Continuous Control Node (CCN) for CompactPCI

Reference Manual

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CompactPCI®

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1 Introduction

Welcome to the *Continuous Control Node (CCN) Reference Manual.* This document provides an overview of how the Continuous Control Node (CCN) interacts with the user and with other elements in a CompactPCI system.

This manual contains the following information related to the CCN module:

- Description
- How the CCN works
- Features and Benefits
- Front panel interface
- Rear panel I/O connections
- Command Line Interface
- Pinouts
- Specifications
- Troubleshooting

Using This Manual

The *CCN Reference Manual* is written for computer technicians and hardware and software engineers. It is assumed that the user of the CCN has the following background:

- Familiarity with the handling of ESD-sensitive electronic equipment
- Familiarity with the Solaris operating system

Glossary

Compute Node is a CPU, a Continuous Control Node (CCN), and peripherals, such as I/O cards and disk drives, which are connected to the CPU.

Description

The Continuous Control Node (CCN):

- Monitors and controls a compute node in a CompactPCI system.
- Provides the administrator with the ability to turn the system on or off, monitor power and temperature, and access the CPU console remotely.
- Can set off alarms by using its relay.

Block Diagram

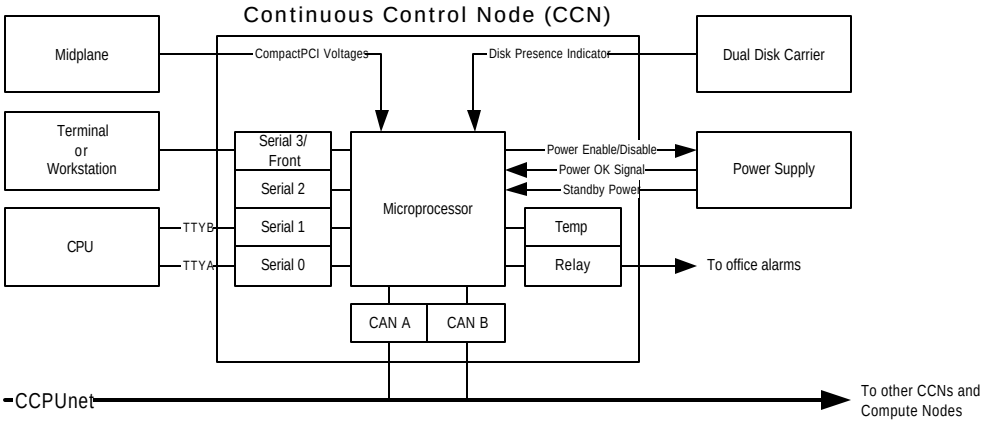


Figure 1 CCN block diagram

Typographic Conventions

A summary of the typographic conventions used in this manual is listed in Table 1 below.

Typeface/Symbol	Meaning	Example
`AaBbCc123`	The names of commands, files and directories; on-screen computer output	Edit your `.login` file. At the `ok` prompt….
`AaBbCc123`	What you type, contrasted with on-screen computer output	To turn the unit on, type **`on`** at the `ccpu>` prompt. i.e., `ccpu>:`**`on`**
<***`AaBbCc123`***>	Command-line placeholder or token to be replaced with a real name or value (do not type brackets)	To delete a file, type **`rm`** <***`filename`***>.
[**`AaBbCc123`**]	Optional argument (do not type brackets)	[**`help`**] **`dir`** [<***`filename`***>]
{<***`a`***> <***`b`***>}	Required argument (do not type brackets)	{<***`na`***> <***`cmd`***>} **`grade`** {**`a`**, **`b`**, **`c`**, **`d`**, **`f`**}
AaBbCc123	Book titles, new words or terms, or words to be emphasized	• This manual is used in conjunction with the *SPARCengine CP1500 User's Manual.* • You *must* be grounded to avoid ESD damage to the equipment.
ABC	Acronyms	Locate the On / Off toggle switch on the CCN front panel.
`Ctrl`	Keystroke press	Send a break using **`Ctrl-]`**. (**Note:** Hold down the **`Ctrl`** key and then press **`]`**. *Do not include the hyphen*).
	Caution	Failure to heed the instructions that follow the Caution symbol may result in damage to the equipment.

Table 1 Typographic conventions

2 Interfaces

Front Panel

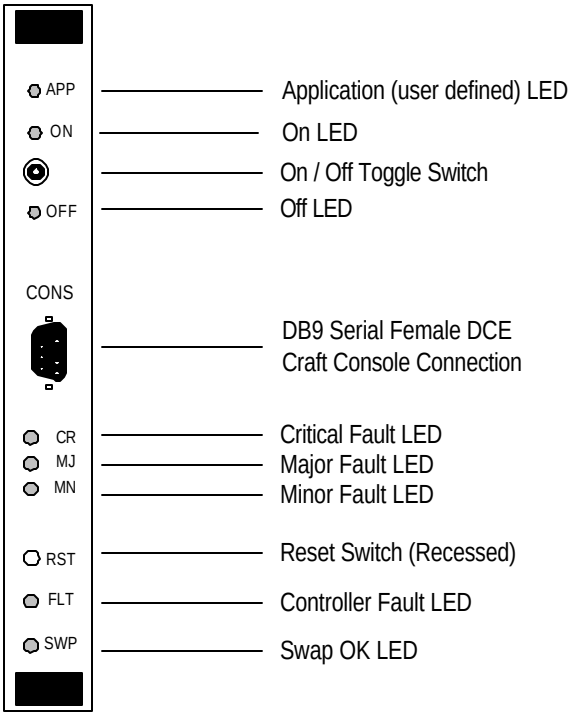


Figure 2 Front panel interface

APP (APPLICATION) LED

LED state	Information conveyed
ON	Solaris is booted and CCPUnet daemon (CCNd) is communicating with the CCN
BLINKING	Single blink indicates Sun is in the process or booting or halting. Double-blink indicates CCN lost contact with CCNd.
OFF	The CPU is off, has not begun booting, or has finished halting. If this LED is off, then the CCN knows the CPU is in a state where power removal will not harm the boot disk/operating system image.

Table 2 APP LED states

ON LED

LED state	Information conveyed
ON	The CCN is requesting that the power supply provide system voltages to the CPU, I/O cards, and disks.
OFF	The CCN is requesting that the power supply turn off.

Table 3 ON LED states

ON/OFF TOGGLE SWITCH

Press towards ON for one second to instruct the CCN to turn the system on. Hold towards DOWN for one second to begin a soft shutdown. If the CPU is already halted or must be shutdown ungracefully for some reason, hold the switch towards DOWN for 5 seconds.

OFF LED

LED state	Information conveyed
ON	The power supply is off.
BLINKING	The CCN has requested that the CPU shut down gracefully and is awaiting confirmation of the shutdown.
OFF	The power supply is on.

Table 4 OFF LED states

CONS-DB-9 DCE CRAFT CONSOLE CONNECTION

This DB-9 is used for Command Line Interface interaction. The default settings are 38400 baud, 8 bits, no parity, 1 stop bit. This port is DCE, so a straight-through DB-9 cable may be used to connect this port to a standard PC-compatible DB-9 serial port.

CR – CRITICAL ALARM LED

The CR – Critical Alarm LED lights when this CCN has a critical alarm active or latched.

MJ – MAJOR ALARM LED

The MJ – Major Alarm LED lights when this CCN has a major alarm active or latched.

MN – MINOR ALARM LED

The MN – Minor Alarm LED lights when this CCN has a minor alarm active or latched.

RST – RESET SWITCH

The RST – Reset Switch will reset the Control Node only. Doing so will not affect the CPU module or power supplies.

FLT – CONTROLLER FAULT LED

The FLT – Controller Fault LED lights when the CCN detects some form of internal or CCN-related fault.

SWP – SWAP LED

The SWP – Swap LED is currently not used. The CCN may be hot-swapped at any time.

Rear Panel I/O Connections

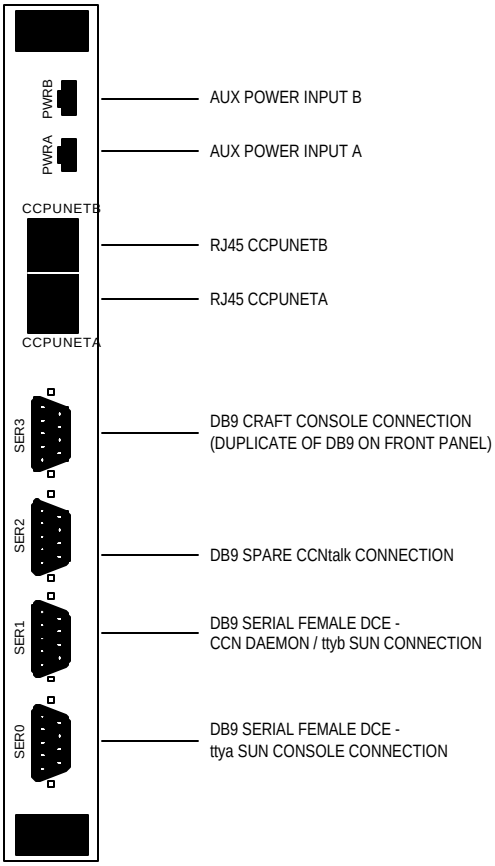
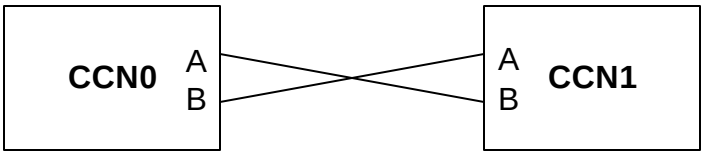


Figure 3 CCN transition module, rear panel interface

PWRA / PWRB – AUX POWER INPUT A/B

The PWRA / PWRB – Aux Power Input A/B inputs are used to input power to or receive power from a CCN. If a CCN is controlling two power supplies, these connectors should not be used because the CCN is receiving power from each supply. In a duplex system where each node has a single supply,

the A and B inputs on the two CCNs can be cross-connected to provide power to a CCN even if its power supply is removed or has a fault.



CCPUNETA / CCPUNETB

The CCPUNETA and CCPUNETB provide redundant interconnections between CCNs and other CCPUnet nodes.

SER3 – DB-9 Craft Console connection

The SER3 – DB-9 Craft Console connection is a duplicate of the front-panel CONS connector. Do not connect to the front and rear panel connectors at the same time.

SER2 – DB-9 spare CCNtalk connection

The SER2 connection can be used to communicate with a CCNd daemon running on a remote system or it can be configured as another ttya Sun Console connection.

SER1 – DB-9 DCE ttyb Sun CPU CPU connection

The SER1 connection should be connected to the ttyb connector of the Sun CPU. This allows the CCNd daemon running on the Sun to communicate with the CCN using the CCNtalk protocol.

SER0 – DB-9 DCE ttya Sun CPU connection

The SER0 – DB-9 DCE ttya Sun Console connection should be connected to the console (ttya) of the Sun CPU. This allows console access through CCPUnet (from the CLI or by telnet access to CCNd).

3 Command Line Interface (CLI)

The CCN command line interface (CLI) allows operators and maintenance personnel to query system status and modify the system state using a simple RS232 terminal. A CCN can thus be used as a management interface to an entire system without any other processing elements.

CLI Operation

The CLI accepts input one line at a time. Backspace (ASCII 0x08) or Delete (ASCII 0x7f) may be used to erase characters, Control-U may be used to erase an entire line, and Carriage-Return (ASCII 0x0d) or Newline (ASCII 0x0a) will end a line of input. Any lines beginning with '#' will be ignored as comments.

CLI Prompt

The CLI prompt looks like this:

```
nodename (na) ccncli>
```

where nodename is the name of the node into which the craft terminal is plugged and ***na*** is the node address.

CLI Syntax

A CLI command line consists of a command followed by optional arguments.
Note: Multiple whitespace is treated as a single space.

CLI Commands

The following sections describe the command formats for the CLI commands. Note that all commands are case-sensitive and that typically lowercase characters are used.

CONNECT

Usage

connect [[<***na***>][**.**<***sub***>]]

Description

Connecting to a node establishes a serial connection from the CLI terminal to a serial port on a node (generally used for the CPU ttya console port). If no node address argument <***na***> is specified, then the current node on which the CLI is running is the default. Also, if no subnode argument <***sub***> is provided, then the default subnode 0 (i.e. SER0) is used. Note that the period "." is required if the subnode argument <***sub***> is specified. **connect** will check a subnode to ensure it is configured as serial packetizer (SERPKT) prior to forming the connection. The spare serial connection SER2 is normally set to its default state as a CCNtalk connection, but can be configured as a SERPKT connection (see the **ser2mode** node command for further details on SER2 configuration).

Once connected, all characters typed on the CLI will be sent to the serial port, and all characters received on the serial port will be displayed on the CLI terminal. The only exception to this is when

the user types the escape character (**Control-]**). After typing the escape character, the user may use telnet-like (command line) or **tip**-like (single-character) sequences for certain actions as show in Table 5.

If a single-character command is sent within one second of the escape character, then no prompt will be printed; otherwise, a `connect>` prompt will be printed to notify the user that the CCN is waiting for an escape command. Single-character commands are still accepted even if a prompt is printed. Unless the "." or **exit** command is used, the CCN will return to connected mode after the command is executed.

Action	Single char.	Command line
Send serial BREAK	#	**send break**
Send escape char	^]	**send escape**
Show help info	?	help
Close connection, return to CLI	.	exit

Table 5 Connect actions and sequences

Example

```
switchmon(03) ccncli> connect 2
Connecting to console on CCN 02. Escape char is Ctrl-]

dns1 console login: root
Last login: Fri Jan 29 20:52:08 on console
Feb 2 18:20:07 dns1 login: ROOT LOGIN /dev/console
Sun Microsystems Inc. SunOS 5.6 Generic August 1997
#           <User hits ctrl-]>

Connected to console on 02.
connect> exit
Disconnecting from console on CCN 02.
switchmon(03) ccncli>
```

DEFCONFIG

Usage

defconfig

Description

Reprograms the EEPROM to its generic factory default configuration. This is a hidden command. Care must be taken when using this command since it will erase all of the configuration variables that are stored in EEPROM.

HELP

Usage

help

Description

Prints a list of all available commands.

Example

An example of the use of this command will produce a display as follows.

```
switchmon (03) ccncli> help
***** CLI Commands:
connect <na>  connect to serial console of node na
rsh <na> <cmd> send node na command cmd
probe [na]  probe node na (or all nodes)
```

LOGOUT

Usage

logout

Description

Logs out of the CLI if password was enabled by the **passwd** command. If the password is not set, then **logout** has no effect.

PROBE

Usage

probe

Description

probe listens for heartbeat packets from other nodes on the CCPUnet. After listening for two seconds, it queries status from all detected nodes and displays that status.

Example

An example of the use of this command will produce a display as follows.

```
switchmon(03) ccncli> probe
Listening: 02 03
 NodeName(NodeAddr) NodeSt AlarmSt
  testbox2 (02) ON-VULN No_Alarms
  switchmon(03) OFF  Major
switchmon(03) ccncli>
```

RSH

Usage

rsh

Description

Requests a remote node (specified by node) run a command and return the output. **command** may consist of any command acceptable to the remote CCN.

Example

An example of the use of this command will produce a display as follows.

```
switchmon(03) ccncli> rsh 2 help
connect <na>  connect to serial console of node na
rsh <na> <cmd> send node na command cmd
probe [na]  probe node na (or all nodes)
rsh <naddr> <command>
...
switchmon(03) ccncli>
```

TIME

Usage

`time`

Description

Shows the number of seconds that the CCN has been running since the last reset. This is a hidden command.

Firmware Download

Usage

`@`

Description

The CCN has flash-upgradeable firmware. To upgrade the image, you must connect to the CCN CLI from a machine that is capable of sending a large text file to the CLI as though it were being typed in. Follow the steps below and refer to the following paragraphs for more specific details pertaining to downloading on a Windows or a Linux/Unix machine.

1. Connect to the CCN CLI (SER3 on the back or CONS on the front).
2. At the `ccncli>` prompt, send the `@` command.
   The CCN will respond with `Send Continuous Computing CCN software update file now`.
3. Send the firmware image file as a text file (refer to the instructions below for your machine type). Once it is received completely, the CCN will reprogram itself and reset.
   Each line of the file is check-summed, and the entire file also has a checksum. If any errors are detected, the CCN will abort the download and discard any additional lines sent.
4. If any errors do occur during the download, follow this sequence:
   a) Wait for your terminal program to finish sending the file.
   b) When the file is sent, hit carriage return, followed by capital **X**.
   c) Hit the carriage return again.
   This instructs the download routine in the CCN to return control to the CLI.

Windows machine:

Use Hyperterm to connect to a CCN console. Make sure the serial port settings on the computer match that of the CCN console (default settings are: 38400, 8N1, and, no flow control). At the CLI prompt (`ccncli>),` enter `@`. The CCN will prompt the user to send the image file. Do this by going to `Transfer` at the Hyperterm menu bar. Select **`Send Text File`** which will display `.txt` files in the default Hyperterm directory. Then select **`All files (*.*)`** so that the ".i" image file will be visible. You will also have to change directories to where the image file is located on your computer. Once the desired image file has been located, double-click on it (or single click the desired file to select it and then press the `Open` button).

Note: On a Windows NT or 2000 system, the file transfer is very slow even if the serial port settings are correct. This is a known problem with Windows NT/2000.

Linux/Unix Machine:

This method requires two terminal windows to be opened, one to connect to the CCN console ("console window"), the other to type the command to send the file ("command window"). From the console window, connect to the CCN using the **`cu`** (Unix and Linux) or **`tip`** (Unix only) commands. Alternatively, a serial communications program (such as **`minicom`** on Linux machines) can be used to connect to the console. Make sure the serial port settings match the CCN console settings (for example, the full **`cu`** command on a Linux machine could be **`cu -s 38400 -l /dev/ttyS0`** where it is assumed the CCN console is connected to the ttyS0 port on the computer). Type the `@` command; then, from the command window, type **`cat image_file.i > /dev/ttyS0`** where **`image_file.i`** should be the full name of the new image file. Make sure you have read/write access to the serial port ttyS0 (or whichever port is being used). This can be achieved by the command **`chmod 666 /dev/ttyS0`**, which will set the permissions accordingly.

4 Node Commands

Node commands are sent across the network to other nodes. Node commands instruct a node to perform a particular function. Node commands can also be executed on the local node (that is, it is not necessary to use **rsh *<na>*** to execute a command on the local node).

ALARMS

Usage

alarms

Description

Reports the current system status including node name, node address, CCN node state, and alarm state. This command is the same as the **status** command.

APP

Usage

app

Description

The **app** command allows the CLI user to view any application-requested faults, along with the application-supplied fault message. See the **appmsg** command in `/opt/CCPUclnt/bin` or the API documentation to send application faults.

CPURESET

Usage

cpureset [**0**,**1**] [**assert**,**deassert**]
cpureset [**help**]

Description

Asserts or deasserts a software reset of the specified Sun CPU where 0 indicates the left CPU and 1 indicates the right CPU when viewed from the front in a duplex CompactPCI system. If no argument is provided, then displays the reset status of both Sun CPUs. If a CPU reset has been asserted, then the reset status indicates whether the reset was asserted by hardware, software, or both.

FAULTS

Usage

faults [<#>,**masked**,**reset**,**all**,**help**]

Description

Reports on system faults. With no argument, displays all of the active or latched faults. With a numeric (decimal 0 to 31) argument, displays the current fault status of that particular fault number. With the **masked** argument, displays all of the faults that are currently masked. With the **reset** argument, resets all the faults. With the **all** argument, displays all the valid faults for the connected CCN and their current fault status.

Application faults

The application running on the host can request that faults be asserted or cleared through the CCNtalk interface. Setting these faults triggers the generation of critical, major, or minor alarms.

Each CCN maintains a watchdog timer with a daemon (CCNnc) running on the Solaris host. This timer will assert the APPDOG fault if it expires. This fault, when asserted, triggers the generation of a critical alarm.

Table 6 below lists the application fault bits detected by the CCN-cCPI.

Bit #	Name	Description
24	CCNALM	CCN has internal fault
25	APPMN	Application requested minor alarm
26	APPMJ	Application requested major alarm
27	APPCR	Application requested critical alarm
28	APPDOG	CCN Host (ccnnc) watchdog timed out

Table 6 Application Fault Bits Detected By CCN-cCPI

FORECEOFF

Usage

forceoff

Description

Forces the power to the Sun CPU off immediately. Whenever possible, the **off** command should be used instead of **forceoff** to prevent data loss or corruption by inducing a graceful shutdown. If the **forceoff** command is used, the user should halt the Solaris operating system on the Sun CPU and wait for the ok prompt prior to using the **forceoff** command.

INFO

Usage

info

Description

The **info** command displays information about the target node such as hardware part number, hardware serial number, hardware revision, software part number, software revision, and node type. Also, the time up in seconds for the CCN since the last reset is also show in hexadecimal format.

INITMODE

Usage

initmode [**on**,**off**,**check**,**help**]

Description

Sets the CCN state upon power up or reset. If no argument is provided, then displays the current setting for **initmode**. When the **on** argument is specified, the CCN attempts to turn on immediately after power up or reset. When the **off** argument is specified, the CCN stays in the OFF state. The default configuration is **check** where the CCN checks the power supplies and if power is available, turns on, otherwise it stays off. CCPU recommends using the **check** initmode setting and discourages the use of the **off** initmode setting which can result in a data loss or corruption.

IOSTAT

Usage

iostat {**can**,**ser**,**ct**}

Description

The command **iostat** checks and displays the input/output statistics for the selected communication port buffers. If the argument **can** is specified, then the statistics for the CCPUnet CAN bus are displayed. If the argument **ser** is specified, then the statistics for the four serial ports are displayed. If **ct** is specified, then the statistics for CCNtalk port are displayed (number of packets sent to or received from CCNd). **iostat** does require an argument.

LEDTEST

Usage

ledtest [[**-**]<#>,[**-**]**all**]

Description

The **ledtest** command tests any or all of the front panel LEDs by turning on the specified LEDs. Likewise, specified LEDs can be turned off if preceded by the minus sign (**–**). Individual LEDs can be specified by a single digit number where the top-most LED (i.e. APP LED) on the CompactPCI CCN front panel is LED number 0 and sequentially increasing going downwards to the bottom-most LED (i.e. SWP LED) which is LED number 7. Alternatively, the individual LEDs can be specified by their abbreviated name (i.e. **app**, **on**, **off**, **cr**, **mj**, **mn**, **flt**, **swp**). All of the LEDs can be selected by the argument **all**. If no argument is provided, then the **ledtest** status byte is displayed where a non-zero value indicates that at least one LED is being driven. Because the **ledtest** command works separately from and overrides the INHLED and FORCELED byte variables, the user must be sure to turn all the LEDs off when finished testing. This can be done using the command **ledtest –all**.

MASK

Usage

mask [[-]<#>]

Description

The **mask** command is used to mask out faults that the user does not want considered when evaluating the current alarm state. A particular fault can be masked by specifying the corresponding fault number as the argument. A fault can be unmasked if the fault number is preceded by a minus sign. If no argument is specified, then **mask** will list all of the faults that are currently masked. For a listing of all of the faults and their corresponding fault numbers, use the **faults all** command.

MONITOR

Usage

monitor [ignore|pwrcyc|cpures|smreset|falm-no|falm-nc]

Description

The **monitor** command allows the user to specify the action to be taken when the miscellaneous dry contact inputs to the CCN are closed; if no argument is given, it shows the current setting.

The **ignore** argument is the default and basically ignores the miscellaneous inputs. **cpures** resets the CPU when the miscellaneous inputs are closed (if cabled). **pwrcyc** cycles the power to the CPU when the miscellaneous inputs are closed. **smreset** asserts SM reset when the miscellaneous inputs are closed (if cabled).

falm-no generates a normally open fan alarm when the miscellaneous inputs are closed. Conversely, **falm-nc** generates a normally closed fan alarm when the miscellaneous inputs are opened. With no arguments, the **monitor** command displays the status of the inputs.The miscellaneous inputs are pins 4 and 5 of the CCPUnet RJ-45 connector which share the common ground on pin 6. See
Table 15 and Section 5 for more details.

NODENAME

Usage

nodename [<***newname***>]

Description

The **nodename** command renames the node to the user-specified name, if provided. If no argument is specified, then displays the current nodename. Ordinarily, the nodename is set by the CCNd to match the hostname of the associated CPU. However, the nodename can be changed from the CLI if desired using this command.

OFF

Usage

off

Description

The **off** command requests a graceful shutdown.

ON

Usage

on

Description

The **on** command requests power to the node and begins the boot process.

PASSWD

Usage

passwd [<***newpwd***>]

Description

The **passwd** command sets the CLI password to that specified by the user. If no argument is provided, then shows the current CLI password. To disable the CLI password, use the command **passwd none**.

PICS

Usage

pics

Description

The **pics** command displays the power supply voltage data directly from the Microchip PIC16C72 on the power supplies.

RESET

Usage

reset

Description

The CCN has a "hidden" **reset** command to perform a software reset of the CCN. This command has essentially the same effect as hitting the front-panel reset switch: all statistics are reset, faults and alarms are cleared, etc. This command is not displayed in the help list so that people in the field will not be tempted to use it indiscreetly.

RLYTEST

Usage

rlytest [[-]**all**,[-]**cr**,[-]**mj**,[-]**mn**]

Description

The **rlytest** command turns the specified dry contact relays "on" (normally closed contacts are opened and normally open contacts are closed), or if the minus sign is used, turns the specified relays "off". Unlike **ledtest**, only alphabetic arguments are accepted. If no argument is provided, then the **rlytest** byte status is returned which, if not zero, indicates that at least one relay is being driven. Since **rlytest** overrides the normal functionality of the relays, the user should be sure to clear the rlytest byte to zero when finished testing. This can be done with the **rlytest –all** command. Note that the CompactPCI CCN only has one physical relay that is used for all of the three alarm states.

SER2MODE

Usage

ser2mode [<***mode***>,**help**]

Description

The **ser2mode** command allows run-time configuration of the SER2 port as a ttya connection to a Sun processor or as a CCNtalk connection to the CCNd, which is the default configuration. The following values for <***mode***> will configure SER2 as a ttya connection: **ttya, sun, warp,** or **serpkt**. To configure SER2 as a CCNtalk connection, use **ccntalk** for the <***mode***> argument. Note that a CCNtalk connection usually uses 38400 baud while a ttya connection typically uses 9600 baud, so the **serial** command should be used in conjunction with the **ser2mode** command to completely reconfigure the SER2 port to the desired state.

SERIAL

Usage

serial [<***port***> <***param***> <***val***> [<***param***> <***val***> **…**]]

Description

The **serial** command checks or sets the CCN serial port parameters. With no options, lists the communication settings for all of the CCN serial ports. With arguments, configures a given port to the specified settings. Port numbers can range from 0 to 3 where 0 is the Sun console ttya, 1 is the Sun ttyb (used by CCNd as a CCNtalk port), 2 is a spare serial port which can be configured either as a Sun ttya connection or as a CCNtalk port, and 3 is the craft console port that runs the CLI.

Acceptable <***param***> argument values are **baud** (baud rate), **cfmt** (character format), and **flow** (flow control mode). Acceptable baud rate values are **1200**, **2400**, **4800**, **9600**, **19200**, and **38400**. Acceptable character formats can be formed from the following template: {**7**,**8**}{**n**,**N**,**e**,**E**,**o**,**O**}{**1**,**2**} (e.g. **8N1**, **7e2**, etc.). Acceptable flow control values are **none**, **hard**, and **soft**.

Example

An example use of this command is given below:

`serial 2 baud 38400 cfmt 8N1 flow hard`.

SMHALT

Usage

`smhalt`

Description

Sends an OS halt command via CCNtalk port SER1 to the System Manager CPU.

SMRESET

Usage

`smreset [assert|deassert]`

Description

Asserts or deasserts reset to the System Manager CPU. A special cable is required.

Note: If monitor mode is SMRESET, then this command is OR'ed with the hardware SM reset signal.

STATUS

Usage

`status`

Description

The **`status`** command displays a brief summary of the node's current status, including power and alarm state. This command is the same as the **`alarm`** command.

SUBMOD

Usage

`submod`

Description

The **`submod`** command displays the current state and presence of the CCN submodules, including the removable submodules, if any.

VOLTAGES

Usage

voltages [**reset**]

Description

The **voltages** command will list all sampled voltages and temperatures along with the minimum and maximum values since the last **voltages reset** command which clears all of the stored min/max values. Also, the allowable upper and lower limits for each sampled voltage or temperature are displayed. TEMP0 is the temperature within the chassis, ALM12A and ALM12B are the CCN power feeds (ALM12B is only present in multi-node systems), TEMP1 is an extra sensor that is typically not connected, and the remaining voltages are the CompactPCI midplane voltages.

WDOGS

Usage

wdogs

Description

The **wdogs** command displays the internal watchdog counters.

5 Alarm Generation

The CCN continuously monitors various critical parameters of system operation to ensure that they stay within expected bounds for correct system operation. When parameters exceed preset values, the CCN enters an alarm state. Information about the alarm state is available through several sources, including front panel Critical, Major, and Minor LEDs, a dry contact relay output, CLI commands, and a GUI via CCPUnet. This section details how the user interfaces with the CCN alarm code and how the CCN monitors and responds to faults.

For the purposes of this discussion, a *fault* is the failure of a particular piece of hardware to stay within expected operational parameters. An *alarm* is the state that the CCN assumes as a result of a particular combination of faults. For instance, one 48V feed becoming disconnected is a *fault* that gives rise to a Major *alarm*.

Alarm States

Table 7 below lists the CCN's alarm states.

Level	Name	Indicates
0	None	No unmasked faults have occurred
1	Minor	A fault or combination of faults that does not threaten continued operation.
2	Major	A fault or combination of faults that puts the system at risk of outage, either by the fault continuing or by an additional fault condition.
3	Critical	A fault or combination of faults is causing the system not to operate or to operate in a degraded mode.

Table 7 Alarm states

- Alarm states for a fault group are presented on the front panel of the CCN in that group.
- The CCN dry contact relay will close whenever the alarm state is not "None."
- The alarm state and the reason for the alarm can be read through the CLI using the **`alarms`** and **`faults`** commands.
- Alarms are generated from the fault list using a set of rules. Because the fault list latches faults which occur, alarm states will remain in effect until the fault list is cleared (either through the front panel or using the **`faults reset`** command).

Faults

The CCN monitors many aspects of the system operation, watching for out-of-specification conditions. When such a condition occurs, a fault bit is set and some information about the fault may be logged. The fault bit will remain set until the "faults reset" command is received through the CLI, CCPUnet, or by using the front panel switch as described in the user interface section. A cleared fault bit will become set again immediately unless the condition causing the fault has been removed.

- To mask out fault conditions so that they will not be taken into account, a FAULTMASK register is provided. Each bit in this register corresponds to a bit in the FAULT register. If the FAULTMASK bit is set, then that fault will be ignored when generating the alarm state from the current faults.
- The FAULTMASK register loads its default setting from EEPROM on powerup. This EEPROM setting should be set according to the system setup.

The following sections describe the bits in the fault register by type.

Voltage faults

The CCN samples system voltages and temperatures one hundred times per second. These readings are averaged to reduce noise and then compared against a table of expected values.

- When a voltage is outside of its defined range, it will be registered as a fault.
- The current, minimum, and maximum voltage readings, as well as the upper and lower limits of their acceptable ranges, may be inspected using the "voltages" command.
- To disable monitoring of a specific voltage, set the corresponding bit in the VOLTMASK register to one. The minimum and maximum will still be recorded, but the voltage's value will no longer cause a fault, regardless of its value.

Table 8 below lists the voltages monitored by the CCN-cPCI:

Bit #	Name	Description	Normal range
0	TEMP0	Temperature in degrees C measured on CCN board.	5-40
1	ALM12A	Voltage on CCN 12V power feed A	11.0 – 13.0
2	ALM12B	Voltage on CCN 12V power feed B	11.0 – 13.0
3	PCIP12	Voltage on PCI backplane +12V	11.0 – 13.0
4	PCIN12	Voltage on PCI backplane –12V	-10.0 – -13.0
5	PCIP5	Voltage on PCI backplane +5V	4.5 – 6.0
6	UNUSED	Unused	---
7	PCIP3	Voltage on PCI backplane +3.3V	2.8 – 3.8

Table 8 Voltages monitored by CCN-cCPI

Presence faults

The CCN-cPCI has the ability to detect the removal of many components of a fault group. If one of these components is removed when it is expected to be present, then a fault will be generated.
To prevent such a fault when removal of a unit is desired, the corresponding bit in the EQUIP register must be cleared. The presence or absence of that unit will then be ignored for computing faults, but the correct status will still be shown when the "presence" command is used.

Table 9 below lists the presence bits detected by the CCN-cPCI.

Bit #	Name	Description
8	PWRAPRES	Power supply A (left supply or only supply)
9	PWRBPRES	Power supply B (right supply in two-supply node)
10	DSKAPRES	Primary hard disk (boot disk or top disk)
11	DSKBPRES	Secondary hard disk (application disk or bottom disk)
12	SWAPPING	CCN ejector latch handle (someone is about to eject the CCN). Currently not implemented in hardware.
13	CPUPRES	cPCI CPU presence detect. Currently not implemented in hardware.

Table 9 Presence bits detected by CCN-cCPI

Miscellaneous input fault bits

The CCN has the capability to monitor and detect two miscellaneous input signals and take one of several pre-defined actions when these signals are received. The action taken is specified by the **`monitor`** command. Please refer to Section 4 for further details on the **`monitor`** command. The two miscellaneous input signals are delivered to the CCN via pin 4 (MISCIN0) and pin 5 (MISCIN1) which share a common ground on pin 6 on the CCPUnet RJ-45 connectors. See Table 15 for CCPUnet RJ-45 pin diagram.

A miscellaneous input fault is triggered if **`monitor`** mode is set to **`falm-nc`** (normally closed) or **`falm-no`** (normally open) and the appropriate signal (normally open and normally closed, respectively) is detected on either miscellaneous input pins. As a specific example, setting **`monitor`** mode to **`falm-nc`** will result in the corresponding MISCIN fault bits to be set when the normally closed miscellaneous inputs (which are being pulled low) are opened and pulled high. Conversely, setting **`monitor`** mode to **`falm-no`** will result in the appropriate MISCIN fault bits to be set when the normally open miscellaneous inputs (which are being pulled high) are closed and pulled low. A common use for the miscellaneous inputs is to monitor fan trays and alarm upon the detection of a fan failure.

No faults or alarms are generated in any of the other **`monitor`** modes.

Table 10 below lists the miscellaneous input fault bits.

Bit #	Name	Description
14	MISCIN0	Miscellaneous input 0
15	MISCIN1	Miscellaneous input 1

Table 10 Miscellaneous input fault bits detected by CCN-cCPI

Power supply faults

The CCN communicates regularly with Continuous' intelligent power supplies to detect current or latent fault conditions. The most basic check is a presence detect, as described above. If the supply is present and is not disabled in the DISABLE register, then the CCN will verify that the supply is receiving power on each input feed and that its outputs are within acceptable limits.

Table 11 below lists the power supply fault bits detected by the CCN-cCPI.

Bit #	Name	Description
16	PWAFEEDA	Supply A 48V feed A bad
17	PWAFEEDB	Supply A 48V feed B bad
18	PWAOUTBD	Supply A outputs bad
19	RSVD	Reserved
20	PWBFEEDA	Supply B 48V feed A bad
21	PWBFEEDB	Supply B 48V feed B bad
22	PWBOUTBD	Supply B outputs bad
23	RSVD	Reserved

Table 11 Power supply fault bits detected by CCN-cCPI

Application faults

The application running on the host can request a fault through the CCNtalk interface. This fault can be set to cause a critical, major, or minor alarm.
The application can also enable a watchdog timer on the CCN which will cause a fault if it expires.

Table 12 below lists the application fault bits detected by the CCN-cCPI.

Bit #	Name	Description
24	APPMN	Application requested minor alarm
25	APPMJ	Application requested major alarm
26	APPCR	Application requested critical alarm
27	APPDOG	Application watchdog timed out

Table 12 Application fault bits detected by CCN-cCPI

CCPUnet bus faults

The CCN constantly monitors the data communication on both CCPUnet busses. If no communication is detected for more than three seconds on either of the CCPUnet busses, the connection is presumed lost and the appropriate CCN CCPUnet bus error fault bit is set.

Bit #	Name	Description
28	CCNCAN0	CCN CCPUnet A bus error
29	CCNCAN1	CCN CCPUnet B bus error

Table 13 CCPUnet bus fault bits detected by CCN-cCPI

Generating Alarms From Faults

The following are descriptions of the rules used to convert fault states into alarm states.

Critical alarms

- Single-supply system *and* power supply is absent or has bad output.
- Dual-supply system *and* both supplies are absent or have bad outputs

- Any PCI voltage out of range (+5V, +3.3V, ±12V).
- Application heartbeat lost.
- Application-requested Critical fault.

Major alarms

- Power supply A is Inhibited, Pullable, or Not Present *and* power supply B has a fault.
- Power supply B is Inhibited, Pullable, or Not Present and power supply A has a fault.
- Both power supplies have a fault.
- Either power supply is removed or not present and its EQUIP bit is set.
- Either hard disk is removed or not present and its EQUIP bit is set.
- Either +12V feed to the CCN is absent or out of range.
- Monitor mode is set and either of the miscellaneous input faults is triggered.
- Application-requested watchdog timer expired.
- Application-requested Major alarm.

Minor alarms

- Dual-supply system and one power supply has a fault.
- Temperature out of range.
- Either CCPUnet bus has an error.
- Application-requested Minor alarm.

6 Troubleshooting

This section includes some of the more commo n issues with the proper functioning of the CCN. As a first step, be sure you have a serial terminal. This can be one of the following:

- VT100 or compatible
- Sun system running **`tip`**
- Windows PC laptop with Hyperterm or another terminal program

Serial CLI Connections

Ensure the proper settings

First, make sure your system matches the following factory defaults:

- 38400, 8 data bits, no parity, 1 stop bit.

  If you have changed your settings from the factory defaults, you need to change them back to the defaults.

Note: You change the baud rate or any other setting in Windows Hyperterm, you have to actually disconnect and then reconnect—using the software commands, not by unplugging the cable—to the port for the new setting to take effect. This is a bug in Hyperterm.

Check your terminal's cable

Assuming your serial terminal has a standard PC DB-9 port, then you need a male-female cable with all pins straight through.

Check the SER3 port

If you are using the front-panel port, make sure nothing else is plugged into SER3 on the back of that CCN.
The front panel CONS port and the SER3 port on the back are the same physical connection and cannot both be used at once.

Verify your terminal is sending and receiving correctly

You can verify that your serial terminal is sending/receiving correctly by shorting pins 2 and 3 on the male end of the cable with a loopback plug or screwdriver – then, when you type, you should see an echo. This does not check the baud, but it does makes sure you are opening the correct COMx: device (on a laptop, it's not always obvious exactly what is what).

Disconnect CCN CLI from the Sun console

The last person to use the console port may have used a **`connect`** command and left it that way. If this is the case, you are sending characters to the remote CPU.
Possible solution: Press **`Ctrl-]`** to see if you get a `connected to xx` prompt. If so, then type **`exit`** and you'll be back at the CLI.

Use a lightbox or breakout box

As always, the best way to diagnose serial problems is with a lightbox or breakout box. It's a good idea to keep one in your lab, as well as having some DB-9/DB-25 adapters available.

Last-ditch solution: press RESET

As a last-ditch effort to resolve cabling or flow-control problems:

1. Make sure everything is connected.
2. Press the RESET switch on the CCN.

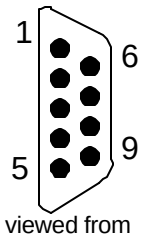
   Note that this will *not* reset the Sun CPU unless **`initmode`** is set to **`off`**. It will reset the CCN, which causes it to print its banner.
   If your problem is related to flow control, somehow preventing the terminal from transmitting, you should at least receive the banner string at this point.

Contact Technical Support

If all of the above fail, contact the Technical Support team at Continuous Computing. See Section 8 for contact information.

7 Pinouts and Specifications

Serial DCE (DB-9)

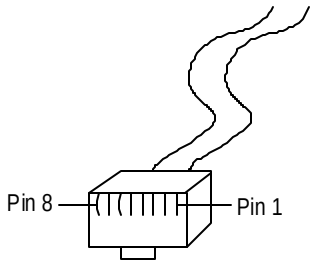


viewed from board end

Pin #	Signal	In/Out
1	DCD	Out
2	RXD	Out
3	TXD	In
4	DTR	In
5	GND	
6	DSR	Out
7	RTS	In
8	CTS	Out
9	Not used	

Table 14 Serial DCE (DB-9) pinout

CCPUnet (RJ-45)



RJ45 male connector viewed from connection end

Pin	Signal
1	Relay Normally Open
2	Relay Common
3	Relay Normally Closed
4	Miscellaneous Input 0
5	Miscellaneous Input 1
6	Ground
7	CCPUnet High
8	CCPUnet Low

Table 15 CCPUnet (RJ-45) pinout

Specifications (Preliminary/Expected)

Operating Environmental	
Temperature Humidity Altitude	-5°C to 50°C (Operating) 5% to 90% relative humidity, noncondensing 3000m
Storage/Transit Environmental	
Temperature Humidity Altitude	-40°C to 70°C 5% to 95% relative humidity, noncondensing 10000m
Power	
Voltage Current	Two 12VDC feeds 500mA total
Safety Compliance	
UL/cUL1950 3rd Edition Recognized Component UL/cUL1950 Listed (Systems only) European Low Voltage Directive (Systems only)	
Electromagnetic Compatibility (EMC)	
FCC Class A European EMC Directive (Systems only)	
Telco Compliance	
Telcordia NEBS GR-63-CORE Level 3 Telcordia NEBS GR-1089-CORE Level 3	
Marks	
UL, cUL, CE (Systems only)	

Table 16 Specifications

8 Technical Support

Before contacting the Technical Support team at Continuous Computing, be sure you have read Section 6, "Troubleshooting," of this guide.

If you continue to experience problems with the Continuous Control Node, please contact the Technical Support team at Continuous Computing by any of the methods listed below.

Note: Please be sure to include the serial numbers for each affected module, system and/or part. In addition, we will need to know what version of Solaris (or other operating system) you are running, as well as the patch level, and any other significant software packages that are installed.

Contacting Technical Support

To contact the Technical Support team at Continuous Computing, do one of the following:

- Email us at support@ccpu.com
- Visit our support web site at http://support.ccpu.com
  (This site features our automatic technical support system. Create a new user profile. Then submit a new ticket at the "Welcome to SupportWizard" page. This process ensures that our team delivers a timely solution to any technical problem you have.)
- Call us at (858) 882-8911, 9:00 a.m. – 5:00 p.m. (PST)

Note: If you have a Gold or Platinum service contract, follow the contact instructions provided with your contract.