Quintech SRM/SRB/SMC Series Protocol v3.15

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This document specifies a common command protocol that can be used to control a Quintech SRM, SRB, or SMC control module from a computer.

Protocol 3.15 is a superset of the previous 2.15 and 3.00 protocols. It provides a common protocol command set for both SRB and SRM matrix systems. A SRM control module running protocol 3.15 will be backward compatible with control software built for protocol 2.15. A SRB control module running protocol 3.15 will be backward compatible with control software built for protocol 3.00. The common command set is given in the first section and alternates for backward compatibility in the second section.

Definitions:

FFI: Full fan-in. Any number of inputs can be connected to one output.

FFO: Full fan-out. One input signal can be routed to any number of outputs.

SMC: Unidirectional Switch module with FFO and FFI capability. Typical size is 16 inputs by 16 outputs. Larger matrix systems are built up from these modules

SRB: Bi-directional Switch module with FFO and FFI capability. Typical size is 16 by 16 with two Ports labeled A and B. Larger matrix systems are built up from these modules.

SRD: Signal distribution modules. These provide multiple copies of input signals.

SRM: Unidirectional Switch module with FFO capability. Typical size is 16 inputs by 16 outputs. Larger matrix systems are built up from these modules.

SRO: Switch output module. A SRO is needed for matrix systems if the number of matrix inputs is greater than the number of inputs for one SRB or SRM.

In this document the terms SRB, SMC, and SRM are used to generically indicate a matrix system built from one or more of these modules or the matrix control module for such a system. A matrix larger than 16 inputs by 16 outputs (16x16) is built from all the same type of switch modules plus SRD and SRO modules. Crosspoint refers to one connection between a matrix input and output or between a matrix Port A and Port B.

Some commands allow outputs or ports to be turned off. SRB or SMC modules can always turn their ports or outputs off. SRM modules with less than 16 inputs can turn their outputs off by connecting to the non-existent input 16. SRM matrices with SRO modules can also turn off their outputs at the SRO output regardless of the number of SRM module inputs. SRM matrices that do not meet either of these criteria will return an error message for those commands that turn off outputs.

Command Summary

This list gives the commands defined in Protocol 3.15. Different systems implement different subsets of this command set. Check the command availability table on the next page to see if the command is available for your system.

C Check Change Flag / Unit Status. This flag will be set if a crosspoint has been changed since the last polling or if any alarms are present.

D Delete a crosspoint. Disable one path between an output and input.

F Firmware version. Identifies the SRB or SRM model, protocol and firmware version, and size of the matrix as set on the controller.

G Set gain/attenuation level for an input port.[1]

I Read gain/attenuation level for an input port.[1]

L Lock the front panel controls (or a crosspoint[1]).

M Messages. Retrieve specific alarm messages, etc. Reserved for future use.[1]

N No Alarms. Disable alarms. Reserved for future use.[1]

O Input/output query. Query the status of an output or one Port A to one Port B.

P Poll a port. Query for a list of all inputs connected to a single output.

Q Check queue. The queue stores up to 8 local changes made since the last check.

R Reset the matrix.

S Set a crosspoint. Enable a path from an input to an output or between ports.

T Turn off an output.

U Unlock the front panel keypad (or a crosspoint[1]).

V Vector. Sends a vector of switch settings for a single output or Port B.

X Check I/O status of a single port.[1]

[1] This command is not available on most systems.

Command and Feature Availability

The table below shows the command and feature availability for different protocols and firmware releases. An “X” means that the command or feature is available. SRB/C refers to a matrix system with SRB or SRC units.

Protocol Version	3.15	3.15
Firmware Revision	5.42	6.xx
System Module Type	SRM	SRB/C
Commands		
C – Check Change Flag	X	X
D – Delete Crosspoint	X	X
F – Firmware Version	X	X
G – Set Gain/Attenuation		
I – Read Gain/Attenuation		
L – Lock Front Panel	X	X
M – Messages		
N – Disable Alarms		
O – Output Query	X	X
P – Poll Port	X	X
Q – Check Queue	X	X
R – Reset Matrix	X	X
S – Set Crosspoint	X	X
T – Turn Off Output	X	X
U – Unlock Front Panel	X	X
V – Vector Switch Set		X
X – Check Port I/O Status		
Features		
Front panel selection of RS-232 or RS-422/485	X	X
Supports multiple units on a shared RS-485 bus	X	X
Supports remote units	X	
Supports PC control of remotes	X	

Protocol Message Structure

Commands are sent to a SRB or SRM over a serial link using a standard STX/ETX protocol wrapper. Each packet includes a header byte, a two-byte address field, a command byte, necessary data bytes, end byte, and a checksum byte. The bytes are transmitted using an 8-bit word, with 1 stop bit and no parity. The general form for commands and messages is:

Header Address Command Databyte(s) End Checksum

Control Bytes

Control bytes are transmitted as hexadecimal values.

Command Header Byte = STX (0x02)

Command End Byte = ETX (0x03)

Response Header Byte = ACK (0x06) for accepted commands.

Response Header Byte = NAK (0x15) for rejected commands.

Response End Byte = ETX (0x03)

The Header Byte (STX) is also used to reset the command receive buffer. If this byte is received, it will be accepted as the beginning of a new message. The previous message will be discarded. The only exception to this is if the byte (0x02) is a checksum byte. When the buffer is reset, the checksum byte is also reset.

There is a 32-byte limit on command length. Any command longer than this will automatically generate an error response if or when an ETX end byte is received. If a new STX is received before an ETX, it will reset the command receive buffer and no error message will be sent.

Address Field

The address field consists of two ASCII digits. The address for a control unit is normally set using a front panel keypad or a rear panel rotary switch. Each unit will only respond to a command with a matching address. This allows multiple control units to be connected on a shared RS-422/485 control bus. The address can be set from 00 to FF on units with front panel configuration.

The address field is used somewhat differently in systems where a single 16 input X 16 output switch module serves as a master control unit with several 16x16 slave units. In this case the addresses for the master and the slaves are pre-assigned. The master unit has address 00, slave 1 has address 01, slave 2 address 02, and so on to slave 9 with address 09.

For this type of system the master control unit keeps track of changes for the whole system. Check Change Flag commands “C” or Queue Check commands “Q” can have any valid module address, either master or slave. The response will pertain to the entire system as well instead of an individual module.

Command

The command is a single ASCII character from A to Z. A list of available commands is in the next section.

Data Bytes

Each command has a fixed number of data bytes. A response to a command may have a variable number of data bytes. In that case one of the data bytes will signify how many data bytes are contained in the message.

Checksum

The checksum byte is a bit wise Exclusive OR (XOR) of all the bytes, inclusively, from the header to the ETX. For example:

```
02h 30h 30h 51h 03h 50h
STX  0   0   Q  ETX CHK
```

Command Descriptions

C: Check Change Flag/Unit Status

The change flag tells the user if any crosspoint changes are in the queue. The queue will store up to eight changes made from the local front panel keypad control. This command can be sent periodically to check if any local changes have been made or if any alarms have occurred. The change flag is cleared only when the queue is empty. The response will always contain 8h as the MSD (most significant digit). The LSD (least significant digit) will be determined as follows:

0h – No Change since last “Q” Check Queue command.

1h – At least one crosspoint has been changed locally.

2h – At least one alarm is present.

8h – The queue has overflowed.

If the queue has overflowed, all crosspoints should be queried.

Command sent:

```
02  XX  XX  43  03  XX
STX ADR ADR  C  ETX CHK
```

Examples of positive responses:

```
06  XX  XX  43  80  03  XX
ACK ADR ADR  C  80  ETX CHK (No changes have occurred)

06  XX  XX  43  81  03  XX
ACK ADR ADR  C  81  ETX CHK (Changes have occurred)

06  XX  XX  43  88  03  XX
ACK ADR ADR  C  88  ETX CHK (The queue has overflowed)

06  XX  XX  43  83  03  XX
ACK ADR ADR  C  83  ETX CHK (An alarm and changes have occurred)
```

D: Delete Crosspoint

This command will delete or turn off one crosspoint. The command byte is followed by 3 ASCII bytes for the Port A or input connection and 3 ASCII bytes for the Port B or output connection. For a SRM, the specified output will be turned off if that feature is available regardless of the specified input.

Example command sent:

```
02  XX  XX  44  30  30  31  30  30  32  3   XX
STX ADR ADR  D   0   0   1   0   0   2  ETX CHK
```

Example action performed:

SRB: Turn off the connection from Port A 1 to Port B 2.

SRM: Turn off the connection from input 1 to output 2 if possible. If the system does not support turning outputs off then a “command unavailable” error will be returned.

SMC: Turn off the connection from input 1 to output 2.

Positive response:

```
06  XX  XX  44  03  XX
ACK ADR ADR  D  ETX CHK
```

F: Firmware Version / Unit ID

This command will return a message with the protocol and firmware versions, the series and model number, and the size of the matrix. The fields will be returned as follows: “Firmware version” “Protocol version” “Model Number”/ “Matrix Size”. For example, a SRB 2100/16x16 would have a response of the form, “Fv6.00 Pv3.15 SRB2100/016X016”. A 32x64 SRM would give a response of the form “Fv5.10 Pv3.15 SRM2150/032X064”.

Command sent:

02	XX	XX	46	03	XX
STX	ADR	ADR	F	ETX	CHK

Example of positive response:

06	XX	XX	46	76	35	2E	31	30	20	50	76	33	2E	31	35	20…
ACK	ADR	ADR	F	v	5	.	1	0		P	v	3	.	1	5	…

…56	55	4C	32	31	35	30	2F	30	33	32	58	30	36	64	3	XX
…	S	R	M	2	1	5	0	/	0	3	2	X	0	6	4	ETX CHK

L: Lock out front panel control

The front panel controls will be locked until the power is cycled, a software reset “R”, or the “U” remote unlock command is issued.

Command sent:

```
02  XX  XX  4C  03   XX
STX ADR ADR  L  ETX CHK
```

Positive response:

```
06  XX  XX  4C  03  XX
ACK ADR ADR  L  ETX CHK
```

The front panel will display “Keypad Lockout On” while the lock is enabled.

O: Query Input/Output Channel

This command queries the status of one Port A (input) to one Port B (output) path.

Example command sent:

```
02  XX  XX  4F  30  30  31  30  30  32  03  XX
STX ADR ADR  O   0   0   1   0   0   2  ETX CHK
```

Example positive responses:

```
06  XX  XX  4F  44  03  XX
ACK ADR ADR  O   D  ETX CHK
(Port A-1 is not connected to Port B-2)

06  XX  XX  4F  53  03  XX
ACK ADR ADR  O   S  ETX CHK
(Port A-1 is connected to Port B-2)
```

This command is useful for matrix switches with FFI since multiple inputs can be connected to one output. For a SRM it is more useful to use the Poll Port command or to use the alternate form.

There is an alternate SRM only version of this command. See the section on alternate commands for more information.

P: Poll a Port

This command will poll port A/B for all ports B/A currently connected to it. For each connection three bytes will be returned after the command designator in the response. Note that for large SRB or SMC systems the number of connection bytes in a response could be very long, up to 3 times the number of inputs or outputs.

Command field variants:

SRB: A = Port A. B = Port B.

SMC: A = input. B = output.

SRM: A is not recognized and will return an "improper data" error. B = output. For a SRM this command is functionally equivalent to the Output Query command "O".

Example commands sent:

```
02  XX  XX  50  41  30  30  31  03  XX
STX ADR ADR  P   A   0   0   1  ETX CHK
(Query Port A-1 or input 1)

02  XX  XX  50  42  30  31  36  03  XX
STX ADR ADR  P   B   0   1   6  ETX CHK
(Query Port B-16 (output 16))
```

Example positive responses:

```
06  XX  XX  50  30  30  31  30  30  32  30  30  33  03  XX
ACK ADR ADR  P   0   0   1   0   0   2   0   0   3  ETX CHK
(Port A-1 is connected to Port B 1, 2, and 3)

06  XX  XX  50  03  XX
ACK ADR ADR  P  ETX CHK
(Port A-1 is not connected to any Port B)

06  XX  XX  50  30  30  37  03  XX
ACK ADR ADR  P   0   0   7  ETX CHK
(Port B-16 (output 16) is connected to Port A-7 (input 7))
```

Q: Check Queue

This command will read the change queue. The change queue contains up to 8 changes executed from the local (front panel keypad) control since the last Q command. The ASCII number after Q in the response is the number of changes that the queue contains. If no crosspoint changes are stored in the queue this number will be zero (30h). If more than 8 changes occurred since the last Q command, this number will be 8 (38h) and bit 3 of the queue change flag will be set to signal that an overflow has occurred. After the queue is checked the queue and the queue change flag are cleared.

The “QU” command will produce a common response from all standard SRB, SRC, and SRM units. In order to maintain backward compatibility with previous protocols an alternate command with only “Q” will also be recognized. However, with this command a different response will be sent from a SRM and a SRB or SMC. A specialized master/slave system will also have a different response format. See the section on alternate formats for more information.

Command sent:

```
02  XX  XX  51  55  03  XX
STX ADR ADR  Q   U  ETX CHK
```

Example positive responses:

```
06  XX  XX  51  30  03  XX
ACK ADR ADR  Q   0  ETX CHK
(No changes have occurred)

06  XX  XX  51  32  30  30  35  30  31  35  53…
ACK ADR ADR  Q   2   0   0   5   0   1   5   S…

…30 31  36  30  30  31  44  03  XX
… 0  1   6   0   0   1   D  ETX CHK
[Two changes have occurred: Port A-5 (input 5) was connected to Port B-15
(output 15), and Port A-16 (input 16) was disconnected from Port B-1
(output 1).]
```

A main controller will add local keypad changes and any change done at a remote unit to the queue. A remote unit will add all system changes to its local queue.

R: Reset Matrix

This command will perform a software reboot and reset of the system. A reset command will only be accepted by the main matrix controller in order to maintain system coherency. A reboot clears the change flag, the change queue, and resets the serial interface and input buffers. There are two options. If a “C” for “crosspoint reset” follows the command byte then all outputs or port connections are turned off (if possible) as part of the reset. If an “N” or any character except C follows the command byte then the matrix will be reinitialized but the status of the ports or outputs will be unchanged. During the reboot process the matrix controller will not accept any new commands, and any commands sent during the reboot will be lost.

A SRM system that does not support turning off outputs will ignore the “C” option.

Example commands sent:

```
02  XX  XX  52  43  03  XX
STX ADR ADR  R   C  ETX CHK
(Reboot and turn off all outputs and connections if possible)

02  XX  XX  52  43  03  XX
STX ADR ADR  R   N  ETX CHK
(Reboot but do not change the matrix switch state)

02  XX  XX  52  03  XX
STX ADR ADR  R  ETX CHK
(Short form equivalent to R+C, Reboot and turn off all outputs and
connections if possible)
```

Positive response sent after the reboot:

```
06  XX  XX  52  03  XX
ACK ADR ADR  R  ETX CHK
```

Previous protocol versions sent a response before the reboot started and did a partial reset. With protocol 3.15 a more thorough reset is provided which is equivalent to a power-on reset. The reset takes approximately 3 seconds plus additional time to set or clear switchpoints. The positive response is sent after the reboot process has finished.

Commands sent after the reset command and before the positive response is given will be lost when the serial interface is reset. However, if a command is sent after the serial interface is reset but before the response is given, the command will be serviced as long as the 16-character input buffer does not overflow.

During the reboot process the serial port drivers are turned off for approximately 200 ms. This may be interpreted by some systems as a byte of data = “FF” being sent from the matrix.

S: Set Crosspoint

This command will connect one Port A to one Port B or one input to an output. The input or Port A channel is specified first with “A” followed by three bytes giving the input or channel number. The output or Port B channel is specified second with “B” followed by three bytes giving the output or channel number. The A and B designators are required to insure backward compatibility with previous protocols.

Example command sent:

```
02  XX  XX  53  41  30  30  31  42  30  30  32  03  XX
STX ADR ADR  S   A   0   0   1   B   0   0   2  ETX CHK
(Connect Port A-1 to Port B-2)
```

Positive response:

```
06  XX  XX  53  03  XX
ACK ADR ADR  S  ETX CHK
```

An alternate format is also available. Check the section on alternate commands for more information.

T: Turn Off Output

This command will disconnect all connections to the specified port or output.

Command field variants:

SRB: A = Port A. B = Port B.

SMC: A = input. B = output.

SRM: A is not recognized and will return an “improper data” error. B = output. If the system does not support this command then a “command unavailable” error will be returned.

Example commands sent:

```
02  XX  XX  54  41  30  30  37  03  XX
STX ADR ADR  T   A   0   0   7  ETX CHK
(Disconnect Port A-7)

02  XX  XX  54  42  30  30  33  03  XX
STX ADR ADR  T   B   0   0   3  ETX CHK
(Disconnect Port B-3 or output 3)
```

Positive response:

```
06  XX  XX  54  03  XX
ACK ADR ADR  T  ETX CHK
```

An alternate format is also available. Check the section on alternate commands for more information.

U: Unlock front panel control

This command will unlock the front panel keypad control after it has been locked with an “L” command.

Command sent:

```
02  XX  XX  55  03  XX
STX ADR ADR  U  ETX CHK
```

Positive response sent:

```
06  XX  XX  55  03  XX
ACK ADR ADR  U  ETX CHK
```

V: Set a block of switches using a binary vector

This command is only available on SRB or SMC matrix systems.

The vector command sets a block of up to 16 switches corresponding to a particular Port B. The Port B or output number is specified by the 3 bytes following the command byte. A Port A or input bank number follows the Port B number. The bank number B corresponds to the set or bank of Port A switches to be set. Each bank contains M ports, where M = number of Port A channels per SRB or SMC module. The bank number is between 0 and F hex and selects a set of outputs BM+1 to (B+1)M. For example, in a system with 16x16 SRB modules, bank 0 selects ports A1 – A16, bank 1 selects ports A17 – A32, and so on.

The bank designation is followed by a 2 byte hexadecimal representation (16-bit vector) of the binary state of the M ports A. The least significant bit corresponds to the lowest number port in a bank and the most significant bit corresponds to the highest number port in a bank. These 2 bytes must be sent as 4 ASCII characters.

Example commands sent (16 inputs per SRB or SMC):

```
02  XX  XX  56  30  30  31  30  46  46  30  30  03  XX
STX ADR ADR  V   0   0   1   0   F   F   0   0  ETX CHK
(Connect port B1 to ports A9 – A16)

02  XX  XX  56  30  30  37  32  30  30  37  30  03  XX
STX ADR ADR  V   0   0   7   2   0   0   7   0  ETX CHK
(Connect port B7 to ports A37 – A39)
```

Example command sent (12 inputs per SRB or SMC):

```
02  XX  XX  56  30  31  32  32  46  30  30  46  03  XX
STX ADR ADR  V   0   1   2   1   F   0   0   E  ETX CHK
(Connect port B12 to ports A14 – A16.)
(Bits 13-16 of the vector are ignored.)
```

Positive response sent:

```
06  XX  XX  56  03  XX
ACK ADR ADR  V  ETX CHK
```

There is an alternate master/slave only version of this command. Check the section on alternate commands for more information.

Alternate Commands

The alternate commands fall into two different categories: command formats included for backward compatibility with earlier protocols, and command formats or responses specific to matrix variants like master/slave systems.

Legacy command formats that are included for backward compatibility with earlier protocols will continue to be supported for the foreseeable future. Some of the alternate commands provide a shorter command but no additional capabilities over the common command set.

Command formats and responses specific to master/slave systems are only supported for those systems and should not be used for any other system.

O: Query Input/Output Channel (Alternate)

This is a legacy SRM only command format and response. It queries the status of one output path on a SRM system. An input = 0 means that the output is off. A space is inserted after the 3 bytes giving the input number. This format is not supported on SRB or SMC systems and will return an “improper data” error.

Example alternate command sent to SRM:

```
02  XX  XX  4F  30  30  31  03  XX
STX ADR ADR  O   0   0   1  ETX CHK
(Query the status of output 1)
```

Examples of positive responses:

```
06  XX  XX  4F  30  30  32  03  XX
ACK ADR ADR  O   0   0   2  ETX CHK
(Output 1 is connected to input 2)

06  XX  XX  4F  30  30  30  03  XX
ACK ADR ADR  O   0   0   0  ETX CHK
(Output 1 is off)
```

Q: Check Queue (Alternate)

This command will read the change queue. The change queue contains up to 8 changes executed from the local (front panel keypad) control since the last Q command. The ASCII number after Q in the response is the number of changes that the queue contains. If no crosspoint changes are stored in the queue this number will be zero (30h). If more than 8 changes occurred since the last Q command, this number will be 8 (38h) and bit 3 of the queue change flag will be set to signal that an overflow has occurred. After the queue is checked the queue and the queue change flag are cleared.

A SRB or SMC system will give the same response to “Q” as “QU”.

Alternate Command sent:

```
02  XX  XX  51  03  XX
STX ADR ADR  Q  ETX CHK
```

Example SRM positive responses:

```
06  XX  XX  51  30  03  XX
ACK ADR ADR  Q   0  ETX CHK
(No changes have occurred)

06  XX  XX  51  32  30  30  35  30  31  35  30  31  36  30  30  30  03  XX
ACK ADR ADR  Q   2   0   0   5   0   1   5   0   1   6   0   0   0  ETX CHK
(Two changes have occurred: output 5 was connected to input 15, and output
16 was turned off)
```

Q: Check Queue (Master/Slave system only)

A master/slave system will respond in the same way to a “Q” or “QU” command.

In a SRB Master/Slave system the master maintains the queue for all the modules in the system. A system with a single 16 x16 Master switch module and 0-8 additional 16 x 16 slave modules has a response to the Q command that is different from standard SRB, SRM, or SMC matrix systems.

There are two major differences. The first is that there are no address bytes immediately following the ACK. The second difference is that each change is preceded by “M” and the address of the module where the change occurred.

Standard Command sent:

```
02  XX  XX  51  55  03  XX
STX ADR ADR  Q  U   ETX CHK
```

Alternate Command sent:

```
02  XX  XX  51  03  XX
STX ADR ADR  Q  ETX CHK
```

Example Master/Slave system positive responses:

```
06  51  30  03  XX
ACK  Q   0  ETX CHK
(No changes have occurred)

06  51  32  4D  30  30  30  30  35  30  31  35  53…
ACK  Q   2   M   0   0   0   0   5   0   1   5   S…

…4D 30  31  30  31  36  30  30  31  44  03  XX
… M  0   1   0   1   6   0   0   1   D  ETX CHK
[Two changes have occurred:
Master (address 00) Port A-5 was connected to Port B-15 and
Slave 1 (address 01) Port A-16 was disconnected from Port B-1]
```

S: Set Crosspoint (Alternate)

This command will connect one input to an output. In this format, the command byte is followed by three bytes giving the output, then three bytes giving the input. The order of inputs and outputs specified in this command is opposite from the common command form. This format was originally for SRM systems only but will be correctly executed on SRB or SMC systems running protocol 3.15.

Example alternate command sent:

```
02  XX  XX  53  30  30  31  30  30  32  03  XX
STX ADR ADR  S   0   0   1   0   0   2  ETX CHK
(Connect output 1 to input 2)
```

Positive response:

```
06  XX  XX  53  03  XX
ACK ADR ADR  S  ETX CHK
```

T: Turn Off Output (Alternate)

This command format is provided for backward compatibility with earlier protocol versions. This command will disconnect all connections to the specified output. In this format, the command byte is followed by three bytes giving the output. Since there is no A/B designator this command can only be used to turn off an output or a Port B channel.

Example alternate command sent:

```
02  XX  XX  54  30  30  33  03  XX
STX ADR ADR  T   0   0   3  ETX CHK
(Disconnect output 3)
```

Positive response:

```
06  XX  XX  54  03  XX
ACK ADR ADR  T  ETX CHK
```

V: Set a block of switches using a binary vector (Master/Slave only)

An alternate form is available for backward compatibility with earlier protocols. This form was only used with 16x16 master/slave SRB systems and should not be used for other types of systems. With this format only the Port B number is given and only ports A1-A16 are affected.

Example command sent:

```
02  XX  XX  56  30  30  31  46  46  30  30  03  XX
STX ADR ADR  V   0   0   1   F   F   0   0  ETX CHK
```

Positive response sent:

```
06  XX  XX  56  03  XX
ACK ADR ADR  V  ETX CHK
```

Negative Responses:

Occasionally, the matrix will be unable to carry out a command due to various reasons. The NAK reply set is provided to help determine where the error occurred. A NAK reply will be sent after the matrix has received the CHK byte.

x: Checksum Incorrect

This reply is sent when the checksum sent by the computer controller is different from the one calculated by the matrix controller. This message would indicate data has been corrupted during transmission.

Negative response sent:

```
15  XX  XX  78  03  XX
NAK ADR ADR  x  ETX CHK
```

c: Command Unrecognized

This type of error message occurs when the matrix receives an unspecified command. The unit will respond as specified below.

Negative response sent:

```
15  XX  XX  63  03  XX
NAK ADR ADR  c  ETX CHK
```

u: Command Unavailable

This type of error message occurs when the matrix receives command that is not implemented or can't be done on a particular system. The unit will respond as specified below.

Negative response sent:

```
15  XX  XX  75  03  XX
NAK ADR ADR  u  ETX CHK
```

i: Improper Data

This reply is sent if an improper number of data bytes are contained in the protocol wrapper. For example, if an "S" command is sent with only an output number and no input number. This error will also be sent for any command that contains too many or too few bytes, even if the command does not have any data bytes.

Negative response sent:

```
15  XX  XX  69  03  XX
NAK ADR ADR  i  ETX CHK
```

d: Data out of Range

This message will be sent if the data bytes sent are outside the parameters of your matrix. If the SRM is polled for the status of output 17 and you only have 16 outputs, you will receive this message.

Negative response sent:

```
15  XX  XX  64  03  XX
NAK ADR ADR  d  ETX CHK
```

PLEASE NOTE: If a message contains multiple errors, the matrix will send a NAK to the first detected error. The unit will check for errors in this order:

1. Checksum error
2. Command unrecognized
3. Command unavailable
4. Improper data
5. Data out of range

Serial Interface

A new command can be sent to the matrix as soon as a response to the previous command is received. If a break in communication occurs while a message is being transmitted the input buffer will automatically clear in about 370 ms and no error response will be given. If the interface should lock up due to some unforeseen condition, the controller will reboot in about 4 seconds and reset the serial interface.

Serial Parameters:

Baud Rate: 9600
Data Bits: 8
Stop Bits: 1
Parity: None
Protocol: STX/ETX
Flow Control: None. The program sending commands must wait until a response is received from the matrix controller before sending another command.

"Control In" Serial Pinouts (Matrix Controller only):

RS-232	RS-422/485
1 – DCD (NOT USED)	1 - GND
2 - RXD	2 - NC
3 – TXD	3 – Non-Inverting Transmit (+)
4 – DTR (NOT USED)	4 – Non-Inverting Receive (+)
5 – GND	5 - GND
6 – DSR (NOT USED)	6 – Inverting Transmit (-)
7 – RTS (NOT USED)	7 - NC
8 – CTS (NOT USED)	8 - NC
9 – NC	9 – Inverting Receive (-)

Note on RS-232 mode:

With the above pinout a null modem is required to directly connect to a standard PC serial port.

Note on shared RS-422/485 bus mode:

The latest firmware revisions allow front panel selection of the serial interface. Possible selections are RS-232, RS-422/485, and Shared 422/485 bus mode. The RS-232 and RS-422/485 modes are for a dedicated connection between the computer controller and the matrix controller. The output driver in these cases is never turned off.

Shared 422/485 bus mode is for a 4-wire 422/485 bus with multiple matrix controllers or other devices connected to it. In this mode a matrix controller will only turn on its driver to give a response to a command addressed to that controller. After the response is sent the driver is turned off. Some receiving programs will interpret the turning off of the driver as an additional "FF" or garbage data byte.