eCNA

D-Cinema Automation

Command Interface Protocol Specification

Revision 1.0 Aug 8, 2006

Includes CAI and KDI Communications Protocols

STRONG

Cinema Products

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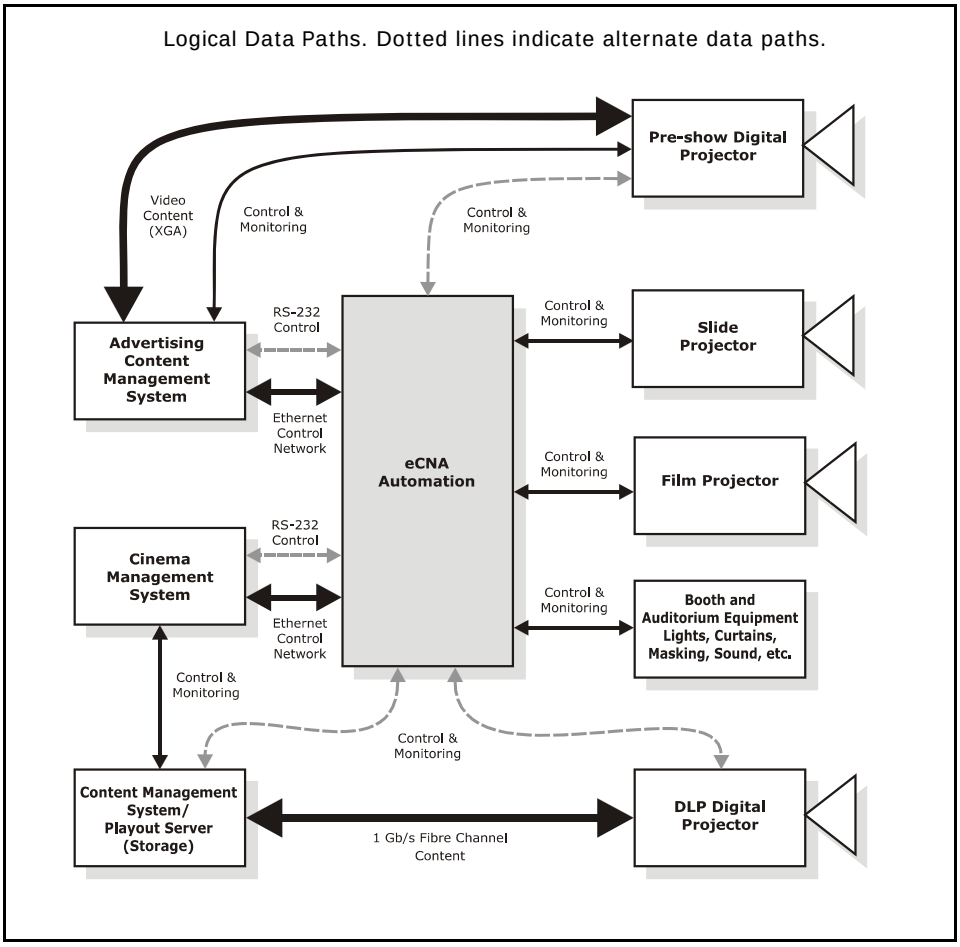
Cinema Automation Interface (CAI)

Introduction

The eCNA cinema automation now supports multiple projection systems. In addition to the film and slide projector the eCNA coordinates the presentation of up to two digital projection systems. The eCNA automates digital pre-show advertising, intermission entertainment and digital feature presentations. In addition to the normal film projector control, the eCNA will exchange status and control information with the digital projection systems so the digital and film media can share the screen in a coordinated manner. The eCNA uses standard IP-based (Ethernet) connectivity and an RS-232 port for serial communications. The serial protocol can easily be implemented by the digital content player systems to exchange information between the digital systems and the eCNA to facilitate automatic control of the equipment. The eCNA also features many programmable inputs and outputs for controlling and monitoring the digital projection systems.



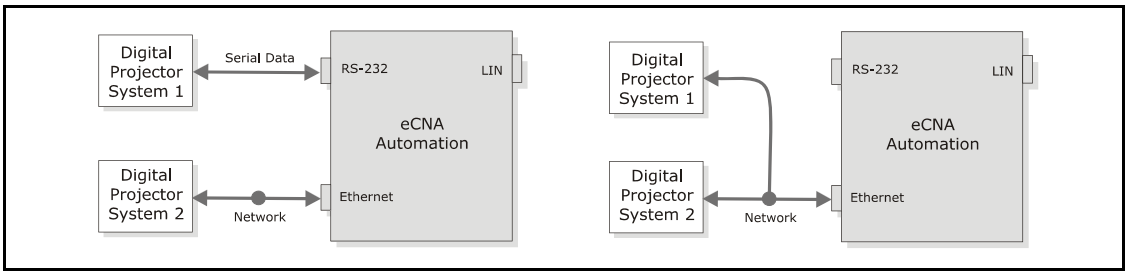
The diagram depicts the building blocks of a single screen with digital and 35 mm equipment. The cinema/content management system blocks support the scheduling and playback of digital features for single or multiple screens. The Advertising Content Management system supports digital pre-show advertising, trailers, etc. for a single screen.

Implementations and Requirements

The eCNA automation supports several topologies. Some of the most common implementations are shown below with the hardware requirements indicated. Regardless of your requirements, legacy CNA automation systems can easily be upgraded to support multiple projector systems. The following information will help to determine your requirements.

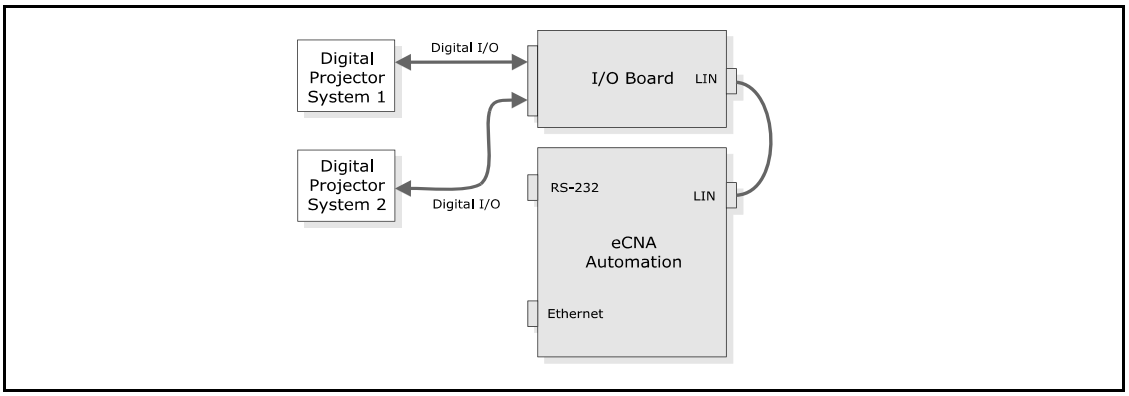
- **Serial - Ethernet / RS-232**

  This implementation requires a serial connection to the digital projector systems using the either RS-232, Ethernet or a combination of both. The eCNA accepts ASCII serial commands from the digital client(s) for status and control purposes.



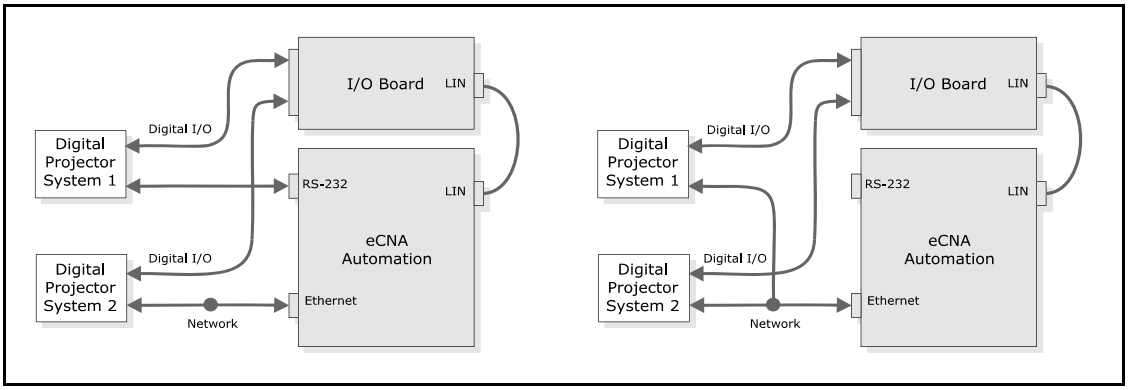
- **Digital I/O**

  This implementation assumes that a serial connection is not available or not required. Discrete digital output and input signals to the digital client(s) are used for status and control purposes. Digital projector specific I/O functions are assigned and controlled by the eCNA.



- **Serial/Digital I/O Combination**

  This combines the serial and digital I/O implementations. This is the most flexible setup allowing the digital client(s) to read digital inputs and control individual outputs as well as exchange information serially with the eCNA CPU.



CNA Automation System Requirements		
Automation System Configuration	Additional Components Required for Serial Only Implementation	Additional Components Required for Digital I/O Implementation (These components also support Serial implementation)
CNA with 39330 Console Board 39331 Booth Board	39425 eCNA Main CPU Board	39425 eCNA Main CPU Board along with one or more of the following: • 39490 I/O Board • 39431 House/Aux Board (Replaces 39331) • 39431 House/Aux Board w/39436 Aux I/O Board (Replaces 39331)
CNA with 39332 Single Board	39425 eCNA Main CPU Board	39425 eCNA Main CPU Board along with one or more of the following: • 39490 I/O Board • 39432-1 Combo Board with 39436 Aux I/O Board (Replaces 39332)
eCNA with 39330 Console Board 39331 Booth Board	None	One or more of the following: • 39490 I/O Board • 39431 House/Aux Board (Replaces 39331) • 39431 House/Aux Board w/39436 Aux I/O Board (Replaces 39331)
eCNA with 39332 Single Board	None	One or more of the following: • 39490 I/O Board • 39432-1 Combo Board with 39436 Aux I/O Board (Replaces 39332)
eCNA with 39432-2 Film Board 39431 House/Aux Board	None	One or more of the following: • 39436 Aux I/O Board • 39490 I/O Board
eCNA with 39432-1 Combo Board	None	One or more of the following: • 39436 Aux I/O Board • 39490 I/O Board

Note: These are the most common configurations for new orders and upgrades for existing systems. There are other possible configurations not described in the above table. For example, an old single termination board (39332) could be replaced by a new dual board set (39432-2 and 39431). Please contact the factory for more options.

Serial Commands and Definitions

This section describes the eCNA digital interface commands. These commands can be issued through either the RS-232 serial port or TCP/IP Ethernet. The command structure is exactly the same either way.

Hardware Connection Method:

1) RS-232 (P9): Digital Projector 1 Interface
   Baud Rate: 19200 bps
   Data Length: 8 bits
   Parity Bit: No Parity
   Stop Bits: 1 bit
   Flow Control: Hardware (RTS-CTS)

2) Ethernet (J2):
   TCP/IP Port 13000: Digital Projector 1 Interface
   TCP/IP Port 13001: Digital Projector 2 Interface
   10 Base T: 10mbps
   Duplex: Half/Full

Commands:

CMD indicates a "command" message. (Requests the target to perform a specific action.)
RSP indicates a "response" message. (Response to a command.)

List of Commands Supported by the eCNA

Command	Response	Description
CMD RID	RSP RID	Report Id. The eCNA returns its identification information to the caller
CMD RST	RSP RST	Report Status. The eCNA returns its status record to the caller
CMD XST	RSP XST	Exchange Status. The eCNA exchanges status records with the caller.
CMD DOT	RSP DOT	Digital Output. The eCNA controls the outputs accordingly.
CMD DIN	RSP DIN	Digital Input. The eCNA returns the status of all its inputs.
CMD RDO	RSP RDO	Read Digital Outputs. The eCNA returns the status of all its outputs.
	RSP ERR	Connect Error. Resource Unavailable error response.

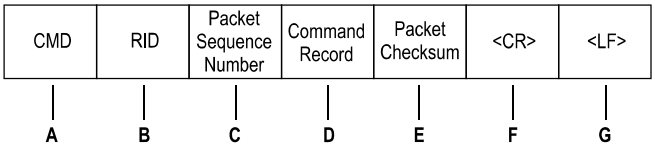
Each command line must meet the following criteria:

1. Commands exceeding 132 characters including the terminating carriage return and line feed are discarded.

2. Must not contain the NULL character (0x00) anywhere in the command line.

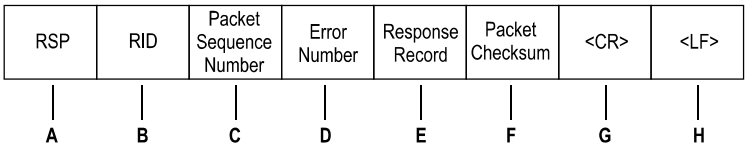
REPORT ID Command and Response Message Format

Command Message Format



Item	Name	Description
A	CMD,	Start of message. Indicates a "command" message
B	RID,	Report identification information
C	Packet Sequence Number,	Packet sequence number (Decimal 0 to 65535, special case; always is 0)
D	Command Record	--------
E	Packet Checksum,	1 to 5 digits that represent an unsigned 16-bit decimal sum of all preceding characters. Use wildcard ?? instead of checksum to force the eCNA to ignore the value for the checksum (not recommended for final application).
F	<CR>	Terminating carriage return (0x0D)
G	<LF>	Terminating line feed (0x0A)

Response Message Format



Item	Name	Description
A	RSP,	Start of message. Indicates a "response" message from eCNA
B	RID,	Report identification information
C	Packet Sequence Number,	Packet sequence number (0 to 65535, special case; always is 0)
D	Error Number,	Error number (0=okay, else number indicating problem)
E	Response Record	<< *eCNA's Identification Record* >>
F	Packet Checksum,	Unsigned 16-bit decimal sum of all preceding characters
G	<CR>	Terminating carriage return (0x0D)
H	<LF>	Terminating line feed (0x0A)

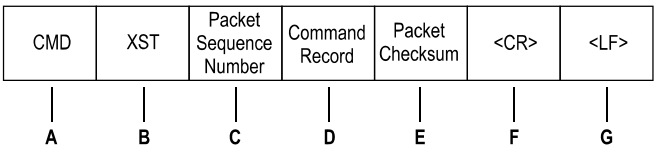
eCNA's Identification Record	
Parameter	**Description**
Device Name,	This parameter is the name of the device. ASCII text. Max length = 8 characters Values: "CNA-200", "CNA-150", "CNA-100"
Software Version,	This parameter indicates the current revision of the device's application software. ASCII text. Max length = 6 characters
LSN Id Number,	This parameter is the eCNA's LSN Id number. DIP switches on the eCNA set the value of this number. Most theatres set this number to the auditorium house number. Decimal number in the range of 0 to 63, where 0 indicates the device is not active on the LSN. Max length = 2 characters

Report Id Example

Command	Response
CMD,RID,0,615<CR><LF>	RSP,RID,0,0,CNA-200,2008,9,1532<CR><LF>

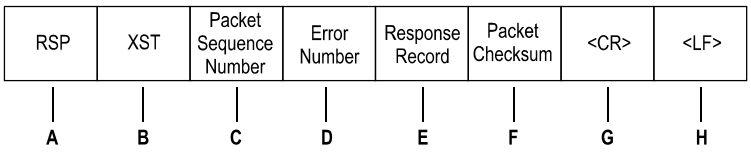
EXCHANGE STATUS Command and Response Message Format

Command Message Format



Item	Name	Description
A	CMD,	Start of message. Indicates a "command" message
B	XST,	Exchange status information with CNA
C	Packet Sequence Number,	Packet sequence number (0 to 65535, special case; always is 0)
D	Command Record	<< *Content Player's status record* >>
E	Packet Checksum,	1 to 5 digits that represent an unsigned 16-bit decimal sum of all preceding characters. Use wildcard ?? instead of checksum to force the eCNA to ignore the value for the checksum (not recommended for final application).
F	<CR>	Terminating carriage return (0x0D)
G	<LF>	Terminating line feed (0x0A)

Response Message Format



Item	Name	Description
A	RSP,	Start of message. Indicates a "response" message from eCNA
B	XST,	Exchange status information with eCNA
C	Packet Sequence Number,	Packet sequence number (0 to 65535, special case; always is 0)
D	Error Number,	Error number (0=okay, else number indicating problem)
E	Response Record	<< *eCNA's Status Record* >>
F	Packet Checksum,	Unsigned 16-bit decimal sum of all preceding characters
G	<CR>	Terminating carriage return (0x0D)
H	<LF>	Terminating line feed (0x0A)

CP's Status Record

This record contains data from the Digital Content Player (CP) that can be used for control or display purposes. The CP sends this information when issuing the XST command to the eCNA. This information can be used by tools or displayed by the applications, but is mainly used by the eCNA to coordinate its presentation with the CP's presentation. The data in this record is formatted as a comma delimited ASCII string.

Parameter	Description
Device Name,	This parameter is generally used to indicate the name of the connecting device. This string may be displayed by the eCNA on some of its status screens. ASCII text, max length = 8 characters.
Start/Resume,	This parameter can be set (STY) by the CP to request the eCNA to Start (or Resume) the Show Program. The eCNA watches for the flag to transition from STN to STY, which will cause the eCNA to start (or resume) when there are no active Faults. The CP should reset this flag to STN once the eCNA starts. Note that the eCNA may "Start" due to other conditions and the CP can monitor this by watching the eCNA's Mode and Fault flags. Fixed length = 3 ASCII characters, values: "STN"=No, "STY"=Start.
Stop,	This parameter can be set (SPY) by the CP to request the eCNA to Stop the Show Program. The eCNA watches this flag to transition from SPN to SPY to stop the Show. The CP should reset this flag to STN once the eCNA stops. Note that the eCNA may "Stop" due to other conditions and the CP can monitor this by watching the eCNA's Mode and Fault flags. Fixed length = 3 ASCII characters, values: "SPN"=No, "SPY"=Start.

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Parameter	Description
Fault,	This parameter can be set (FLT) by the CP to request the eCNA to Stop the Show Program. The eCNA sets the “Digital n Fault” when this flag transitions from “OK” to “FLT”. The “Digital n Fault” is automatically cleared if both this flag and any configured “Digital n Input” bits are off. The “Digital n Fault” can also be cleared with the “Alarm Cancel” key at the CNA. Fixed length = 3 ASCII characters, values: “OK”=No, “FLT”=Start.
Next Cue,	This parameter can be set (NXT) by the CP to indicate it is finished presenting this portion of its presentation. The control logic in the eCNA only monitors this flag when it is in its RUN state. The eCNA watches for this flag to transition from NO to NXT, which will cause the eCNA to add one (1) to the CUE Number. This advances the eCNA program to the next Wait for Cue Instruction. Once the CP sees the eCNA Cue change it can reset this flag to NO. NOTE: CUE advances must be coordinated with other devices! (See the Power and Video flags in the eCNA’s Status Record.) Fixed length = 3 ASCII characters, values: “NO”=No, “NXT”=Add 1 to CNA CUE.

eCNA's Status Record

This record contains data from the eCNA that can be used for control or display purposes. The eCNA returns this information when it responds to the RST and XST commands. This information can be used by tools or displayed by applications, but is mainly used by the CP to coordinate its presentation with the eCNA’s presentation. The data in this record is formatted as a comma delimited ASCII string.

Parameter	Description
CP Enable Flag,	This parameter indicates whether the eCNA accepts control data from this command set. When this flag is "DIS", the eCNA ignores incoming control data from the CP. When this flag is "ENA" the eCNA will accept valid control data from the Content Player.
Control State,	This parameter indicates the current state of the eCNA's control program. eCNA reports “IDL” between shows, and “RUN” when running a Feature Program. The CP must co-ordinate it's presentation with the eCNA's presentation by monitoring the DIGITAL 1, DIGITAL 2, and AUX Projector Presentations see those status flags in this packet for more information. Fixed length = 3 ASCII characters, Values: "IDL" = Idle, "RUN" = Running
Stopped State,	This parameter indicates the exception state of the eCNA. The CP must co-ordinate it’s presentation with the eCNA’s presentation by monitoring the DIGITAL 1, DIGITAL 2, and AUX Projector Presentations – see those status flags in this packet for more information. The eCNA will not start or resume when in the “FLT” or “FIR” states. It can be started when in the “OK” state. It can be resumed when in the STP state. Max length = 3 characters, values: “OK“=No Fault, “STP”=Stopped, “FLT”=Faulted, “FIR”=Fire Stop
Cue Number,	This parameter reports the current Cue Number of the eCNA’s Feature program. When between shows (IDL), this number will be zero. Max length = 2, decimal number in the range of 0 to 20 for the eCNA-200, 0 to 10 for the eCNA-100/150.
Digital 1 Power Control Flag,	This parameter indicates the current state of the eCNA’s "Control Program" and indicates that Digital 1 Power is on or off. This is the 'desired' state, not necessarily the state of the output. This output may fault to a different state. Fixed length = 3 ASCII characters, values: “NO”=Digital 1 Power is off, “D1P”=Digital 1 Power is on.
Digital 1 Power Output Status,	This parameter indicates the current state of the eCNA’s "Output State" and indicates that Digtal 1 Power is on or off. See Note 1. Fixed length = 3 ASCII characters, values: “NO”=Digital 1 Power is off, “D1P”=Digital 1 Power is on.
Digital 1 Video Control Flag,	This parameter indicates the current state of the eCNA’s "Control Program" and indicates that Digtal 1 Video is on or off. See Note 1. Fixed length = 3 ASCII characters, values: “NO”=Digital 1 Video is off, “D1V”=Digital 1 Video is on.
Digital 1 Video Output Status,	This parameter indicates the current state of the eCNA’s "Output State" and indicates that Digtal 1 Video is on or off. See Note 1. Fixed length = 3 ASCII characters, values: “NO”=Digital 1 Video is off, “D1V”=Digital 1 Video is on.
Digital 2 Power Control Flag,	This parameter indicates the current state of the eCNA’s "Control Program" and indicates that Digtal 2 Power is on or off. See Note 1. Fixed length = 3 ASCII characters, values: “NO”=Digital 2 Power is off, “D2P”=Digital 2 Power is on.
Digital 2 Power Output Status,	This parameter indicates the current state of the eCNA’s "Output State" and indicates that Digtal 2 Power is on or off. See Note 1. Fixed length = 3 ASCII characters, values: “NO”=Digital 2 Power is off, “D2P”=Digital 2 Power is on.
Digital 2 Video Control Flag,	This parameter indicates the current state of the eCNA’s "Control Program" and indicates that Digtal 2 Video is on or off. See Note 1. Fixed length = 3 ASCII characters, values: “NO”=Digital 2 Video is off, “D2V”=Digital 2 Video is on.
Digital 2 Video Output Status,	This parameter indicates the current state of the eCNA’s "Output State" and indicates that Digtal 2 Video is on or off. See Note 1. Fixed length = 3 ASCII characters, values: “NO”=Digital 2 Video is off, “D2V”=Digital 2 Video is on.
Film Projector Power,	This parameter indicates the current state of the eCNA’s control program and indicates that Film Projector Motor is on or off. Note this output has a manual override and the state of the projector may not match this flag... Fixed length = 3 ASCII characters, values: “NO”=Film Motor is off, “PJM”=Film Projector Motor is on.
Film Projector Changeover,	This parameter indicates the current state of the eCNA’s control program and indicates that Film Projector Changeover is open or closed. Note this output has a manual override and the state of the projector may not match this flag... Fixed length = 3 ASCII characters, values: “NO”=Changeover is closed, “C/O”=Changeover is open.
Slide Projector Control Flag,	This parameter indicates the current state of the eCNA’s "Control Program" and indicates that the Aux Projector is on or off. Note this output has a manual override and the state of the projector may not match this flag... See Note 1. Fixed length = 3 ASCII characters, values: “NO”=Aux Projector is off, “AUX”=Aux Projector is on.

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Parameter	Description
Slide Projector Output Status,	This parameter indicates the current state of the eCNA's "Output State" and indicates that the Aux Projector is on or off. Note this output has a manual override and the state of the projector may not match this flag... See Note 1. Fixed length = 3 ASCII characters, values: "NO"=Aux Projector is off, "AUX"=Aux Projector is on.
Sync Mode,	This parameter indicates when the eCNA is configured for Interlock (SYN) mode of operation. Interlock mode is where more than one auditorium uses the same film that is run through several projectors. Max length = 3 characters, values: "NO"=Stand alone, "SYN"=Sync (one film, multi house).
Synced House Id,	This parameter indicates the LSN Id of another auditorium that is currently "Interlocked" (SYNC'ed) with this eCNA. This number only has meaning when the eCNA is in Sync Mode (SYN). Max length = 2, decimal number in the range of 0=not used, 1 to 64 = Id of device.
Synced House Id,	This parameter indicates the LSN Id of another auditorium that is currently "Interlocked" (SYNC'ed) with this CNA. This number only has meaning when the eCNA is in Sync Mode (SYN). Max length = 2, decimal number in the range of 0=not used, 1 to 64 = Id of device.
Synced House Id,	This parameter indicates the LSN Id of another auditorium that is currently "Interlocked" (SYNC'ed) with this eCNA. This number only has meaning when the eCNA is in Sync Mode (SYN). Max length = 2, decimal number in the range of 0=not used, 1 to 64 = Id of device.
Synced House Id,	This parameter indicates the LSN Id of another auditorium that is currently "Interlocked" (SYNC'ed) with this eCNA. This number only has meaning when the eCNA is in Sync Mode (SYN). Max length = 2, decimal number in the range of 0=not used, 1 to 64 = Id of device.
Synced House Id,	This parameter indicates the LSN Id of another auditorium that is currently "Interlocked" (SYNC'ed) with this eCNA. This number only has meaning when the eCNA is in Sync Mode (SYN). Max length = 2, decimal number in the range of 0=not used, 1 to 64 = Id of device.
Reset,	This parameter indicates that the eCNA has re-booted. This would most likely be due to a power up, but will also indicate any other system reset. This is a 1 byte value. The most significant bit (80 Hex, 128 Decimal) is set after a reset and cleared after the eCNA status record is sent the first time. The lower bits (0 to 7F Hex, 0 to 127) are simply incemented by one after each reset. Max length = 5, decimal number in the range of 0 to 255
Bypass,	This parameter indicates the state of the Bypass flag. The Bypass flag can be set or cleared with the Bypass program instruction or a programmable input. Bypass is currently used with the 39440 CNI termination board to activate or de-activate CNI control. Fixed length = 3 ASCII characters, values: "BPN" = Bypass is not active, "BPY" = Bypass is activated.
Future	*Future parameters can be added to the end of this record.*

Exchange Status Example

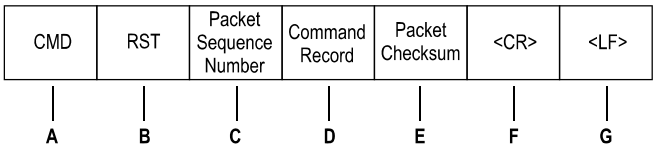
Command	Response
CMD,XST,0,PLAYER1,STN,SPN,OK,NO,2174<CR><LF>	RSP,XST,0,0,ENA,RUN,OK,1,D1P,D1V,NO,NO,NO,NO,NO,NO,2,15,0,0,0,3818<CR><LF>

Notes:

1) The 'Reset' parameter can be used by the client to detect a power up allowing the client to initialize outputs if desired.

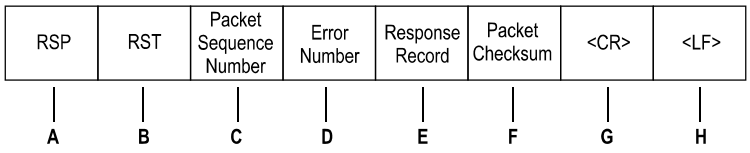
REPORT STATUS Command and Response Message Format

Command Message Format



Item	Name	Description
A	CMD,	Start of message. Indicates a "command" message
B	RST,	Report status information of eCNA
C	Packet Sequence Number,	Packet sequence number (0 to 65535, special case; always is 0)
D	Command Record	-------
E	Packet Checksum,	1 to 5 digits that represent an unsigned 16-bit decimal sum of all preceding characters. Use wildcard ?? instead of checksum to force the eCNA to ignore the value for the checksum (not recommended for final application).
F	<CR>	Terminating carriage return (0x0D)
G	<LF>	Terminating line feed (0x0A)

Response Message Format



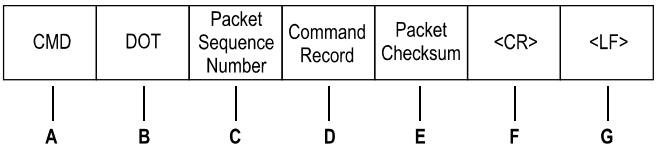
Item	Name	Description
A	RSP,	Start of message. Indicates a "response" message from eCNA
B	RST,	Report status information of eCNA
C	Packet Sequence Number,	Packet sequence number (0 to 65535, special case; always is 0)
D	Error Number,	Error number (0=okay, else number indicating problem)
E	Response Record	<< *eCNA's Status Record* >>
F	Packet Checksum,	Unsigned 16-bit decimal sum of all preceding characters
G	<CR>	Terminating carriage return (0x0D)
H	<LF>	Terminating line feed (0x0A)

Report Status Example

Command	Response
CMD,RST,0,641<CR><LF>	RSP,RST,0,0,ENA,RUN,OK,2,NO,NO,D2P,D2V,NO,NO,NO,NO,2,15,0,0,0,3815<CR><LF>

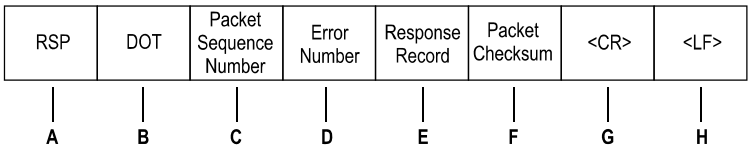
DIGITAL OUTPUT Command and Response Message Format

Command Message Format



Item	Name	Description
A	CMD,	Start of message. Indicates a "command" message
B	DOT,	Turn on/off eCNA Auxiliary outputs
C	Packet Sequence Number,	Packet sequence number (0 to 65535, special case; always is 0)
D	Command Record	<< *Digital Output command record* >>
E	Packet Checksum,	1 to 5 digits that represent an unsigned 16-bit decimal sum of all preceding characters. Use wildcard ?? instead of checksum to force the eCNA to ignore the value for the checksum (not recommended for final application).
F	<CR>	Terminating carriage return (0x0D)
G	<LF>	Terminating line feed (0x0A)

Response Message Format



Item	Name	Description
A	RSP,	Start of message. Indicates a "response" message from eCNA
B	DOT,	Turn on/off eCNA Auxiliary outputs
C	Packet Sequence Number,	Packet sequence number (0 to 65535, special case; always is 0)
D	Error Number,	Error number (0=okay, else number indicating problem)
E	Response Record,	Auxiliary I/O Board Id number (1,2,3 or 4)
F	Packet Checksum,	Unsigned 16-bit decimal sum of all preceding characters
G	<CR>	Terminating carriage return (0x0D)
H	<LF>	Terminating line feed (0x0A)

Digital Output Command Record

This record contains digital output control data for the eCNA auxiliary outputs.

Parameter	Description
Board Id,	This parameter controls which board the command is to act on. Unsigned integer, max length = 2 characters, values: 1, 2, 3 or 4. See notes for description of boards.
Output Data,	The parameter specifies the data to output, where 1 = on and 0 = off. This number is a hexidecimal representation of (up to) a 16 digit binary number where each digit represents an output. The right most digit is output 1. Must be used in conjuction with the output mask. Hex number: 0 to FFFF. Example of 12 outputs (board 1 or 2) represented by hex number 84F Turn on outputs 1,2,3,4,7,12. Turn off the rest (assuming mask = FFF). 100001001111 Output 12 … Output 1 Example of 13 outputs (board 3) represented by hex number 10F2 Turn on outputs 2,5,X1,X2,X3,X8. Turn off the rest (assuming mask = FFFF). 0001000011110010 Output X8 … Output 1

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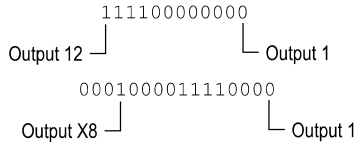
Parameter	Description
Output Mask,	The parameter specifies the outputs to write, where 1 = write and 0 = don't write (discard). This number is a hexidecimal representation of (up to) a 16 digit binary number where each digit represents an output. The right most digit is output 1. Hex number: 0 to FFFF. Example of 12 mask bits represented by hex number F00 Write only to outputs 9, 10, 11, 12 (board 1or 2). Example of 13 mask bits represented by hex number 10F0 Write only to outputs 5,X1,X2,X3,X8 (board 3).



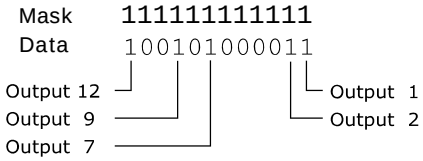
Digital Output Example

Command	Response
CMD,DOT,0,1,00A5,00FF,1254<CR><LF>	RSP,DOT,0,0,1,841<CR><LF>

Notes:

Board 1: 39490 Termination Board (Id 1)

This termination board is an optional I/O board that connects to the eCNA Local I/O Network (LIN). It features 12 relay outputs and 8 isolated inputs. The outputs and mask are designated 1 through 12. The 'DOT' command has position fields for the Output Data and Mask. The position field is a 3 digit hex representation of a 12 digit number where each digit can only be a 1 or 0. The left most digit is output 12 and the right most digit is output 1. The example below shows that output 1,2,7,9 and 12 will be turned on and the remaining outputs will be turned off.



To find the hexidecimal equivalent, divide the 12 digit number into 4 digit numbers and look up each of the 4 digit numbers and replace it with the corresponding hex number.

1001 0100 0011

Output #	Hex digit
12 11 10 9	1st digit (0 - F)
8 7 6 5	2nd digit (0 - F)
4 3 2 1	3rd digit (0 - F)

Bit Pattern	Hex
0000	0
0001	1
0010	2
0011	3
0100	4
0101	5
0110	6
0111	7
1000	8
1001	9
1010	A
1011	B
1100	C
1101	D
1110	E
1111	F

Data 1001 0100 0011 Mask 1111 1111 1111

9 4 3 F F F

The resulting hexidecimal number is: 943 and FFF.

The eCNA will also accept a 4 digit hex number for this board and act on it accordingly. For example, the number 943 could be 0943 and FFF could be 0FFF and would have identical results. The eCNA will also accept 1 or 2 digit hex number, but will act only on outputs 1 through 4 or 1 through 8, respectively.

Board 2: 39490 Termination Board (Id 2)

This termination board is identical to Board 1 except that it is addressed as Id 2.

Board 3: 39431 House/Aux Termination Board

This termination board connects to the eCNA Local I/O Network (LIN). It features 5 standard relay outputs and 8 auxiliary relay outputs that are available for control. The standard outputs are designated as 1 through 5 and the auxiliary outputs are designated as X1 through X8. The auxiliary outputs are only available with the optional 39436 I/O board. The 'DOT' command has position fields for the Output Data and Mask. The position field is a 4 digit hex representation of a 16 digit number where each digit can only be a 1 or 0.

```
            0001110100001001
 Output X8 ─┘              └─ Output  1

 Output #        Hex digit
 -  -  - X8    (msd) digit (0 - F)
X7 X6 X5 X4          digit (0 - F)
X3 X2 X1  5          digit (0 - F)
 4  3  2  1    (lsd) digit (0 - F)
```

0001 1101 0000 1001

1 D 0 9

Board 4: 39432 Film/Combo Termination Board

This termination board connects to the eCNA Local I/O Network (LIN). It features 1 standard relay output and 8 auxiliary relay outputs that are available for control. The standard output is designated as 1 and the auxiliary outputs are designated as X1 through X8. The auxiliary outputs are only available with the optional 39436 I/O board. The 'DOT' command has position fields for the Output Data and Mask. The position field is a 3 digit hex representation of a 12 digit number where each digit can only be a 1 or 0.

```
             000111001010
 Output X8 ─┘          └─ Output  1

 Output #        Hex digit
 -  -  - X8    (msd) digit (0 - F)
X7 X6 X5 X4          digit (0 - F)
X3 X2 X1  1    (lsd) digit (0 - F)
```

0001 1100 1010

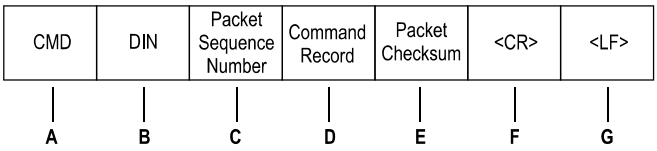
1 C A

The eCNA will also accept a 4 digit hex number for this board and act on it accordingly. For example, the number 1CA could be 01CA and would have identical results.

See the *eCNA Installation Manual* for further details on the Termination Boards.

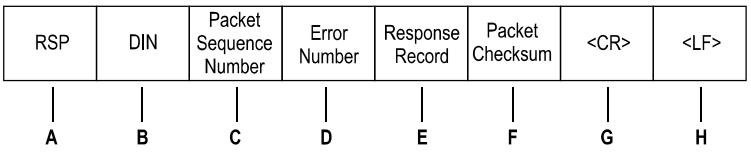
DIGITAL INPUTS Command and Response Message Format

Command Message Format



Item	Name	Description
A	CMD,	Start of message. Indicates a "command" message
B	DIN,	Read state of eCNA Auxiliary inputs
C	Packet Sequence Number,	Packet sequence number (0 to 65535, special case; always is 0)
D	Command Record,	Auxiliary I/O Board Id number (1,2,3 or 4)
E	Packet Checksum,	1 to 5 digits that represent an unsigned 16-bit decimal sum of all preceding characters. Use wildcard ?? instead of checksum to force the eCNA to ignore the value for the checksum (not recommended for final application).
F	<CR>	Terminating carriage return (0x0D)
G	<LF>	Terminating line feed (0x0A)

Response Message Format



Item	Name	Description
A	RSP,	Start of message. Indicates a "response" message from eCNA
B	DIN,	Read state of eCNA Auxiliary inputs
C	Packet Sequence Number,	Packet sequence number (0 to 65535, special case; always is 0)
D	Error Number,	Error number (0=okay, else number indicating problem)
E	Response Record	<< *Digital Input response record* >>
F	Packet Checksum,	Unsigned 16-bit decimal sum of all preceding characters
G	<CR>	Terminating carriage return (0x0D)
H	<LF>	Terminating line feed (0x0A)

Digital Input Response Record

This record contains digital input response data returned by the eCNA.

Parameter	Description
Board Id,	This parameter controls which board the command is to act on. Unsigned integer, max length = 2 characters, values: 1, 2, 3 or 4. See notes for description of board inputs.
Intput Data,	The parameter specifies the current state of all the inputs on the specified board, where 1 = on and 0 = off. This number is a hexidecimal representation of a 16 digit binary number where each digit represents an input. The right most digit is input 1 or X1. (See notes). 4 digit Hex number: 0000 to FFFF. Example of inputs represented by 004F Inputs 1,2,3,4,7 are on. The rest are off. 0000000001001111 Input 8 — Input 1
Rising Edge,	The parameter indicates the inputs that transitioned 0 to 1 at least once since the last time this command was issued. A "1" indicates a rising edge occurred on the bit, a "0" indicates no rising edge occurred. 4-digit Hex number: 0000 to FFFF
Falling Edge,	The parameter indicates the inputs that transitioned 0 to 1 at least once since the last time this command was issued. A "1" indicates a falling edge occurred on the bit, a "0" indicates no falling edge occurred. 4-digit Hex number: 0000 to FFFF

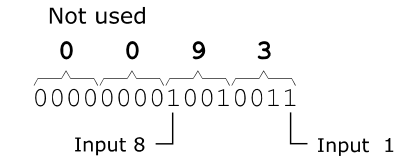
Digital Input Example

Command	Response
CMD,DIN,0,1,704<CR><LF>	RSP,DIN,0,0,1,004F,0000,0000,1563<CR><LF>

Notes:

Board 1: 39490 Termination Board (Id 1)

This termination board is an optional I/O board that connects to the eCNA Local I/O Network (LIN). It features 8 isolated inputs. The inputs are designated 1 through 8. The 'DIN' response contains position fields for the Input Levels, Rising and Falling Edges. Each position field is a 4 digit hex representation of a 16 digit binary number where each digit is either a 1 or 0. Only 8 of the 16 fields (the 2 least significant hex digits) are needed for this (8 input) board.

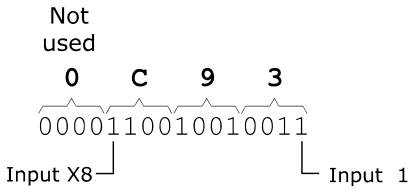


Board 2: 39490 Termination Board (Id 2)

This termination board is identical to Board 1 except that it is addressed as Id 2.

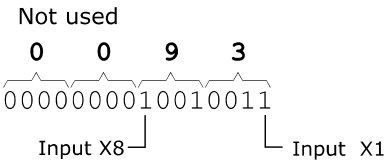
Board 3: 39431 House/Aux Termination Board

This termination board connects to the eCNA Local I/O Network (LIN). It features 12 inputs that are designated 1 through 4 and X1 through X8. X1 through X8 are available on the 39436 Auxiliary Board. The 'DIN' response contains position fields for the Input Levels, Rising and Falling Edges. Each position field is a 4 digit hex representation of a 16 digit binary number where each digit is either a 1 or 0. Only 12 of the 16 fields (the 3 least significant hex digits) are needed for this (12 input) board.



Board 4: 39432 Film/Combo Termination Board

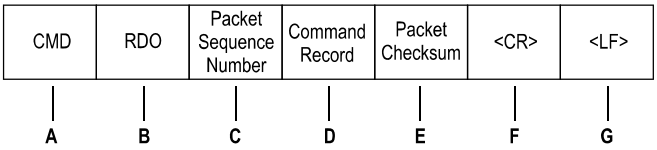
This termination board connects to the eCNA Local I/O Network (LIN). It features 8 auxiliary inputs. The inputs are designated X1 through X8. These are available on the 39436 Auxiliary Board. The 'DIN' response contains position fields for the Input Levels, Rising and Falling Edges. Each position field is a 4 digit hex representation of a 16 digit binary number where each digit is either a 1 or 0. Only 8 of the 16 fields (the 2 least significant hex digits) are needed for this (8 input) board.



See the *eCNA Installation Manual* for further details on the Termination Boards.

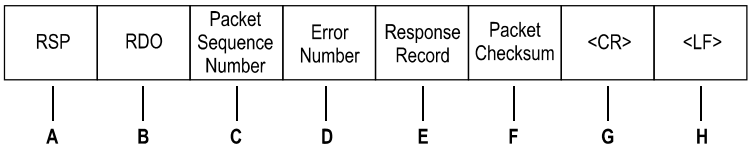
READ DIGITAL OUTPUTS Command and Response Message Format

Command Message Format



Item	Name	Description
A	CMD,	Start of message. Indicates a "command" message
B	RDO,	Read state of eCNA Auxiliary outputs
C	Packet Sequence Number,	Packet sequence number (0 to 65535, special case; always is 0)
D	Command Record,	Auxiliary I/O Board number (1,2,3 or 4)
E	Packet Checksum,	1 to 5 digits that represent an unsigned 16-bit decimal sum of all preceding characters. Use wildcard ?? instead of checksum to force the eCNA to ignore the value for the checksum (not recommended for final application).
F	<CR>	Terminating carriage return (0x0D)
G	<LF>	Terminating line feed (0x0A)

Response Message Format



Item	Name	Description
A	RSP,	Start of message. Indicates a "response" message from eCNA
B	RDO,	Read state of eCNA Auxiliary outputs
C	Packet Sequence Number,	Packet sequence number (0 to 65535, special case; always is 0)
D	Error Number,	Error number (0=okay, else number indicating problem)
E	Response Record	<< *Read Digital outputs response record* >>
F	Packet Checksum,	Unsigned 16-bit decimal sum of all preceding characters
G	<CR>	Terminating carriage return (0x0D)
H	<LF>	Terminating line feed (0x0A)

Read Digital Outputs Response Record

This record contains digital output response data returned by the eCNA.

Parameter	Description
Board Id,	This parameter controls which board the command is to act on. Unsigned integer, max length = 2 characters, values: 1, 2, 3 or 4.
Output Status,	The parameter specifies the current state of all the maintained outputs and the desired state of all the pulsed outputs of the specified board, where 1 = on and 0 = off. This number is a hexidecimal representation of a 16 digit binary number where each digit represents an output. The right most digit is output 1. Hex number: 0000 to FFFF. Example of the 9 outputs on the 394932-1 Combo Board represented by hex number 0034. 0000000000110100 Output X8 — Output 1

Read Digital Outputs Example

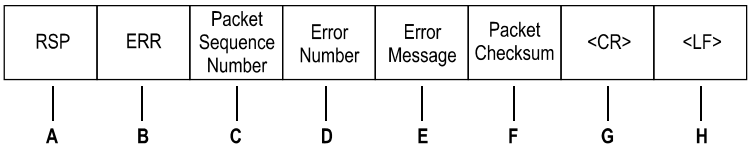
Command	Response
CMD,RDO,0,4,714<CR><LF>	RSP,RDO,0,0,4,0034,1085<CR><LF>

Connect Error Response

In the special case where the eCNA communications resource is already being used, when the caller tries to connect, the following error response is sent back to the caller and the connection is then closed by the eCNA.

CONNECT ERROR Response Message Format

Response Message Format



Item	Name	Description
A	RSP,	Start of message. Indicates a "response" message from eCNA
B	RDO,	Read state of eCNA Auxiliary outputs
C	Packet Sequence Number,	Packet sequence number (0 to 65535, special case; always is 0)
D	Error Number,	Error number = 998 (Resource Unavailable)
E	Error Message	Error Message Text: Resource Unavailable
F	Packet Checksum,	Unsigned 16-bit decimal sum of all preceding characters
G	<CR>	Terminating carriage return (0x0D)
H	<LF>	Terminating line feed (0x0A)

Connect Error Response Example

Command	Response
Any	RSP,ERR,0,998,Resource Unavailable,828<CR><LF>

Error Response Numbers

The Error Number is normally the parameter number of the problem parameter. However, there a few special case Error Numbers that have been defined.

Error No.	Description
0	OK - All data in the packet received by the eCNA was accepted
1	Not used. The command must start with CMD. If it doesn't the characters up to and including the next CR LF are discarded (quietly).
2	The command was not recognized. This response always return Sequence Number = 0.
3 to n	This Error Number indicates which parameter of the received packet has a problem. The parameter was unrecognized or out of range. None of the data in the received packet was stored. Example: "CMD,XST,0,Host,xxx,SPN,OK,NO,?" would return an Error Number of 5 indicating that xxx was not recognized as a valid parameter.
996	Indicates I/O Board is not present or not responding. This error can be returned for the DIN. DOT and RDO commands.
997	Content Player Control is disabled at the eCNA. See CNA DIP SW2-8.
998	Resource Not Available. This is returned when the connection is not available (already connected).
999	Checksum Error. The packet received by the eCNA had a missing or incorrect checksum and was ignored. If possible, the eCNA returns the normal response packet (but did not use the received data).

Checksum

A checksum is appended to the end of all messages to help detect errors in transmission. The checksum is an unsigned 16-bit decimal sum of all characters preceding the checksum. The checksum is obtained by adding all the decimal values of ASCII characters that make up a command or response. Logically 'AND' 65535 to this sum or repeatedly subtract 65536 (2^{16}) from this sum until the remainder is less than 65536 to get the final 16-bit decimal checksum value.

Example:

Instruction

CMD,RID,0,[ ]<CR><LF>

The instruction is:

Instruction Character	ASCII Value
C	67
M	77
D	68
,	44
R	82
I	73
D	68
,	44
0	48
,	44
	615

The checksum is 615 and the complete instruction is:

CMD,RID,0,615<CR><LF>

Response

RSP,RID,0,0,CNA-200,2008,9,[ ]<CR><LF>

The response is:

Response Character	ASCII Value
R	82
S	83
P	80
,	44
R	82
I	73
D	68
,	44
0	48
,	44
0	48
,	44
C	67
N	78
A	65
-	45
2	50
0	48
0	48
,	67
2	50
0	48
0	48
8	56
,	44
9	57
,	44
	1532

The checksum is 1532 and the complete response is:

RSP,RID,0,0,CNA-200,2008,9,1532<CR><LF>

If ?? is added to the instruction instead of a checksum, the instruction is executed. It sends a "don't care" value for the checksum. This method is not recommended for programming because it does not insure proper communication error checking.

Example:

Instruction	Response
CMD,RID,0,??<CR><LF>	RSP,RID,0,0,CNA-200,2008,9,1532<CR><LF>

Application Examples

Before beginning the communication software to the eCNA, a brief explanation of the rules and some examples may help with a successful implementation. First, the client always initiates a TCP/IP connection to the eCNA. The eCNA does not initiate communications, it only responds to commands sent to it by the client. The idea is to open a connection to the eCNA and keep it open. Only a single connection is required for all communications. The eCNA supports up to two open connections allowing for two digital projection systems to coordinate their presentations with each other and the film. The Connect Error (ERR) response lets the client know that a connection is already opened and is not available.

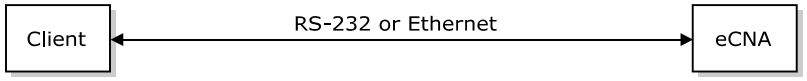
How you structure the communications is up to you. We recommend establishing a 'heartbeat' by continuously exchanging status using the XST command. If you do not utilize the digital inputs or outputs, the XST command should be all you need for starting and stopping the digital pre-show. The eCNA program will coordinate the digital pre-show and film portion of the presentation (see Program Examples on pages 24 to 26). Information returned in the eCNA status record will tell you when to start. You will tell the eCNA when you are finished by setting the 'Next Cue' flag. The start could also come from you by setting the Start/Resume parameter to STY. The heartbeat time is up to you, but you would want to exchange status with the eCNA often enough as not to delay a start or stop. Probably every 2 seconds or less. Of course if you are using digital inputs, you would want to include the DIN command in your heartbeat.

The eCNA quietly closes a connection after 60 seconds of no communication. You may want to indicate a communications time-out after a specific time period (10 to 20 seconds or so) by sounding an alarm or something to let the booth operator know that the systems are no longer communicating. Although a heartbeat isn't required, you can see why it is important. The connection at the eCNA is opened again simply by receiving a command.

Example 1: Power up for both Client and eCNA-200

- Establish Communications
- Request Id information from the eCNA-200
- Exchange Status

Flow



1.		<< Client Powers Up >>	
2.	Request Status Command	---------- RST --------->	No Response
3.		:	No Response
4.		<< eCNA Powers Up >>	
5.	Request Status Command	<--------- RST --------->	Request Status Response
6.	Request Id Command	<--------- RID --------->	Request Id Response
7.	Exchange Status Command	<--- Heartbeat XST --->	Exchange Status Response
	:	:	:
	:	:	:

The Client powers up (1) and attempts to initiate communications (2, 3) with the eCNA-200 by using the RST command. On power up (4), the eCNA-200 does not open a connection or initiate communications but waits. The eCNA-200 responds to the RST command from the client (5). The *Reset* parameter indicates to the client that the eCNA has re-booted. The client then requests the id information with the RID command to determine the type, firmware version and id of the eCNA-200.

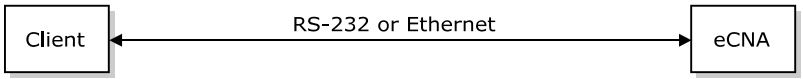
From then on or until communications is interrupted, the 'heartbeat' logic will periodically use the Exchange Status command (7) to monitor the communication link, update display parameters, etc. The control will be accomplished by this simple status exchange by monitoring flags and data in the status record being recieved and setting flags and data in the status record being sent out. Locally, events can be constructed by watching for flag and state changes, etc. The 'heartbeat' logic should occur at a rate of about every 1 to 2 seconds.

Example 2a: Digital Pre-show and Start from eCNA-200

- Assume a Serial Only Connection and a Communications Heartbeat is Established
- Assume Client and eCNA-200 are Ready
- Assume Manual Push Button Start at the eCNA-200
- Assume the following eCNA-200 program:

```
1- 1 Projector:Film          Off  0:00
1- 2 Projector:Digital 1 Pwr On   0:00
1- 3    --- Wait ---              0:55
1- 4 House Lights Mid 1           0:00
1- 5    --- Wait ---              0:05
1- 6 Projector:Digital 1 Vid On   0:00
1- 7 Slide Projector Off          0:00
1- 8 Sound: Aux 1
1- 9    --- Wait Cue 1 ---
1-10 Projector:Film          On   0:00
1-11 House Lights Down            0:00
1-12    --- Wait ---              0:07
1-13 Format 1: Dig 1 Flat
1-14 Projector:Changeover Open    0:00
1-15 Projector:Digital 1 Vid Off  0:00
1-16 Projector:Digital 1 Pwr Off  0:00
1-17    --- Wait Cue 2 ---
1-18 Projector:Changeover Close   0:00
1-19 Slide Projector On           0:00
1-20 Format 2: Non-sync Scope
1-21 House Lights Up              0:00
1-22    --- Wait Cue 3 ---
```

Flow




```
                    :                          :                          :
1.  Exchange Status Command    <--- Heartbeat XST --->       Exchange Status Response
2.                  :                          :                          :
3.                          <<< Manual Start pressed on eCNA-200 >>>
4.  Exchange Status Command    <--- Heartbeat XST --->       Exchange Status Response
5.                  :                          :                          :
6.                             <<< Client nears end of Pre-show >>>
7.  Exchange Status Command    <--- Heartbeat XST --->       Exchange Status Response
8.                  :                          :                          :
9.                          <<< eCNA-200 reaches the end of the film >>>
10. Exchange Status Command    <--- Heartbeat XST --->       Exchange Status Response
11.                 :                          :                          :
12.                            <<< Wait for start of the next show >>>
13. Exchange Status Command    <--- Heartbeat XST --->       Exchange Status Response
14.                 :                          :                          :
```

Assume the eCNA is in the Idle state, the Client is not playing content, the Slide projector is on the screen and heartbeat exchanges are taking place (1, 2).

The eCNA detects a local start input (3) and the *Control State* transitions from idle (IDL) to running (RUN). The *Digital 1 Power* (D1P) flag tells the Client that it is time to turn on the digital projector's power or lamp for warm up. 1 minute later the *Digital 1 Video* (D1V) flag tells the client that it is time to start the Pre-show. The slide projector turns off, the sound processor is switched to the appropriate source and the house lights are at mid 1 level.

The Pre-show nears the end (7). The client sets the Next Cue (NXT) flag [1] 7 seconds before the end of the Pre-show. The Film Projector Motor On (PJM) flag is set. This allows the film projector to get up to speed [2] before the film changeover douser is opened. 7 seconds later the house lights are at the down level, the screen and lens masking are at flat, the sound processor is switched to Dig 1 and the Digital 1 Video (D1V) and Digital 1 Power (D1P) flags are cleared (NO) telling the client to turn off the lamp and video. Also, the Film Projector Changeover Open (C/O) flag is set. The PJM and C/O flags indicate to the client that the film is on the screen.

The eCNA-200 reaches the end of film (9) or the end of show cue. Normal film shut down sequence takes place and the Film Projector Motor and Changeover flags are both cleared (NO). The Aux Projector flag is set indicating that the Slide Projector is on the screen. The film finally runs out of the projector and the program ends. The Control State flag transitions back to Idle (IDL). Heartbeat exchanges continue, waiting for the start of the next show.

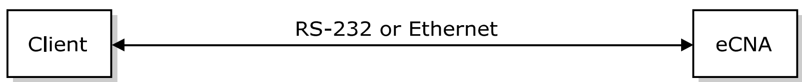
[1] The eCNA is looking for a transition from NO to NXT as a valid cue input. The client would want to change the flag back to NO when the Cue Number parameter is incremented by the eCNA.

[2] The eCNA has a programmable 3 to 59 second ‘Sound C/O Delay’ timer. Normally this is set to between 5 to 7 seconds. This is the time to let the film projector motor get up to speed prior to opening the changeover douser. The client may want to indicate the end of Pre-show a little early (7 seconds in this example) so the transition from the digital Pre-show to the film will appear seamless.

Example 2b: Digital Pre-show and Start from Client

- Assume a Serial Only Connection and a Communications Heartbeat is Established
- Assume Client and eCNA-200 are Ready
- Assume a Start from the digital Client
- Assume the eCNA-200 program in example 2a:

Flow



	:	:	:
1.	Exchange Status Command	<--- Heartbeat XST --->	Exchange Status Response
2.	:	:	:
3.		<<< Start from Client >>>	
4.	Exchange Status Command	<--- Heartbeat XST --->	Exchange Status Response
5.	:	:	:
6.		<<< Client nears end of Pre-show >>>	
7.	Exchange Status Command	<--- Heartbeat XST --->	Exchange Status Response
8.	:	:	:
9.		<<< eCNA-200 reaches the end of the film >>>	
10.	Exchange Status Command	<--- Heartbeat XST --->	Exchange Status Response
11.	:	:	:
12.		<<< Wait for start of the next show >>>	
13.	Exchange Status Command	<--- Heartbeat XST --->	Exchange Status Response
14.	:	:	:

This example is identical to example 2a except that the start originates from the client. The client sets the Start/Resume flag to STY to start the presentation. The eCNA is looking for a transition from STN to STY to start a program. The client will want to change the flag back to STN when the Control State flag changes from IDL to RUN.

Exception Notes

Stopped: The Stopped condition occurs because someone pushed the Stop Button at either the eCNA or a Remote Station. This can occur at any time during the presentation (Pre-Show or Show). The eCNA drives the outputs to user programmable Fault State when In-Progress. This information is provided to the Client so that it can take whatever action it deems appropriate.

Fault: This indicates the eCNA either won’t be able to Start (Idle), or is halted due to a problem that requires manual intervention (film break, etc., when In-Progress). The eCNA drives the outputs to user programmable Fault State when In-Progress. This information is provided to the Client so that it can take whatever action it deems appropriate.

Fire Stop: This indicates the Fire Stop Input is asserted. The eCNA drives the outputs to the Fire Stop state. This information is provided to the Client so that it can take whatever action it deems appropriate.

Loss of Communications: Should communications be lost during the presentation, the eCNA will not indicate this. It is recommended that the Client alert the operator to the problem. Manual intervention or re-establishment of communications is required.

eCNA-200 Supervisory Set-up

This section explains how to configure the eCNA-200 Supervisory network settings and digital input/output.

Network Setup

The eCNA's Ethernet network parameters are displayed on page 13 of the Supervisory System Setup section. Press *Setup Super* > *Setup System* > *Enter Password* and goto page 13. The **Ethernet Mode**, **IP Address**, **Subnet Mask** and **Gateway IP Address** fields display the current values.

```
            Setup CNA System     Page 13
                Ethernet
Ethernet Mode            Half Duplex
IP Address               192.168.  0.254
Subnet Mask              255.255.255.  0
Gateway IP Address         0.  0.  0.  0
```

Ethernet Mode

The eCNA can operate in half or full duplex mode. This setting will depend on your network. The default is Half Duplex. Select Half Duplex or Full Duplex with the Message keys.

IP Address

The IP Address is displayed in the decimal-dot notation. Each eCNA on the local network must have a unique IP Address. Change the address with the number keys.

Subnet Mask

The Subnet mask is displayed in the decimal-dot notation. The Subnet Mask defines the number of bits taken from the IP address that are assigned for the host part. Change the Subnet Mask with the number keys.

Standard IP Network Subnet Masks

Network Class	Host Bits	Subnet Mask
A	24	255.0.0.0
B	16	255.255.0.0
C	8	255.255.255.0

Gateway IP Address

The Gateway IP Address is displayed in the decimal-dot notation. The gateway address, or router, allows communication to other LAN segments. The gateway address should be the IP address of the router connected to the same LAN segment as the eCNA. The gateway address must be within the local network. Change the address with the number keys.

Digital I/O Setup

The eCNA digital I/O structure is now very flexible. The eCNA supports up to 4 auxiliary I/O boards.

Board #1 (Part Number 39490, LIN Id 17): 12 Outputs/8 Inputs
Board #2 (Part Number 39490, LIN Id 18): 12 Outputs/8 Inputs
Board #3 (Part Number 39436 plugged on to the 39431 board): 8 Outputs/8 Inputs
Board #4 (Part Number 39436 plugged on to the 39432-1,-2 board): 8 Outputs/8 Inputs

The digital I/O can be used for control and monitoring of the digital content player system or other projection control equipment.

Inputs

Inputs can be assigned any of the 10 functions in the table. All inputs can be read by the Digital Input command but inputs that are not assigned (blank) are not acted on by the eCNA. These inputs are generally used by the connected device for a specific purpose.

Input Assignments

Name	Description
<<Blank>>	Not acted on by the eCNA. Can be use as general purpose input.
Digital 1 Cue	Auxiliary Cue Input from digital system 1 (Always active)
Digital 1 Fault	Major Fault input from digital system 1
Digital 1 Stop	Stop Input from digital system 1
Digital 1 Start	Start Input from digital system 1
Digital 2 Cue	Auxiliary Cue Input from digital system 2 (Always active)
Digital 2 Fault	Major Fault input from digital system 2
Digital 2 Stop	Stop Input from digital system 2
Digital 2 Start	Start Input from digital system 2
Bypass	De-activates Control Relays on 39440 Termination Board. (CNI use only.)

Outputs

The outputs of the boards can be assigned any of the 40 functions in the table. Serial output commands only have control over the outputs that are not assigned (blank). Other assigned outputs are only controlled by the eCNA program or status flags

Output Assignments

Name	Description	Name	Description
<<Blank>>	Controlled by External Serial Device (Ethernet/RS-232)	Mask Flat	Controlled by Format or Masking program instructions
DP1 Pwr Off	Controlled by Digital Projector 1 Power Off program instruction	Mask Scope	Controlled by Format or Masking program instructions
DP1 Pwr On	Controlled by Digital Projector 1 Power On program instruction	Mask Special	Controlled by Format or Masking program instructions
DP1 Vid Off	Controlled by Digital Projector 1 Video Off program instruction	Lens Flat	Controlled by Format or Lens program instructions
DP1 Vid On	Controlled by Digital Projector 1 Video On program instruction	Lens Scope	Controlled by Format or Lens program instructions
DP2 Pwr Off	Controlled by Digital Projector 2 Power Off program instruction	Lens Special	Controlled by Format or Lens program instructions
DP2 Pwr On	Controlled by Digital Projector 2 Power On program instruction	Slide Projector	Controlled by Slide Projector program instructions
DP2 Vid Off	Controlled by Digital Projector 2 Video Off program instruction	Sound Aux 1	Controlled by Format or Sound program instructions
DP2 Vid On	Controlled by Digital Projector 2 Video On program instruction	Sound Aux 2	Controlled by Format or Sound program instructions
In Progress	Controlled by eCNA's In Progress Flag	Sound Digital 1	Controlled by Format or Sound program instructions
Fault	Controlled by eCNA's Major Fault Flag	Sound Digital 2	Controlled by Format or Sound program instructions
Fire Stop	Controlled by eCNA's Fire Stop Flag	Sound Mono	Controlled by Format or Sound program instructions
H. Lights Down	Controlled by House Lights Down program instruction	Sound Mute	Controlled by Format or Sound program instructions
H. Lights Mid 1	Controlled by House Lights Mid 1 program instruction	Sound Non-Sync	Controlled by Format or Sound program instructions
H. Lights Mid 2	Controlled by House Lights Mid 2 program instruction	Sound SR	Controlled by Format or Sound program instructions
H. Lights Up	Controlled by House Lights Up program instruction	Sound SVA	Controlled by Format or Sound program instructions
S. Lights Down	Controlled by Stage Lights Down program instruction	Out 1	Controlled by Aux Out program instruction
S. Lights Up	Controlled by Stage Lights Up program instruction	Out 2	Controlled by Aux Out program instruction
Curtain Open	Controlled by Curtain Open program instruction	Out 3	Controlled by Aux Out program instruction
Curtain Close	Controlled by Curtain Close program instruction	Out 4	Controlled by Aux Out program instruction

The input and output settings are configured on pages 4 through 15 of the Supervisory System Setup section. Press *Setup Super* > *Setup System* > *Enter Password* and goto page 5. Power-up" and "Fault-to" settings do not apply to the externally controlled (blank) outputs. The controlling equipment will be responsible for these.

Use the "Prev Message" and "Next Message" keys to assign a function to an output and input.

Digital Projector Configuration

DP1 (Digital Projector 1) and DP2 (Digital Projector 2) power-up and fault-to states are configured on this screen.

```
                Setup System       Page 4

   Output                Power-up Fault-to
DP1 Power                Off      Off
DP1 Video                Off      Off
DP2 Power                Off      Off
DP2 Video                Off      Off
```

Board 1 : 39490 Id 1 Setup

The outputs and inputs for board 1 can be assigned any of the functions in the tables shown on page 19.

Output Setup

```
           Setup CNA System     Page 6
         Board 1: 39490/39440 #1
Out Controlled by  Contact
 1 [redacted]      Maint.
 2                 Maint.
 3                 Maint.
 4                 Maint.
 5                 Maint.
 6                 Maint.
 7                 Maint.
 8                 Maint.
 9                 Maint.
10                 Maint.
11                 Maint.
12                 Maint.
```

Input Setup

```
           Setup CNA System     Page 8
         Board 1: 39490/39440 #1
In  Connected to
 1  [redacted]
 2
 3
 4
 5
 6
 7
 8
```

Board 2 : 39490 Id 2 Setup

The outputs and inputs for board 2 can be assigned any of the functions in the tables shown on page 19.

Output Setup

```
           Setup CNA System     Page 9
         Board 2: 39490 #2
Out Controlled by  Contact
 1 [redacted]      Maint.
 2                 Maint.
 3                 Maint.
 4                 Maint.
 5                 Maint.
 6                 Maint.
 7                 Maint.
 8                 Maint.
 9                 Maint.
10                 Maint.
11                 Maint.
12                 Maint.
```

Input Setup

```
           Setup CNA System     Page 11
         Board 2: 39490 #2
In  Connected to
 1  [redacted]
 2
 3
 4
 5
 6
 7
 8
```

Board 3 : 39431 House/Aux Board Setup

The outputs and inputs for board 3 can be assigned any of the functions in the tables shown on page 19.

Output Setup

```
            Setup CNA System     Page 12
      Board 3: 39431 House/Aux Board
Out Controlled by  Contact Pwr-up Flt-to
 1 ■■■■■■■■■■■■■■■ Maint.  Off    No-op
 2                 Maint.  Off    No-op
 3                 Maint.  Off    No-op
 4                 Maint.  Off    No-op
 5                 Maint.  Off    No-op
X1                 Maint.  Off    No-op
X2                 Maint.  Off    No-op
X3                 Maint.  Off    No-op
X4                 Maint.  Off    No-op
X5                 Maint.  Off    No-op
X6                 Maint.  Off    No-op
X7                 Maint.  Off    No-op
X8                 Maint.  Off    No-op
```

Input Setup

```
            Setup CNA System     Page 13
      Board 3: 39431 House/Aux Board
In  Connected to
 1  ■■■■■■■■■■■■■■■
 2
 3
 4
X1
X2
X3
X4
X5
X6
X7
X8
```

Board 4 : 39432-1 Combo/39432-2 Board Setup

The outputs and inputs for board 4 can be assigned any of the functions in the tables shown on page 19.

Output Setup

```
            Setup CNA System     Page 14
   Board 4: 39432-1 Combo/39432-2 Film
Out Controlled by  Contact Pwr-up Flt-to
 1 ■■■■■■■■■■■■■■■ Maint.  Off    No-op
 2                 Maint.  Off    No-op
 3                 Maint.  Off    No-op
 4                 Maint.  Off    No-op
 5                 Maint.  Off    No-op
X1                 Maint.  Off    No-op
X2                 Maint.  Off    No-op
X3                 Maint.  Off    No-op
X4                 Maint.  Off    No-op
X5                 Maint.  Off    No-op
X6                 Maint.  Off    No-op
X7                 Maint.  Off    No-op
X8                 Maint.  Off    No-op
```

Input Setup

```
            Setup CNA System     Page 15
   Board 4: 39432-1 Combo/39432-2 Film
In  Connected to
 1  ■■■■■■■■■■■■■■■
X1
X2
X3
X4
X5
X6
X7
X8
```

eCNA-200 Program Instructions

Version 2.009 firmware features a new “Projector” instruction. This allows the eCNA-200 program to control and coordinate multiple projectors systems.

Instruction #35

35 **Projector:** [*a*] 0:00 to 59:59 (min:sec)

a Film Off, Film On, Changeover Close, Changeover Open, Digital 1 Pwr Off, Digital 1 Pwr On, Digital 1 Vid Off, Digital 1 Vid On, Digital 2 Pwr Off, Digital 2 Pwr On, Digital 2 Vid Off, Digital 2 Vid On

Film Off/On — Controls the film projector motor and xenon lamp outputs on the 39330, 39332, 39432-1 and 39432-2 boards.

Changeover Open/Close — Controls the film projector changeover douser on the 39330, 39332, 39432-1 and 39432-2 boards.

Digital 1 Pwr Off/On — Controls the Digital 1 Power Off and On outputs on the auxiliary output boards 1 - 4 as set up in the eCNA-200 Supervisory. This output is intended to be used to control the digital content player’s power or lamp.

Digital 1 Vid Off/On — Controls the Digital 1 Video Off and On outputs on the auxiliary output boards 1 - 4 as set up in the eCNA-200 Supervisory. This output is intended to be used to control the digital content player’s video mute.

Digital 2 Pwr Off/On — Controls the Digital 2 Power Off and On outputs on the auxiliary output boards 1 - 4 as set up in the eCNA-200 Supervisory. This output is intended to be used to control a second digital content player’s power or lamp.

Digital 2 Vid Off/On — Controls the Digital 2 Video Off and On outputs on the auxiliary output boards 1 - 4 as set up in the eCNA-200 Supervisory. This output is intended to be used to control a second digital content player’s video mute.

Note: See the *eCNA-200 Setup and Operation Manual* For a complete list of program instructions and how to use them.

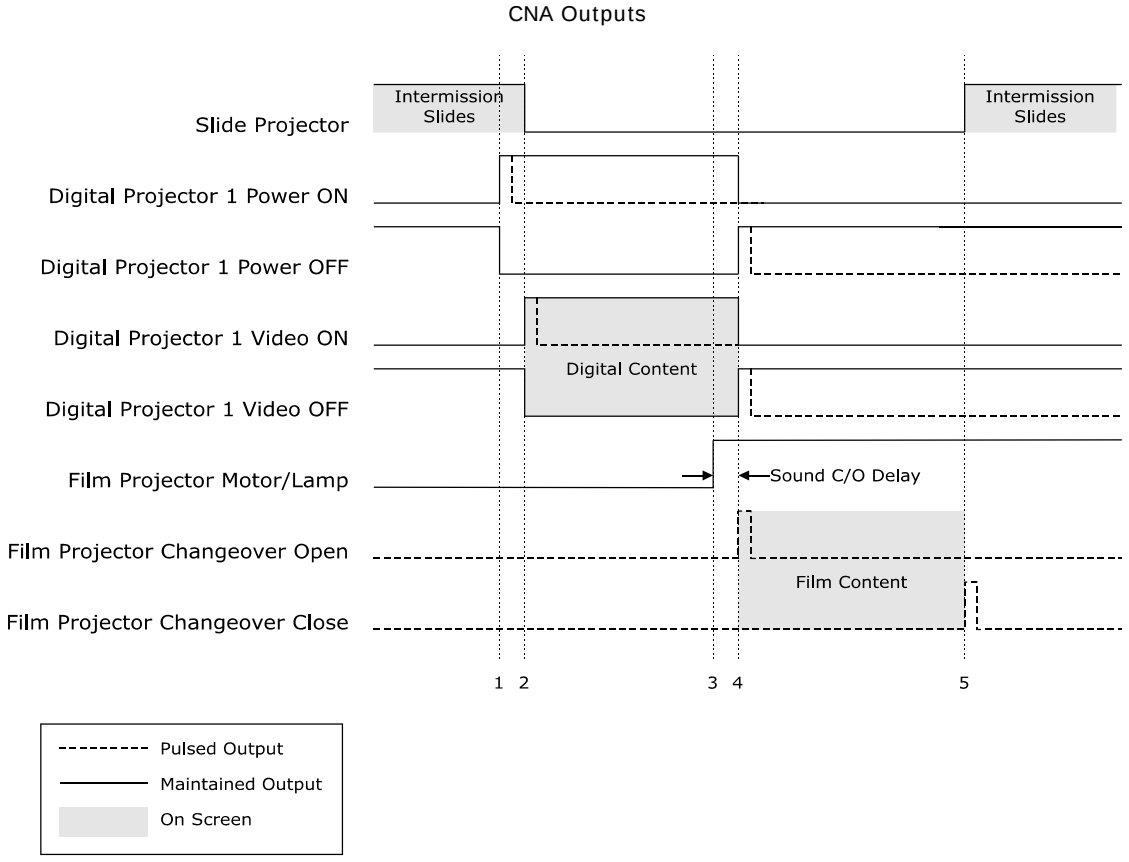
Example Programs

Note: For backwards compatibility it is required to put a “Projector: Film Off” instruction before the first “Wait Cue” to suppress the film projector from turning on.

Example 1: Digital to Film Changeover

For simplicity, only projector related instructions are used to demonstrate how a program is constructed for multiple projectors. Instructions for Lights, Sounds, Masking, etc. can be inserted where necessary.

Program		Comments	
1- 1 Projector:Film Off	**0:00**	1	Keep film projector off (required),
1- 2 Projector:Digital 1 Pwr On	**0:00**		Turn on digital projector power/lamp,
1- 3 --- Wait ---	**1:00**		Start 1 minute lamp warm up time
1- 4 Projector:Digital 1 Vid On	**0:00**	2	Put Digital video on the screen,
1- 5 Slide Projector Off	**0:00**		Turn off slide projector,
1- 6 --- Wait Cue 1 –			Wait for cue from digital system
1- 7 Projector:Film On	**0:00**	3	Turn on film projector,
1- 8 --- Wait –	**0:07**		Wait Film start up time
1- 9 Projector:Changeover Open	**0:00**	4	Open changeover douser,
1-10 Projector:Digital 1 Vid Off	**0:00**		Turn off video and
1-11 Projector:Digital 1 Pwr Off	**0:00**		power/lamp of digital projector,
1-12 --- Wait Cue 2 –			Wait for film cue - End of show cue
1-13 Projector:Changeover Close	**0:00**	5	Close changeover douser,
1-14 Slide Projector On	**0:00**		Turn on slide projector,
1-15 --- Wait Cue 3 ---			Wait for end of film

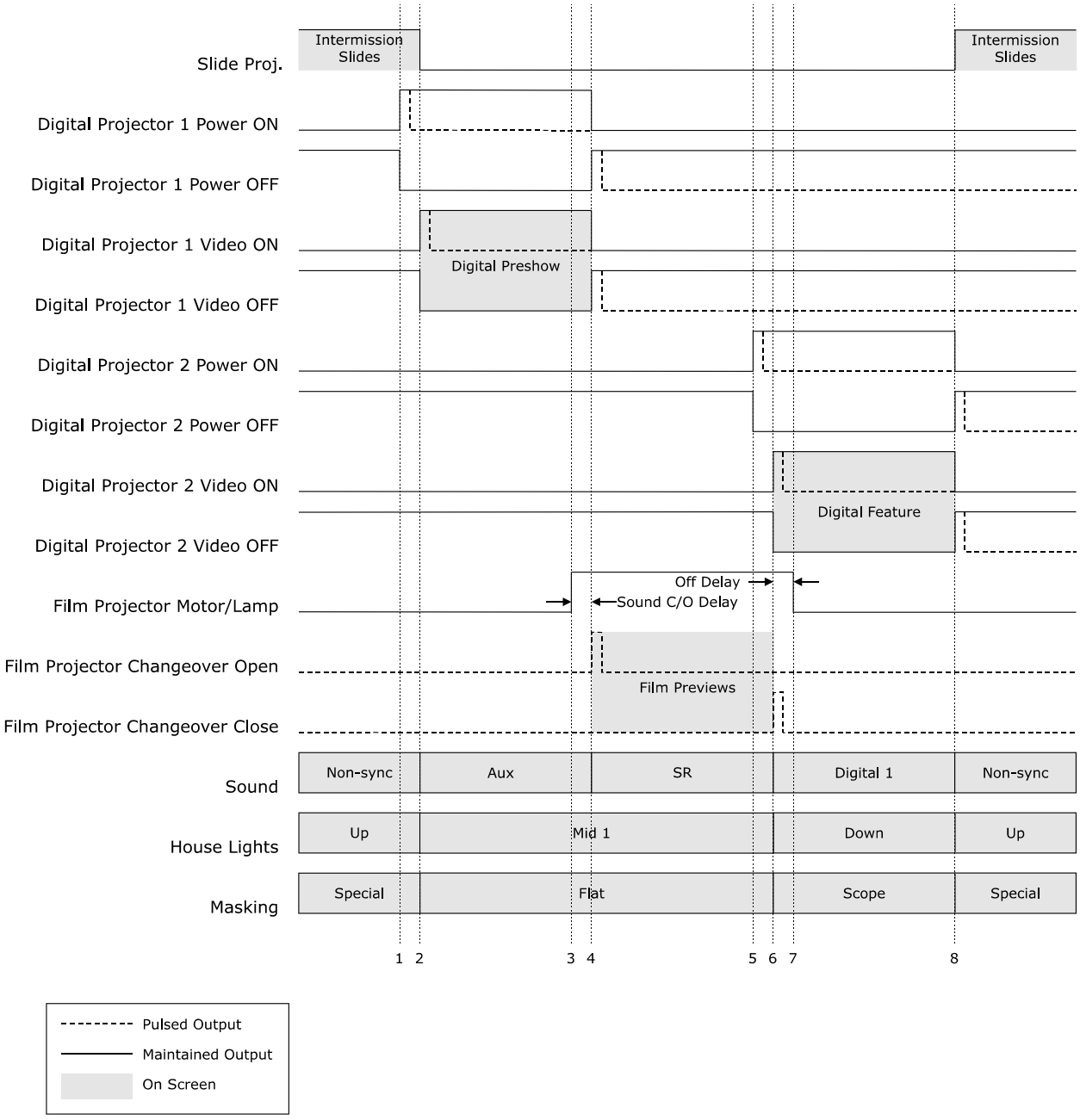


Example 2: Digital Pre-show > Film Preview > Digital Feature Changeover

This example program demonstrates how the eCNA-200 can coordinate the sharing of the screen between four projection systems. Sound, masking and light instructions are used in this example to illustrate a realistic program.

Program				Comments
1- 1 Projector:Film	**Off**	**0:00**	1	Keep film projector off (required),
1- 2 Projector:Digital 1 Pwr	**On**	**0:00**		Turn on Digital Projector 1 power/lamp,
1- 3 --- Wait ---		**1:00**		Start 1 minute lamp warm up time
1- 4 House Lights Mid 1		**0:00**		
1- 5 Masking: Flat				
1- 6 Slide Projector Off		**0:00**	2	Turn off slide projector,
1- 7 Projector:Digital 1 Vid	**On**	**0:00**		Put Digital 1 video on the screen,
1- 8 Sound: Aux 1				
1- 9 --- Wait Cue 1 ---				Wait for cue from Digital 1 system
1-10 Projector:Film	**On**	**0:00**	3	Turn on film projector,
1-11 --- Wait ---		**0:07**		Wait Film start up time
1-12 Sound: SR				
1-13 Projector:Changeover	**Open**	**0:00**	4	Open changeover douser,
1-14 Projector:Digital 1 Vid	**Off**	**0:00**		Turn off video and
1-15 Projector:Digital 1 Pwr	**Off**	**0:00**		power/lamp of Digital Projector 1,
1-16 --- Wait Cue 2 ---				Wait for film cue - End of show cue
1-17 Projector:Digital 2 Pwr	**On**	**0:00**	5	Turn on Digital Projector 2 power/lamp
1-18 --- Wait ---		**1:00**		Start 1 minute lamp warm up time
1-19 Projector:Changeover	**Close**	**0:00**	6	Close changeover douser,
1-20 Masking: Scope				
1-21 House Lights Down		**0:00**		
1-21 --- Wait ---		**0:05**		
1-22 Projector:Digital 2 Vid	**On**	**0:00**		Put Digital 2 video on the screen
1-23 Sound: Dig 1				
1-21 Projector:Film	**Off**	**0:15**	7	Shut off film projector motor after a delay and
1-24 --- Wait Cue 3 ---				Wait for cue from Digital 2 system
1-25 Projector:Digital 2 Vid	**off**	**0:00**	8	Turn off video and
1-26 Projector:Digital 2 Pwr	**off**	**0:00**		power/lamp of Digital Projector 2,
1-27 Slide Projector On		**0:00**		Turn on Slide Projector
1-28 Sound: Non-Sync				
1-29 House Lights Up		**0:00**		
1-30 Masking: Flat				

CNA Outputs


Slide Proj.
Intermission Slides
Intermission Slides
Digital Projector 1 Power ON
Digital Projector 1 Power OFF
Digital Projector 1 Video ON
Digital Preshow
Digital Projector 1 Video OFF
Digital Projector 2 Power ON
Digital Projector 2 Power OFF
Digital Projector 2 Video ON
Digital Feature
Digital Projector 2 Video OFF
Off Delay
Sound C/O Delay
Film Projector Motor/Lamp
Film Projector Changeover Open
Film Previews
Film Projector Changeover Close
Sound
Non-sync
Aux
SR
Digital 1
Non-sync
House Lights
Up
Mid 1
Down
Up
Masking
Special
Flat
Scope
Special
1 2 3 4 5 6 7 8
Pulsed Output
Maintained Output
On Screen

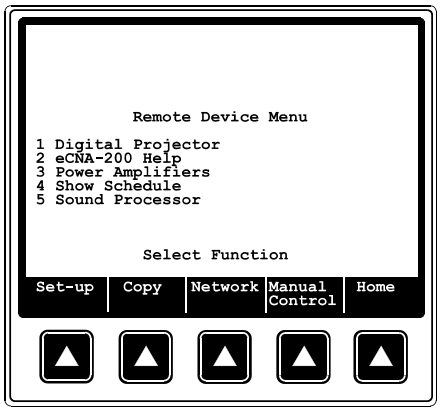
Keyboard Display Interface (KDI)

The eCNA-200 software provides an easy way for any TCP/IP capable device to access the eCNA-200 display and keyboard over an Ethernet connection. This allows devices to use the eCNA-200's keyboard and display for their own application's purposes. The protocol is built upon a standard TCP connection using a few simple ASCII commands terminated by a carriage return and line feed.

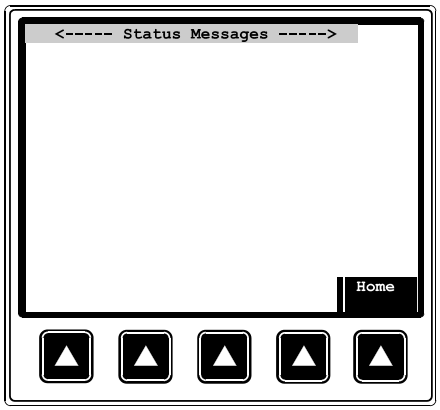
To access this feature, simply connect to the CNA-200's TCP Port **16001, 16002, 16003, 16004** or **16005**. The rest of this document describes the ASCII protocol in detail.

1. **The eCNA-200 KDI is a "server"** capable of supporting 5 simultaneous open TCP/IP connections. Obviously the eCNA operator has access to viewing only 1 client screen at a time – however the client can write display data to the buffer at any time. The connection should remain "open", until normally closed by the client. Note that the Server automatically closes the connection after a period of inactivity.

2. **The "Main Menu"** of the eCNA-200 is enhanced to allow the number keys 1 to 5 to access any device that has "opened" a connection with the CNA. The menu is "dynamic" in the sense that its text is set by the client when it "connects" and the menu items appear in alphabetical order.



Main Menu Screen



Client Screen

3. **The Client Screen:** Once the operator of the CNA-200 selects the "Remote Screen" from the menu, the remote screen data is displayed. The eCNA-200 software maintains control of the "Home" soft-key and the Top Line of the display for the "Error Messages".

   When the Operator enters this screen, the pseudo AT (attention) key is sent to the Client.

   While viewing this screen all keys pressed by the Operator are sent to the Client and the Client has full control over the "user area" of the Screen. The Client is free to use the screen as it desires. For example it could have one simple status screen or a complex menu driven system of status, help, and data entry screens that use the CNA keypad.

   Pressing the F5 (Home) key causes the eCNA to exit this function and return to displaying it's local screens. The Client receives the F5 key so it can tell that the Operator exited the screen.

   The ASCII screen information is maintained in a buffer and the screen is automatically displayed when the Operator enters the screen. The Client can write to this buffer whether or not the Operator is viewing the screen. The buffer data is deleted when the connection is closed.

Commands to the eCNA-200

The Client may send any combination of the following commands to the Server any time after establishing the TCP/IP connection:

List of Commands Supported by the eCNA-200

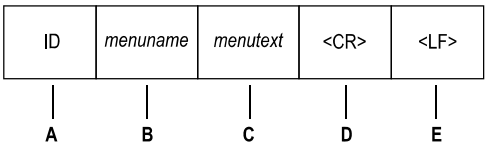
Command	Description
ID	Identification: sets the name and menu text of the connecting device.
CL	Clear Screen: clears the user area of the screen.
TX	Display Text: writes text to user area of the screen.
ST	Status Message: adds message to eCNA's status message system.
CT	Keep connection alive.

Each command line must meet the following criteria:

1. Commands exceeding 132 characters including the terminating carriage return and line feed are discarded.
2. Can NOT contain the NULL character (0x00) anywhere in the command line.
3. The line feed (0x0A) character is NOT supported in the text fields.
4. Text for the individual command parameters can be quoted (“”) or unquoted. To display a quote in quoted text, send two quotes.
5. To send a comma (,) in a text field, you must use a quoted (“”) string.

IDENTIFICATION Command

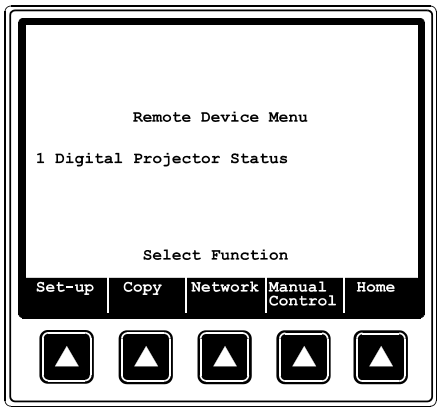
Identification Command Format



Item	Name	Description
A	ID,	The Identification Command sets the name text and menu text of the connecting device. The user screen is not accessible to the operator until the server receives this command.
B	*menuname,*	Up to 8-character (user-defined) name of the connecting device (for future)
C	*menutext*,	Up to 32 characters of text to be displayed for the Menu. These characters are always displayed in normal text.
D	<CR>	Terminating carriage return (0x0D)
E	<LF>	Terminating line feed (0x0A)

ID Command Example

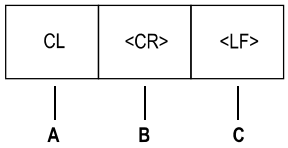
Command
ID,"Client 1","Digital Projector Status <CR><LF>



The ***menutext*** field is displayed as menu item 1. As other clients connect to the eCNA-200, they will be displayed in alphabetical order. The ***menuname*** field not currently used by the eCNA, but could be helpful for debugging or troubleshooting the network by making it easier to find and identify network packets of interest.

CLEAR SCREEN Command

Clear Screen Command Format

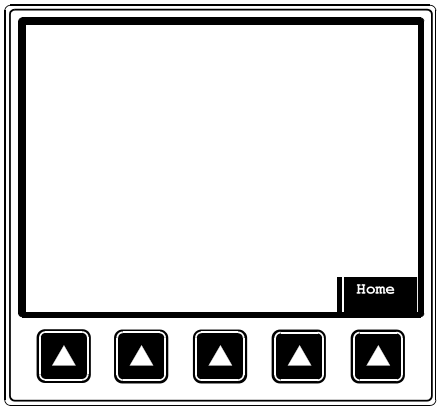


Item	Name	Description
A	CL,	The Clear Screen Command causes the user area of the screen to be cleared.
B	<CR>	Terminating carriage return (0x0D)
C	<LF>	Terminating line feed (0x0A)

CL Command Example

Command
CL<CR><LF>

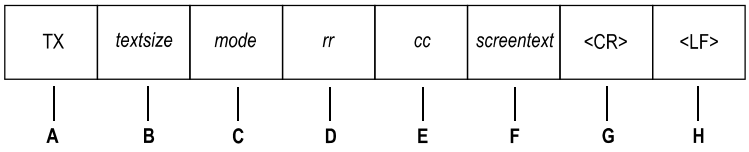
This command causes the user area of the screen to be cleared. The drawing below shows the result after a Clear Screen command is sent.



Cleared Screen

DISPLAY TEXT Command

DISPLAY TEXT Command Format



Item	Name	Description
A	TX,	Writes text to the user area of the screen.
B	*textsize*,	L or S sets Large or Small text respectively
C	*mode*,	N or R sets Normal or Reverse video respectively
D	*rr*,	Row of the first character to display.
E	*cc*,	Column of the first character to display
F	*screentext*,	Text to be displayed
G	<CR>	Terminating carriage return (0x0D)
H	<LF>	Terminating line feed (0x0A)

TX Command Example

Command

TX,S,N,1,8,"XYZ Digital Projector Status:"<CR><LF>

TX,S,N,3,2,"Power:"<CR><LF>

TX,S,N,4,2,"Video Mute:"<CR><LF>

TX,S,N,5,2,"On Screen Mute:"<CR><LF>

TX,S,N,6,2,"Sound Mute:"<CR><LF>

TX,S,N,7,2,"Lamp Hours:"<CR><LF>

TX,S,N,8,2,"Cooling:"<CR><LF>

TX,S,N,9,2,"Lens Position:"<CR><LF>

TX,S,N,11,15,"Error Status:"<CR><LF>

TX,S,N,13,2,"Temperature:"<CR><LF>

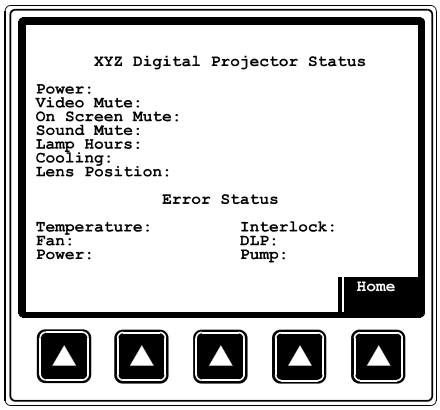
TX,S,N,14,2,"Fan:"<CR><LF>

TX,S,N,15,2,"Power:"<CR><LF>

TX,S,N,13,23,"Interlock:"<CR><LF>

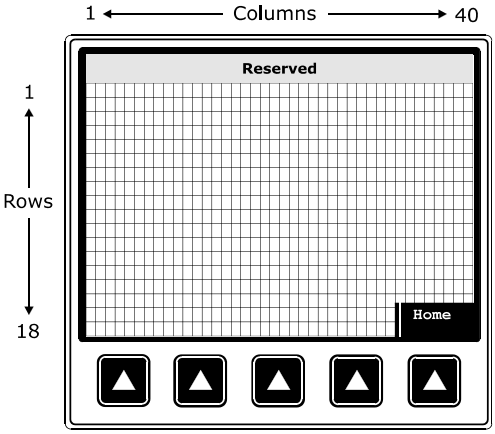
TX,S,N,14,23,"DLP:"<CR><LF>

TX,S,N,15,23,"Pump:"<CR><LF>

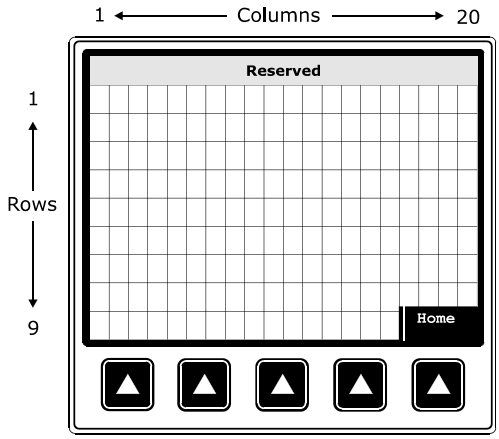


Client Screen Example

The Client area of the screen consists of 9 rows by 20 columns of Large characters or 18 rows by 40 columns of Small characters. Note that due to the “Home” key text, row 9 (bottom row) of the Large characters only has 16 characters and rows 17 & 18 (bottom two rows) of the Small characters has only 32 characters. Be aware that text will automatically wrap.

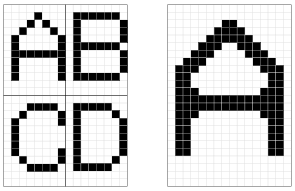


Small Character Grid

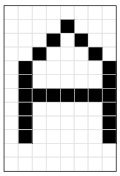


Large Character Grid

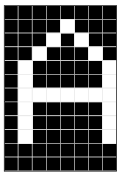
The Large and Small characters can be mixed in any fashion. However, every Large character occupies the space of four Small characters at that location on the screen.



The 0x80 bit of the character can be used to “toggle” the Normal/Reverse state of the character. So it is easy to send a command of all “Normal” characters with a few of them “Reversed” (by setting their 0x80 bits).

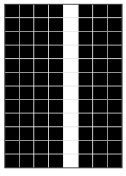


01000001



11000001

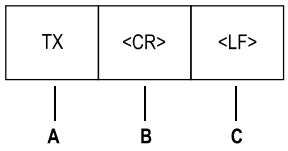
The character “0x81" is a special “vertical bar” character that can be used as a separator for the soft-key menu.



81h

CONNECTION TIMER Command

CONNECTION TIMER Command Format



Item	Name	Description
A	CT,	Connection Timer command keeps connection alive.
B	<CR>	Terminating carriage return (0x0D)
C	<LF>	Terminating line feed (0x0A)

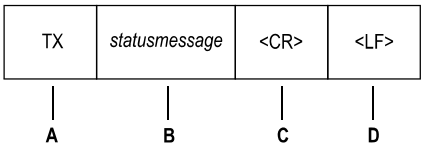
CT Command Example

Command
CT<CR><LF>

Use this command to keep the Connection Timer from timing out... The connection timeout is 60 seconds. This command should be sent periodically to keep the server from automatically closing the connection. When this command is received it simply restarts a 60-second connection time-out timer.

STATUS MESSAGE Command

STATUS MESSAGE Command Format



Item	Name	Description
A	TX,	Writes text to the user area of the screen.
B	*statusmessage,*	Text to be displayed (up to 34 characters)
C	<CR>	Terminating carriage return (0x0D)
D	<LF>	Terminating line feed (0x0A)

ST Command Example

Command
ST,DIGITAL PROJECTOR FAULT<CR><LF>

This command is used to add a status message to the eCNA's Status Message system. The text is automatically displayed on the top line of all screens along with a list of other system status information. This command can be used to notify the Operator that there is important information to see on the Client Screen.

This message times out after 60 seconds. To cancel the message prior to the 60-second timeout issue the command with the null string (""). To keep the message active longer than 60 seconds, send the command again before the end of the 60-second time out period.

The eCNA-200 supports only one status message from a Client at a time – if the Client has more information to display, it can direct the user to another screen and put the message there using the "TX" command.

The "Status Message Text" is always displayed in Reverse Small characters to match the other messages in the eCNA-200.

eCNA-200 Character Table

Dec	Hex	Char	Dec	Hex	Char	Dec	Hex	Char	Dec	Hex	Char	Dec	Hex	Char	Dec	Hex	Char	Dec	Hex	Char	Dec	Hex	Char
0	00		16	10		32	20		48	30		64	40		80	50		96	60		112	70	
1	01		17	11		33	21		49	31		65	41		81	51		97	61		113	71	
2	02		18	12		34	22		50	32		66	42		82	52		98	62		114	72	
3	03		19	13		35	23		51	33		67	43		83	53		99	63		115	73	
4	04		20	14		36	24		52	34		68	44		84	54		100	64		116	74	
5	05		21	15		37	25		53	35		69	45		85	55		101	65		117	75	
6	06		22	16		38	26		54	36		70	46		86	56		102	66		118	76	
7	07		23	17		39	27		55	37		71	47		87	57		103	67		119	77	
8	08		24	18		40	28		56	38		72	48		88	58		104	68		120	78	
9	09		25	19		41	29		57	39		73	49		89	59		105	69		121	79	
10	0A		26	1A		42	2A		58	3A		74	4A		90	5A		106	6A		122	7A	
11	0B		27	1B		43	2B		59	3B		75	4B		91	5B		107	6B		123	7B	
12	0C		28	1C		44	2C		60	3C		76	4C		92	5C		108	6C		124	7C	
13	0D		29	1D		45	2D		61	3D		77	4D		93	5D		109	6D		125	7D	
14	0E		30	1E		46	2E		62	3E		78	4E		94	5E		110	6E		126	7E	
15	0F		31	1F		47	2F		63	3F		79	4F		95	5F		111	6F		127	7F	

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eCNA-200 Character Table

Dec	Hex	Char	Dec	Hex	Char	Dec	Hex	Char	Dec	Hex	Char	Dec	Hex	Char	Dec	Hex	Char	Dec	Hex	Char	Dec	Hex	Char
128	80		144	90		160	A0		176	B0		192	C0		208	D0		224	E0		240	F0	
129	81		145	91		161	A1		177	B1		193	C1		209	D1		225	E1		241	F1	
130	82		146	92		162	A2		178	B2		194	C2		210	D2		226	E2		242	F2	
131	83		147	93		163	A3		179	B3		195	C3		211	D3		227	E3		243	F3	
132	84		148	94		164	A4		180	B4		196	C4		212	D4		228	E4		244	F4	
133	85		149	95		165	A5		181	B5		197	C5		213	D5		229	E5		245	F5	
134	86		150	96		166	A6		182	B6		198	C6		214	D6		230	E6		246	F6	
135	87		151	97		167	A7		183	B7		199	C7		215	D7		231	E7		247	F7	
136	88		152	98		168	A8		184	B8		200	C8		216	D8		232	E8		248	F8	
137	89		153	99		169	A9		185	B9		201	C9		217	D9		233	E9		249	F9	
138	8A		154	9A		170	AA		186	BA		202	CA		218	DA		234	EA		250	FA	
139	8B		155	9B		171	AB		187	BB		203	CB		219	DB		235	EB		251	FB	
140	8C		156	9C		172	AC		188	BC		204	CC		220	DC		236	EC		252	FC	
141	8D		157	9D		173	AD		189	BD		205	CD		221	DD		237	ED		253	FD	
142	8E		158	9E		174	AE		190	BE		206	CE		222	DE		238	EE		254	FE	
143	8F		159	9E		175	AF		191	BF		207	CF		223	DF		239	EF		255	FF	

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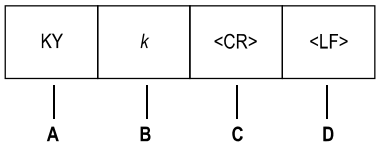
Commands to the Client

At this time the KEY command is the only command sent to the Client from the eCNA-200.

KEY Command

KEY Command Format



Item	Name	Description
A	KY,	Key Code Command.
B	*k*	Key Code.
C	<CR>	Terminating carriage return (0x0D)
D	<LF>	Terminating line feed (0x0A)

KY Command Example

Command
KY,AT<CR><LF>

While viewing the Client screens all keys pressed at the eCNA-200 are buffered and then sent to the Client. *k* is the Key Code representing the key that was pressed.

The table below shows all key codes.

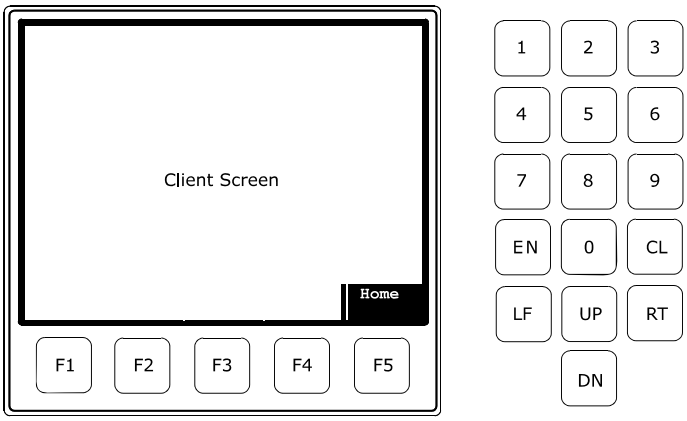
Key Code Table

Key Code	Description	Key Code	Description
0	Number 0 Key	CL	Clear Key
1	Number 1 Key	RT	Right Arrow Key
2	Number 2 Key	LF	Left Arrow Key
3	Number 3 Key	UP	Up Arrow Key
4	Number 4 Key	DN	Down Arrow Key
5	Number 5 Key	F1	Soft Key 1
6	Number 6 Key	F2	Soft Key 2
7	Number 7 Key	F3	Soft Key 3
8	Number 8 Key	F4	Soft Key 4
9	Number 9 Key	F5	Soft Key 5
EN	Enter Key	AT	Pseudo Key

A special “AT” (attention) pseudo key is sent to the client when the operator selects the client screen from the eCNA menu. This lets the client know that the operator wants to view it’s screens.

The “F5" Home key is sent when the operator exits the client screen back to the eCNA menu. This lets the client know that it’s screens are no longer being viewed.

The drawing below shows the eCNA-200 keys identified with the corresponding key code.



Keypad Layout