OPERATING MANUAL

QE3 MATRIX SWITCHING SYSTEM

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QUINTECH®
The Source for RF Reliability

QE3 2500
QE3250032X32CAFFF000
Modular Hot-Swap Matrix Switching System

QUALITY MANAGEMENT SYSTEM
CERTIFIED BY DNV
ISO 9001:2008

General Description:

The **QE3250032X32CAFFF000** is a matrix switch and switching subsystem that provides a complete 32x32 matrix, including hot-swappable cards, redundant power supplies, and redundant system controllers in a 6 RU chassis. The modularity of the QE3250032X32CAFFF000 provides easy access to cards for seamless upgrades and maintenance via the front panel without requiring cables to be disconnected or disrupting the signal paths of other cards in the system.

Specifications:

	L-Band	IF
Operating Frequency:	950-2150 MHz	50-200 MHz
Gain Range (manual mode):	-12 dB to +18 dB in 0.5 dB steps	-12 dB to +18 dB in 0.5 dB steps
Impedance:	75 Ω	75 Ω
P1dB:	0 dBm	-1 dBm
OIP^3	+10 dBm	+9 dBm
RF Input Power:	-10 dBm to -70 dBm	-10 dBm to -70 dBm
RF Output Power:	-10 dBm	-10 dBm
Output AGC Level:	-10 dBm to -50 dBm	-10 dBm to -50 dBm
Frequency Response:	± 1.5 dB ± 0.5 dB over any 36 MHz channel	± 1.5 dB ± 0.5 dB over any 36 MHz channel
Isolation (input-to-input):	65 dB min.	65 dB min.
Isolation (output-to-output):	60 dB min.	60 dB min.
Isolation (input-to-output):	50 dB min.	50 dB min.
Input Return Loss:	14 dB	13 dB
Output Return Loss:	14 dB	10 dB
Noise Figure:	22 dB @ 0dB gain	26 dB @ 0 dB gain**

Configuration:	32 inputs / 32 outputs
RF Connectors:	Type F, 75 Ω
Power Requirements:	100-240 VAC autoranging, 50/60 Hz
Power Consumption:	328 W
Local Control:	Front panel keypad with LCD display
Remote Control:	RS-232, RS-422/485, SNMP, TELNET or TCP/IP via customer-supplied PC
Software:	PC-compatible operating software and protocol (included with the system)
Mechanical:	6 RU (10.5" H x 19" W x 25-1/4 " D) (including rear handles)
Weight:	57 lbs.
Certifications:	CE, NRTL/TUV, FCC Part 15

****Note: -20 dBm minimum input signal level is recommended from 50-200 MHz to achieve -50 dBc spurious noise ratio.**

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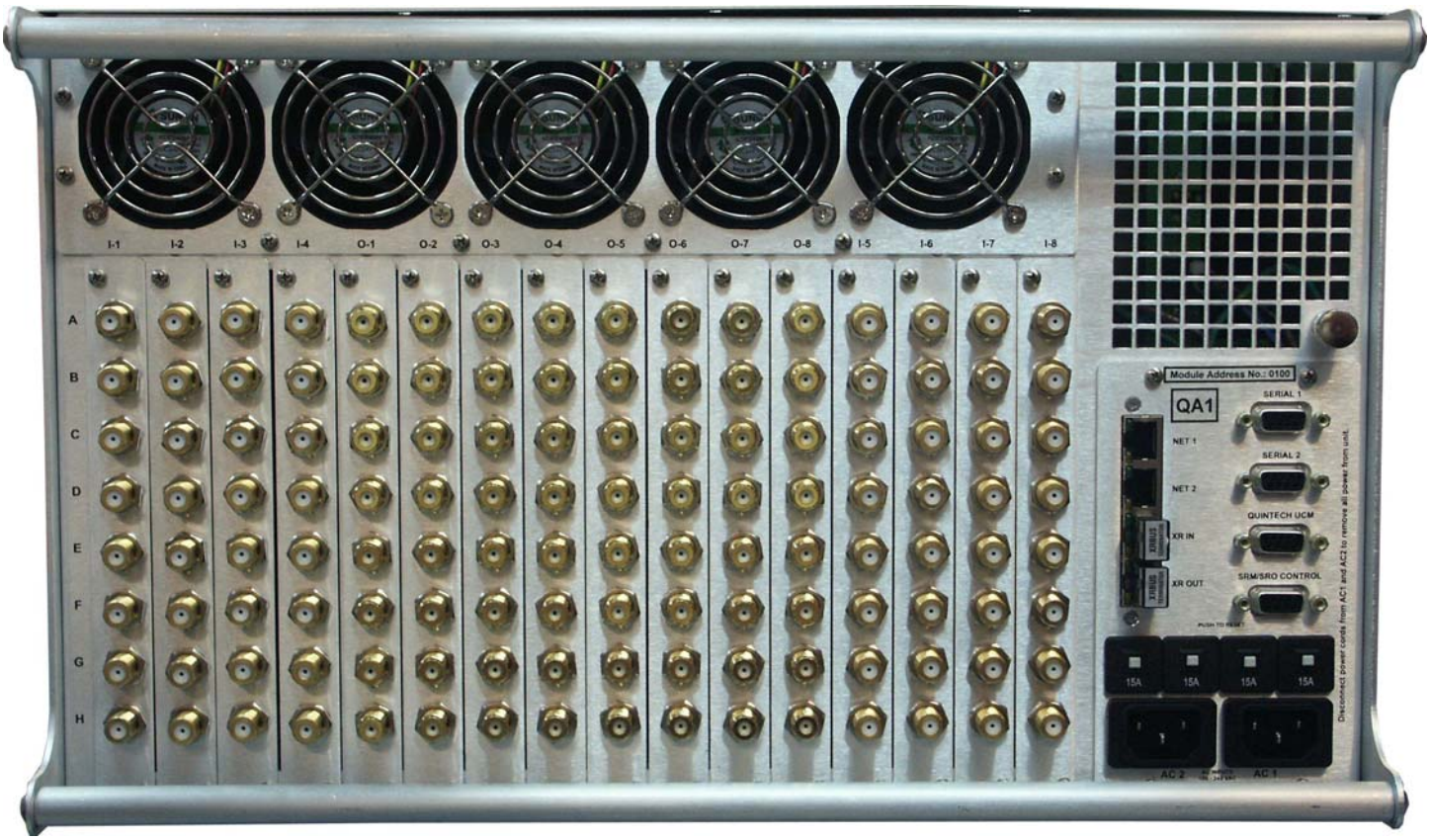

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Quintech XRM/QE3/SRM/MRF/MRM/QRM/LTE Series Protocol v2.15 – Release 07/08/09/10/11

Rev CL, 2/16/2011

This document specifies a common command protocol that can be used to control a Quintech matrix controller from a computer. This protocol is for a full fan-out matrix.

Protocol 2.15 release 07 (2.15.07) is backward compatible with all previous 2.15 protocols.

Protocol 2.15 release 08 (2.15.08) is not backward compatible with 2.15 protocol release 07 but is backward compatible with releases 06 and lower. Release 07 is for XRM products only. Release 08 is for SRM products. SRM products do not have the same features as the XRM products, therefore Release 8 is backwards compatible with 06 and lower releases.

Protocol 2.15 release 09 (2.15.09) is for QE3 products only.

Protocol 2.15 release 10 (2.15.10) is for QRM products only.

Protocol 2.15 release 11 (2.15.11) is for LTE products only.

Command Summary

This list gives the commands defined in Protocol 2.15

B Backup. Various commands to set up the QRM/QE3/XRM Q-Sense feature.

C Check Change Flag / Unit Status. Contains system change flags that indicate whether crosspoints, messages, names, or access control settings have changed.

E Ethernet. Various commands to set Ethernet parameters and control access.

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

I Input. Command to read the access control setting of an input.

K Keypad. Various commands to control access to the front panel keypad.

L Lock a crosspoint.

M Messages. Retrieve message log.

N Name. Commands to manage naming of inputs, outputs, and other parameters.

O Output query. Various commands to get information on the specified output.

P Protected Mode command.

Q Crosspoint queue.

R Reset. Soft reset equivalent to a reboot or a hard reset back to factory defaults.

S Set a crosspoint. Connect an input to an output. Protect and unprotect outputs.

U Unlock a crosspoint.

X XRM, QE3, and QRM commands. Various commands to support the XRM/QE3/QRM advanced feature set.

Z Access Control. Various commands to support control access and manage accounts.

Other commands are reserved for future use.

Command Availability

The table gives the availability of various commands for different protocol releases.

Command	2.15.00	2.15.01	2.15.02	2.15.03	2.15.04	2.15.05	2.15.06	2.15.07	2.15.08	2.15.09	2.15.10	2.15.11
BB								X		X	X	
BBC								X		X		
BBR								X		X	X	
BE											X	
BER											X	
BO								X		X	X	
BOR								X		X	X	
BR								X		X	X	
BRO								X		X		
BT								X		X	X	
BTR								X		X	X	
C	X	X	X	X	X	X	X	X	X	X	X	X
ED				X	X	X	X	X	X	X	X	X
EG			X	X	X	X	X	X	X	X	X	X
EI			X	X	X	X	X	X	X	X	X	X
ELD			X	X	X	X	X	X	X	X	X	X
ELE			X	X	X	X	X	X	X	X	X	X
ELP			X	X	X	X	X	X	X	X	X	X
EP			X	X	X	X	X	X	X	X	X	X
ES			X	X	X	X	X	X	X	X	X	X
F	X	X	X	X	X	X	X	X	X	X	X	X
FX								X	X	X	X	X
IS								X	X	X	X	X
KL					X	X	X	X	X	X	X	X
KS					X	X	X	X	X	X	X	X
KU					X	X	X	X	X	X	X	X
L		X	X	X	X	X	X	X	X	X	X	X
LC								X	X	X		
M								X	X	X	X	X
NI								X	X	X	X	X
NO								X	X	X	X	X
NRI								X	X	X	X	X
NRO								X	X	X	X	X
NSI								X	X	X	X	X
NSO								X	X	X	X	X
NQ								X	X	X	X	X
O	X	X	X	X	X	X	X	X	X	X	X	X
P									X	X		
OS						X	X	X	X	X	X	X
Q	X	X	X	X	X	X	X	X	X	X	X	X
RH				X	X	X	X	X	X	X	X	X
RS				X	X	X	X	X	X	X	X	X
S	X	X	X	X	X	X	X	X	X	X	X	X
SC								X	X	X		
SP								X	X	X		
SU								X	X	X		
U		X	X	X	X	X	X	X	X	X	X	X
XA								X				
XAS								X				
XC								X		X		
XF								X		X	X	
XGA										X		
XGAO											X	
XGH										X		
XGM										X		
XGMO											X	X

XGR								X		X		
XGRO											X	X
XGS										X		
XGTA										X		
XGTD										X		
XGTPA										X		
XGTPD										X		
XGZ										X		
XP								X		X	X	
XPI										X		
XPS										X		
XPT										X		
XPV										X		
XRB								X				
XRC								X				
XRI								X		X	X	
XRO								X		X	X	
XRW								X		X	X	
XT								X		X	X	
XWI								X			X	
XWIS								X		X	X	
ZA							X	X	X	X	X	X
ZAI								X	X	X	X	X
ZAO								X	X	X	X	X
ZC							X	X	X	X	X	X
ZG								X	X	X		
ZI							X	X	X	X	X	X
ZL							X	X	X	X	X	X
ZO							X	X	X	X	X	X
ZP							X	X	X	X	X	X
ZU							X	X	X	X	X	X
ZX							X	X	X	X	X	X

Note 1: Some firmware versions implementing releases 2.15.01 – 2.15.03 allowed an "L" lock command to change a locked output to a different input without first using the "U" unlock command to remove the lock. In order to maintain compatibility over all 2.15 releases, this type of operation is no longer supported.

Note 2: Some commands such as M and N were available earlier in custom firmware versions. Check the command format to determine compatibility between an earlier custom command and the standard command.

Note 3: Release 7 is currently only available on XRM products.

Note 4: Release 9 is currently only available on QE3 products.

Note 5: Release 10 is currently only available on QRM products.

Note 6: Release 11 is currently only available on LTE products.

Firmware Releases

The following tables indicate the firmware releases to date along with which protocol release is implemented.

Firmware	Date	Protocol	Field Update Capability	Control Board	Notes
SRM					
2.56	4/11/03	2.15.02	Serial	1433-F or later	Support for serial firmware upgrade
2.59	10/30/03	2.15.03	Serial/Ethernet	"	Upgrade to 2.6x recommended
2.60	12/02/03	"	"	"	
2.61	12/02/03	"	Ethernet	1433-E only	
2.62	2/04/04	2.15.05	Serial/Ethernet	1433-F or later	
2.63	3/11/04	"	"	"	
2.64	4/28/04	"	"	"	Support for LNB option
2.66	5/12/04	2.15.06	"	"	Support for access control. Command ZG is not implemented. 8 Users, each user set to fixed GID
2.67	6/3/04	"	"	"	SNMP dynamic viewing and main/remote moved under configuration program model type
2.68	6/23/04	"	"	"	Fixes DHCP function
2.69	12/09/04	"	"	"	Fixes SNMP function
2.71	6/14/05	"	"	"	Includes 15 Second screen refresh
2.73	7/05/06	"	"	"	Support for BAE 32x2 system only
2.74	5/03/07	2.15.08	"	"	Added features
2.75	8/21/07	2.15.08	"	"	Added features. Input access control, enhanced M&C LCD panel. ZAI & ZAO commands.
2.76	9/21/10	2.15.08	"	"	Added features priority and protected modes. Full SNNP protocol control. Commands SP, SC, SU, LC, IS, PM, and ZG. Short form L, SP, and U commands. SNMP event traps generated.
2.77	1/4/11	2.15.08	"	"	Multiple internal fixes and additions. MAX size 464. Features remain same.
QRM					
4.00	03/12/09	2.15.10	Ethernet	1661	Added QRM specific commands
4.03	04/07/09	2.15.10	Ethernet	1661	Added "M" cmd & alarm msgs
4.04	04/29/09	2.15.10	Ethernet	1661	Added A-B switch backup alarm Deleted XQA command
4.05	06/11/09	2.15.10	Ethernet	1661	Added IS, XRW, XWIS support
4.06-4.10	06/09	2.15.10	Ethernet	1661	No Protocol Changes
4.11	07/29/09	2.15.10	Ethernet	1661	Added BB, BBR, BE, BER, BO, BOR, BR, BT, and BTR for Q-Sense. These commands replace and render obsolete XBRO and XBWO.

Firmware	Date	Protocol	Field Update Capability	Control Board	Notes
XRM					
7.00	10/25/05	2.15.07	Serial	1514-D or later	Support for XRM features and I/O naming. . No remote UCM support.
7.01	11/07/05	2.15.07	Serial	1514-D or later	Fixes messages command. Messages are generated for all RF levels if threshold is set larger than -77dBm. Fixes RS-485 on control in serial port . . No remote UCM support.
7.02		2.15.07	Serial	1514-D or later	Internal Release
7.03	1/9/06	2.15.07	Serial	1514-D or later	Internal Release
7.04	1/26/06	2.15.07	Serial	1514-D or later	Uses "CAN" bus communication between Processor and PIC. . No remote UCM support.
7.05	4/25/06	2.15.07	Serial	1514-D or later	Firmware supports only 32x64 size with 2 XRM units with 1514s and 1 XRD unit. Internal XRM reading of RF dBm values not supported. . No remote UCM support.
7.06	5/15/06	2.15.07	Serial	1514-D or later	Firmware supports only 32x32 size and a remote UCM.
7.07	6/12/06	2.15.07	Serial	1550-D or later	Firmware supports only 32x32 size. System communications based on interrupts, not polling as before. . No remote UCM support.
7.08	6/12/06	2.15.07	Serial	1514-D or later	Firmware supports only 32x32 size. Increased timeout length between XRM and remote UCM.
7.09	8/21/06	2.15.07	Serial	1550-D or later	Supports hot swappable 1550 control card. No support for XRB or XRC commands. Supports XRDs and XROs for systems up to 512x512. No remote UCM support.
7.10	10/2/06	2.15.07	Serial/Ethernet	1550-D or later	Improved communications interface with memory enhanced 1530 on/off card. No remote UCM support.
7.11	10/12/06	2.15.07	Serial/Ethernet	1550-D or later	Improved communications interface with memory enhanced 1530 on/off card. . No remote UCM support.
7.12	10/12/06	2.15.07	Serial/Ethernet	1550-D or later	Improved communications interface with memory enhanced 1530 on/off card. . Limited remote UCM supported. See note
7.13	10/26/06	2.15.07	Serial/Ethernet	1550-D or later	Fixes accidental 1530 on/off card memory re-initialization. Limited remote UCM supported. See note.
7.14	11/19/06	2.15.07	Serial/Ethernet	1550-D or later	Fixes incorrect backup memory writing. Fan PRM read timing change. Support for 512x512. Access control bug fix.
7.15	12/19/06	2.15.07	Serial	1550-D or later	Internal Release
7.16	12/20/06	2.15.07	Serial/Ethernet	1550-D or later	Fan speed read correction. Firmware version and release not stored on XRM memory. Correction now advances version numbers after an upgrade.
7.17	02/07/07	2.15.07	Serial/Ethernet	1550-D or later	Systems requiring multiple XRM units now store and initialize individual XRM unit inputs attenuation values. Support for up to 512x512 size. Possible 256 XRM x 32inputs = 8192 input attenuation values.

Firmware	Date	Protocol	Field Update Capability	Control Board	Notes
XRM					
7.18	03/01/07	2.15.07	Serial/Ethernet	1550-D or later	Enhanced SNMP trap IP address storage. Improved memory allocation. Addition of advanced diagnostic screen for 32x32 systems.
7.19	5/15/07	2.15.07	Serial/Ethernet	1550-D or later	Simtek memory changes for .32 inputs and , 33 outputs. (XRM system inputs) XRO route to zero changed to assume route confirmed from XRM.
7.20		2.15.07	Serial/Ethernet	1550-D or later	Simtek memory write routine modified to support hardware. Simtek written after keypad is released.
7.21	7/16/07	2.15.07	Serial/Ethernet	1550-D or later	Firmware re-written to correct access control bug for 7.09-7.14
7.22	7/18/07	2.15.07	Serial/Ethernet	1550-D or later	Firmware now will boot in main mode in a XRM remote 1RU UCM
7.23	8/31/07	2.15.07	Serial/Ethernet	1550-D or later	Designed to support SRM/XRM combination system. No support for XWI, XRI, XRO, & XA. No front panel for reading RF level set warning level and attenuate inputs if front panel is set to XRM/SRM system.
7.24	11/13/07	2.15.07	Serial/Ethernet	1550-D or later	Fixes input access control for an additional 1RU remote controller.
7.25	12/10/07	2.15.07	Serial/Ethernet	1550-D or later	Adds support for XRO attenuation after a crosspoint change.
7.26	1/22/08	2.15.07	Serial/Ethernet	1550-D or later	Enhanced factory test mode. No changes to customer features.
7.27	2/20/08	2.15.07	Serial/Ethernet	1550-D or later	Add additional XRO attenuation for greater factory flexibility in XRM system testing. No changes to customer features.
7.28	07/14/08	2.15.07	Serial/Ethernet	1550-D or later	Add additional test modes for factory acceptance tests. Autoroute minimum dB level and Delta dB value now can be set at front panel.
7.29	09/23/08	2.15.07	Serial/Ethernet	1550-D or later	Initialization fixes.
7.30	02/09/09	2.15.07	Serial/Ethernet	1550-D or later	Added Autoroute errors to front panel
7.31	05/27/09	2.15.07	Serial/Ethernet	1550-D or later	Added self diagnostic test. Large system fan PS, route data, temperature reads All errors to front panel. Boot up shows % data. Added IS, XGR, and XRW support.
7.32	07/14/09	2.15.07	Serial/Ethernet	1550-D or later	Minor enhancements to scrolling screens.
7.33	07/22/09	2.15.07	Serial/Ethernet	1550-D or later	Screens repair. Improved front panel boot up diagnostics.
7.34	08/4/09	2.15.07	Serial/Ethernet	1550-D or later	Fix input attenuation and fan read screens. Expand boot up LCD comments.

Firmware	Date	Protocol	Field Update Capability	Control Board	Notes
XRM					
7.35	08/26/09	2.15.07	Serial/Ethernet	1550-D or later	Improved front panel interface. Remote UCM support fixed.
7.36	09/21/09	2.15.07	Serial/Ethernet	1550-D or later	Fix to SRM/XRM systems. Alarm report improvements
7.37	10/05/09	2.15.07	Serial/Ethernet	1550-D or later	Fix to S XAS XA commands
7.38	10/07/09	2.15.07	Serial/Ethernet	1550-D or later	Fixes Ethernet download
7.39	10/07/09	2.15.07	Serial/Ethernet	1550-D or later	Fixes Bridge card test mode Will not boot after download
7.40	10/07/09	2.15.07	Serial only	1550-D or later	Fixes boot up problem. Ethernet upgrade not functional
7.41	10/14/09	2.15.07	Serial/Ethernet	1550-D or later	Fixes boot up problem. Ethernet upgrade functional
7.42	10/15/09	2.15.07	Serial/Ethernet	1550-D or later	Fixes boot up problem. Ethernet upgrade functional.
7.43	9/14/10	2.15.07	Serial/Ethernet	1550-D or later	QSENSE, Priority lock and protection mode. B command set. Event SNMP traps. ZG command.
7.44	10/21/10	2.15.07	Serial/Ethernet	1550-D or later	Corrective action for LC command and access control operation. Correct ZI and ZL commands. Add ZG keypad screen.
7.45	02/15/11	2.15.07	Serial/Ethernet	1550-D or later	Corrective action for fan read and GID default values. XRI/O commands made more user friendly.

Firmware	Date	Protocol	Field Update Capability	Control Board	Notes
QE3					
9.01	3/05/09	2.15.09	Serial/Ethernet	1624-A	QE3 Firmware
9.03	3/18/09	2.15.09	Serial/Ethernet	1665	QE3 changed to single processor with shared memory for main and backup processor
9.04	3/18/09	2.15.09	Serial/Ethernet	1665	Added additional boot up screen information.
9.05	3/21/09	2.15.09	Serial/Ethernet	1665	Changed boot procedure for enhanced hardware boot.
9.06	6/17/09	2.15.09	Serial/Ethernet	1665	Added support for SRM/QE3 systems.
9.07	7/8/09	2.15.09	Serial/Ethernet	1665	Added leading zeros to F command system size.
9.08	10/6/09	2.15.09	Serial/Ethernet	1665	DOES NOT REPLACE 907. Released to support 1 system. A 128x64 with 2 QE3s and 2 XROs. Removed all front panel system options except firmware and RF warning levels. 908 does not support any XG subset, XRI, or XRO.
9.09	12/09/09	2.15.09	Serial/Ethernet	1665	Setup XRD/XRO for QE3 systems
9.10	12/22/09	2.15.09	Serial/Ethernet	1665	Adds QED on/off switch
9.11	12/22/09	2.15.09	Serial/Ethernet	1665	Fixes input 100 boot up error.
9.12	05/06/10	2.15.09	Serial/Ethernet	1665	Add 1RU remotes. Protection and priority modes. Add LC,SP,SU,SC, PM, ZG.
9.13	05/12/10	2.15.09	Serial/Ethernet	1665	Fix 1RU remotes. Protection and priority modes shared with remotes. SNMP traps corrected.
9.14	05/12/10	2.15.09	Serial/Ethernet	1665	Fix remote screens. Fix XGA/XGM commands. Add front panel F2=Protect output
9.15	05/27/10	2.15.09	Serial/Ethernet	1665	Add QED termination. Fix RF polling of QI1-2.
9.16	06/17/10	2.15.09	Serial/Ethernet	1665	SNMP protocol buffer
9.17	Internal release	2.15.09	Serial/Ethernet	1665	Modify SC, SP, & L commands, and protect front panel function. Add boot SNMP trap. Added 2 TCP/IP message queues and 3 trap addresses.
9.18	87/8/10	2.15.09	Serial/Ethernet	1665	Fix power supply front panel poll screen. Boot SNMP trap. Added user ID. Alternate L, U, SP, SU commands. Unit address in trap. All SNMP taps sent from main.
9.19	8/10/10	2.15.09	Serial/Ethernet	1665	Fix power supply front panel poll screen. Remove beta version switch.
9.20	8/31/10	2.15.09	Serial/Ethernet	1665	Add QSENSE and QROUTE. Add B commands.
9.21	9/16/10	2.15.09	Serial/Ethernet	1665	Additions to front panel interface.

Firmware	Date	Protocol	Field Update Capability	Control Board	Notes
QE3					
9.22	9/28/10	2.15.09	Serial/Ethernet	1665	Additions to front panel boot up. Q-route alarms. SNMP objects input and output tied to access control.
9.23	10/21/10	2.15.09	Serial/Ethernet	1665	Output access control 1RU remote update fix. Priority lock fix.
9.24	10/26/10	2.15.09	Serial/Ethernet	1665	Fix ZI, ZL, LC commands. Add ZG screen to KP/LCD. Modified access control KP/LCD function to link to GID not UID.
9.25	11/11/10	2.15.09	Serial/Ethernet	1665	QEO attenuation enhancements
9.26	11/16/10	2.15.09	Serial/Ethernet	1665	QEO attenuation enhancements and debug tool removal
9.27	11/18/10	2.15.09	Serial/Ethernet	1665	ZX telnet command restored
9.28	12/2/10	2.15.09	Serial/Ethernet	1665	Adjust memory timing write. Change NQ command.
9.29	12/9/10	2.15.09	Serial/Ethernet	1665	Change boot procedure for AGC value for QE3 inputs. Fix DHCP lockup.
9.30	12/16/10	2.15.09	Serial/Ethernet	1665	Change XGH memory saving function. Redesign set group and set user screen for 14 character names.
9.31	12/21/10	2.15.09	Serial/Ethernet	1665	Fix S command.
9.32	1/5/10	2.15.09	Serial/Ethernet	1665	Modify SNMP response to S, U, SP, SU, and L commands.
9.33	2/16/10	2.15.09	Serial/Ethernet	1665	Add XGS. Enhance boot process. 320x320 support. QEO off switch.

Note: 7.XX and 9.XX firmware has limited support for the remote 1RU controller. Remotes do not support advanced features such as reading RF levels, fan status, power supply status, temperature read, and Qsense, Most advanced feature commands return error code 'u' for unavailable.

Firmware	Date	Protocol	Field Update Capability	Control Board	Notes
Special Builds					
8.00	2/23/06	2.15.06	Serial/Ethernet	1433-F or later	Unique build for 2x24 substitution switch.
8.10	4/18/06	2.15.06	Serial/Ethernet	1433-F or later	Unique build for TXS/RXS fiber optic redundancy switch. Used for TXS215008FFC000-ASI and RXS215008FFC000-ASI.
8.20	11/30/06	2.15.06	Serial/Ethernet	1433-F or later	Unique build for TXS/RXS fiber optic redundancy switch. Used for TXS00700BFC000 and RXS007008BFC000.
8.30	5/30/07	2.15.08	Serial/Ethernet	1433-F or later	Unique build for a RSS 550 RX/TX Router
8.40	07/01/10	2.15.11	Ethernet	1660	LTE firmware initial release
SRX					
1.03	09/23/10	2.15.08	Serial/Ethernet	1433-F or later	Add second TCP/IP support, SNMP protocol buffer, LC, IS, ZG commands, Input access control, naming inputs and outputs, ALT L, and U commands

SNMP Traps

This document assumes the reader has a general working knowledge of SNMP functionality and SNMP traps. SNMP traps are currently supported by the SRM, XRM, QE3, and QRM products.

These Quintech products can generate and send SNMP traps for various conditions or events. Generally they are created and sent to inform about error conditions. Some traps however, can be generated for normal events such as changing crosspoints or locking an output. All SNMP traps can be captured by a monitoring system at the set SNMP trap IP address. There are numerous programs that capture and can display, save, or even forward these traps to other mediums.

SNMP Trap Structure

Quintech SNMP traps contain additional information in a description field that indicates the location and type of condition that generated the SNMP trap and may contain additional details about the condition. The location is usually indicated by an address or number pointing to the exact source of the event. The type of event is usually indicated by a description in a few words about the event.

SNMP Trap Descriptions

SNMP traps are all the same in general structure, but contain different text information related to the condition. Quintech SNMP traps usually indicate two types of conditions: events or alarms.

Events:

SNMP traps indicating events can be turned on or off by turning on or off SNMP functionality. Events are considered normal operational events and usually require no user intervention. Events include but are not limited to: locking an output, unlocking an output, changing an output, and protecting an output.

Alarms:

SNMP traps indicating alarm conditions can not be turned off and are sent regardless whether SNMP is on or off. Alarm traps usually indicate a condition that may require user intervention. Alarms include but are not limited to: power supply failure, power supply or unit overheating, RF board offline, RF level warning, auto re-route, and fan failure.

XRM Re-route Alarm

This SNMP trap indicates an output to input path in an XRM unit has been automatically re-routed to another path by the XRM unit.

Complete trap:

<Output XX @YYYZZ Rerouted>

Description structure:

<Output XX >	= XX indicates the specific output of the unit that re-routed. Valid numbers are 1-32. This is not a system output but specific to the unit indicating the alarm.
<@YYY>	= Type of unit indicating the alarm. Typically XRM.
<ZZ>	= Address of the unit. This number is the same as the two right rotary dials on the control board.
<Rerouted>	= Alarm description

Example Alarm:

<Output 23 @XRM00 Rerouted>

XRM at address 00 re-routed output 23

<Output 4 @XRM12 Rerouted>

XRM at address 12 re-routed output 4

QE3/XRM Input RF Level Alarm

This SNMP trap command indicates the RF level on an input has dropped below the customer set threshold.

Complete trap:

<In XX RFLevel @YYYZZ Failure>

Description structure:

```
<In XX RFLevel >   = XX indicates the specific input of the unit that
                dropped below the threshold.

<@YYY>          = Type of unit indicating the alarm.

<ZZ >           = Address of the unit. This number is the same as
                the two right rotary dials on the control board.

<Failure>       = Alarm description
```

Example Alarm:

<In 12 RFLevel@XRD01 Failure>

Input 12 @ XRD at address 01 RF level dropped

<In 31 RFLevel@XRM12 Failure>

Input 31 @ XRM at address 12 RF level dropped

XRM Temperature Alarm

This SNMP trap command indicates the temperature sensor on the control board has detected a higher than normal operating temperature. This indicates a cooling problem that may require checking fans and airflow.

Complete trap:

<Temp @ XXXYY Warning>

Description structure:

```
<Temp @ >       = Alarm description. Temperature abbreviated.

< XXX>          = Type of unit indicating the alarm.

<YY>            = Address of the unit. This number is the same as
                the two right rotary dials on the control board.

<Warning>       = Alarm description
```

Example Alarm:

<Temp @ XRD01 Warning>

Temperature in unit XRD at address 01 is higher than normal

XRM Fan Speed Alarm

This SNMP trap command indicates the fan specified is running well below the normal expected RPM. Fan may require servicing or cleaning.

Complete trap:

<FanX @ YYYZZ Warning>

Description structure:

```
<Fan>          = Alarm description. Cooling fan.

<X @ >         = Fan number. Fans are numbered from left to right
                 on the rear panel.

< YYY>         = Type of unit indicating the alarm.

<ZZ>           = Address of the unit. This number is the same as
                 the two right rotary dials on the control board.

<Warning>      = Alarm description
```

Example Alarm:

<Fan 2 @ XRD01 Warning>

Fan 2 on XRD at address 01 is running slower than normal.

XRM Power Supply Alarm

This SNMP trap command indicates the power supply has a fault or failure condition. Additional information can be found by using the power supply protocol command “XP”.

Complete trap:

<PSX @ YYYZZ Warning>

Description structure:

```
<PS>            = Alarm description. Power supply problem.

<X @ >          = Power supply number. PS 1 is on left. PS 2 is on right.

< YYY>          = Type of unit indicating the alarm.

<ZZ>            = Address of the unit. This number is the same as
                  the two right rotary dials on the control board.

<Warning>       = Alarm description
```

Example Alarm:

<PX 2 @ XRD01 Warning>

Power supply on right on XRD at address 01 has an error condition..

XRM Keypad/LCD Alarm

This SNMP trap command indicates the LCD and keypad have a fault condition.

Complete trap:

<KP/LCD@XXXYY Warning>

Description structure:

```
<KP/LCD@>       = Alarm description. LCD problem.

<XXX>           = Type of unit indicating the alarm.

<YY>            = Address of the unit. This number is the same as
                  the two right rotary dials on the control board.

<Warning>       = Alarm description
```

Example Alarm:

<KP/LCD@ XRM00 Warning>

The keypad/LCD has a fault condition.

XRM RF Card Offline

This SNMP trap command indicates an RF card that was operating has stopped responding. Indicates a failure or the card has been removed from the chassis. The XRM has 3 types of cards and this trap indicates the type and location of the failure. Each XRM has 8 input cards, 8 output cards, and 4 bridge cards. The input and output cards are numbered from right to left. The first input card is the one farthest to the right. The XRM also has 4 bridge cards numbered from top to bottom.

Complete trap:

<Output card X @YYYZZ offline>

<Bridge card X @YYYZZ offline>

<Input card X @YYYZZ offline>

Description structure:

```
<Output card >
<Bridge card >
<Input card >   = Cards type description

<X>             = Card number.

<YYY>           = Type of unit indicating the alarm.

<ZZ>            = Address of the unit. This number is the same as
                the two right rotary dials on the control board.

<offline>       = Alarm description
```

Example Alarm:

<Output card 3 @ XRM00 offline>

Third from the right output cards has gone offline.

XRD/XRO RF Card Offline

This SNMP trap command indicates an RF card that was operating has stopped responding. Indicates a failure or the card has been removed from the chassis. The XRD and XRO have 32 cards. The cards are numbers starting at the top right with card number 1. Card number 2 is on the bottom rack on the right. The top rack contains all odd numbered cards. The bottom rack contains all even numbered cards. Cards always numbered from right to left.

Complete trap:

<Card XX @ YYYZZ offline>

Description structure:

```
<Card XX @ >    = Card number.

<YYY>           = Type of unit indicating the alarm.

<ZZ>            = Address of the unit. This number is the same as
                the two right rotary dials on the control board.

<offline>       = Alarm description
```

Example Alarm:

<Card 1 @ XRO00 offline>

Card 1 top right upper card at XRO 00 has gone offline.

XRM Auto-Reroute Fault Location

This SNMP trap command indicates an auto-route has occurred. This trap sends out the address, number and type of the card that is determined to have caused the re-route.

Complete trap:

<Auto Re-route@ UUUVVI=W B=X O=Y:CheckInputCardZ:>

<Auto Re-route@ I=W B=X O=Y:CheckBridgeCardZ:>

<Auto Re-route@ I=W B=X O=Y:CheckOutputCardZ:>

Description structure:

```
<Auto Re-route@>= Alarm description

<I=W >          = Input card number W.

<B=X >          = Bridge card number X.

<O=Y >          = Output card number Y.

<Check(type)Card>  = Type of card indicating the alarm.

<Z>             = Address of the unit. This number is the same as
                the two right rotary dials on the control board.

<offline>       = Alarm description
```

Example Alarm:

<Card 1 @ XRO00 offline>

Card 1 top right upper card at XRO 00 has gone offline.

XRM Input/Output RF level balance Alarm

This SNMP trap is only active when auto-routing is disabled. The command indicates that the RF level difference between the output and connected input on an RF path has a difference greater than the customer set difference. This condition will send 2 traps. One indicates the output and the second if successful will report back the card where the failure is detected.

Complete trap1:

<Path Fault @WWWXXOutputYY>

Complete trap2:

<Output card Z of 8 >

<Input card Z of 8 >

<Bridge card Z of 4 >

Description structure:

```
<Path Fault @>  = Alarm description

<WWW>           = Type of unit indicating the alarm.

<XX>            = Address of the unit. This number is the same as
                the two right rotary dials on the control board.

<OutputYY>      = Unit output number 1-32.

<Z>             = Bridge/Output/Input card number.
```

Example Alarm:

< Path Fault @XRM00Output5 >

<Output card 2 of 8 >

Output 5 at XRM 00 has RF balance fault. Output card 2 is determines to be the cause of the fault.

QE3 RF Card Offline

This SNMP trap command indicates an RF card that was operating has stopped responding. Indicates a failure or the card has been removed from the chassis. The QE3 has 2 types of cards: Input and output cards.

There are 8 input cards each supporting 8 inputs for possible total of 8 inptu cards, numbered freom right to left. There are 8 output cards but each output cards supports 16 outputs. There are 2 banks of output cards each bank supports the upper or lower 32 inputs. Four lower bank cards support outputs 1-64 but only inputs 1-32. Four upper bank output cards support 64 outputs but only 33-64 inputs. This trap indicates the type and location and output bank of the failure.

The QE3 also has a backup control card. If the control card goes offline it will send a trap also.

Complete trap:

<Out card WW-XX@YYYZZ Lower Bank Offline>

<Out card WW-XX@YYYZZ Upper Bank Offline>

<In card WW-XX@YYYZZ Offline>

<Control card @ XXXYY offline error.>

Description structure:

```
<Control card >
<Output card >
<Input card >   = Cards type description


<WW-XX>         = Inputs or output range supported by indicated card.


<YYY>           = Type of unit indicating the alarm.


<ZZ>            = Address of the unit. This number is the same as
                the two right rotary dials on the control board.


<Upper bank>    = 4 Output cards on right of unit


<Lower bank>    = 4 Output cards on left of unit


<offline>       = Alarm description
```

Example Alarm:

<Output card 3 @ QE300 Lower bank offline>

Lower bank output cards number 3 has gone offline.

QE3 Power Supply AC Input Alarm

This SNMP trap command indicates the AC input to the supply is not plugged in.

Complete trap:

<PSX AC Input error @ YYYZZ>

Description structure:

```
<PSX>           = Power supply number. 1 on left, 2 on right.

<AC input error @> = Alarm description

< YYY>          = Type of unit indicating the alarm.

<ZZ>            = Address of the unit. This number is the same as
                the two right rotary dials on the control board.
```

QE3 Power Supply DC Output Alarm

This SNMP trap command indicates the DC output of the supply is low or not functioning.

Complete trap:

<PSX DC out error @ YYYZZ>

Description structure:

```
<PSX>           = Power supply number. 1 on left, 2 on right.

<DC out error @ >  = Alarm description

< YYY>          = Type of unit indicating the alarm.

<ZZ>            = Address of the unit. This number is the same as
                  the two right rotary dials on the control board.
```

QE3 Power Supply Temperature Alarm

This SNMP trap command indicates the power supply temperature is exceeding normal operating limits.

Complete trap:

<PSX Temp Warning @ YYYZZ>

Description structure:

```
<PSX>           = Power supply number. 1 on left, 2 on right.

<Temp Warning @>   = Alarm description


<YYY>           = Type of unit indicating the alarm.

<ZZ>            = Address of the unit. This number is the same as
                the two right rotary dials on the control board.
```

QE3 Unit Temperature Alarm

This SNMP trap command indicates the ambient temperature detected on the control board is exceeding normal operating limits.

Complete trap:

<CPU temperature @ YYYZZ>

Description structure:

```
<CPU temperature @>= Alarm description

< YYY>          = Type of unit indicating the alarm.

<ZZ>            = Address of the unit. This number is the same as
                the two right rotary dials on the control board.
```

QE3 Fan RPM Low Alarm

This SNMP trap command indicates the cooling fan on the rear panel is running slower than normal.

Complete trap:

<Fan X low rpm @ YYYZZ>

Description structure:

<Fan X>	= Fan number indicating a fault. Fans are numbered from left to right when viewing the rear panel.
<low rpm @ >	= Alarm description
< YYY>	= Type of unit indicating the alarm.
<ZZ>	= Address of the unit. This number is the same as the two right rotary dials on the control board.

QE3 Unit Requested Reload Alarm

This SNMP trap command indicates that a unit in the QE3 system has requested a reload of system parameters from the system controller. This typically occurs during system start up and is usually not a reason for concern. If the request occurs repeatedly then the error requires examination.

Complete trap:

<Reload Alarm @ YYYZZ>

Description structure:

```
< Reload Alarm @ > = Alarm description

< YYY>          = Type of unit indicating the alarm.

<ZZ>            = Address of the unit. This number is the same as
                  the two right rotary dials on the control board.
```

QE3 Input/Output RF Level Balance Alarm

This SNMP trap indicates that the RF level difference between the output and connected input on an RF path has a difference greater than the customer set difference.

Complete trap:

<Path Fault @WWWXXOutputYY>

Description structure:

```
<Path Fault @>  = Alarm description

<WWW>           = Type of unit indicating the alarm.

<XX>            = Address of the unit. This number is the same as
                the two right rotary dials on the control board.

<OutputYY>      = Unit output number 1-64.
```

BR Command Event

This SNMP trap indicates that the BR or BRO command has been successfully issued.

Complete trap:

<S out WWW in XXX from BR command>

<S out WWW in XXX from BRO command>

Description structure:

```
<BR>          = Event description. QSENSE restore input command.
<BRO>         = Event description. QSENSE restore output command.
<out WWW>     = Output number.
<in XXX>      = Input number.
```

L Command Event

This event trap is generated on SRM, QE3, XRM, and SRM products. This SNMP trap indicates that the L command has been successfully issued.

Complete trap:

<L out WWW in XXX from userY@ portZ address AA>

Description structure:

```
<L>             = Event description. Set Lock output command.

<out WWW>       = Output number.

<in XXX>        = Input number.

<from>          = more event description

<userY@>        = User that issued the command. User1 is the Admin,
                  up to user8. User 9 is no user logged in.

<portZ>         = Port of access. Local keypad=0, Remote port=1,
                  Control in port=2, Ethernet A=3, Ethernet B=4,
                  Telnet=5, SNMP=6.

<address AA>    = Serial address of 1RU remote or main controller
                  unit the command originated from.
```

S Command Event

This event trap is generated on SRM, QE3, XRM, and SRM products. This SNMP trap indicates that the S command has been successfully issued.

Complete trap:

<S out WWW in XXX from userY@ portZ address AA >

QSENSE trap:

<S out WWW in XXX from QSENSE@ portZ address AA >

QSENSE restore command trap:

<S out WWW in XXX from BR command>

Description structure:

```
<S>             = Event description. Set output command.

<out WWW>       = Output number.

<in XXX>        = Input number.

<from>          = more event description

<userY@>        = User that issued the command. User1 is the Admin,
                  up to user8. User 9 is no user logged in.

<portZ>         = Port of access. Local keypad=0, Remote port=1,
                  Control in port=2, Ethernet A=3, Ethernet B=4,
                  Telnet=5, SNMP=6 QSENSE=7.

<address AA>    = Serial address of 1RU remote or main controller
                  unit the command originated from.

QSENSE          = Indicates the crosspoint was changed automatically
                  by the system in accordance with QSENSE settings.
```

SP Command Event

This event trap is generated on SRM, QE3, XRM, and SRM products. This SNMP trap indicates that the SP command has been successfully issued.

Complete trap:

<SP out WWW in XXX from userY@ portZ address AA >

Description structure:

```
<SP>            = Event description. Set Protect command.

<out WWW>       = Output number.

<in XXX>        = Input number.

<from>          = more event description

<userY@>        = User that issued the command. User1 is the Admin,
                  up to user8. User 9 is no user logged in.

<portZ>         = Port of access. Local keypad=0, Remote port=1,
                  Control in port=2, Ethernet A=3, Ethernet B=4,
                  Telnet=5, SNMP=6.

<address AA>    = Serial address of 1RU remote or main controller
                  unit the command originated from.
```

SU Command Event

This event trap is generated on SRM, QE3, XRM, and SRM products. This SNMP trap indicates that the SU command has been successfully issued.

Complete trap:

<SU out WWW in XXX from userY@ portZ >

Description structure:

```
<SU>            = Event description. Set Un-Protect command.

<out WWW>       = Output number.

<in XXX>        = Input number.

<from>          = more event description

<userY@>        = User that issued the command. User1 is the Admin,
                  up to user8. User 9 is no user logged in.

<portZ>         = Port of access. Local keypad=0, Remote port=1,
                  Control in port=2, Ethernet A=3, Ethernet B=4,
                  Telnet=5, SNMP=6.

<address AA>    = Serial address of 1RU remote or main controller
                  unit the command originated from.
```

U Command Event

This event trap is generated on SRM, QE3, XRM, and SRM products. This SNMP trap indicates that the U command has been successfully issued.

Complete trap:

<U out WWW in XXX from userY@ portZ address AA >

Description structure:

```
<U>             = Event description. Unlock output command.

<out WWW>       = Output number.

<in XXX>        = Input number.

<from>          = more event description

<userY@>        = User that issued the command. User1 is the Admin,
                  up to user8. User 9 is no user logged in.

<portZ>         = Port of access. Local keypad=0, Remote port=1,
                  Control in port=2, Ethernet A=3, Ethernet B=4,
                  Telnet=5, SNMP=6.

<address AA>    = Serial address of 1RU remote or main controller
                  unit the command originated from.
```

Using QEC Commands

This document provides a list of commands which can be used to control a Quintech matrix. No hardware flow control is supported. After a controlling program issues a command, it must wait until it receives a response before issuing the next command.

QEC Telnet Console Command Structure

There are three interfaces to send commands to the matrix controller: a Telnet console, a QEC Ethernet port, and a serial port. When sending commands over the serial or Ethernet ports, a STX/ETX bounded command packet is used. This is described in the next section. The packet structure is not used with the Telnet console interface. The same commands are used but no address, checksum, or ETX/STX packet boundaries are required. For example, to issue the Firmware Version command “F”, you simply enter command mode on the console, type F and hit the Enter key.

QEC Protocol Message Structure

Commands packets can be sent over the Ethernet and serial ports (if available) and use 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 Data byte(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.

If a break in communication occurs while a message is being transmitted (i.e., before the unit receives the ETX and CHK byte), the buffer will clear and the command will be lost (no response will be sent). This condition will occur if there is a delay of about 200 milliseconds between bytes.

Address Field

The address field consists of two ASCII digits. The address for a control unit is normally set using the front panel keypad. 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.

Address FF is a serial broadcast address. Any unit will respond to a command with an address of FF regardless of the actual serial address set for the unit. **Commands being sent to units over Ethernet must contain an address of FF for proper operation.** If you use a serial address other than FF in your Ethernet command packet, that serial address must match the serial address set for the target unit or the command will be rejected even if the IP address is correct.

Command

The command is one or more ASCII characters 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

BB: Set Q-Sense Backup Input

This command will set the Q-Sense backup input for the specified "primary" input. The QE3 will only accept this command if both specified inputs are not currently active QSENSE inputs used elsewhere in the system.

Command Format:

```
02   XX   XX   42  42  XX    XX   XX   XX     XX    XX   03   XX
STX  ADR  ADR  B   B   IN3   IN2  IN1  BUI3   BUI2  BUI1 ETX  CHK

IN  =   Primary Input. Must be between 001 and the number of system
        inputs. Always 3 characters.

BUI =   Backup Input. Must be between 001 and the number of system
        inputs. Always 3 characters.
```

Example Command Sent:

```
02    XX   XX    42   42   30   31   36   30   30   37    03    XX
STX   ADR  ADR   B    B    0    1    6    0    0    7     ETX   CHK
(Set Q-Sense backup input 7 for primary input 16.)
```

Response Format:

```
06   XX    XX    42   42    03    XX
ACK  ADR   ADR   B    B     ETX   CHK
```

BBC: Turn Off Qsense Input Pair

This command will clear an input primary and backup pair. This command will accept a primary or backup input number and clear both the primary and the backup association.

Command Format:

```
02   XX    XX    42   42   43  XX   XX    XX    03    XX
STX  ADR   ADR    B    B   C   IN3  IN2   IN1   ETX   CHK
```

```
IN  =   Primary or backup input number. Must be between 001 and the
        number of system inputs. Always 3 characters.
```

Example Command Sent:

```
02    XX    XX   42   42   43   30    31  36  03    XX
STX   ADR   ADR   B    B    C    0    1   6   ETX   CHK
(Clear Q-Sense backup input for system input 16)
```

Response Format:

```
06   XX   XX   42 42  43   03   XX
ACK  ADR  ADR  B  B   C    ETX  CHK
```

BBR: Read Q-Sense Backup Input

This command will return the Q-Sense backup input which is configured for the specified “primary” input.

Command Format:

02	XX	XX	42	42	52	XX	XX	XX	03	XX
STX	ADR	ADR	B	B	R	IN3	IN2	IN1	ETX	CHK

IN = Primary Input to read status. Must be between 001 and the number of system outputs. Always 3 characters.

Example Command Sent:

02	XX	XX	42	42	52	30	31	36	03	XX
STX	ADR	ADR	B	B	R	0	1	6	ETX	CHK

(Get Q-Sense backup input for system “primary” input 16)

Response Format:

06	XX	XX	42	42	52	XX	XX	XX	XX	XX	XX	03	XX
ACK	ADR	ADR	B	B	R	IN3	IN2	IN1	BUI3	BUI2	BUI1	ETX	CHK

Example Response Sent:

06	XX	XX	42	42	52	30	31	36	30	30	37	3	XX
ACK	ADR	ADR	B	B	R	0	1	6	0	0	7	ETX	CHK

(The Q-Sense backup input for primary input 16 is input 7.)

BE: Set Q-Sense On/Off Reset Ability of Input

This command will set the Q-Sense on/off reset ability for the specified input.

Command Format:

```
02  XX  XX  42 45 XX  XX  XX  XX       03   XX
STX ADR ADR B  E  IN3 IN2 IN1 ON/OFF   ETX CHK

IN  =  Primary Input. Must be between 001 and the number of system inputs.
Always 3 characters.

ON/OFF  =  Reset status for input. Either 0 (reset off) or 1 (reset on).
Always 1 character.
```

Example Command Sent:

```
02   XX    XX   42  45  30  31  36  31  03    XX
STX  ADR   ADR  B   E   0   1   6   1   ETX   CHK
(Set the Q-Sense reset ability for input 16 to on.)
```

Response Format:

```
06   XX    XX   42   45  03    XX
ACK  ADR   ADR   B    E  ETX   CHK
```

BER: Read Q-Sense On/Off Reset Ability of Input

This command will return the Q-Sense on/off reset ability for the specified input.

Command Format:

```
02    XX    XX    42  45  52  XX   XX   XX    03     XX
STX   ADR   ADR   B   E   R   IN3  IN2  IN1   ETX    CHK

IN  =   Primary Input to read status. Must be between 001 and the
        number of system outputs. Always 3 characters.
```

Example Command Sent:

```
02  XX  XX  42  45  52   30 31  36  03  XX
STX ADR ADR  B   E   R   0  1   6   ETX CHK
(Get Q-Sense reset status for system input 16)
```

Response Format:

```
06  XX  XX  42 45 52  XX  XX  XX  XX       03   XX
ACK ADR ADR B  E  R   IN3 IN2 IN1 ON/OFF   ETX CHK
```

Alternate (QE3) Response Format:

```
06  XX  XX  42 45 52  XX      03   XX
ACK ADR ADR B  E  R  ON/OFF  ETX CHK

ON/OFF  =   Reset status for input. Either 0 (reset off) or 1 (reset on).
Always 1 character.
```

Example Response Sent:

```
06  XX  XX  42  45  52 30   31 36 31  03  XX
ACK ADR ADR  B  E   R      0     1  6     1 ETX CHK
(The Q-Sense reset ability for input 16 is on.)
```

Alternate Example Response Sent:

```
06  XX  XX  42  45  52  31  03  XX
ACK ADR ADR  B  E   R    1  ETX CHK
(The Q-Sense reset ability for the sent input is on.)
```

BO: Set Q-Sense On/Off (Q-Sense Enabled/Disabled) for Input

This command will set the Q-Sense on/off (enabled/disabled) status for the specified input.

Command Format:

```
02  XX  XX  42  4f  XX   XX   XX   31/30    03   XX
STX ADR ADR B   O   IN3  IN2  IN1  ON/OFF  ETX CHK

IN  =   Primary Input. Must be between 001 and the number of system inputs.
Always 3 characters.

ON/OFF  =   Q-sense on/off status for input. Either 0 (off/disabled) or 1
(on/enabled). Always 1 character.
```

Example Command Sent:

```
02  XX  XX  42  4f  30  31  36  30  03  XX
STX ADR ADR  B  O   0    1   6    0 ETX CHK

(Disable (turn off) Q-Sense for input 16.)
```

Response Format:

```
06   XX  XX   42   4f      03       XX
ACK  ADR     ADR      B    O     ETX   CHK
```

BOR: Read Q-Sense On/Off (Q-Sense Enabled/Disabled) Status for Input

This command will return the Q-Sense on/off (enabled/disabled) status for the specified input.

Command Format:

```
02   XX   XX   42  4f   52  XX    XX    XX    03    XX
STX  ADR  ADR  B   O    R   IN3   IN2   IN1   ETX   CHK

IN  =   Primary Input to read status. Must be between 001 and the
        number of system outputs. Always 3 characters.
```

Example Command Sent:

```
02  XX  XX  42  4f  52   30 31  36  03  XX
STX ADR ADR  B   O   R   0  1   6   ETX CHK
(Get Q-Sense on/off status for system input 16)
```

Response Format:

```
06  XX  XX  42 4f 52  XX  XX  XX  XX       03   XX
ACK ADR ADR B  O  R   IN3 IN2 IN1 ON/OFF   ETX CHK
```

QE3 Response Format:

```
06  XX  XX  42 4f 52  XX       03   XX
ACK ADR ADR B  O  R   ON/OFF   ETX CHK
```

Example Response Sent:

```
06  XX  XX  42  4f  52 30   31 36 30  03  XX
ACK ADR ADR  B  O   R      0     1  6     0 ETX CHK
(Q-Sense is disabled for input 16)
```

QE3 Example Response Sent:

```
06  XX  XX  42  4f  52  30  03  XX
ACK ADR ADR  B  O   R    0  ETX CHK
(Q-Sense is disabled for polled input)
```

BR: Restore Input Currently in Q-Sense

This command will attempt to restore the specified input if it is currently in Q-Sense (backup mode). Note: a successful ACK does not indicate whether the restore operation on the input was successful or not. It simply indicates that the command was accepted and the restore is being attempted.

Command Format:

```
02    XX   XX    42  52   XX    XX     XX     03    XX
STX   ADR  ADR    B   R   IN3   IN2    IN1    ETX   CHK
IN  =   Primary Input to read status. Must be between 001 and the
        number of system outputs. Always 3 characters.
```

Example Command Sent:

```
02  XX  XX    42    52   30   31    36    03     XX
STX ADR ADR   B     R    0    1     6     ETX    CHK
(Restore input 16)
```

Response Format:

```
06    XX    XX    42   52   03    XX
ACK   ADR   ADR   B    R    ETX   CHK
```

BRO: Restore Output Currently Connected to Q-Sense Backup Input

This command is valid for the QE3 system QSENSE operation. This command will connect an output back to the original primary QSENSE input. This command can be used if the QSENSE function has taken action and changed the output to the backup input based on QSENSE settings.

Command Format:

```
02    XX   XX    42  52    XX       XX      XX     03    XX
STX   ADR  ADR    B   R   OUT3   OUT 2    OUT 1    ETX   CHK
OUT =   Output. Must be between 001 and the number of
        system outputs. Always 3 characters.
```

Example Command Sent:

```
02  XX  XX    42    52   30   31    36    03     XX
STX ADR ADR   B     R     0    1     6     ETX    CHK
(Restore output 16)
```

Response Format:

```
06    XX    XX    42   52   03    XX
ACK   ADR   ADR   B    R    ETX   CHK
```

BT: Set Q-Sense Threshold Level for Input

This command will set the Q-Sense threshold level in dBm for the specified input. The threshold value must be between -60 dBm and 0 dBm. QE3 only accepts values from -10 to -50 and -99. QE3 will accept a value of -99 to turn off the threshold value essentially disabling the QSENSE feature for that input.

Command Format:

02	XX	XX	42	54	XX	XX	XX	40	2B/2D	XX	XX
STX	ADR	ADR	B	T	IN3	IN2	IN1	@	+/-	10s	1s

2E	XX	03	XX
.	tenths	ETX	CHK

E xample Command Sent:

02	XX	XX	42	54	30	31	36	40	2D	34	35	2E	35	03	XX
STX	ADR	ADR	B	T	0	1	6	@	-	4		5	.	5	ETX	CHK

(Set the Q-Sense threshold value for input 16 to -45.5 dBm)

Response Format:

06	XX	XX	42	54	03	XX
ACK	ADR	ADR	B	T	ETX	CHK

BTR: Read Q-Sense Threshold for Input

This command will return the Q-Sense threshold level in dBm for the specified input. A QE3 may return -99 which means the input threshold has been turned off.

Command Format:

```
02     XX    XX     42   54   52    XX    XX    XX    03     XX
STX   ADR    ADR    B    T    R    IN3    IN2   IN1   ETX    CHK
IN  =   Primary Input to read status. Must be between 001 and the
        number of system outputs. Always 3 characters.
```

Example Command Sent:

```
02    XX    XX    42  54    52   30   31    36   03    XX
STX   ADR   ADR   B    T    R    0    1     6    ETX   CHK
(Get Q-Sense threshold value for system input 16)
```

Response Format:

```
06   XX   XX  42   54  52   XX   XX   XX    40   2B/2D   XX     XX
ACK  ADR  ADR  B   T   R   IN3   IN2  IN1   @     +/-    10s    1s


2E XX  03  XX
. 10th ETX CHK
```

Alternate (QE3) Response Format:

```
06   XX   XX  42   54  52  2B/2D  XX    XX  2E  XX     03   XX
ACK  ADR  ADR  B   T   R   +/-    10s   1s  .   10th   ETX  CHK
```

Example Response Sent:

```
06   XX  XX  42 54 52 30  31  36  40   2D  34  35  2E  35   XX  XX
ACK ADR ADR  B  T  R   0  1    6   @   -    4   5   .   5   ETX CHK
(The Q-Sense threshold value for input 16 is -45.5 dBm)
```

Alternate (QE3) Example Response Sent:

```
06   XX  XX  42 54 52 2D  34  35  2E  35   XX  XX
ACK ADR ADR  B  T  R  -    4   5   .   0   ETX CHK
(The Q-Sense threshold value for the polled input is -45.0 dBm)
```

C: Check Change Flag and Unit Status

Each control port for the system maintains a change flag and several change queues that allow changes throughout the system to be tracked. The change flag contains an eight bit flag to indicate the various changes. The flag bits are defined as follows:

Bit	Flag	Change Indication	Action Indicated	Cleared By:
0	Crosspoint	One of the following has changed: -Crosspoint (input to output connection) -Crosspoint lock status -Access Control setting for input or output The affected crosspoint is entered in to the crosspoint queue.	Front panel access control change, crosspont lock, unlock, or change, L, U, S, or SP command	Q command
1	Alarm	-An error or fault has been detected. The associated message is entered in the message queue.	Fault condition detected	M
2	Access Control	-Access Control has been turned on or off for the port. Only the port where access control has changed will show this bit set. -A user's group ID setting has changed.	Front panel set group or access control on/off or ZG command	Q
3	Overflow	The crosspoint change queue has overflowed.	More than 8 L SP, or S commands for 8 different outputs	Q
4	Name	-An input or output name has changed. The affected input or output is entered in the name queue.	NSI, NSO, NI, NO	NQ
5	Overflow	The name change queue has overflowed.	NSI, NSO, NI, NO	NQ
6	Reserved			
7	Reserved	None. Always set to "1".		

The C command is typically sent periodically to check if any changes have been made or if any alarms have occurred. There are three different crosspoint, message, and name change queues for each control port (serial, Ethernet, etc.). Each queue will store up to eight changes made anywhere in the system. Once the queue overflows the contents are no longer valid and different actions will have to be taken to recover the system state.

If any changes have occurred since the last Q command the crosspoint flag bit will be set. Changes include a crosspoint change, Access Control setting, or crosspoint lock status change. If eight or fewer changes have been made then all the affected crosspoints can be read from the crosspoint queue. If more than eight changes occur before the queue is read and cleared the overflow flag will be set. If the queue has overflowed then all crosspoints in the matrix will have to be queried. The Q command clears the queue and both the crosspoint flag and the overflow flag.

The alarm bit indicates that an error or fault has been detected and an associated message indicating the problem has been stored in the message queue. If the message queue is full, a new message will cause the queue contents to be sent in an SNMP TRAP message to the set SNMP trap IP address. The message queue is then cleared and the new message entered to the queue. The M command provides a log of messages and clears the queue and the alarm flag. Messages not read via the M command or SNMP are lost when the queue overflows. If the alarm condition is still present after the M command clears the queue it will be re-entered to the queue.

The name flag indicates that an input or output name has been set or changed. The affected input or output is put in the name queue. The NQ command will read the queue and clear the name flag. The NQ response contains an overflow flag. If the name queue has overflowed then all input and output names should be checked.

Command Format:

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

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 (Crosspoint changes have occurred)

06  XX  XX  43  82  03  XX
ACK ADR ADR  C  82  ETX CHK (An alarm has occurred)

06  XX  XX  43  84  03  XX
ACK ADR ADR  C  84  ETX CHK (Access Control changes have occurred)

06  XX  XX  43  89  03  XX
ACK ADR ADR  C  89  ETX CHK (The crosspoint queue has overflowed)

06  XX  XX  43  90  03  XX
ACK ADR ADR  C  90  ETX CHK (A name has been changed)

06  XX  XX  43  83  03  XX
ACK ADR ADR  C  83  ETX CHK (Alarm & crosspoint changes have occurred)

06  XX  XX  43  85  03  XX
ACK ADR ADR  C  85  ETX CHK (Access control & crosspoint changes
                             have occurred)

06  XX  XX  43  91  03  XX
ACK ADR ADR  C  91  ETX CHK (Name & crosspoint changes have occurred)

06  XX  XX  43  8B  03  XX
ACK ADR ADR  C  8B  ETX CHK (The crosspoint queue has overflowed
                             plus an alarm)

06  XX  XX  43  9F  03  XX
ACK ADR ADR  C  9F  ETX CHK (Crosspoint, alarm, Access Control,
                             and name changes have occurred, plus
                             the crosspoint queue has overflowed)
```

Note: This command will be accepted regardless of whether a user is logged in.

ED: Set DHCP On/Off

This command turns DHCP on or off.

Command Format:

```
02  XX  XX  45  44  30  03  XX
STX ADR ADR  E   D   0  ETX CHK

02  XX  XX  45  44  31  03  XX
STX ADR ADR  E   D   1  ETX CHK
```

Example Command:

```
02  XX  XX  45  44  30  03  XX
STX ADR ADR  E   D   0  ETX CHK
(Turn DHCP Off)

02  XX  XX  45  44  31  03  XX
STX ADR ADR  E   D   1  ETX CHK
(Turn DHCP on)
```

Positive Response:

```
06  XX  XX  45  44  03  XX
ACK ADR ADR  E   D  ETX CHK
```

Note: DHCP will immediately be set as on or off. If DHCP is turned on the unit will not ask for new IP parameters from the DHCP server until the unit is reset or the power is cycled.

EG: Set Ethernet Default Gateway

This command sets the static default Ethernet gateway.

Command Format:

```
02  XX  XX  45  47  XX  XX  XX  2E  XX  XX  XX  2E
STX ADR ADR  E   G  nn  nn  nn   .  nn  nn  nn   .

XX  XX  XX  2E  XX  XX  XX  03  XX
nn  nn  nn   .  nn  nn  nn  ETX CHK
```

Example Command:

```
02  46  46  45  47  30  31  30  2E  30  30  30  2E
STX  F   F   E   G   0   1   0   .   0   0   0   .

30  30  30  2E  30  30  31  03  2D
 0   0   0   .   0   0   1  ETX CHK
 (Set Gateway = 10.0.0.001)
```

Positive Response:

```
06  46  46  45  47  03  07
ACK  F   F   E   G  ETX CHK
```

Note: The change will take place in ten seconds. If DHCP is enabled the static gateway value will not be used until DHCP is turned off and the unit has been reset.

EI: Set Ethernet IP Address

This command sets the static Ethernet IP Address.

Command Format:

```
02  XX  XX  45  49  XX  XX  XX  2E  XX  XX  XX  2E
STX ADR ADR  E   I  nn  nn  nn   .  nn  nn  nn   .

XX  XX  XX  2E  XX  XX  XX  03  XX
nn  nn  nn   .  nn  nn  nn  ETX CHK
```

Example Command:

```
02  46  46  45  49  30  31  30  2E  30  30  30  2E
STX  F   F   E   I   0   1   0   .   0   0   0   .

30  30  30  2E  32  33  34  03  27
 0   0   0   .   2   3   4  ETX CHK
(Set IP Address = 10.0.0.234)
```

Positive Response:

```
06  46  46  45  49  03  09
ACK  F   F   E   I  ETX CHK
```

Note:

The change will take place in ten seconds. If DHCP is enabled the static IP address will not be used until DHCP is turned off and the unit has been reset.

ELD: Ethernet Lock Disable

This command disables the Ethernet lock. If the lock has been enabled (using the ELE command), command packets input from the QEC Ethernet port are received but ignored except for the ELD command. This provides an additional level of control over the switch and the Ethernet port. The ELD command is used to disable the lock and enable the processing of command packets.

The ELD command must contain a password value that matches the current password in order for the Ethernet lock to be disabled. The default value for the password is "Quintech". The value of the password can be changed using the ELP command.

Command Format:

```
02  XX  XX  45  4C  44  XX  ....  XX    03  75
STX ADR ADR  E   L   D  [ PASSWORD ]   ETX CHK
```

Example Command:

```
02  46  46  45  4C  44  51  75  69  6E  74  65  63  68  03  75
STX  F   F   E   L   D   Q   u   i   n   t   e   c   h  ETX CHK
(Disable Ethernet Command Lock)
```

Positive Response:

```
06  46  46  45  4C  03  0C
ACK  F   F   E   L  ETX CHK
```

Note:

The password may be reset to the default "Quintech" from the front panel LCD and keypad.

An ELD command with an incorrect password value will return a NAK response.

The switch is shipped from the factory with the Ethernet lock disabled so it will accept and process command packets. If the ELE command is never issued, the Ethernet lock will never be enabled and the ELD, ELE, and ELP commands can be ignored.

This command has been superceded by the access control features available with Protocol 2.15 release 6. It is included for backward compatibility.

ELE: Ethernet Lock Enable

This command enables the QEC Ethernet command lock. When the lock is enabled, command packets input from the Ethernet port are received but ignored except for the ELD command. The ELD command is used to disable the lock and enable the processing of command packets.

Command Format:

```
02  XX  XX  45  4C  45  03  XX
STX ADR ADR  E   L   E  ETX CHK
```

Example Command:

```
02  46  46  45  4C  45  03  4D
STX  F   F   E   L   E  ETX CHK
(Enable Ethernet Command Lock)
```

Positive Response:

```
06  46  46  45  4C  03  0C
ACK  F   F   E   L  ETX CHK
```

Note:

The switch is shipped from the factory with the Ethernet lock disabled so it will accept and process command packets. If the ELE command is never issued, the Ethernet lock will never be enabled and the ELD, ELE, and ELP commands can be ignored.

If the Ethernet lock is on, valid command packets sent over the Ethernet will return a NAK message with the issued command, indicating that it was rejected because of the lock. Valid packets sent over the serial port will still be accepted.

This command has been superceded by the access control features available with Protocol 2.15 release 6. It is included for backward compatibility.

ELP: Set Ethernet Lock Password

This command sets a new QEC Ethernet Lock Password. The password is an alpha-numeric value from 1 to 10 characters. A null password (no password) is also allowed.

Command Format:

```
02  XX  XX  45  4C  50  XX  …   XX  03  XX
STX ADR ADR  E   L   P  [Password] ETX CHK
```

Example Command:

```
02  46  46  45  4C  50  78  79  7A  7A  79  03  20
STX  F   F   E   L   P   x   y   z   z   y  ETX CHK
(Set password to “xyzzy”)
```

Example Command:

```
02  46  46  45  4C  50  31  2B  52  61  4C  70  48  21  32  03  16
STX  F   F   E   L   P   1   +   R   a   L   p   H   !   2  ETX CHK
(Set password to “1+RaLpH!2”)
```

Example Command:

```
02  46  46  45  4C  50  03  58
STX  F   F   E   L   P  ETX CHK
(Set password to no password)
```

Positive Response:

```
06  46  46  45  4C  03  0C
ACK  F   F   E   L  ETX CHK
```

Note:

Although almost any hex value or ASCII character can be used in the password, users would be wise not to use the hex values 00 – 1F or 7F – FF since these are not associated with keys on a standard keyboard. They may also cause undesirable side effects. In particular hex 02 (STX) and 03 (ETX) are used to delineate the command packet and should never be used in the password. If the password is set to some unknown value, it can be reset to the default “Quintech” from the front panel LCD and keypad.

This command has been superceded by the access control features available with Protocol 2.15 release 6. It is included for backward compatibility.

EP: Set Ethernet Port

This command sets the QEC Ethernet port that is monitored for STX/ETX command packets. The default port set at the factory is 9100. There is no need to change this unless it conflicts with another network device.

Command Format:

```
02  XX  XX  45  50  XX  XX  XX  XX  03  XX
STX ADR ADR  E   P  nn  nn  nn  nn  ETX CHK
```

Example Command:

```
02  46  46  45  50  39  31  30  30  03  1C
STX  F   F   E   P   9   1   0   0  ETX CHK
(Set Port = 9100)
```

Positive Response:

```
06  46  46  45  50  03  10
ACK  F   F   E   P  ETX CHK
```

Note:

The change will take place after the current Ethernet session ends and the connection is released.

ES: Set Ethernet Subnet Mask

This command sets the static Ethernet Subnet Mask.

Command Format:

```
02  XX  XX  45  53  XX  XX  XX  2E  XX  XX  XX  2E
STX ADR ADR  E   S  nn  nn  nn   .  nn  nn  nn   .

XX  XX  XX  2E  XX  XX  XX  03  XX
nn  nn  nn   .  nn  nn  nn  ETX CHK
```

Example Command:

```
02  46  46  45  53  32  35  35  2E  32  35  35  2E
STX  F   F   E   S   2   5   5   .   2   5   5   .

32  35  35  2E  30  30  30  03  3B
 2   5   5   .   0   0   0  ETX CHK
(Set Netmask = 255.255.255.000)
```

Positive Response:

```
06  46  46  45  53  03  13
ACK  F   F   E   S  ETX CHK
```

Note:

The change will take place after the current Ethernet session ends and the connection is released. If DHCP is enabled this will not take effect until DHCP is turned off.

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 32x64 SRM would give a response of the form “Fv2.69 Pv2.15 XRM2250/032X032”.

Command Format:

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

Example Command:

02	46	46	46	03	47
STX	F	F	F	ETX	CHK

Positive Response:

06	XX	XX	46	76	37	2E	30	30	20	50	76	32	2E	31	35	20…
ACK	ADR	ADR	F	v	7	.	0	0		P	v	2	.	1	5	…

…58	52	4D	32	32	35	30	2F	30	33	32	58	30	33	32	3	XX
…	X	R	M	2	2	5	0	/	0	3	2	X	0	3	2	ETX	CHK

Note: This command will be accepted regardless of whether a user is logged in.

FX: Extended Firmware Version / Unit ID

This command will return a more detailed version of the information returned by the F command.

Response structure:

FX:<FV>:<PV>:<M#>:<I#>:<O#>:<RES>:<RES>:<RES>:<RES>

FV = A four digit firmware number in the format n.nn

PV = An eight digit protocol number in the format nn.nn.nn

M# = A seven digit alphanumeric model number

I# = Number of inputs, 1 to 3 digits

O# = Number of outputs, 1 to 3 digits

RES = A reserved field for future expansion

Command Format:

```
02  XX  XX  46  58  03  XX
STX ADR ADR  F   X  ETX CHK
```

Example Command:

```
02  46  46  46  03  47
STX  F   F   F  ETX CHK
```

Positive Response:

```
06  XX  XX  46  58  3A  37  2E  30  30  3A  32  2E  31  35  2E  30  37…
ACK ADR ADR  F   X   :   7   .   0  0    :   2   .   1   5   .   0   7…


…3A 58  52  4D  32  32  35  30  3A  33  32  3A  33  32  3A  3A  3A  3A…
… :  X   R   M   2   2   5   0   :   3   2   :   3   2   :   :   :   :…


…3      XX
…ETX    CHK
```

Note: This command will be accepted regardless of whether a user is logged in.

IS: Query Input State

This command queries for the access control parameters of the specified input.

The access control parameters are given by the last two characters in the response. They give numbers that represent an access control bitmap table:

Bit	7	6	5	4	3	2	1	0
Group	8	7	6	5	4	3	2	1
Hex	Response character 1				Response character 2			

If a particular bit is set, then that group is allowed to change a particular input with the L, S, and U commands. If the bit is clear then the corresponding group is not allowed access.

Character	Response 1: Groups allowed access	Response 2: Groups allowed access
0	none	none
1	5	1
2	6	2
3	5, 6	1, 2
4	7	3
5	5, 7	1, 3
6	6, 7	2, 3
7	5, 6, 7	1, 2, 3
8	8	4
9	5, 8	1, 4
A	6, 8	2, 4
B	5, 6, 8	1, 2, 4
C	7, 8	3, 4
D	5, 7, 8	1, 3, 4
E	6, 7, 8	2, 3, 4
F	5, 6, 7, 8	1, 2, 3, 4

Example Command Sent:

```
02  XX  XX  49  53  30  30  31  03  XX
STX ADR ADR  I   S   0   0   1  ETX CHK
(Query the state of output 1)
```

Examples of Positive Responses:

```
06  XX  XX  49  53  30  31  03  XX
ACK ADR ADR  I   S   0   1  ETX CHK
(only users in group 1 are allowed access to the input)

06  XX  XX  49  53  36  46  03  XX
ACK ADR ADR  I   S   6   F  ETX CHK
(users in group 1, 2, 3, 4, 6 and 7 are allowed access to the input)
```

Note: This command will be accepted regardless of whether a user is logged in.

KL: Keypad Lock

This command locks the front panel keypad as a convenience feature to prevent accidental keystrokes. To unlock the keypad use the KU command.

Command Sent:

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

KLPositive Response:

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

Note: The front panel will display “Keypad Locked”. The keypad can be unlocked from the front panel by entering the 3-digit password 857.

Note: To secure against unauthorized changes from the front panel keypad use Access Control features. See the user’s manual and the “Z” commands for more information.

KS: Keypad State

This command gives the locked/unlocked state of the front panel keypad.

Command Sent:

```
02  XX  XX  4B  53  03  XX
STX ADR ADR  K   S  ETX CHK
```

Positive Responses:

```
06  XX  XX  4B  53  4C  03  XX
ACK ADR ADR  K   S   L  ETX CHK
(keypad locked)

06  XX  XX  4B  53  55  03  XX
ACK ADR ADR  K   S   U  ETX CHK
(keypad unlocked)
```

Note: This command will be accepted regardless of whether a user is logged in.

KU: Keypad Unlock

This command unlocks the front panel keypad. The front panel keypad can be locked as a convenience feature to prevent accidental keystrokes. Use the KL command to lock the keypad.

Command Sent:

```
02  XX  XX  4B  55  03  XX
STX ADR ADR  K   U  ETX CHK
```

Positive Response:

```
06  XX  XX  4B  55  03  XX
ACK ADR ADR  K   U  ETX CHK
```

Note: The front panel will display “Keypad Locked”. The keypad can be unlocked from the front panel by entering the 3-digit password 857.

Note: To secure against unauthorized changes from the front panel keypad use Access Control features. See the user’s manual and the “Z” commands for more information.

L: Lock Crosspoint

This command sets a crosspoint and then “locks” it so that output may not be rerouted to any other input until it is unlocked using the “U” command.

Command Sent:

```
02  XX  XX  4C  30  30  31  30  30  35  03  XX
STX ADR ADR  L   0   0   1   0   0   5  ETX CHK
(Lock output 1 to input 5)
```

Positive Response:

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

Alternate L: Lock Crosspoint

This command locks the output to the currently connected input, so that output may not be rerouted to any other input until it is unlocked.

Command Sent:

```
02  XX  XX  4C  30  30  31  03  XX
STX ADR ADR  L   0   0   1  ETX CHK
(Lock output 1 to currently connected input)
```

Positive Response:

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

LC: Lock Crosspoint Check

This command returns the port number that locked the output. Returns NAK if output is unlocked.

Command Sent:

```
02  XX  XX  4C  46  30  30  31  03  XX
STX ADR ADR  L   C  0    0   1  ETX CHK
(Check output 1)
```

Positive Response:

```
06  XX  XX  4C  46  30-35   03  XX
ACK ADR ADR  L  C   0-5     ETX CHK
```

```
PORT        Physical connection

0       Local Keypad/LCD
1       Remote Port B
2       Control In Port C
3       Ethernet Port A
4       Ethernet Port B
5       Telnet
6       SNMP
```

M: Messages

This command will return the contents of the message queue. The message queue contains up to four alarm or information messages concerning the health of the system. System monitoring is only implemented on the XRM and QE3. The following events will cause a message to be put in the message queue:

1. Power supply error.
2. Cooling fan error.
3. Fault detected in RF signal path.
4. RF input level out of set bounds.
5. LCD not responding.
6. Requested re-route.
7. Cards offline.
8. Output/Input RF level balance alarm.

For the QRM, the following events will cause a message to be put ifcn the message queue:

1. Power supply failure.
2. Q-Sense (A-B switch) in effect.
3. Automatic Gain Control (AGC) value out of bounds.
4. RF input level out of set bounds.
5. QRM in Q-route.
6. Route failure (Failure on the new route established by Q-route).
7. Output's Q-Sense (A-B switched) backup input RF level is low (out of bounds).
8. Cooling fan failure.

The M command response also contains an overflow flag. If the message queue is full, a new message will cause the queue contents to be sent in an SNMP TRAP message to the set IP address. The message queue is then cleared and the new message entered to the queue. Messages not read via the M command or SNMP are lost when the queue overflows. When the M command is next executed, the response will have the overflow flag set. Issuing an M command clears the message queue overflow flag and also resets the alarm bit in the change flag. See the C command for more information.

The response to the M command contains the standard response header of an acknowledge, serial address, and the command echo, followed by a flag bit and the message count. Messages are placed in the queue in the order that they occur and are separated by a colon. Messages are variable in length. The maximum size of the queue is 128 characters including separating colons between messages.

Each message contains an address. This address of a given module is determined by looking at the right 2 dials on the control board. The left 2 dials set up the type of module. The right 2 dial will match this address in the error message. This is how you determine which module sent the error message.

Example Command Sent:

```
02  XX  XX  4D  03  XX
STX ADR ADR  M  ETX CHK
(Query the message queue)
```

Example Positive Response:

```
06  XX  XX  4D  30  30  3A  03  XX
ACK ADR ADR  M   0   0  :   ETX CHK
(The queue did not overflow and there are no alarms or messages)
```

Example Positive Response:

```
06  XX  XX  4D  30  32  3A  50  53  32  40  58  52  44  30  33
ACK ADR ADR  M   0   2  :   P   S   2   @   X   R   D   0   3


46  61  69  6C  75  72  65  3A  49  6E  32  30  52  45  4C  65  76
F   a   i   l   u   r   e   :   I   n   2   0   R   F   L   e   v


65  6C  40  58  52  4D  30  30  57  61  72  6E  69  6E  67
e   l   @   X   R   M   0   0   W   a   r   n   i   n   g


03  XX
ETX CHK

(The queue did not overflow and there are two alarms/messages)

Power Supply # 2 at an XRD unit at address 003 has failed

The input RF minimum dBm level has been set and the monitored input level
has dropped below that set level. The error occurred at XRM unit at address
000 on input 20.
```

Note: This command will be accepted regardless of whether a user is logged in.

Types of Messages Received:

Type 1 Power supply message:

```
06  XX  XX  3A  50  53  XX   40  58  52   XX     XX    XX
ACK ADR ADR :   P   S   NUM  @   X   R   TYPE   XADR  XADR

46  61  69  6C  75  72  65   03   XX
F   a   i   l   u   r   e   ETX   CHK


NUM     =   Power Supply number 1 or 2.

TYPE    =   M, O, or D to represent XRM unit, XRO output module
            or XRD distribution module.

XADR    =   Address of individual unit in an XRM system. XRM is
            000 to 255. An XRO and XRD unit is 000 to 015.


Failed  =   Power supply is not operating. Power supply may have
            failed, it may be unplugged, or it may be not
            installed in the slot.
```

Type 2 Fan message:

06	XX	XX	3A	46	61	6E	XX	40	58	52	XX	XX	XX
ACK	ADR	ADR	:	F	a	n	NUM	@	X	R	TYPE	XADR	XADR

46	61	69	6c	65	64	03	XX
F	a	i	l	e	d	ETX	CHK

NUM = Fan number 1, 2, 3, or 4.

TYPE = M, O, or D to represent XRM unit, XRO output module or XRD distribution module.

XADR = Address of individual unit in an XRM system. XRM is 000 to 255. An XRO and XRD unit is 000 to 015.

Failed = Fan should be replaced. The fan is not rotating at all or so slow that it cannot keep the unit at optimum operating temperature.

Type 3 Temperature Message:

06	XX	XX	3A	54	65	6D	70	40	58	52	XX	XX
ACK	ADR	ADR	:	T	e	m	p	@	X	R	UTYPE	XADR

XX	57	61	72	6E	69	6E	67	3	xx
XADR	W	a	r	n	i	n	g	EXT	CHK

UTYPE = M, O, or D to represent XRM unit, XRO output module or XRD distribution module.

XADR = Address of individual unit in an XRM system. XRM is 000 to 255. An XRO and XRD unit is 000 to 015.

Warning = The temperature inside the unit has exceeded 50 degrees Celsius. Immediate servicing is required.

Type 4 Keypad/LCD Message:

06	XX	XX	3A	4B	50	2F	4C	43	44	40	58	52	XX	XX
ACK	ADR	ADR	:	K	P	/	L	C	D	@	X	R	UTYPE	XADD

XX	57	61	72	6E	69	6E	67	3		xx
XADD	W	a	r	n	i	n	g	EXT		CHK

XADR = Address of individual unit in an XRM system. XRM is 000 to 255. An XRO and XRD unit is 000 to 015.

UTYPE = M, O, or D to represent XRM unit, XRO output module or XRD distribution module.

Warning = The keypad and LCD are not responding. This typically indicates the cable that connects the front panel to the unit has been disconnected.

Type 5 RF Unbalanced Level Message:

```
06  XX  XX  3A  4F  75  74   XX  XX  XX  52 46  4C  65  76
ACK ADR ADR :   O   u   t   NUM NUM NUM  R  F   L   e   v


65  6C  40   58  52   XX     XX      XX     46  61  69  6C  75  72
e   l   @    X   R   UTYPE  XADR    XADR    F   a   i   l   u   r


65  3       xx
e   EXT     CHK
```

NUM = Output number.

UTYPE = M, O, or D to represent XRM unit, XRO output module, or XRD distribution module.

XADR = Address of individual unit in an XRM system. XRM is 000 to 255. An XRO and XRD unit is 000 to 015.

Failure = The XRM monitors all routed paths. The XRM examines each output, and the connected input. If the RF level at the output does not closely match the RF level at the input then this message will be generated.

Type 6 RF Input Threshold Level Message:

```
06  XX  XX    XX    49  6E   XX  XX  52 46  4C  65  76
ACK ADR ADR CTYPE   I   n   NUM NUM  R  F   L   e   v


65  6C  40   58  52   XX     XX   XX    57  61  72  6E  69  6E
e   l   @    X   R   UTYPE  XADD  XADD W   a   r   n   i   n


67  3       xx
g   EXT     CHK
```

NUM = Input number. This value is not preceded by zeros. If the input number is 1 – 9 then only one character is output. If the input number is 10 – 32 then two characters are output

XADR = Address of individual unit in an XRM system. XRM is 000 to 255. An XRO and XRD unit is 000 to 015.

UTYPE = M, O, or D to represent XRM unit, XRO output module or XRD distribution module.

Warning = The XRM has the ability to monitor the RF levels of each input and determine if the dBmlevel has dropped below a set threshold value. This message is generated if a dBm value has been set for an input and the RF level has dropped below that set level.

N: Name I/O

NOTE: This command is included for backward compatibility. It is recommended that new users use the NS command to change a name. This command limits the name to 4 characters. The NS command has a variable name length from 0 to 7 characters and also accepts lower case letters.

This command sets a new name for an input or output. This name is displayed on the front panel LCD of the matrix UCM for convenience when operating the unit manually. Each name is limited to only 4 characters. The only acceptable entries are ASCII SPACE (20h), 0-9 (30-39h), and A-Z (41-5A).

Command structure:

N<I/O><nnn><xxxx>

I/O = I for input and O for output.

nnn = Input or output number.

xxx = 4 ASCII characters

Example Command Sent:

```
02  XX  XX  4E  4F  30  30  31      03  XX
STX ADR ADR  N   O   0   0   1  R   C   V   2   ETX CHK
(Assign output 1 the name ”RCV2”)
```

Positive Response:

```
06  XX  XX  4E  4F  30  30  31   03     XX
ACK ADR ADR  N   O   0   0   1   ETX    CHK
(Output 1 is named “RCV2”)
```

Note: This command will be accepted regardless of whether a user is logged in.

NR: Name Read

This command reads the convenience name for an input or output. This name is displayed on the front panel LCD of the matrix UCM for convenience when operating the unit manually. Each name can be up to seven characters long and can consist of any standard keyboard character. If the name is less than seven characters the response is not padded.

Command structure:

NR<I/O><nnn>

I/O = I for input and O for output.

nnn = Input or output number.

Example Command Sent:

```
02  XX  XX  4E  52  4F  30  31  36  03  XX
STX ADR ADR  N   R   O   0   1   6  ETX CHK
(Read the name of output 16)
```

Positive Response:

```
06  XX  XX  4E  52  4F  30  31  36  52  65  63  76  72  32  03  XX
ACK ADR ADR  N   R   O   0   1   6   R   e   c   v   r   2  ETX CHK
(Output 16 is named “Recvr2”)
```

Note: This command will be accepted regardless of whether a user is logged in.

NS: Name Set

This command sets a new name for an input or output. This name is displayed on the front panel LCD of the matrix UCM for convenience when operating the unit manually. Any remote commands to set crosspoints must still use input and output numbers.

Names can consist of any standard keyboard character when set using the N or NS command. Each name can be up to seven characters long. Names can also be set manually from the front panel of the UCM but are limited to using the characters a-z, A-Z, 0-9, and space since there is a simple keypad for entry.

Command structure:

NS<I/O><nnn><aaaaaaa>

I/O = I for input and O for output.

nnn = Input or output number.

Aaaaaaa = Up to 7 alphanumeric characters.

Example Command Sent:

```
02  XX  XX  4E  53  49  30  30  37  53  61  74  31  56  03  XX
STX ADR ADR  N   S   I   0   0   7   S   a   t   1  V   ETX CHK
(Set the name of input 7 to Sat1V)
```

Positive Response:

```
06  XX  XX  4E  53  49  30  30  37  03  XX
ACK ADR ADR  N   S   I   0   0   7  ETX CHK
```

Note: An alternate version of the NS command will be accepted to maintain compatibility with a previous custom version of the command. This version is the N command which is identical to the NS command except that names are a fixed 4 characters long. The response is also different with only the “N” returned.

NQ: Name Change Queue

This command reads the name queue which holds up to eight input or output numbers that have had their convenience names changed. Issuing the NQ command clears the name queue, the change count, and the name bit in the C command change flag.

Command structure:

NQ

Response structure:

NQ<Status Flag><Change Count><I/O number><I/O number>…

Status Flag = 1 for name queue overflow.

Change Count = Number of name changes in queue.

I/O number = An I or O to indicate input or output plus the associated 3 digit number.

Example Command Sent:

```
02  XX  XX  4E  51  03  XX
STX ADR ADR  N   Q  ETX CHK
```

Positive Response:

```
06  XX  XX  4E  51  30  31  63  76  72  32  03  XX
ACK ADR ADR  N   Q   0   1   I   0   0   2  ETX CHK
(No overflow, one change; input 2)
```

Positive Response:

```
06  XX  XX  4E  51  31  31  63  76  72  32  03  XX
ACK ADR ADR  N   Q   1   1   I   0   0   2  ETX CHK
(Name queue overflowed, more than 8 names have been changed since last
check, input 2 is the last known name changed )
```

Note: This command will be accepted regardless of whether a user is logged in.

O: Query Output Channel

This command queries for the input connected to the specified output.

Example Command Sent:

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

Example Positive Response:

```
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)
```

Note: This command will be accepted regardless of whether a user is logged in.

OS: Query Output State

This command queries for the input connected to the specified output along with the locked/unlocked state and access control parameters.

The access control parameters are given by the last two characters in the response. They give numbers that represent an access control bitmap table:

Bit	7	6	5	4	3	2	1	0
Group	8	7	6	5	4	3	2	1
Hex	Response character 1				Response character 2			

If a particular bit is set, then that group is allowed to change a particular output with the L, S, SP, and U commands. If the bit is clear then the corresponding group is not allowed access to that output.

Character	Response 1: Groups allowed access	Response 2: Groups allowed access
0	none	none
1	5	1
2	6	2
3	5, 6	1, 2
4	7	3
5	5, 7	1, 3
6	6, 7	2, 3
7	5, 6, 7	1, 2, 3
8	8	4
9	5, 8	1, 4
A	6, 8	2, 4
B	5, 6, 8	1, 2, 4
C	7, 8	3, 4
D	5, 7, 8	1, 3, 4
E	6, 7, 8	2, 3, 4
F	5, 6, 7, 8	1, 2, 3, 4

Example Command Sent:

```
02  XX  XX  4F  53  30  30  31  03  XX
STX ADR ADR  O   S   0   0   1  ETX CHK
(Query the state of output 1)
```

Examples of Positive Responses:

```
06  XX  XX  4F  53  30  30  32  4C  30  31  03  XX
ACK ADR ADR  O   S   0   0   2   L   0   1  ETX CHK
(Output 1 is connected to input 2, is locked, and only users in group 1 are
allowed access to the output)

06  XX  XX  4F  53  30  30  37  55  36  46  03  XX
ACK ADR ADR  O   S   0   0   7   U   6   F  ETX CHK
(Output 1 is connected to input 7, is unlocked, and users in group 1, 2, 3,
4, 6 and 7 are allowed access to the output)
```

Note: This command will be accepted regardless of whether a user is logged in.

PM: Priority Mode Read/Write

This command turns Priority Mode on or off or reads back priority status of the system. Priority mode assigns user priority to the lock/unlock function. Any user can lock an output. If the priority mode is on, the user that locked the output is recorded. The output can then only be unlocked by a user with equal or higher priority than the user that locked the output.

Priority hierarchy is set and not adjustable. Users are listed below from highest priority to lowest priority.

user1 - highest priority
user2
user3
user4
user5
user6
user7
user8
user9 no user - lowest priority

Write Command Format:

```
02  XX  XX  50  4D  30  03  XX
STX ADR ADR  P   M   0  ETX CHK

02  XX  XX  50  4D  31  03  XX
STX ADR ADR  P   M   1  ETX CHK
```

Example Write Command:

```
02  XX  XX  50  4D  30  03  XX
STX ADR ADR  P   M   0  ETX CHK
(Turn priority Off)

02  XX  XX  50  4D  31  03  XX
STX ADR ADR  P   M   1  ETX CHK
(Turn priority on)
```

Positive Write Response:

```
06  XX  XX  50  4D  03  XX
ACK ADR ADR  P   M  ETX CHK
```

Read Command Format:

```
02  XX  XX  50  4D  03  XX
STX ADR ADR  P   M  ETX CHK

02  XX  XX  50  4D  XX  XX  XX  03  XX
STX ADR ADR  P   M  X   X   X   ETX CHK
```

Example Read Command:

```
02  XX  XX  50  4D  03  XX
STX ADR ADR  P   M  ETX CHK
(Read current system wide priority mode setting)

02  XX  XX  50  4D  30  30  31  03  XX
STX ADR ADR  P   M  0   0   1   ETX CHK
(Read user that locked output 01 while priority is on)
```

Positive Read Response:

```
06  XX  XX  50  4D  30  03  XX
ACK ADR ADR  P   M  0   ETX CHK
(Priority mode is off)


06  XX  XX  50  4D  31  03  XX
ACK ADR ADR  P   M  1   ETX CHK
(Priority mode is on)


06  XX  XX  50  4D  31  03  XX
ACK ADR ADR  P   M  7   ETX CHK
(user7 locked the output)
```

Q: Check Queue

This command will read the change queue. Each control port for the system maintains a change queue that allows changes throughout the system to be tracked. The change queue contains up to 8 crosspoint changes executed since the last Q command. This includes changes to the lock state of a crosspoint. All crosspoint changes are put in the queue regardless of the source. If more than one change is executed for a given output, only the last change will be stored in the queue.

The ASCII number after Q in the response is the number of changes that the queue contains and ranges from 0 to 8. If no crosspoint changes are stored in the queue this number will be zero. If more than 8 changes occurred since the last Q command, this number will not be valid and bit 3 of the queue change flag (see command C) will be set to signal that an overflow has occurred. After the queue is checked the queue and the queue change flag are cleared, including the crosspoint, queue overflow, and access control change bits.

Command Sent:

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

Note: This command will be accepted regardless of whether a user is logged in.

RH: Hard Reset

This command resets all parameters to the factory specified defaults. Note that the matrix and module sizes are reset as well as the output module size. If these are not correct, your matrix will no longer operate correctly. Other parameters are also changed that might make it difficult to access the controller to reconfigure the matrix.

WARNING! DO NOT USE this command unless you are absolutely sure you want the following configuration:

DHCP:	Off
Default Static IP:	192.168.0.249
Default Static Netmask:	255.255.255.0
Default Static Gateway:	192.168.0.1
Telnet Port:	23
QEC Ethernet Port:	9100
Serial Port:	RS232, 9600 baud, 8N1
RS485 Terminations:	Off
Matrix Size:	32x32
Module Size:	32x32
XRO Size:	4

Example Command Sent:

```
02  XX  XX  52  48  03  XX
STX ADR ADR  R   H  ETX CHK
```

Example Positive Response:

```
06  XX  XX  52  48  03  XX
ACK ADR ADR  R   H  ETX CHK
```

RS: Soft Reset

This command reboots the control program and is the equivalent of a power cycle.

Example Command Sent:

```
02  XX  XX  52  53  03  XX
STX ADR ADR  R   S  ETX CHK
```

Example Positive Response:

```
06  XX  XX  52  53  03  XX
ACK ADR ADR  R   S  ETX CHK
```

S: Set Crosspoint

This command will connect one input to an output. The command byte is followed by three bytes giving the output, then three bytes giving the input.

Example 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
```

SC: Set Check Protected Mode

This command will check an output for the status of the protected mode. The command returns the protected mode status, and if the output is in protected mode it will also return the port that put it in protected mode. The output has to be unprotected before it can be changed. The output can only be unprotected from the same port and same address it was protected from.

The reply will return 0 for off. If the output is protected the reply will return a 1 for on and the port number. The serial address of the unit follow in the last two characters.

```
PORT        Physical connection

0       Local Keypad/LCD
1       Remote Port B
2       Control In Port C
3       Ethernet Port A
4       Ethernet Port B
5       Telnet
6       SNMP
```

The response also returns the serial address of the unit the output was protected from.

Example Command Sent:

```
02  XX  XX  53  43  30  30  31  03  XX
STX ADR ADR  S   C  0    0   1  ETX CHK
(Check output 1)
```

Positive Response:

```
06  XX  XX  53  43  30  03  XX
ACK ADR ADR  S  C   0   ETX CHK
Output protected mode is off
```

Positive Response:

```
06  XX  XX  53  43  31  31  46  44  03  XX
ACK ADR ADR  S  C   1   1   F   D   ETX CHK
Output protected mode is on and the output was protected by the
Remote in port from unit address FD
```

Positive Response:

```
06  XX  XX  53  43  31  35  33  38  03  XX
ACK ADR ADR  S  C   1   5   3   8   ETX CHK
Output protected mode is on and the output was protected by
the Telnet port from unit address 38
```

SP: Set Protect Mode

This command will connect the output and input and turn protected mode on for the specified output.

Example Command Sent:

```
02  XX  XX  53  50  30  30  31  30  30  32  03  XX
STX ADR ADR  S   P       0    0   1   0   0   2  ETX CHK
(Connect output 1 to input 2 and turn protected mode on for output 1)
```

Positive Response:

```
06  XX  XX  53  50  03  XX
ACK ADR ADR  S  P   ETX CHK
```

Alternate SP: Set Protect Mode

This command will turn protected mode on for the specified output.

Example Command Sent:

```
02  XX  XX  53  50  30  30  31   03     XX
STX ADR ADR  S   P  0    0   1   ETX    CHK
(turn protected mode on for output 1)
```

Positive Response:

```
06  XX  XX  53  50  03  XX
ACK ADR ADR  S  P   ETX CHK
```

SU: Set Unprotect Mode

This command will clear the protected mode status of the specified output.

NOTE: This command is only successful if the SU command for the specified output is sent from the same port the original SP command was sent from to protect the specified output.

```
PORT        Physical connection

0       Local Keypad/LCD
1       Remote Port B
2       Control In Port C
3       Ethernet Port A
4       Ethernet Port B
5       Telnet
```

Example Command Sent:

```
02  XX  XX  53  55  30  30  31  03  XX
STX ADR ADR  S   U  0    0   1  ETX CHK
(Unprotect output 1)
```

Positive Response:

```
06  XX  XX  53  55  03  XX
ACK ADR ADR  S  U   ETX CHK
```

U: Unlock Crosspoint

This command will unlock a locked crosspoint.

Command Sent:

```
02  XX  XX  55  30  30  31  30  30  35  03  XX
STX ADR ADR  U   0   0   1   0   0   5  ETX CHK
(Unlock output 1 to input 5)
```

Positive Response:

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

Alternate U: Unlock Crosspoint

This command will unlock a locked crosspoint without having to specify the input it is currently locked.

Command Sent:

```
02  XX  XX  55  30  30  31  03  XX
STX ADR ADR  U   0   0   1   ETX   CHK
(Unlock output 1)
```

Positive Response:

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

XA: Attenuate Input

This command will attenuate an input of a XRD or XRM unit in a XRM system. The attenuation of an input is in 0.5dB steps from 0.0 dB attenuation up to a maximum of 15.5dB of attenuation. Check your user's manual to see if this feature is available on your system.

For QE3 systems refer to XG commands or XAS command.

Command Format:

```
02  XX  XX   58     41    XX          XX      XX     XX       XX      XX
STX ADR ADR  X      A    MSADR       ADR     ADR    ADR     INPUT   INPUT

 XX      XX       XX        XX      XX
TENS    ONES    TENTHS      ETX     CHK
```

```
MSDXADR =   Most significant digit of the address. This determines
            what type of unit will respond in an XRM system.

            MSADR = 0       XRM unit
            MSADR = 2       XRD unit

XADR    =   Address of individual unit in an XRM system. Must be
            between 000 and 015 for an XRD and range from 0 to 255
            for an XRM unit.

INPUT   =   Input number of the individual unit you want to attenuate.
            Must be between 01 and 32.


TENS ONES and TENTHS = Number of dB of attenuation from 00.0 to
            15.5. The tens and ones value can range from 0 to
            15. The tenths always have to be 5 or 0. Attenuation
            is only in 0.5 increments so any other tenth value
            will be rejected as an invalid data range. Any
            value larger than 15.5 will also be rejected as
            invalid data range.
```

Example Command:

```
02  XX  XX  58  41  32  32  33  35  30  35  30  37  35  03   XX
STX ADR ADR  X  A   2   2   3   5   0   5   0   7   5   ETX  CHK
(Attenuate XRD unit at address 235 or EBH Input #5 a total of 7.5 dB)
```

Example Command:

```
02  XX  XX  58  41  32  30  31  36  31  37  31  34  30  03   XX
STX ADR ADR  X  A   0   0   1   6   1   7   1   4   5   ETX  CHK
(Attenuate XRM unit at address 196 or 0FH Input #17 a total of 14.5 dB)
```

Positive Response:

```
06  XX  XX  58  41  XX   XX
ACK ADR ADR  X   A  ETX  CHK
```

NOTE: Some firmware releases do not support this command. Refer to the firmware release notes at the beginning of this document for details.

XAS: Attenuate Input (Simplified)

This command will attenuate an XRM system input. If the system has XRDs then the attenuation value is applied to the that input. If the system input is on an XRM then the attenuation is applied at that input. The attenuation of an input is in 0.5dB steps from 0.0 dB attenuation up to a maximum of 15.5dB of attenuation for XRM systems

QE3 systems can be equipped with input attenuation or gain control depending on the system modules. If the system has input distribution modules the system can attenuate the inputs and this is a valid command. Otherwise use XG gain control commands.

Check your user's manual to see if this feature is available on your system.

Command Format:

```
02  XX  XX   58     41    53        XX      XX      XX      40
STX ADR ADR  X      A     S         IN      IN      IN      @

 XX      XX     2E        XX        XX      XX
TENS    ONES    .       TENTHS      ETX     CHK


INPUT   =   System input number you want to attenuate. Must be
            between 001 and number of system inputs. Always 3
            characters.


TENS ONES = Number of dB of attenuation from 00.0 to 15.5.
and TENTHS  The tens and ones value can range from 00 to 15. The
            tenths always have to be 5 or 0. Attenuation is only
            in 0.5 increments so any other tenth value will be
            rejected as an invalid data range. Any value larger
            than 15.5 will also be rejected as invalid data range.
```

Positive Response:

```
06  XX  XX  58  41  53  XX   XX
ACK ADR ADR  X   A  S   ETX  CHK
```

Example Command:

```
02  XX  XX  58  41  53  31  33  35  40  30  35  2E  35  03   XX
STX ADR ADR  X  A   S   1   3   5   @   0   5   .   5   ETX  CHK
(Attenuate system input #135 a total of 5.5 dB)
```

Example Command:

```
02  XX  XX  58  41  53  30  32  34  40  31  33  2E  35  03   XX
STX ADR ADR  X  A   S   0   2   4   @   1   3   .   5   ETX  CHK
(Attenuate system input #24 a total of 13.5 dB)
```

NOTE: Some firmware releases do not support this command. Refer to the firmware release notes at the beginning of this document for details.

XC: Check for Cards Installed

This command will report any cards not installed in an XRM or QE3 unit. This command applies to input, bridge, and output cards on the XRM. This command applies to input and output cards on the QE3. XRD and QED units only report missing input cards, XRO and QEO units only report missing output cards.

QE3 only has input and output cards. No bridge cards. XC command issued to a QE3 has no bridge card response, only input and output card response.

XRM: The bridge card is a special case. Each bridge card has two separate addresses. The addressing is as follows:

Bridge card 1 = cards 1 & 2

Bridge card 2 = cards 3 & 4

Bridge card 3 = cards 5 & 6

Bridge card 4 = cards 7 & 8

It is possible in a fault condition for only half of a bridge card to respond to a check command. If for example no response is read from bridge card 3, then half of the second bridge card is not responding and will be reported as not installed.

Command Format:

```
02  XX  XX   58  46  XX     XX   XX   XX     03    XX
STX ADR ADR  X   C   MSADR ADR  ADR  ADR    ETX   CHK

MSADR =   Most significant digit of the address. This determines what
          type of unit will respond in a system.

            MSADR = 0      XRM
            MSADR = 1      XRO
            MSADR = 2      XRD
            MSADR = 3      QED
            MSADR = 4      QE3
            MSADR = 5      QEO

ADR =       Address of individual box in a system. This is the two
            dials on the control board on the right on an XRM system,
            or the bottom two dials on a QE3 system. The control
            board address is in Hex format. Note the dials go from
            0 to F. This address must be converted to decimal format
            to use this command correctly.
```

EXAMPLE Dials read left to right, or for QE3 from top to bottom 0 3 2 F. You are only concerned with the 2F on the right. 2F Hex converts to 47 decimal. So you would use 047 in the ADR field to write to that unit.

Example Command Sent:

```
02  XX  XX  58  43   34  30  35     34      03  XX
STX ADR ADR  X   C   4   0    5     4       ETX CHK
(Report Cards installed on QE3 unit address 054) (dial reads 36)
```

Example Command Sent:

```
02  XX  XX  58  43   30  30  32     36      03  XX
STX ADR ADR  X   C   0   0    2     6       ETX CHK
(Report Cards installed on XRM unit address 026) (dial reads 1A)
```

XRD Response Format:

```
06    XX     XX   58   43   3A   49   XX     2C   XX   . . .
ACK   ADR    ADR  X    C    :    I    nn     ,    nn    . . .

3       XX
ETX     CHK
```

XRO Response Format:

```
06    XX     XX   58   43   3A   49   XX     2C   XX   . . .
ACK   ADR    ADR  X    C    :    O    nn     ,    nn    . . .

3       XX
ETX     CHK
```

XRM Response Format:

```
06    XX     XX   58   43   3A   49   XX     2C   XX   . . .
ACK   ADR    ADR  X    C    :    I    nn     ,    nn    . . .


3A   42   XX    2C   XX   . . .  3A   4F   XX   2C   XX
:    B    nn    ,    nn   . . .   :    O   nn   ,    nn . . .

3       XX
ETX     CHK
```

XRM Response Example:

```
06    XX     XX   58   43   3A   49   35    3A  42   31
ACK   ADR    ADR  X    C    :    I    5      :   B    1


3A   30   33   2C   36   ETX   CHK
:    0    3    ,    6     03    XX
(Input card #5 not responding, 1st half of bridge card 1 not responding,
Output cards #3 and # 6 not responding)
```

XRM Response Example:

```
06    XX     XX   58   43   3A   49   3A  42   3A   4F    3    XX
ACK   ADR    ADR  X    C    :    I    :   B    :    O    ETX   CHK
(All cards installed and responding)
```

QED Response Format:

```
06    XX     XX   58   43   3A   49   XX     2C   XX   . . .
ACK   ADR    ADR  X    C    :    I    nn     ,    nn    . . .

3       XX
ETX     CHK
```

QEO Response Format:

```
06    XX     XX   58   43   3A   49   XX     2C   XX   . . .
ACK   ADR    ADR  X    C    :    O    nn     ,    nn    . . .

3       XX
ETX     CHK
```

QE3 Response Format:

```
06    XX     XX   58   43   3A   49   XX     2C   XX   . . .
ACK   ADR    ADR  X    C    :    I    nn     ,    nn    . . .

3A   4F   XX   2C   XX         3       XX
:    O   nn    ,    nn . . .    ETX     CHK
```

QE3 Response Example:

```
06    XX     XX   58   43   3A   49   34  2C  38
ACK   ADR    ADR  X    C    :    I    4   ,   8

3A   30   33   2C   36   ETX   CHK
:    O    3    ,    6    03    XX
(Input card #4 and #8 not responding, Output cards #3 and # 6 not
responding)
```

QE3 Response Example:

```
06    XX     XX   58   43   3A   42   3A   4F  3    XX
ACK   ADR    ADR  X    C    :    I    :    O   ETX   CHK
(All cards installed and responding)
```

XF: Check Fan

This command will report the speed and condition of an individual cooling fan in an XRM or QE3 system.

Command Format:

```
02  XX  XX   58 46   XX    XX    XX   XX   XX    03    XX
STX ADR ADR  X  F   NUM  MSADR  ADR  ADR  ADR   ETX   CHK

NUM =       Fan number 1 through 5. QRM units only have two fans.
            If a fan 3 or 4 is polled that does not exist a
            NAK "failed" condition will be returned.

MSADR =     Most significant digit of the address. This determines
            what type of unit will respond in a system.  This field
            is not used for QRM.

            MSADR = 0      XRM unit
            MSADR = 1      XRO unit
            MSADR = 2      XRD unit
            MSADR = 3      QED unit
            MSADR = 4      QE3 unit
            MSADR = 5      QEO unit

ADR =       Address of individual box in a system. This is the two
            dials on the control board on the right on an XRM system,
            or the bottom two dials on a QE3 system control
            board. The control board address is in Hex format,
            note the dials go from 0 to F. This address must be
            converted to decimal format to use this command correctly.
            This field is ignored for QRM.

EXAMPLE     Dials read left to right, or for QE3 from top to bottom
            0 3 2 F. You are only concerned with the 2F on the
            right. 2F Hex converts to 47 decimal. So you would use
            047 in the ADR field to write to that unit.
```

Example Command Sent:

```
02  XX  XX  58  46  31  30  30  34  37  03  XX
STX ADR ADR  X   F   1   0   0   4   7  ETX CHK
(Report Fan 1 condition on XRM unit at address 47D or 2FH)
```

Example Command Sent:

```
02  XX  XX  58  46  33  35  30  32  34  03  XX
STX ADR ADR  X   F   3   5   0   2   4  ETX CHK
(Report Fan 3 condition on QEO unit at address 024D or 18H)
```

Response Format:

```
06  XX  XX  58  46  20      46  61  6E  20      FanNumber   20
ACK ADR ADR  X  F   Space   F   a   n   Space       X       Space

52  50  4D  XX XX XX XX     61  74  20      RPM RPM RPM RPM
R   P   M   “condition”     a   t   Space    X   X   X   X

Condition = “Good”, or “Slow”, or “Fail”
```

Example Response:

```
06   XX    XX    58  46   20   46   61   6E   20    32   20   52  50
ACK  ADR   ADR   X   F   ‘ ‘   F    a    n    ‘ ‘   2   ‘ ‘   R  P

4D   20    47  6F  6F  64  20   61   74  20  32  34  37  35  03  XX
M    ‘ ‘   G   o   o   d  ‘ ‘    a   t  ‘ ‘  2   4   7   5  ETX CHX

(XF Fan 2 RPM Good at 2475)
```

XGA: Set Gain Control to Automatic Mode

This is a QE3 command, not an XRM command. Gain control can be set to manual or automatic. This command turns on automatic gain control for the specified input. By default when an input is set to auto mode the manual gain control settings are turned off. An input can be set to automatic or manual gain control, not both at the same time. This command has 2 formats. Both commands turn on the automatic gain control for the input. One sets the input to the previous auto dB value stored in memory. The other sets the value to the dB value given in the command. Valid values for auto gain control are between -10dBm and -60dBm, in .5dB intervals. EXAMPLE: -10.5 is valid -10.0 is valid -60.5 is not valid. Tenths values if entered incorrectly will be set to .0 or .5 depending on the input value. Input .5 or higher set to .5. .4 or lower will be set to .0. The values are variable in length. Leading zeros are not necessary. The values must be separated by the @- symbols and the tenth value must be separated by the '.' (period) symbol.

Command Format 1:

```
02  XX  XX  58  47  41  XX  . . . 03      XX
STX ADR ADR X   G   A   IN  . . . ETX   CHK
```

Command Format 2:

```
02  XX  XX  58  47  41   XX   . . .    40   2D   . . .      2E
STX ADR ADR X   G   A    IN   . . .     @   -    . . .      .

XX      03     XX
tenths  ETX   CHK


IN      =   Input port. Must be between 1 and the number of
            system inputs. Up to 4 characters accepted.

TENS ONES = Value in dB from -10 to -60. Any value larger than -10 or
            smaller than -60dB will be rejected as invalid data range


TENTHS  =   Rounded down to 0 or 5
```

Example Command Sent:

```
02  XX  XX  58  46      41      31      38      40      2D    32
STX ADR ADR  X   G      A       1       8       @       -     2

35      2E     35       03     XX
5       .       5       ETX   CHK
(Set auto gain control on for input 18. Set the dB level at -25.5dBm)
```

Response Format:

```
06  XX  XX  58  46  41  03  XX
ACK ADR ADR  X  G   A   ETX CHK
```

XGAO: Set Gain Control to Automatic Mode - Output

QRM only. Gain control can be set to manual or automatic. This command turns on automatic gain control for the specified output. By default when an output is set to auto mode the manual gain control settings are turned off. An output can be set to automatic or manual gain control, not both at the same time. This command has 2 formats. Both commands turn on the automatic gain control for the output. One sets the output to the previous auto dB value. The other sets the value to the dB value given in the command. Valid values for QRM auto gain control are between -60 dBm and 0 dBm. Tenths value must be either 0 or .5.

Command Format 1:

```
02  XX  XX  58  47  41  4F  XX      XX      XX      03     XX
STX ADR ADR X   G   A   O   OUT3    OUT2    OUT1    ETX   CHK
```

Command Format 2:

```
02  XX  XX  58  47  41  4F  XX      XX      XX      40  2B/2D   XX   XX

STX ADR ADR X   G   A   O   OUT3    OUT2    OUT1    @   +/-     10s  1s

2E    XX     03    XX
.   tenths  ETX   CHK
```

```
OUT =       Output. Must be between 001 and the number of system
            outputs.  Always 3 characters. Tenths must be either 0
            or 5 (values valid in .5 increments)
```

Example Command Sent:

```
02    XX    XX   58  46  41  4F 30   31  36  40  2D 30
STX   ADR   ADR   X   G   A  O   0   1    6  @   -  0

35      2E     35       03     XX
5       .       5       ETX   CHK
(Set auto gain control on for output 16. Set the dB level at -5.5dBm)
```

Response Format:

```
06  XX  XX  58  46  41  4F  03  XX
ACK ADR ADR  X  G   A   O   ETX CHK
```

XGH: Set Gain Control Hysteresis dB

Number of dB a signal has to rise or fall beyond the set user level before the gain control feature will act upon the signal. Can be set from 0 to 60 seconds in 1/1000 intervals.

Command will accept value from 1 to 10. Command length is variable also. User does not need to enter leading zeros. Input number and dB number must be separated by the @ symbol. The user must specify a number for both the input and delay time. Zero is not acceptable for either value.

Command Format 1:

```
02  XX  XX  58  47  48  XX      . . .   40
STX ADR ADR X   G   H   IN      . . .   @

XX      . . .   XX03       XX
DB      . . .   ETX   CHK
```

```
IN      =   Input port. Must be between 1 and the number of
            system inputs.

DB       =  dB value. Value 1 to 10dB. Numbers only, no characters.
```

Example Command Sent:

```
02  XX  XX  58  47  48  38   40   32   3     XX
STX ADR ADR  X   G   H  8    @    2    ETX   CHK
(Set hysteresis on input 8 to 2dB)
```

Example Command Sent:

```
02  XX  XX  58  47  48  33  35  40   31     30      3     XX
STX ADR ADR  X   G   H  3   5   @    1      0      ETX   CHK
(Set hysteresis on input 35 to 10dB)
```

Response Format:

```
06  XX  XX  58  46  48  03  XX
ACK ADR ADR  X  G   H   ETX CHK
```

```
Note: Some firmware versions do not implement this command.
```

XGM: Set Gain Control to Manual Mode

This is a QE3 command, not an XRM command. Gain control can be set to manual or automatic. This command turns on manual gain control for the specified input. By default when an input is set to manual mode the auto gain control settings are turned off. An input can be set to automatic or manual gain control, not both at the same time. This command has 2 formats. Both commands turn on the manual gain control for the input. One sets the input to the previous manual dB value. The other sets the value to the dB value given in the command. Valid values for manual gain control are between +18dBm and -13.5dBm. Tenths values if entered incorrectly will be set to .0 or .5 depending on the input value. Input .5 or higher set to .5. .4 or lower will be set to .0. All 3 values are variable in length. Leading zeros are not necessary. The values must be separated by the @-or @+ symbols and the tenth value must be separated by the '.' (period) symbol. Values outside the range of +18 to -13.5 will be rejected. EXAMPLE: -13.6 and +18.1 are invalid values.

Manual gain control can be set to amplify or attenuate an input. Manual gain control has no feedback or internal adjusting. The manual dB value is what is applied to the input regardless of signal strength.

Command Format 1:

```
02  XX  XX  58  47  41  4D  XX  . . . 03      XX
    STX ADR ADR X   G   M   IN  . . . ETX   CHK
```

Command Format 2:

```
02  XX  XX  58  47  4D   XX     . . .   40      2D\2B       XX
STX ADR ADR X   G   M    IN     . . .   @       -\+         10s

XX      2E    XX     03    XX
1s      .   tenths  ETX   CHK
```

```
IN  =   Input port. Must be between 001 and the number of system
        inputs. 1 to 3 characters.

TENS ONES = Value in dB from -13 to +18. Any value larger
            than +18 or smaller than -13dB will be rejected as
            invalid data range. 1 to 3 characters.


TENTHS  =   Rounded down to 0 or down to 5. 1 to 2 characters.
```

Example Command Sent:

```
02  XX  XX  58  46      4D      31      38      40      2D
STX ADR ADR  X   G       M       1       8       @       -


35      2E      35      03      XX
5       .       5       ETX     CHK
(Set manual gain control on for input 18. Set the dB level at -5.5dBm)
```

Example Command Sent:

```
02  XX  XX  58  46      4D      38      40      2B
STX ADR ADR  X   G       M       8       @       +


31      36      2E      30      03      XX
1       6       .       0       ETX     CHK
(Set manual gain control on for input 18. Set the dB level at +16.0dBm)
```

Response Format:

```
06  XX  XX  58  46  4D  03  XX
ACK ADR ADR  X  G   M   ETX CHK
```

XGMO: Set Gain Control to Manual Mode - Output

QRM and LTE only. Gain control can be set to manual or automatic. This command turns on manual gain control for the specified output. By default when an output is set to manual mode the auto gain control settings are turned off.

Manual gain control can be set to amplify or attenuate an output. Manual gain control has no feedback or internal adjusting. The manual dB value is what is applied to the output regardless of signal strength. This command has 2 formats. Both commands turn on the manual gain control for the output. One sets the output to the previous manual dB value. The other sets the value to the dB value given in the command.

QRM: An output can be set to automatic or manual gain control, not both at the same time. Valid values for QRM manual gain control are between -30 dBm and +16 dB. For the QRM, the tenths value must be either 0 or .5.

LTE: An output can only be set to manual gain control because the LTE does not support AGC (automatic gain control). Valid values for LTE attenuation are between 0.00 dB and +31.75 dB. Because the LTE accepts attenuation values in 0.25 dB increments, the tenths value must be either 0, 2, 5, or 7, and it is interpreted as follows: 0 = .00, 2 = .25, 5 = .50, and 7 = .75. For example, if the value 13.7 is sent, the LTE will set attenuation for the specified output at 13.75 dB.

Command Format 1:

```
02  XX  XX  58  47  4D  4F  XX      XX      XX      03     XX
STX ADR ADR X   G   M   O   OUT3    OUT2    OUT1    ETX   CHK
```

Command Format 2:

```
02  XX  XX  58  47  4D  4F XX      XX      XX      40  2B/2D XX     XX
STX ADR ADR X   G   M    O  OUT3    OUT2    OUT1    @   +/-     10s  1s

2E    XX     03    XX
.   tenths  ETX   CHK
```

```
OUT =   Output. Must be between 001 and the number of system
        outputs. Always 3 characters. Tenths must be either 0 or 5
        (values valid in .5 increments)
```

Example Command Sent:

```
02  XX  XX  58   46  4D  4F  30  31     36      03      30
STX ADR ADR  X   G   M   O    0   1     6       @       0

35      2E     35       03     XX
5       .       5       ETX   CHK
(Set auto gain control on for output 16. Set the dB level at 5.5dBm)
```

Response Format:

```
06  XX  XX  58  46  4D  4F  03  XX
ACK ADR ADR  X  G   M   O   ETX CHK
```

XGR: Gain Control Read Status

This is a QE3 and XRM command. This command will report the input gain control settings and RF level of the specified input. It will return the attenuation value for an XRM. Command length is variable. User can but does not need to enter leading zeros.

Command Format:

```
02  XX  XX      58   47  52   XX    . . .   03     XX
STX ADR ADR     X    G   R    IN3   . . .   ETX    CHK


IN  =   Input to read status. Must be between 001 and the number of
        System inputs. Always 3 characters.
```

Example Command Sent:

```
02   XX    XX   58    46    52  30   31  38     03      XX
STX  ADR  ADR    X    G     R   0    1    8     ETX     CHK
(Read gain control status of system input 18)
```

Response Format:

```
06  XX  XX  58  46  20  4D/41  40   2B/2D  XX   XX   2E   XX   03  XX
ACK ADR ADR  X  G   R    M/A   @    +/-   10s    1s  .  tenths ETX CHK

M/A     =   M for manual mode. A for automatic mode. Always returns
            M for XRM

+/-     =   + for gain, – for attenuation. Always returns – for XRM.

10s 1s . tenths =   dB value input is set at.
```

Example Response:

```
06   XX    XX    58  46   52   4D   40  2D  31  33  2E  35  03   XX
ACK  ADR   ADR   X   G    R    M    @   -   1   3   .   5   ETX  CHX
(Input set at -13.5 dB of attenuation in manual mode.)


06   XX    XX    58  46   52   4D   40  2B  31  33  2E  35  03   XX
ACK  ADR   ADR   X   G    R    M    @   +   1   8   .   0   ETX  CHX
(Input set at +18.0 dB of gain in manual mode.)


06   XX    XX    58  46   52   4D   40  2D  31  33  2E  35  03   XX
ACK  ADR   ADR   X   G    R    A    @   -   1   0   .   5   ETX  CHX
(Input auto gain control enabled and level set at -10.5dBm.)
```

XGRO: Gain Control Read Status - Output

This is a QRM and LTE command. This command will report the output gain control settings and RF level of the specified output.

LTE: Since the LTE does not support AGC (automatic gain control), the mode returned from the LTE will always be 'M' for manual. Also, because the LTE supports gain values in increments of .25 dB, the tenths value will be one of four digits: 0, 2, 5, or 7, which respectively represent the values .00, .25, .50, and .75. Therefore, if a value of 13.2 is returned, the actual attenuation value is 13.25 dB. Likewise, if a value of 06.7 is returned, it represents 6.75 dB.

Command Format:

```
02  XX  XX  58 47    52 4F  XX    XX        XX03       XX
STX ADR ADR X  G      R  O  OUT3      OUT2  OUT1       ETX   CHK

OUT     =   Output to read status. Must be between 001 and the number
            of system outputs. Always 3 characters.
```

Example Command Sent:

```
02  XX  XX  58  46      52      30      31      36      03      XX
STX ADR ADR  X   G      R       0       1       6       ETX     CHK
(Read gain control status of system output 16)
```

Response Format:

```
06  XX  XX  58  46  20  4F 4D/41  40     2B/2D  XX   XX   2E
ACK ADR ADR  X  G   R    O M/A   @    +/-   10s  1s    .

XX 03  XX
tenths ETX CHK


M/A     =   M for manual mode. A for automatic mode (QRM only).

+/-     =   + for gain, – for attenuation

10s 1s  =   dB value output is set at. Half dB steps. 0 or 5
            tenths.
```

Example Response:

```
06   XX    XX    58  46   52  4F  4D   40  2D  31  33  2E  35  03  XX
ACK  ADR   ADR   X   G    R    O    M  @   -   1   3   .   5 ETX  CHX
(Output set at -13.5 dB of attenuation in manual mode. )
```

Example Response:

```
06   XX    XX    58  46   52   4F 4D    40  2B  31  33  2E  35  03   XX
ACK  ADR   ADR   X   G    R    O  M     @   +   1   8   .   0   ETX  CHX
(Output set at +18.0 dB of gain in manual mode.)
```

Example Response:

```
06   XX    XX    58  46   52  4F  41    40  2D  31  33  2E  35  03   XX
ACK  ADR   ADR   X   G    R   O    A    @   -   1   0   .   5   ETX  CHX
(Output auto gain control enabled and level set at -10.5dBm.)
```

XGS: Set Simple Gain Control Second Delay

Number of seconds the system will wait before acting upon a signal that requires a changed based on the AGC settings. This applies to simple AGC mode only. Can be set from 0 to 255 seconds in 1 second intervals.

Command length is variable. User does not need to enter leading zeros but they will be accepted. Input number and delay number must be separated by the @ symbol. The user must specify a number for both the input and delay time.

Command Format 1:

```
02  XX  XX  58  47  53  XX      . . .   40
STX ADR ADR X   G   S   IN      . . .   @

XX      . . .   XX03       XX
DELAY       . . .   ETX   CHK



IN      =   Input port. Must range from 1 to the number of
            system inputs. Numbers only, no characters 1 to
            3 digits accepted.

DELAY    =  Number of seciond. Value 0 to 255. Numbers only,
            no characters. 1 to 3 digits accepted.
```

Example Command Sent:

```
02  XX  XX  58  47  48  38   40   32   3     XX
STX ADR ADR  X   G   H  8    @    2   ETX   CHK
(Set hysteresis on input 8 to 2dB)
```

Example Command Sent:

```
02  XX  XX  58  47  48  33  35  40   31    30     3     XX
STX ADR ADR  X   G   H  3   5   @    1     0     ETX   CHK
(Set hysteresis on input 35 to 10dB)
```

Response Format:

```
06  XX  XX  58  46  48  03  XX
ACK ADR ADR  X  G   H   ETX CHK
```

Note: Some firmware versions do not implement this command.

XGTA: Set Gain Control Time: Attack Time

Only supported by certain QE3 systems.

Number of seconds or milliseconds the system waits between 0.5 dB power increases during the time that a weak signal is boosted to get it back up to a user pre-defined dB signal level. Can be set from 0 to 60 seconds in 1/1000 intervals.

This is a QE3 automatic gain control command. Attack time is when the input RF level has decreased and the system is now increasing the input signal strength to get the RF level back up to the user pre-defined automatic gain control dB level. The gain control feature can increase this signal strength slowly or quickly based on this number. If the value is set to a small number then the signal level will increase quickly back up to the pre-defined R level. If the value is set to a large number then the signal level will increase slowly back up to the pre-defined R level.

Command will accept milliseconds or seconds. User must specify with an “s” or “ms” in the command structure. Command length is variable also. User does not need to enter leading zeros. Input number and delay number must be separated by the ‘@’ symbol. The end of the delay number is indicated by the “s” or “ms” characters. The user must specify a number for both the input and attack time. If the user wants to set this value to zero then the user must specify “0” character in the attack time.

Command Format 1:

```
02  XX  XX  58  47  54  41  XX      . . .   40
STX ADR ADR X   G   T   A   IN      . . .   @

XX      . . .   73  XX03       XX
AT      . . .   s   ETX   CHK
```

Command Format 2:

```
02  XX  XX  58  47  54  41  XX      . . .   40
STX ADR ADR X   G   T   A   IN      . . .   @

XX      . . .   6D  73  03     XX
AT      . . .   m   s   ETX   CHK
```

```
IN      =   Input port. Must be between 1 and the number of
            system inputs.

AT       =  Attack time. Value in seconds or 1/1000 seconds wait
            period. If  the user specifies ms then valid values
            range from 0 to 60,000. If the user specifies  then
            valid values range from 0 to 60. Can vary from
            1 to 5 characters. Numbers only, no characters.
```

Example Command Sent:

```
02  XX  XX  58  47  54    41  38   40   32  6D  73   3     XX
STX ADR ADR  X   G   T    A   8    @    2   m   s    ETX   CHK
(Set auto gain control delay time on input 8 to 2/1000 of a second)
```

Example Command Sent:

```
02  XX  XX  58  47  54      41  38   40    32   73   3     XX
STX ADR ADR  X   G   T      A   8     @    2    s    ETX   CHK
(Set auto gain control delay time on input 8 to 2 seconds)
```

Example Command Sent:

```
02  XX  XX  58  47    54    41   34     33   40
STX ADR ADR  X   G    T     A     4     3     @


36  35  30  30   6D     73    3     XX
6   5   0   0    m      s     ETX   CHK
(Set auto gain control delay time on input 43 to 6500 milliseconds
 or the equivalent of 6.5 seconds)
```

Response Format:

```
06  XX  XX  58  46  54  41  03  XX
ACK ADR ADR  X  G   T   A   ETX CHK
```

Note: Some firmware versions do not implement this command.

XGTD: Set Gain Control Time: Decay Time

Number of seconds or milliseconds the system waits between 0.5 dB power decreases during the time that a high power signal is attenuated to get it back down to a user pre-defined dB signal level. Can be set from 0 to 60 seconds in 1/1000 intervals.

This is a QE3 automatic gain control command. Decay time is when the input RF level has increased and the system is now decreasing the input signal strength to get the RF level back down to the user pre-defined automatic gain control dB level. The gain control feature can decrease this signal strength slowly or quickly based on this number. If the value is set to a small number then the signal level will decrease quickly back down to the pre-defined RF level. If the value is set to a large number then the signal level will decrease slowly back down to the pre-defined R level.

Command will accept milliseconds or seconds. User must specify with an “ms” or “s” in the command structure. Command length is variable also. User does not need to enter leading zeros. Input number and decay number must be separated by the ‘@’ symbol. The end of the decay number is indicated by the “s” or “ms” characters. The user must specify a number for both the input and decay time. If the user wants to set this value to zero then the user must specify “0” character in the decay time.

Command Format 1:

```
02  XX  XX  58  47  54  44  XX      . . .   40
STX ADR ADR X   G   T   D   IN      . . .   @

XX      . . .   73  XX03       XX
DT      . . .   s   ETX   CHK
```

Command Format 2:

```
02  XX  XX  58  47  54  44  XX      . . .   40
STX ADR ADR X   G   T   D   IN      . . .   @

XX      . . .   6D  73  03     XX
DT      . . .   m   s   ETX   CHK
```

```
IN      =   Input port. Must be between 1 and the number of
            system inputs.

DT       =  Decay time. Value in seconds or 1/1000 seconds wait
            period. If  the user specifies ms then valid values
            range from 0 to 60,000. If the user specifies s then
            valid values range from 0 to 60. Can vary from
            1 to 5 characters. Numbers only, no characters.
```

Example Command Sent:

```
02  XX  XX  58  47  54  44  38    40   32    6D  73   3     XX
STX ADR ADR  X   G   T  D    8    @    2    m   s    ETX   CHK
(Set auto gain control decay time on input 8 to 2/1000 of a second)
```

Example Command Sent:

```
02  XX  XX  58  47  54  44  38   40    32   73   3     XX
STX ADR ADR  X   G   T   D   8    @    2    s    ETX   CHK
(Set auto gain control decay time on input 8 to 2 seconds)
```

Example Command Sent:

```
02  XX  XX  58  47   54  44  54   34    38   40
STX ADR ADR  X   G    T   D   T    4    3     @


36  35  30  30   6D     73    3     XX
6   5   0   0    m      s     ETX   CHK
(Set auto gain control decay time on input 43 to 6500 milliseconds
 or the equivalent of 6.5 seconds)
```

Response Format:

```
06  XX  XX  58  46  54  44  03  XX
ACK ADR ADR  X  G   T   D   ETX CHK
```

Note: Some firmware versions do not implement this command.

XGTPA: Set Gain Control Time: Pre-Attack Time

Number of seconds or milliseconds the system waits before acting on an input signal if the gain control is set to start increasing signal strength. If an input signal decreases below the user defined dB level, the gain control will want to increase that signal power. This is a set time interval the system will wait before starting that power increase process. Can be set from 0 to 60 seconds in 1/1000 intervals. This only applies to the gain control feature when a weak signal needs to be increased. For delay time for weak signals refer to the XGPDT command

Command will accept milliseconds or seconds. User must specify with an “s” or “ms” in the command structure. Command length is variable also. User does not need to enter leading zeros. Input number and delay number must be separated by the @ symbol. The end of the delay number is indicated by the “s” or “ms” characters. The user must specify a number for both the input and pre-attack time. If the user wants to set this value to zero then the user must specify “0” character in the pre-attack time.

Command Format 1:

```
02  XX  XX  58  47  54  50  41  XX      . . .   40
STX ADR ADR X   G   T   P   A   IN      . . .   @

XX      . . .   73  XX03       XX
PAT     . . .   s   ETX   CHK
```

Command Format 2:

```
02  XX  XX  58  47  50  41  54  XX      . . .   40
STX ADR ADR X   G   P   A   T   IN      . . .   @

XX      . . .   6D  73  03     XX
PAT     . . .   m   s   ETX   CHK
```

```
IN      =   Input port. Must be between 1 and the number of
            system inputs.

PAT      =  Pre-attack time. Value in seconds or 1/1000 seconds wait
            period. If  the user specifies ms then valid values
            range from 0 to 60,000. If the user specifies s then
            valid values range from 0 to 60. Can vary from
            1 to 5 characters. Numbers only, no characters.
```

Example Command Sent:

```
02  XX  XX  58  47   54  50 41 38   40   32 6D  73   3     XX
STX ADR ADR  X   G   T   P  A   8    @   2  m   s    ETX   CHK
(Set auto gain control Pre-attack time on input 8 to 2/1000 of a second)
```

Example Command Sent:

```
02  XX  XX  58  47  54  50  41   38   40    32   73   3     XX
STX ADR ADR  X   G  T   P   A    8     @    2    s    ETX   CHK
(Set auto gain control Pre-attack time on input 8 to 2 seconds)
```

Example Command Sent:

```
02  XX  XX  58  47  54  50  41   34     38   40
STX ADR ADR  X   G  T   P   A     4     3     @


36  35  30  30   6D     73    3     XX
6   5   0   0    m      s     ETX   CHK
(Set auto gain control Pre-attack time on input 43 to 6500 milliseconds
 or the equivalent of 6.5 seconds)
```

Response Format:

```
06  XX  XX  58  46  54  50  41  03  XX
ACK ADR ADR  X  G   T   P   A   ETX CHK
```

Note: Some firmware versions do not implement this command.

XGTPD: Set Gain Control Time: Pre-Decay Time

Number of seconds or milliseconds the system waits before acting on an input signal if the gain control is set to start attenuating a signal. If an input signal increases above the user defined dB level, the gain control will want to attenuate that signal. This is a set time interval the system will wait before starting that attenuation process. Can be set from 0 to 60 seconds in 1/1000 intervals. This only applies to the gain control feature when a strong signal needs to be attenuated. For delay time for weak signals refer to the XGTPA command

Command will accept milliseconds or seconds. User must specify with an “s” or “ms” in the command structure. Command length is variable also. User does not need to enter leading zeros. Input number and pre-decay number must be separated by the @ symbol. The end of the pre-decay number is indicated by the “s” or “ms” characters. The user must specify a number for both the input and pre-decay time. If the user wants to set this value to zero then the user must specify “0” character in the pre-decay time.

Command Format 1:

```
02  XX  XX  58  47  54  50  44  XX      . . .   40
STX ADR ADR X   G   T   P   D   IN      . . .   @

XX      . . .   73  XX03       XX
PDT     . . .   s   ETX   CHK
```

Command Format 2:

```
02  XX  XX  58  47  54  50  44  XX      . . .   40
STX ADR ADR X   G   T   P   D   IN      . . .   @

XX      . . .   6D  73  03     XX
PDT     . . .   m   s   ETX   CHK
```

```
IN      =   Input port. Must be between 1 and the number of
            system inputs.

PDT      =  Pre-decay time. Value in seconds or 1/1000 seconds wait
            period. If  the user specifies ms then valid values
            range from 0 to 60,000. If the user specifies s then
            valid values range from 0 to 60. Can vary from
            1 to 5 characters. Numbers only, no characters.
```

Example Command Sent:

```
02  XX  XX  58  47   54  50  44  38   40  32   6D  73    3     XX
STX ADR ADR  X   G   T   P   D   8    @   2    m   s     ETX   CHK
(Set auto gain control pre-decay time on input 8 to 2/1000 of a second)
```

Example Command Sent:

```
02  XX  XX  58  47  54  50  44  38   40    32   73   3     XX
STX ADR ADR  X   G   T  P   D   8     @    2    s    ETX   CHK
(Set auto gain control pre-decay time on input 8 to 2 seconds)
```

Example Command Sent:

```
02  XX  XX  58  47  54  50  44  34  38   40
STX ADR ADR  X   G  T   P   D   4   3    @


36  35  30  30   6D    73    3     XX
6   5   0   0    m     s     ETX   CHK
(Set auto gain control pre-decay time on input 43 to 6500 milliseconds
 or the equivalent of 6.5 seconds)
```

Response Format:

```
06  XX  XX  58  46  54  50  44  03  XX
ACK ADR ADR  X  G   T   P   D   ETX CHK
```

Note: Some firmware versions do not implement this command.

XGZ: Set Gain Control for Zero Input

It is possible for the signal strength of an input to drop to a strength level that can't be read by the gain control hardware. This is referred to as zero input. If an input set on automatic gain control is at zero input, this value is applied to the gain control hardware until the signal comes back and is acted upon by the gain control feature.

This value can be set to the same range when gain control is in the manual mode. Current values range from -13.5dB of attenuation up to +18dB of gain. Command length is variable. dB and input numbers must be separated by the @ symbol. Tens and tenths place need to separated by the "." symbol. Command must contain the @ and period and a valid number for both parameters.

Command Format 1:

```
02  XX  XX  58  47  5A   XX     . . .   40  2D\2B       XX      . . .
STX ADR ADR X   G   Z    IN3    . . .   @   -\+         dB      . . .

2E    XX     03    XX
.   tenths  ETX   CHK

IN  =       Input port. Must be between 1 and the number of system
            inputs.

dB      =   positive or gain values range from 0 to 18.
            Negative or attenuation values range from 0 to
            13.5

tenths  =   Valid tenths values are 0 and 5 only. Half dB steps
            only.
```

Example Command Sent:

```
02  XX  XX  58  46  5A   31  30   38  40 2B  35 2E  35  3     XX
STX ADR ADR  X   G   Z   1   0    8   @   +   5  .   5   ETX  CHK
(Set zero gain control value on input 108 to +5.5dB gain)
```

Example Command Sent:

```
02  XX  XX  58  46  5A   33 40  2D   31   32   2E  30   3     XX
STX ADR ADR  X   G   Z   3  @    -    1    2    .   0    ETX  CHK
(Set zero gain control value on input 3 to 12.0dB attenuation)
```

Response Format:

```
06  XX  XX  58  46  4D  03  XX
ACK ADR ADR  X  G   Z   ETX CHK

Note: Some firmware versions do not implement this command.
```

XP: Check Power Supply and LCD Status

This command will report the condition of the power supplies and LCD in an XRM system. If a degrade or failure condition is indicated the power supply requires servicing or is unplugged. The power supply current capacity will begin to degrade at temperatures over 50 degrees Celsius. The degrade signal will be asserted when the power supply temperature reaches 40 degrees Celsius.

Command Format:

```
02  XX  XX   58     50   XX     XX      XX      XX      03      XX
STX ADR ADR  X      P   MSADR   ADR     ADR     ADR     ETX     CHK

MSDXADR =   Most significant digit of the XRM address. This determines
            what type of unit will respond in an XRM system.

            MSADR = 0       XRM unit
            MSADR = 1       XRO unit
            MSADR = 2       XRD unit
            MSADR = 3       QED unit
            MSADR = 5       QEO unit


ADR =       Address of individual box in an XRM system. Must be
            between 000 and 255.
```

Response Format:

```
06  XX  XX  58  50      XX           XX       XX            XX      XX
ACK ADR ADR  X   P   PS1-Degrade  PS1-Fail PS2-Degrade  PS2-Fail  LED1

 XX      XX     03       XX
LED2    LCD    ETX      CHK

PS1-Degrade     0 = no Degrade, 1 = Danger condition on power supply 1
PS1-Fail        0 = no Failure, 1 = Failure on Power supply 1
PS2-Degrade     0 = no Degrade, 1 = Danger condition on power supply 2
PS2-Fail        0 = no Failure, 1 = Failure on Power supply 2
PS1-LED         0 = LED on       1 = LED off
PS2-LED         0 = LED on       1 = LED off
LCD             0 = LCD OK       1 = Not responding
```

Example Command:

```
02  XX  XX  58  50  31  32  33  35  03   XX
STX ADR ADR  X  P   1   2   3   5   ETX  CHK
(Check status of power supplies and LCD on XRO unit at address 235)
```

Example Response:

```
06  XX  XX  58  50  30  30  31  30  30  30  30  03   XX
ACK ADR ADR  X  P   0   0   1   0   0   0   0   ETX  CHK
(Power supply 2 running in degrade mode. Power supply 1 normal, LCD OK)
```

XPI: QE3 Check Power Supply Current

This command will report the current in amps output of a power supply in a QE3 system.

Command Format:

```
02  XX  XX   58 50  49  XX    XX    XX    XX    XX   03   XX
STX ADR ADR  X  P   I   NUM MSADR   ADR   ADR   ADR  ETX   CHK


NUM     =   Power supply number. 1 or 2.

MSADR =     Most significant digit of the QE3 address. This determines
            what type of unit will respond in an QE3 system.

            MSADR = 4      QE3 unit

ADR =   Address of individual box in a QE3 system. Must be between
            000 and 255.
```

Response Format:

```
06  XX  XX  58   50    49    XX    XX    2D    XX        41     6D   70
ACK ADR ADR  X   P      I    10s    1s    .    tenths     A     m    p

73   ETX    CHK
s     03     XX
```

Example Command:

```
02  XX  XX  58  50  49  32  35  30  30  36  03   XX
STX ADR ADR  X  P   I   2   4   0   0   6   ETX  CHK
(Check current of power supply # 2 on QE3 unit at address 6)
```

Example Response:

```
06  XX  XX  58  50  56  30  31  2D  33  41  6D  70 73  03   XX
ACK ADR ADR  X  P   I   0   1   .   3   A   m   p  s   ETX  CHK
(Power supply reports current is 1.3 amps output)
```

XPS: QE3 Check Status bits of a Power Supply

This command will report the 5 status bits of a QE3 power supply in a QE3 system.

Command Format:

```
02  XX  XX   58 50  53  XX   XX    XX   XX   XX   03   XX
STX ADR ADR  X  P   S   NUM MSADR  ADR  ADR  ADR  ETX  CHK


NUM     =   Power supply number. 1 or 2.

MSADR =     Most significant digit of the QE3 address. This determines
            what type of unit will respond in a QE3 system.

            MSADR = 4       QE3 unit

ADR =   Address of individual box in a QE3 system. Must be between
            000 and 255.
```

Response Format:

```
06  XX  XX  58  50   53  XX     XX      XX      XXF    XX     ETX  CHK
ACK ADR ADR  X   P   S   NUM1   NUM2    NUM3    NUM4    NUM5    03   XX

NUM1    AC input                        0=Good  1 Fault
NUM2    DC output                       0=Good  1 Fault
NUM3    Temperature                     0=Good  1 Fault
NUM4    Over temperature shutdown       0=Good  1 Fault
NUM5    Fan failure                     0=Good  1 Fault
```

Example Command:

```
02  XX  XX  58  50  54  31  33  30  30  37  03   XX
STX ADR ADR  X  P   S   1   3   0   0   7   ETX  CHK
(Check status bits of power supply 1 on QED unit at address 7)
```

Example Response:

```
06  XX  XX  58  50  54  30  31  30  30  30  03   XX
ACK ADR ADR  X  P   S   0   1   0   0   0   ETX  CHK
(Power supply reports DC output failure)

In the event that the power supply is not plugged in all bits will
return a fault condition.
```

XPT: QE3 Check Power Supply Temperature

This command will report the internal temperature of the power supply in a QE3 system.

Command Format:

```
02  XX  XX   58 50  54  XX    XX    XX    XX   XX    03   XX
STX ADR ADR  X  P   T   NUM  MSADR  ADR   ADR  ADR   ETX  CHK


NUM     =   Power supply number. 1 or 2.

MSDXADR =   Most significant digit of the QE3 address. This determines
            what type of unit will respond in an QE3 system.

            MSADR = 4      QE3 unit

ADR =       Address of individual box in a QE3 system. Must be between
            000 and 255.
```

Response Format:

```
06  XX  XX  58  50   54  XX    XX    43    20    6F    72    XX
ACK ADR ADR  X   P   T   10s   1s    C    ' '    o     r    10s

XX   46   ETX   CHK
1s   F    03    XX
```

Example Command:

```
02  XX  XX  58  50  54  31  33  30  30  37  03   XX
STX ADR ADR  X  P   T   1   3   0   0   7   ETX  CHK
(Check temperature of power supply 1 on QED unit at address 7)
```

Example Response:

```
06  XX  XX  58  50  54  32  39  43  20  6F  72  20  38  34  46  03   XX
ACK ADR ADR  X  P   T   2   9   C       o   r       8   4   F   ETX  CHK
(Power supply reports temperature 29 Celsius or 84 Fahrenheit)
```

XPV: QE3 Check Power Supply Voltage

This command will report the voltage output a power supply in a QE3 system.

Command Format:

```
02  XX  XX   58 50  56  XX    XX    XX   XX   XX    03    XX
STX ADR ADR  X  P   V   NUM  MSADR  ADR  ADR  ADR   ETX   CHK


NUM     =   Power supply number. 1 or 2.

MSADR =     Most significant digit of the QE3 address. This determines
            what type of unit will respond in a QE3 system.

            MSADR = 4      QE3 unit

ADR =       Address of individual box in a QE3 system. Must be between
            000 and 255.
```

Response Format:

```
06  XX  XX  58  50     56    XX    XX    2D    XX        56     6F
ACK ADR ADR  X   P      V    10s    1s    .    tenths     V     o

6C      74      73      ETX     CHK
 l      t       s       03      XX
```

Example Command:

```
02  XX  XX  58  50  56  31  34  30  30  39  03   XX
STX ADR ADR  X  P   V   1   4   0   0   9   ETX  CHK
(Check Vout of power supply 1 on QE3 unit at address 9)
```

Example Response:

```
06  XX  XX  58  50  56  32  34  2D  31  56  6F  6C  74  73  03    XX
ACK ADR ADR  X  P   V   2   4   .   1   V   o   l   t   s   ETX  CHK
(Power supply 1 reports voltage is 24.1 volts output)
```

XRB: RF Signal Level Check at PC Board Level

This command will report the RF level (in dBm) at internal and external points in a XRM system. This command was included to aid in diagnostics of an RF path failure. RF level sensing is currently available on:

XRD inputs

XRO outputs

XRM inputs

XRM outputs

Command Format:

```
02      XX    XX      58    52   42      XX       XX     XX       XX      XX
STX    ADR    ADR      X     R    B    MSDXADR   XADR   XADR    XADR    I/O/B

 XX      XX     XX     XX    XX      3    XX
CNUM0   CNUM1   I/O   NUM0   NUM1   ETX   CHK
```

MSDXADR = Most significant digit of the XRM address. This determines what type of unit will respond in an XRM system.

MSDXADR = 0 XRM unit
MSDXADR = 1 XRO unit
MSDXADR = 2 XRD unit

XADR = Address of individual unit in an XRM system. Must be between 000 and 255 for an XRM. Must be between 000 and 015 for an XRO and XRD unit.

CARD = This can be an “I” or “O”. Stands for Input card or Output card.

CNUM0 = This is the card number to be read. Currently this value will be 0 because current systems only have 8 maximum cards. This value is included for future system expansion.

CNUM1 = This is the card number to be read. Currently 1 - 8 for the input, output , or bridge cards.

```
I/O     =   This can be “I” for input or “O” for output of the selected
            card.

NUM0    =   This is the card input or output number. 10s place.
            Currently this value is always 0. It is included for
            future system design.

NUM1    =   This is the card input or output number.
```

Response Format:

```
06  XX  XX  58  52  42  XX  XX   XX     2E  XX   03  XX
ACK ADR ADR  X   R   B  +/- TENS ONES   .   1/10 ETX CHK
```

Example Command:

```
02  XX  XX  58  52  42  31  32  33  35  42  30 32   49  34  03    XX
STX ADR ADR  X  R   B   0   2   3   5   I   0  2    I   4   ETX  CHK
(Check RF level on XRM unit at address 235 input card #2 Input #4)
```

Example Response:

```
06  XX  XX  58  52  42  2D  31  32  2E  36  03   XX
ACK ADR ADR  X  R   B   -   1   2   .   6   ETX  CHK
(RF level read = -12.6 dBm)
```

NOTE: Some firmware releases do not support this command. Refer to the firmware release notes at the beginning of this document for details.

XRC: RF Crosspoint Signal Level Check

This command will report the RF level (in dBm) along an entire path through a XRM matrix system. The XRD and XRO fields will report no signal for matrices consisting of a single XRM.

Command format:

XRC<output nnn>

Response structure:

XRC:<XRD input +/-nn.n>:<XRM input +/- nn.n>:<XRM output +/- nn.n>:<XRO output +/-nn.n>

Example Command:

```
02  XX  XX  58  52  43  30  30  35  03  XX
STX ADR ADR X   R   C   0   0   5   ETX CHK
(Check RF level on matrix output 5
```

Example Response:

```
06  XX  XX  58  52  43  3A  3A  2D  31  32  2E  36  3A
ACK ADR ADR  X  R   C   :   :   -   1   2   .   6   :

2D  31  31  2E  30  3A  3A  03   XX
-   1   1   .   0   :   :   ETX  CHK
(No XRD)
(XRM input RF level read = -12.6 dBm)
(XRM output RF level read = -11.0 dBm)
(No XRO)
```

Example Response:

```
06  XX  XX  58  52  43  3A  2D  31  31  2E  32  3A  2D  31  32  2E  36
ACK ADR ADR  X  R   C   :   -   1   1   .   2   :   -   1   2   .   6

3A  2D  31  33  2E  30  3A  2D  31  32  2E  35  3A  03   XX
:   -   1   3   .   0   :   -   1   2   .   5   :   ETX  CHK
(XRD input RF level read = -11.2 dBm)
(XRM input RF level read = -12.6 dBm)
(XRM output RF level read = -13.0 dBm)
(XRO output RF level read = -12.5 dBm)
```

NOTE: Some firmware releases do not support this command. Refer to the firmware release notes at the beginning of this document for details.

XRI: RF Input Signal Level Check

This command will report the RF level (in dBm) at a particular XRM, QE3, or QRM matrix system input. This will give the RF level at the XRM/QE3/QRM input for matrices consisting of a single XRM/QE3/QRM, or the XRD/QED for larger matrices. Old format required leading zeros. Current version is variable in length from 1 to 3 characters. No leading zeros required.

Command Format:

```
02  XX  XX   58 52  49  XX  . . . . 03  XX
STX ADR ADR  X  R   I   n   . . . . ETX CHK

n       =   Input number of matrix.
```

Response Format:

```
06  XX  XX  58  52  49  XX  XX   XX     2E  XX   03  XX
ACK ADR ADR X   R   I   +/- TENS ONES   .   1/10 ETX CHK
```

Example Command:

```
02  XX  XX  58  52  49  30  30  35  03  XX
STX ADR ADR X   R   I   0   0   5   ETX CHK
(Check RF level on matrix input 5)
```

Example Response:

```
06  XX  XX  58  52  49  2D  31  32  2E  36  03   XX
ACK ADR ADR  X  R   I   -   1   2   .   6   ETX  CHK
(RF level read = -12.6 dBm)
```

NOTE: Some firmware releases do not support this command. Refer to the firmware release notes at the beginning of this document for details.

XRO: RF Output Signal Level Check

This command will report the RF level (in dBm) at a particular XRM/QRM matrix system output. This will give the RF level at the XRM/QRM output for matrices consisting of a single XRM/QRM, or the XRO for larger matrices. Old format required leading zeros. Current version is variable in length from 1 to 3 characters. No leading zeros required.

Command Format:

```
02  XX  XX   58 52  4F  XX  . . . .    03  XX
STX ADR ADR  X  R   O   n   . . . .    ETX CHK

n       =   Output number of matrix.
```

Response Format:

```
06  XX  XX  58  52  4F  XX  XX   XX    2E  XX   03  XX
ACK ADR ADR X   R   O   +/- TENS ONES   .   1/10 ETX CHK
```

Example Command:

```
02  XX  XX  58  52  4F  31  31  32  03  XX
STX ADR ADR X   R   O   1   1   2   ETX CHK
(Check RF level on matrix output 112)
```

Example Response:

```
06  XX  XX  58  52  4F  2D  31  32  2E  36  03   XX
ACK ADR ADR  X  R   O   -   1   2   .   6   ETX  CHK
(RF level read = -12.6 dBm)
```

NOTE:Some firmware releases do not support this command. Refer to the firmware release notes at the beginning of this document for details.

XRW: Read Input Warning Threshold Levels

This command will report the warning threshold set level of a given input. This command works on XRM, QE3, and QRM systems. This command will report the set RF threshold warning level (in dBm) at a particular XRM, QE3, or QRM matrix system input. Return of -99.0 means monitoring is turned off for that particular system input.

Command Format:

```
02  XX  XX   58 52  57  XX   XX     XX      03      XX
STX ADR ADR  X  R   W   NUM  NUM    NUM    ETX      CHK


NUM     =   Valid input numbers from 001 to 999.
```

Response Format:

```
06  XX  XX  58  52  57  2B/2D   XX   XX     2E  XX   03  XX
ACK ADR ADR X   R   W   -/+     TENS ONES   .   1/10 ETX CHK
```

Example Command:

```
02  XX  XX  58  52  57  30  31  32  03  XX
STX ADR ADR X   R   W   0   1   2   ETX CHK
(Check RF warning level on matrix input 12)
```

Example Response:

```
06  XX  XX  58  52  57  2D  31  32  2E  36  03   XX
ACK ADR ADR  X  R   W   -   1   2   .   0   ETX  CHK
Warning level set at input = -12.0 dBm)
```

Example Response:

```
06  XX  XX  58  52  57  2D  31  32  2E  36  03   XX
ACK ADR ADR  X  R   W   -   9   9   .   0   ETX  CHK
 Monitoring is turned off for that input )
```

NOTE:Some firmware releases do not support this command. Refer to the firmware release notes at the beginning of this document for details.

XWI: Set RF Input Signal Warning Level

RF signal monitoring is done on the XRM system inputs. This level can be set differently for every input. The signal is compared to this level and if the signal level is below this threshold level then a message is generated and placed in the message queue and an SNMP trap will also be generated. This trap is sent to the assigned trap IP address. This command will set the RF dBm level that will generate this error message. **Note that the XRD and XRM inputs can be attenuated. This warning level is compared directly at the system inputs before any attenuation is applied to the signal.** (see XA command)

This command only works for system inputs. Any attempt to attenuate an XRM input on a system with XRDs will fail.

This command will only accept values from -10 to -50 dBm and -99. To turn RF monitoring on set the level from0125 -10 to -50. To turn monitoring off set the level to -99 dBm.

For the QRM, this command will only accept values from 0 to -60 dBm and -99. To turn RF monitoring on, set the level to any value from 0 to -60 dBm. To turn monitoring off set the level to -99 dBm.

Command Format:

```
02     XX   XX     58   57  49    XX      XX    XX   XX     XX
STX   ADR   ADR     X   W   I     MSADR  ADR  ADR   ADR   TENS

 XX       XX      XX    03    XX
ONES    dBTENS  dBONES  ETX  CHK
```

```
MSDADR =    Most significant digit of the XRM address. This determines
            what type of unit will respond in an XRM system.

            MSADR = 0      XRM unit
            MSADR = 2      XRD unit


ADR     =   Address of individual unit in an XRM system. Must be
            between 000 and 255 for an XRM. Must be between 000 and
            015 for an XRD unit.

TENS/ONES   The input or output number. Must range from 1 to 32 for
            XR systems and 1-64 for QE systems .

dBTENS/dBONES  The dBm value that the signal is compared to. Range
               from -10 to -50 and -99 turns monitoring off. Other
               values will be rejected as out of range
```

Response Format:

```
06  XX  XX  58  57  49   03  XX
ACK ADR ADR X   W   I   ETX CHK
```

Example Command:

```
02  XX  XX  58  52  49  31  30  30  33  30  35  34  30  03  XX
STX ADR ADR X   W   I   1   0   0   3   1   5   4   0   ETX CHK
(Set RF dB threshold level for XRO at address 003 input 15 to -40dBm)
```

NOTE:Some firmware releases do not support this command. Refer to the firmware release notes at the beginning of this document for details.

XWIS: Set RF Input Signal Warning Level (Simplified)

RF signal monitoring is done on the XRM and QE3 system inputs. This simplified version of the XWI command is input based rather than address based. This warning level can be set differently for every system input. Comparison of the input signal is monitored at the XRM inputs. Simple for a 32x32 system. If the system has XRDs user should note that when this level is set for a system input, the monitoring will be done on every XRM that the XRD distributes that input to.

The signal is compared to this warning level and if the signal level is below this level then a message is generated and placed in the message queue and an SNMP trap will also be generated. This trap is sent to the assigned trap IP address. This command will set the RF dBm level that will generate this error message. **Note that the XRD, XRM, QE3, and QED inputs can be attenuated. This warning level is compared directly at the system inputs before any attenuation is applied to the signal.** (see XA or XG commands)

For the XRM, this command will only accept values from -10 to -50 dBm and -99. To turn RF monitoring on set the level from -10 to -50. To turn monitoring off set the level to -99 dBm.

For the QRM, this command will only accept values from 0 to -60 dBm and -99. To turn RF monitoring on, set the level to any value from 0 to -60. To turn monitoring off set the level to -99 dBm.

Command Format:

```
02     XX   XX     58   57  49  53   XX     XX     XX     40       2D
STX   ADR   ADR     X   W   I   S   IN1     IN2    IN3     @       -

  XX      XX    03    XX
dBTENS  dBONES  ETX  CHK

IN      =       System input.

dBTENS/dBONES   The dBm value that the signal is compared to. Range
                from -10 to -50 and -99 turns monitoring off. Other
                values will be rejected as out of range
```

Response Format:

```
06  XX  XX  58  57  49  03   XX
ACK ADR ADR X   W   I   ETX CHK
```

Example Command:

```
02  XX  XX  58  57  49  53  32  31  33  40  2D  34  30  03  XX
STX ADR ADR X   W   I   S   2   1   3   @   -   4   0   ETX CHK
(Set RF dB threshold level at input 213 set to -40dBm)
```

NOTE: Some firmware releases do not support this command. Refer to the firmware release notes at the beginning of this document for details.

XT: Check CPU Temperature

This command will report the temperature of the local control CPU card in the module with the specified address. The temperature is reported in degrees Celsius. This command is useful for making sure that the module is receiving adequate cooling. If the temperature begins to raise it can indicate that the air intake filters are becoming blocked with dust and need to be cleaned.

Command Format:

```
02  XX  XX   58     54      XX      XX   XX    XX     03   XX
STX ADR ADR  X      T       MSADR   ADR  ADR   ADR    ETX  CHK

MSADR =     Most significant digit of the address. This determines
            what type of unit will respond in an XRM system.

            MSADR = 0       XRM unit
            MSADR = 1       XRO unit
            MSADR = 2       XRD unit
            MSADR = 3       QED unit
            MSADR = 4       QE3 unit
            MSADR = 5       QEO unit


ADR =   Address of individual box in a system. Must be between 000
        and 255 for an XRM. Must be between 000 and 015 for an XRD
        or XRO.
```

Response Format:

```
06  XX  XX  58  54     XX    XX     XX      XX   43   03     XX
ACK ADR ADR  X   T    +/-   100'S  10'S    1'S   C    ETX   CHK
```

Example Command:

```
02  XX  XX    58   54   32   30    31    32   03     XX
STX ADR ADR   X    T    2    0     1     2    ETX    CHK
(Check temperature of XRD unit at addresses 012)
```

Example Response:

```
06   XX     XX    58   54   2B   30  35  36   43   03    XX
ACK  ADR    ADR   X    T    +    0   4   1    C   ETX    CHK
(temperature on CPU card reads 41 degrees Celsius)
```

NOTE: Some firmware releases do not support this command. Refer to the firmware release notes at the beginning of this document for details.

ZA: Set Group Access for Output

This command can only be executed by the Admin.

This command sets the privilege for a group to change an output.

Command structure:

```
ZA:<GID>:<access>:<output>

GID         = Group ID. Can be 1-8, with 1 being Admin.

Access      = Access Control. 1 = Allow, 0 = Deny.

Output      = Matrix output number. Can be 1 to the size of the matrix.

If access is allowed for that output, then any user in that group can issue
an L, S, or U command for that output.
```

Example Command Sent:

```
02  XX  XX  5A  41  3A  32  3A  30  3A  30  30  35  03  XX
STX ADR ADR  Z   A   :   2   :   0   :   0   0   5  ETX CHK
(Deny group 2 access to output 5)
```

Positive Response:

```
06  XX  XX  A5  41  03  XX
ACK ADR ADR  Z   A  ETX CHK
```

ZAI: Set Group Access for Input

This command can only be executed by the Admin.

This command sets the privilege for a group to change an input.

Command structure:

ZAI:<GID>:<access>:<input>

GID = Group ID. Can be 1-8, with 1 being Admin.

Access = Access Control. 1 = Allow, 0 = Deny.

Input = Matrix input number. Can be 1 to the size of the matrix.

If access is allowed for that input, then any user in that group can issue an L, S, or U command for that input.

Example Command Sent:

```
02  XX  XX  5A  41  49  3A  32  3A  30  3A  30  30  35  03  XX
STX ADR ADR  Z   A  I    :   2   :   0   :   0   0   5  ETX CHK
(Deny group 2 access to input 5)
```

Positive Response:

```
06  XX  XX  A5  41  03  XX
ACK ADR ADR  Z   A  ETX CHK
```

ZAO: Set Group Access for Output

This command can only be executed by the Admin.

This command sets the privilege for a group to change an output.

Command structure:

ZAO:<GID>:<access>:<output>

GID = Group ID. Can be 1-8, with 1 being Admin.

Access = Access Control. 1 = Allow, 0 = Deny.

Output = Matrix output number. Can be 1 to the size of the matrix.

If access is allowed for that output, then any user in that group can issue an L, S, or U command for that output.

Example Command Sent:

```
02  XX  XX  5A  41  4F  3A  32  3A  30  3A  30  30  35  03  XX
STX ADR ADR  Z   A  O    :   2   :   0   :   0   0   5  ETX CHK
(Deny group 2 access to output 5)
```

Positive Response:

```
06  XX  XX  A5  41  03  XX
ACK ADR ADR  Z   A  ETX CHK
```

This is the same command as ZA. It was added when input access control was added so both input and output commands had the same format. ZA has been kept for backward compatibility.

ZC: Current User

This returns the user ID, group ID, and username of the current logged in user.

Example Command Sent:

```
02  XX  XX  5A  43  03  XX
STX ADR ADR  Z   C  ETX CHK
```

Example Response:

```
06  XX  XX  5A  43  3A  31  3A  31  3A  41  64  6d  69  6E  03  XX
ACK ADR ADR  Z   C   :   1   :   1   :   A   d   m   i   n  ETX CHK
(User 1, group 1, username = Admin)
```

ZG: Set User Group

This command can only be executed by the Admin.

This command sets a new group for a user.

Command structure:

ZG:<username/UID>:<GID>

Username/UID= The username or User ID.

GID = Group ID.

The username must start with a character, not a number.

Example Command Sent:

```
02  XX  XX  5A  47  3A  41  64  6d  69  6E  3A  31  03  XX
STX ADR ADR  Z   G   :   A   d   m   i   n   :   1  ETX CHK
(Set the Admin user to be in group 1)
```

Example Command Sent:

```
02  XX  XX  5A  47  3A  31  3A  31  03  XX
STX ADR ADR  Z   G   :   1   :   1  ETX CHK
(Set the Admin user to be in group 1)
```

Positive Response:

```
06  XX  XX  A5  47  03  XX
ACK ADR ADR  Z   G  ETX CHK
```

Note: This command will set a flag in the Change “C” command response.

Note: Some firmware versions do not implement this command. For those firmware releases, the group ID is set to be the same as the user ID and can’t be changed. For example, User 1 (UID = 1 = Admin) is in group 1, UID 2 is in group 2, and so on.

ZI: Login

This command is used to login to a particular control port. (A different user may be logged in to each available command port on a controller.) The command is sent with the username and password. The user ID and group ID are returned in response to a successful login.

Example Command Sent:

```
02  XX  XX  5A  49  3A  41  64  6d  69  6E  3A  31  03  XX
STX ADR ADR  Z   I   :   A   d   m   i   n   :   1  ETX CHK
```

Example Response:

```
06  XX  XX  5A  49  3A  31  3A  31  03  XX
ACK ADR ADR  Z   I   :   1   :   1  ETX CHK
(User 1, group 1)
```

ZL: List user by User ID (UID)

This command can only be executed by the Admin.

This command shows the current group ID, username, and password for a given user ID (UID).

Command:

ZL:<UID>

Response structure:

ZL:<GID>:<username>:<password>

Example Command Sent:

```
02  XX  XX  5A  4C  3A  31  03  XX
STX ADR ADR  Z   L   :   1  ETX CHK
```

Example Response:

```
06  XX  XX  5A  4C  3A  31  3A  41  64  6d  69  6E  3A  31  03  XX
ACK ADR ADR  Z   L   :   1   :   A   d   m   i   n   :   1  ETX CHK
(User ID 1 is in group 1, has a username of Admin and password = 1)
```

ZO: Logoff System

This command will logoff the current user.

Example Command Sent:

```
02  XX  XX  5A  4F  03  XX
STX ADR ADR  Z   O  ETX CHK
```

Positive Response:

```
06  XX  XX  A5  4F  03  XX
ACK ADR ADR  Z   O  ETX CHK
```

ZP: Set User Password

This command can only be executed by the Admin.

This command sets a new password for a user.

Command structure:

ZP:<username/UID>:<password>

Username = The username that will be assigned a new password.

UID = User ID. Alternatively the user ID can be specified.

Password = Up to 14 alphanumeric characters.

Example Command Sent:

```
02  XX  XX  5A  50  3A  41  64  6d  69  6E  3A  32  41  62  03  XX
STX ADR ADR  Z   P   :   A   d   m   i   n   :   2   A   b  ETX CHK
(Set the Admin password to 2Ab)
```

Example Command Sent:

```
02  XX  XX  5A  50  3A  31  3A  32  41  62  03  XX
STX ADR ADR  Z   P   :   1   :   2   A   b  ETX CHK
(Set the Admin password to 2Ab)
```

Positive Response:

```
06  XX  XX  A5  50  03  XX
ACK ADR ADR  Z   P  ETX CHK
```

ZU: Set Username

This command can only be executed by the Admin.

This command sets a new username for a user.

Command structure:

ZP:<username/UID>:<new username>

Username = The username that will be assigned a new password.

UID = User ID. Alternatively the user ID can be specified.

New Username = Up to 14 alphanumeric characters.

The username must start with a character, not a number.

Example Command Sent:

```
02  XX  XX  5A  55  3A  41  64  6d  69  6E  3A  55  31  03  XX
STX ADR ADR  Z   U   :   A   d   m   i   n   :   U   1  ETX CHK
(Set the Admin username to U1)
```

Example Command Sent:

```
02  XX  XX  5A  55  3A  31  3A  55  31  03  XX
STX ADR ADR  Z   U   :   1   :   U   1  ETX CHK
(Set the Admin username to U1)
```

Positive Response:

```
06  XX  XX  A5  55  03  XX
ACK ADR ADR  Z   U  ETX CHK
```

ZX: Show Access Control On/Off

This command shows the current port number and whether access control is on or off for the port.

Command:

ZX:<PID> where PID = Port ID.

Response structure:

ZX:<PID>:<access on/off>

Port IDs:

0: Current port (whatever port is receiving the command)

1: Local (Keypad)

2: Quintech UCM (Remote Panel)

3: PC Control In (Serial)

4: QEC Ethernet Port Socket A

5: QEC Ethernet Port Socket B

6: Telnet Ethernet Console Window

7: SNMP

Port IDs 4 and 5 track each other and the setting will be the same for both.

Example Command Sent:

```
02  XX  XX  5A  58  3A  31  03  XX
STX ADR ADR  Z   X   :   0  ETX CHK
```

Example Response:

```
06  XX  XX  5A  58  3A  34  3A  31  03  XX
ACK ADR ADR  Z   X   :   4   :   1  ETX CHK
(The current port is 4 = QEC port and access control is on.)
```

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 or at a particular time. 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
```

f: XRM Command Failed

This message will be sent if there was no response or an unexpected response from the XRM system. If the XRM system receives a correctly formatted valid command but was unable to execute the command, you will receive this message.

Negative response sent:

```
15  XX  XX  66  03  XX
NAK ADR ADR  f  ETX CHK
```

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 and no error response will be given.

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.

SRM "Control In" Serial Pinouts:

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

Note on the RS-232 port:

No null modem or crossover cable is needed on the serial port.

Note on RS-485 mode:

RS-485 is compatible with RS-422. RS-485 allows multiple devices on a single shared serial bus. The matrix unit uses a 4-wire RS-485 interface.

QE3 Introduction

The Quintech QE3 RF matrix switch is the most advanced matrix switch available from Quintech Electronics and Communications Inc. It features a compact, highly scalable design that covers the L-Band (950-2150MHz) operating frequency ranges. Hot-swappable component cards enable fast and easy replacement (less than 30 seconds) without requiring special tools or re-cabling. There are two control cards for operational control redundancy. Included with the QE3 is an impressive array of control and monitoring options which provides redundant power and cooling, ease of maintenance, and enables you to quickly upgrade the system or add features in the field to maximize your investment.

Some of the features included in the QE3 Matrix Switch are:

- Hot swappable component cards with integrated RF monitoring and auto-resetting current protection. All hot-swappable component cards can be replaced without disconnecting any cables.
- Dual hot swappable control modules.
- Programmable AGC (Automatic Gain Control) and attenuation on all inputs for signal strength balancing and optimum performance.
- Redundant auto-ranging hot-swappable power supplies with over-temperature, over-voltage, and output short protection.
- Long-life cooling fans.
- Monitoring of RF levels, power supply condition, fan condition, internal temperature, and various other system parameters.
- Easy maintenance and upgrades in the field.
- Local control via front panel keypad and LCD.
- Remote control via RS232, RS422, RS485, Ethernet TCP/IP, Telnet, and SNMP.
- Secure partitioning of matrix control between multiple users to prevent unauthorized changes.
- Field upgrades of control firmware via serial or Ethernet to add features and enhance existing capabilities.
- 64x64 matrix size in just 6 RU (10.5” or 267mm high).
- Large matrix systems (up to 1024x1024 or larger) by combining multiple QE3 modules with QED and QEO expansion modules.

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Quintech: A Company Introduction

Who we are

Incorporated in Indiana Pennsylvania in 1989, Quintech Electronics and Communications Inc. was based on a foundation of proprietary technology and over 120 years of combined technical expertise in terrestrial microwave, CATV, and satellite communications. From its inception, Quintech has emphasized the development of customer-driven new product solutions in order to facilitate the convergence of the telephone, broadcast, satellite and cable/hfc industries.

Our Mission

Quintech Electronics and Communications, Inc. produce reliable state of the art RF and microwave electronic systems. We strive to exceed the expectations of our worldwide customers, as they are the sole driver for our corporate existence. Quality objectives are achieved through employee expertise, attention to detail, and an on going commitment to continual improvement.

Our Products

Quintech RF matrix switch products automate RF signal routing. Large numbers of signals from radar or satellite antennas, communications systems, cable networks, etc., can be instantly switched between various receiving or transmitting systems to meet changing demands. A Quintech-based signal distribution and management system provides increased reliability, redundancy, automation and agile reconfiguration capabilities along with space, weight and cost savings through the efficient sharing of resources. Our products reduce system malfunction due to equipment failure, human error, or lack of automation.

Just Some of our Customers

Our customers include AT&T, Raytheon, NBC, CNN, CCTV, PCCW, Lucent, Boeing, British Telecom, ESPN, Time Warner, United States Department of Defense, Lockheed Martin, Harris Corp. and you.

System Overview

The QE3 matrix switch is a collection of one or more electronic modules working together to enable you to control the switching of multiple broadband RF coaxial lines. Switching A/V or RF signals between multiple inputs and outputs can now be done easily and instantaneously at the switch using a keypad or remotely from a PC with the use of Quintech's supplied software or third party control software.

The Quintech System Advantage

The QE3 matrix switch provides a complete 64x64 matrix, including hot swappable component cards, redundant power supplies, and integrated redundant system controllers in a 6 RU chassis. Multiple QE3 matrix system modules can be used to create configurations up to 1024x1024 or larger. The unit provides easy access to cards for seamless upgrades and maintenance via the front panel, without requiring cables to be disconnected or without disrupting the signal paths of other cards in the system.

System Features

QE3 systems are equipped with many standard features that make the system highly configurable. Each system also has many features which allow the QE3 to be monitored for numerous conditions including power supply condition, fan condition, internal air temperature, routed RF path report, RF dBm level reads at system inputs and outputs, alarm messages, input and output names, input attenuation, number of cards installed or removed, and LCD/keypad status.

Self Monitoring

The QE3 continually monitors the temperature, fans condition, power supplies, lcd/keypad, and input/output path RF levels.

Q-SENSE

Quintech is proud to introduce Q-SENSE, which provides you with increased flexibility in meeting your RF routing needs. Q-SENSE enables you to configure a switching threshold power and backup input for any input. If the measured input power drops below the threshold, Q-SENSE reroutes all outputs connected to that primary input to the backup input. The QE3 offers multiple options for the recovery from a failed input. Upon receiving a restore command, the system will restore all primary input connections if the output status has not changed after the Q-SENSE function executed.

Power Supply Monitoring

All power supplies in a QE3 system are continually monitored. If the power supply is unplugged, fails or has a fault condition, an error message will be generated. That message will include the power supply number and the location of the power supply in the system.

QE3 Fan Condition Monitoring

All fans in a QE3 system are continually monitored. If the fan RPM drops below a set RPM value, an error message will be generated. That message will include the fan number and the location of the fan in the system.

Power Supply Fan Condition Monitoring

All fans in a QE3 power supplies system are continually monitored. If one of the dual power supply fans fails, an error message will be generated. That message will include the location of the fan in the system.

Internal Air Temperature Monitoring

The internal temperature of each QE3 module is continually monitored. If the internal temperature rises above 50 degrees Celsius an error message is generated. The message will indicate which unit in the system is running hot.

Power Supply Temperature Monitoring

The internal temperature of each QE3 power supply is continually monitored. If the internal temperature rises above 75 degrees Celsius an error message is generated. The message will indicate which power supply and the specific unit address in the system is running hot.

Input RF Warning Level Threshold Monitoring

This feature can be turned on or off. An RF dBm monitoring level can be individually set for every input in a system. If this feature is enabled for an input, the RF level of each input is continually monitored. If the input level drops below the specified threshold, a warning message will be generated.

LCD Status Monitoring

If the LCD/keypad is unplugged, an LCD/keypad error message is generated.

Error Reporting

When the QE3 system detects an error, a detailed error message is generated. This message contains specific information about the type of error, where the error occurred, and additional information such as input number, output number, card type, card number, unit label or address, or power supply number.

This message by default will be placed in the message queue and be sent out in an SNMP trap. The message can also be routed to the front panel. This front panel feature can be turned on or off. If enabled, the error message will remain on the front panel until a user presses a key to clear it. The message also remains in the message queue until read by a user, or until other messages fill up the message queue and flush out the oldest message.

Gain Control

The QE3 provides gain control functionality which can be used to attenuate or amplify input signals.

Gain control has two separate modes: manual and automatic. An input can utilize automatic gain control, manual gain control, or have its gain control turned off. Each system input has a separate manual and automatic gain control dBm value.

Automatic Gain Control

Automatic gain control actively attenuates or amplifies a signal based upon the current input signal strength. Each input has an automatic gain control dBm value. If the input RF level is above the automatic dBm value, the QE3 will attenuate the input signal down to the set dBm level. If the input signal is below the set automatic dBm level, the input signal is amplified to the set dBm level. This feature can be either disabled or enabled for each input.

Manual Gain Control

Manual gain control assigns a set attenuation or amplification value to an input. Independent of input signal strength, the set dB value is added or subtracted from the input signal before the signal passes through the QE3 system.

Alarm Condition Notification

If an error condition occurs in the QE3, the QE3 generates an error message. The message indicates where the error occurred and any other specific information about the alarm. The alarm will be sent out in an SNMP trap. The alarm is also placed in the message queue. Refer to the protocol document for details. The alarm message can also be routed to the front panel if that feature is so enabled.

Alarm Message Queue

The alarm queue contains up to 4 current error messages that have not been read out of the queue. The messages are unique for every possible error condition. For example, if Input 17 on QED unit # 2 drops below the set threshold, that specific information will be included in the message. When the message is read out of the queue, the queue is emptied.

SNMP Traps

If an error condition exists, an SNMP trap is generated. If more than 4 error conditions exist, the entire message queue is loaded into the trap and sent to a user defined SNMP IP address. The trap queue is then emptied and the next error message is placed in the message queue.

Input and Output RF Level Read

The input and output RF level can be read at any time either from the front panel or by issuing a protocol command.

User Permissions

Every QE3 matrix switching system provides the ability to administer user access control by allowing an administrator to set up user accounts with names, passwords, and permissions. These accounts limit the system settings and cross points that individual users can change. After an account is configured, the user logs into the system, the settings in their account determine what they can and cannot do.

The primary benefit of the access control feature is the protection that clients are afforded from unintentional or accidental RF connection changes.

Access Control

The QE3 matrix system features port-level access control. Each control module in our system has one or more access ports that are available for user interface. They include a front panel keypad, Ethernet port, Telnet port, Control In port, and Remote port. Users can control the system from any one of these access ports.

If access control is enabled for a port, a user must first login with a user name and password before any system changes can be made. For example, with different access control settings, a user could change the system settings from a serial port but be required to login with permissions from the keypad or Ethernet port. This feature enables or disables the login and permissions requirements before a user can make changes to the system.

Circuit Elements of a QE3 Module

The circuit elements for selectively connecting the inputs to any one of the outputs, incorporates a switching module. This module is comprised of input cards, output cards, controller cards and a common backplane. Electrical branching elements such as solid state switches, splitters/combiners, and couplers allow the connection of any input to each output. All of these components are arranged to form connecting paths between the inputs and each of the outputs on each card. They are designed such that each path has an equal number of electrical branching elements and a substantially equal total length of electrical paths. This assures that insertion loss and the impedance are nominally the same over each of the switching paths through the matrix and eliminates most of the internal connectors or interface cables between switching modules.

Unity Gain

The system is designed to optimize gain flatness over the entire operating band by passing the signal at the same level and flatness through any path. The excellent RF performance of these switching matrices is achieved through proprietary technology developed by Quintech (U.S. Patents 4,935,709 and 5,481,073). No matter how many inputs or output you may have, and how you have your cross points configured, the system retains good impedance match and unity gain throughout the entire system.

System Upgrades

You can upgrade your system to increase the number of inputs and outputs available.you. A QE3Matrix Switch can be configured in a wide variety of I/O combinations ranging from 8x16 up to 1024x1024. Contact us at Quintech and we can help you with your growing communication needs.

System Sizes

The number of modules and size of your system depends on the amount of inputs and outputs that are originally designed into your system. A small switching matrix may consist of one module with everything integrated into that module, while a large switching matrix may contain several modules all working together to achieve configurable and effortless RF signal switching.

Modules

We refer to the main building blocks of a matrix system as modules. Every QE3 switching system is made up of one or more modules. A module refers to an enclosed unit that is mounted on the rack as part of the entire system. Your system is simply one or more modules connected, communicating, and working together. All modules have a unique function and all have their own power supplies. The LEDs on the front panel of the modules indicate the status of the power supplies.

Module Inter-Connections

Modules “talk” to each other through XR Bus cables connected to XR Bus ports on the rear panels of the modules. These connections are made when the system is set up and, in most cases, never needs to be changed. However, there are a few exceptions such as changing serial port control or upgrading the system. These specific situations are covered later in the manual.

The RF signals that are being switched are also connected to the rear of the modules. The RF connections between the modules are determined during the design of your system. They remain the same unless you are changing your matrix requirements and upgrade the system. The connections have been set up specifically for your system design. You can always change the connections going into and out of the matrix system, but the connections between the system modules are set for your specific configuration and must remain constant.

Types of Modules

A QE3 matrix switching system may use four types of modules. Your system may or may not contain each type of module. The type and number of modules used to build your system, and how they are connected together, depends on your particular configuration. The module types and their general functions are listed in the following table.

Controller Module – UCM	**Receives user commands and controls other modules.**
Input Distribution Module – QED	**Accepts RF signal system inputs and outputs them to Matrix Switching Modules.**
Matrix Switch Module – QE3	**Accepts RF signals from the Input Distribution Modules and sends them to an Output Switch Module.**
Output Switch Module – QEO	**Accepts RF signals from the Matrix Switch Modules and routes them to the appropriate system output(s).**

Table 1. QE3 Switching System Module

Acronyms

Quintech uses several acronyms in this manual to refer to the QE3 system components. To avoid confusion, the acronyms and their definitions are listed below.

QE3 SYSTEM – Also referred to as the matrix system or switching system. This references the entire system as a whole.

QE3 – Referred to as the matrix switch module**.** This module accepts RF signals from the input distribution module (QED) and sends them to an output switch module (QEO). This is the main switching module of the system.

UCM - Universal **C**ontroller **M**odule Also referred to as a remote unit. This 1RU module is a system add on for QE3 systems. This module will receive commands and send them to the main QE3 controller.

QED - Referred to as the input distribution module. This module accepts RF signal system inputs and outputs them to matrix switching modules (QE3).

QEO - Also referred to as the output switch module. This module accepts signals from the matrix switch module (QE3) and routes them to the appropriate system output.

LCD – Liquid **C**rystal **D**isplay. Refers to the front panel display of the main controller module (UCM).

RF – Radio **F**requency. General term for the range of frequencies switched in our systems.

LNB - Low **N**oise **B**lock. Refers to the amplifier located at the focal point of a satellite dish antenna. It amplifies the very weak received satellite signal then converts the received signal to a lower frequency.

System Modules Description

Controller Module

Each matrix system is supplied with at least one controller module. The controller module is typically integrated into one of the QE3 switching modules and interfaces with the entire switching system.

The controller allows you to setup and use the system to fit your particular requirements, maintain user accounts for a multiple user environment, and monitor and modify the RF connections. This can all be done from the controller's front panel keypad interface or computer connection. In addition, the controller has several ports on the rear panel to facilitate control from a PC and communication with other system modules.

Redundant Control Architecture

The QE3 contains redundant control cards. There is an active control card and a standby control card. Only one controller is operational at a time. By default, if both controllers are operational, controller A is the main controller and controller B is in backup. If the active controller fails or is physically removed, the standby controller boots up and takes control of the QE3 system. Each control card has its own Ethernet and serial port. Both control cards share the single front panel LCD and keypad.

Controller Ports

The serial ports are labeled "Serial 1 and Serial 2”. These ports are used for computer control. They are typically connected directly to a PC if the system is being controlled remotely with a serial connection.

There are two XR Bus ports. One is labeled “XR Bus In” and the other is labeled “XR Bus Out”. These ports are used to control other modules in the QE3 system. If your system contains more than one module, these ports will be used to daisy-chain the modules together. XR Bus ports are not Ethernet ports. They are only used for QE3 system communications.

The ports that supports TCP/IP communications are labeled “NET 1” and “NET 2”. Net1 is connected to controller A. NET2 is connected to controller B.

The port labeled “Quintech UCM” has two uses. It can be used as an RS-485 communications port. It can also be used to communicate with additional 1RU controllers.

The port labeled “SRM/SRO Control” is for non-QE3 system equipment. The new QE3 systems can be integrated into non-QE3 existing system. This is the port used to control your non-QE3 Quintech communications equipment.

Controller Appearance

The controller may exist as a stand-alone 1 RU unit or it may be integrated within the QE3 module as shown below.

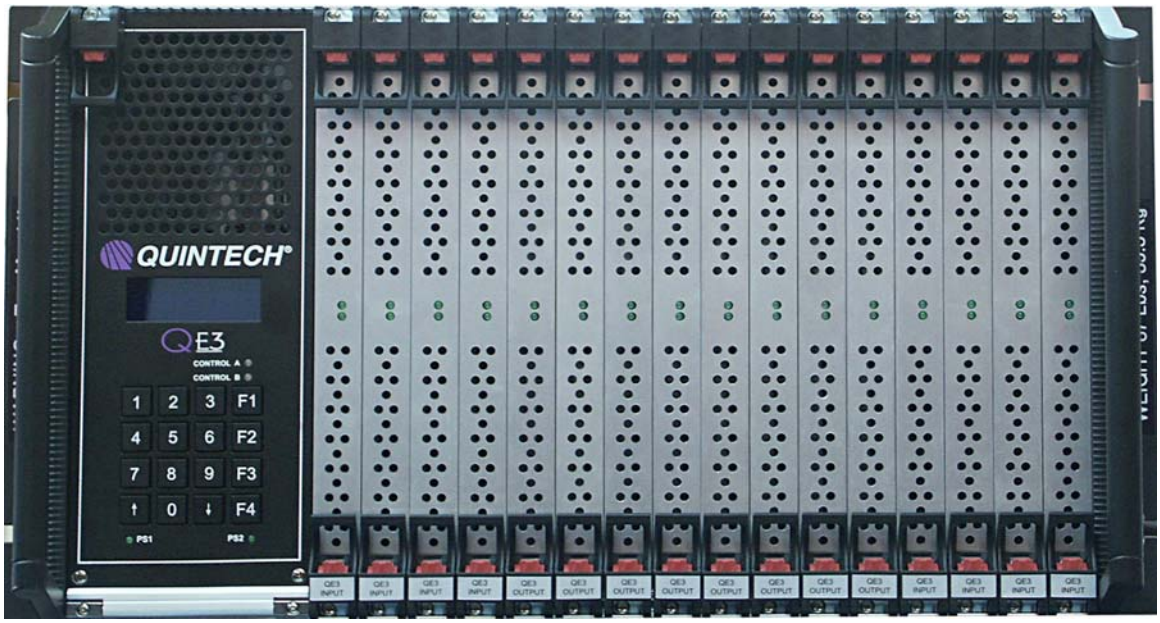

Figure 1. Front Panel of QE3 w/ Integrated Controller

The placement of the control unit in relation to the other matrix switch modules in the system rack will depend upon the size of the switching system.

Basic QE3 Architecture

Fully populated, a QE3 module contains a variety of card types and modules. The figure below illustrates the type of cards that are installed and their position(s) within the QE3 chassis.

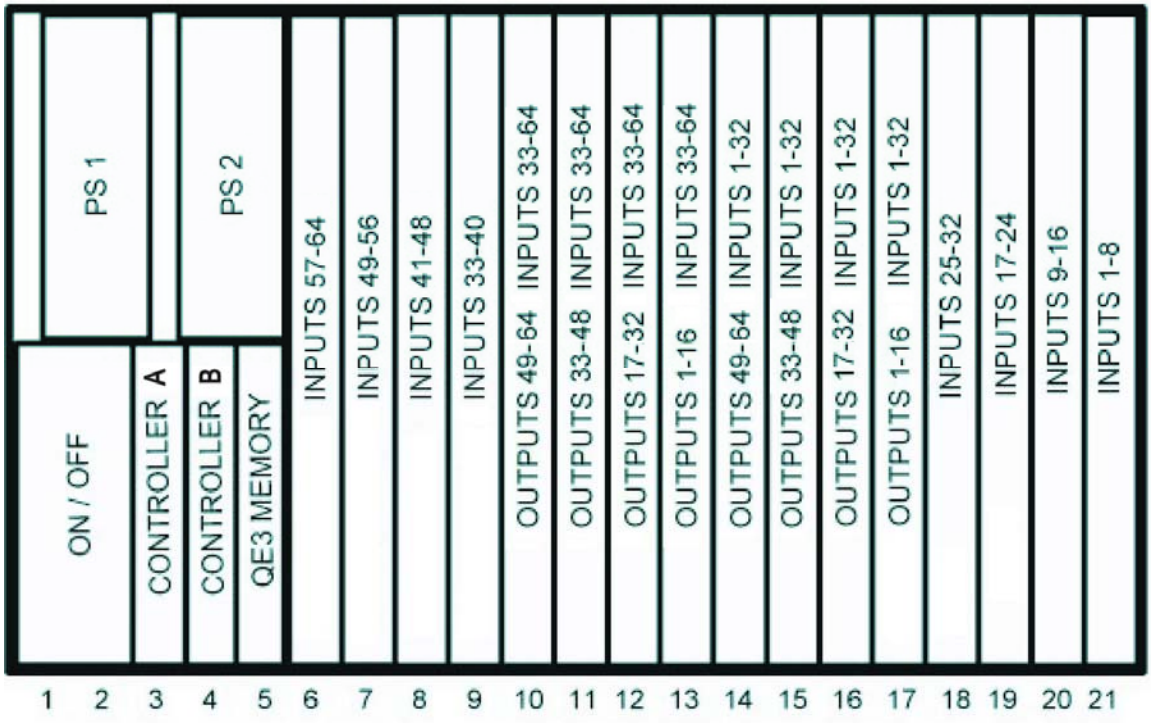

Figure 2. QE3 Architecture (Front View)

Typically, a QE3 contains:

8 - Output cards
8 - Input cards
2 - Hot-swappable power supply modules
1 - QE3 memory card
1 - Display card (installed only in QE3s containing integrated controllers)
2 - Hot-swappable controller cards
1 - Power supply on/off card

Input and Output Cards

A bank of eight output cards are located between two banks of four input cards. Input and output cards are not interchangeable. They can only be installed in their respective slots. At least one input card and one output card must be installed.

Input and Output Card LEDs

Each input card and output card contains two LEDs. On both input and output cards, the top LED indicates that the card is powered. On an output card, the bottom LED indicates that at least one route has been established to/from that card. On an input card, it indicates that at least 1 output card is currently connected to that input card.

Input and Output Card Hot Swapping

Both input and output cards are hot-swappable. When an input card is removed, all of the output cards connected to that input card are temporarily disabled. When a new input card is inserted, the routes between the cards are re-established. When an output card is removed, only the output ports contained on that particular card are temporarily disabled. All other output ports associated with the same input card remain active.

Controller Cards

The controller cards are installed at the far left of the QE3 module behind the panel on which the Quintech logo appears.

Controller Cards Address

On the front panel of the controller card are four rotary switches. The rotary switch on the top regulates how the control board boots up. The three rotary switches below that are used to specify the QE3 module's address. Each QE3 module has a unique 3-digit address. This address must match the switch settings on the three rotary switches at the bottom of the controller card. When replacing the controller card, check the controller card that is being removed and set the new controller card to the same switch settings as the one that is being replaced.

Active and Standby Controller

The control card on the left is, by default, the active operational controller. It is labeled Control A on the front panel. On the front panel, the green LED represents the active controller, while the orange LED represents the standby controller.

Either controller can be the active controller depending on which controller boots up first. By default if both are operational at start up, this will be control A. If the QE3 is powered up with the left control A board removed, the control B board will boot up as the active controller. If control A is inserted after control B is booted, control A will remain the standby controller.

Controller A is connected to the rear panel ports labeled NET1 and Serial 1.
Controller B is connected to the rear panel ports labeled NET2 and Serial 2.

These ports do not operate simultaneously. Only one control board is functioning at a time. The standby controller takes over in the event of an active controller failure.

If the front panel LED for a control card is off, it indicates that no control card is installed or that the card has failed. If a control card has failed, the LED on the front of the control card will turn red.

Watchdog Timer

The standby controller constantly polls the active controller hardware. If the control card processor stops working, the standby takes over control of the system. No changes occur during this transition.

Controller Card Switch Setting

The top rotary switch on the controller card controls the boot up method. In most instances, the switch should be left in position 0. With the switch in this position, the controller card will download all system parameters from the QE3. System operation will then resume without having to reboot or power cycle the QE3 system. If the switch is in position 1, the controller board will boot from the memory on the control board. This is not recommended because the system parameters on the controller board will not match the current settings of the QE3 system, thus causing the system parameters to be reset to their factory default settings.

Controller Card Hot Swapping

The controller board is hot swappable. QE3 system parameters remain unchanged and RF paths are not interrupted when a new controller card is inserted to replace a malfunctioning controller card. All system variables are backed up in the QE3 system. If a new control board is inserted, the system parameters are downloaded from the QE3 onto the control board.

The backed up parameters include:

Input attenuation values
Gain control values
RF cross point connections
IP address
Gateway address
Subnet address
TCP/IP port number
Ethernet lock password
Model type
Model number
Number of inputs
Number of outputs
SNMP on/off
SNMP trap IP address
DHCP on/off
UCM port termination on/off
Control in port termination on/off
Serial mode
Serial address
Load access control on/off
Remote port access control on/off
Control in port access control on/off
TCP/IP port access control on/off
Telnet access control on/off
SRM input module size (SRM/SRO control port data)
SRM output module size (SRM/SRO control port data)
SRO input row size (SRM/SRO control port data)

Control mode (main/remote)
Input names
Output names
User names
User passwords
Output permissions for all users and all outputs
Instant RF threshold warning levels for all inputs
Output routed/not routed data
Output locked/not locked data
Power Supply Modules

Power Supplies

The two power supplies in the upper left are redundant and the QE3 module can run on one power supply if one should fail. Either power supply can be hot-swapped individually and replaced without affecting the QE3's operation.

Input Distribution Module – QED

The QED is the first stage of signal processing for a multi-module QE3 system. Your RF signals enter the QE3 system through the QED(s), then distributes the RF signals out to the QE3 modules in your system.

QED Function and Appearance

The QED takes your RF inputs and creates as many multiples as is required by your system's design. The row of inputs on the top of the QED is where your RF inputs are attached.

QED Sizes

The quantity of QEDs required depends on the size of the matrix system being implemented. The main consideration is the number of times the input signal needs to be replicated. The capacity of a QED can be increased by simply adding additional expansion cards.

For systems where the number of inputs or outputs is larger than 64, an attached appendix describes how to interconnect the RF cables between the QED(s) and the other matrix modules. Interconnect all matrix modules as outlined. All unused outputs of the QED should be grounded using terminations that match the system impedance.

Output Switch Module - QEO

The QEO is the final stage of RF signal processing within the matrix system. The Output Switch Module (QEO) receives RF signals from the QE3 and routes them to the appropriate system output(s).

QEO Function and Appearance

The internal structure and physical dimensions of the QEO will vary, depending on your system’s configuration.

QEO Sizes

The quantity of QEOs required and the number of cards installed in them depends upon the size of the QE3 system being implemented. For each output, there are multiple inputs. An attached appendix describes how to interconnect the RF cables between the QEO(s) and other QE3 modules for systems with more than 64 inputs and/or outputs.

Connections and Port Descriptions

AC Power

Redundancy

All modules in the matrix system are equipped with integrated redundant power supplies and/or dual AC inlets. This provides redundancy so that if one power supply fails, the module continues to operate properly.

For DC redundancy, both AC inlets must be activated. For true AC redundancy, separate AC sources must be applied. The power supplies are internally separate. As such, a module can be powered from two different voltage sources operating at two different voltages, as long as the voltage and frequency of the source is within proper tolerances. (See “Voltages”)

LNB Power Supplies

Note that the main power supplies **DO NOT** supply LNB power. Separate LNB power supplies are available for purchase from Quintech (RPS series of products).

AC Connections

AC power cords are not included with your system when shipped. They must be purchased separately, either from Quintech or from another supplier. If you decide to use an AC power cord that has not been supplied by Quintech, make sure that it has a grounding plug. Grounded power cords are preferred because they help isolate AC noise from the RF signals.

Quintech power cords are 18 AWG gauge, which is the minimum size recommended for QE3 operation.

Voltages

The internal power supplies used in Quintech matrix switching systems are auto-ranging. This means that an acceptable range AC source can be connected to the unit and it will automatically accommodate the new source voltage. QE3 power supplies can operate from 90 VAC to 264 VAC at 47 Hz to 63 Hz.

All modules have one LED per power supply on the front panel to indicate the status of the power supply. This allows you to detect any partial failures and service them to prevent a system failure. If any of the LED's are extinguished and the power switch is on, consult the troubleshooting guide immediately. QE3 power supplies can be polled for their conditionwhich enables the QE3 modules to continually monitor their own power supplies.

RF Signals

RF Connections (Inter-Module)

Each system is interconnected differently. Your system requirements determine which modules are required. Your system requirements also dictate how those modules should be interconnected to get the desired number of inputs and outputs. The order and location of modules within the rack(s) have been predetermined and tested. Refer to Appendix A and B for details on your system's RF interconnections wiring.

Although all systems are connected differently, there are some traits that are common to all RF inter-module connections. RF cables don't hold up well to repeated stress. Don't bend or stress the connectors, and don't bend, pull, or stress the RF cables after installation. If a module has to be removed for any reason, disconnect all connectors from the unit prior to removal. The replacement module must be installed in the same position as the one that was removed.

RF connections between the modules should remain constant. Changes should only occur if a system change or upgrade is purchased. Any changes to the inter-module connections should not be attempted without Quintech's assistance.

RF Connectors

75 Ohm BNC type connectors are standard on most QE3 units. However, 75 and 50 Ohm “F” type connectors, 50 Ohm SMA connectors, and 75 and 50-Ohm “N” type connectors are also available. Other connectors may be available by special request.

The RF connections only need to be finger tightened for proper termination. If desired, the connectors can be tightened slightly with a wrench to ensure complete contact. **NOTE: Do not force a cable connector onto the rear panel RF connectors.** If the RF connectors are over tightened with a wrench, the connector may break internally with no visible signs of breakage on the outside of the connector.

If a connector does not seem to mate properly, recheck the type of cable and connector you are using. If you are still having difficulties contact Quintech for assistance.

Replacement Cables

All RF interconnection cables are supplied by Quintech. The use of third party cables is not recommended for system inter-connections. All system cables have been tested and verified for mechanical and electrical integrity before being shipped with the systems. We do not guarantee optimum performance of our equipment with non-Quintech cables for inter-module connections. Contact Quintech for cable replacements or for additional RF cables.

Control Ports

There are typically three DB-9 control ports on a system controller, each of which utilizes female style connectors. They are:

Serial
Quintech UCM
SRM/SRO Control

The pinout definitions for both the serial port and the Quintech UCM port are listed in Table 2. As illustrated by the table, the pinout definition of the Serial port depends upon how it has been configured. The SRM/SRO Control port is reserved for Quintech communications with other non-QE3 modules; thus, the pinout has not been listed.

Pin	Control In – Serial RS 232 mode	Control In – Serial RS-422/485 mode	Quintech UCM In/Out
1	GND	GND	GND
2	TXD (transmit data)	not used	not used
3	RXD (receive data)	Non-Inverting Transmit	Non-Inverting Transmit
4	DTR (data terminal ready)	Non-Inverting Receive	Non-Inverting Receive
5	GND (signal ground)	GND	GND
6	DSR (data set ready)	Inverting Transmit	Inverting Transmit
7	not used	not used	not used
8	not used	not used	not used
9	not used	Inverting Receive	Inverting Receive

Table 2. Serial /Quintech UCM Pin Definition

Serial 1 and Serial 2 Ports

The Serial 1 and Serial 2 ports are where serial data from a PC is accepted for communications control of the matrix. Serial control can be established using any Serial port, including those on connected remote controllers.

Serial 1 is connected to controller A. Serial 2 is connected to controller B. The serial ports are typically connected to a PC serial port if control of the switch is to occur from a personal computer connection. All operations of the matrix can be controlled from the serial ports. These connectors are configurable and can operate in one of three separate modes. The ports can communicate in the RS-232, RS-422, and
RS-485 serial interface standards.

Serial Port Connectors

The serial ports are standard DB-9 female serial connectors. The pin definitions depend on how the serial ports are configured. They are shown in Table 2.

Serial Cable

Each serial connector is shared for both RS-232 and RS-422/485 interfaces. A NULL MODEM or crossover cable is **not** required on these ports. The ports will not work using a null modem adapter or null modem cable. Use only a straight through one to one cable.

Serial Communication Settings

The serial port parameters are the same regardless of whether you are using RS-232, RS-422 or RS-485. The parameters are fixed at 9600 baud, 8 data bits, no parity, and 1 stop bit (8N1). The command protocol for controlling the switch is provided in Appendix D.

RS-232

RS-232 was designed for communication of local devices. It supports one transmitter, one receiver, and uses single ended signals over unbalanced, unterminated wires. Single ended means the signal is sent over one wire with respect to a single ground source. Unterminated means the signal lines do not have impedance matching at the line ends. This interface is useful for point-to-point communication at slow speeds and over short lengths of cable. Most PCs come equipped with one or more RS-232 serial ports.

RS-232 Advantages/Disadvantages

RS-232 is easy to implement and has a long history of standardization and industry acceptandce. However, due to the nature of RS-232, the signals are susceptible to noise and grounding problems which sets a limit to cable lengths. If using RS-232, Quintech recommends that the cable length be limited to 20 meters or approximately 60 feet. RS-232 facillitates only point-to-point communications, thus only two devices will typically communicate with each other over the RS-232 standard.

RS-422

In RS-422 communications, a pair of twisted wires is used to carry a signal. The data is encoded and decoded as a differential voltage between the two lines. In principle, as a voltage, in principle the interface is unaffected by differences in ground voltage between sender and receiver.

RS-422 Advantages/Disadvantages

RS-422 differential signals over twisted pair wires are less affected by noise. They can therefore communicate at faster rates and across longer distances. Unlike RS-232, RS-422 connectors are not standardized. Refer to Table 2 for the RS-422 interface pinouts. Although RS-422 is better than RS-232, it still is limited to one master and up to ten receivers on the bus. Recommended maximum length is 4000 feet. The Quintech RS-422 standard is limited to 10 receivers.

RS-485

The QE3 can be configured to communicate in RS-485 standard.

XR Bus Ports

The XR Bus ports on the rear of the modules enable the main controller to communicate with the QEDs, QEOs and QE3s . The QEOs and QE3s communicate with each other via the XR Bus In and XR Bus Out ports. **XR Bus connectors are not Ethernet TCP/IP ports.**

Daisy Chaining

XR Bus Control ports are always daisy chained together. Daisy chaining refers to the wiring scheme in which, for example, module A is wired to module B, module B is wired to module C, module C to module D etc. The output port of the first module and the input port of the last module is terminated.

XR Bus Connections

The XR Bus In port is where the QED, QE3 and QEO modules look for instructions. XR Bus In ports are always connected to the XR Bus Out port of another module. It may be connected to a QED, QE3, or QEO, depending on your system configuration. The control connections of each system is different. Your specific port connections are outlined in “Control Interconnection”.

A typical control port system connection is shown in Figure 9.

NOTE: If the system is a stand alone 64x64 system, the XR Bus starts and stops with the same QE3. Even with single module systems, the XR Bus still needs terminated; thus, both XR Bus terminators need to both be installed. The system will not route or operate correctly without the terminators installed.

XR Bus Terminators

There are two XR Bus terminators shipped with every system. These terminators are placed at the ends of the daisy chain. For a multiple unit system the terminator would go on the first QE3 XR Bus in port and the last unit in the chain on the unused XR Bus out port. The terminators are labeled “XRBUS terminator”. These terminators are not interchangeable with other non-Quintech Ethernet type terminators.

XR Bus Terminators for 64x64 System

The XR Bus terminators need to be installed on the XR bus ports on a 64x64 6RU system. The system will not route or operate correctly without the terminators installed. The terminators are required on a 64x64 system because the XR Bus begins and ends at the QE3.

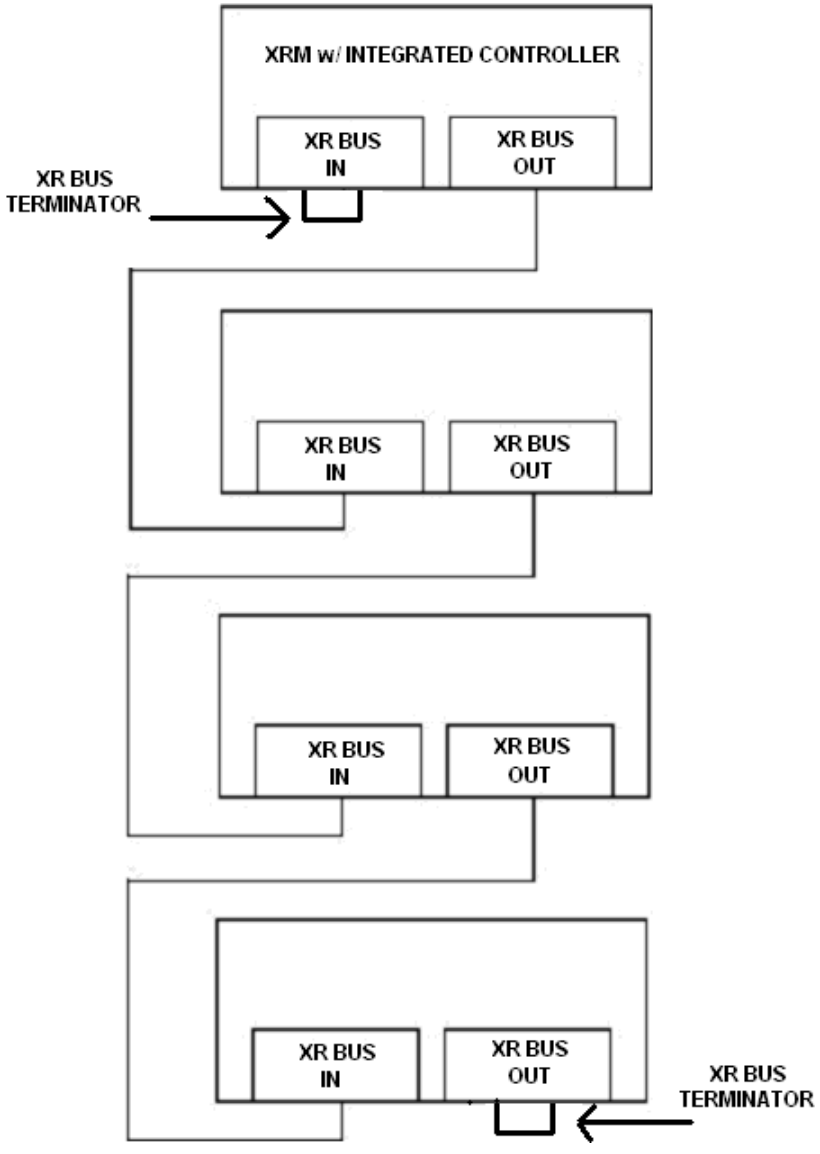

Figure 3. XR Bus Connections

Quintech UCM Ports

An integrated controller has one “Quintech UCM” port. A 1RU stand-alone controller will have two Quintech UCM ports labeled “Quintech UCM In” and “Quintech UCM Out”. These ports have two separate functions. They can be used for communications with remote controllers or you can use them as one additional RS-485 ports for controlling the system. Regardless of how you intend to use them, they can only be used for one purpose at a time. The ports cannot support a remote controller and an RS-485 connection at the same time.

Daisy Chaining

Quintech UCM ports are usually daisy chained together. Daisy chaining refers to the wiring scheme in which, for example, module A is wired to module B, module B is wired to module C, module C to module D etc. The last device is terminated or left open. This is how multiple controller modules can be connected together in a system.

The main controller “Quintech UCM” connector is wired to the first remote “Quintech UCM In” connector with a supplied Quintech adapter in line. The first remote controller “Quintech UCM Out” connector is wired to the second remote controller “Quintech UCM In” connector with a straight through cable. The second remote controller “Quintech UCM Out” connector is wired to the third remote controller “Quintech UCM In” connector with a straight through cable. The connections continue in this style until the last remaining remote controller is left with an unused “Quintech UCM Out” connector.

Quintech UCM Port Crossover Adapter

NOTE: A supplied cross over adapter or a crossover cable must be used between the main controller module and the first remote controller of the daisy chain. A cable adapter is supplied with the purchase of an additional controller that will be used as a remote unit. The adapter is used between the main controller and the first remote controller.

If more than one remote is connected to the system, additional adapters are not required. Use only a straight through one to one cable between the additional remotes.

Pins 3, 4, 6, and 9 on the main side connect to pins 4, 3, 9 and 6 on the supplied adapter. The pinout of the adapter is shown below.

Main controller Remote out Pin number	Remote controller Remote In Pin number
1	NC
2	NC
3	4
4	3
5	NC
6	9
7	NC
8	NC
9	6

This adapter is custom built by Quintech and cannot be purchased from another vendor. Note that this is NOT a NULL MODEM adapter. The adapter can only be used in one location: between the main controller and the first remote controller in the daisy chain.

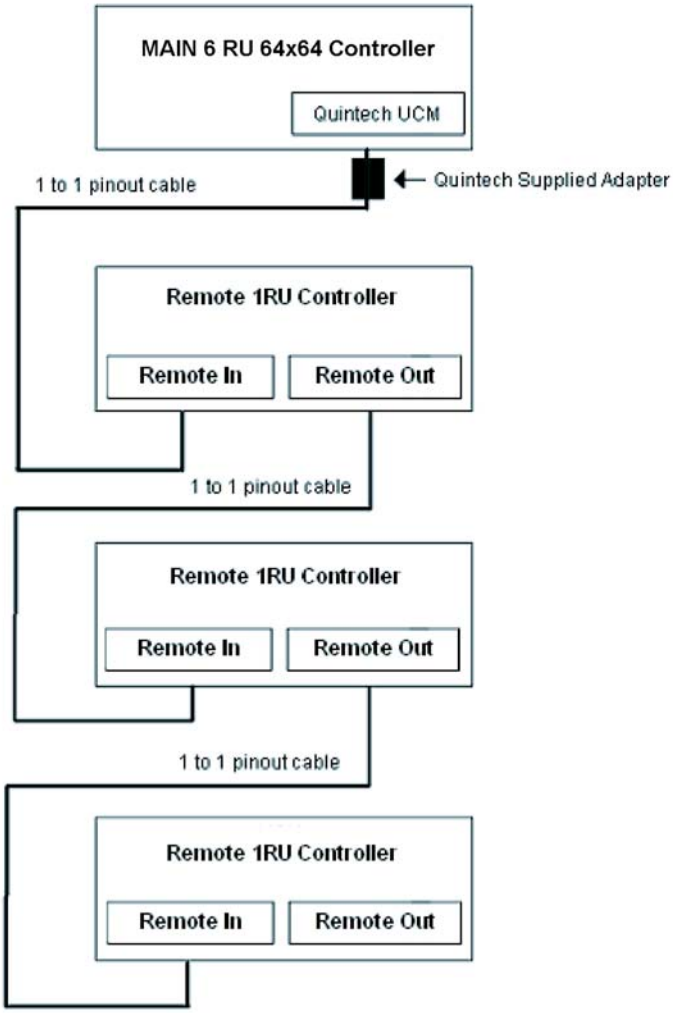

Figure 4. Quintech UCM Connections

Ethernet Port

Each QE3 system has the ability to communicate over Ethernet. Your QE3 may be equipped with a 10BaseT or 100BaseT Ethernet port depending on the options ordered. The Ethernet port supports a Telnet interface, TCP/IP and SNMP. All commands are sent to the configured IP address and port. The command protocol for controlling the switch is provided in Appendix D.

Ethernet Connections

For Ethernet connections, connect the controller to a network port or router via the Ethernet port using a standard cable. You can also connect directly to the computer's network port, but this requires a crossover cable. Standard and crossover Ethernet cable pinouts are provided below**.**

Ethernet Cable Pinout

Crossover Cable		**Standard Cable**	
RJ-45	RJ-45	RJ-45	RJ-45
Pin 1 Tx +	Pin 3 Rx +	Pin 1 Tx +	Pin 1 Rx +
Pin 2 Tx -	Pin 6 Rx -	Pin 2 Tx -	Pin 2 Rx -
Pin 3 Rx +	Pin 1 Tx +	Pin 3 Rx +	Pin 3 Tx +
Pin 6 Rx -	Pin 2 Tx -	Pin 6 Rx -	Pin 6 Tx -

Table 3. Ethernet Cable Pinout

Ethernet Command Protocol

TCP/IP

The same command protocol is used for control over Ethernet TCP/IP and the serial port. Since the same command formats are used, the command packet will contain a serial address. This address must match the serial address of the QE3 or the packet will be rejected, even though the address is unnecessary when the command is sent over TCP/IP.

To avoid any problems, commands sent over TCP/IP should use the broadcast address "FF" hexadecimal.

Telnet

A Telnet console window is provided for configuring and controlling the matrix. A command mode is provided where the same protocol commands can be issued but no serial address or packet headers are required. See Appendix D for more information.

SNMP

SNMP or Simple Network Management Protocol is now implemented on the QE3 system. It is part of the Transmission Control Protocol/Internet Protocol (TCP/IP) protocol suite. The *Simple Network Management Protocol (SNMP)* is an application layer protocol that facilitates the exchange of management information between network devices.

SNMP works by sending messages, called protocol data units (PDUs), to different parts of a network. SNMP-compliant devices, called agents, store data about themselves in Management Information Bases and return this data to the SNMP requesters.

To use the protocol, it must be enabled from the front keypad first. Currently, the default is on.

SNMP Additional Features

The QE3 polls the input RF levels and the system status. If an alarm condition develops, a message and SNMP trap are generated specific to the alarm condition. If more than 4 alarm conditions are noted before the message queue is read out, the QE3 will send out these messages in an SNMP trap containing alarm messages. The trap will be sent to the SNMP assigned IP address. The message buffer will then be emptied and the current message will be added to the now empty queue.

QE3 SNMP Traps

The QE3 can send additional traps to indicate crosspoint changes and other system changes. These traps contain information such as where the change originated, and specifics about the type of change. If access control is enabled, the user logged in is also reported.

Front Panel Interface

The front panel keypad and screen are used to set various operating parameters and to monitor and control the QE3 matrix switch. Depending on the tasks being performed, various sub-menu screens will appear. The display utilizes a refresh mechanism which redisplays the screen about every 5 seconds.

Main Menu

The **Main Menu** has four choices, “Monitor & Control”, “System Options”, “Access Control”, and "System Information".

When in any other menu, pressing F4 repeatedly will exit you out of a screen back to the previous screen. Pressing F4 repeatedly will return you to the **Main Menu**. There is one exception; the download firmware screen can only be exited by downloading firmware or power cycling the controller. This **Main Menu** is the top of the front panel hierarchy.

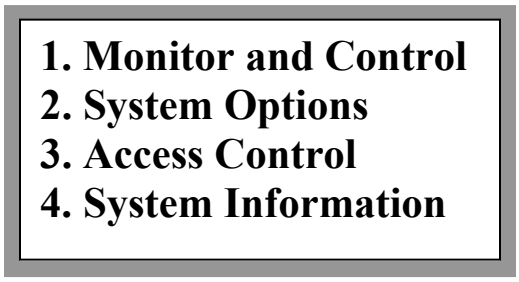

Figure 5. Main Menu

Front Panel Hierarchy and Page References

The entire front panel hierarchy is listed below. The page number that refers to a particular menu item is listed here for your convenience. Some options are only available if logged in as the Admin. Other options are only available if the system is a combination SRM/QE3 system. Access control for the local (keypad/LCD) has to be turned on to view the access control setup menus.

1. Monitor & Control 45

2. System Options Menu 82

2.1. Configuration Menu 84

Entry into the configuration menu requires a factory code. The code is **732**. Refer to "Factory Settings Code Number" for more information on this code. Most settings under this menu are critical to system functionality. Care should be taken any time this menu is accessed.

2.1.1. System Setup Menu 85

2.1.1.1. Matrix Size 86

2.1.1.2. Model 87

2.1.1.3. Module Sizes Menu 88

2.1.1.3.1. SRM Module Size 89

2.1.1.3.2. SRO Module Size 90

2.1.1.3.3. Combination QE3/XRM/SRM 89

2.1.1.3.3.1. QE3/SRM System 92

2.1.1.3.3.2. QE3/SRM Setup 92

2.1.1.3.3.3. QE3/XRM System 93

2.1.1.3.3.4. QE3/XRM Setup 93

2.1.1.3.4. QED Setup 94

2.1.1.4 I/O Names Menu……...…....132

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2.1.1.4.2. Set Output Names 134

2.1.2. Load Firmware…….…....100

2.1.3. Features Menu…….……....106

2.1.3.1. Set Control Mode…….……..... 107

2.1.3.2. Options Menu.....103

2.1.3.2.1. LNB Power (not available) 21

2.1.3.2.2. SNMP Menu 111

2.1.3.2.2.1. SNMP On/Off 112

2.1.3.2.2.2. Set SNMP Trap IP……..... 113

2.1.3.2.3. XRO Attenuation 104

2.1.3.2.4 QE3 Setup 112

2.1.3.2.41. Can Bus Errors.....108

2.1.3.2.4.2. Card Calibration.....108

2.1.3.2.4.2. QEO Attenuation 109

2.1.3.3. Set Priority Mode.....111

The rest of the front panel hierarchy does not require the “732” factory settings code number to make changes to the system.

2.2. Interface Options Menu 38

2.2.1. Set Address 40

2.2.2. Set Serial Mode.....39

2.2.3. Serial Termination 44

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Communications Setup

If the controller module is to be controlled by a port connection in addition to the keypad, the communication parameters must be set up first.

Interface Options Menu

Option 2 of the **System Options Menu** will load the **Interface Options Menu**.

To invoke the **Interface Options Menu** from the main menu: key sequence 2, 2.

2. System Options
    2. Interface Options

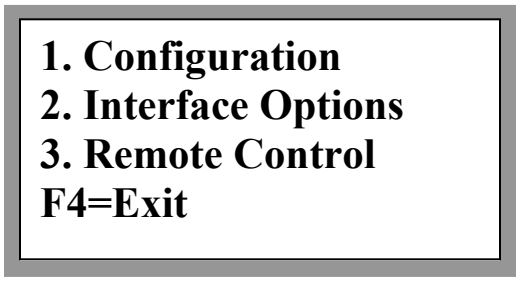


Figure 6. Interface Options Menu

Press 2 to enter the **Interface Options Menu**

From this menu, you will be able to initiate the configuration of seven different communication parameters. Use the up and down arrows to scroll thru the various communications parameters. When the desired parameter is displayed in the upper left corner, press F1 to select it. Press F4 to back out to the **System Options Menu**.

Serial Mode

The **Serial Mode** parameter enables you to specify whether an RS-232, RS-485, or RS-422 serial interface will be used to communicate with the Serial or Quintech UCM serial communications port. Select the appropriate protocol using the up/down arrows and back out by pressing F4.

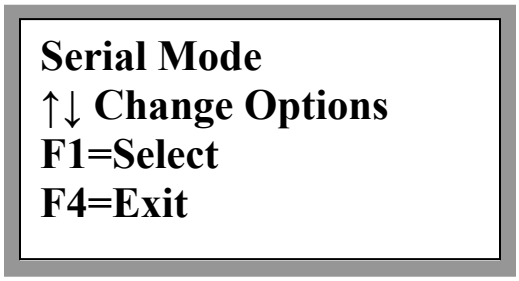


Figure 7. Serial Mode

Serial Address

The **Serial Address** parameter allows you to set a 2-byte hexadecimal address for the controller. This address is used for two purposes. If the system contains more than one controller, this address is used by the controller to communicate properly through the remote ports to other controllers. This address is also used by the Quintech software to communicate properly to the serial port. Set the address for the controller and then when setting up the parameters for serial communications in the Quintech software, set the address to the same address as the controller.

To change the address, use the up and down arrows until the desired address is displayed, then press F1 to select the new address. No change is made until the F1 key is pressed. The address range is from 00H to FEH. **Do not use FFH as an address**. Press F4 repeatedly to back out to the main menu again.

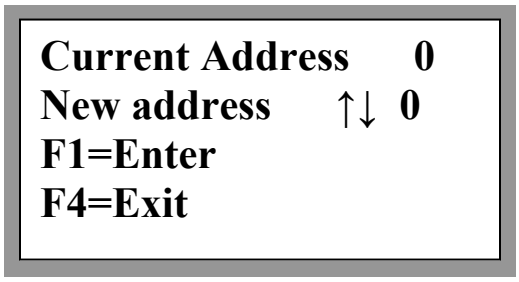


Figure 8. Serial Address

NOTE: If you have remotes in the system make sure the main controller address and all remote controllers have different addresses.

Valid Addresses

Addresses can be set from 00 to FE hexadecimal. The unit only responds to commands sent over the serial bus that contain a matching address. The only exception is the address "FF" which is a broadcast address. All units will respond to a command containing FF as the address regardless of its current address. For this reason, FF should not normally be used as a unit address.

Reset Password

The **Reset Password** parameter enables you to reset the QEC port access password to the Quintech-specified default. Press F4 to exit or F1 to reset the password to "Quintech".

Figure 9. Reset Password

Why Reset the Password?

The password can be set with the ELP command from a communication port on the controller. You can find more information about this in the Quintech protocol document found in Appendix D.

The ELP command allows you to use almost any ASCII hex values to set the password. You can even use ASCII hex values that are not found on a standard keyboard. If the password is accidentally programmed with a Hex value that can't be typed in from a keyboard then the password needs to be reset. The default value when reset is Quintech.

Set QEC Port

The **Set Qec Port #** parameter allows you to configure the port number for QEC port access. Contact your network administrator for the correct values to use for this parameter. Use the scroll keys to scroll the port number up or down until the desired port is displayed or explicitly type in the port number. Press F4 to exit or F1 to change the port number.

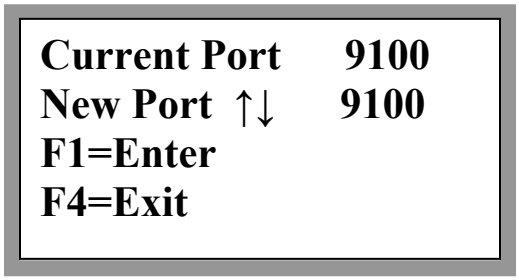


Figure 10. Ethernet Port

What is a Qec Port Number?

A port number represents an endpoint or "channel" for network communications. Port numbers allow different applications on the same computer to utilize network resources without interfering with each other. Port numbers most commonly appear in network programming, particularly socket programming.

Qec Port Number Default Setting

The default setting of the Qec port is 9100. This number was selected because it is a port number that is not widely used or registered by IANA (Internet Assigned Numbers Authority). Most applications use much lower numbers like 1000 or less.

Why Change the Qec Port Number?

In almost all cases, there is not a conflict and the port number will be left at the default of 9100. In case your network happens to be using port 9100 for some reason, you can change Quintech's port number to some other value to avoid communication conflicts.

DHCP On/Off

The **DHCP On/Off** parameter allows you to enable or disable DHCP service. This will cause the controller to look for a DHCP server to assign an address for network communications after boot up. Pressing F1 turns DHCP on/off.

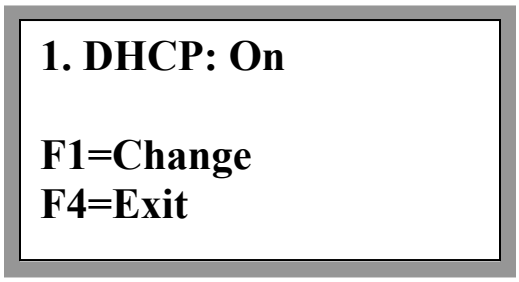


Figure 11. DHCP

Should DHCP be On or Off?

When set to ON, the IP address of the QE3 system is dynamically assigned by the DHCP server. Note that the IP address assigned in this manner will override any IP address that may have been specified via the Static IP configuration screen. When set to OFF, the static IP address that is specified in the IP configuration screen will be used. Contact your network administrator to confirm the correct setting of DHCP service.

Ethernet Address

The Ethernet Address parameter allows you to set the static IP address, gateway and mask for the controller. Contact your network administrator for the correct values to use for these parameters.

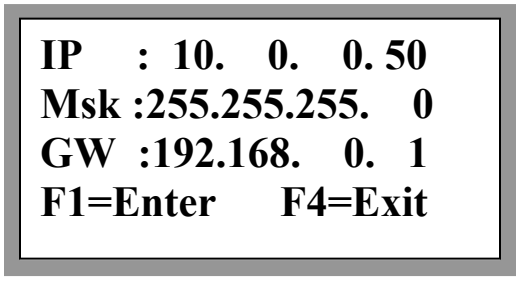


Figure 12. IP Settings

The information displayed in the IP field depends upon the DHCP setting. Whether or not you can change the configuration also depends upon the DHCP setting. Changes are only made after pressing F1. F4 will back you out without making changes to the settings.

IP Configuration with DHCP Off

If DHCP is off, the currently configured static IP information will be displayed. When DHCP is off, the IP address, the gateway, and mask can be changed.

IP Configuration with DHCP On

If DHCP is on and the controller has successfully been assigned an address from the DHCP server, that current information is displayed on the screen. If DHCP is on but for some reason a DHCP server could not be found for addressing, the static configuration will be displayed. In this case, you can change the IP configuration, even if DHCP is on.

Serial Termination

The Serial Termination parameter enables you to specify how the control port and the remote ports are terminated. This setup is only necessary if you are using RS-485 communications on one or more of the ports. If you are not using RS-485 communications, these settings should be turned off. There is an entire section of this manual that explains the details of RS-485 termination.

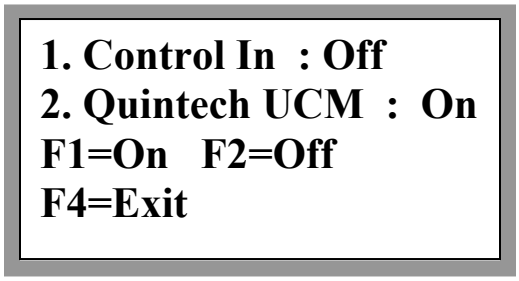


Figure 13. Serial Termination

Crosspoint Connections

The following information describes how to monitor and change all RF connections through the keypad interface.

Monitor a Connection

Select option 1 “Monitor and Control” in the main menu. The screen may have more options available if you are logged in with permissions or access control is disabled. For more information on permissions, refer to “Access Control”.

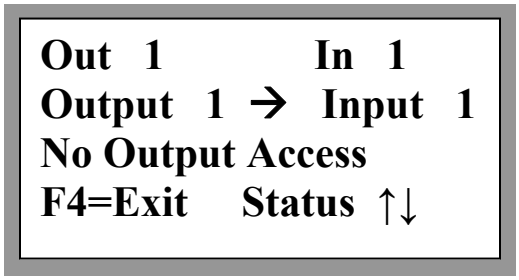


Figure 14. Connection Status wo/Permissions

Current QE3 design supports input access control as well as output access control. After the output is selected, the user must have allow permission for the input as well. If the user does not have access to ther current input the screen will appear with the no input access message.

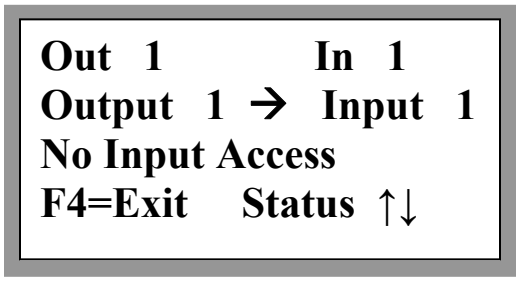


Figure 15. Connection Status wo/Permissions

If the user is logged on with permissions or access control for the local keypad setting is off then you have permission to change the output.

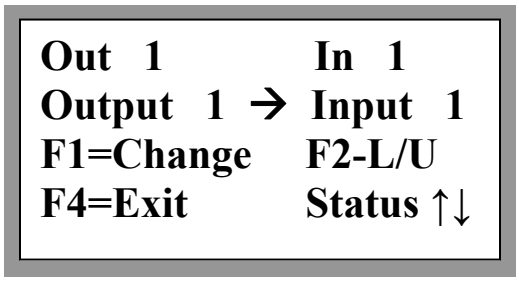


Figure 16. Connection Status w/Permissions

To view the status of a particular output channel, type in the output number or use the scroll (↑↓) keys to scroll up or down respectively. When a valid output channel is entered, the channel input will be displayed approximately two seconds after the last digit is entered. Do not precede numbers by leading zeros.

The "out 1" and "in 1" captions in the upper left quadrant is the associated name of those inputs and outputs. This screen shows factory default names but they can be named with any name using a standard character set from a common keyboard. Refer to the N commands for further details.

Changing a Connection

This function is available if the user is logged on with permissions, or if access control for the local keypad setting is off. These permissions are discussed in the "Access Control" section of the manual. Pressing F1 will allow the user to change the input connected to the currently displayed output.

The **Change Connection** screen is displayed when F1 is pressed on the **Connection Status** screen. It allows you to change the input connected to the currently selected output.

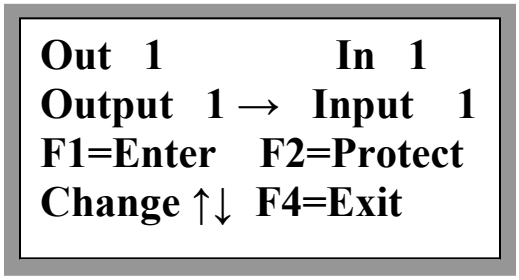


Figure 17. Change Connection

The menu heading will change from showing the assigned names to “Change” and the cursor will move to the right side of the display just after “Input”. Select the new input by either typing it in or scrolling through the available inputs with the arrow keys. Press F1 to enter the change. No connection will be made until you press F1. To exit back to the main menu without making any changes, press F4.

Locking and Unlocking Connections

This function is available if the user is logged on with permissions, or if access control for the local keypad setting is off. Pressing F2 while the **Connection Status** screen is displayed locks/unlocks the connection status of the currently displayed output. The display is not currently able to display the locked or unlocked condition of the output. If the display shows the F1 and F2 options but the output cannot be changed, the output is locked. Simply press F2 to unlock the output and then proceed to change the output connection.

The F2 button operates as a toggle. Pressing it once locks the connection as currently specified. Pressing it again disables the lock thereby allowing changes to be made. The F1 button has no effect upon the output's connection status while the lock is enabled. The connection must be unlocked before any changes to the connection can be made. This feature was added for additional protection against accidental cross point connection changes.

Turning off an Output

To turn off an output, simply connect the output to input 0. Connecting to input 0 effectively turns off the output.

System Information Menu

Additional information about the system is available from the System Information menu. Pressing 4 in the main menu displays the **System Information Menu**.

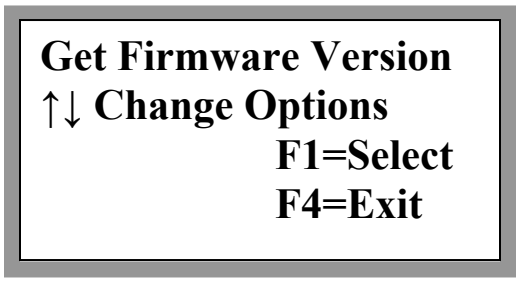


Figure 18. System Information Menu

Scrolling

Pressing the up or down arrow keys scrolls through the available options in the menu. Not all options are available to all system configurations

Get Firmware Version
Input Warning Level
Fan Speed
Power Supply Status
Internal Temperature
Get Input RF Level
Get Output RF Level
System Errors
Output Attenuation
AGC Mode
Gain Control
Simple AGC Setup
Advanced AGC Setup
QE3 System Test
QSENSE setup

Firmware Version

Option one will flash the same screen that appears during power up. The displayed information includes:

Model Type
Model Number
Configured system size
Protocol Version

To display the firmware version, use the up and down scroll arrows to scroll through the various options. Stop scrolling when "Get Firmware Version" is displayed. To display specific firmware version information, press F1. The Firmware Version screen will be displayed. This screen is displayed for 5 seconds before automatically reverting back to the **System Information Menu**.

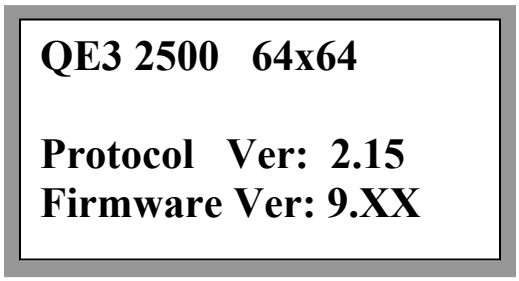


Figure 19. Firmware Version

QE3 System Labels

If the system has more than 64 inputs or 64 outputs, certain menus may prompt you for a label. This label is stamped on the rear panel at the factory and represents the placement of the module in the system. If your system is only a single 64x64 module, the label is QA1.

If the system has multiple modules refer to the rear panel for the correct label. Switch modules are label QA1 QA2 QB1 QB2 etc. Input modules are labeled QI1-1 QI2-1 etc. Output modules are labeled QO1-1, QO2-1 etc.

The screens will prompt you for a label.

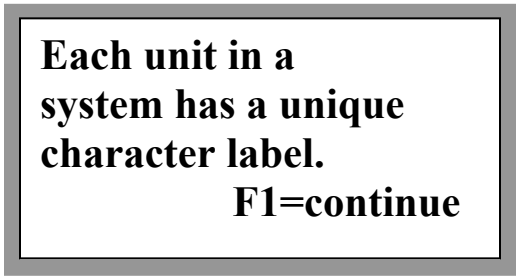


Figure 20. Label Prompt 1

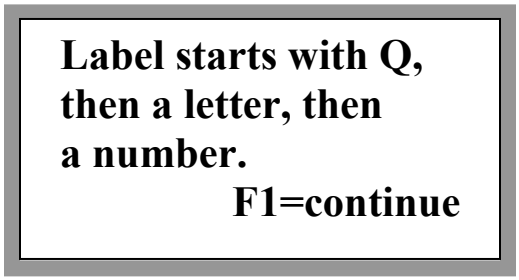


Figure 21. Label Prompt 2

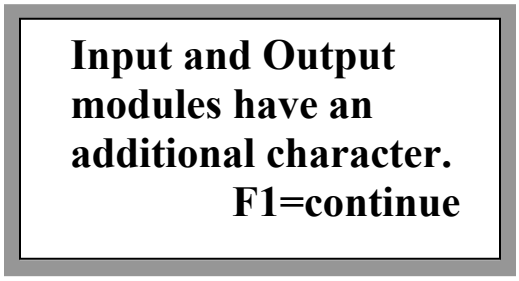


Figure 22. Label Prompt 3

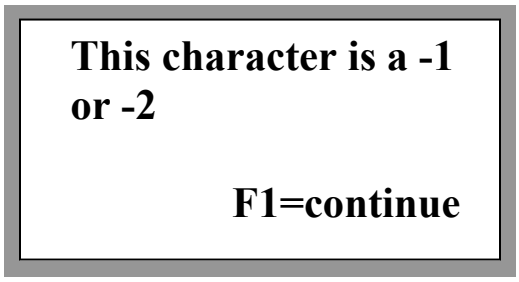


Figure 23. Label Prompt 4

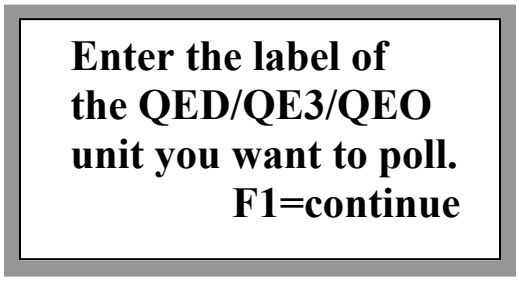


Figure 24. Label Prompt 5

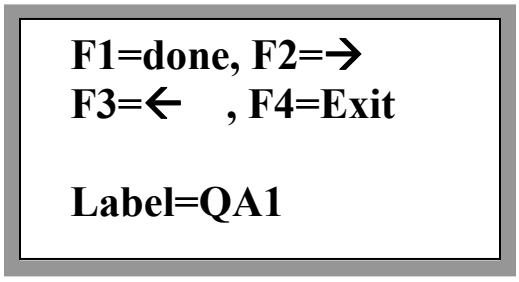


Figure 25. Label Prompt 6

Enter the label identifier. This tells the controller which module in the system you want information about. F2 and F3 moves the cursor left and right. Up or down arrows select the next character in a pre-determined list of characters available. An invalid label or a label that is not compatible with the current system size will be rejected.

Input Warning Level

Input Warning Level sets warning threshold levels for input alarm conditions. RF warning level can be set from -10 to -50dBm. This is the total power at the input before any QE3 attenuation is applied. If this value is set and the total power on that input drops below the set threshold, an SNMP trap will be sent and a message will be added to the message queue.

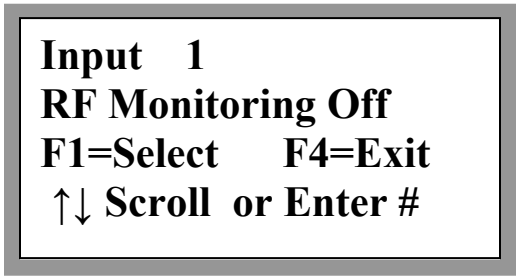


Figure 26. Monitoring Off

Scroll up or down to select the system input for whichyou want to set an RF warning level, then press F1 to select.

Set RF dBm Warning Level

Type in a number from -10 to -50. The threshold is not accepted until the F1 key is pressed. This screen can be exited without any changes by pressing the F4 key. F2 will turn RF monitoring off for that input.

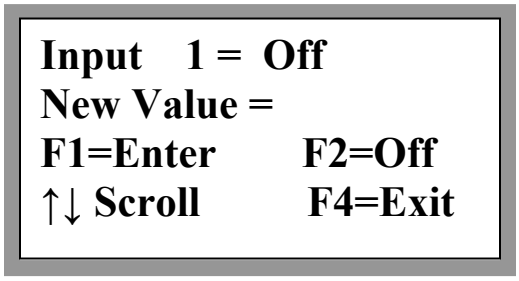


Figure 27. Set RF Warning Level Menu

Fan Speed

Get Fan Speed reports the RPM of all fans in a module. Press F1 to get the fan speeds.

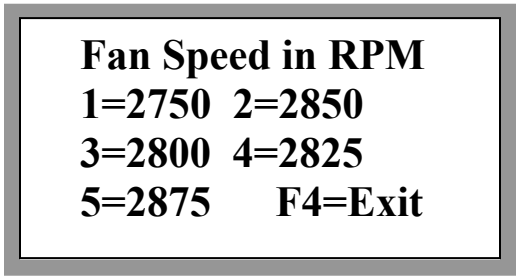


Figure 28. Get Fan Speed Screen

Power Supply Status

Power Supply Status reads information available from the power supplies. Press F1 to retrieve the power supply status.

The power supplies status reports back the current, voltage, temperature and any fault condition found.

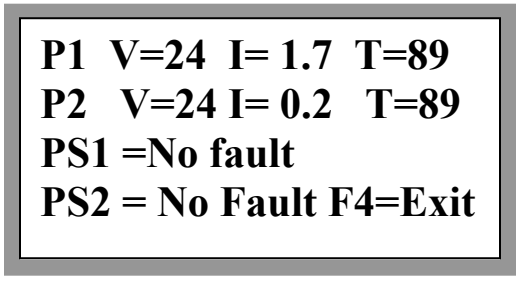


Figure 29. Power Supplies Status

Don't be concerned with the numbers. This is mainly for factory diagnostics. If the third and fourth lines state "no fault", the power supplies are operating within specifications. Any problem found will be printed on the third and fourth lines of the screen.

Internal Temperature

Internal Temperature reads the temperature on the control board. This is an ambient temperature read and has no status associated with it. If there is an extreme difference between the room temperature and the internal temperature, check the rear fans, power supply tray fans, and check the front panel filter for dust build up.

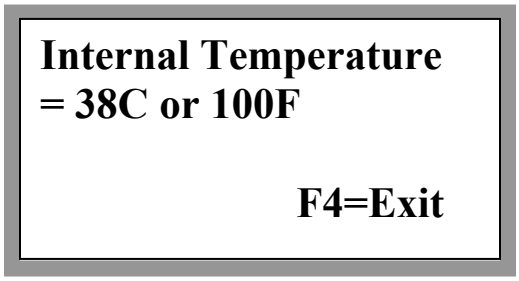


Figure 30. Internal Temperature

Get Input RF Level

Get Input RF Level reports the total input power of a specified input.

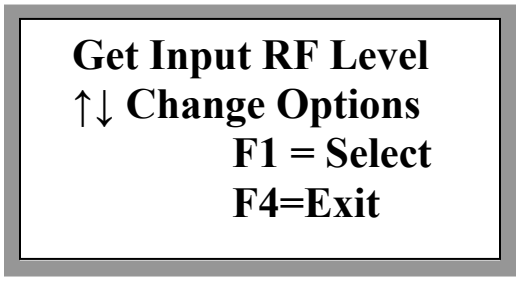


Figure 31. Get Input RF Levels Menu

Read Input RF dBm Signal Level.

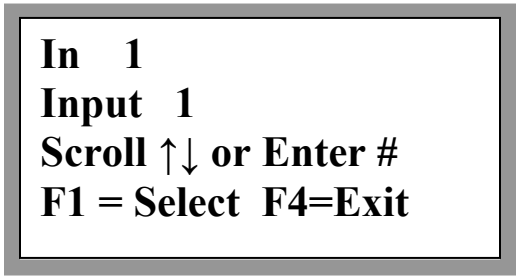


Figure 32. Get Input RF Level

If the QE3 system has more than 64 outputs but is not equipped with QED input modules, this command will not be available.

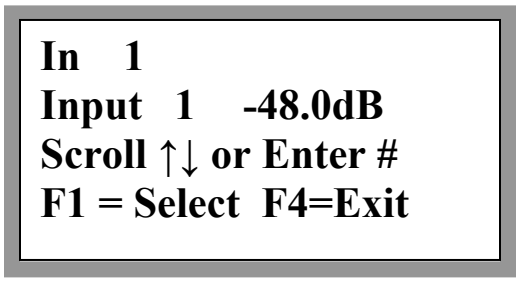


Figure 33. Display Input RF Level

Scroll through the inputs to get the desired number. You can also explicitly enter the number using the keypad. Press F1 to make QE3 sample the input and retrieves a dBm value. The value is displayed on the screen. This feature is included to assist in determining where a system fault is located.

If the command fails to read a valid value, a message screen will be displayed. It there is no RF signal on that input the following screen will be displayed. It will also detect and report if that particular input or XRD card is offline.

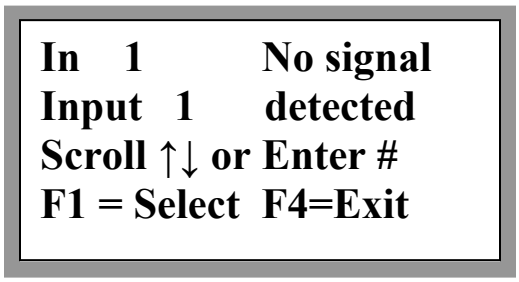


Figure 34. RF Signal not detected

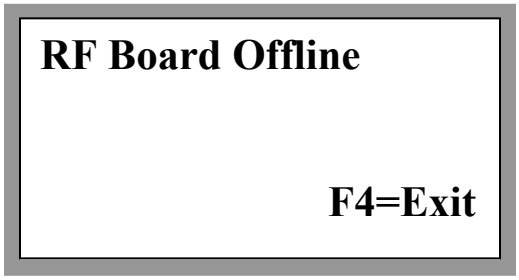


Figure 35. RF Board not detected

Get Output RF Level

Get Output RF Level reports the total output power of a specified output.

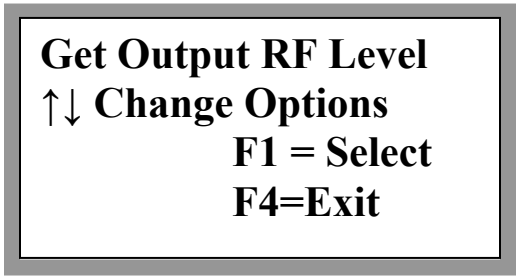


Figure 36. Get Output RF Levels Menu

Read Output RF dBm Signal Level

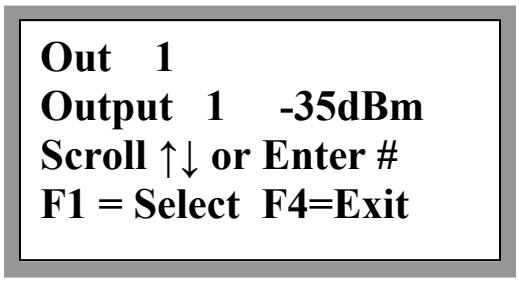


Figure 37. Report Output RF Levels Menu

Scroll through the outputs to get the desired number. You can also explicitly enter the number on the keypad. Press F1 to make the QE3 sample the output and retrieve a dBm value. The value is displayed on the screen. This feature is included to assist in determining where a system fault is located.

If the command fails to read a valid value, a message screen will be displayed. It there is no RF signal on that input, the following screen will be displayed. It will also detect and report if that particular input or XRD card is offline.

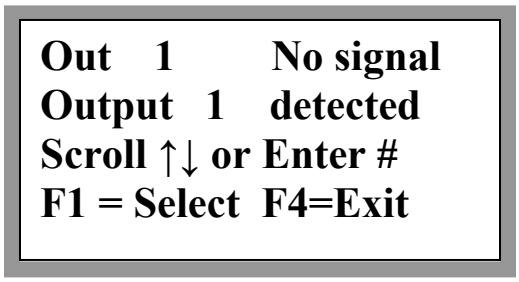


Figure 38. RF Signal not detected

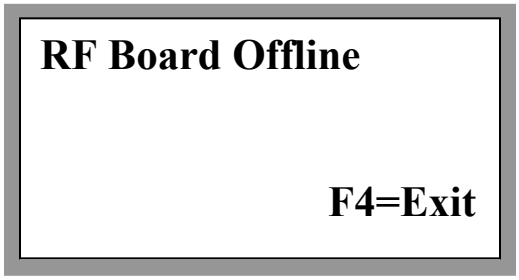


Figure 39. RF Board not detected

Accuracy of dBm Values

The dBm values returned from a read is only accurate from -10dBm down to -50dBm. This feature has been included to assist in determining where a system fault is located. It is not intended to replace a spectrum analysis of the RF signal.

QE3 System Test

QE3 system test is a diagnostic test used to find communications errors in the system and identify non-responsive boards. The test is based on the system setup and tests all boards and communication links in a system.

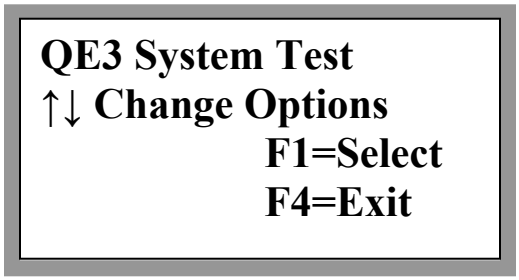


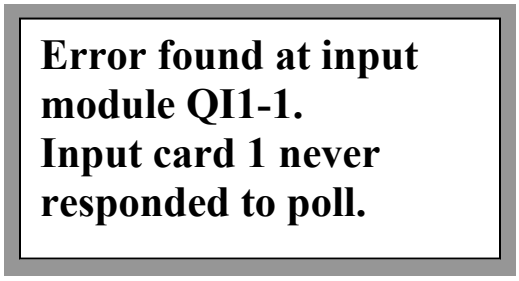
Figure 40. QE3 System Test Menu

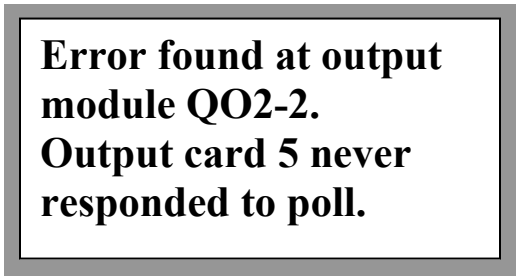
System Size

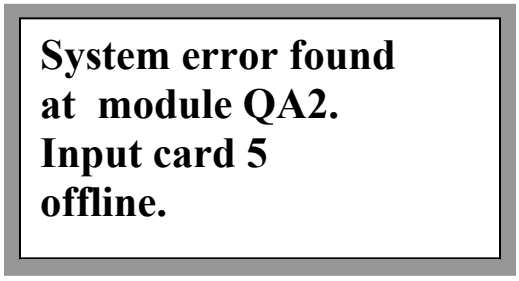
The System Size test is based on the number of system inputs and outputs in a standard QE3 configuration. If the system is a 6RU 64x64 or smaller, only that unit's boards will be tested. If the system is a standard configuration, (128x128) the system test is performed upon 4 input and output modules each and 4 QE3 switching modules. Every board in all 12 of the modules will be tested.

Error Reporting

If the test finds a non-responsive board, it pauses and displays the error on the front panel. The error lists the module label, followed by the card's type, followed by the card's location.







Pressing the F4 key exits the test without continuing. Pressing any other key continues the test.

System Errors

The System Error option assists with the integration of non-Quintech hardware into a Quintech system. When set to YES, any command failures will be ignored. Quintech recommends leaving this parameter set to NO so all errors will be reported.

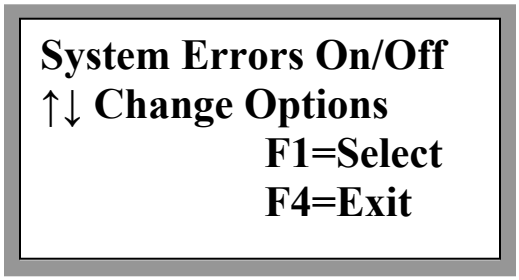


Figure 41. System Errors

Press F1 to select the System Errors option.

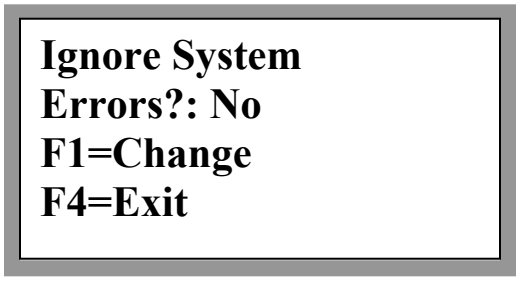


Figure 42. Ignore System Errors

Press F1 to toggle the option ON or OFF.

Gain Control

Every QE3 system has been equipped with input gain control which can be set either manually or automatically. In manual mode, a simple user-specified gain or attenuation value is consistently applied to the input(s) regardless of the input's current RF level. In automatic mode, the QE3 tracks the input(s) and automatically applies gain or attenuation to maintain the user-specified RF level.

Press F1 to set up input gain control.

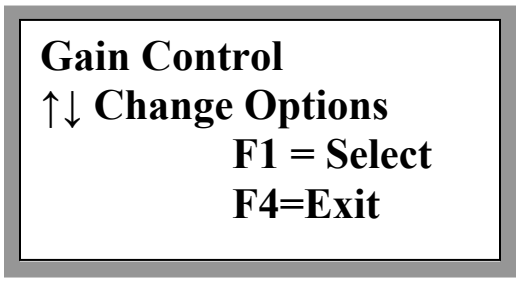


Figure 43. Enter Gain Control

If the QE3 system has more than 64 outputs but is not equipped with QED input modules, this feature will not be available.

Manual Gain Control

Manual gain control consistently applies a set amplification or attenuation value to all input signals equally. Input signal strength has no effect on manual gain control. The attenuation or amplification value is set and that value is added or subtracted from the input signal level consistently.

Notice the top line reads Gain Control Manual. This means the currently selected input is already in manual mode and set at 0.0 dBm. This value basically turns off the gain control function.

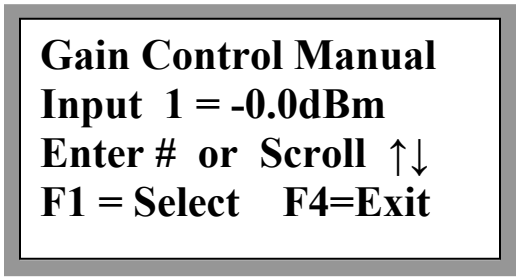


Figure 44. Manual Gain Control

Select an input then press F1 to set up manual gain control value.

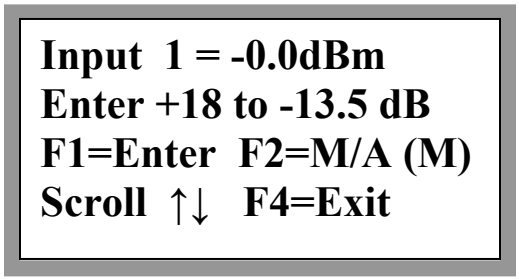


Figure 45. Set-Up Manual Gain Control

Here input 1 is selected. Arrow up or down to set the input gain or attenuation value. F4 will exit without any changes. F2 will toggle the input between automatic and manual gain control modes.

Manual Gain Control Limitations

Manual gain control is limited to +18dB of gain or -13dB of attenuation per input. Press F2 to switch this input to automatic mode. Adding too much gain to an input can cause degradation of the signal. Gain compression of a signal can occur if the input signal is at a high level and the manual gain is set high as well.

Automatic Gain Control

When operating under automatic gain control, the QE3 tracks the input(s) and automatically applies gain or attenuation, where needed, to maintain the user-specified RF level. Automatic Gain Control can be categorized as Simple or Advanced. Simple mode uses a simple timer that adjusts the input level at regular intervals; whereas, advanced mode utilizes multiple timers that determine how the system will react to the user RF level changes at the input(s). The system can be set to use Simple or Advanced mode at the **AGC Mode** screen which is in the **System Information Menu**.

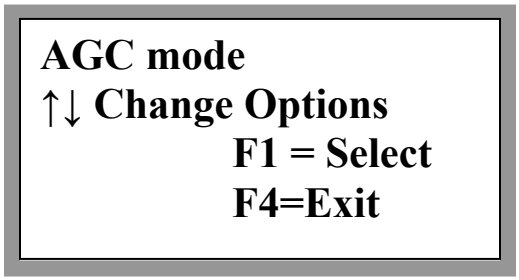


Figure 46. AGC Mode

Select F1 to enter the AGC mode screen where you can choose between Simple and Advanced modes.

Simple Mode

Simple mode uses a simple timer that adjusts the input level at regular intervals. The adjustment is made every time the simple AGC timer expires and is made in a single instance, regardless of how large or small the change is. The timer is then reset and the process is repeated.

Simple AGC Setup

Simple AGC has three parameters per input that can be setup: Delay, Hysteresis, and Zero Input dB Level.

Simple AGC Delay

Simple AGC Delay is a timer (0-255s) that determines the amount of time the system waits between input RF sampling and adjustment. Once the RF is adjusted, the timer is reset and the process repeats.

Simple AGC Hysteresis

Hysteresis is the maximum level change (in dB) that the input level is allowed to vary before the delay timer can be triggered.

Simple AGC Zero Input dB Level

The Zero Input dB Level is sthe default level setting applied if the input signal drops below -60 dBm with automatic gain control enabled. This can prevent a large undershoot or overshoot of the signal when the RF has been removed and then quickly returns.

Advanced Mode

Advanced AGC mode utilizes multiple timers that determine how the system will react to user RF level changes at the input(s). Different timers can set the input reaction times and how fast or slow the RF level will be adjusted to match the set input.

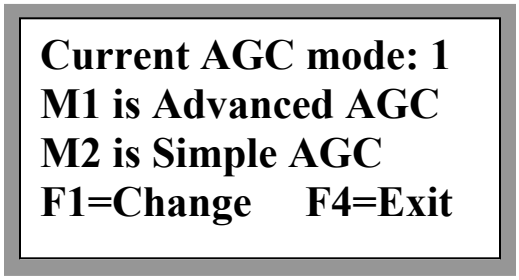
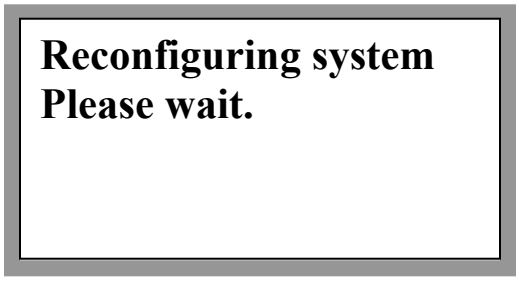


Figure 47. AGC Mode Select

The current system setting is at the top of the screen. Pressing F1 will reconfigure all system inputs to the other mode.

Changing a system requires configuring all inputs. This process may take a few seconds. A message will temporarily be displayed while the system is busy.



Advanced AGC Setup

Advanced AGC utilizes multiple timers and has six parameters per input that can be configured: Hysteresis, Zero Input dB Level, PreAttack Delay Time, PreDecay Delay Time, Attack Delay Time, Decay Delay Time.

Advanced AGC Hysteresis

Hysteresis is the maximum level change (in dB) that the Input Level is allowed to vary before either the PreAttack or PreDecay timer can be triggered.

Advanced AGC Zero Input dB Level

Zero Input dB Level is the defaultlevel setting applied if the input signal drops below -60 dBm with automatic gain control on. This can prevent a large undershoot or overshoot of the signal when the RF has been removed and then quickly returns. The Zero Input dB Level remains in effect until either the PreAttack Delay or PreDecay Delay expires the first time.

Advanced AGC PreAttack Delay Time

PreAttack Delay Time is the amount of time the input signal must remain aabove the set point before any reduction in gain will occur. In order to start the PreAttack timer, the level increase must exceed the hysteresis value and remain above the set point plus the hysteresis until the PreAttack timer expires. The Attack phase starts when this condition is met.

Advanced AGC PreDecay Delay Time

PreDecay Delay Time is the amount of time the input signal must remain below the set point before any increase in gain will occur. In order to start the PreDecay timer, the level decrease must exceed the hysteresis value and remain below the set point minus the hysteresis value until the PreDecay timer expires. The Delay phase starts when this condition is met.

Advanced AGC Attack Delay Time

The Attack Delay Time is the amount of time required for the AGC to decrease the input signal level to the desired setpoint level. The change occurs in .5 dB increments divided by the total Attack Delay Time.

Advanced AGC Decay Delay Time

The Decay Delay Time is the amount of time required for the AGC to increase the input signal level to the desired set point level. The change occurs in .5 dB increments divided by the total Decay Delay Time.

NOTE: Specifications such as P1dB, OIP3, and noise figure are affected by gain changes, so the user must be aware of the input level at the QE3 as well as the level setting to prevent signal distortion.

Automatic Gain Control Limitations

The QE3 system has a limit to the amount of gain or attenuation it can apply to a signal to get the level to the user requested dBm level. The QE3 can add 18dB of gain, or 13.5 dB of attenuation to an input signal.

For example, say the automatic gain control dBm level for input 1 is set at -40dBm. The input signal could be up to -26.5dB and the signal would still be attenuated down to -40dBm. If the input signal was set to -26dBm, then the attenuation is past its limit and the signal will start tracking the input signal. The input would then be -39.5 dBm.

Gain can also cause signal degradation if the signal is at maximum input strength and the input is set to manual gain. Amplification of a strong signal will cause signal degrading and distortion. Quintech recommends a signal strength plus gain value added do not exceed -10dBm.

Q-SENSE

The Q-SENSE option sets up the QE3 Q-sense feature. For details on the Q-SENSE feature refer to the “Q-SENSE” section.

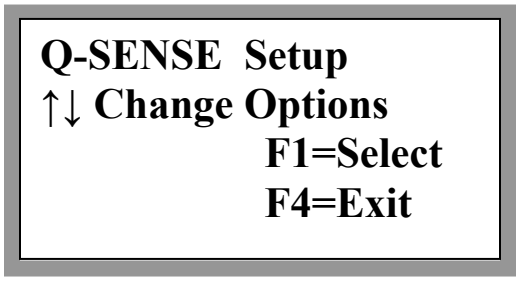


Figure 48. Q-SENSE Menu

RS-485

Why an RS-485 Section?

In the past, there have been questions as to how to handle certain RS-485 communications setups with Quintech systems. This section was written to eliminate confusion about the Quintech RS-485 communications, specifically termination. This section discusses the major points of RS-485 communications, including specific details such as signaling, cabling, pinout, and termination settings.

RS-485 Basics

In order to discuss RS-485, let's review the basics of RS-232 for comparison. RS-232 in simplest terms is a three-wire interface: one transmit, one receive, and one common ground. This is called an unbalanced signal.

It's a simple protocol but because signaling is in reference to a common ground, the speed and cable lengths are severely limited. RS-232 is typically only a few feet and usually limited to less than 20,000 bits per second. Rather slow for today's standards.

Balanced vs. Unbalanced

The RS-485 standard uses balanced differential signals. In balanced signaling, there are two lines. One signal carries the true signal and the other carries the same signal except that it is 180 degrees out of phase. The receiver then reads the difference between the two signals. A ground wire exists, but it has nothing to do with how the receiver determines the logic level of the signal.

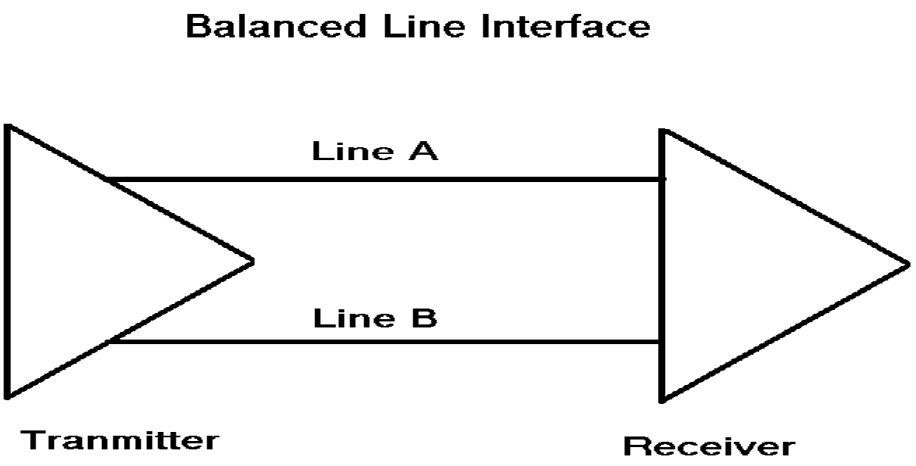


Figure 49. Balanced Line Interface

Voltages and Signaling

A pair of wires is used to carry each signal. The data is encoded and decoded as a differential voltage between the two lines. A typical truth table is shown below.

VA-VB < -0.2v = Logic 0
VA-VB > +0.2v= Logic 1

As a differential voltage, the interface is, in principle, unaffected by differences in ground voltage between the sender and receiver.

Noise Immunity

Furthermore, if lines A and B are close together, they will be affected almost identically by external noise. If the lines are also twisted together, then neither line is permanently closer to a noise source than the other. Hence, the well known "twisted pair" is extremely effective in eliminating noise from the signal. Due to the nature of the differential receiver, any equivalent noise on both wires is cancelled out.

Number of Devices

The RS-485 standard allows 32 devices on one bus, whereas RS-232 is typically only a one to one connection. Quintech allows one main controller and up to 31 remote controllers.

Master/Slave

Most RS-485 systems use Master/Slave architecture, where each slave module has its unique address and responds only to packets addressed to that module. These packets are generated by the master controller, which periodically polls all connected slave units. This is how Quintech controller modules communicate with each other. Each controller on the RS-485 bus has a unique assigned address. Only communications sent to the assigned address will cause a response by the remotes on the bus. This is why it is important to assign each controller in your system a unique address.

4-Wire and 2-Wire Systems

RS-485 has a 2-wire and a 4-wire standard. Quintech uses the 4-wire standard which allows the master controller to send data out one pair of wires and the slaves send data back to the master on the other twisted pair.

RS-485 Pinout

The Quintech UCM port is a dedicated RS-485 port. The Serial Control In port can also be configured for RS-485 communications. The pin definitions are listed in Table 2.

Cable Lengths

Quintech recommends the same cable length as the RS-485 standard. The RS-485 cable length can be up to 4000 feet between nodes.

Signal Reflection

As data speeds and cable lengths go up, the problem of signal reflections becomes important. Lines must be properly terminated by a resistor that makes the cable look electrically like it is infinitely long. An infinitely long cable, of course, can have no reflected signals because the far end is infinitely far away. When this reflection occurs it propagates from one end of the wires to the other end and back repeatedly. Therefore, to add something to fix this reflection you only need to take care of the end of the cable, not any nodes in between the ends. From the remote port description, it was explained that the remote ports are identical and can be interchanged. When remotes are daisy chained together, the controllers between the first and last unit in the chain do not need to have termination resistors.

Receiver/Transmitter Termination

RS-485 termination is required to eliminate signal reflection as discussed earlier. There is a twisted pair for sending data from the controller to the slaves and there is another twisted pair for the slaves to transmit to the master. Therefore, in a four wire RS-485 bus, you only need to terminate the receivers. Quintech RS-485 termination is only applied to the internal receivers and not the transmitters.

Biasing Resistors

When an RS-485 network is in an idle state, all nodes are in the receive mode and the transmitters are tri-stated. When this happens, the state of the line is undefined. Bias resistors are nothing more than a pull up resistor on line B and pull down resistor on line A to guarantee logic high when the bus is idle. When RS-485 termination is turned on, these two resistors and the termination resistor are connected to the RS-485 receiver.

Which ports are RS-485?

The Remote ports are dedicated, identical, and connected RS-485 ports. They can be used for control of remote controller units or as another input port to control the system. The Control In port is RS-485, only if the mode is set to RS-485. The Control Out port is a dedicated Quintech communications port used only for Quintech equipment. The remote and the Control In buses are two separate communication busses and must be terminated as such.

Summary

So now, we understand from the previous sections that Quintech RS-485 communications only needs to terminate the ends of the cables and we only need to terminate the receivers. Internally, the controller adds a termination resistor and two bias resistors when termination is turned on.

Front Panel RS-485 Termination

To invoke the **RS-485 Termination** screen from the main menu: key sequence 2, 2.

2. System Options
    2. Interface Options
        Scroll to "Serial Termination" and press F1 to select

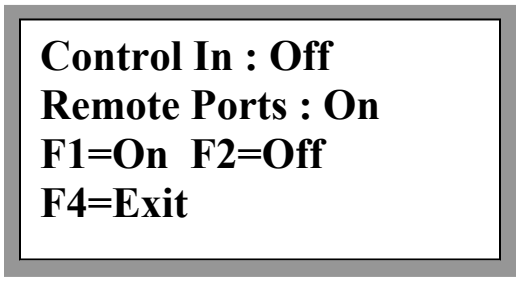


Figure 50. Serial Termination

Which Controllers in My System Should be RS-485 Terminated?

RS-485 Port Termination

From our discussion, you should now know that only the first and last controllers in the daisy chain should have remote termination turned on. If there is only one controller and there is no RS-485 bus, leave remote termination off. If there are only two controllers, both should be set with remote termination on.

If there are any more than two controllers, only the first and last controllers in the remote daisy chain will be RS-485 remote terminated.

RS-485 Serial Control In Port Termination

The Serial Control In port can be configured for RS-485 communications. If the port is configured for RS-232 or RS-422 communications, termination should be off. If the port is configured for RS-485 communications and it is the last unit on the RS-485 bus, control termination should be on. If the controller is not the last unit on the bus, the control termination should be off. See Figure 48 for a graphical example. If you are not using RS-485 in the control port, leave this setting off.

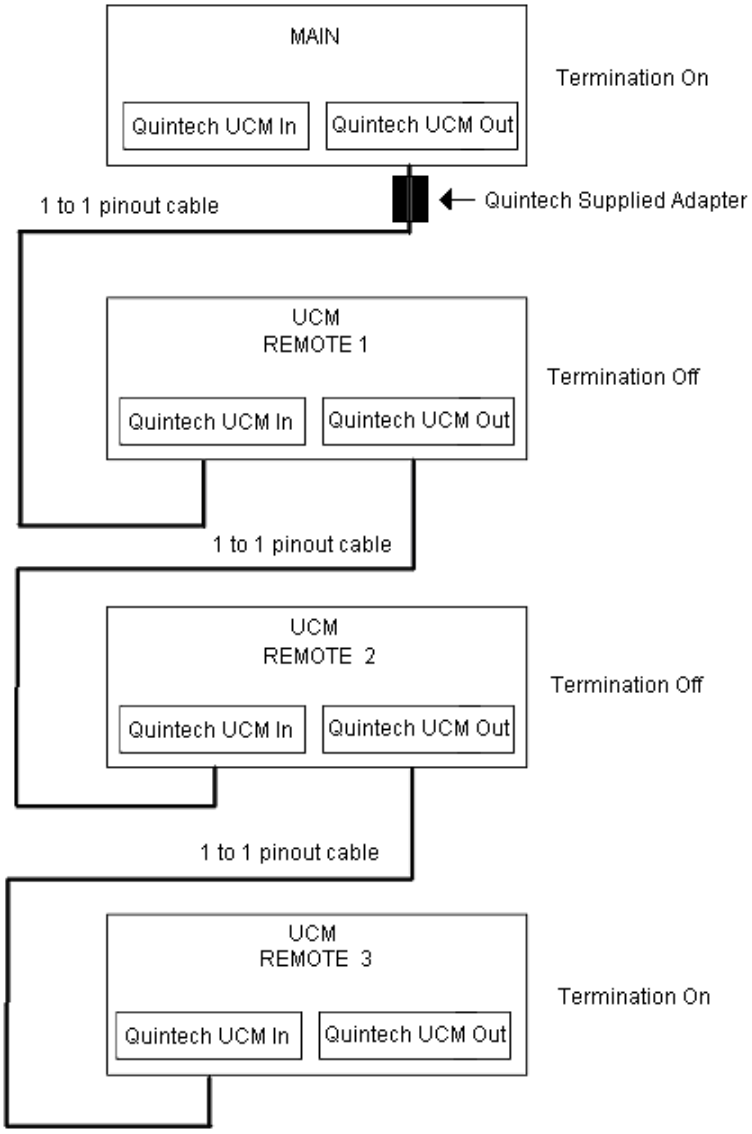


Figure 51 Quintech UCM Termination

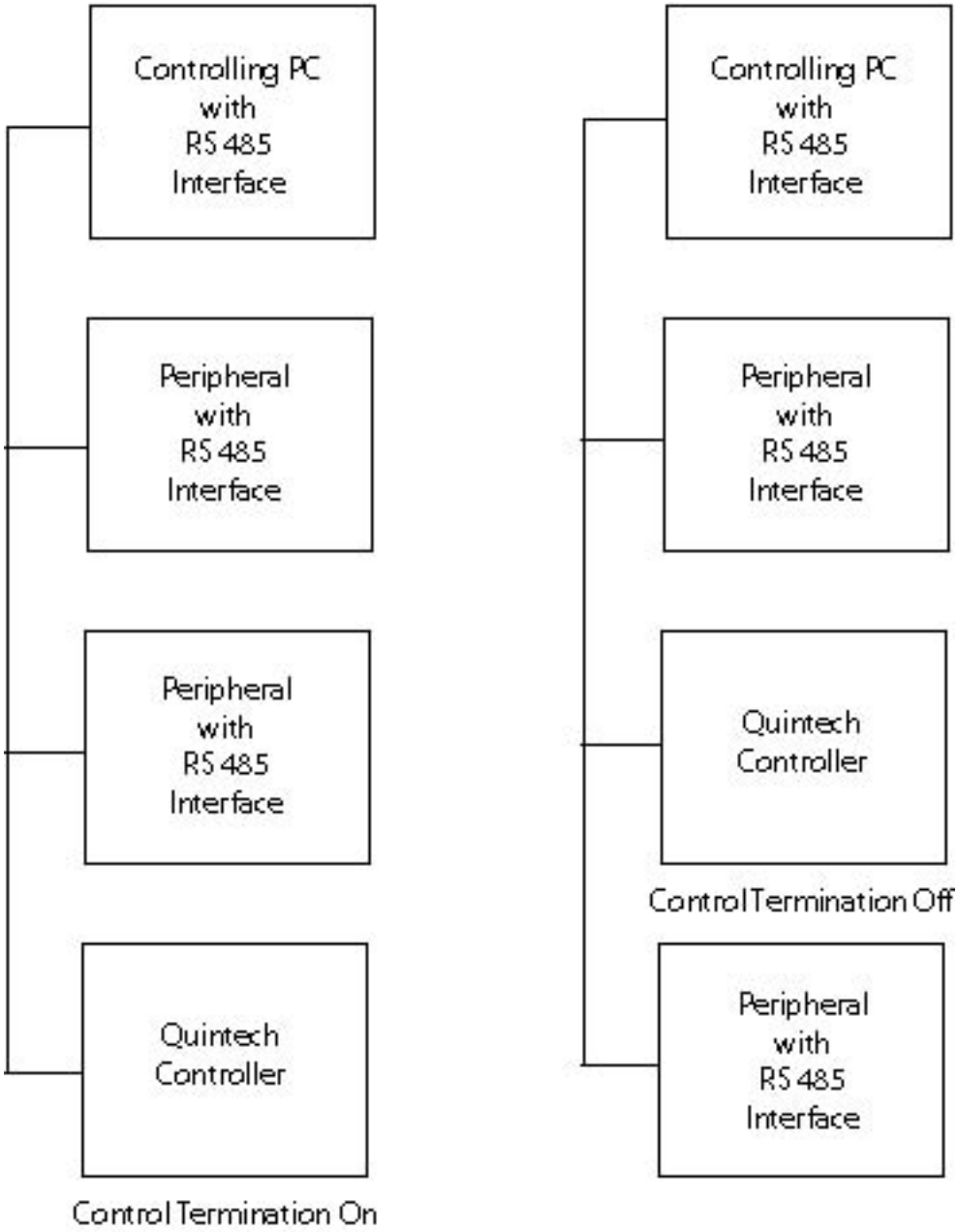


Figure 52. Serial Control In RS485 Connection/Termination Examples

Main vs. Remote Mode

All Quintech switching systems come with at least one controller which may exist as a stand-alone unit or may be integrated into a QE3 unit. The main controller is the interface where system commands are accepted and sent to the system. It is the module that controls the system.

Every QE3 system can also be upgraded to include extra 1RU controllers called remotes. Any system can be upgraded to include as many as 31 remote controllers.

Differences between Main and Remotes

The primary difference that exists between main and remote controllers is the way in which internal communication occurs between them.

Once remotes are connected properly and are communicating with the main controller, there is no visible difference between a remote controller and the main controller. Both accept commands and control the system in the same way. To the user, the remote will appear the same as the main controller except for the serial address and the control mode setting.

The main and remote controllers are connected together via the Quintech UCM ports and remote ports on the 1RU controllers.

Since they communicate using RS-485, a remote controller can be located up to 4000 feet away from the main system. This provides additional control of the QE3 system,. Since you can now locate additional remotes in another room or even in another building.

Control Mode

Up to 32 Quintech controllers may be connected together. The first controller that is connected to the system must be designated as the main controller while all the others (up to 31) function in remote mode.

Checking Control Mode

If needed, you can check the mode setting of a controller from the front panel.

To invoke the **Display Control Mode** screen from the main menu: key sequence 2, 3, 1.

2. System Options
    3. Remote Control
        1. Control Mode

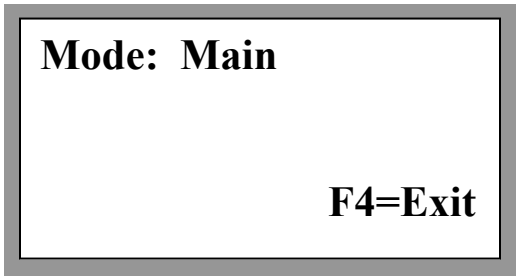


Figure 53. Control Mode

The Control Mode screen only displays the mode of the controller. The mode can't be changed from this screen.

Setting the Control Mode

The controllers that came with your system have already been properly configured as main and remote controllers and were marked as such in the packaging. A controller's mode can be checked and even changed from the front panel. Changing the mode should never be necessary except for a few rare cases such as system upgrades or firmware upgrades .

Changing the control mode is a critical setting and is therefore included under the **Configuration Menu**, which is protected by the factory settings code number screen. To change the control mode refer to "Set Control Mode" in the "Factory Configuration Settings" chapter.

System Commands from the Main Controller

From a user standpoint, the main controller operates the same as remotes: controlling the system and changing crosspoint connections. The only diference between a remote and a main is that it is set as main controller and has a different serial address than all other remotes. The only reason one controller must be main and all addresses must be different is so that Quintech's communications can operate correctly. The main controller can accept a system reset command.

System Commands from the Remote Controller(s)

Any switch changes that are made thru a remote controller will update all other controllers and make the system crosspoints change instantly. This does not include factory-configured settings like matrix and module sizes.

Set Address

Each controller in the system must have a unique serial address assigned to it for proper operation. If this is not done, the main controller and remotes will not be able to communicate.

Initializing Remotes

The Initializing Remotes function sends the switch settings of the main controller to all remote control panels. The initialization sequence takes a few seconds and should be started from the main controller. The main controller will display "Initializing Remotes" and will check for remotes at addresses between 00H and FEH. This display will be shown on the main controller for a few seconds, but will not be shown on the other units.

The Initializing Remotes function should be run after the system is first set up or if the information in any remote does not match the main controller for any reason. If any factory-specified parameters such as matrix size are changed, each remote must have those parameters set from the front panel. Initialization only recognizes other remotes, establishes communications, and sets up the cross point connections.

Remotes Initialization Procedure

Option 2 in the **Display Control Mode/Init Remotes Menu** initializes all remotes in the system. This function should be executed after the system is initially configured or if the information in a remote doesn't match the main controller for any reason. To back out of the screen to the **System Options Menu**, press F4.

To navigate to the **Display Control Mode/Init Remotes Menu** from the main menu: key sequence 2, 3.

2. System Options
    3. Remote Control

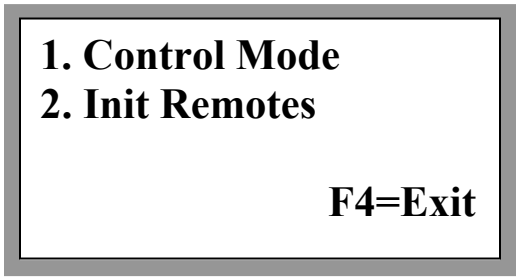


Figure 54. Display Control Mode/Init Remotes Menu

If you are having difficulty getting remotes to communicate, refer to the Adding Additional Remotes section.

Adding Additional Remotes

After additional remotes are added to the system configuration, the system must be reinitialized. To add additional remotes, perform the following sequence of steps:

NOTE: Do not attempt to set any crosspoint connections until this procedure is complete.

1. Power down all controllers in the system.
2. Connect the main controller and all remote controllers together. (Refer to the Quintech UCM Termination illustration as a guide)

(don't forget the Quintech crossover adapter between the main and first remote!!)

3. Power up the main controller

Record the Protocol version and Firmware version that appears on LCD during bootup or press "1.System Options" followed by "1. Firmware version" and this information will display for 5 seconds.

Protocol version _____

Firmware version _____

4. Record the serial address of the main controller under the **Interface Options menu**

Serial address _____

(If this address is changed at any time you must re-initialize the system from main controller)

5. Record the matrix sizes under the configuration menu

Matrix size # inputs _____

Matrix size # outputs _____

6. Record the QE3 module sizes under the configuration menu

QE3 Module size # inputs _____

QE3 Module size # outputs _____

7. Record the QEO module size under the configuration menu

QEO size # input rows _____

8. Set “main” as the control mode
9. Set the remote port termination to ON
10. Power down the main controller

11. Power up the first remote

Make sure the Protocol and Firmware versions match the numbers recorded in step 3. If the numbers don’t match, contact Quintech to determine whether the different versions are compatible.

12. Set the serial address to an address between 00H – FEH
The chosen address must be different from main address (step 4) and any other remote address

13. Set “remote” as the control mode
14. Set remote port termination corectly
15. Make sure the size settings on remote match the numbers recorded in steps 5, 6, and 7
16. Power down the remote
17. Repeat steps 11 through 16 for each additional remote in the system.

Power should now be off for all controllers.

18. Power up the first remote. Wait until it boots up and main screen appears
20. Power up second remote. Wait until it boots up and main screen appears
21. Continue the power up procedure in this manner until all remotes are powered up and display the main menu
22. Power up the main controller last

Watch the main controller screen carfully during boot up. If setup was performed correctly, the main controller will display a screen similar to this:

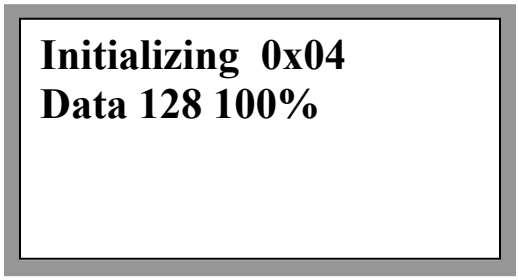


Figure 55. Remote Initialization

The data number will cycle from 0 to 128 and the percent will go from 0 to 100. The main controller will also show an addition screen like this for every remote connected to it. If you have a remote that the main controller did not cycle through, you have a cable or set up problem. Consult the troubleshooting guide, then contact Quintech for technical support.

The main controller automatically searches for remotes every time it is turned on. It detects all remotes that have been properly connected and configured, including the newly added ones. It will also download the crosspoint settings to all the remotes.

What Mode Should This Controller Be In?

First rule of thumb to remember: There is always only one main controller. If your system contains more than one controller and you configure more than one of those controllers as a main controller, your system will not work properly.

To check the controller's mode, refer to “Checking Control Mode”. If you need to change the mode of the controller, refer to “Set Control Mode”.

Factory Configuration Settings

System Options Menu

The **System Options Menu** is a critical part of the system hierarchy**. From this menu, you can select options to make your system function differently or not function at all**. Here is a list of functions available in the **System Options Menu**:

Change the number of inputs
Change the number of outputs
Change the Model number
Setup SRM/XRM/QE3 systems
Assign alpha-numeric names to inputs
Assign alpha-numeric names to outputs
Load new firmware
Set the control mode
Initialize remote controllers
Set up SNMP protocol
Set up can bus error reporting
Enable/disable access control for 5 ports
Set up Ethernet communication
Set up serial port communications

The serial and Ethernet software settings are non critical to system functionality. These settings are determined by how you are communicating with the controller. Refer to "Communications Setup".

Option 2 of the **Main Menu** displays the **System Options Menu**.

2. System Options

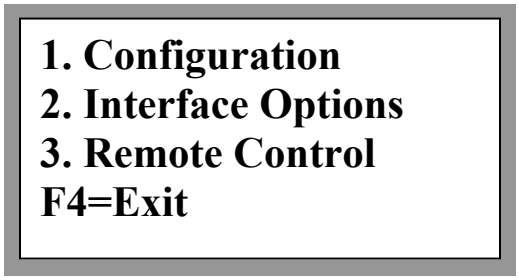


Figure 56. System Options Menu

From this menu, you can elect to change the system configuration, change the communications setup, or set up communications with an optional 1RU controller. The remote control refers to setting up an additional 1RU controller not typically sold with a QE3 system. The main controller is always integrated into one of the 6RU QE3 units. The remote control will set up an additional 1RU “remote” controller.

Configuration Menu

Warning: The settings under the configuration menu are included in case of a system upgrade or servicing. Most settings included under the configuration menu are set at the factory and **should never be changed.**

Exceptions to this may be:

Setting up SNMP protocol
Naming Inputs and Outputs
Changing Priority mode
Changing access control for a port

Option 1 of the **System Options Menu** displays the **Configuration Menu Pass-code** screen.

To invoke the **Configuration Menu Pass-code** screen from the main menu: key sequence 2, 1

2. System Options
    1. Configuration

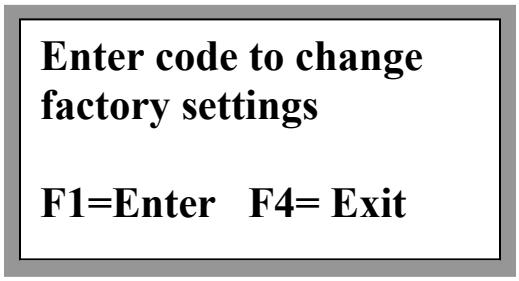


Figure 57. Configuration Menu Pass-code

Factory Settings Code Number

A code has been introduced into the front panel hierarchy in order to prevent accidental changes to the system settings. If valid changes do need to be made to the system, the code to get into the configuration menu is **732**.

This is not a security password. That is what access control is for. This number is to remind the user that they are entering into a critical area of the menu hierarchy. **If these values are improperly changed, the system will cease to operate!**

To get past the password screen, simply enter the key sequence 7, 3, 2, F1. That will load the **Configuration Menu** screen.

Figure 58. Configuration Menu

The options under the **Configuration Menu** are where all critical system settings can be modified.

System Setup Menu

Option 1 in the Configuration Menu displays the System Setup Menu. The system configuration defines the number of matrix inputs and outputs, the model number, and the number of module inputs and outputs. The configuration settings are set at the factory and should not be changed unless the system has been expanded with additional modules. Altering the configuration improperly will prevent the matrix from operating correctly. We included these features to make Quintech factory upgrades quick and easy to implement.

To navigate to the **System Setup Menu** screen from the main menu: key sequence 2, 1, (factory settings code number + F1), 1

2. System Options
    1. Configuration (factory settings code number + F1)
        1. System Setup

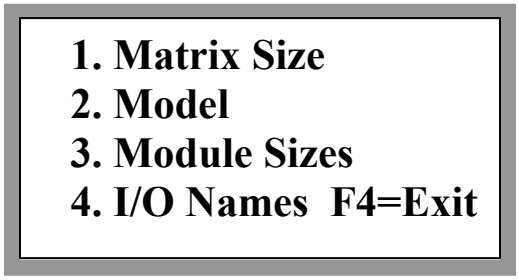


Figure 59. System Setup

Matrix Size

Option 1 of the **System Setup Menu** displays the **Matrix Size** screen. This option allows the specified size of the matrix to be changed when multiple Quintech switch modules are used to form a larger matrix switching system. For standard QE3 systems (i.e., single enclosure systems), the matrix size is equal to the number of inputs and outputs built into the QE3 unit. This setting should never be changed unless the configuration of the matrix has been changed.

To navigate to the **Matrix Size** screen from the main menu: key sequence 2, 1, (factory settings code number + F1), 1, 1

2. System Options
    1. Configuration (factory settings code number + F1)
        1. System Setup
            1. Matrix Size

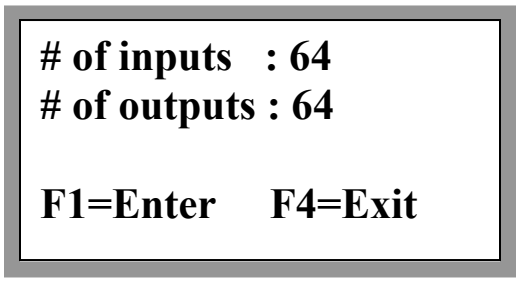


Figure 60. Matrix Size

Model

Option 2 of the **System Setup** menu displays the **Model Number/Type** screen. This option is included as part of the system's firmware identification in accordance with the protocol outlined in Appendix D. The control system is not affected by the model number or type. System expansion requires no change of the model number.

To invoke the **Model Number/Type** screen from the main menu: key sequence 2, 1, (factory settings code number + F1), 1, 2

2. System Options
    1. Configuration (factory settings code number + F1)
        1. System Setup
            2. Model

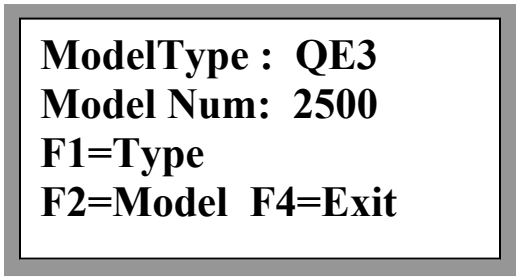


Figure 61. Model Number/Type

Module Sizes

These settings are to support the connection of Quintech legacy equipment to the SRM/SRO Control port and for custom QE3 system setup.

Option 3 in the System Setup menu displays the Module Sizes Menu. This menu allows you to select option 1 – SRM Size or option 2 – SRO size. From this menu, press 1 to specify the number of inputs and outputs per SRM switching module. Press 2 to specify the number of input rows per SRO.

Note that option 4 only appears for systems that have more than 64 inputs.

To navigate to the **Module Sizes Menu** from the main menu: key sequence 2, 1, (factory settings code number + F1), 1, 3

2. System Options
    1. Configuration (factory settings code number + F1)
        1. System Setup
            2. Module Sizes

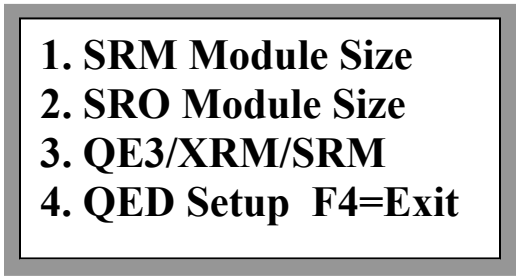


Figure 62. Module Sizes

SRM Module Size

Option 1 of the **Module Size Menu** will load the **SRM Module Size** Screen**.** This setting should never be changed unless the internal hardware of the SRM module has been changed.

To navigate to the **SRM Module Size** screen from the main menu: key sequence 2, 1, (factory settings code number + F1), 1, 3, 1

2. System Options
    1. Configuration (factory settings code number + F1)
        1. System Setup
            3. Module Sizes
                1. SRM Module Size

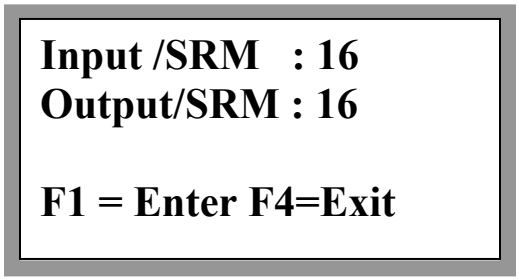


Figure 63. SRM Module Size

SRO Module Size

Option 2 in the Module Size Menu displays the SRO Module Size screen. The number of input rows for each SRO output module is specified via this screen. Enter the numbers "4", "8", or "16" to specify 4, 8, or 16 input rows respectively. A matrix with 1 to 64 inputs requires an SRO with 4 input rows, 65-128 inputs require 8 input rows, and 129-256 inputs require 16 input rows. Some customers prefer to purchase an SRO larger than required to allow for future expansion.

To navigate to the **SRO Module Size** screen from the main menu: key sequence 2, 1, (factory settings code number + F1), 1, 3, 2

2. System Options
    1. Configuration (factory settings code number + F1)
        1. System Setup
            3. Module Sizes
                2. SRO Module sizes

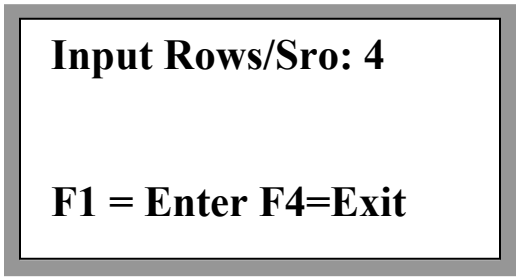


Figure 64. SRO Module Size

Combination QE3/XRM/SRM Systems

QE3 systems can be combined with either XRM or SRM systems for expansion purposes. Option 3 in the Module Size Menu displays the QE3/XRM/SRM Systems screen which will enable you to combine a QE3 system with an existing XRM or SRM system.

To navigate to the **QE3/XRM/SRM Systems** screen from the main menu: key sequence 2, 1, (factory settings code number + F1), 1, 3, 2

2. System Options
    1. Configuration (factory settings code number + F1)
        1. System Setup
            3. Module Sizes
                3. QE3/XRM/SRM

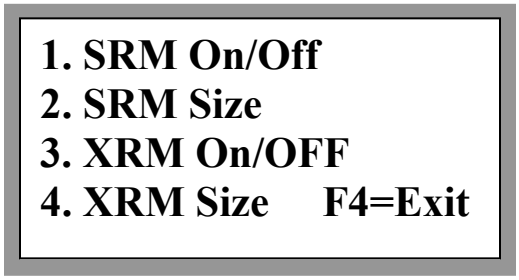


Figure 65. QE3/XRM/SRM Systems

QE3/SRM Setup

Selecting Option 1 from the **QE3/XRM/SRM Systems** screen displays the **QE3/SRM System** screen through which you can specify whether any SRM units are being used in combination with the QE3 system. Press F1 to toggle between yes and no. Press F4 to exit.

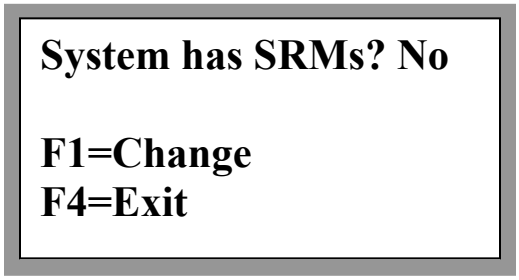


Figure 66. QE3/SRM System

Selecting Option 2 from the **QE3/XRM/SRM Systems** screen sets up the original size of the SRM system. Since the QE3 system is being added to an original SRM systems, the QE3 operating system needs to know which inputs and outputs are SRM and which are QE3. This screen sets up the SRM inputs and outputs. Enter the original SRM system size.

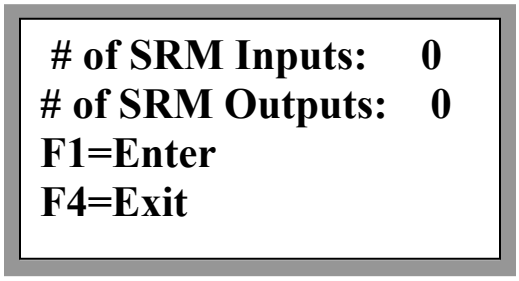


Figure 67. QE3/SRM Setup

QE3/XRM Setup

Selecting Option 3 from the **QE3/XRM/SRM Systems** screen displays the **QE3/XRM System** screen through which you can specify whether any XRM units are being used in combination with the QE3 system. Press F1 to toggle between yes and no. Press F4 to exit.

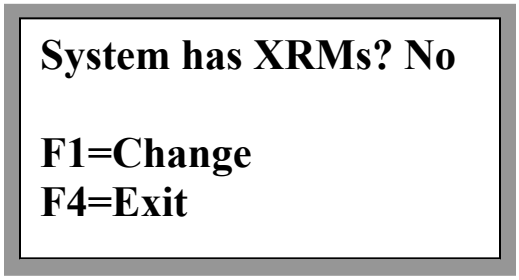


Figure 68. QE3/XRM System

Selecting Option 4 from the **QE3/XRM/SRM Systems** screen sets up the original size of the XRM system. Since the QE3 system is being added to an original XRM systems, the QE3 operating system needs to know which inputs and outputs are XRM and which are QE3. This screen sets up the XRM inputs and outputs. Enter the original XRM system size.

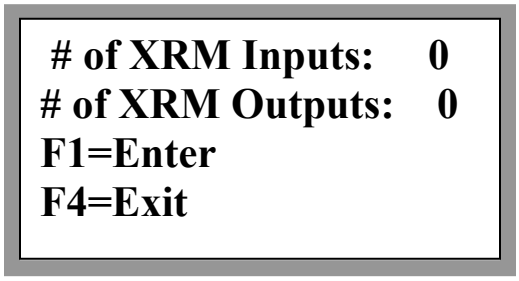


Figure 69. QE3/XRM Setup

Option 3 of the QE3/SRM Expanded Setup screen sets up the QE3 system modules. A QE3 system can contain XRD distribution modules and QEO output modules. The operating system needs to know the system configuration and where in a system the inputs and outputs are located. This is asking if the system includes QED modules. If the system has more than 64 outputs but is not equipped with QED input modules then this setting needs to be set to no. This type of system is equipped with customer supplied input splitters and all input features such as attenuation and gain control are disabled.

QEDs

Option 4 of the **Module Sizes Menu displays the QED Setup** screen which enables you to specify whether the system includes QED modules. If the system has more than 64 inputs but is not equipped with QED input modules, then this setting needs to be set to no. This type of system is equipped with customer supplied input splitters and all input features such as attenuation and gain control are disabled.

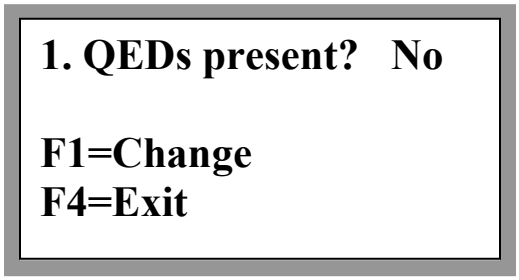


Figure 70. QED Setup

I/O Names

Option 4 of the System Setup screen allows the user to assign names to the inputs and outputs. These names will then be displayed above the corresponding input and output in the Monitor and Control screen.

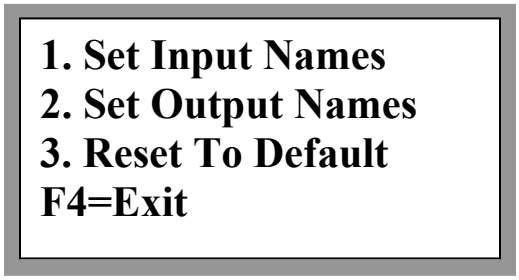


Figure 71. Set I/O Names

Load Firmware

Contact Quintech technical assistance for any firmware downloads. Depending on the system and date of manufacturing the process may or may not require system offline time and resetting of system parameters. QE3 systems manufactur ed after September 2006 have been manufactured with internal QE3 upgrade memory. These QE3s can be upgraded without any interruption of crosspoint or changing of system parameters.

Option 2 in the **Configuration Menu** displays the **Load Firmware** screen. The **Load Firmware** screen, enables you to upgrade the internal firmware level of the controller.

To invoke the **Load Firmware** screen from the main menu: key sequence 2, 1, (factory settings code number + F1), 2

2. System Options
    1. Configuration (factory settings code number + F1)
        2. Load Firmware

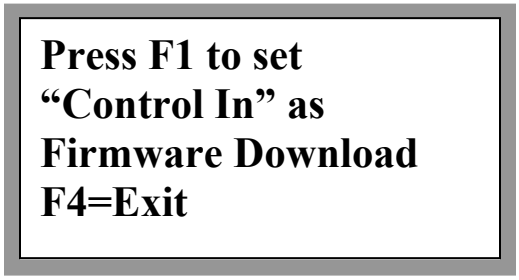


Figure 72. Load Firmware

Pressing F1 will put the controller in a special firmware download mode. Only press F1 if you have the firmware ready for download.

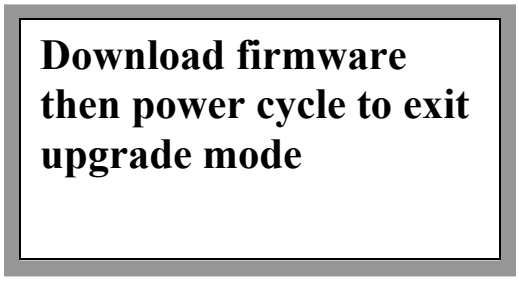


Figure 73. Download Firmware

Exiting Download Mode

If you “accidentally” put the QE3 in download mode, you can power cycle the unit or pull out and reinsert the control board. Removing the control board will not interrupt the crosspoints. The control board will reboot without interrupting any crosspoints or changing any system parameters.

Firmware Upgrade Kit

A firmware upgrade kit only comes from Quintech service personnel. A firmware upgrade kit will come as a zipped set of files that will contain all the files needed to download new firmware to your QE3. Instructions on how to do this procedure will be included in the zip file. Upgrade kits include files to download from the Ethernet port or the serial port.

Firmware Download Instructions

The instructions to download firmware are included in an upgrade kit. There are instructions for an Ethernet download and separate instructions for a serial port download.

Firmware Download Preparation

QE3 systems manufactured after September 2006 have internal QE3 memory that allows firmware upgrades without system parameter modification. Previous QE3 models will change system parameters back to factory default after a firmware upgrade.

QE3 Internal Memory

QE3s manufactured after September 2006 are manufactured with QE3 internal memory. This internal memory stores all QE3 system parameters to allow for control board hot-swap.

QE3 with Internal Memory

An QE3 with internal memory can be upgraded without interrupting crosspoints or changing any system parameters.

QE3 Without Internal Memory

Write down the settings for your system before you start the download process. Record all the settings under the configuration menu and the Interface Options menu. These setings will be overwritten during a firmware download. You will also have to recreate any user acounts, user names, and passwords. Input – Output connections will also go back to factory defaults as well.

A firmware download is not something that can be done in the background while the switch is operating. A firmware download will overwrite all settings in the system. After a successsful firmware download the system settings will be set to Quintech defaults. These defaults are listed in the protocol document but listed here again for your convenience.

Firmware Default Settings

DHCP Off……..……..Off
Static IP……...…010.000.000.050
Static Netmask……255.255.255.000
Static Gateway……..…. 192.168.000.001
Telnet Port……..…23
QEC Ethernet Port……..……9100
Serial Port……..…….RS-232 9600 baud 8N1
RS-485 Terminations……..… Off
Matrix Size…… 64x64
Module Size…..…….…… 64x64
SRO Size……..…..……..…..……4

The crosspoint connections will also revert back to 1 to 1 connections. Input 1 connected to output 1, input 2 connected to output 2, etc.

Ethernet or Serial Port Download?

If the firmware is downloaded from the Ethernet port the controller will reboot itself after completing the download. If the download is done via serial port the power must be cycled manually after the download is complete. Both methods will upgrade the fimware they just use different ports and methods. If for some reason your firmware is corrupted or your Ethernet connection is not working, you can still upgrade the firmware through the serial port. The ethernet download is the faster and easier method.

Why Download Firmware?

New firmware is continually being developed to enhance the system features, make the system easier to use or simply add a new feature that a customer requested. These firmware upgrades when available are not ususally nesseccary but may enable you to have more features previously not implemented on your firmware version.

If you feel you might need to upgrade your firmware, contact Quintech for the latest available firmware version for your system.

Why Is Downloading Failing?

Some Quintech customers have encountered problems while downloading new firmware. Listed here are some of the most common solutions to problems associated with a firmware download.

Serial Port Download Method Solutions

1. Use a one to one straight through serial port cable. **Do not use a null modem cable or adapter.**

Test the cable with an Ohmmeter to make sure each pin is connected to the same pin on both ends. Pin 1 connected to only pin 1, pin 2 connected to only pin 2, ect. Test all nine pins. **If there are pins that are not connected, the download will not work.**

3. Before starting the download, the controller has to be in firmware download mode.

4. If using RS-232, check that you are connected to the Control In or PC Control port

5. Copy the unzipped upgrade kit and run the applications from your root C or D drive. A directory path with more than 104 characters causes problems with some PC operating systems.

6. Make sure the COM port number in the rabbit field utility matches the com port number you are connected to on your PC.

7. Try bumping down the baud rate to 57600 in the RFU utility.

8. Make sure the RFU utility is pointing to the correct files:

Cold Loader	=	coldload.bin
Pilot BIOS	=	pilot.bin
Flash table	=	flash.ini

9. Make sure the serial port mode is configured in RS-232 mode.

Ethernet Download Method Solutions

1. If for some reason the firmware and/or Ethernet connection is no longer working you must download through the serial port.

2. The controller does not have to be in firmware download mode to upgrade the firmware via the Ethernet port.

3. If connecting directly to a PC network card, use a cross over CAT5 Ethernet cable.

4. If you are connecting to a hub or switch, use a 1 to 1 straight through CAT5 Ethernet cable.

5. Check the cable for pinched or broken conductors. This is more common than you think. The pin outs for both cable types are in Table 3. Ethernet Cable Pinout.

6. Check the IP address, gateway and subnet mask of your PC.

An easy solution is to turn on DHCP and power cycle the controller. This will allow your Ethernet DHCP server to assign the three addresses to the controller.

These 3 addresses consist of 4 sets of numbers. These individual numbers range from 0 to 255. They are addresses that allow the PC to find the controller on the network. If the mask or gateway for the PC doesn't match the controller mask and gateway you may be able to see the controller on the network but a firmware download will not work. Make sure the first three sets of numbers match the gateway.

Make sure the IP address of the unit has the first three sets of numbers as the gateway and IP of the PC.

To find the IP gateway and mask numbers:

Windows 95/98:
Open a dos window
Type winipcfg
A window will be displayed that shows your PC’s configuration.

Windows NT/Me/2000/XP
Select Start > Run. Type command into the dialog box, then click OK.
In the resulting command line window, type ipconfig /all.

The IP address, Subnet mask, and default gateway will be listed.

6. Copy the unzipped upgrade kit to your root C or D drive. A directory path with more than 104 characters causes problems with some PC operating systems.

Features Menu

Option 3 in the Configuration Menu displays the Features Menu. The Features Menu enables you to configure optional mode of operation for a controller module. These options include the Controller Mode, LNB Power (if equipped), SNMP Protocol enabled, and whether access control is in effect or disabled for various control ports.

To navigate to the **Features Menu** screen from the main menu: key sequence 2, 1, (factory settings code number + F1), 3

2. System Options
    1. Configuration (factory settings code number + F1)
        3. Features

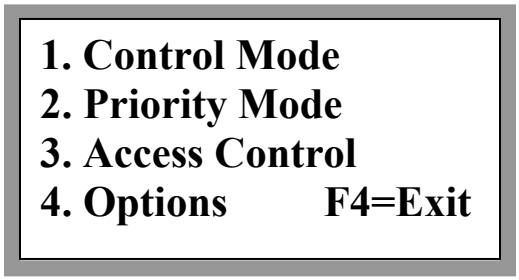


Figure 74. Features Menu

Note: The Access Control option only appears in the Features Menu when you are logged into the controller as Admin and access control for local is enabled. For a description of Access Control see the "Access Control" section.

Set Control Mode

Option 1 of the **Features Menu** displays the **Set Control Mode** screen. This setting need may only need to be changed if you upgrade to more than one controller in the system. For a detailed description of main and remote modes, refer to “Main vs. Remote Mode”.

To invoke the **Set Control Mode** screen from the main menu: key sequence 2, 1, (factory settings code number + F1) 3, 1

2. System Options
    1. Configuration (factory settings code number + F1)
        3. Features
            1. Control Mode

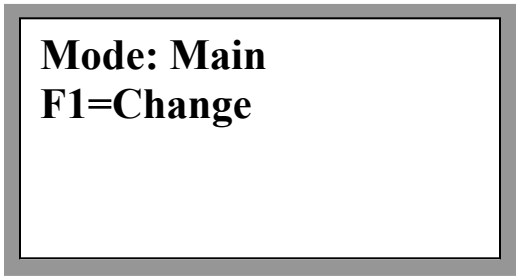


Figure 75. Control Mode Setup

F1 toggles the mode between main to remote. Set it to the proper mode and exit with F4. **If you have only one controller with an LCD and keypad, this setting has to be set to main. Remote mode is for an additional 1RU UCM controller.**

Set Priority Mode

Option 3 in the Features Menu invokes the Options Menu. From this menu, you can select to enable/disable Priority Mode. For a detailed description of Priority Mode, refer to “Priority Mode”.

To navigate to the **Priority Mode** screen from the main menu: key sequence 2, 1, (factory settings code number + F1) 3, 3

2. System Options
    1. Configuration (factory settings code number + F1)
        3. Features
            2. Priority Mode

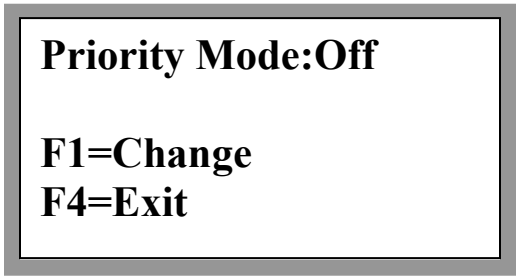


Figure 76. Priority Mode Screen

Pressing F1 toggles Priority Mode on and off. Set it to the proper mode and then exit by pressing F4.

Port Access Control Enable/Disable

This option is discussed in detail in the “Access Control” section of this manual.

Option 3 of the **Features Menu** displays the **Access Control** screen. Through this screen, you can designate whether the access control system is on or off (i.e., in effect or disabled) for various control ports.

Note: The Access Control option only appears in the Features Menu when you are logged in as the administrator. This is true regardless of whether access control has been enabled for local control.

Options Menu

Option 2 in the Features Menu invokes the Options Menu screen. From this menu, you can select to enable/disable the SNMP protocol.

To navigate to the **Options Menu** from the main menu: key sequence 2, 1, (factory settings code number + F1) 3, 4

2. System Options
    1. Configuration (factory settings code number + F1)
        3. Features
            4. Options

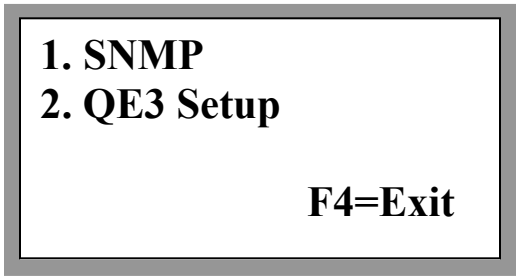


Figure 77. Options Menu

SNMP Menu

Option 2 in the Options Menu invokes the SNMP Menu. From this menu, you can enable/disable the SNMP protocol and set the TRAP IP address. For details on SNMP, refer to “SNMP”.

To invoke the **SNMP Menu** from the main menu: key sequence 2, 1, (factory settings code number + F1) 3, 2, 2

2. System Options
    1. Configuration (factory settings code number + F1)
        3. Features
            4. Options
                1. SNMP

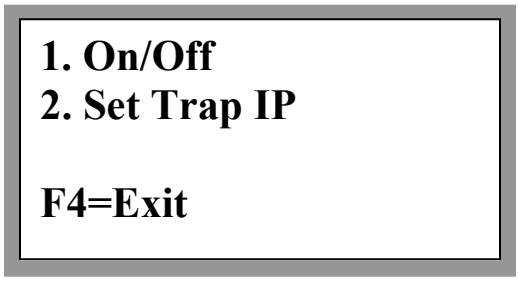


Figure 78. SNMP Menu

SNMP On/Off

Option 1 in the **SNMP Menu** displays the **SNMP On/Off** screen.

To invoke the **SNMP On/Off** screen from the main menu: key sequence 2, 1, (factory settings code number + F1) 3, 2, 2, 1

2. System Options
    1. Configuration (factory settings code number + F1)
        3. Features
            4. Options
                1. SNMP
                    1. On/Off

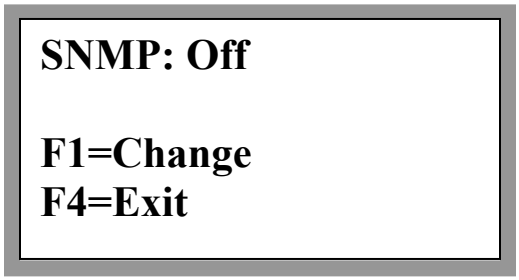


Figure 79. SNMP On/Off

Press F1 to toggle SNMP protocol on and off. F4 exits to the previous menu. For details on SNMP refer to “SNMP”.

Set SNMP Trap IP

Option 2 in the **SNMP Menu** invokes the **Set SNMP Trap IP** screen (refer to "SNMP").

To navigate to the **SNMP Trap IP** screen from the main menu: key sequence 2, (factory settings code number + F1) 3, 2, 2, 2.

2. System Options
    1. Configuration (factory settings code number + F1)
        3. Features
            4. Options
                1. SNMP
                    2. Set Trap IP

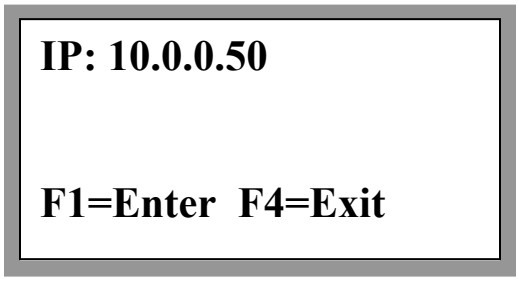


Figure 80. Set SNMP Trap IP

Some versions of the QE3 firmware can send additional traps to up to 4 different IP addresses.

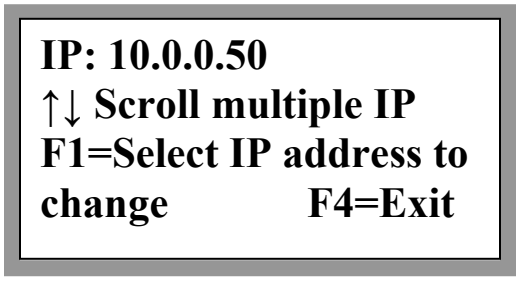


Figure 81. Select IP Address

Scroll through the available 4 IP addresses and press F1 to select one. Eneter the new IP address and press1 to add the new IP address to the trap address list.

QE3 Setup

This screen may have a fourth option to set up can bus error reporting. The can bus is the main link between all the hardware and the main controller. If the hardware experiences a problem it will be reported across the can bus. These are the errors that are always placed in the message queue. Now you have the option of displaying these errors on the front panel as well.

All can bus errors are placed into the message queue and also sent out in SNMP traps Refer to the protocol document.

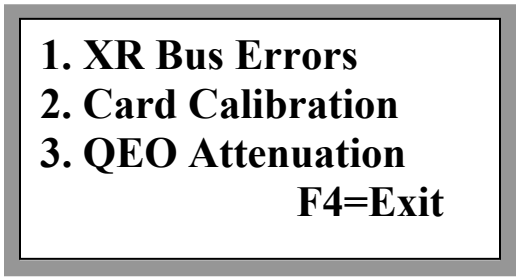


Figure 82. QE3 Setup

Error currently reported to the front panel are: card offline, power supply offline, temperature warning, fan failed, and output/input dB difference. The panel will display which type of box had the failure. What the address of the failure is, what type of card failed, and what card number failed.

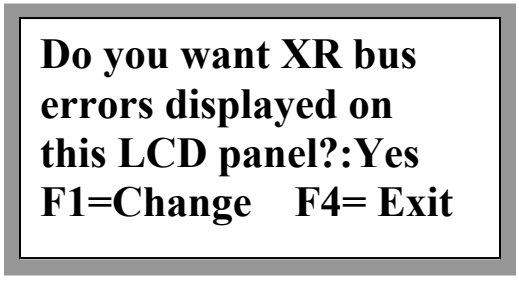


Figure 83. Enable Errors

Select yes and the can bus alarms will be displayed on the front panel. The error message will remain displayed until a user presses any key on the keyboard.

Card calibration is for setting up initial hardware at Quintech. Users are advised not to enter this menu.

QEO Input Attenuation

QEO's currently support input attenuation. QEO Input attenuation is a set value of attenuation that is to be applied to the current QEO input. QEO inputs are attenuated per box (i.e., all inputs in that QEO receive the same attenuation value) and can be attenuated from 0.0 dB to 15.5 dB. It does not change regardless of the input signal strength.

Option 3 in the QEC Setup menu invokes the QEO Attenuation screen. To invoke the QEO Attenuation screen from the main menu: key sequence 2, 1, (factory settings code number + F1), 3, 4, 4, 3.

2. System Options
    1. Configuration (factory settings code number + F1)
        3. Features
            4. Options
                4. QE3 Setup
                    3. QEO Attenuation

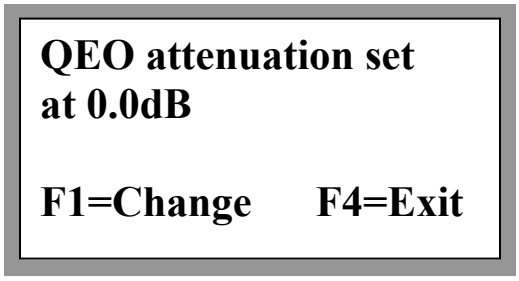


Figure 84. QEO Attenuation

By default, the QEO Attenuation screen displays the current QEO attenuation setting. To change the current attenuation setting, press F1. Arrow up or down to select the new value of input attenuation. Nothing is set until you press F1.

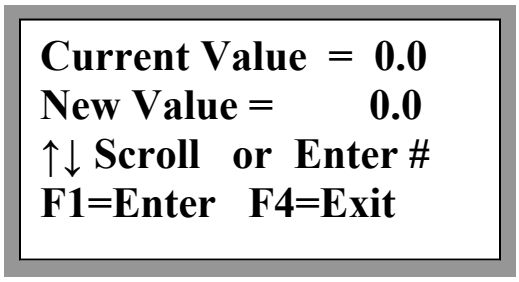


Figure 85. Set QEO Input Attenuation

Q-SENSE

Q-SENSE Description

QE3 Q-SENSE is a redundant input feature. Q-SENSE can be set up so that in the event of a RF level failure on a primary input, the system will automatically switch to the backup input.

Q-SENSE Priority

The Q-SENSE function has priority over all other access control and system settings. This includes input access control, output access control, locked output, priority locked outputs, and protected outputs. The function will execute and change crosspoints regardless of the status of the input or outputs.

Q-SENSE RF Threshold Level

The RF failure threshold level is a user settable value. If the RF level on the primary input drops below this set threshold, the Q-SENSE backup input is switched to all outputs currently connected to the primary input.

This RF level threshold point can be set individually for every system input. This RF level only is applicable to a primary input for a Q-SENSE input pair. The backup input level threshold point can be set up but it will not be used. If the backup input is later re-configured as a primary input, the set RF level will then apply.

Q-SENSE Setup

The Q-SENSE function can be set up from the front panel or protocol commands. Q-SENSE inputs can use any system input numbers except input zero. Additional Q-SENSE input pairs can be continually added until there are no more inputs being used as a backup or primary already. Since there is only two inputs per Q-SENSE pair, then the maximum number of Q-SENSE pairs for a system is the number of system inputs divided by 2. For example: A 64x64 QE3 can support up to 32 Q-SENSE input pairs.

A Q-SENSE primary or backup input is handled no different than any other input in system functions during normal operations. Regardless of the Q-SENSE setup, an input is handled the same as any other system input. It can be connected to any valid output if other QE3 features allow the connection.

Q-SENSE On/Off

The Q-SENSE feature can also be enabled or disabled individually per input. This on/off setting, like the set threshold point only applies to the primary input. The on/off setting for the backup input is not examined before a Q-SENSE action is taken. The action will only be executed if the primary input Q-SENSE switch is on.

Q-SENSE Action

The only action taken by the Q-SENSE feature is in the event that the primary input RF level drops below the user defined threshold level. If the primary input is Q-SENSE enabled and the RF threshold properly set, then the Q-SENSE function is executed by the system for that Q-SENSE input pair.

At that time all outputs that are currently connected to the primary input are switched automatically to the backup input. This action only applies to that particular Q-SENSE configured input pair. No Q-SENSE pair will be acted upon unless it’s primary input had a failure.

Marked Outputs

Any output that has been switched to a backup input by the Q-SENSE feature is internally saved to memory. This information will remain until the user restores the primary input by a restore command from the front panel or protocol command, or the user changes the status of the output. This saved Q-SENSE information is deleted if the output status is changed. This includes protect, unprotect, lock, unlock, and set from any port including the front panel.

Restore Function

Outputs that have been switched by the Q-SENSE function are marked and saved. These outputs can then be automatically restored to the original primary input. This can be done from the Q-SENSE restore command or the front panel restore screen. This restore command is accepted regardless of the RF level at either Q-SENSE input. It is left to the user to correct the problem that caused the RF loss before the Q-SENSE input is reastored.

Restore Function Limitations

The restore function can only restore an output if the last action on the output was the Q-SENSE function execution. If the output status is changed then the Q-SENSE information is deleted. Any output that has it's status changed can no longer be automatically switched by the restore function. Status change includes set, protect, unprotect, lock, and unlock.

Q-SENSE Front Panel Operation

Q-SENSE functions can be set up from the front panel or protocol commands. The Q-SENSE functions are under the system information menu

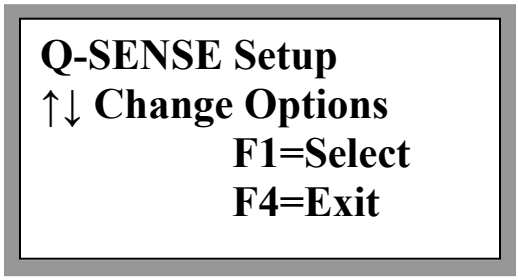


Figure 86. Q-SENSE Setup Screen

Press F1 to enter the Q-SENSE setup options. Once in the Q-SENSE menu you can scroll through the available Q-SENSE setup options.

On/Off

The Q-SENSE function can be enabled or disabled per system input.

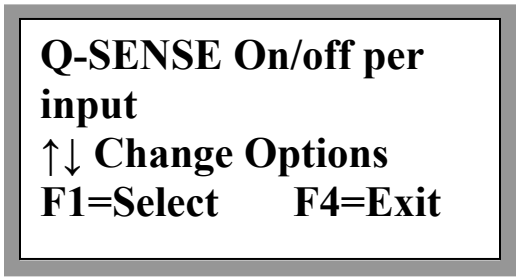


Figure 87. Q-SENSE on/off

Turning on or off the Q-SENSE function on an input will not exclusively enable the Q-SENSE function on that input. The input also has to be set up as a primary input and the threshold RF level has to be set in order for the Q-SENSE function to be enabled properly.

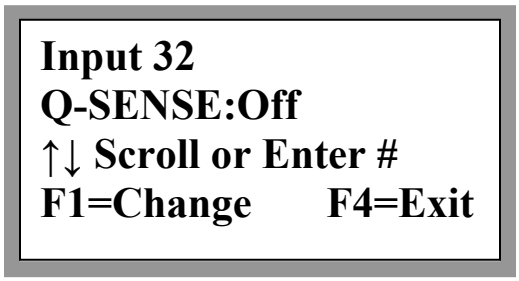


Figure 88. Q-SENSE on/off

Toggle up or down or enter the input number and the current Q-SENSE status is displayed. F1 toggles the function on or off for the input.

Q-SENSE Input Pair Setup

The input pair has to be selected. Q-SENSE requires a primary input and a backup input to be specified. Once the numbers are specified the 2 inputs cannot be used with any other Q-SENSE inputs. The Q-SENSE function can support multiple Q-SENSE pairs but the Q-SENSE pair always consists of only one primary and one backup input.

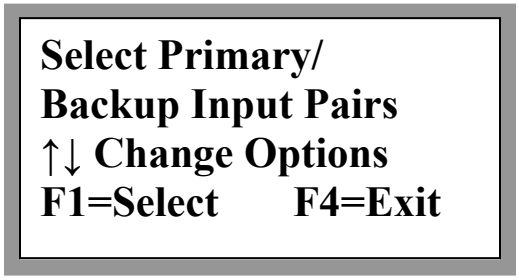


Figure 89. Primary/Backup Setup

Enter F1 to set up one or more Q-SENSE input pairs. If an input is unused by the Q-SENSE function the display will look like the following:

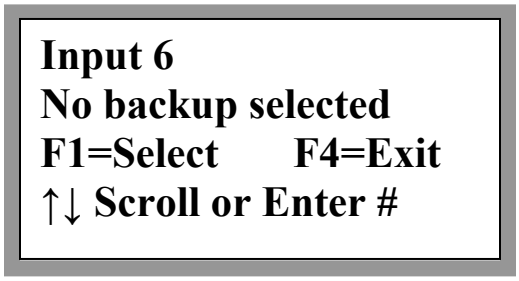


Figure 90. Select Primary Input

Press F1 will select the current input as primary.

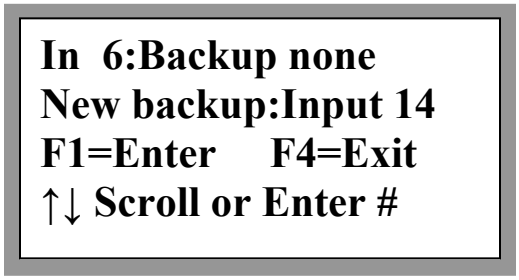


Figure 91. Select Backup Input

Now scroll or enter the input you want to select as backup. F1 will select the input as backup. This screen still displays that input 6 has not been assigned a backup input yet.

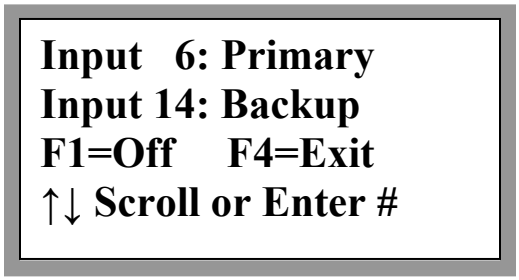


Figure 92. Q-SENSE Pair Displayed

The new screen displays the new primary and backup pair. At this screen F1 will now clear the status of both the primary and backup input and return the inputs to unused by Q-SENSE status.

Q-SENSE Threshold

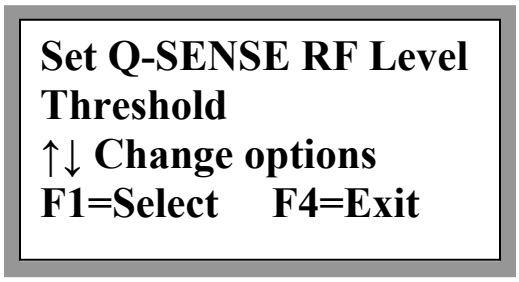


Figure 93. Threshold Select

F1 will enter the threshold setup function. If an input RF level is not already set the input will display “off”.

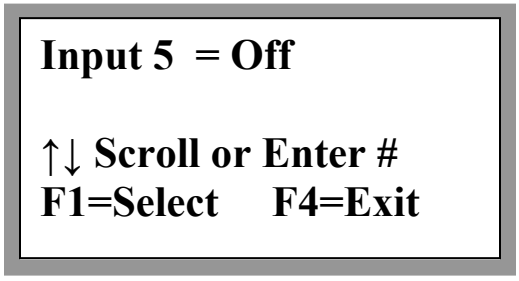


Figure 94. Threshold Display Off

Otherwise the current Threshold is displayed.

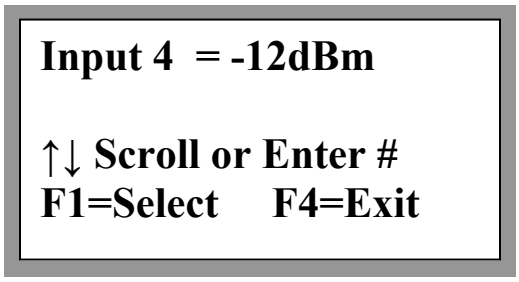


Figure 95. Threshold Display On

F1 selects the input then scroll up or down or enter the desired RF level. No value is entered until the F1 key is pressed. F4 exits the screen with no changes made. Valid numbers are between -10 and -50.

Q-SENSE Manual Restore

If an output has been changed by the Q-SENSE function to the backup input, the restore function may be able to restore the output to the primary input. If the output status has been altered after the Q-SENSE action, this restore command will not be available for that output.

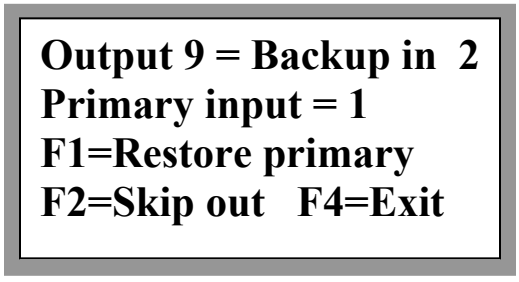


Figure 96. Restore Output

This screen shows an example that output 9 has been automatically switched to input 2. Output 9 was originally connected to primary input 1. Pressing F1 will connect output 9 to input 1. F2 will skip the output and look for more outputs that have been switched to the Q-SENSE backup input by the Q-SENSE function.

This function will continually look for outputs that can be restored. F4 will exit the menu or if there are no longer any output that can be found that information will be displayed. If there are no outputs that the restore command can change, the screen will indicate this status.

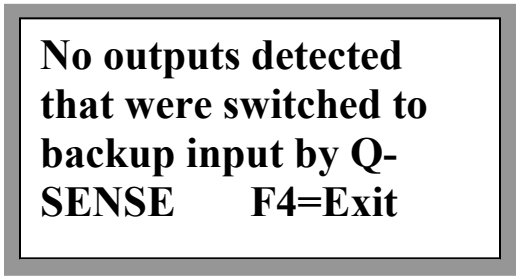


Figure 97. No Outputs Detected

Priority Mode

Priority On/Off

Priority mode can be turned on or off from the front panel.

To navigate to the Priority mode screen from the main menu: key sequence 2, 1, (factory settings code number + F1) 3, 3.

2. System Options
    1. Configuration (factory settings code number + F1)
        3. Features
            3. Priority Mode

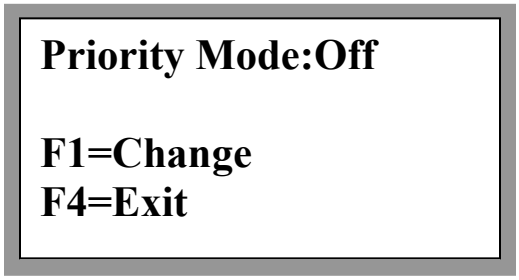


Figure 98. Priority Mode Screen

Priority Mode Description

Priority mode is associated with the lock and unlock output functions. When this mode is on, the user that locks an output is recorded. This information is referenced again when the output is commanded to unlock. If the current user has equal or higher priority than the user that locked the output, the user will be able to unlock the output.

It does not matter what port the user is logged into when the output is locked. Only the priority information is saved, not any port information.

Front Panel Priority Display

If an output has been locked by a user while the priority mode is on, the status of the output is indicated by the front panel. If the current user has equal or higher priority, the screen looks like an ordinary output that is locked.

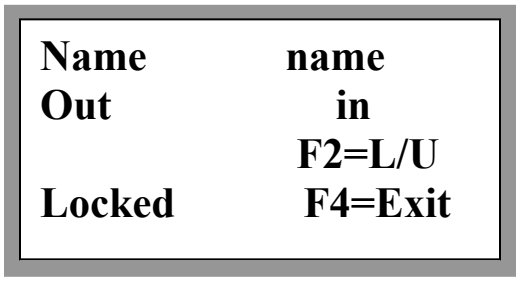


Figure 99. Locked with Priority

I f the user logged in has lower priority than the user that locked the output, the word “Priority” will be displayed and the user will not be able to change or unlock the output

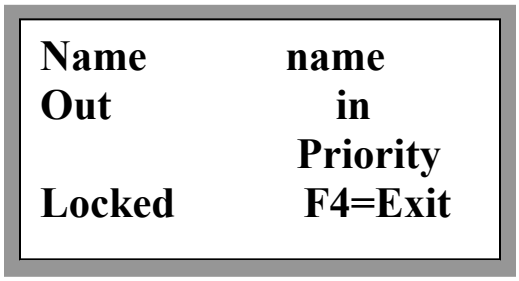


Figure 100. Locked without Priority

User’s Priority

There are 8 available users for the priority function. Each user has a different priority. These are set and not adjustable.

Default Names and Priority In Order

Admin	-	Highest priority
User2		
User3		
User4		
User5		
User6		
User7		
User8		
No user logged in	-	Lowest priority

Priority Mode On/Off Clear Memory

Priority mode can be set and read from the front panel or from a protocol command. Refer to the PM command. When this mode is turned on, every output that is locked is associated with the user who locked it. This information is stored until the output is successfully unlocked. At that point, the user information is cleared.

All output locked priority information is cleared after the system is power cycled, or whenever the priority mode is turned off.

Priority Example

Priority mode is turned on.
User5 is logs into the Telnet port.
User5 locks output 1
User6 logs into TCP port
User6 fails to unlock output 1

(User 6 can not unlock output 1 because user5 has higher priority than user6)

User3 logs into control in port
User 3 unlocks output1

(User3 can unlock the output because user3 is higher priority than user5)

Output Protection

Protected Outputs Description

Protection is another way to prevent an output from being changed by an unauthorized user. If an output is protected it cannot be changed until the protection status has been removed. The protected status is removed by making the output unprotected. This can be done from a protocol command or from the front panel. An unprotected output is just like all other regular outputs. Protection feature is port specific. An output can only be un-protected from the same port it was protected from.

Protected vs. Locked

A protected output cannot be locked. A locked output cannot be protected. An output cannot be locked and protected at the same time. A locked output cannot be changed until it is unlocked. A protected output cannot be changed until it is un-protected

Commands

An output can only be protected or unprotected from a protocol command or from the front panel. Refer to the SP, SU, and SC commands in the protocol document. An output can also be protected from the input select screen, as shown below.

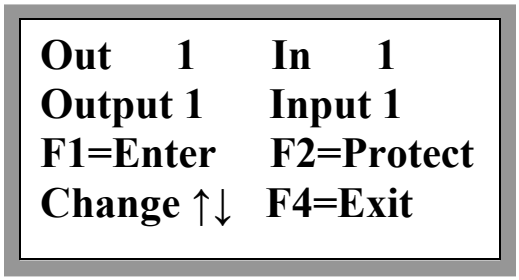


Figure 101. M&C

Ports Specific

The protected mode is port specific. A command to protect an output must be cleared by un-protecting it from the same port.

0 Local keypad/LCD	3 Ethernet Port A	5 Telnet
1 Remote Port B	4 Ethernet Port B	6 SNMP
2 Control In Port C		

Address Specific

The protected mode is also serial address specific. This normally only applies to users that are using additional 1RU remote controllers in their system. If a user protects an output from a remote 1RU controller front panel, that output can only be unprotected from that same 1RU controller front panel. Same applies to the other 1RU ports as well.

Front Panel Protected Output Display

An output if protected will display protected on the front panel

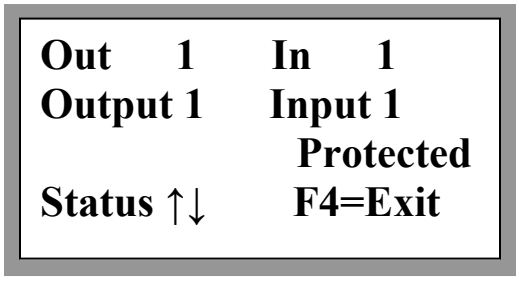


Figure 102. Front Panel Protected Output Display

Unprotect Output

An output can also be un-protected from the front panel. In this instance, the F3=Un-P option will be available on the **Monitor and Control** screen, as shown below. If the F3 option is not present then the output was protected from some other port or unit address.

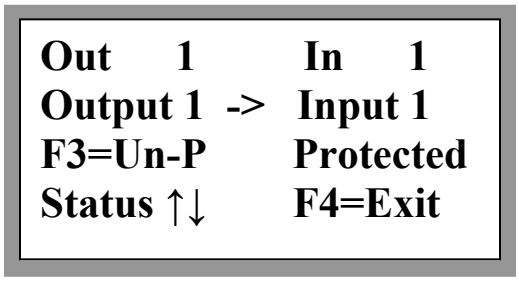


Figure 103. Protected

Naming Inputs and Outputs

I/O Names Options Menu

The I/O Names option is found under the configuration setup. Option 4 of the **System Setup Menu** displays the **I/O Names Menu** screen.

To navigate to the **I/O Names Menu** screen from the main menu: key sequence 2, 1, (factory settings code number + F1) 1, 4.

2. System Options
    1. Configuration (factory settings code number + F1)
        1. System Setup
            4. I/O Names

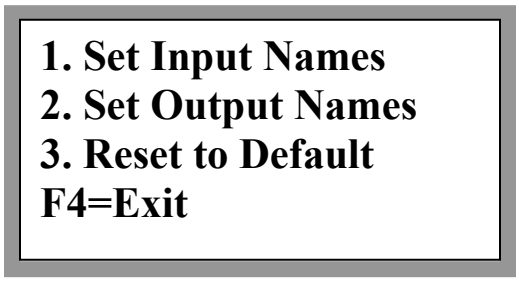


Figure 104. I/O Names Menu

Set Input Names

Option 1 of the **I/O Names Menu** displays the **Set Input Names** screen.

To invoke the **Select Input Names** screen from the main menu: key sequence 2, 1, (factory settings code number + F1) 1, 4, 1.

2. System Options
    1. Configuration (factory settings code number + F1)
        1. System Setup
            4. I/O Names
                1. Set Input Names

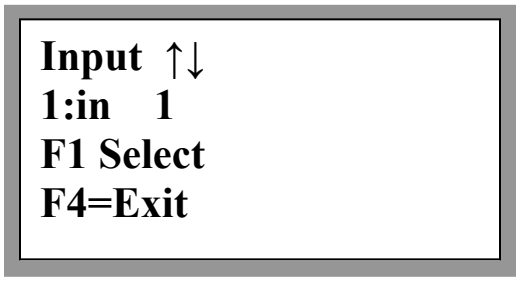


Figure 105. Select Input to Assign Name

Scroll through the inputs and when the desired input to be named is on the screen press F1 to select it. This brings up a screen to write a name and assign it to the selected input. The cursor moves to the bottom left at the first character in the current input's name.

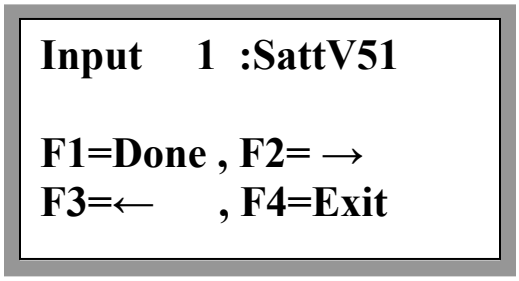


Figure 106. Write Name for Selected Input

Use the scroll keys to select a letter or number. Scrolling will bring up lower case letters, upper case letters, the numbers 0-9 and the “space” character. Use F2 and F3 to move the cursor. The length is 7 characters and if less characters are desired, fill in the unwanted characters with the “space” character. When scrolling, it appears between the 9 and capital A. Press F1 to accept the new name or at any time press F4 to exit the screen. No name is assigned until the F1 key is pressed.

Set Output Names

Option 2 of the **I/O Names Menu** displays the **Set Output Names** screen.

To navigate to the **Select Output Names** screen from the main menu: key sequence 2, 1, (factory settings code number + F1) 1, 4, 1.

2. System Options
    1. Configuration (factory settings code number + F1)
        1. System Setup
            4. I/O Names
                2. Set Output Names

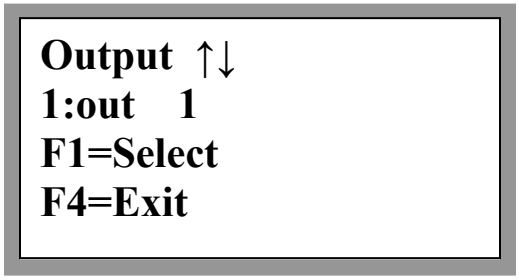


Figure 107. Select Output to Assign Name

Scroll through the outputs and when the desired output to be named is on the screen press F1 to select it. This brings up a screen to write a name and assign it to the selected output. The cursor moves to the bottom left at the first character in the current output’s name.

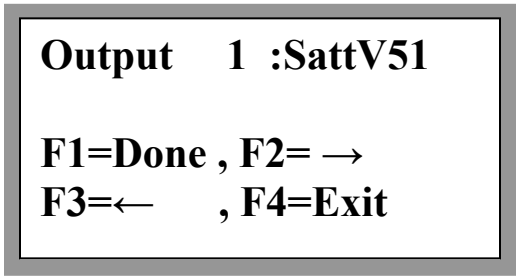


Figure 108. Write Name for Selected Output

Use the scroll keys to select a letter or number. Scrolling will bring up lower case letters, upper case letters, the numbers 0-9 and the “space” character. Use F2 and F3 to move the cursor. The length is 7 characters and if fewer characters are desired, fill in the unwanted characters with the “space” character. When scrolling, it appears between the 9 and capital A. Press F1 to accept the new name or at any time press F4 to exit the screen. No name is assigned until the F1 key is pressed.

Assigning Names Using Protocol Commands

Names can be assigned from the front panel. Names can also be assigned using naming read and write commands included in the protocol. Refer to the attached protocol document for further details.

Command Advantage

Assigning a name from the keypad is limited to the alphabet and numbers 0-9. Using the protocol command to read and write a name allows the user to assign all the available characters on a standard keyboard. These usable characters are in the ASCII range of 20Hex up to 126Hex.

Default Names

Option 3 in the I/O names menu will reset all names back to factory default. The default names for inputs and outputs is 7 characters containing the word “in” or “out”, then spaces, and then the number of the input or output. Default names are always 7 characters.

i.e.
input # 1 default name: “in 1”
input # 15 default name: “in 15”
input # 3 default name: “out 3”
input # 23 default name: “out 23”

Access Control

Quintech systems can limit a person's access to the system in several ways. Our mechanism is the factory code that is required to gain access to the configuration menu, the second is a lockable keypad, and the third is the enabling of access control and creation of user accounts to assign permissions.

Access control on a Quintech matrix allows a matrix system to be partitioned between multiple users or groups. It also prevents the accidental changing of a cross point by an unauthorized user. The access control features described in this section are available on Quintech matrix controllers that are executing protocol 2.15 releases 6 and later. This corresponds to all QE3 firmware releases.

The access control operation is based on the implementation of user accounts and privilege groups. A user must login with a valid username and password in order to gain access to the matrix system. In addition, each user account is assigned to a privilege group. The ability of a group to change an input-output connection is set for each individual output. These features implement access control on both the control port and at the level of an individual cross point.

Access Control Overview

Access control was created for customers who had problems with unauthorized changes being made to their switch settings. If this is not a problem, you can disable access control in any combination on all five ports. If access control is disabled on a communications port, anyone using that port has the ability to change any setting or cross point connection on the QE3 system.

If access control is enabled on a port, a user must login with an assigned name and assigned password. They will then be pre-assigned permissions. The user logs into an account that the Admin has previously set up. This account, in turn, assigns output permissions to the user.

Thus, if access control is enabled for a port, a user can only change an output if they have permission from the Admin to change that specified output. The ability of a user to change an input-output connection (cross point) is set for each individual output. These features implement access control on both the control port and at the level of an individual cross point.

System Access

A Quintech matrix is controlled through a standard control module. This is typically a separate 1U (1.75”) high module but it may be built in to a matrix switch module as well. The controller accepts control commands from external sources that tell it how to switch the matrix or configure various system options. A standard controller has five control ports that will accept commands:

Local: Front panel keypad and LCD.

Remote: The “Remote In” connector. This is typically where other controllers are connected when they are configured to operate as remote control panels. If remotes are not going to be used in the system, this port can typically be used as an auxiliary serial port. It is configured as an RS-485 port and accepts 9600-baud 8N1 (8 data bits, no parity, 1 stop bit) data. Command data is sent as an STX/ETX bounded packet with checksum as defined in the protocol document.

Control In: The “PC Control” connector. This is typically where a control computer or PC is connected. The port can be configured as an RS-232, RS-422, or RS-485 port and accepts 9600-baud 8N1 data. Command data is sent as an STX/ETX bounded packet with checksum as defined in the protocol document.

QEC Port: Ethernet. The exact Ethernet port is user defined with the default Ethernet port set at 9100. It accepts the same command packet that is used on the serial port. This makes it easy for a single driver to be used for both serial and Ethernet connections.

Telnet: Telnet console window. This provides an ASCII interface with a cursor for keyboard entry of commands.

The system is highly flexible and the access control feature can be configured to be on or off for each of the 5 possible control ports on an individual controller. This also holds true for a system with a main controller and multiple remote controllers. The control port access control must be set separately for the main unit and each of the remotes.

Port Access Control Enable/Disable

Option 3 in the Features Menu displays the **Port Access Control Enable/Disable** screen. Through this screen, you can designate whether the access control system is on or off (i.e., in effect or disabled) for various control ports.

Note: The Access Control option only appears in the Features Menu when you are logged in as the administrator and access control is on for the local (keypad/LCD) port.

To navigate to the **Port Access control Enable/Disable** screen from the main menu: key sequence 2, 1, (factory settings code number + F1), 3, 3

2. System Options
    1. Configuration (factory settings code number + F1)
        3. Features
            2. Access Control

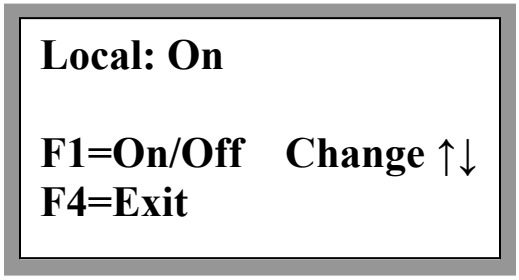


Figure 109. Port Access Control Enable/Disable

The ports for which access control can be enabled or disabled are as follows:

Local	-	Keypad
Remote	-	Remote Port
Ctrl-In	-	PC Control In
QEC PortA	-	Ethernet Port
QEC PortB	-	Ethernet Port
Telnet	-	Telnet Console

Use the up and down scroll arrows to display the port for which access control will be configured, then press the F1 key to toggle access control on or off for that port. Press F4 to return to the Features Menu.

Once access control is enabled for a port, it will only accept passive monitoring commands unless a valid user logs in to that port. These commands allow for passive monitoring of the matrix but do not allow changes to be made: C, F, KS, O, OS, and Q. Other protocol commands will return with a “command unavailable” (NAK u) response. See the protocol document for more information.

Access Control Menu

Option 3 in the Main Menu displays the Access Control Menu screen. From this menu, you can configure various types of access controls. Pressing 1 displays the Keypad Lock Screen that allows you to lock or unlock access to the front panel keypad. Pressing 2 displays the Login/Logout screen that controls access to certain capabilities, based upon the particular user access group to which a user belongs. A third option, “Setup”, will only appear when you are logged into the controller as “Admin”. It enables the administrator to define and configure the access capabilities for various users. Pressing F4 returns you to the Main Menu.

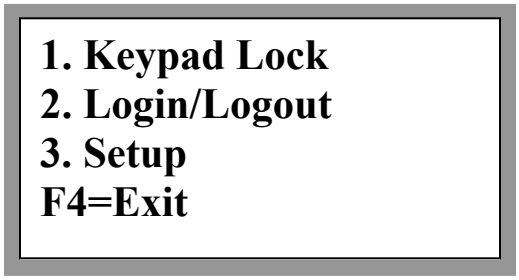


Figure 110. Access Control Menu

Keypad Access Control

The simplest method of access control is locking the keypad. This can be done to prevent someone from bumping into the UCM keypad and accidentally changing a setting. When the keypad is locked, only the exact key sequence of 857 will allow the user back into the system from the keypad. Note that the keypad lock does not disable port access in any way.

Keypad Lock

Option 1 in the Access control menu will load the lock keypad screen.

To navigate to the Lock keypad screen from the main menu: key sequence 3, 1

3. Access Control
    1. Keypad Lock

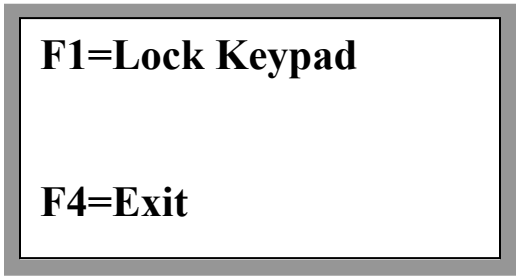


Figure 111. Lock Keypad

From the Keypad Lock Screen, press F1 to lock the keypad or press F4 to return to the Access control screen.

When enabled, the phrase “Keypad Locked” will be displayed on the screen to indicate that the lock is in effect.

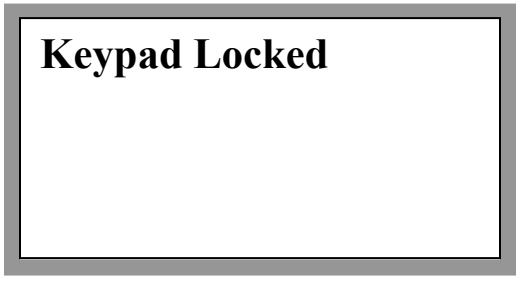


Figure 112. Keypad Locked

Unlock Keypad

To remove the keypad lock, press any key on the keypad. The Unlock Keypad Screen will be displayed.

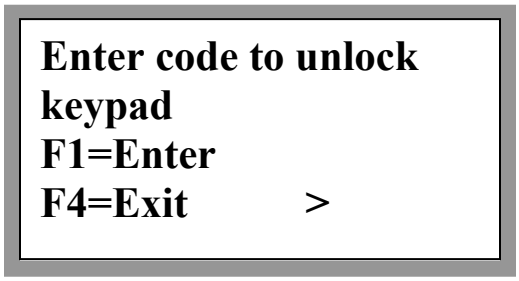


Figure 113. Unlock Keypad

Unlock Keypad Code

Enter the numeric sequence "857". After a few seconds, you will be returned to the Keypad Lock Screen. The numeric sequence equates to the letters "UKP" on a telephone keypad. This acronym stands for Unlock Key Pad. Entering an invalid code or pressing the F4 key will redisplay the Keypad Locked message.

Logging In and Logging Out

A user is automatically logged out when the controller module is reset, or if the Ethernet socket is closed or broken.

Once access control is enabled for a port, a user must log into that port before issuing any commands except those that are allowed with no login. For the computer interface ports PC Control In, Remote, and Ethernet, the ZI protocol command is used to login. For the Ethernet Telnet console window, any standard Telnet program may be used to bring up a text window with a login prompt.

Login /Logout

To invoke the **Login /Logout** screen from the main menu: key sequence 3, 2.

3. Access Control
    2. Login/Logout

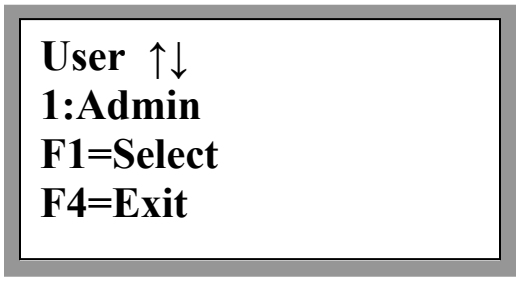


Figure 114. Login /Logout

In the Login /Logout Screen 1:Admin (or the current Admin username) should be displayed. The user ID (UID) is always displayed in front of the username since all usernames including Admin may be customized. Use the scroll keys to scroll through the available usernames. Once the desired username is shown push F1 to select the user to log in as.

Password Entry

Once you have selected the desired username, the screen will change to the **Password Entry** screen.

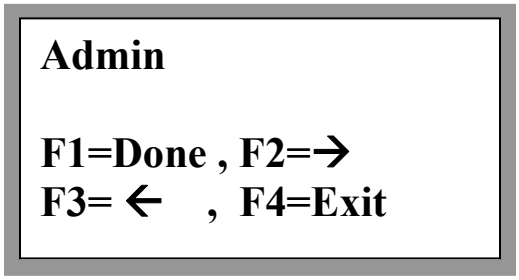


Figure 115. Password Entry

A password is built one character at a time. You can enter a number directly from the keypad or use the scroll keys to bring up an alphanumeric character. Once you have the correct character, push F2 to enter it and move forward to the next character position. After all characters in the password have been entered, push F1 to attempt the login. If the password is incorrect, the message “incorrect login” will be displayed and the password will be cleared to allow for another attempt.

Logout

Once the user is logged in, re-displaying the Login/Logout screen will display the current user and provide the option to logout. The **Logout** Screen will be displayed. To logout, press F1. Control will be returned to the Access Control screen.

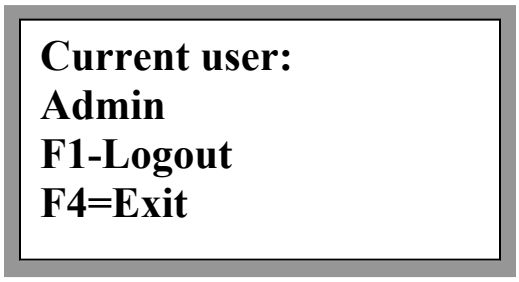


Figure 116. Logout

User Accounts

Option 3 Setup of the Access Control menu allows you to setup user accounts. User accounts consist of a fixed user ID, an assigned group ID, and a variable username and password.

User accounts can be managed remotely using the ZA, ZG, ZL, ZP, and ZU commands. See the protocol document for more information. They can also be managed from the front panel keypad.

Access Control Setup Menu

Note that you must be logged in as Admin and local access control has to be enabled to be able to access this menu.

In order to define a user's name, password, or permissions you need to access the **Setup** screen. From this screen, you can select to modify user names and passwords or set output permissions.

To navigate to the **Setup** screen from the main menu: key sequence 3, 2.

3. Access Control
    3. Setup

Figure 117. Access Control

From this screen, you can select to modify user names and passwords or set output permissions.

Defining User Names and Passwords

Usernames and passwords are defined using the Set User screen.

Set User

To define or modify a user name or their password, choose "**Set Users**" in the Setup Menu. The **User Selection** screen will be displayed.

To navigate to the **User Selection** screen from the main menu: key sequence 3, 3, 1.

3. Access Control
    3. Setup
        1. Set Users

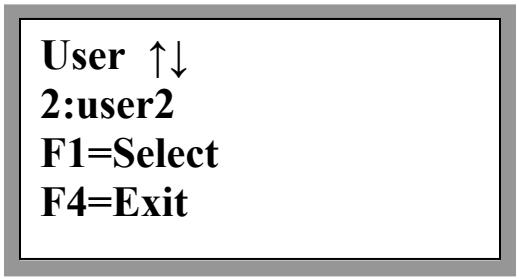


Figure 118. Select User

In the **User Selection** screen, the user's Group ID is shown followed by current username. You can use the scroll keys to scroll through the available users.

Use the up and down arrow keys to select the user whose name or password you wish to modify. As a default, the user names "Admin" and "user2" through "user8" have already been defined when using the access control feature for the first time.

Depending on the firmware release, the group for a particular UID may be fixed or there may be a menu where the group ID can be set.

Once the correct user is selected, press F1 to enter the **Select Name/Password** screen.

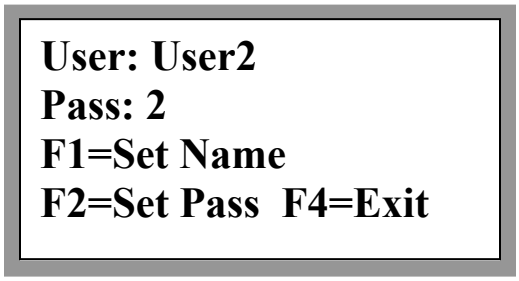


Figure 119. Select Name/Password

To change the user name, press F1. To change the password, press F2. This will display either the **Change User Name** or the **Change Password** screen. They are both identical except for the cursor location.

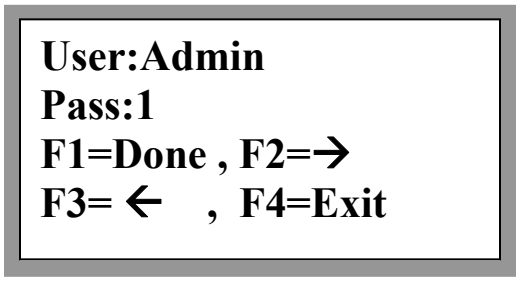


Figure 120. Change User Name/Password

Use the F2 and F3 keys to position the cursor at a particular character position, then use the up and down arrow keys to scroll through a list of alphanumeric characters. Repeat this process as often as necessary until the desired name or password has been entered. Then press F1 to save it and return to the Set Name/Password Screen. Pressing F4 will exit without making any changes.

Valid Passwords and Length

A user name can consist of up to 14 alphanumeric characters and must begin with a letter. A password can also consist of up to 14 alphanumeric characters and can begin with any alphanumeric character. Usernames are not allowed to start with a number. Once the user name and password has been specified, press F1 to enter the information, press F4 to return to the user selection screen where you can choose another user whose name or password you want to change. From the User Selection Screen, press F4 to return to the Setup Menu.

Defining Group Permissions

Permission for each output or input for each group is assigned through the Set Access menu option.

Set Access

The **Set Access** menu option in the setup directory is where Admin sets permissions for the groups.

To navigate to the **Set Access** screen from the main menu: key sequence 3, 3, 2.

3. Access Control
    3. Setup
        2. Set Access

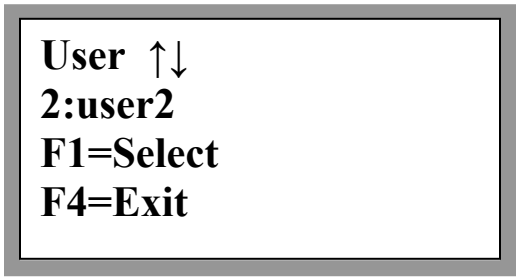


Figure 121. Select User

Setting User Access

If users have a fixed assignment to a group, the associated user name will also be displayed after the group number.

Use the up and down arrow keys to display the group whose access capabilities you wish to modify, then press F1 to select that group. The **Set Access** Screen will be displayed.

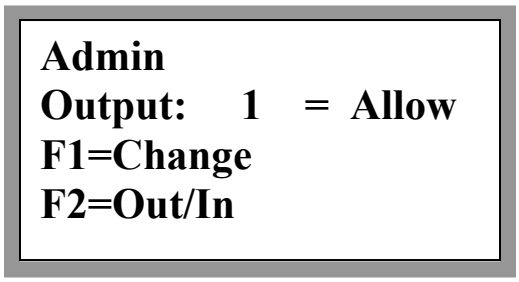


Figure 122. Set Output Access

The Set Access Screen allows you to grant or deny a particular group access to each of the output ports. Use the up and down scroll arrows to display a particular output port or control port, then press the F1 key to display “Allow” or “Deny” for that output. Repeat the process as often as necessary until the proper access has been set up for each group for each output.

After the proper access has configured, press F4 to return to the group selection screen whereby you can choose another group for whom you want to set access. From the Group Selection Screen, press F4 to return to the Setup Menu.

Crosspoint Control Access

The ability to change an individual cross point is controlled by the settings for a particular group. There are 8 privilege groups with an associated group ID (GID) from 1 to 8. Each valid user is assigned to a specific privilege group. By appropriately setting the control rights for the groups, a matrix can be partitioned into several sub-matrices with separate or overlapping domains.

The control privilege for a group is set one of two ways. The ZA command can be used by the Admin (UID 1) to allow or deny control of an output to a group. See the protocol document for more information. Output control can also be set from the keypad.

In the Set Access screen the group ID (GID) is shown and the scroll keys are used to scroll through the available groups. Once F1 is used to select the desired group, the screen switches to show an output along with the current access control setting, Allow or Deny. The current setting can be toggled by pushing F1.

Output Access Control

All QE3 firmware has output access control which can allow or deny a user access to any output.

Input Access Control

QE3 firmware has output and input access control. An F2 option will be at the top right of the screen.

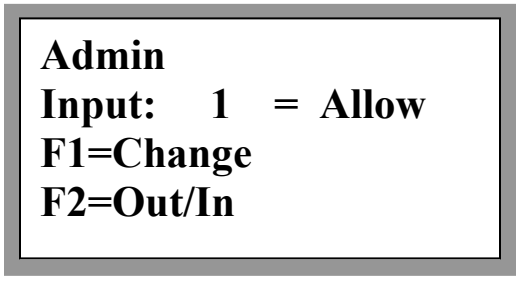


Figure 123. Set Input Access

Pressing F2 will toggle between output and input access control. If access control is turned on for a port the user must log in. The user must also be assigned “Allow” permission for an output in order to change the output. With input access control the user logged in must have “Allow” permission for an output and an input in order to make a cross point change.

EXAMPLE: If a user has “Allow” permission for all the outputs but “Deny” for all inputs, the user can not make any cross point changes. The user needs “Allow” permission for the output and the input before a cross point change can be made.

EXAMPLE: A user is given “Allow” permission to change all outputs and “Allow permission for input 1 and 2. The user can log in and change any output, but can only connect the outputs to input 1 or 2.

The access to control a particular output or input is set individually for each group. That allows flexible partitioning of access to the matrix outputs. For example, you could set the following group access:

Group 1: outputs 1, 2, 3, 4
Group 2: outputs 5, 6, 7, 8
Group 3: outputs 1, 2, 3, 4, 5, 6, 7, 8
Group 4: outputs 1, 3, 5, 7, 9, 11, 13, 15
Group 5: outputs 9, 10, 11, 12, 16
…and so on.

Determining Group Access

The current output access settings for a group can be found in two ways. The first is to login as Admin on the keypad and view the current setting in the Set Access screen. The second is to use the OS or IS command on one the control ports. The OS or IS command will show whether or not the cross point is locked, and the current group access settings for that port. See the protocol document for more information.

Defining User Groups

Each user can be assigned to 1 of 8 groups. These groups are set with input and output permissions through the Set Access menu option.

Set Access

The **Set Groups** menu option in the setup directory is where Admin sets permissions for the groups.

To navigate to the **Set Groups** screen from the main menu: key sequence 3, 3, 3.

3. Access Control
    3. Setup
        2. Set Groups

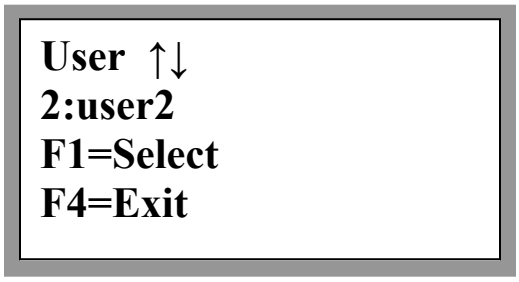


Figure 124. Select User

First select the user.

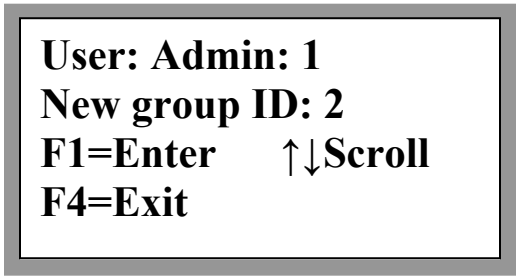


Figure 125. Select User

Once the user is selected you can scroll through the group IDs and press F1 to re-assign the user to a new Group ID.

Firmware Specifics

Command ZG is implemented on firmware versions 9.12 and higher. The number of users is currently limited to 8, with user Group IDs from 1 to 8. A user's Group ID can be changed using the ZG command or the front panel. Refer to the protocol document for more information.

In the Set Access Screen, an associated username is shown after the GID since users are assigned to groups based on their user ID (UID). Future firmware releases may or may not show this depending on whether multiple users can be assigned to the same group. The default settings are listed in Table 4.

Factory Defaults for Access Control

UID	Username	Password	Group	Output Control
1	Admin	1	1	All
2	User2	2	2	None
3	User3	3	3	None
4	User4	4	4	None
5	User5	5	5	None
6	User6	6	6	None
7	User7	7	7	None
8	User8	8	8	None

Table 4. Access Control Defaults

Admin Account

The Admin is the main controller of the system. He is the one who hands out and sets up all other users' permissions.

Admin Default Username

The default password for the Admin is "Admin". The Admin can change this user name to any valid password after first logging in as the Admin.

Admin Default Login Password

The default password for the Admin is "1". The Admin can change this password to any valid password after first logging in as the Admin.

Admin User Name and Password Warning

Current versions of the software have no reset for the Admin username or password. If the Admin name or password is programmed and then forgotten, there are only two solutions. Reload the firmware or reset the internal board to factory defaults. These solutions require either qualified Quintech technical service personnel or Quintech technical support assistance.

MATRIX CONTROL SOFTWARE

This tutorial describes Quintech's Matrix Control Program. The Matrix Control Software makes it easy for you to configure and manage multiple QE3 systems. It does this through the use of system configurations which store multiple settings and options. Using the software, multiple configurations can be created and saved for the same QE3 or different QE3s. The Matrix Control Program is available free of charge and can be found on the Quintech website.

Setting up the Communication Parameters

Open the program and click the setup button. This will open the Communication Settings window.

Ethernet vs. Serial Communications

The initial task in setting up the communications parameters involves specifying whether Ethernet or serial communications will be used. If you choose Ethernet, you will be prompted to set the Ethernet address and port. The default port is 9100. It should not need changed unless port 9100 is not allowed on your network. If a new port will be specified, make sure that it matches the port setting of the matrix controller. The default port value of the matrix controller is also 9100.

If you choose Serial, you will be prompted to set the serial control address and local COM port. The local COM port is whatever serial port on your PC you are using to connect to the matrix. Be sure that the specified serial address matches the serial address setting of the matrix controller. The default is 00.

Monitoring

The Matrix Control Program can be set up to monitor the QE3 for any changes made at any other port including the matrix front panel. The Monitoring On/Off checkbox controls whether monitoring is used or not. Checking the checkbox enables monitoring. Clearing the checkbox disables it. By default, monitoring is enabled. Located below the monitoring checkbox are fields where you can set a monitoring interval. The monitoring interval is the frequency at which the control program polls the matrix to determine if changes have been made. The default interval is 15 seconds, but you may wish to increase this in order to minimize traffic across your network.

The minimum interval that can be specified is 5 seconds, but this interval should not be used in most cases unless a dedicated serial connection is being used to control the matrix, and it is a small matrix.

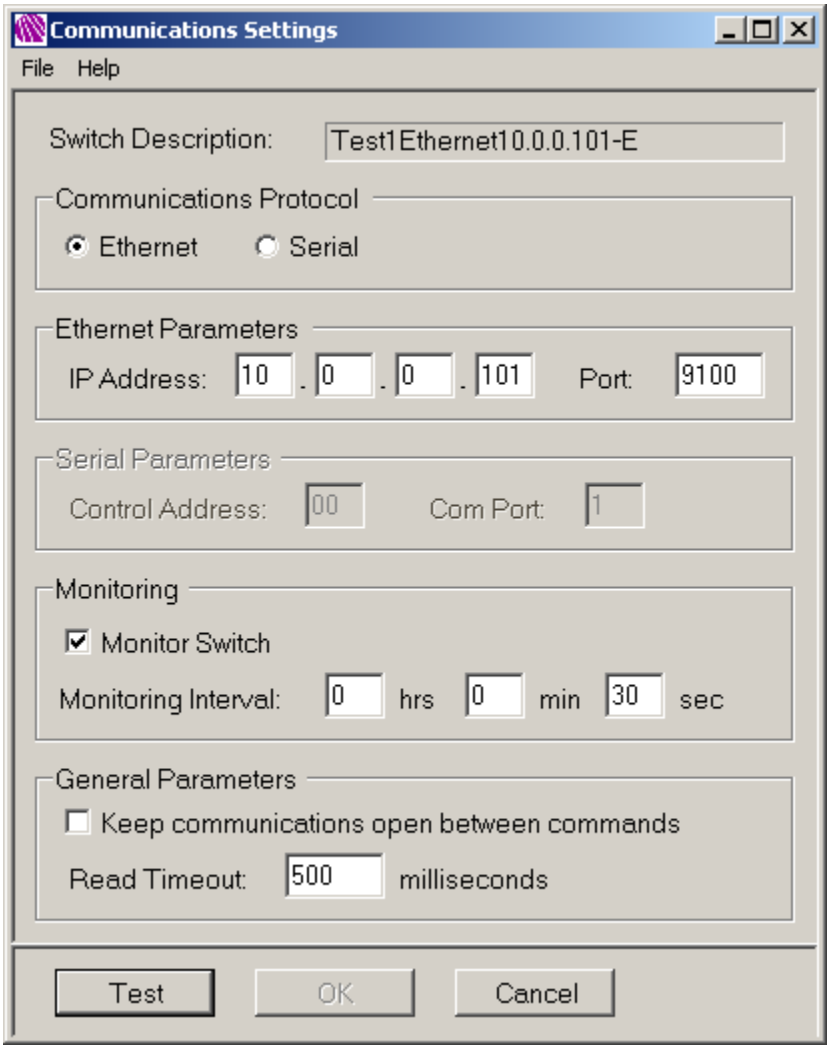


Figure 126. Communication Setting Window

General Parameters

Two general parameters can be set for the Matrix Control Program. The first identifies whether the Ethernet connection should stay open between the transmissions of control commands to the matrix. If this feature is disabled, the control program will open and close the Ethernet port for each command. This may add substantial overhead if you are monitoring the switch. The second general parameter that can be set is the Read Timeout. The Read Timeout parameter identifies how long the control program will wait for a response after sending a command. If you are controlling the switch over the Internet or on a heavily utilized network, you may need to increase this time to ensure that the matrix response is correctly received.

Testing the Communications

Once all of the communication parameters are set, click the Test button at the bottom of the Communication Settings window. The program will attempt to communicate with the matrix using the parameters as set. If it is successful, you will receive a pop-up window displaying some of the matrix settings. Click OK to close the pop-up window and then click OK on the Communication Settings window to start normal operation.

Creating and Managing Configurations

Configurations are for **multiple systems**. **Configurations only save communications parameters.** They are not intended to change crosspoints. To write one or more crosspoints at a time, refer to scripts.

Once the communications parameters are set up and a connection is made to the switch, the user can save those communications settings in a configuration file. Multiple configurations can be used to connect to several different systems without having to reset all communications parameters every time the user connects to a different switch.

Open the Create Configuration window by choosing “New Configuration” under the File menu. Enter the name that will be used to describe your system and click the CREATE button. The Create Configuration window will automatically close after your configuration has been created. You can save your configuration at any time. You can also load, delete, and copy your configuration using the other options in the File menu.

Controlling the QE3

After successful communications has been established, you are ready to control the QE3 using the point and click interface.

Changing a Crosspoint

To change a crosspoint, click on the output name displayed in the main window. The Change Crosspoint window will be displayed. In this window, all available inputs are displayed. Choose an input by clicking on it. The chosen input will be displayed in the Pending Input box. Your pending change will be shown in the main window in the Pending Inputs and/or Pending Status column. You can set up multiple pending changes at the same time before committing the changes. Click “apply” to change the impending inputs to make the crosspoint change(s).

Cancel Crosspoint Changes

At any time before the apply button is clicked, the user can hit the CLEAR button to clear the impending inputs and start over.

Change Impending Inputs

You can change an impending input by clicking the output and selecting a different input. You can cancel one output’s pending input without changing or canceling any other pending inputs. Select the output and then select the input that it is currently connected to it. This will erase the pending input.

Locking Cross points

If necessary, an output can be locked. Locked outputs cannot be changed until they are unlocked. To lock an output, click on the output to open the Change Crosspoint window. Click on the unchanged button and it will switch to locked pending status. Click on the OK button to accept the change. The pending lock column will show “lock”. You can still cancel the action by clicking the CANCEL button. To lock the output, click the APPLY button. The small square icon next to the output will show a small padlock to indicate the locked status..

Unlocking Cross points

A locked cross point cannot be changed until it has been unlocked. Click on the locked output to display the Change Crosspoint window and make the desired change. Click the enter button to execute the Unlock command and unlock the crosspoints.

Locking and Unlocking the Keypad

On the main window is a screen for locking and unlocking the QE3 front panel keypad. The primary purpose of this lock is to prevent unintentional changes. If desired, you can override the keypad lock from the matrix keypad by entering the 3-digit code “857”. If the front panel is unlocked and monitoring is enabled, the status of the keypad lock will be updated within the specified monitoring interval.

Controlling Monitoring

Monitoring the current status of the QE3 can be enabled or disabled using the START/STOP button on the main window. When monitoring is enabled, the data transfer activity box in the lower left corner of the main window will flash green each time the QE3 is polled for information.

Online/Offline

The Online/Offline button is useful when you want to change your communication settings without closing the program. While communicating with the QE3, the Online/Offline button will display “Go Offline”. Clicking the button will stop communications with the MRF and close any Ethernet connections. While offline, the button will display “Go Online”. Clicking the button will re-establish communications with the QE3.

Options

Various global and configuration options can be specified via the Options menu which is under the Tools menu. The Options window can be displayed by choosing “Options” in the Tools menu. Configuration options are stored in saved configurations. Global options are not.

Load last configuration on startup

This option automatically loads the last configuration that was used when the program is restarted. Default: On.

Debug mode

Setting this option forces the program to wait the entire specified Read Timeout period before issuing another command. This option should normally be off and is only useful when trying to debug a faulty connection.

Display raw command data in log

Setting this option displays the command(s) sent to the QE3 in hexadecimal format. This feature is useful when trying to debug a faulty connection and should normally be disabled.

Display raw response data in log

Setting this option displays the response(s) sent by the matrix in hexadecimal format. This feature is useful when trying to debug a faulty connection and should normally be disabled.

Log size

This option specifies the maximum number of lines that can be held in the command/response log file. The logfile is stored in memory, so you must limit the log size to prevent it from using up all available memory. If you have problems with your PC running out of memory, set this option to a lower number. Default: 1000 lines.

Default to only show errors in the log

When this option is set, the command/response log will only show errors by default. All commands/responses will be logged, but only the errors will be shown.

Save only errors in the log

When this option is set, only command/response errors will be saved in the log.

Use matrix controller names

When this option is set, the program will read the input and output names from the matrix during boot up. The QE3 stores its input and output names in memory. These names can be read back by the program and are also displayed on the front panel Monitor and Control screen.

When this option is unchecked, the program will load up the last names used in the program.

Login/Logout

If access control is turned on for the port defined in the communications setup, the output and input names will appear in red.

The user will have to log in with a username and password that will have permissions in order to change or lock an output. Once logged in, the outputs with permission will appear in black.

For detailed access control information, refer to the Access Control section.

Matrix Customization

Customizing Input and Output Names

If desired, you can specify your own matrix input and output names. You can enter these names and write these names to the matrix or read the names from the QE3. These names are displayed in the Monitor and Control screen on the front panel, as well as the program screen in the outputs and current inputs columns. OK confirms new names and clear will clear any new names not yet written to the QE3. Click CANCEL to exit without assigning any pending new names. Clicking OK will close the window only if there are no pending names to be written.

Write Names

Enter new names and click “write” to download new names to the QE3.

Read Names

Click read to read previously assigned names from the QE3.

Manage Users

Only available if logged in as Admin:1. This allows you to change usernames and passwords. OK confirms and writes any changes to the QE3, then closes the window. CANCEL closes the window and cancels any pending changes. RESET cancels all changes and sets names and passwords back to what the program read in when the window was open. REFRESH re-rereads usernames and passwords from the QE3. APPLY writes all pending names and passwords to the switch and keeps the window open.

Manage Groups

Only available if logged in as Admin:1. This allows changes to users' allow or deny permissions for all outputs. Group 1 is the Admin, Group 2 is user2, etc. A checkmark indicates that the user has permission to change that output. Output permissions can also be changed from protocol commands or the front panel. All three require Admin privileges.

Input Permission

QE3 firmware provides both input and output access control. Output access control can be set up in the group administration window. Input access control can be set up from protocol commands and the front panel.

Scripts

The run script option allows multiple protocol commands to be sent to the QE3. Scripts can define anything from multiple crosspoint setups input and output naming schemes. Any QE3-compatible commands in the QE3 protocol document can be used in a script file.

Writing Data to the QE3

Only success or failure feedback is provided when scripts are executed. An acknowledgement will confirm whether any value written to the QE3 was successful. A script can write anything that a protocol command can write including crosspoints, names, attenuation data, warning levels, etc.

Reading Data from the QE3

A command that asks for data to be returned from the QE3 may be successful, but the control program provides no way for the script data (e.g. fan speed, temperature, etc.) to be returned from the QE3.

Script Naming Extension

Scripts can be named as desired. The file extension for a script file is ".scr", which happens to be the same extension that Windows uses to define screen saver files. Thus, double clicking on a script file name that has the .scr suffix will likely cause an error because Windows will think that it is a screen saver file.

Editing Scripts

The easiest way to write and edit scripts is to rename the file suffix to ".txt". Once the ffile suffix has been renamed, open it with a text editor, make the desired modifications, and then resave the file using the ".scr" suffix.

Command Structure

A script does not require the STX/ETX, address, or CHK bytes.

Scripts Examples

Scripts should be created using a simple text editor such as windows notepad. MS-Word and other programs will save additional formatting data that will not be understood during script execution. For example, the following script connects outputs 1, 2, and 32 to inputs 4, 5, and 6 respectively.

S001004
S002005
S032006

Copy these script commands into windows notepad. Delete the last line feed character by placing the cursor after the 6 and press the DELETE key. Extra characters, even spaces and line feeds, will cause the command to fail. Save the file as "QE3-1.scr". Make sure to change the Save As… type to "All Files", then type in the name and extension and click the SAVE button.

Open the program and connect to the QE3. From the tool menu, open "Run script". Setup the execution parameters. Use the no delay between commands and run only once defaults.

Click SET FILE and navigate to where the QE3-1.scr was saved. Once open, the three commands will be in the open window with empty boxes. The script is ready to run. Click the START button. The three boxes should have a green check mark indicating success for all three commands. A failed command will show a red X.

Failed Commands

Since the script's only feedback is a pass or fail, a failure may require additional investigation. Check that the inputs and outputs are valid. You can't set output 32 if the system only has 16 outputs. Check if the output is locked. Make sure the data used in the command is valid. Check for correct command structure.

Event Log

The Matrix Control Program contains a command and log file which can be used to monitor communication activity between the control program and the QE3. This does not record scripts or script responses. To view the log, choose “Event Log” in the Tools menu. Each command should have a response and a green check mark indicating success.

Troubleshooting

Quintech Technical Support

We are available for your questions and to assist you. Contact us through e-mail or call us directly toll free. Whether your system is 6 month old or 6 years old, we strive to help our customers any way we can.

Before I contact Quintech

There are several pieces of information that many times help us answer technical questions in minutes rather than hours or longer. Please have with you the following information when calling Quintech or include this information in an e-mail question.

1. Model
2. Matrix size
3. Protocol version
4. Firmware version

All this information is available at the front panel. It is under the “System Information” “Get Firmware Version” menu. It is also displayed when you apply power to the controller.

Have Information Ready

If you call or write in with a technical question and you have this information available let us know.

Warranty Information

If your unit may need warranty service, having the following information ready makes a repair process easier and faster to start and complete.

Serial number - Marked S/N on rear panel
Approximate date of purchase

Company dealer or representative the system was purchased from or if was purchased factory direct.

Problems and Solutions

This section has been written to help eliminate operator error. It does not describe how to repair damaged equipment. If there is more than one solution the most common solution is listed first and least common solution last.

If you have a problem that is not addressed in this troubleshooting guide, or you need technical assistance, please contact us. Contact information is listed at the end of the troubleshooting guide.

General Problems	
The signal is lost when the power is turned off.	The QE3 is an active switch which requires power to maintain the crosspoint connections. If power is turned off the signal no longer passes through.
Several options referred to in the manual are not coming up on the display.	In order to see all the options you must be logged in as Admin and the access control for local has to be on also.
The LCD is blank except for a row of dim blocks.	1. Firmware may have been corrupted. Contact Quintech for new firmware and download instructions. 2. LCD or cable has failed. Contact Quintech for service.
The unit does not remember the previous switch settings/switch size after power has been removed and restored.	Contact Quintech for service.
Front Panel displays “download firmware” and it won’t do anything.	You are in firmware download mode. The only solution is to download firmware or cycle power. 1. Cycling power will not corrupt or change any settings. 2. Downloading firmware may overwrite the entire system and set all values back to Quintech defaults. Refer to the “Load Firmware” section.
There is a lot of crosstalk between the signals.	It may be necessary to “balance” your signal levels. Leveling the signals (attenuating stronger signals, amplifying weaker signals) ensures that all signals will be passing at approximately the same level and will help to minimize any crosstalk.
The keypad is locked	Press 857
I am a qualified technician and would like to try to fix a problem myself.	A warranty covers all units. Quintech or a representative of Quintech should make any repairs. Removing any part of the chassis will void the warranty. Additionally, attempting to repair a unit could be dangerous.

Front Panel LEDs	
The front panel LED is not lit.	This indicates the unit is not receiving power. 1. Check to see if the power switch is in ON. 2. Make sure that the AC cables are properly connected. 3. Check the fuse located just above the power cord (if equipped). 4. Verify with a volt meter that the AC source is available. If the problem isn't with the AC supply, contact Quintech for service.
One of the LEDs is not lit on a module with integral dual supplies and/or dual AC inlets.	Make sure the unit is turned on. Verify with a volt meter that the AC source is available. If the problem isn't with the AC supply, contact Quintech for service.
LNB Power	
I'm not getting any DC power out from the input.	QE3s are not equipped with LNB supplies

Problems with Cross Point Connections	
No signal is passing at all. The connection is shown as being made but no switch occurred.	1. First, be certain that all coaxial cables are properly connected, and that all control cables are connected and in good working conditioning. Refer to the appendix for your system connections. 2. Make sure that the main controller unit is set to "Main" control mode. Type in the desired path again. 3. Type in a different path to verify that the units are switching. For example, if you cannot route Input 7 to Output 7, try routing Input 8 to Output 7. Try this for several different inputs. 4. If the units are switching, verify that the signal you requested is actually there (the matrix switching system is DC blocked and will not allow receivers to power LNBs). It is useful to monitor the system with some type of analyzer. 5. Make sure that the matrix size is set correctly. The actual matrix size will only switch up to the set matrix size. Alternately, if the controller is set larger, it will show matrix crosspoints that are not physically available.
The option to change or lock/unlock a cross point is only available on some outputs.	You are logged in as a user with assigned permissions. The Admin has assigned permissions to your account. Your account allows you to change only those outputs the Admin gave your account permission to change.
The signal is passing at a low level.	Using appropriate equipment, check the signal level. If it is below specifications, contact the factory.
The monitor and control menu lists the wrong number of inputs and or outputs for my system.	Someone incorrectly changed settings under the configuration menu. Refer to "Factory Configuration Settings" and contact Quintech for technical assistance.

Only some of the cross points will switch.	Make sure that no one has modified the factory settings for the matrix configuration. For example, if the QE3 size has been erroneously set to 1x1, then only output 1 can be controlled. You can tell if the number of outputs is correctly set by going to the Monitor & Control Screen and scrolling through the outputs. Likewise, you can check the set number of inputs by going to the Change Connection screen and scrolling through the available inputs. Contact Quintech if the settings do not match the matrix configuration.
Serial Port Problems	
The controller will not respond to protocol commands on the Control In or PC Control serial port.	1. Make sure that you are NOT using a null modem cable or null modem adapter. Use a straight through 1 to 1 pin cable 2. If using RS-232, check that the serial cable from the computer is connected to the Control In DB-9 connector port on the back panel. Not the Control Out or a Remote port. 3. Make sure that the address in the commands being sent matches the serial address set for the controller. 4. Make sure that the COM port you are using on the computer matches the COM port the matrix control software is set at. 5. Check that the serial interface mode (RS-232 or RS-485/422 is correct. 6. If using RS-422/485 make sure the termination settings are correct. 7 Make sure the data protocol is 8 bit 1 stop bit no parity and 9600bps.

Ethernet Problems	
The QE3 unit will not connect using Telnet.	1. Make sure that another Telnet session is not currently open. Only one Telnet session at a time is allowed. 2. Make sure you are trying with the correct IP address.
Controller won't accept any SNMP protocol commands.	Check that SNMP is enabled. Refer to "SNMP".
I can't change anything in the IP configuration.	Turn off DHCP When DHCP is on the IP configuration displays the DHCP configuration assigned to the unit, not the static IP configuration.
The controller keeps booting up to an IP address that is not the same as the one I had entered in the IP configuration.	Turn off DHCP The DHCP is assigning an address to the unit. To use the static IP configuration turn off DHCP.
The controller will not respond to protocol commands on the Ethernet Port.	1. Make sure that the serial address in the commands being sent is either set as "FF" or matches the serial address set for the controller. 2. Make sure that the controller IP address matches the target address used by the control computer. 3. Make sure that the mask and/or gateway are correctly set for your network. 4. If the controller is connected directly to the network port of another computer, make sure that a crossover cable is being used. 5. If the controller is connected to a router or switch, make sure that a standard cable is being used, that the router detects the connection to the controller, and that the router is connected to the same network as the control computer. 6. Make sure the Ethernet lock has not been enabled using the ELE command. 7. Make sure that the control computer is sending the commands to port 9100. 8. Check with the administrator that no other program is using port 9100 for Ethernet communications

Remote Not Working	
Remote Controller is not working correctly or at all	95% of all problems with remotes are cable issues. 1. Make sure you are using the supplied Quintech adapter in line between the main unit and the first remote. Forgetting this adapter is usually the cause of a communications error. The adapter connects pins 3 to 4, 4 to 3, 6 to 9, and 9 to 6. NOTE: This is not a NULL MODEM adapter pinout. If you don't have this adapter, you can call us and order another or simply make a cable that crosses these connections. If you have the adapter then use the adapter and a straight through 1 to 1 cable between the main controller and the first remote. 2. Use the Quintech crossover adapter between the main and first remote only. All other remote connections use straight through cables. 3. Make sure the cable is 1 to 1 straight through cable. Test the cable with an Ohmmeter to be sure all pins are connected from end to end. Some manufacturers will only connect pins 2, 3, and 5. This type of cable will work for most RS-232 applications but a Quintech remote will not operate without all the pins connected. 4. Make sure the RS-485 termination settings are correct. 5. Make sure that the address of the main and remotes are different. If you have more than one remote, those addresses have to be different as well. 6. Check that any address isn't set to FFH. 7. Make sure the main and remotes are connected via the remote ports and not the control ports. 8. Re-initialize the remote.

Passwords and Permissions	
I forgot my password.	1. Default passwords are listed in Table 4. 2. If the Admin has re-assigned names and passwords contact that person for your username and password. 3. If you are the Admin and you don't know your password, contact Quintech for technical assistance.
I am typing in my password but it won't let me login.	1. Passwords are case sensitive. If the admin gave you a password of "PasSMe" then the P,S,and M need to be capital letters when you type it in. 2. The Admin has reassigned or changed your password 3. The unit has been given a hard reset which sets all accounts to default permissions, names, and passwords. Defaults are listed in Table 4.
I have permissions but I still can't change an output connection.	Check if the output is Locked. Unlock the output first before you change the connection.
I can't turn on/off access control	Login as Admin first. Only the Admin can turn on/off access control for a port.
I can't modify the user accounts or permissions	Only the Admin can modify accounts. Login as the Admin.
The system won't allow me to make cross point changes.	1. Log in using your assigned username and password. If the Admin has denied you access to some or all outputs then you can't change those outputs without the Admin changing your account first. 2. Login as Admin 3. Turn off access control for the port you are using. (requires Admin login)
My password to unlock the Ethernet port using the ELD command is not working.	Reset the password to "Quintech" from the front panel.

For additional information or technical support please contact Quintech.

Toll Free: (800) 839-3658
Fax: (724) 349-1412
Email: info@quintechelectronics.com
Website: http://www.quintechelectronics.com

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