



Prowler 8x8
Clarity Elite 8x8
Serial & TCP/IP Protocol

Component Video / CAT5/6/7 Audio Matrix Switches

(For Prowler 8x8 and Clarity Elite 8x8 firmware Versions 1.21 and above.)

History

2011-06-15 Version 1.9

- Updated the default value of the 'AUT' flag, and fixed the description of the 'KYD' in the table.
- Added a description of two, previously undescribed, error codes (Codes 100 & 200).

2010-12-01 Version 1.8

- Updated the descriptions of the 'AUT' bit in the 'XS' command, and the descriptions of the 'DRZ' and 'XDRZ' commands to indicate the new options available in the "Classic" mode.

2010-10-05 Version 1.7

- Added the 'MJP' option to the 'XS' command's bitmapped flags.

2010-07-21 Version 1.6a

- Updated the description of the XDRZ command to make it a bit more understandable.

2010-07-18 Version 1.6

- Added DUPZ (Duplicate Zone) command.

2010-06-25 Version 1.5c

- Fixed BLZ (Balance) command description.

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RS-232 / TCP/IP Port Hardware

TCP/IP Overview

The Serial and TCP/IP port share the same protocol.

The TCP/IP connection is a very simple socket, sometimes referred to as Raw TCP/IP socket, similar to Telnet, but without the Telnet protocol overhead. Most telnet clients will allow you to telnet into the Clarity Elite 8x8 or Prowler 8x8 without error.

We use the open source package PuTTY to do our testing. It has a convenient “Raw” mode that works great with the Clarity Elite 8x8 or Prowler 8x8, and is available in Windows and Linux (with a Mac OS version in the works). (*We are not associated with PuTTY in anyway, but do find it a useful tool when communicating over TCP/IP and Serial port connections*)

Website: <http://www.chiark.greenend.org.uk/~sgtatham/putty>

The default IP address is 192.168.1.200 and the port is 50005. The serial command “^IPA xxx,xxx,xxx,xxx\$” (See: “*‘IPA’ Set / View TCP/IP Address*” on page 47) can be used to change the IP address, the port number is fixed at 50005.

Once a connection is made it will remain open until closed by the client, or after 10 minutes of retries at attempting to talk to the client.

After connecting to the TCP/IP port, all commands are identical to those of the Serial port. All strings coming from the Clarity Elite 8x8 or Prowler 8x8 will be sent to both the TCP/IP and Serial port.

The Clarity Elite 8x8 or Prowler 8x8 will accept commands from both the Serial and TCP/IP simultaneously, each command will be buffered until the ending ‘\$’ is read, at which time the commands will be executed in the order received. Any responses will be sent to both the Serial port and TCP/IP connections.

TCP/IP settings used by the Clarity Elite 8x8 or Prowler 8x8

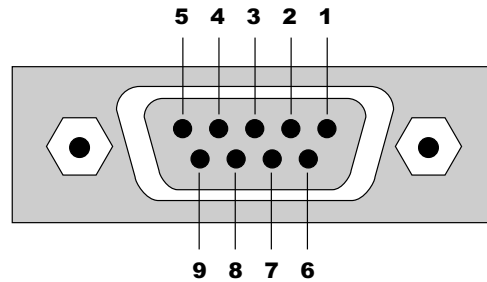
Default IP Address:	192.168.1.200
Port Number:	50005
Duplex:	Full
Speed:	10 Mbps

RS-232 Pinout and Baudrate Settings

The RS-232 port on the Clarity Elite 8x8 or Prowler 8x8 is the same format, and pinout, as a PC modem, and uses the same type of cable as a standard serial modem would, which is a standard straight through cable. Do not use a cable that is marked as a “Null Modem” cable.

The Clarity Elite 8x8 or Prowler 8x8 can also be used with any USB to RS-232 conversion cable, these are all typically straight through cables. (*Be sure to install any drivers that come with the USB to RS-232 cable you are using.*)

The RS-232 port is a female type DE-9 connector (sometimes mistakenly referred to as a DB-9 connector) with the following pinout:



Pin definitions

1 - No Connect	6 - No Connect
2 - TX	7 - No Connect
3 - RX	8 - No Connect
4 - No Connect	9 - No Connect
5 - GND	

Port settings used by the Clarity Elite 8x8 or Prowler 8x8

Baudrate:	19200
Data Bits:	8
Stop Bits:	1
Parity:	NONE

Timing information (unless specified otherwise by a command's description)

Min character to character time:	0ms
Min line to line time:	0ms
Min time between commands:	0ms
Max time to respond to a request:	100ms

Command Syntax

Command Syntax

The Clarity Elite 8x8 or Prowler 8x8 serial command set uses an ASCII based protocol and a terminal emulator can be used to test the serial port of the Clarity Elite 8x8 or Prowler 8x8.

Each serial command is formatted as:

```
^CMD param1,param2,...$
```

Where:

^ = All commands and responses start with the '^' character.
CMD = The name of the command.
param = Any number of parameters can follow a command.
\$ = All commands and responses end with the '\$' character.

For instance the name of the command to turn power on / off is 'P' (must be capitalized) therefore, to turn on the Clarity Elite 8x8 or Prowler 8x8 send:

```
^P 1$          -> Command sent to the A/V switch  
^+$           <- Acknowledgment indicating valid command  
^=P 1$       <- Response from the A/Vswitch for new setting
```

to turn off the Clarity Elite 8x8 or Prowler 8x8 send:

```
^P 0$          -> Command sent to the A/V switch  
^+$           <- Acknowledgment indicating valid command  
^=P 0$       <- Response from the A/V switch for new setting
```

NOTE: Only the characters between '^' and '\$' are valid, any characters sent before the '^' or after the '\$' will be ignored.

NOTE: By default, the Clarity Elite 8x8 or Prowler 8x8 adds a carriage return and a line feed to the end of its responses, after the '\$'. This makes testing with terminal software easier. Since they are outside the '^' and '\$' characters, they should be ignored by software drivers. If desired, this behavior can be disabled. (See: "'XS' Control Settings" on page 39)

Command Responses

Type of Responses and Timing Information

There are three different types of responses: Acknowledgements, Errors and Query Strings.

By default, the Clarity Elite 8x8 or Prowler 8x8 will always respond to a command, there are no "time-out" modes, if you send a command and don't get a response within 100ms, something's wrong with the connection.

The Acknowledgement Response

Every command will be followed by an acknowledgement or error response.

Anytime you issue a command and there are no errors, you will receive the acknowledgement response. Which is:

```
^+$
```

The Error Response

Every command will be followed by an acknowledgement or error response.

If something is wrong with the command, you will get an error response. Which is

```
^!<error_number>$
```

which is the ‘!’ followed by an error number (in ASCII), followed the ‘\$’ character.

For instance ‘2’ is not allowed as a parameter in the ‘P’ (power) command, so:

```
^P 2$          -> Command sent to A/V switch
^!2$          <- Error response to an out of range parameter
```

which indicates there was an out of range parameter.

The following are the Error Response codes that can be returned by the Clarity Elite 8x8 or Prowler 8x8:

- 1 - Unrecognized command.
- 2 - A parameter was out of range.
- 3 - Syntax error, or a badly formed command.
- 4 - Checksum error.
- 5 - Too many or too few parameters.
- 6 - Device busy, cannot process command.
- 7 - Buffer overflow.
- 8 - Command not valid if device is not powered on.
- 100 - Error initializing the audio subsystem.
- 200 - Error initializing the video subsystem.

And some more detailed descriptions of their meanings:

Error 1 - The command given was not recognized as a Clarity Elite 8x8 or Prowler 8x8 command. Commands are case sensitive and in the Clarity Elite 8x8 or Prowler 8x8, all commands are upper case.

Error 2 - One of the parameters given was too large, or too small, the command will be ignored.

Error 3 - Something was wrong with the command's syntax. There was possibly extra data at the end of the line, or non-decimal data as part of a parameter. There cannot be whitespace before or after a checksum or CRC-8 checkcode, or this error will be returned.

Error 4 - The ‘!’ character was used to indicate a Checksum was appended to the command string, but the Checksum did not match the calculated one. The command will be ignored.

Error 5 - The number of parameters given does not match the number allowed by this command.

Error 6 - To prevent conflicts between the front panel Setup Mode and the serial port settings, when the Clarity Elite 8x8 or Prowler 8x8 is in the Setup Mode, many parameters become read only and any attempt at writing them will return Error 6. Issuing the “Key Emulation” command with key code ‘0’ can be used to exit the Setup Mode, at which point the command can be re-issued without an Error 6 response.

Error 7 - An internal buffer has overflowed, for instance more than 16 key codes were sent as part of the “Key Emulation” command.

Error 8 - Power to the device must be ‘ON’ before this command is allowed.

Error 100 - An error occurred while initializing the audio DSP section.

Error 200 - An error occurred while initializing the composite to component converters.

The Query Response

The query response is sent by the Clarity Elite 8x8 or Prowler 8x8 to indicate a setting has changed, or as a response to a query command. The query response string consists of the '=' character followed by the command string of the command being queried.

For instance, in the case of the power command:

```

^P ?$          -> Send a power request command to the A/V switch
^+$           <- Acknowledgement (the command has no errors)
^=P 1$       <- Query response indicating the power is on.
  
```

Using Bitmapped Parameters

Reading / Writing Bitmapped Parameters

Some commands accept “Bitmapped” parameters. These are decimal values that represent a series of flags, or bits, that control, enable and/or disable different device operations.

Binary arithmetic is used to represent bitmapped parameters, it is assumed the reader has some familiarity with binary arithmetic.

An example of a command that uses a bitmapped parameter is the “XS settings” command, which is defined as:

```
^XS settings$
```

Where ‘settings’ is a bitmapped parameter defined as:

Value	32768	16384	8192	4069	2048	1024	512	256	128	64	32	16	8	4	2	1
Bit Position	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name	AMU	VMU	12V	AON	IRJ	IRS	IRE	KYE	CHG	SET	CSE	CRE	CHN	ECO	ACK	ASY
Default:	1	0	0	1	1	1	0	0	1	1	0	1	0	1	1	1

For information on what each bit of the XS command does, see: “XS’ Control Settings” on page 39.

The “Value” row, in the table’s header, refers to the values, that when added together, create the decimal parameter used by the command. For instances if you want the bits ‘ASY’ and ‘IRS’ to be set to 1, and the rest of the bits set to zero, the parameter’s value would be calculated as: 1+1024, making the parameter value: 1025.

The command to set those two bits to ones, and reset all the others would be:

```
^XS 1025$
```

Individual bits of a bitmapped parameter can be set or reset without affecting the other bits, by prefixing the bitmapped parameter with a ‘+’ to set individual bits, or a ‘-’ to reset individual bits.

For instance in the above example the bitmapped value has been set to 1025. If we would now like to enable the IR jack, by setting the ‘IRJ’ bit, the following command can be issued:

```
^XS +2048$
```

This will set the ‘IRJ’ bit, and have no effect on the others, and the new “XS” value would be: 3073

If we’d like to now disable the IR jack and the IR sensor, by clearing the ‘IRJ’ and ‘IRS’ bits, we’d use the value “2048+1024, or 3072 and issue the command:

```
^XS -3072$
```

leaving the new “XS” value to be: 1.

Basic Control

Reference for Basic Control Commands

These commands are all that are needed for basic control of the Clarity Elite 8x8 or Prowler 8x8 and includes power on/off, remapping sources to zones. This section also includes some helpful control options for changing the way serial commands behave.

Definitions

The following terms are used through out this manual.

Zone

An output. The Clarity Elite 8x8 or Prowler 8x8 has eight (8) outputs, known as zones. A single zone consists of the combination of a YPbPr (component) video channel, a composite video channel, an analog (L/R stereo) channel, and a digital (SPDIF) channel. For most command lines zones are indicated by using a '@' prefix character.

Input

An input, or source. The Clarity Elite 8x8 or Prowler 8x8 has eleven (11) video inputs and eight (8) audio inputs, each consists of the combination of a YPbPr (component) video channel, a composite video channel, an analog (L/R stereo) channel, and a digital (SPDIF) channel. For command lines that mix inputs with zones, 'inputs' are indicated by numbers without a '@' prefix.

Channel

A channel is a YPbPr (component) video path, or a composite video path, or an analog (L/R stereo) path, or a digital (SPDIF) path. Channels are used to control breakaway features. All channels can be switched independently of each other.

The following channels are supported by the Clarity Elite 8x8 or Prowler 8x8:

- 1 - YPbPr (Component) Video Channel.
- 2 - Analog Audio Channel.
- 4 - Digital Audio Channel.

On a command line, a channel is indicated by a '.' followed by the channel(s) number. Channel numbers can be combined by adding them together, for instance channel number 6 would refer to both the Digital and Analog audio channels. (See: "'SZ' Set Zone(s)" on page 9 for more information on using channels to control breakaway options.)

Basic Control Commands

Command	Description	Comments
P p	Power control	p=power state (0=off, 1=on, +=toggle).
SZ @z,i	Set zones to inputs	@z=Zone (1-8), i=Input (1-11,+,-).
SZ.ch @z,i	Set zones to inputs with breakaways	ch=Channel(s) (1-7), @z=Zone (1-8), i=Input(s) (1-11,+,-)
DUPZ @z,dz	Duplicate zones	@z=Zone (1-8), dz=Zone to copy (1-8).
DUPZ.ch @z,dz	Duplicate zones with breakaways	ch=Channel(s) (1-7), @z=Zone (1-8), dz=Zone to copy (1-8)
MZ @z,m	Mute zone	@z=Zone (1-8), m=Mute (0=Disabled (muted), 1=Enabled, +=Toggle).
MZ.ch @z,m	Mute zones w/breakaway	ch=Channel(s) (1-7), @z=Zone (1-8), m=Mute (0,1,+).
DZ @z,d	Set zone switching delays	@z=Zone (1-8), d=Delay (in milliseconds, 1000 milliseconds = 1 second).
DZ.ch @z,d	Set delays per channel	ch=Channel(s) (1-7), @z=Zone (1-8), d=Delay (in milliseconds).
Q ?	Query for status	Returns: Operating status flags (see text).
QSZ ?	Query setting change bitmap	Returns: A bitmap of the zones that have had their input settings changed.
QMZ ?	Query mute change bitmap	Returns: A bitmap of the zones that have had their mute settings changed.
QDZ ?	Query mute change bitmap	Returns: A bitmap of the zones that have had their delay settings changed.

Table 1: Basic Control Commands

Basic Command Definitions

'P' Power Control

Turn on / off, or toggle the power state of the Clarity Elite 8x8 or Prowler 8x8:

^P 0\$	Turn off power
^P 1\$	Turn on power
^P +\$	Toggle power
^P ?\$	Query for current setting

Response String:

^=P n\$

Where:

n = Current power status, 0=Off, 1=On.

The 'P' command is an exception to the 100ms rule for response time. When the power to the Clarity Elite 8x8 or Prowler 8x8 is applied, there is a short delay while the digital audio processors are initialized. The power on response string of '^P1\$' will not be returned until the Clarity Elite 8x8 or Prowler 8x8 is fully powered on and ready to accept commands.

'SZ' Set Zone(s)

This is the command used to map inputs to any number of zones.

Its different forms are:

^SZ @zone,@zone,in\$	Map all channels of an input, to a zone or zones.
^SZ.ch @zone,in\$	Map only the selected channels of inputs to zones.
^SZ.ch @zone,+\$	Sequence zones forward through inputs.

<code>^SZ.ch @zone,-\$</code>	Sequence zones in reverse through inputs.
<code>^SZ ?\$</code>	In polled mode, reads current settings of all logged changes.
<code>^SZ @zone,?\$</code>	Read current settings of given zones.
<code>^SZ.ch @zone,?\$</code>	Read current settings of the selected channels of zones.

Response Strings:

`^=SZ @zone,in$` or,
`^=SZ.ch @zone,in$`

Where:

`@zone` = One (or more) zones to be mapped.
`in` = Input to map to given zone(s).
`ch` = Channel bitmap (Range 1-7).

Composite to Component Video Converters

The Clarity Elite 8x8 or Prowler 8x8 has 11 video inputs and 8 audio inputs. The video inputs 9 through 11 refer to the 3 composite to component transcoders. The Clarity Elite 8x8 or Prowler 8x8 does not do upscaling of the Composite video, all composite inputs are converted to 480i component video.

When selecting inputs 9, 10 and 11, the audio channels will not be affected, only the video channel will change to the new settings.

'SZ' Examples

The 'SZ' command in its simplest form:

```
^SZ @1,@3,2$
```

maps the input '2' to the zones '1' and '3'. You can also map multiple zones and inputs using a single command. For instance:

```
^SZ @1,2,@3,@5,7$
```

maps the input '2' to zone '1', and also maps the input '7' to zones '3' and '5'.

By appending a '.' and a channel bitmap to the 'SZ' command, the command can also be used to breakaway the different channels:

```
^SZ.2 @1,3
```

maps only the analog audio from input '3' to zone '1'. The YPbPr (component) video and digital audio channels, on zone 1, remain unchanged.

The channel (the '.2' in the above example) is a bitmapped number that indicates which channel or channels are to be affected by the command.

The Clarity Elite 8x8 or Prowler 8x8 can operate in two different modes, the classic mode, and the auto-conversion mode. (For more information see: “**AUT' Enable / Disable Auto Conversion of Analog / Digital Paths**” on page 42)

For the classic mode, the channels are mapped as:

1 = YPbPr (Component) Video
2 = Analog Audio
4 = Digital Audio

For the auto-conversion mode, the channels are mapped as:

1 = YPbPr (Component) Video

2 = Audio (both digital and analog)

By adding together the above numbers, you can switch any combination of channels without affecting the unselected channels.

For instance:

```
^SZ.1 @3,4$
```

would map only the component video from input '4' to zone '3'.

To map both the component and digital audio channels, add the component and digital audio channel numbers together: 5 = 4 + 1, and use that as the channel number:

```
^SZ.5 @2,@3,4$
```

This would map the component video and digital audio channels from input '4' to zones '2' and '3', leaving the analog audio mappings unchanged.

There are two forms of the query response string, depending upon whether any channel breakaway options are in affect.

If component video, digital audio, and analog audio, from input '3' are all mapped to zone '1', then:

```
^SZ @1,?$ -> Query request sent to the A/V switch
```

would respond with:

```
^+$ -<- Indicates no errors in the command  
^=SZ @001,003 -<- Video and all audio channels are all mapped to input 3
```

If instead, zone '1' had component video from input '3' mapped to it, but had digital and analog audio from input '4' mapped to it, the response would have been:

```
^=SZ.001 @001,003 -<- YPbPr from input '3' mapped to zone 1  
^=SZ.006 @001,004 -<- Analog & digital audio from input '4' mapped to zone '1'
```

'SZ' Query Examples

To make parsing the response strings easier, only one response string is sent per zone. Or, in the case of channel breakaways, only one response string per channel is returned. The response string is sent as a fixed length string using leading zeroes.

You can request the mapping of multiple zones, with one command, and still only one response string per zone will be returned, for instance:

```
^SZ @1,@3,@4,?
```

could return:

```
^+$ -<- Indicates no errors in the command  
^=SZ @001,002$ -<- All channels of input '2' mapped to zone '1'  
^=SZ @003,001$ -<- All channels of input '1' mapped to zone '3'  
^=SZ.005 @004,007$ -<- Video & Digital audio from input '7' mapped to zone '4'  
^=SZ.002 @004,005$ -<- Analog audio from input '5' mapped to zone '4'
```

You can also request the mapping of channels, for instance:

```
^SZ.1 @2,?
```

could return:

```
^SZ.001 @002,006 -<- Video from input '6' mapped to zone 2
```

only the video channel's status is returned.

If you plan on using breakaway options consistently you, you can have the Clarity Elite 8x8 or Prowler 8x8 always send the channel with the response string. This keeps you from having to parse two different types of strings.

Using the 'XS' command to set the 'CHN' bit, will cause the Clarity Elite 8x8 or Prowler 8x8 to always include the channel number. The following example demonstrates this:

```
^XS +4$           -> Set the CHN bit
^+$              <- Acknowledge 'XS' command
^=XS nnnnn$     <- Indicates the new 'XS' settings
^SZ @1,?$       -> Request mappings for zone 1
^+$              <- Acknowledge 'SZ' command
^=SZ.007 @1,4   <- All channels of input '4' mapped to zone '1'
```

By setting the 'CHN', even though all channels on zone '1' are the same, the full channel bitmap is still returned.

In the polled mode (See: “**XS' Control Settings**” on page 39.), any zone selections changes are logged. You can retrieve all the logged changes by issuing the 'SZ ?' command. This command returns any pending changes, followed by a termination record to indicate their are no more pending changes.

For instance, assume Zone 1 and 3 have changed since the last time read:

```
^SZ ?$           -> Request pending changes
^+$              <- Acknowledge 'SZ' command
^=SZ @001,002$   <- Input '2' mapped to zone '1'
^=SZ @003,001$   <- Input '1' mapped to zone '3'
^=SZ @000,000$   <- Termination record, there are no more pending changes.
```

'DUPZ' Duplicate Zone(s)

All zones will be set to the same source as the 'srcZone'.

Its different forms are:

```
^DUPZ @zone,@zone,srcZone$   Map all channels of an srcZone, to a zone or zones.
^DUPZ.ch @zone,srcZone$      Map only the selected channels of srcZones to zones.
```

^Response Strings:

```
^=SZ @zone,in$           or,
^=SZ.ch @zone,in$
```

Where:

```
@zone   = One (or more) zones to be mapped.
srcZone = Source zone to copy.
ch      = Channel bitmap (Range 1-7).
```

The response strings for the DUPZ command are the SZ response strings of the zones that have been changed. Any attempt to query the current settings of the DUPZ command will return the SZ response string of the zones being queried.

'MZ' Mute Zone(s)

This is the command used to mute any number of zones. When audio is muted, the sound is turned off. When video is muted, video is turned off, leaving a black screen. (Or possibly blue screen, depending upon how your receiver acts when video has been turned off.)

For audio muting it is highly recommend that you use the VMZ command. The MZ command can only turn the audio off (the same as powering down audio for the given zone). The VMZ has numerous options for dealing with audio mute, such as adjustable mute levels, and fading, that are not available when using the MZ command.

The different forms of the MZ command are:

<code>^MZ @zone,@zone,mute\$</code>	Mute all channels of a zone or zones.
<code>^MZ.ch @zone,mute\$</code>	Mute only the selected channels of zones.
<code>^MZ.ch @zone,+\$</code>	Toggle the mute setting of zones.
<code>^MZ ?\$</code>	In polled mode, reads current settings of all logged changes.
<code>^MZ @zone,?\$</code>	Read current settings of given zones.
<code>^MZ.ch @zone,?\$</code>	Read current settings of the selected channels of zones.

Response Strings:

`^=MZ @zone,mute$` or,
`^=MZ.ch @zone,mute$`

Where:

@zone = One (or more) zones to be mapped.
mute = Mute setting (0=Unmuted, 1=Muted).
ch = Channel bitmap (Range 1-7).

'MZ' Examples

The 'MZ' command in its simplest form:

```
^MZ @1,@3,1$
```

mutes all channels of the zones '1' and '3'. You can also mute/unmute multiple zones using a single command. For instance:

```
^MZ @1,1,@3,@5,0$
```

mutes zone '1', and unmutes zones '3' and '5'.

By appending a '.' and a channel bitmap to the 'MZ' command, the command can also be used to mute individual channels. This is the proper way to mute an audio channel while allowing video to pass unobstructed. For instance to mute the Digital and Analog audio sound, while leaving the video alone:

```
^MZ.6 @1,1
```

mutes the digital and analog audio on zone '1'. The YPbPr (component) video remains unchanged.

The channel (the '.6' in the above example) is a bitmapped number that indicates which channel or channels are to be affected by the command.

The Clarity Elite 8x8 or Prowler 8x8 can operate in two different modes, the classic mode, and the auto-conversion mode. (For more information see: "**AUT' Enable / Disable Auto Conversion of Analog / Digital Paths**" on page 42)

For the classic mode, the channels are mapped as:

1 = YPbPr (Component) Video
2 = Analog Audio

4 = Digital Audio

For the auto-conversion mode, the channels are mapped as:

- 1 = YPbPr (Component) Video
- 2 = Audio (both digital and analog)

By adding together the above numbers, you can switch any combination of channels without affecting the unselected channels.

For instance:

```
^MZ.1 @3,1$
```

would mute (blank) only the component video on zone '3'.

To mute both the digital and analog audio channels, add the digital and analog channel numbers together: $6 = 4 + 2$, and use that as the channel number:

```
^MZ.6 @2,@3,1$
```

This would mute the digital and analog audio channels on zones '2' and '3', leaving the component video unchanged.

'MZ' Query Examples

There are two forms of the query response string, depending upon whether any channel breakaway options are in affect.

For instance if component video, digital audio, and analog audio, are all muted on zone '1', then:

```
^MZ @1,?$ >- Query request sent to the A/V switch
```

would respond with:

```
^+$ <- Indicates no errors in the command  
^=MZ @001,1 <- Video and all audio channels are muted on zone '3'
```

If instead, zone '1' had digital and analog audio muted, but component video was not muted, then the response would have been:

```
^=MZ.001 @001,0 <- YPbPr not muted on zone '1'  
^=MZ.006 @001,1 <- Analog and digital audio muted on zone '1'
```

To make parsing the response strings easier, only one response string is sent per zone. Or, in the case of channel breakaways, only one response string per channel is returned. The response string is sent as a fixed length string using leading zeroes.

You can request the settings of multiple zones, with one command, and only one response string per zone will be returned, for instance:

```
^MZ @1,@3,@4,?
```

could return:

```
^+$ <- Indicates no errors in the command  
^=MZ @001,1$ <- All channels of zone '1' are muted  
^=MZ @003,0$ <- All channels of zone '3' are not muted  
^=MZ.003 @004,0$ <- Video and Analog audio of zone '4' not are muted  
^=MZ.004 @004,1$ <- Digital audio on zone '4' is muted
```

You can also request the mapping of channels, for instance:

```
^MZ.2 @4,?
```

could return:

`^MZ.002 @004,1` <- Analog audio on zone '4' is muted

only the analog audio channel's status is returned.

If you plan on using breakaway options consistently you, you can have the Clarity Elite 8x8 or Prowler 8x8 always send the channel with the response string. This keeps you from having to parse two different types of strings.

'MZ' Query Examples

Using the 'XS' command to set the 'CHN' bit, will cause the Clarity Elite 8x8 or Prowler 8x8 to always include the channel number. The following example demonstrates this:

<code>^XS +4\$</code>	<->	Set the CHN bit
<code>^+\$</code>	<-	Acknowledge 'XS' command
<code>^=XS nnnnn\$</code>	<-	Indicates the new 'XS' settings
<code>^MZ @1,?\$</code>	<->	Request mute settings for zone 1
<code>^+\$</code>	<-	Acknowledge 'MZ' command
<code>^=MZ.007 @1,0</code>	<-	All channels of zone '1' are not muted

By setting the 'CHN', even though all channels on zone '1' are the same, the full channel bitmap is still returned.

'DZ' Set Zone Switching Delays

This command is used to add a "mute time" when switching between inputs.

With no delay in place, when the Clarity Elite 8x8 or Prowler 8x8 switches from one input to another, the switching is immediate. When a delay is added, an extra step takes place when switching between inputs.

Instead of immediately switching to the new input, the zone is first muted for the 'delay' amount of time, and is then switched to the new input.

For audio devices, the sound is first muted for the amount of time given by the 'DZ' command, and then switched to the new input. This can eliminated thumps on some digital audio receivers.

When a delay is added to a video channel, the video will be blanked for the given amount of time before switched to the new input. There are some monitors that cannot detect a change in signals if there is no "blank time" when switching between two signals. If a monitor is having problems synchronizing to a new signal when switching between inputs, adding a "blank time" can sometimes fix the problem.

Each channel, on each zone, can have its own delay setting.

The different command forms are:

<code>^DZ @zone,@zone,delay\$</code>	Add a delay to all channels of a zone or zones.
<code>^DZ.ch @zone,delay\$</code>	Add a delay to only the selected channels of zones.
<code>^DZ ?\$</code>	In polled mode, reads current settings of all logged changes.
<code>^DZ @zone,?\$</code>	Read current settings of given zones.
<code>^DZ.ch @zone,?\$</code>	Read current settings of the selected channels of zones.

Response Strings:

<code>^=DZ @zone,delay\$</code>	or,
<code>^=DZ.ch @zone,delay\$</code>	

Where:

@zone = One (or more) zones to be mapped.
delay = The delay time in milliseconds (1000 milliseconds = 1 second).
ch = Channel bitmap (Range 1-7).

'DZ' Examples

The 'DZ' command in its simplest form:

```
^DZ @1,@3,250$
```

causes all channels of the zones '1' and '3' to mute (or blank) for 1/4 of a second when switching between inputs.

By appending a '.' and a channel bitmap to the 'DZ' command, the command can also be used to mute individual channels. This allows adding a video blanking time to a zone, without affecting audio channels. For instance to cause the video on zone '1' to blank for a half a second, each time an input is switched, without affecting the audio channels:

```
^DZ.1 @1,500
```

The channel (the '.1' in the above example) is a bitmapped number that indicates which channel or channels are to be affected by the command.

The Clarity Elite 8x8 or Prowler 8x8 can operate in two different modes, the classic mode, and the auto-conversion mode. (For more information see: "**AUT' Enable / Disable Auto Conversion of Analog / Digital Paths**" on page 42)

For the classic mode, the channels are mapped as:

1 = YPbPr (Component) Video
2 = Analog Audio
4 = Digital Audio

For the auto-conversion mode, the channels are mapped as:

1 = YPbPr (Component) Video
2 = Audio (both digital and analog)

By adding together the above numbers, you can switch any combination of channels without affecting the unselected channels.

For instance:

```
^DZ.2 @3,100$
```

would cause the analog audio of zone '3' to mute for 1/10 of a second each time its inputs is switched.

To add a mute delay to both the digital and analog audio channels, add the digital and analog channel numbers together: 6 = 4 + 2, and use that as the channel number:

```
^DZ.6 @2,@3,100$
```

This would cause the digital and analog audio channels on zones '2' and '3' to go silent for 1/10 of a second each time one of their an inputs is switched. There would be no change to the video settings.

'DZ' Query Examples

There are two forms of the query response string, depending upon the setting of the different channels.

If component video, digital audio, and analog audio, are all have the same delay timings on zone '1', then:

```
^DZ @1,?$
```

-> Query request sent to the A/V switch

could respond with:

^+ $\$$ <- Indicates no errors in the command
^=DZ @001,00100 <- There's a 1/10 second delay on all channels on zone '3'

If instead, zone '1' had digital and analog audio timings different from the component video timing, then the response could have been:

^=DZ.001 @001,00250 <- There is a 1/4 second "blank time" on YPbPr video
^=DZ.006 @001,00000 <- Analog and digital audio have no delays on zone '1'

'DZ' Query Examples (Continued)

To make parsing the response strings easier, only one response string is sent per zone. Or, in the cases differing channels, only one response string per channel is returned. The response string is sent as a fixed length string using leading zeroes.

You can request the settings of multiple zones, with one command, and only one response string per zone will be returned, for instance:

^DZ @1,@3,@4,?

could return:

^+ $\$$ <- Indicates no errors in the 'MZ' request command
^=DZ @001,00000 $\$$ <- No delays on zone '1'
^=DZ @003,00500 $\$$ <- All channels have delay of 1/2 second on zone '3'
^=DZ.001 @004,00250 $\$$ <- Video is blanked for 1/4 second. on zone '4'
^=DZ.002 @004,00100 $\$$ <- Analog audio is muted for 1/10 second. on zone '4'
^=DZ.004 @004,00000 $\$$ <- Digital audio has no delay on zone '4'

You can also request the mapping of selected channels, for instance:

^DZ.2 @4,? -> Request setting of just the analog audio channel

could return:

^DZ.002 @004,00333 <- Analog audio is muted for 1/3 second on zone '4'

Only the analog audio channel's delay setting is returned.

If you plan on using breakaway options consistently you, you can have the Clarity Elite 8x8 or Prowler 8x8 always send the channel with the response string. This keeps you from having to parse two different types of strings.

Using the 'XS' command to set the 'CHN' bit, will cause the Clarity Elite 8x8 or Prowler 8x8 to always include the channel number. The following example demonstrates this:

^XS +4 $\$$ -> Set the 'CHN' bit
^+ $\$$ <- Acknowledge 'XS' command
^=XS nnnnn $\$$ <- Indicates the new 'XS' settings
^DZ @1,? $\$$ -> Request delay settings for zone 1
^+ $\$$ <- Acknowledge 'DZ' command
^=DZ.007 @1,00000 <- Zone '1' has no switching delays set

By setting the 'CHN' bit, even though all channels on zone '1' are the same, the full channel bitmap is still returned.

'Q', 'QSZ', 'QMZ', 'QDZ' Query Status Commands

These commands use bitmapped parameters. (See: "Using Bitmapped Parameters" on page 7.)

In the polled mode of operation, these commands are used to poll for any pending state changes that are waiting to be read. By issuing these commands and testing the returned bitmapped values, the controller can determine what has changed in the Clarity Elite 8x8 or Prowler 8x8 since the last time it was polled.

These commands allow the controller to quickly poll the Clarity Elite 8x8 or Prowler 8x8, using only one or two commands, instead of issuing a string of commands to check every possible state of the Clarity Elite 8x8 or Prowler 8x8. The Query Status commands are used to determine if anything has changed, and then based on the results of the Query Statuses, only the commands needed to read the changes can be sent to the Clarity Elite 8x8 or Prowler 8x8.

Once the new state is read by issuing the proper query command, the associated bits will be reset.

The command formats are:

- Q ? -> Query for current flag values
- QSZ ? -> Query for zones that have mapping changed
- QMZ ? -> Query for zones that have had mute settings changed
- QDZ ? -> Query for switch delay settings changed

Response Strings:

- =Q qflags1,qflags2
- =QSZ qsz_zones
- =QMZ qmz_zones
- =QDZ qdz_zones

Where the parameters are defined as:

qflags1 - A bitmapped parameter defined as:

Value	32768	16384	8192	4069	2048	1024	512	256	128	64	32	16	8	4	2	1
Bit Position	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name	0	0	0	0	0	0	0	KYE	CTL	LMI	IRR	KEY	QDZ	QMZ	QSZ	PWR

- PWR - 1=Power State has changed. (See: **"P' Power Control"** on page 9.)
- QSZ - 1=Selection (Source / Zone Mapping) has changed, use the 'QSZ' command for more granularity.
- QMZ - 1=Mute settings have changed, use the 'QMZ' command for more granularity.
- QDZ - 1=Switching delay settings have changed, use the 'QDZ' command for more granularity.
- KEY - 1=One or more keys have been pressed. (See: **"K' Key Emulation"** on page 45.)
- IRR - 1=A new IR code has been received. (See: TBD)
- LMI - 1=Light mode and / or intensities have changed. (See: **"LI' Lighting Mode and Intensities"** on page 45.)
- CTL - 1=Control settings have changed. (See: **"XS' Control Settings"** on page 39.)
- KYE - 1 = 'Keycode enabled' mask has changed. (See: **"KE' Key Enable / Disable"** on page 47.)
- 0 - Reserved, always returns 0.

qflags2 - Reserved for future use and currently returns all zeros.

qsz_zones - Bitmap of zones, a '1' indicates a selection changed for zone.

qmz_zones - Bitmap of zones, a '1' indicates muting has changed for zone.

qdz_zones - Bitmap of zones, a '1' indicates switching delays have changed for zone.

Value	32768	16384	8192	4069	2048	1024	512	256	128	64	32	16	8	4	2	1
Bit Position	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Zone	0	0	0	0	0	0	0	0	8	7	6	5	4	3	2	1

The "Zone" row indicates which bit represents which zone.

For all the above parameters, a bit set to '1' indicates the status has changed for the zone represented by the bit, and needs to be read. Once read, the bit will return to '0'.

Examples

By default, the Clarity Elite 8x8 or Prowler 8x8 transmits any changes made by the user immediately. Assuming the controller can handle randomly transmitted "update strings" (the same strings that are returned when a query is made), the default mode is the best way of keeping the controller in sync with the Clarity Elite 8x8 or Prowler 8x8.

If however, the controller cannot always be ready to accept these strings, or there are times when the controller is simply too busy, you can place the Clarity Elite 8x8 or Prowler 8x8 into a polling mode.

In the polling mode, changes made by the user (using the front panel or IR remote) are not immediately transmitted to the controller, but are instead are kept track of (logged) until a request to read them is made by the controller.

The number of parameters that would need to be constantly read by the controller, just to see if any changes were made by the user, would be overwhelming. To keep the controller in sync with the Clarity Elite 8x8 or Prowler 8x8, the controller would have to constantly query all zones commands, of all zones, that could possibly be changed. An ordeal that the "Query Status Commands" are designed to eliminate.

The 'Q', 'QSZ', 'QMZ', and 'QDZ' are all commands used when the Clarity Elite 8x8 or Prowler 8x8 is used in its polling mode. The polling mode is entered by clearing the 'ASY' bit using the 'XS' command (See: "**XS Control Settings**" on page 39.)

These commands allow the controller to check for changes in the Clarity Elite 8x8 or Prowler 8x8 by issuing a single command, the 'Q' command.

If anything has changed in the Clarity Elite 8x8 or Prowler 8x8, then a bit will be set in the 'Q' bit-mapped parameter, indicating what has changed. The bit will remain set until the controller issues the proper command requests to read the changes. Once all the "logged" data has been read, the corresponding bits in the 'Q' parameter, will be cleared.

This is best described by an example. This example starts by setting the Clarity Elite 8x8 or Prowler 8x8 to the polled mode, and then demonstrates the changes in the status commands as front panel changes are made. It assumes the Clarity Elite 8x8 or Prowler 8x8 has just been plugged, and no front panel switches have been pressed:

```
^XS -1$           -> Place the A/V switch into the polled mode
^+$              <- No errors in the 'XS' command
^=XS nnnnn$     <- New 'XS' settings
^Q ?$           -> Get current status
^+$              <- No errors in the 'Q' command
^=Q 00000,00000$ <- Current status
```

At this point press the front panel power switch to turn on the A/V switch.

```
^Q ?$           -> Get status
^+$              <- No errors in the 'Q' command
^=Q 00005,00000$ <- New status
```

The '00005' indicates that a key has been pressed, and that the power state has changed. Since the power state has changed, read the new state.

```
^P ?$           -> Ask for the new power state
^+$              <- No errors in the 'P' command
```

`^=P 1$` <- Indicates that the A/V switch is powered up

Now re-read the status to see what's changed:

`^Q ?$` -> Get status
`^+$` <- No errors in the 'Q' command
`^=Q 00004,00000$` <- New status

The status now indicates only a key has been pressed. (For more information on keycodes see...).

For now, we'll ignore the key press and test for zone changes.

On the front panel: Select zone '1', then press the input '4' to switch zone '1' to input '4'. Now:

`^Q ?$` -> Get status
`^+$` <- No errors in the 'Q' command
`^=Q 00006,00000$` <- New status

The status command now indicates a key has been pressed, and zone has been remapped. The 'QSZ' bit indicates any number of zones have changed, to find more details on which zones have changed, use the 'QSZ ?' command:

`^QSZ ?$` -> Get 'select zone' status
`^+$` <- No errors in the 'QSZ' command
`^=QSZ 00001$` <- Bitmap of changed zones

This indicates that only zone '1' has changed state.

Using 'SZ @zone,?' commands you can read each zone that has been changed, or, if your controller can handle the possible in rush of data that might occur, you can use the 'SZ ?' command to read all pending changes:

`^SZ ?$` -> Ask for all logged changes
`^+$` <- No errors in the 'SZ' command
`^=SZ @001,004$` <- Input 4 is mapped to zone 1
`^=SZ @000,000$` <- No more pending changes

In this case, since only zone '1' has changed, only the status for zone '1' is returned.

Now check status, again, on everything to see what's changed:

`^SZ ?$` -> Ask for all logged changes
`^+$` <- No errors in the 'SZ' command
`^=SZ @000,000$` <- Nothing has changed

If nothing has changed the 'SZ ?' will return with zone and input set to zero to indicate nothing has changed. The 'QSZ' command will now indicate that no pending changes need to be read:

`^QSZ ?$` -> Get 'select zone' status
`^+$` <- No errors in the 'QSZ' command
`^=QSZ 00000$` <- Bitmap of changed zones

No selection changes are waiting to be read

Check for overall status:

`^Q ?$` -> Get status
`^+$` <- No errors in the 'Q' command
`^=Q 00004,00000$` <- New status

Only key presses are waiting to be read.

By issuing only 'Q ?' commands, the controller can quickly, in one command, see if any changes have been made through the front panel. If changes in zone settings have occurred, the 'QSZ', 'QMZ' and 'QDZ' commands can be used to find out which zones were changed, or the 'SZ ?', 'MZ ?' or 'DZ ?' can be used to read all logged changes.

Audio Control

Reference for Audio Control Commands

The commands are used to control the audio features of the Clarity Elite 8x8 or Prowler 8x8.

Audio features include: Volume, Bass and Treble controls, and a 5 Band Equalizer for each zone.

Audio / Video Control Commands

Command	Description	Comments
MV v	Master volume	v=Overall volume of all channels (0-248, 0=Full mute, 248=full volume)
VTS vs,ts	Volume and tone step size	vs=Volume steps when using up/down buttons or IR, ts=Tone steps (Bass,Treble & Eq's)
VZ @z,v	Per zone volume settings	z=Zone (1-8), v=Volume level (0-200, 0=Full mute, 248=full volume)
VPZ @z,v	Per zone volume as a percentage	z=Zone (1-8), v=Volume percentage level (0-100, 0=Full mute, 100=full volume)
VMIZ @z,vmin	Per zone minimum volume	z=Zone (1-8), vmin=Minimum volume level allowed.
VMAZ @z,vmax	Per zone maximum volume	z=Zone (1-8), vmax=Maximum volume level allowed.
VRT timed,speed	Set fade times and speeds	time=Time setting when doing timed fades, speed=Speed setting when doing speed fades.
BLZ @z,b	Per zone balance settings	z=Zone (1-8), b=Balance setting (200=Centered, 0=Max left, 400=Max right)
BAZ @z,b	Per zone bass settings	z=Zone (1-8), b=Bass level (88-168, 128=0dB, 88=-20dB, 168=+20dB)
GAZ @z,g	Per zone gain setting	z=Zone (1-8), g=Gain (152-248, 152=-24dB, 200=0dB, 248=+24dB)
TRZ @z,t	Per zone treble settings	z=Zone (1-8), b=Treble level (88-168, 128=0dB, 88=-20dB, 168=+20dB)
EQ1Z @z,e	Per zone band-1 equalizer settings	z=Zone (1-8), e=EQ 100Hz level (88-168, 128=0dB, 88=-20dB, 168=+20dB)
EQ2Z @z,e	Per zone band-2 equalizer settings	z=Zone (1-8), e=EQ 330Hz level (88-168, 128=0dB, 88=-20dB, 168=+20dB)
EQ3Z @z,e	Per zone band-3 equalizer settings	z=Zone (1-8), e=EQ 1000Hz level (88-168, 128=0dB, 88=-20dB, 168=+20dB)
EQ4Z @z,e	Per zone band-4 equalizer settings	z=Zone (1-8), e=EQ 3300Hz level (88-168, 128=0dB, 88=-20dB, 168=+20dB)
EQ5Z @z,e	Per zone band-5 equalizer settings	z=Zone (1-8), e=EQ 10000Hz level (88-168, 128=0dB, 88=-20dB, 168=+20dB)
MXZ @z,mix	Per zone stereo mixer	z=Zone (1-8), mix=Mixer setting (0=Norm, 1=L/R Swap, 2=Mono, 3+=See text)
DRZ @z,routing	Per zone Non-PCM routing control	z=Zone (1-8),routing=Routing control (0=Pass Non-PCM digital audio, 1=Use analog audio)
XDRZ @z,routing	Per zone CAT5 Non-PCM control	z=Zone (1-8),routing=Routing control (0=Pass Non-PCM digital audio, 1=Use analog audio)
LSZ @z,dly	Per zone lip sync delay	z=Zone (1-8), dly=Lip sync delay (0-8191, 0=no delay, 8191=170.65mS delay)
LSI @i,dly	Per input lip sync delay	i=Input (1-8), dly=Lip sync delay (0-8191, 0=no delay, 8191=170.65mS delay)
GAI @in.ch,gain	Per input gain settings	i=Input (1-8), .ch=Channel (2=Analog, 4=Digital), g=Gain (0-248, 200=0dB, 248=+24dB)
CCV cv,i,c,b,s,h	Composite converter settings	cv=Converter, i=Input, c=Contrast, b=Brightness, s=Saturation, h=Hue

Table 2: Audio / Video Control Commands

Audio Command Definitions

'MV' Set Master Volume

This command controls the overall volume of the Clarity Elite 8x8 or Prowler 8x8. It can be used to mute all zone (by setting it to zero), or increase the overall gain of the Clarity Elite 8x8 or Prowler 8x8, by setting it beyond 0dB.

When set to 0dB (when the volume parameter is set to 200), the Master Volume has no effect on the audio path. Values above 0dB add gain to the overall audio levels, and levels below 0dB lower the gain.

Using the '+' or '-' modifiers to adjust the current volume level will disable the mute command. (See “**VMZ**’ Mute a Zone using Volume Control” on page 28.) The current volume level used will be the value heard by the user (volume - mute attenuation). In other words, when adjusting the volume using +/- values, the volume will go up or down from the current value being heard by the user, regardless of the mute setting. The mute setting will be cancelled (unmuted), but will not have an affect on the volume level. The VMZ response will be sent to the controller to indicate mute was cancelled, along with the VZ response to indicate the new unmuted volume level.

Setting the volume without using the '+' or '-' modifiers will not have an affect on the mute setting.

When setting, raising or lowering the volume, the 'VZ' command will not allow you to go above 'maxVol' setting (See “**VMAZ**’ Set Zone’s Maximum Volume” on page 26), or below the 'minVol' setting (See “**VMIZ**’ Set Zone’s Minimum Volume” on page 25), with an exception of '0', which is always allowed).

The value 0 is special in that it indicates full attenuation, or fully muted audio.

The value returned from the VZ command will always be in the 0-248 range, regardless of the fade settings. For instance if you set the volume to '1200' (fade to 200 over time), the value returned will be 200, not 1200.

'VZ' Examples

The 'VZ' command in its simplest form:

```
^VZ @1,200$
```

causes the audio on zone '1' to be set to the level '200', which is full volume.

The easiest way to use the volume on the Clarity Elite 8x8 or Prowler 8x8 is to know that 200 is full volume, and 0 is off, and everything step from 0 to 200 makes the audio louder by 0.5dB.

*(Or perhaps an even easier way is to use the VPZ command instead of the VZ command. The VPZ command allows the volume to be set using a number between 0 and 100 regardless of the minimum and maximum volume settings. See “**VPZ**’ Set Zone’s Volume as a Percentage” on page 26)*

If you really need to set the volume in actual dBs, you can adjust to an absolute volume, in decibels, by taking the gain in decibels, multiply by 2 (to account for 0.5dB steps), add 200 and use that as the volume level.

For instance if you wanted to attenuate the audio by 24dB (the output level would be 24dB lower than the input level), you take the gain of -24dB, multiply by 2, and add 200. So 'vol = -24*2 + 200 = 152', and:

```
^VZ @1,152      -> Set the volume on zone 1 to -24.0dB
```

would set the volume gain on zone 1 to -24.0dB.

You can also easily add or subtract from the current volume in 0.5dB steps, for instance:

```
^VZ @1,+6      -> Increase the volume (make it louder) on zone 1 by 3.0dB
^VZ @3,-9      -> Decrease the volume (make it softer) on zone 3 by 4.5dB
```

'VZ' Volume Fading Examples

The Clarity Elite 8x8 or Prowler 8x8 volume can also be faded to new levels using a timed approach, or a dB per second approach.

To fade to a new level in a given amount of time add 1000 to the volume setting (use the VRT command to set both volume fade time and/or fade speed. See “**VRT**’ Set Volume Ramp (Fade) Times” on page 27). For instance, if the ramp time given to the VRT command is 20 (2 seconds) then:

`^VZ @1,@2,1020$`

will fade zones 1 and 2 to the a level of 20. Regardless of their current values, zones 1 and 2 will both reach level 20 at exactly the same time. If one zone is farther away from 20 than the other, the fade speed will be faster, so that both zones reach the new level at the same time.

To fade to a new level using a fixed fade speed, add 2000 to the volume setting. For instance if the ramp speed given to the VRT command is 40 (20dB per second) then:

`^VZ @1,@2,2010$`

will fade zones 1 and 2 to the level of 10 at a speed of 20dB per second. The zone closest to 10 will be the first zone to reach 10.

You can cross-fade, and mix the different types of fades in a single command. For instance:

`^VZ @1,1000,@2,+2040,@3,35$`

will fade zone 1 to the mute level of 0, using a timed ramp. At the same time zone 2 will fade up 20dB (40 steps) using a fixed ramp speed, and zone 3 will jump immediately to level 35.

All fades are interruptable. If you issue a new volume command while a zone is in the process of fading, it will simply begin fading to the new level from its current mid-fade setting.

'VMIZ' Set Zone's Minimum Volume

Each zone has a minimum and maximum volume setting.

The maximum prevents a user from overdriving the speakers, amplifier, or even the Clarity Elite 8x8 or Prowler 8x8 switch.

The minimum allows you to set the volume to just below the noise level of a quiet room. The volume setting Clarity Elite 8x8 or Prowler 8x8 can be adjusted down to -99.5dB before muting. This is usually quite a bit beyond the noise level of any room, or the noise level of most amplifiers. Since adjusting the volume below the noise level is just a waste of time, the minimum level allows you to limit the volume range.

Attempting to set the volume below the minimum level will cause the Clarity Elite 8x8 or Prowler 8x8 go into full mute (no sound). When adjusting the volume upward from full mute, the volume will immediately jump to the minimum level.

The level is set in 0.5dB steps.

Command format:

<code>^VMIZ @zone,@zone,minVol</code>	Set the minimum volume of a zone or zones.
<code>^VMIZ @zone,+step\$</code>	Add 'step' number of 0.5dB steps to current minimum.
<code>^VMIZ @zone,-step\$</code>	Sub 'step' number of 0.5dB steps from current minimum.
<code>^VMIZ ?\$</code>	In polled mode, reads current settings of all changes.
<code>^VMIZ @zone,@zone,?\$</code>	Read current minimum setting(s) of given zone(s).

Response Strings:

`^=VMIZ @zone,minvol$`

Where:

`@zone` = One (or more) zones to be affected.

`minVol` = Minimum volume in 0.5dB steps with an offset of 200. Range is 0 to 'maxVol'-99.

The gain command is given in 0.5dB steps and uses an offset of 200 to indicate a gain of 0.0dB. Values above 200 raise gain, and values below 200 lower gain.

The minimum and maximum volume settings must have at least a 49.5dB (99 steps) difference between them. Any attempt to set the minimum volume closer than 99 steps of the maximum, will result in a setting of exactly 99 steps below the maximum volume setting.

'VMAZ' Set Zone's Maximum Volume

Each zone has a minimum and maximum volume setting.

The maximum prevents a user from overdriving the speakers, amplifier, or even the Clarity Elite 8x8 or Prowler 8x8 switch.

The level is set in 0.5dB steps.

Command format:

<code>^VMAZ @zone,@zone,maxVol</code>	Set the minimum volume of a zone or zones.
<code>^VMAZ @zone,+step\$</code>	Add 'step' number of 0.5dB steps to current minimum.
<code>^VMAZ @zone,-step\$</code>	Sub 'step' number of 0.5dB steps from current minimum.
<code>^VMAZ ?\$</code>	In polled mode, reads current settings of all changes.
<code>^VMAZ @zone,@zone,?\$</code>	Read current minimum setting(s) of given zone(s).

Response Strings:

`^=VMAZ @zone,minvol$`

Where:

`@zone` = One (or more) zones to be affected.

`maxVol` = Minimum volume in 0.5dB steps with an offset of 200. Range is 'minVol'+99 - 248.

The gain command is given in 0.5dB steps and uses an offset of 200 to indicate a gain of 0.0dB. Values above 200 raise gain, and values below 200 lower gain.

The minimum and maximum volume settings must have at least a 49.5dB (99 steps) difference between them. Any attempt to set the maximum volume closer than 99 steps of the minimum, will result in a setting of exactly 99 steps above the minimum volume setting.

'VPZ' Set Zone's Volume as a Percentage

The Clarity Elite 8x8 or Prowler 8x8 can have their volumes adjusted as a percentage instead of an dB level. This can make writing drivers easier for many systems.

The VPZ command always uses a setting of 0 to 100, regardless of the minimum volume settings ("VMIZ' Set Zone's Minimum Volume" on page 25) and the maximum volume settings ("VMAZ' Set Zone's Maximum Volume" on page 26).

A value of 0 is always full mute.

A value of 1 is always the minimum volume level.

A value of 100 is always the maximum volume level.

Any value between 1 and 100 will be a percentage between minimum and maximum volume, to the nearest 0.5dB.

The format is:

<code>^VPZ @zone,@zone,vol</code>	Set the volume of a zone or zones.
<code>^VPZ @zone,+step\$</code>	Add 'step' number of 0.5dB steps to current volume.
<code>^VPZ @zone,-step\$</code>	Subtract 'step' number of 0.5dB steps from current volume.
<code>^VPZ ?\$</code>	In polled mode, reads current settings of all volume changes.

^VPZ @zone,@zone,?\$ Read current volume settings of given zone(s).

Response Strings:

^=VPZ @zone,vol\$

Where:

@zone = One (or more) zones to be affected.

vol = Volume as a percentage: 0 through 100.

To jump immediately to a new volume, the range is 0 to 100.

To fade to a new level in a given time period the range is 1000 to 1100.

To fade to a new level at a given speed the range is 2000 to 2100.

Using the '+' or '-' modifiers to adjust the current volume level will disable the mute command. (See “**VMZ’ Mute a Zone using Volume Control**” on page 28.) The current volume level used will be the value heard by the user (volume - mute attenuation). In other words, when adjusting the volume using +/- values, the volume will go up or down from the current value being heard by the user, regardless of the mute setting. The mute setting will be cancelled (unmuted), but will not have an affect on the volume level. The VMZ response will be sent to the controller to indicate mute was cancelled, along with the VPZ response to indicate the new unmuted volume level.

Setting the volume without using the '+' or '-' modifiers will not have an affect on the mute setting.

All the examples given in the set volume command (See “**VZ’ Set Zone’s Volume**” on page 23) apply for the VPZ command as well. Simply substitute the VPZ for the VZ command and use values between 0 and 100.

‘VRT’ Set Volume Ramp (Fade) Times

The Clarity Elite 8x8 or Prowler 8x8 allows the volume to be ramped over time (fading), this command sets the ramp time and ramp speed used when fading volume. All zones share the same times.

There are two different ways to fade volume.

- 1 Fade volume over a set period of time.
- 2 Fade volume at a controlled ramp speed.

The VRT allows setting both of these.

The 1st parameter of the VRT command is the ‘ramp time’ setting. This indicate the amount of time needed to ramp (or fade) from one volume to the next and is given in 1/10th of seconds. The setting of 10 would equal 1 second. This is the value used when 1000 is added to a volume command setting.

The 2nd parameter is the ‘ramp speed’ setting. This is given in 0.5dB steps per second. The setting of 40 would equal a 20dB per second ramp speed. This is the value used when 2000 is added to a volume command setting.

The VRT command format is:

^VRT time ,speed\$ Set the ramp time, and ramp speed.

^VRT ?\$ Reads current settings.

Response Strings:

^=VRT @time ,speed\$

Where:

time = Volume ramp time in 1/10th increments. 1 = 0.1 second, 10 = 1 second, etc.

speed = Volume ramp speed in 0.5dB per second increments. 40 = 20dB per second ramp.

'VMZ' Mute a Zone using Volume Control

The VMZ command allows you to mute the volume on the Clarity Elite 8x8 or Prowler 8x8 using the audio processor. This differs from the MZ command which is used to completely shut down a zone.

Using the audio processor allows a mute attenuation setting; allowing you to mute a level by a specific amount, -20dB for instance instead of full audio off.

Also available are mute fade options. Instead of instantly jumping to a mute setting, you can fade over time, or fade at a given speed, to the new mute level.

The VMZ command is used to mute and unmute a zones. The mute level and fading options are set by the VMLZ command (See "**VMLZ' Set a Zone's Mute Level**" on page 28). The mute fade times are set using the VMT command (See "**VMT' Set Muting (Fade) Times**" on page 29).

There are three options when using mute:

- 0=Unmute - This disables muting, and returns the volume back to its original unmuted level.
- 1=Mute - This enables muting. It attenuates the volume by the mute level (See: VMLZ).
- 2=NoMute - This disables muting, but sets the volume level to the current muted level.

The '2' (NoMute) option allows the mute setting to be cancelled without affecting the volume level. Response strings for the 'VZ' and 'VPZ' commands will be sent to indicate the new volume to the controller. The response string for the 'VMZ' command will be a '0' to indicate muting is now disabled. A '2' will never be returned in the response string.

The VMZ command format is:

- `^VMZ @zone,@zone,mute$` Mute all channels of a zone or zones.
- `^VMZ ?$` In polled mode, reads current settings of all logged changes.
- `^VMZ @zone,?$` Read current settings of given zones.

Response Strings:

- `^=VMZ @zone,mute$`

Where:

- @zone = One (or more) zones to be mapped.
- mute = Mute setting (0=Unmuted, 1=Muted, 2=NoMute).

A value of '2' is never returned by the response string. If muting is disabled by the '2' (NoMute) command, a value of '0' will be returned to indicate muting is disabled.

'VMLZ' Set a Zone's Mute Level

The VMZ command allows you to mute the volume on the Clarity Elite 8x8 or Prowler 8x8. This differs from the MZ command in that the MZ command is used to completely shut down a zone, whereas using the VMZ is a volume based mute and allows all the volume features supported by the Clarity Elite 8x8 or Prowler 8x8.

These features include a mute level setting that allows you to mute a level by a specific amount, -20dB for instance instead of a full mute.

The VMLZ setting is the value to be subtracted from the current volume when the mute command is enabled. This value is the number of 0.5dB steps to be subtracted, for instance a setting of 40 would subtract 20dB whenever the mute command is enabled. A setting of 248 will always do a full mute.

There are three different ways of muting the volume:

- 1 Jump immediately to the new mute volume.

- 2 Fade to the new level in the time given by the 'VMT' command.
- 3 Fade to the new level using the slope given by the 'VMT' command.

To fade to a new level over a given period of time, add 1000 to any mute level setting.

To fade to a new level at a given ramp speed, add 2000 to any mute level setting.

The format used to jump immediately to a new level is:

^VMLZ @zone,@zone,attn	Set the mute attenuation of a zone or zones.
^VMLZ @zone,+step\$	Add 'step' number of 0.5dB steps to current setting.
^VMLZ @zone,-step\$	Subtract 'step' number of 0.5dB steps from current setting.
^VMLZ ?\$	In polled mode, reads current settings of all changes.
^VMLZ @zone,@zone,?\$	Read current settings of given zone(s).

Response Strings:

^=VMLZ @zone,vol\$

Where:

- @zone = One (or more) zones to be affected.
- attn = Mute attenuation in 0.5dB steps.
 - To jump immediately to a new mute volume, the range is 0 to 248.
 - To fade to a new level in a given time period the range is 1000 to 1248.
 - To fade to a new level at a given speed the range is 2000 to 2248.

'VMT' Set Muting (Fade) Times

The Clarity Elite 8x8 or Prowler 8x8 allows the mute command to be ramped over time (fading), this command sets the ramp time and ramp speed used when muting volume. All zones share the same times.

There are two different ways to fade volume while muting.

- 1 Mute volume over a set period of time.
- 2 Mute volume at a controlled ramp speed.

The VMT allows setting both of these.

The 1st parameter of the VMT command is the 'ramp time' setting. This indicate the amount of time needed to ramp (or fade) from one volume to the next and is given in 1/10th of seconds. The setting of 10 would equal 1 second. This is the value used when 1000 is added to the VMLZ command setting (See "'VMLZ' Set a Zone's Mute Level" on page 28).

The 2nd parameter is the 'ramp speed' setting. This is given in 0.5dB steps per second. The setting of 40 would equal a 20dB per second ramp speed. This is the value used when 2000 is added to a the VMLZ command setting.

The VMT command format is:

^VMT time,speed\$	Set the ramp time, and ramp speed.
^VMT ?\$	Reads current settings.

Response Strings:

^=VMT @time,speed\$

Where:

- time = Volume ramp time in 1/10th increments. 1 = 0.1 second, 10 = 1 second, etc.
- speed = Volume ramp speed in 0.5dB per second increments. 40 = 20dB per second ramp.

'BLZ' Set Zone's Balance

Each zone has a balance level that can be set from 0 attenuation (full left), to 400 (full right).

Balance is set in 0.5dB steps.

Command format:

<code>^BLZ @zone,@zone, bal</code>	Set the balance of a zone or zones.
<code>^BLZ @zone, +step\$</code>	Add 'step' number of 0.5dB steps to current balance.
<code>^BLZ @zone, -step\$</code>	Subtract 'step' number of 0.5dB steps from current balance.
<code>^BLZ ?\$</code>	In polled mode, reads current settings of all balance changes.
<code>^BLZ @zone,@zone, ?\$</code>	Read current balance settings of given zone(s).

Response Strings:

`^=BLZ @zone, bal$`

Where:

`@zone` = One (or more) zones to be affected.
`bal` = Balance in 0.5dB steps from left to right, 200=Center. Range is 0 to 400.

The balance command is given in 0.5dB steps and uses an offset of 200 to indicate center, 0 indicates full left (no audio on right channel), 400 indicates full right (no audio on left channel).

The balance command does not add gain, it only attenuates. Moving the balance to the left will lower the volume on the right channel, but does not increase the volume on the left channel.

The value 200 is "center" and allows audio to pass unaffected on both left and right channels.

'GAZ' Set Zone's Gain (Output Levels)

Each zone has a gain level that can be set from -24dB to +24dB. The gain control allows you to match the volume levels of each zone to the sensitivity of the amplifiers used in each zone. This allows volume settings to sound the same for each zone, even when using different model/brand of amplifiers or different model/brand of speakers.

Zone gain is set in 0.5dB steps.

Command format:

<code>^GAZ @zone,@zone, gain</code>	Set the gain of a zone or zones.
<code>^GAZ @zone, +step\$</code>	Add 'step' number of 0.5dB steps to current gain.
<code>^GAZ @zone, -step\$</code>	Subtract 'step' number of 0.5dB steps from current gain.
<code>^GAZ ?\$</code>	In polled mode, reads current settings of all gain changes.
<code>^GAZ @zone,@zone, ?\$</code>	Read current gain settings of given zone(s).

Response Strings:

`^=GAZ @zone, gain$`

Where:

`@zone` = One (or more) zones to be affected.
`gain` = Gain in 0.5dB steps with an offset of 200. Range is 152 to 248.

The gain command is given in 0.5dB steps and uses an offset of 200 to indicate a gain of 0.0dB. Values above 200 raise gain, and values below 200 lower gain.

'GAI' Set Input's Gain (Input Trimming)

Each input has a gain level that can be set from -24dB to +24dB. The gain control allows you to match the volume levels of each input to the different levels of each source. This allows volume settings to sound the same, when switching between source devices with different output levels.

Input gain is set in 0.5dB steps.

Command format:

<code>^GAI @input,@input,gain</code>	Set the gain of a input or inputs.
<code>^GAI @input,+step\$</code>	Add 'step' number of 0.5dB steps to current input.
<code>^GAI @input,-step\$</code>	Subtract 'step' number of 0.5dB steps from current input.
<code>^GAI ?\$</code>	In polled mode, reads current settings of all input changes.
<code>^GAI @input,@input,?\$</code>	Read current gain settings of given input(s).

Response Strings:

`^=GAZ @input,gain$`

Where:

- `@input` = One (or more) inputs to be affected.
- `gain` = Gain in 0.5dB steps with an offset of 200. Range is 152 to 248.

The gain command is given in 0.5dB steps and uses an offset of 200 to indicate a gain of 0.0dB. Values above 200 raise gain, and values below 200 lower gain.

'BAZ', 'TRZ' Set Zone's Bass and Treble Levels

Each zone has a Bass and Treble level that can range from -20.0dB to +20.0dB. Interaction between the Bass and Treble controls and the 5 Band Equalizer settings are limited to a +/-20.0dB range. Adding a boost of +20.0dB to the Bass setting as well as the EQA or EQB equalizer bands, will not result in a +40.0dB, but will be limited to +20.0dB.

The levels are set in -0.5dB steps.

Command formats:

<code>^BAZ @zone,@zone,level</code>	Set the bass level of a zone or zones.
<code>^BAZ @zone,+step\$</code>	Add 'step' number of 0.5dB steps to current bass level.
<code>^BAZ @zone,-step\$</code>	Subtract 'step' number of 0.5dB steps from current level.
<code>^BAZ ?\$</code>	In polled mode, reads current settings of all bass changes.
<code>^BAZ @zone,@zone,?\$</code>	Read current bass level settings of given zone(s).
<code>^TRZ @zone,@zone,level</code>	Set the treble level of a zone or zones.
<code>^TRZ @zone,+step\$</code>	Add 'step' number of 0.5dB steps to current treble level.
<code>^TRZ @zone,-step\$</code>	Subtract 'step' number of 0.5dB steps from current level.
<code>^TRZ ?\$</code>	In polled mode, reads current settings of all bass changes.
<code>^TRZ @zone,@zone,?\$</code>	Read current bass level settings of given zone(s).

Response Strings:

`^=BAZ @zone,level$`
`^=TRZ @zone,level$`

Where:

- @zone = One (or more) zones to be affected.
- level = Levels 0.5dB steps with offsets of 128 (128 = 0.0dB).

The levels in the commands are given in 0.5dB steps and use an offset of 128 to indicate a boost / cut of 0.0dB. Values above 128 boost level by 0.5dB per step, for instance 129 = +0.5dB (a boost of 0.5dB), and 127 = -0.5dB (a cut of 0.5dB).

'BAZ' ('TRZ') Examples

Examples are only given for the bass command 'BAZ', for treble commands use 'TRZ' in the place of 'BAZ. The simplest form of the command is:

```
^BAZ @1,128$
```

and causes the bass level on zone '1' to be set to 0.0dB which is flat (no boost or cut).

The easiest way to use the volume on the Clarity Elite 8x8 or Prowler 8x8 is to know that 168 is full boost, and 88 is full cut and every step from 88 to 168 boosts the bass level by 0.5dB, with 128 used to indicate no boost or cut.

Or you can set a zone to an absolute level, in decibels, by taking the gain (which is positive for boost and negative for cut), multiplying by 2 (to take into account the 0.5dB steps), adding 128, and using that as the new level.

For instance if you wanted to boost bass by 9dB, you'd take the gain: 9dB multiply by 2 and add 200. So 'level = 9*2 + 128 = 146', and:

```
^BAZ @1,146      -> Boost bass by 9.0dB
```

would set the bass boost on zone 1 to 9.0dB.

You can also easily add or subtract from the current level in 0.5dB steps, for instance:

```
^BAZ @1,+6      -> Boost bass on zone 1 by 3.0dB
^BAZ @3,-9      -> Cut bass on zone 3 by 4.5dB
```

When using the '+' and '-' prefixes to add or subtract from current levels, the 'BAZ' command will not allow you to go above 168 (+20.0dB) or below 88 (-20.0dB), though it's perfectly valid to send a command that would attempt this.

'EQ1Z', 'EQ2Z', 'EQ3Z', 'EQ4Z', 'EQ5Z' Set the 5 Band Equalizers' levels

Each zone has a 5 Band Equalizer associated with it, each of the five bands have levels that range from -20.0dB to +20.0dB. Interaction between the Bass and Treble controls and the 5 Band Equalizer settings are limited to a +/-20.0dB range. Adding a boost of +20.0dB to the Bass setting as well as the EQA or EQB equalizer bands, will not result in a +40.0dB, but will be limited to +20.0dB.

The levels are set in -0.5dB steps.

The band center frequencies for each command are:

- EQ1Z - 100Hz (and below, this is a low frequency slope filter.)
- EQ2Z - 330Hz
- EQ3Z - 1,000Hz
- EQ4Z - 3,300Hz
- EQ5Z - 10,000Hz (and above, this is a high frequency slope filter.)

Only the 'EQ1Z' command will be described, all the bands use identical syntax.

Command format:

```
^EQ1Z @zone,@zone,level      Set the EQ level of a zone or zones.
```

<code>^EQ1Z @zone,+step\$</code>	Add 'step' number of 0.5dB steps to current EQ level.
<code>^EQ1Z @zone,-step\$</code>	Subtract 'step' number of 0.5dB steps from current level.
<code>^EQ1Z ?\$</code>	In polled mode, reads current settings of all EQ changes.
<code>^EQ1Z @zone,@zone,?\$</code>	Read current EQ level settings of given zone(s).

Response String:

`^=EQ1Z @zone,level$`

Where:

`@zone` = One (or more) zones to be affected.

`level` = Levels 0.5dB steps with offsets of 128 (128 = 0.0dB).

The levels in the commands are given in 0.5dB steps and use an offset of 128 to indicate a boost / cut of 0.0dB. Values above 128 boost level by 0.5dB per step, for instance 129 = +0.5dB (a boost of 0.5dB), and 127 = -0.5dB (a cut of 0.5dB).

'EQ1Z' Examples

Examples are only given for the EQ band-1 command 'EQ1Z', for other bands, substitute the proper command for the desired band. The simplest form of the command is:

`^EQ1Z @1,128$`

and causes the EQ level on zone '1' to be set to 0.0dB which is flat (no boost or cut).

The easiest way to use the equalizer settings on the Clarity Elite 8x8 or Prowler 8x8 is to know that 168 is full boost, and 88 is full cut and every step from 88 to 168 boosts the EQ level by 0.5dB, with 128 used to indicate no boost or cut.

Or you can set a zone to an absolute level, in decibels, by taking the gain (which is positive for boost and negative for cut), multiplying by 2 (to take into account the 0.5dB steps), adding 128, and using that as the new level.

For instance if you wanted to boost the EQ level by 9dB, you'd take the gain: 9dB multiply by 2 and add 200. So 'level = 9*2 + 128 = 146', and:

`^EQ1Z @1,146` -> Boost EQ band's level by 9.0dB

would set the EQ level on zone 1 to a 9.0dB boost.

You can also easily add or subtract from the current level in 0.5dB steps, for instance:

`^EQ1Z @1,+6` -> Boost EQ band's level on zone 1 by 3.0dB

`^EQ1Z @3,-9` -> Cut EQ band's level on zone 3 by 4.5dB

When using the '+' and '-' prefixes to add or subtract from current levels, the 'EQxZ' commands will not allow you to go above 168 (+20.0dB) or below 88 (-20.0dB), though it's perfectly valid to send a command that would attempt this.

'MXZ' Stereo Mix Down a Zone

Stereo audio can be mix in a number of different ways. This includes swapping channels, and a number of ways of creating mono audio.

Command format:

`^MXZ @zone,@zone,mix` Set the stereo mix down of a zone or zones.

Response Strings:

`^=MXZ @zone,mix$`

Where:

- @zone = One (or more) zones to be affected.
- mix = Stereo mix down flag.
- 0 = No change to audio.
- 1 = Swap left and right channels.
- 2 = Mix to mono by adding left and right channels.
- 3 = Mix to mono by using the left channel for both outputs.
- 4 = Mix to mono by using the right channel for both outputs.
- 5 = Mix to mono by subtracting the right channel from the left.
- 6 = Mix to mono by subtracting the left channel from the right.

'DRZ' Non-PCM Digital audio Routing

The Clarity Elite 8x8 or Prowler 8x8 cannot mix down non-PCM audio, this is any non-PCM stereo audio bitstream, and includes Dolby5.1, DTS Audio, and all other types of multichannel audio.

Any time non-PCM audio is detected on a digital input, the analog audio inputs are routed to the analog outputs.

This command allows you to decide what data to send to the digital coax output when surround sound audio (non-PCM audio) is detected on a digital input.

You can choose to send the surround sound audio as is, this assumes you have a receiver that can decode surround sound audio, or you can choose to ignore the surround sound audio and instead, convert the analog audio to digital (PCM audio) and send it out the digital output.

This command also doubles as the source selection command when running the switch in the "Classic" mode. In the classic mode no auto-detection is done, and this command is used to select between analog and digital audio sources, for each of the Coax outputs.

Command format:

`^DRZ @zone,@zone,routing` Set the non-PCM routing option.

Response Strings:

`^=DRZ @zone,routing$`

Where:

- @zone = One (or more) zones to be affected.
- routing = Routing flag.
- 0 = Non-PCM, digital audio (such as Dolby5.1) is routed, as-is, to the digital output.
- 1 = Analog audio is converted to digital, and routed to the digital output.

'XDRZ' Extended (CAT5) Non-PCM Digital audio Routing

For the Prowler only. You can choose how audio is routed to the SoloCAT receivers.

To avoid the pops, clicks and buzzes that are common when sending analog audio over CAT5, the Prowler (and SoloCAT series of extenders) convert their analog inputs to PCM audio and send it down the CAT5 cables. The SoloCAT receiver contains a digital to analog convertor that converts the PCM digital audio to noise free analog audio.

This command allows you to decide what data to send to the SoloCAT receivers when surround sound audio (non-PCM audio) is detected on a digital input. You can choose to send the surround sound audio as is, this assumes you have a receiver that can decode surround sound audio, or you can choose

to ignore the surround sound audio and instead, convert the analog audio inputs to digital (PCM audio) and send it to the SoloCAT receiver.

Since SoloCAT receivers cannot decode surround sound audio, when surround sound audio is sent to a SoloCAT receiver, the surround sound audio will only be available on the digital output, the left/right analog outputs will be muted.

This command also doubles as the source selection command when running the switch in the “Classic” mode. In the classic mode no auto-detection is done, and this command is used to select between analog and digital audio sources, for each of the CAT5 outputs.

Command format:

`^XDRZ @zone,@zone,routing` Set the non-PCM routing option.

Response Strings:

`^=XDRZ @zone,routing$`

Where:

`@zone` = One (or more) zones to be affected.
`routing` = Routing flag.
 0 = Non-PCM, digital audio is routed, as-is, to the SoloCAT receiver.
 1 = Analog audio is converted to digital, and routed to the SoloCAT receiver.

Example

Let’s assume you have a cable box connected to a Prowler and you want to send stereo audio to a TV on one zone, but you’d like to send the full Dolby5.1 to a Dolby5.1 capable receiver on a different zone. Assume the TV is on zone 2, and the receiver is on zone 3.

You’d start by connecting both the analog and digital outputs of the cable box to the Prowler’s analog and digital inputs.

Then issue the following command:

`^XDRZ @2,1,@3,0`

Now when digital surround sound is detected on a source (like the cable box), zone 2 will use the analog inputs and convert it to PCM digital audio and it will be available on the left/right and digital outputs of the SoloCAT receiver.

When digital surround sound is detected on a source, zone 3 will send the surround sound audio to the SoloCAT and it will be available on the SoloCAT’s digital output. The left/right analog audio outputs of the SoloCAT will be muted.

‘LSZ’ Set Lip Sync delay for a Zone

Each zone is capable of delaying audio for up to 170.65mS. The delay resolution is 1/48000 of a second, or 48 counts per millisecond.

Command format:

`^LSZ @zone,@zone,delay` Set the lip sync delay of a zone or zones.
`^LSZ @zone,+step$` Add ‘step’ to zone’s delay.
`^LSZ @zone,-step$` Subtract ‘step’ from zone’s delay.

Response Strings:

`^=LSZ @zone,delay$`

Where:

@zone = One (or more) zones to be affected.
delay = Lip sync delay in 48KHz samples, each count delays audio by 1/48000 of a second.

A value of 0 indicates no delay.

There are two forms of the lip sync delay commands, the 'LSZ' command which sets lip sync delay on a zone by zone basis, and the 'LSI' command which sets delays on an input by input basis. Which one to use depends on what is causing the video delay, and where it's connected in the video path.

If the input of a video processor (or monitor) that adds a video delay is connected to a zone, then the 'LSZ' command should be used to delay the audio by the same amount of time the video is being delayed. Only audio that is being sent to the video processor, attached to the zone, will be delayed.

If on the other hand, if the output of a video processor that adds a video delay, is connected to an input, then the 'LSI' command should be used. This allows all zones that connect to the video processor, to have their delays automatically adjusted to compensate for the processor's video delays.

Both inputs and zones can have delays set, however the overall delay cannot exceed 8191 counts (or 170.65mS). If an input and zone combination exceeds 8191 counts, no error will be generated and the delay will be set to 8191.

'LSZ' Examples

The lip sync delay is given in samples of a 48KHz clock, or 48 counts per millisecond. To delay the audio by a given number of milliseconds, take the number of milliseconds, multiply by 48, and use that as the parameter for the command. For instance to delay zone 3 by 24mS: $24\text{mS} * 48 = 1152$

`^LSZ @3,1152` -> Delay zone 3 by 1152 samples (24mS)

Another common timing to apply to lip sync delay is video frame times. Most video processor delay video by a set number of frames, matching audio to video in these cases is done by delay audio by the same number of frames. For instance 1080p60, is 60 frames per second, while 1080p24, is 24 frames per second. To calculate the value needed to delay a set number of frame, divide the frames per second into 48000, and multiply by the number of frames to delay. For instance if your video signal is 60 frames per second, and you want to delay zone 3 by 2 frames: $(48000 / 60\text{fps}) * 2 = 1600$

`^LSZ @3,1600` -> Delay zone 3 by 1600 samples (two 60fps frames)
`^LSZ @2,+800` -> Add one 60fps frame of delay to zone 2

'LSI' Set Lip Sync delay for an Input

Each input is capable of delaying audio for up to 170.65mS. The delay resolution is 1/48000 of a second, or 48 counts per millisecond.

Command format:

<code>^LSI @in,@in,delay</code>	Set the lip sync delay an input or inputs.
<code>^LSI @in,+step\$</code>	Add 'step' to input's delay.
<code>^LSI @in,-step\$</code>	Subtract 'step' from input's delay.

Response Strings:

`^=LSI @in,delay$`

Where:

@in = One (or more) inputs to be affected.
delay = Lip sync delay in 48KHz samples, each count delays audio by 1/48000 of a second.

A value of 0 indicates no delay.

There are two forms of the lip sync delay commands, the 'LSZ' command which sets lip sync delay on a zone by zone basis, and the 'LSI' command which sets delays on a input by input basis. Which one to use depends on what is causing the video delay, and where it's connected in the video path.

If the input of a video processor (or monitor) that adds a video delay is connected to a zone, then the 'LSZ' command should be used to delay the audio by the same amount of time the video is being delayed. Only audio that is being sent to the video processor, attached to the zone, will be delayed.

If on the other hand, if the output of a video processor that adds a video delay, is connected to an input, then the 'LSI' command should be used. This allows all zones that connect to the video processor, to have their delays automatically adjusted to compensate for the processor's video delays.

Both inputs and zones can have delays set, however the overall delay cannot exceed 8191 counts (or 170.65mS). If an input and zone combination exceeds 8191 counts, no error will be generated and the delay will be set to 8191.

For examples, see the examples of the 'LSZ' command on page 35.

Advanced Control

Reference for Advance Control Commands

These commands are for more advanced control over the Clarity Elite 8x8 or Prowler 8x8, including front panel light intensities, changes to serial port behavior, etc.

Advanced Control Commands

Command	Description	Comments
!	Get most recent error code	Returns: Most recent error code, or error code 0' if no error.
V?	Get version string	Returns: Product name and firmware version string.
LI mode,dim,bri,off	Sets LED intensities	mode=Mode (0=off, 1=dim, 2=bright, 3=auto), dim,bri,off=Dim, Bright and Off levels (0-100).
QI?	Query for capability information	Returns: Number of zones & inputs, and a full channel mask.
K k,k,...	Read/Emulate key presses	k=Keycodes (up to 16 codes per 'K' command, see text).
KE k,setting	Enable/disable keycodes	k=Front panel key to enable / disable, setting=EnableFlag (0=Disable,1=Enable)
XS flags	Control settings	Set / reset control options. flags=Control option flags (see text).
XE flags	Transmit enable flags	Enable commands to asynchronously send there status. flags=Enable flags (see text).
SS flags	Save Settings	Save specified settings as initial power on values. flags=Indicate which settings to save.
IPA xxx,xxx,xxx,xxx	View or change TCP/IP address	View the current address, or change it.
FS 246	Reset to factory settings	Resets ALL values to initial factory settings!

Table 3: Advanced Control Commands

Advanced Command Definitions

'!' Resend Error Code

This special purpose command is used to request that the Clarity Elite 8x8 or Prowler 8x8 resend the last error code sent. This can be useful if the last error code sent had a checksum appended to it that did not match.

^!\$ Request that the last error code sent, be resent

'V' Version

Returns the current firmware version of the Clarity Elite 8x8 or Prowler 8x8.

^V ?\$

Response String:

^=V "Clarity8x8",1.0a,30B2S12345678\$

or,

^=V "Prowler8x8",1.0a,37B2S12345678\$

Where:

"Clarity 8x8" = Model
 1.0a = Firmware version
 30B2S12345678 = Serial number

'QI' Query for Zone, Input and Channel Information

Returns the number of zones, and inputs, and a mask of the channels available on the Clarity Elite 8x8 or Prowler 8x8.

`^QI ?$`

Response String:

`^=QI zones,inputs,chan_bitmap$`

Where:

zones = Number of available zones
 inputs = Number of available inputs
 chan_bitmap = Bitmap of the available channels

'XS' Control Settings

Turn on and off operational modes of the Clarity Elite 8x8 or Prowler 8x8.

The format of the command is:

<code>^XS settings1,settings2\$</code>	Set the control bits to 'settings1' and 'settings2'
<code>^XS +settings1,+settings2\$</code>	Set bits indicated in 'settings1' and 'settings2' to 1
<code>^XS -settings1,+settings2\$</code>	Reset bits indicated in 'settings1' and 'settings2' to 0
<code>^XS ?\$</code>	Query for current settings

Response String:

`^=XS settings1,settings2$`

Where 'settings1' is a bitmapped parameter defined as:

Value	32768	16384	8192	4096	2048	1024	512	256	128	64	32	16	8	4	2	1
Bit Position	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name	AMU	VMU	AUT	KYD	IRJ	IRS	IRE	KYE	CHS	SET	CSE	CRE	CHM	ECO	ACK	ASY
Default:	1	0	1	0	1	1	0	0	1	1	0	1	0	1	1	1

ASY - 0=Polled mode.	1=Asynchronous Mode.
ACK - 0=Don't acknowledge cmds with "^+\$"	1=Acknowledge error free commands with a "^+\$"
ECO - 0=Do not send a response strings for each cmd.	1=Always send response string when a serial command is issued
CHM - 0=Only send a ".ch" when needed.	1=Always append a ".ch" channel mask to a zone response cmd
CRE - 0=Don't send CRs/LFs at end of responses	1=End all responses with a carriage return and a line feed.
CSE - 0=Disable the sending of checksums.	1=Append a checksums to all responses.
SET - 0=Disable the setup option.	1=Enable the setup option.
CHS - 0=Setup mode is read only.	1=Enable changing parameters in the setup mode.
KYE - 0=Use 'KE' settings for front panels keys.	1=Enable all front panel keys, overrides 'KE' settings.
IRE - 0=Use 'IRE' settings for IR control.	1=Enable all IR commands, overrides 'IRE' settings.
IRS - 0=Disable IR sensor.	1=Enable IR sensor.
IRJ - 0=Disable IR jack.	1=Enable IR jack.
KYD - 0=Font panel keys not disabled.	1=Disable front panel keys, overrides 'KYE'.
AUT - 0=Classic Analog/Digital mode.	1=Automatic conversion of Analog/Digital paths.
VMU - 0=Disable video muting when a zone is muted.	1=Enable video muting when a zone is muted.
AMU - 0=Disable audio muting when a zone is muted.	1=Enable audio muting when a zone is muted.

'CHM' Enable / Disable always sending ".ch" masks on zone commands

On commands that change zone settings ('SZ', 'MZ', 'DZ'), the ".ch" channel mask is only sent when needed to indicate a difference in settings between channel. With this bit set, the ".ch" mask will always be sent, regardless of any differences between channel settings.

If you plan on using the Clarity Elite 8x8 or Prowler 8x8's breakaway functions, setting this bit can make parsing the response strings easier, since only one type of response string will be returned.

'CRE' Enable / Disable trailing Carriage Returns Line Feeds

A carriage return and line feed can be appended to all responses coming from the Clarity Elite 8x8 or Prowler 8x8. This is useful when using terminal software to test command strings.

Since the carriage returns and line feeds are sent outside of the normal string (they are sent after the ending '\$'), they should be ignored by the controller. But if there are problems with this behavior, they can be turned off by setting this bit to a '0'.

'CSE' Enable checksums

When the 'CSE' option is enabled, all response strings will have a checksum, appended to them.

'SET' Enable / Disable the Setup Mode

This bit can be used to disable the ability to enter the setup mode, preventing a casual user from enter the setup mode and making changes, or reassigning presets, etc.

'CHS' Enable / Disable making changes in the Setup Mode

This bit allows a user to enter the setup mode, and view settings, but does not allow any changes to be made.

'KYE' Enable / Disable front panel Keys

Setting the 'KYE' to '0' allows each key on the remote control to be enabled or disabled by using the 'KE' command. (See: "**'KE' Key Enable / Disable**" on page 47.) When the 'KYE' is set to '1', it will override all 'KE' settings, and front panel keys will be enabled. The 'KYD' bit will override this bit, if the 'KYD' bit is set, the keyboard will be disabled regardless of the setting of the 'KYE' bit or the 'KE' command.

'KYD' Disable front panel Keys

Setting the 'KYD' to '0' allows each key on the remote control to be enabled or disabled by using the 'KYE' bit and the 'KE' command. (See: "**'KE' Key Enable / Disable**" on page 47.) When the 'KYD' is set to '1', it will override the 'KYE' bit, and all 'KE' settings, and all remote control keys will be disabled.

'IRE' Enable / Disable IR Keys

Setting the 'IRE' to '0' allows each key on the remote control to be enabled or disabled by using the 'KE' command. (See: "**'KE' Key Enable / Disable**" on page 47.) When the 'IRE' is set to '1', it will override all 'KE' settings, and all remote control keys will be enabled.

'IRS' Enable / Disable Front Panel IR Sensor

Setting the 'IRS' bit to '0', disables the IR sensor on the front panel. This has no affect on IR signals being received through the rear panel IR jack. This is useful in preventing stray IR from affecting the Clarity Elite 8x8 or Prowler 8x8 when only the rear IR jack is being used.

'IRJ' Enable / Disable Rear Panel IR Jack

Setting the 'IRJ' bit to '0', disables the IR jack on the rear panel. This has no effect on IR signals being received through the front panel IR sensor. The best way to disable the IR jack is to simply unplug whatever it is you have plugged into it.

It's not usually a problem having both the front panel IR sensor and the Rear panel IR jack enabled. IR will be accepted from either. If both the front panel IR sensor, and the rear panel IR jack received signals simultaneously, the rear panel jack will have priority.

If a controller is constantly sending data to the rear panel jack, this can effectively jam the front panel sensor. Setting this bit to '0' will disable the rear panel jack and allow the front panel sensor to operate normally. Though once again, it might be better to just unplug the rear panel IR jack if it's not going to be used.

'AUT' Enable / Disable Auto Conversion of Analog / Digital Paths

When this bit is set to '0', the Clarity Elite 8x8 or Prowler 8x8 behaves like a classic A/V switch, in that it maintains separate paths for the analog and digital signals. Volume and Tone controls will only affect the analog paths, the digital signals will be routed untouched. This also allows the digital audio to breakaway from the analog audio, allowing the digital audio to be switched independent of the analog audio paths.

No automatic selection is done on the audio signals in the classic mode, so you must select the type of audio that is sent down each of the CAT5 lines (in the case of the Prowler 8x8), and what type of audio will be present at each of the Coax outputs. This is done using the 'DRZ' and 'XDRZ' commands. (See: "**'DRZ' Non-PCM Digital audio Routing**" on page 34, and "**'XDRZ' Extended (CAT5) Non-PCM Digital audio Routing**" on page 34.)

When this bit is set to '1', the Clarity Elite 8x8 or Prowler 8x8 performs automatic conversion of the analog and digital signals. The Volume and Tone controls will affect both the analog and digital outputs, and the inputs will be automatically selected based on the signals present on the inputs. The selection is done on an input by input basis, and the priorities are:

- If no digital signal is present, the analog input will be used. The analog audio will be converted to digital audio and be available on the digital outputs, as well as the analog outputs. Volume and Tone settings will affect both digital and analog outputs.
- If a stereo PCM digital signal is present, the digital input will be used. The digital audio will be converted to analog audio and be available on the analog outputs, as well as the digital outputs. Volume and Tone settings will affect both digital and analog outputs.
- If a Dolby Digital or DTS Audio, or some other form of non PCM encoded bitstream audio is present on the digital inputs, then the digital audio will be routed, unaffected to the digital outputs, and the analog audio will be routed to the analog outputs. Volume and Tone settings will only affect the analog outputs.
- The Clarity Elite 8x8 or Prowler 8x8 will automatically choose between the Coax and Optical inputs based on the presence of a signal. If there are digital signals present on both the Coax and Optical inputs, the Clarity Elite 8x8 or Prowler 8x8 will choose the Coax input as its source.

When in the auto conversion mode, the digital paths cannot be switched independent of the analog paths. In this mode, there is no "digital" and "analog" paths, but simply an audio path, with multiple types of inputs and outputs.

'VMU' Enable / Disable Video Blanking when a Zone is Muted

When the Clarity Elite 8x8 or Prowler 8x8 receives an extended IR commands to mute a zone, the 'VMU' setting determines if the video is blanked when the zone is muted.

If the 'VMU' bit is '0', then the video will be unaffected when an IR mute command is received.

If the 'VMU' bit is '1', then the video will be blanked when an IR mute command is received.

Setting both the 'VMU' and 'AMU' bits to '0', effectively disables the IR mute option.

This option has no affect on the muting that is done as part of the switching delays given in the 'DZ' command, it also has no affect on the 'MZ' command.

'AMU' Enable / Disable Audio Muting when a Zone is Muted

When the Clarity Elite 8x8 or Prowler 8x8 receives an extended IR commands to mute a zone, the 'AMU' setting determines if the audio is muted when the zone is muted.

If the 'AMU' bit is '0', then the audio will be unaffected when an IR mute command is received.

If the 'AMU' bit is '1', then the audio will be muted when an IR mute command is received.

Setting both the 'VMU' and 'AMU' bits to '0', effectively disables the IR mute option.

This option has no affect on the muting that is done as part of the switching delays given in the 'DZ' command, it also has no affect on the 'MZ' command.

'MJP' Enable / Disable Mute Volume Jump Option

When this bit is set to '0' incrementing the volume of a muted zone will cause the zone's volume to increment from the current muted level. This is the "no surprises" mode of operation. If one person mutes a zone and walks out of the room, someone else can walk into the room and pick up the volume control and start adjusting the volume with no surprises. The volume will simply start increasing from the current level.

When this bit is set to '1' incrementing the volume of a muted zone will cause the zone's volume to jump back to its unmuted level before incrementing the level. This mode is most useful when only one person is in control of the volume. For instance if the phone rings, the mute button can be pressed. Once the call is over, pressing any volume button will cause the volume to jump back to it's previous setting. Since the same user pressed the mute button, he/she won't be suprised when the volume jumps back to its previous value.

The above behaviors are supported by the IR up/down commands, and the '+' and '-' options of the serial / IP 'VZ' and 'VPZ' commands. Using the 'VZ' or 'VPZ' commands to set the volume directly (leaving out the '+' or '-' characters), will not affect the mute setting.

'XE' Transmit Enable Settings

In the asynchronous mode of operation, the Clarity Elite 8x8 or Prowler 8x8 will transmit state changes as they occur. There are many parameters that a controller might not be interested in (key presses, IR codes, etc).

This command allows enabling / disabling the transmission of different parameters on a parameter by parameter basis.

Enabled transmissions will transmit their new state any time their status changes. Disabled transmissions, will enter the polled mode. Their state changes will be logged and can be polled using the Query Status commands (See: "'Q', 'QSZ', 'QMZ', 'QDZ' Query Status Commands" on page 17).

Command formats:

^XE settings1 , settings2\$	Set the enable bits to 'settings'
^XE +settings1 , settings2\$	Set enable bits indicated in 'settings' to 1
^XE -settings1 , settings2\$	Reset enable bits indicated in 'settings' to 0
^XE ?\$	Query for current settings

Response String:

- Bit-5 - Save IP parameters
- Bit-6 - Save composite converter settings
- Bit-7 - Reserved
- Bit-8 - Save zone's volume
- Bit-9 - Save zone's audio parameters (bass, treble, eq, mute level, zone gains, etc. all but volume)
- Bit-10 - Save source audio parameters (input gains)
- Bit-11 - Save global audio parameters (master volume, volume and mute fade times)

'FS' Reset to Factory Settings

This command will reset the Clarity Elite 8x8 or Prowler 8x8 to the factory default settings.

Every user adjusted setting will be lost!

Command format:

`^FS 246$` Any value but '246' will cause this command to be ignored

Response String:

There is no response string to the FS command, this command is write only.

'LI' Lighting Mode and Intensities

This command uses a bitmapped parameter. Each bit can set or reset without affecting the other bits. (See: "Using Bitmapped Parameters" on page 7, for more information on using bitmapped parameters.)

Allows changing the behavior of the front panel LEDs, and adjusting their intensities.

`^LI mode,dim,bright,off$` Set mode and intensities
`^LI ?$` Query for current settings

Response String:

`^=LI mode,dim,bright,off$` Set mode and intensities

Where:

mode = Lighting mode (Settings: 0=Off, 1=Dim, 2=Bright, 3=Auto-dim)
dim = Intensity of dimmed LEDs (Range: 0-100)
bright = Intensity of brightened LEDs (Range: 0-100)
off = Intensity of the standby power LED (Range: 0-100)

Response Example:

`^=LI 3,020,090,010$` Mode=Auto, dim=20%, bright=90%, off=10%

The mode settings allow you to set the front panel LEDs to always be off, always at the 'dim' intensity, always at the 'bright' intensity, or auto-dim from 'bright' to 'dim' when the front panel is not in use.

The intensities range for 0, which is off, to 100, which is full intensity.

When setting parameters, not all parameter have to be present, if a parameter is not present, it will be left unchanged. For instance to change just the 'bright' value to 50%:

`^LI ,,50$` -> Set the 'bright' intensity to 50%

Only the 'bright' intensity is affected.

'K' Key Emulation

This command allows access to the internal keyboard handling of the Clarity Elite 8x8 or Prowler 8x8. Each key generates a value upon being pressed, and a different value upon release.

The Power toggle key also generates a unique value when held for 4 seconds, which is used to enter the setup mode. Other combinations may also generate unique codes.

This command allows the controller to detect front panel key presses even when the front panel keys are disabled (See: “**KE’ Key Enable / Disable**” on page 47). This allows the controller very tight control over the Clarity Elite 8x8 or Prowler 8x8. By disabling the front panel keys, and by then having the controller process the front panel key presses of the Clarity Elite 8x8 or Prowler 8x8, the controller can redefine the operations of the Clarity Elite 8x8 or Prowler 8x8.

Because of the tight link between this command and the Clarity Elite 8x8 or Prowler 8x8’s firmware, there are some caveats when using this command. The Zektor firmware expects a key press code to always be followed by a key release code. Sending these codes out of logical order will not harm the Clarity Elite 8x8 or Prowler 8x8, but may result in unpredictable behavior (keys codes ignored, or unexpected state changes).

`^K keycode_1,keycode_n...$` Send one or more key codes to the A/V switch.
`^K ?$` Query for any buffered key presses.

Response String:

`^=K keycode_1,keycode_n...$`

Where:

`keycode_1,keycode_n... = A variable number of key codes (1 to 16 codes per command).`

The keycodes for the Clarity Elite 8x8 or Prowler 8x8’s front panel are defined as follows:

Key Name	Pressed Code	Released Code
1	1	43
2	2	44
3	3	45
4	4	46
5	5	47
6	6	48
7	7	49
8	8	50
Zone 1	9	51
Zone 2	10	52
Zone 3	11	53
Zone 4	12	54
Zone 5	13	55
Zone 6	14	56
Zone 7	15	57
Zone 8	16	58
A/V Toggle	20	62
Power Toggle	42	63

The “Pressed Code” is the value returned when a key is pressed, and the “Released Code” is the value returned when a key is released.

In the polled mode, only the last 16 key presses will be logged between queries, after that, new key presses overwrite the old ones in the internal buffer and will be lost to the controller.

The maximum number of key codes that can be sent is 16. If more than 16 key codes are sent a “parameter count error” will be returned and only the first 16 key codes will be accepted.

There are also quite a number of codes that are unique to this command that cannot be generated by pressing a front panel key. These extended codes allow for better control of the Clarity Elite 8x8 or Prowler 8x8.

Extended key codes are:

Code	Description
0	When Issued: Exits any setup modes.
0	When returned by query: No keys have been pressed since last the query.

Codes 200 and above are IR keycodes, and behave the same as pressing an IR key.

The ‘0’ code has special meaning. When returned in a Query Response string it means there are no keys waiting in the buffer. When issue by the user, it acts like an exit key, used to exit setup modes, similar to pressing the Power Toggle key, but it will be ignored if the Clarity Elite 8x8 or Prowler 8x8 is not in a setup mode. By issuing ‘0’ codes, the Clarity Elite 8x8 or Prowler 8x8 can be returned to a known state, regardless of any possible setup state it might be in.

‘KE’ Key Enable / Disable

Individual keys (front panel or IR) can be disabled (ignored when pressed).

For instance, if the breakaway option is not going to be used, it could be convenient to disable the “A/V Toggle” key.

The command format is:

^KE keycode , setting\$	Enable / disable a front panel key
^KE keycode , ?\$	Read the state of the ‘btn’ key
^KE ?\$	Read the state of all keys

Response String:

^=KE keycode , setting

Where:

keycode	= The key to be enabled / disable.
setting	= The enable / disable setting. 0=Disabled key, 1= Enabled key.

For a definition of ‘keycode’ see: “‘K’ Key Emulation” on page 45

‘IPA’ Set / View TCP/IP Address

The command format is:

^IPA xxx , xxx , xxx , xxx\$	Set new TCP/IP address
^IPA ?\$	Read the current TCP/IP address

Response String:

^=IPA xxx , xxx , xxx , xxx\$

Where:

xxx,xxx,xxx,xxx = IP address in standard form (Default: 192,168,1,200)