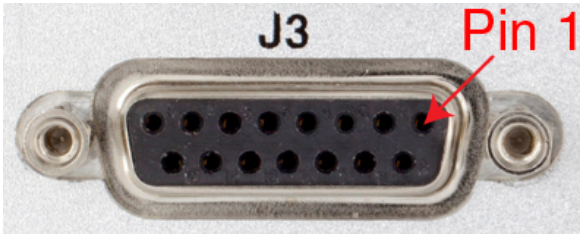

Figure 40. AIC J3 15-Pin D-Sub Connector

Table 11. J3 15-Pin D-Sub Connector Pinout		
J3 15-Pin D-Sub	**1553 Mini PCI-e Site B**	**429 Mini PCI-e Site B**
1	CHASSIS GND	CH1A_717/429_RX_TX_IO
2	CH1_TX_INH	CH1B_717/429_RX_TX_IO
3	CH1_BC_DISABLE	CH2A_717/429_RX_TX_IO
4	CH1_EXT_TRIG_SS_FLAG#	CH2B_717/429_RX_TX_IO
5	IRIG_DIG	CH3A_429_RX_TX_IO
6	CH2_TX_INH	CH3B_429_RX_TX_IO
7	CH2_BC_DISABLE	CH4A_429_RX_TX_IO
8	CH2_EXT_TRIG_SS_FLAG#	CH4B_429_RX_TX_IO
9	DGND	DGND
10	NC	CH5A_429_RX_ONLY_IO
11	NC	CH5B_429_RX_ONLY_IO
12	NC	CH6A_429_RX_ONLY_IO
13	NC	CH6B_429_RX_ONLY_IO
14	NC	DIGITAL_IRIG_IN
15	NC	SPARE (CHASSIS GND)

8.3.5 AIC J4 Connector

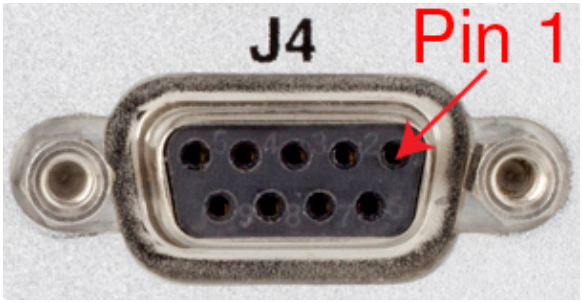

Figure 41. AIC J4 9-Pin D-Sub Connector

Table 12. J4 9-Pin D-Sub Connector Pinout		
J4 9-Pin D-Sub	**1553 Mini PCI-e Site B**	**429 Min PCI-e Site B**
1	MIL_STD_1553_A1-	D_IO_2
2	MIL_STD_1553_A1+	D_IO_1
3	MIL_STD_1553_B1+	D_IO_3
4	MIL_STD_1553_B1-	D_IO_4
5	CHASSIS GND	CHASSIS GND
6	MIL_STD_1553_A2-	D_IO_6
7	MIL_STD_1553_A2+	D_IO_5
8	MIL_STD_1553_B2+	FLASH_WRITE_ENABLE
9	MIL_STD_1553_B2-	BOOT_FROM_BACKUP_L

8.3.6 Mini PCI-e Site B with non-DDC card

J3 and J4 can be used with a non-DDC mini PCI-e card. The user will have to create their own cable to connect from their card to the onboard header to route the signals to the front connectors. The tables below shows you the pins of the onboard header and how they map to the D-Sub connectors.

Table 13. AIC D-Subs to 20-pin onboard header pin out	
AIC J3 9-Pin D-Sub	**20-pin header (J18 on PCB)**
1	2
2	1
3	4
4	5
5	3,6,9,12

Table 13. AIC D-Subs to 20-pin onboard header pin out	
6	8
7	7
8	10
9	11
AIC J4 15-Pin D-Sub	**20-pin header (J18 on PCB)**
1	-
2	13
3	14
4	15
5	16
6	17
7	18
8	19
9	20
10	-
11	-
12	-
13	-
14	-
15	-

Table 14. AIC D-Subs to 24-pin onboard header pin out	
AIC J3 9-Pin D-Sub	**24-pin header (J17 on PCB)**
1	2
2	1
3	4
4	5
5	6
6	8
7	7
8	10
9	11
AIC J4 15-Pin D-Sub	**24-pin header (J17 on PCB)**
1	12

Table 14. AIC D-Subs to 24-pin onboard header pin out	
2	13
3	14
4	15
5	16
6	17
7	18
8	19
9	20
10	21
11	22
12	23
13	24
14	9
15	3

8.3.7 AIC J5 & J6 Connector

These connectors will be the front I/O connectors of the PMC cards that will be installed in the AIC. The card's manual will have the details for the connectors.

8.3.8 10/100/1000 BASE-T Ethernet Port

The AIC will have one RJ-45 jack on the front panel for Ethernet connectivity.

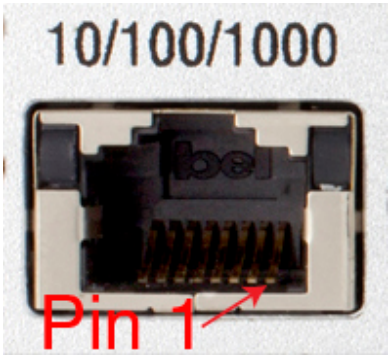

Figure 42. Female RJ-45 jack for Ethernet

Table 15. 10/100/1000 Ethernet Port Pinout	
RJ-45 Receptacle Pin	**BU-67121Wx**
1	E1 TXRX 1+
2	E1 TXRX 1-
3	E1 TXRX 2+
4	E1 TXRX 3+
5	E1 TXRX 3-
6	E1 TXRX 2-
7	E1 TXRX 4+
8	E1 TXRX 4-

8.3.9 USB 2.0 Type A Receptacle

The AIC will have two USB 2.0 ports available for use on the front panel.

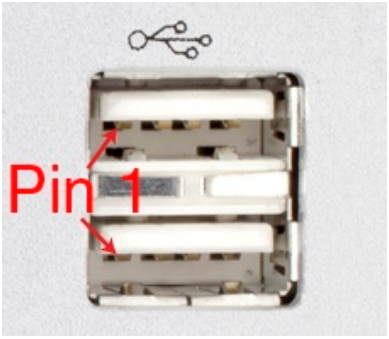

Figure 43. USB 2.0 Type A Receptacle

Table 16. USB 2.0 A Connector Pinouts	
USB A Receptacle Pin	**BU-67121Wx**
1	VBUS
2	D-
3	D+
4	GND

8.3.10 VGA Video Connector

The AIC will have a VGA connector for use with connecting a monitor. The connector is located on the back panel of the AIC.

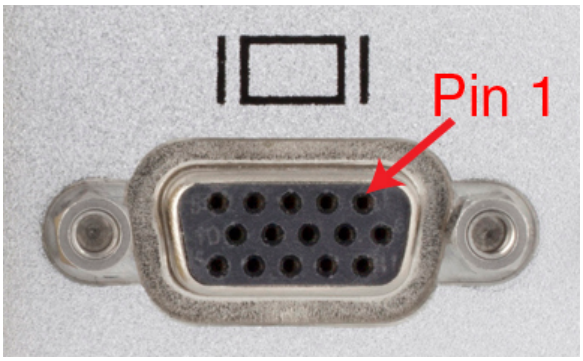

Figure 44. 15-Pin VGA Video Connector

Table 17. 15-Pin VGA Connector Pinout	
15-Pin VGA Port Pin	**BU-67121Wx**
1	Red
2	Green
3	Blue
4	NC
5	GND
6	RGND
7	GGND
8	BGND
9	NC
10	SGND
11	NC
12	NC
13	HSync
14	VSync
15	NC

8.3.11 RS-232 Serial Communication Conenctor

The AIC will include a Male 9-Pin D-Sub connector on the rear panel for serial communication.

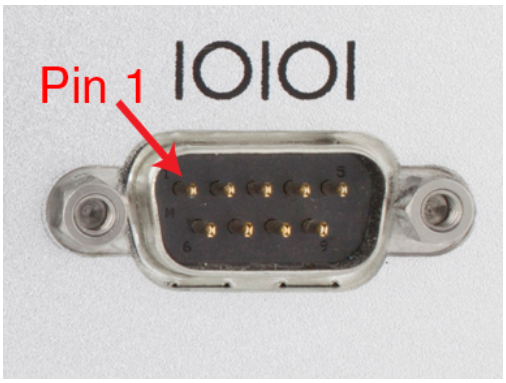

Figure 45. 9-Pin, Male, D-Sub connector for RS-232

Table 18. 9-Pin RS-232 Connector Pinout

9-Pin RS-232 Pin	BU-67121Wx
1	NC
2	SERIAL_RX
3	SERIAL_TX
4	NC
5	Signal GND
6	NC
7	SERIAL_RTS
8	SERIAL_CTS
9	NC

8.4 Mating Connectors

The BU-67121WX is supplied with various mating connectors and backshells for front connectors, along with a 100/240 VAC-to-24 VDC power adaptor.

The mating connectors, and power adaptor that are provided with the AIC are shown in Table 19.

Table 19. Mating Connectors, and Power Adapter	
Mating Connectors, etc.	**BU-67121Wx MF box**
Mating connector to AIC J1 – 15-Pin D-Sub, Male (NorComp 171-015-102L001) with backshell (Amphenol 17E-1657-15)	Included
Mating connector to AIC J2 -- 9-Pin D-Sub, Male (FCI DEM09P) with backshell (Amphenol 17E-1657-09)	Included
Mating connector to AIC J3 – 15-Pin D-Sub, Male (NorComp 171-015-102L001) with backshell (Amphenol 17E-1657-15)	Included
Mating connector to AIC J4 -- 9-Pin D-Sub, Male (FCI DEM09P) with backshell (Amphenol 17E-1657-09)	Included
Flat Flex Cable (FFC) for Mini PCI-e Slots – 20-Pin FFC (Molex 21020-0207) 24-Pin FFC (Molex 15266-0249)	Included ** 2 of each **
SL Power Electronics CENB1080A2403F01 100/240 VAC – 24 VDC power adaptor, with multiple international power cables / plugs	Included

The mating connectors supplied with the ***BU-67121WX*** AIC are explained in the following paragraphs.

8.4.1 Mating Connector to AIC J1

AIC connector J1 is a 15-Pin D-sub Female socket. The mating connector to J1 is a 15-pin, Male, ‘D’ connector (NorComp 171-015-102L001). The backshell for the connector is an Amphenol 17E-1657-15. The pinout for AIC J1 is shown in Table 7.

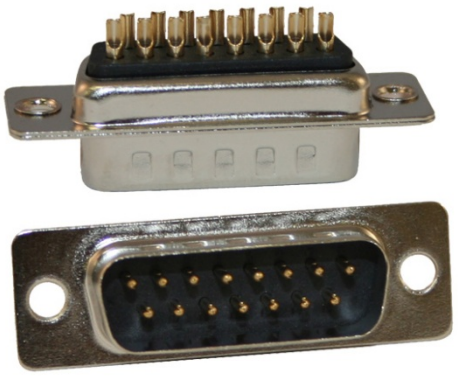

Figure 46. AIC J1 Mating Connector

8.4.2 Mating Connector for AIC J2

AIC J2 is a 9-Pin D-Sub Female socket. The mating connector is a 9-pin, Male, 'D' connector (FCI DEM09P). The backshell is an Amphenol 17E-1657-09. The pin out for AIC J4 is in Table 12.

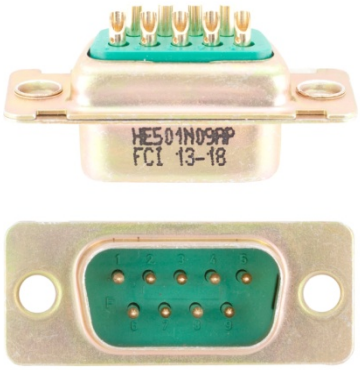

Figure 47. AIC J2 Mating Connector

8.4.3 Mating Connector for AIC J3

AIC J3 is a 15-Pin D-Sub Female Socket. The mating connector to J3 is a 15-pin, Male, 'D' connector (NorComp 171-015-102L001). The backshell for the connector is an Amphenol 17E-1657-15. The pinout for AIC J3 is shown in Table 11.

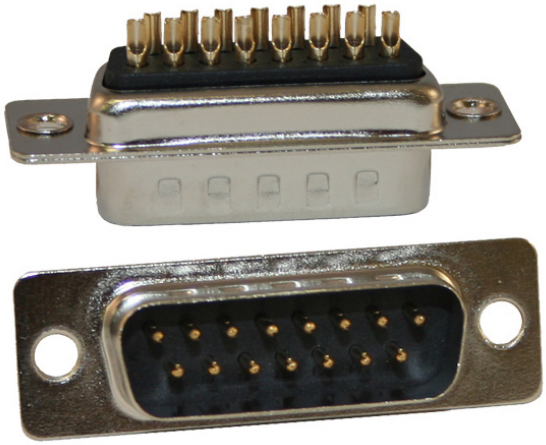

Figure 48. AIC J3 Mating Connector

8.4.4 Mating Connector for AIC J4

AIC J4 is a 9-Pin D-Sub Female socket. The mating connector is a 9-pin, Male, 'D' connector (FCI DEM09P). The backshell is an Amphenol 17E-1657-09. The pin out for AIC J4 is in Table 12.

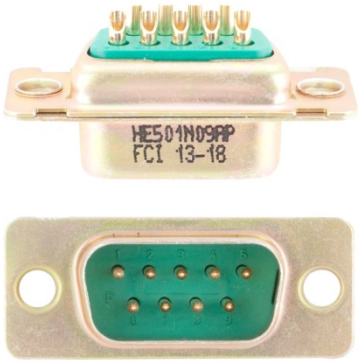

Figure 49. AIC J4 Mating Connector

8.5 External Power Supply

The BU-67121WX AIC comes with an AC-to-DC power adaptor, SL Power Electronics CENB1080A2403F01, along with the four international AC line cords listed below. The adaptor converts 100 or 240 VAC to 24 VDC for the AIC's use.

The power adaptor comes with the following US and international AC line cord attachments:

- For the US: Qualtek 212004-01 (90 in.)
- For the UK: Qualtek 370001-E01 (2.5 meters = 98.4 in.)
- For Europe: Qualtek 3640002-D01 (2.5 meters = 98.4 in.)
- For Japan: Qualtek 397002-01 (2.5 meters = 98.4 in.)

9 ORDERING INFORMATION

Model Number	System Description	Expansion Options	Operating Temperature	Size	Weight
BU-67121W000R-JL0	Intel® Atom E3845 Quad Core, 1.91 GHz Processor, 2GB DDR3L SDRAM, 30 GByte SSD	2 PMC Sites 2 Mini-PCIe Sites	0°C to +55°C	6.7 in x 7.4 in x 2.1 in (170 mm x 188 mm x 53 mm)	2.7lbs (1.2kg)

Notes: 1. Contact the Factory for more ordering options.
2. Product Specifications for DDC's PMC and Mini-PCIe boards are available at www.ddc-web.com/databus

Included Accessories:
For the BU-67121WX model

- Mating Connector to AIC **J1**:
  - 15-pin, Male, 'D' connector (NorComp 171-015-102L001).
    - Can also be ordered as DDC P/N 5301-0766-0001
  - Backshell for mating connector (Amphenol 17E-1657-15)
    - Can also be ordered as DDC P/N 5301-0764-0001
- Mating Connector to AIC **J2**:
  - 9-pin, Male, 'D' connector (FCI DEM09P).
    - Can also be ordered as DDC P/N 5300-0023-0002
  - Backshell for mating connector (Amphenol 17E-1657-09)
    - Can also be ordered as DDC P/N 5301-0775-0001
- Mating Connector to AIC **J3**:
  - 15-pin, Male, 'D' connector (NorComp 171-015-102L001).
    - Can also be ordered as DDC P/N 5301-0766-0001
  - Backshell for mating connector (Amphenol 17E-1657-15)
    - Can also be ordered as DDC P/N 5301-0764-0001
- Mating Connector to AIC **J4**:
  - 9-pin, Male, 'D' connector (FCI DEM09P).
    - Can also be ordered as DDC P/N 5300-0023-0002
  - Backshell for mating connector (Amphenol 17E-1657-09)
    - Can also be ordered as DDC P/N 5301-0775-0001

- Flat Flex Cables (FFC) for Mini PCI-e slots.
  - 20-pin FFC (Molex 21020-0207) (x2)
  - 24-pin FFC (Molex 15266-0249) (x2)
- 100/240 VAC-to-24 VDC Power Adaptor:
  - SL Power Electronics CENB1080A2403F01
    - Comes with the following AC Line cords:
      - Qualtek 212004-01 (US)
      - Qualtek 370001-E01 (UK)
      - Qualtek 3640002-D01 (Europe)
      - Qualtek 397002-01 (Japan)
- BU-69094R OS Restoration flash drive

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Industry documents used to support DDC's certifications and Quality system are: AS9001 OEM Certification, MIL-STD-883, ANSI/NCSL Z540-1, IPC-A-610, MIL-STD-202, JESD-22, and J-STD-020.

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Toll-Free, Customer Service: 1-800-DDC-5757

Web site: www.ddc-web.com

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