

Table of Contents

1.5 UCCx Controllers	3
1.5.1 Installation	4
1.5.2 Operation	5
1.5.2.1 Controller Battery	5
1.5.2.2 Cooling Fan	7
1.5.2.3 EPMC	7
1.5.2.4 UCCA Processor	8
1.5.2.5 UCCC Processor	9
1.5.3 Specifications	10
1.5.3.1 UCCA Specifications	10
1.5.3.2 UCCC Specifications	11
1.5.4 Diagnostics	12
1.5.5 Configuration	12
1.5.5.1 UCCA Jumper Settings	12
1.5.5.2 UCCC Jumper Settings	14

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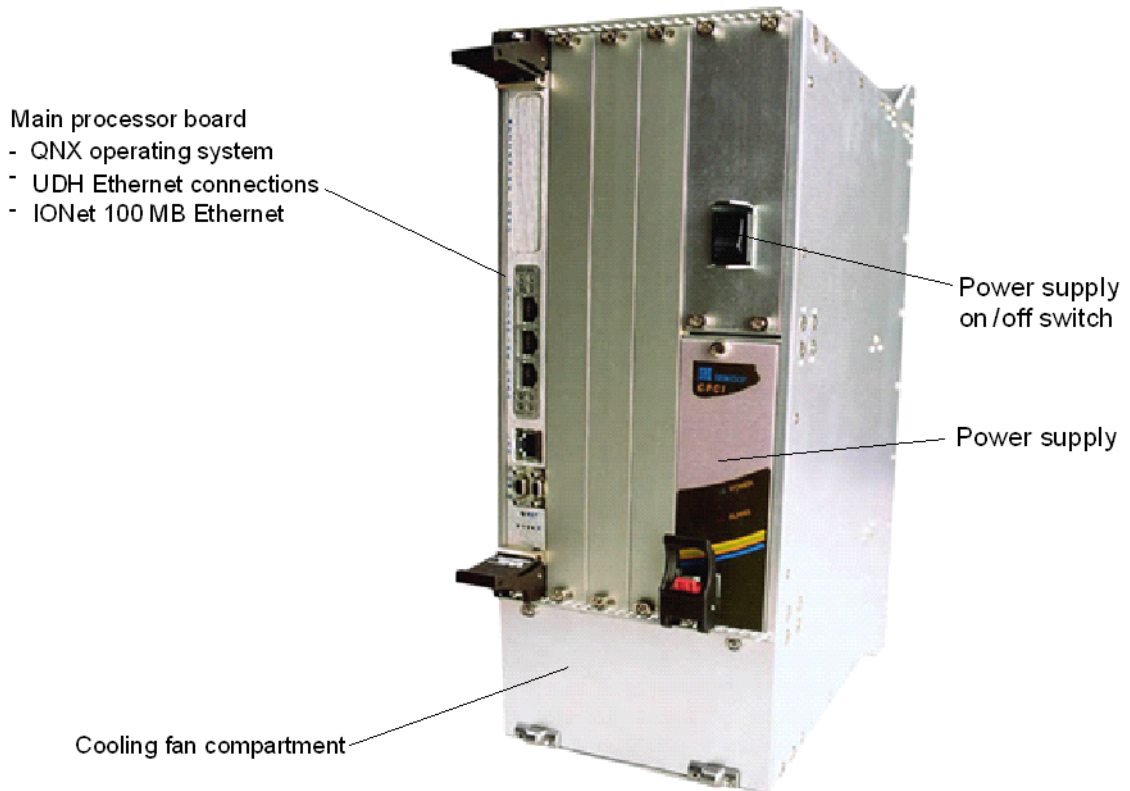
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2.1.2 UCCx Controller

The UCCx product line of controllers include the UCCAM03 and the UCCCM04. The UCCAM03 CPCI controller is a single board module. The baseboard contains a 650 MHz Celeron® processor, 128 MB flash, 128 MB DRAM, two serial ports, and one 10/100 Megabits Ethernet interface. The UCCCM04 contains a 1.6 GHz Pentium® M processor, 128 MB flash, 256 MB DRAM and two 10/100/1000Base-TX Ethernet ports. The baseboard Ethernet provides the UDH connection.



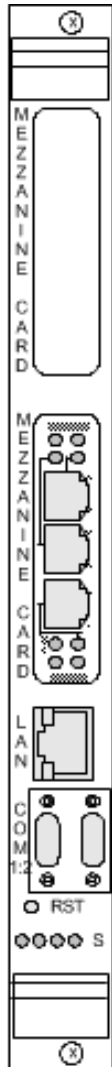
2.2 IONet Switches

GE's Industrial Ethernet 10/100 switches (ESWx) provide the performance and features needed in today's real-time industrial control systems. Use only ESWx Ethernet switches in all control system I/O networks to maintain the reliability needed for all I/O module reception of controller outputs.



1.5 UCCx Controllers

Note Mark VIeS Safety Controller V05.03 is the most current firmware version that still supports the UCCx platform. Beginning with ConstrolST V07.02, the UCCx is installed from the ControlST Software Suite DVD by selecting the ControlST Supplement Package installation option. Refer to the *ToolboxST User Guide for Mark Controls Platform* (GEH-6700 or GEH-6703), the section *Installation* for more information.



The UCCx controller is a single-board computer that runs the application code. The controller mounts in a CompactPCI (CPCI) enclosure and communicates with the I/O packs through on-board I/O network interfaces. The CPCI enclosure typically consists of a 6U high rack, one or two 3U high power supplies, a 6U high single board, and a cooling fan. The rack backplane is CPCI compliant, but is used only to provide power from the power supply(s) to the controller and cooling fan. The CPCI power supply converts the bulk incoming power to ± 12 V dc, 5 V dc, and 3.3 V dc. These voltages are distributed to the controller(s) and fan through the backplane.

The CPCI power supply takes the incoming bulk power from the CPCI backplane and creates ± 12 , 5, and 3.3 V dc. This power is provided to the backplane through one or two Mate-N-Lok® connectors, for use by the power supply(s), controller(s) and cooling fan. The power supply is a CPCI hot swap compliant 3U power supply using the standard CPCI 47-pin connector. Two power supplies can be used to provide power supply redundancy in an optional rack.

The controller operating system (OS) is QNX® Neutrino®, a real-time, multitasking OS designed for high-speed, high-reliability industrial applications. The following communication ports provide links to I/O modules, operator, and engineering interfaces:

- Ethernet connection for the Unit Data Highway (UDH) for communication with HMIs, and other control equipment. The UCCC controller has an additional Ethernet connection for the Control Data Highway (CDH).
- RS-232C connection for setup using the COM1 port
- Ethernet connection for the R, S, and T I/O network

The I/O networks are private, special-purpose Ethernet that support only the I/O modules and the controllers.

1.5.1 Installation

The enclosure contains (at a minimum) a controller and a four-slot CPCI rack with either one or two power supplies. The primary controller must be placed in the left-most slot (slot 1). A second, third, and fourth controller can be placed in a single rack. If the slot 1 controller is removed, the other controllers will stop operating.

The CMOS battery is disconnected using a processor board jumper during storage to extend the life of the battery. When installing the board, the battery jumper must be reinstalled. Refer to the specific UCCx module drawing for jumper location. The battery supplies power to the CMOS RAM settings and the internal date and real-time clock. There is no need to set CMOS settings since the settings are defaulted to the proper values through the BIOS. Only the real-time clock must be reset. The initial date and time can be set using a system NTP server or ToolboxST* application.

If the board is the system board (slot 1 board) and other boards are in the rack, ejection of the system board will cause the other boards to stop operating. It is recommended that power be removed from the rack when replacing any board in the rack. Rack power can be removed by one of the following methods:

- In a single power supply unit, a switch is provided to disable the power supply outputs.
- In a dual power supply unit, both power supplies can be safely ejected to remove power.
- Unplug the bulk power input Mate-N-Lok connector(s) on the bottom of the CPCI enclosure.
- Use a remote disconnect switch.

Note Unlike the Mark VI control VME boards that provided only ejectors, the UCCC has injectors/ejectors at the bottom and top of the module.

Before sliding the board in the rack, the top ejector should be tilted up and the bottom ejector should be tilted down. When the connector on the backside of the board connects with the backplane connector, the injectors should be used to fully insert the board. This is done by pushing down on the top injector and pulling up on the bottom ejector. Remember to finish the installation by tightening the top and bottom injector/ejector screws. This provides mechanical security as well as a chassis ground connection.

Note Failing to lock the injectors will prevent the controller from booting. When extracting the board, perform the insertion process in reverse. See the next section on configuration before connecting the Ethernet cables. If a previous application is loaded in the module, mis-operation can occur if the Ethernet addresses collide with other operating equipment.

1.5.2 Operation

With the Mark VIeS Safety controller, if controller application code is changed and downloaded, a Branding of the new code will be required. Changes that are not downloaded may cause a Brand change. Refer to GEH-6723, Mark VIeS Safety Control Safety Instruction Guide, the section Application Code Branding. Minor modifications to the control software may be made online without requiring a restart.

The controller is loaded with software specific to its application, which includes but is not limited to steam, gas, and land-marine aeroderivative (LM), or balance-of-plant (BOP) products. It can run rungs or blocks. The IEEE® 1588 protocol is used through the R, S, and T IONets to synchronize the clock of the I/O packs and controllers to within ± 100 micro seconds.

External data is transferred to and from the control system database in the controller over the R, S, and T IONets.

In a simplex system, this includes process inputs/outputs to the I/O packs.

In a dual system:

- Process inputs/outputs to the I/O packs
- Internal state values and initialization information from the designated controller
- Status and synchronization information from both controllers

In a triple modular redundant (TMR) system:

- Process inputs/outputs to the I/O packs
- Internal state values from for voting and status and synchronization information from all three controllers
- Initialization information from the designated controller

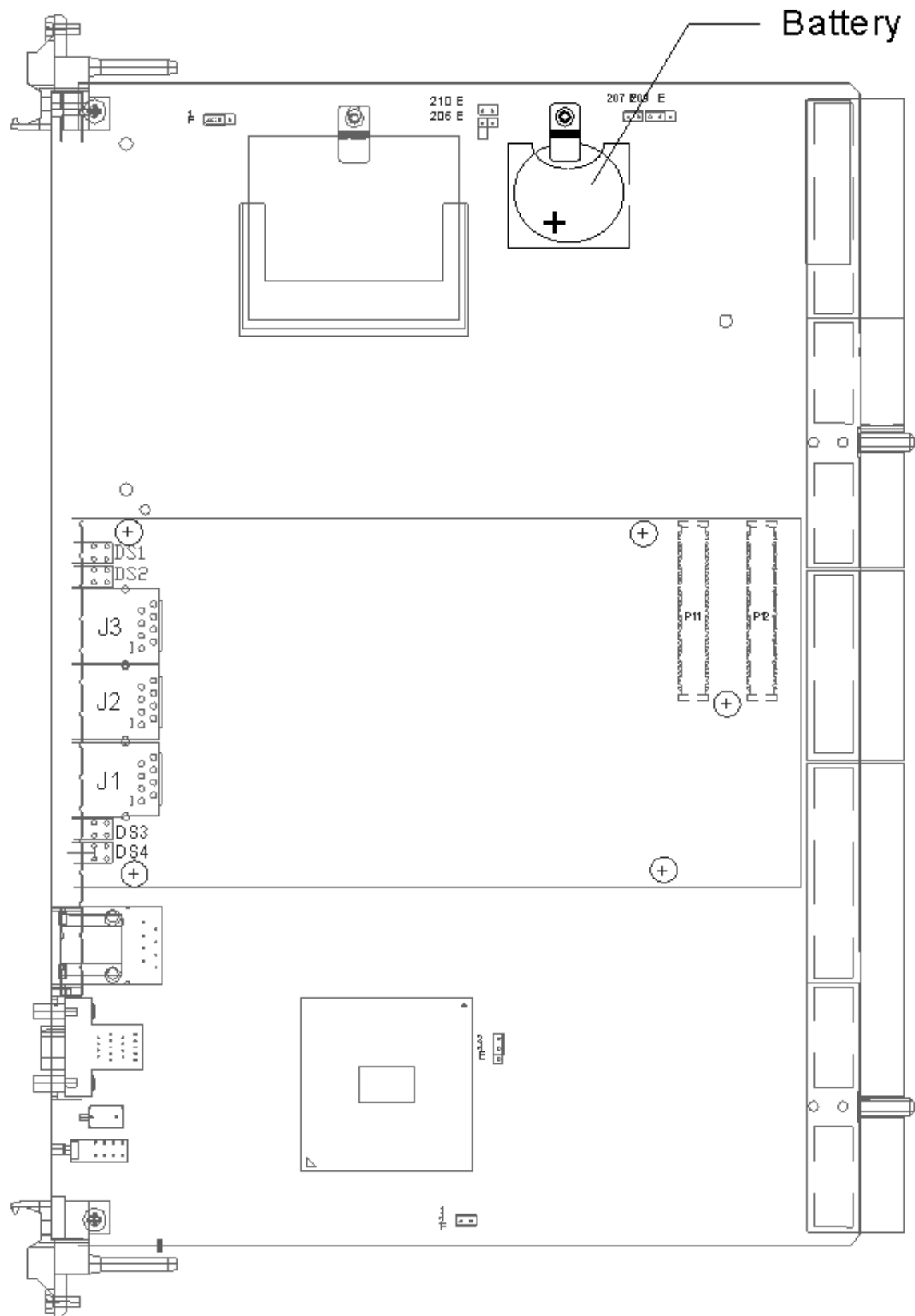
1.5.2.1 Controller Battery

The UCCC uses a lithium battery to supply power to the CMOS (which contains the BIOS settings for the CPU board) and the real-time clock when the controller is not on. Default CMOS settings are also stored in flash memory, so when the battery reaches end-of-life, only the real-time clock functions are lost.

The lithium battery for the UCCC has a service life of 10 years. The battery is disabled in stock and can be disabled when storing a controller. If the controller is stored with the battery disabled, its life expectancy is 10 years, minus the time the controller has been in service. If the controller is stored with the battery enabled, the life expectancy drops to seven years minus the time the controller has been in service. An expired battery can be replaced on the controller board.

➤ To replace the controller battery

1. Power down the CPCI rack. If the rack has a single power supply (version P1), turn off the power switch located on the panel above the power supply.
2. Loosen the screws at the top and bottom of the controller.
3. Press down on the top ejector tab and pull up on the bottom ejector tab to disconnect the controller from the backplane. Carefully pull the controller out of the CPCI rack.
4. Locate the battery near the top, inboard side of the controller.
5. Loosen the screw on the tab holding the battery and move it out of the way.
6. Slide the expired battery out of its enclosure, making note that the positive (+) side faces away from the controller.
7. Insert the new battery. Reposition the holding tab and tighten the screw.
8. Slide the controller back into the CPCI rack and secure it in place.
9. From the ToolboxST application, reset the real-time clock.



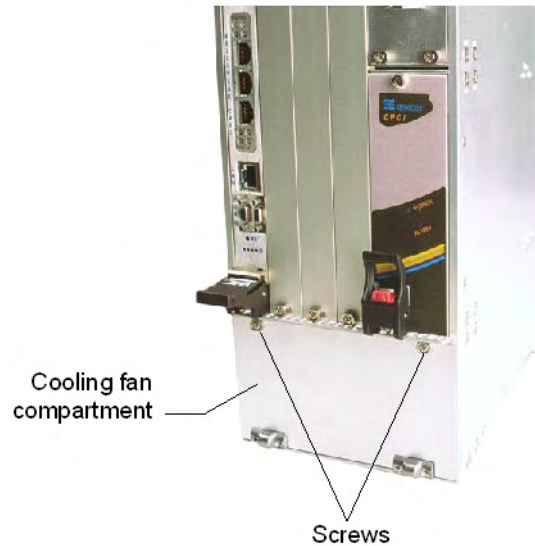
1.5.2.2 Cooling Fan

A cooling fan is located in a tray at the bottom of the CPCI rack. The cooling fan can fail, causing temperatures to rise to a level that will damage the controllers and power supplies. The cooling fan can be replaced without removing power to the rack.

Note The controller automatically monitors the CPU core temperature and can be configured to continue to run, or to reboot the controller into a low power failure state. Refer to the *Mark VIe Controller Standard Block Library* (GEI-100682), the section *Temperature Status (TEMP_STATUS)*.

➤ To replace the cooling fan

1. Loosen the two screws at the top of the door located at the bottom of CPCI rack.
2. Open the door and slide the old cooling fan out of the rack. There are no cables to remove. The fan assembly plugs directly into the backplane.
3. Insert a new cooling fan into the guides in the compartment and push in firmly. If the fan is not completely in place, the compartment door will not close.
4. Close the door and tighten the two screws at the top.



Replacing CPCI Cooling Fan

1.5.2.3 EPMC

The CPCI controllers support a single PCI Mezzanine Card (PMC) daughterboard called the IS200EPMC.

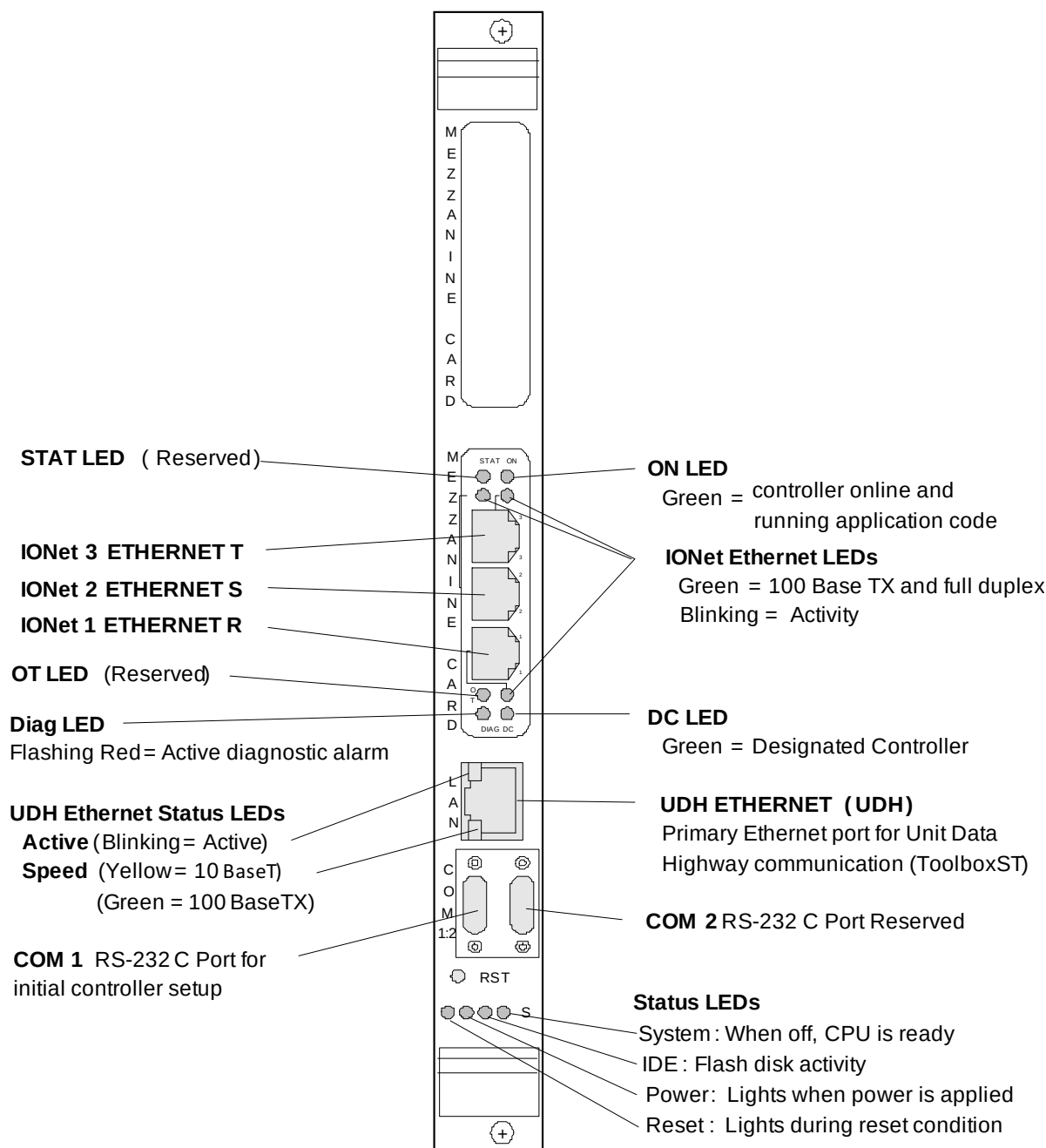
The IS200EPMC contains specific controller hardware functions as follows:

- Power supply monitoring
- Flash backed SRAM
- IONet Ethernets
- Ethernet physical layer packet snooping for precision time synchronization

The EPMC board plugs onto one of the PMC sites and communicates to the processor board through the PCI bus. The PCI interface on the EPMC is PCI Rev 2.2 compliant and supports both 3.3 V and 5 V signal levels.

1.5.2.4 UCCA Processor

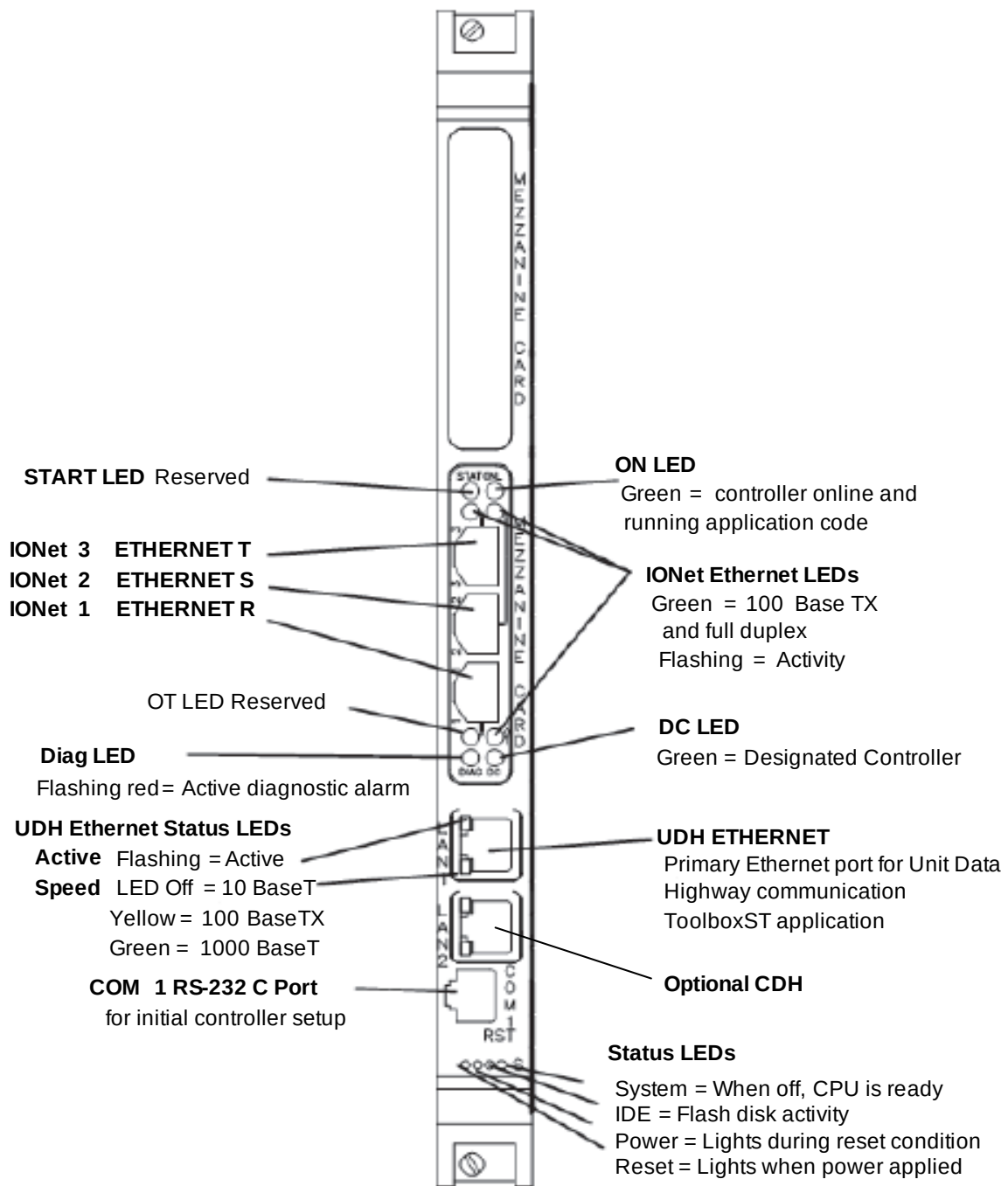
The UCCA (IS215UCCA3) is a single-slot board using a 650 MHz Intel® Celeron® processor. A 10Base-TX/100Base-TX (RJ-45) Ethernet port provides connectivity to the Unit Data Highway (UDH). There are two PCI Mezzanine Card (PMC) sites and a watchdog timer. The processor board is the compute engine of the Mark VIe controller. The IS215UCCAM03 is a module assembly that includes the IS215UCCA3 combined with 128 MB of flash memory, 128 MB of DRAM, and the IS200EPMC.



UCCA LEDs and Connections

1.5.2.5 UCCC Processor

The IS215UCCCH4 is a single-slot CPCI controller board containing a 1.6 GHz Pentium® M processor. Two 10/100/1000Base-TX Ethernet ports provide connectivity to the UDH and an optional Control Data Highway (CDH). The IS215UCCCM04 is a module assembly that includes the IS215UCCCH4 combined with 128 MB of flash memory, 256 MB of DRAM, and the IS200EPMC.



UCCC LEDs and Connections

1.5.3 Specifications

1.5.3.1 UCCA Specifications

Item	UCCAAM03 Specification
Microprocessor	Intel Ultra Low Voltage Celeron 650 MHz (8.3 Watts max)
Memory	128 MB DDR SDRAM through one SODIMM 256 KB L2 cache Flash-backed SRAM
NVRAM	ControlST V07.05 and higher supports 3067 non-volatile program variables, 338 forces, and 128 totalizers ControlST V07.04 and lower supports 3067 non-volatile program variables, 338 forces, and 64 totalizers <i>Not supported by Mark VIeS Safety control</i>
Flash	128 MB ComactFlash module (GE part #336A5196AAP8)
Operating System	QNX Neutrino
Programming	Control block language with analog and discrete blocks; Boolean logic represented in relay ladder diagram format. Supported data types include: Boolean 16-bit signed integer 16-bit unsigned integer 32-bit signed integer 32-bit unsigned integer 32-bit floating point 64-bit long floating point
Primary Ethernet interface (1 port)	TCP/IP protocol for communication between controller and ToolboxST application TCP/IP protocol used for alarm communication to HMIs Ethernet Global Data (EGD) protocol for application variable communication with CIMPLICITY® HMI and Series 90-70 programmable logic controllers (PLCs) Ethernet Modbus® protocol supported for communication between controller and third-party distributed control system (DCS)
EPMC Ethernet Interface (3 ports)	Twisted pair 10Base-TX/100Base-TX, RJ-45 connectors: TCP/IP protocols used to communicate between controllers and I/O modules
COM ports	Two micro-miniature 9-pin D connectors: COM1 Reserved for diagnostics, 9600 baud, 8 data bits, no parity, 1 stop bit COM2 Not used For cabling, use one of the following: GE-provided Ethernet cables, which are specifically designed for use in the Mark* controller product family (GE part #342A4931ABP1) and a controller connector (GE part #342A4931ABP2), or a miniature D shell, null modem serial cable (GE part #336A3582P1), connected with a micro-miniature pigtail (GE part #336A4929G1)
Power requirements	3.3 V dc, 3.5 A typical, 4.25 A maximum 5 V dc, 150 mA typical, 300 mA maximum
† Ambient rating for enclosure design	0 to 60°C (32 to 140 °F)
Technical Regulations, Standards, and Environments	† Refer to GEH-6721_Vol_I, the chapter <i>Technical Regulations, Standards, and Environments</i> for additional equipment rating information depending on application requirements.

1.5.3.2 UCCC Specifications

Item	UCCC Specification
Microprocessor	Intel Pentium M processor 1.6 GHz
Memory	256 MB DDR SDRAM through one SODIMM 256 KB L2 cache Flash-backed SRAM
NVRAM	ControlST V07.05 and higher supports 3067 non-volatile program variables, 338 forces, and 128 totalizers ControlST V07.04 and lower supports 3067 non-volatile program variables, 338 forces, and 64 totalizers <i>Not supported by Mark VIeS Safety control</i>
Flash	128 MB ComactFlash module (GE part #336A5196AAP8)
Operating System	QNX Neutrino
Programming	Control block language with analog and discrete blocks; Boolean logic represented in relay ladder diagram format. Supported data types include: Boolean 16-bit signed integer 16-bit unsigned integer 32-bit signed integer 32-bit unsigned integer 32-bit floating point 64-bit long floating point
Primary Ethernet Interface (2 ports)	Twisted pair 10Base-TX/100Base-TX, RJ-45 connectors: TCP/IP protocol used for communication between controller and toolbox TCP/IP protocol used for alarm communication to HMIs EGD protocol for application variable communication with CIMPPLICITY HMI and Series 90-70 PLCs Ethernet Modbus protocol supported for communication between controller and third-party DCS
EPMC Ethernet Interface (3 ports)	Twisted pair 10Base-TX/100Base-TX, RJ-45 connectors: TCP/IP protocols used to communicate between controllers and I/O packs
COM port	One accessible through RJ-45 connector on front panel For cabling use GE-provided Ethernet cables, which are specifically designed for use in the Mark* controller product family (GE part #342A4931ABP1)
Power Requirements	5 V dc (5%, -3%, 4.5 A (typical), 6.75 maximum) 3.3 V dc, (5%, -3%, 1.5 A (typical), 2.0 A maximum) 12 V dc (5%, -3%), 50 mA maximum -12 V dc (5%, -3%), 50 mA maximum
Mechanical Specifications	Shock: 10 Gs, 16 ms half sine, 6 axis, 10 pulses each Vibration: 6 Gs rms (20-2000 Hz) random, 0.0185 G2 per Hz
† Ambient rating for enclosure design	0 to 50°C (32 to 122 °F)
† Refer to GEH-6721_Vol_I, the chapter Technical Regulations, Standards, and Environments for additional equipment rating information depending on application requirements.	

1.5.4 Diagnostics

Refer to the figures in the [UCCA Processor](#) and [UCCC Processor](#) sections for an explanation of LEDs.

1.5.5 Configuration

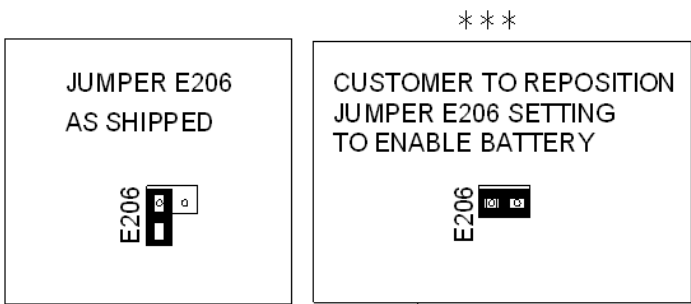
The controller must be configured with a TCP/IP address prior to connecting to the UDH or CDH Ethernet. This is achieved through the ToolboxST application and the COM1 serial port.

1.5.5.1 UCCA Jumper Settings

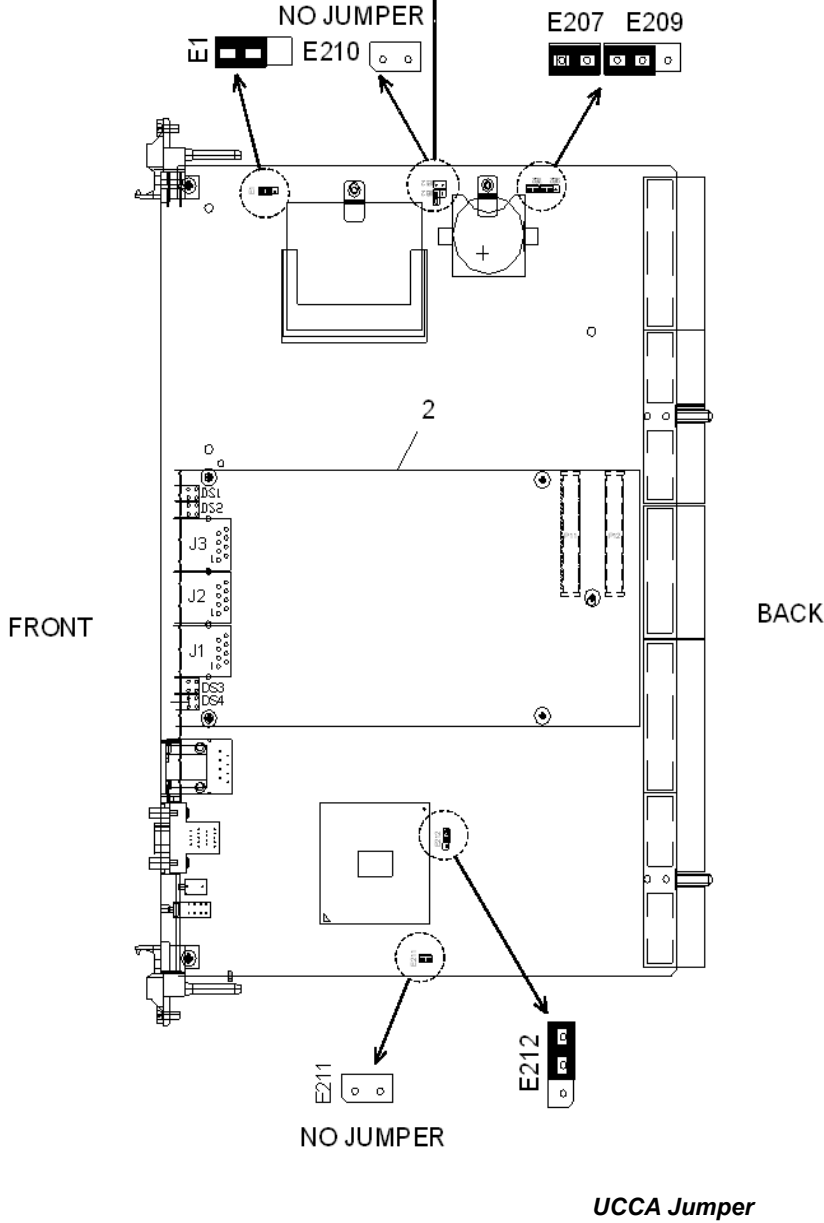


Caution

Airflow requirements as measured at the output side of the heat sink must be greater than 400LFM to prevent overheating and potential damage to the board.



JUMPER NAME	JUMPER FUNCTION	JUMPER POSITION
E1	PASSWORD CLEAR	1 - 2
E204	ITP	NO JUMPERS
E206	BATTERY ENABLE	1 - 2 ***
E210, E211 E212	FACTORY RESERVED DO NOT USE	
E209	WATCHDOG TIMER RESET ENABLE	1 - 2
E207	IGNORE CPCI RESET	1 - 2

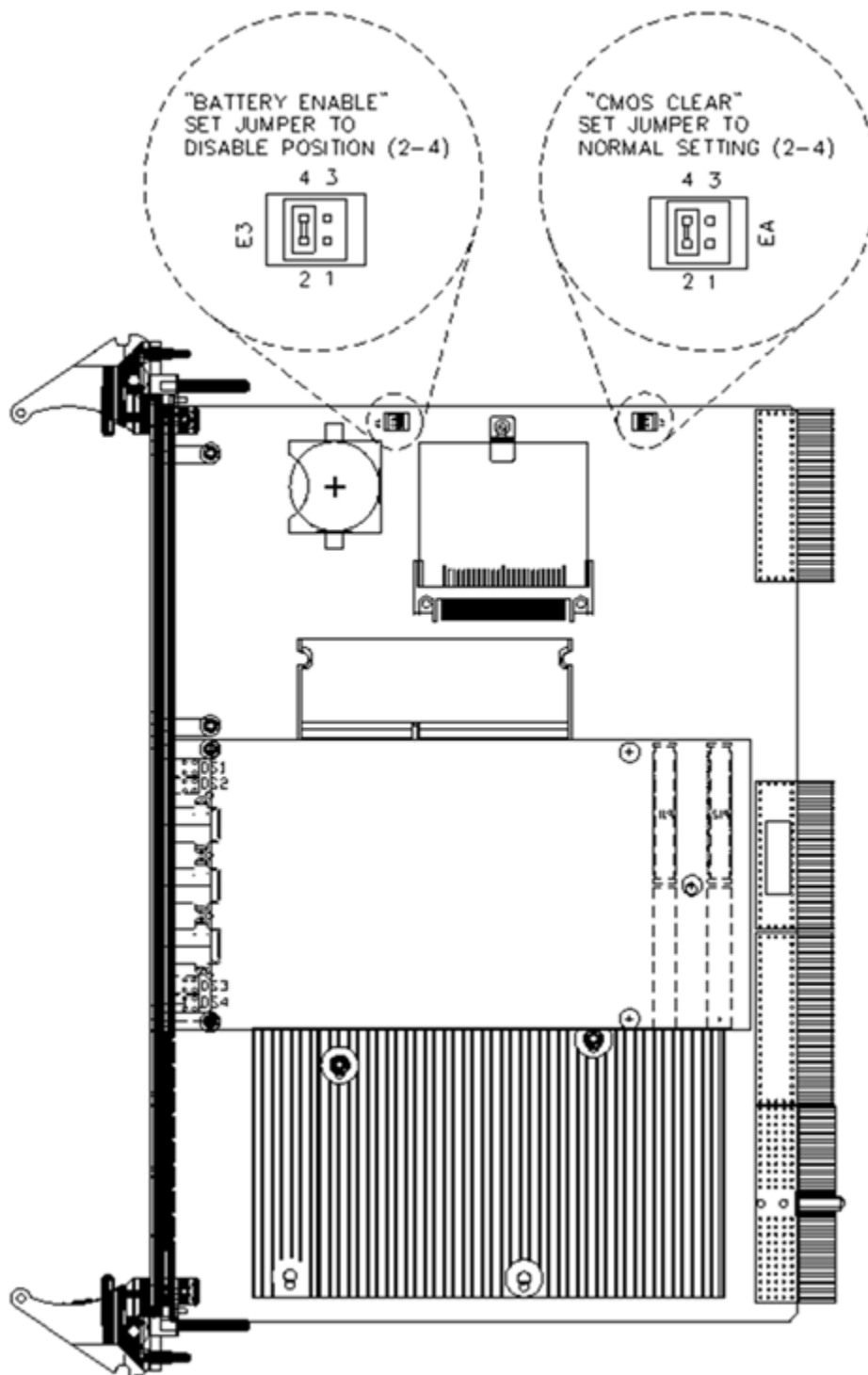


1.5.5.2 UCCC Jumper Settings



Caution

Airflow requirements as measured at the output side of the heat sink must be greater than 300LFM to prevent overheating and potential damage to the board.



UCCC Jumper