SC-500E System Controller

System Manual

IMPORTANT SAFETY INSTRUCTIONS

⚡	The lightning flash with arrowhead symbol within an equilateral triangle is intended to alert the user to the presence of uninsulated "Dangerous voltage" within the product's enclosure that may be of sufficient magnitude to constitute a risk of electric shock to persons.
!	The exclamation point within an equilateral triangle is intended to alert the user to the presence of important operating and maintenance (Servicing) instructions in the literature accompanying the product.

- Read and keep these instructions.
- Please heed all warnings and follow all instructions.
- Do not use this apparatus near water
- Clean only with dry cloth.
- Do not block any ventilation openings. Install in accordance with the manufacturer's instructions.
- Do not install near any heat sources such as radiators, heat registers, stoves, or other apparatus (including amplifiers) that produce heat.
- Do not defeat the safety purpose of the polarized or grounding-type plug. A polarized plug has two blades with one wider than the other. A grounding-type plug has two blades and a third grounding prong. The wide blade or the third prong is provided for your safety. If the provided plug does not fit into your outlet, consult an electrician for replacement of the obsolete outlet.
- Protect the power cord from being walked on or pinched particularly at plugs, convenience receptacles and the point where they exit from the apparatus.
- Only use attachments/accessories specified by the manufacturer
- Unplug this apparatus during lightning storms or when unused for long periods of time.
- Refer all servicing to qualified service personnel. Servicing is required when the apparatus has been damaged in any way, such as power-supply cord or plug is damaged, liquid has been spilled or objects have fallen into the apparatus, the apparatus has been exposed to rain or moisture, does not operate normally, or has been dropped.

WARNING TO REDUCE THE RISK OF FIRE OR ELECTRIC – SHOCK, DO NOT EXPOSE THIS APPARATUS TO RAIN OR MOISTURE AND PLUG EACH POWER SUPPLY CORD INTO SEPARATE BRANCH CIRCUITS EMPLOYING SEPARATE SERVICE GROUNDS
WARNING DO NOT EXPOSE THIS EQUIPMENT TO DRIPPING OR SPLASHING AND ENSURE THAT NO OBJECTS FILLED WITH LIQUIDS ARE PLACED ON THE EQUIPMENT
WARNING TO COMPLETELY DISCONNECT THIS EQUIPMENT FROM THE AC MAINS, DISCONNECT THE POWER SUPPLY CORD PLUG FROM THE AC RECEPTACLE
WARNING THE MAINS PLUG OF THE POWER SUPPLY CORD SHALL REMAIN READILY OPERABLE

WARNING

WARNING: Dangerously high voltages are present inside this equipment.

WARNING: This equipment uses power/mains connectors fitted with earth pins. It is most important as a matter of personal safety that the equipment is properly earthed.

CAUTION: This equipment may have more than one power supply cord. To reduce the risk of electric shock, disconnect all power supply cords before servicing.

CAUTION: These servicing instructions are for use by qualified personnel only. To reduce the risk of electric shock, do not perform any servicing other than that contained in the operating instructions unless you are qualified to do so. Refer all servicing to qualified personnel.

CAUTION: To reduce the risk of electric shock, plug each power supply cord into separate branch circuits employing separate service grounds.

NEVER use flammable or combustible chemicals for cleaning components.

NEVER operate this product with any covers removed.

NEVER wet the inside of this product with any liquid.

NEVER bypass any fuse or replace any fuse with a value or type other than those specified.

NEVER operate this product in an explosive atmosphere.

NEVER block the airflow through ventilation slots.

NEVER expose this product to extremely low or high temperatures.

This product complies with the requirements of the product family standards for video, audio, audio-visual entertainment, and lighting control apparatus for professional use as mentioned below.

CE	EN60950 — Safety EN55103-1: 1996 — Emission EN55103-2: 1996 — Immunity		EN504192 2005 Waste electrical products should not be disposed of with household waste. Contact your Local Authority for recycling advice

Quartz Electronics Ltd FC For Home or Office Use	Tested to comply with FCC Standards	This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: 1) This device may cause harmful interference, and 2) This device must accept any interference received, including interference that may cause undesired operation.

REVISION HISTORY

REVISION	**DESCRIPTION**	**DATE**
1.0	First release	Oct 09

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1. OVERVIEW

The SC-500E system controller is a platform designed to manage all communication and interface requirements for small to medium routing systems.

Housed in a 1RU frame the SC-500E system controller manages the communication between multiple Evertz/Quartz products and third party equipment. It can also be configured to provide communication translations between Q-Link, RS-422/RS-232 and Ethernet.

The SC-500E is powered from a single external power supply that connects to the frame via a secure bayonet locking connector. A redundant external power supply can also be fitted if required.

The SC-500E in its standard configuration provides two Q-Link ports, two RS-422/RS-232 serial ports and a single Ethernet port. There are also two additional ports that can be used as a Q-Link port or a RS-422/RS-232 serial port.

The SC-500E is capable of supporting up to 32 router control panels simultaneously. The panels can be connected to the SC-500E via Q-Link, Ethernet, or a mixture of both.

The SC-500E is capable of controlling up to 16 independent routers on 16 individual levels.

Figure 1-1: SC-500E System Controller

FEATURES:

- Provides an Ethernet interface for Quartz routers that do not have an Ethernet connection to interface with control panels via Ethernet

- Provides a Q-Link interface for Evertz routers that do not have a Q-Link connection to interface with control panels via Q-Link

- Provides an interface to EQX-SERVER for control panels via Q-Link

1.1. HOW TO USE THIS MANUAL

This manual will assist you in the use of the SC-500E, and contains all the necessary information to successfully operate this product. If further product information or assistance is required, please contact Evertz or your local Evertz/Quartz distributor.

This manual is organized into 5 sections: Overview, Installation, Technical Description, System Overview, and Configuration

Section 1: Contains a brief overview of the SC-500E operation, features and a glossary to define concepts and terms used throughout the remainder of the manual.

Section 2: Provides instructions on how to unpack, install and setup the SC-500E.

Section 3: Provides technical specifications and information on configuring the connector pin-outs of the SC-500E system.

Section 4: Describes how to control the SC-500E.

Section 5: Provides instructions on how to configure the SC-500E.

> **This symbol is intended to alert the user to important operating instructions.**

> **The exclamation point within an equilateral triangle is intended to alert the user to the presence of important safety related operating and maintenance (Servicing) instructions in this manual.**

1.2. DEFINITIONS

4:2:2: The sampling ratio used in the HDTV digital video signal. For every 4 samples of luminance there are 2 samples each of R-Y (Red minus Luminance) and B-Y (Blue minus Luminance).

16x9: A wide screen television format such as HDTV in which the aspect ratio of the screen is 16 units wide by 9 high as opposed to the 4x3 of normal TV.

AES/EBU: (Sometimes abbreviated as AES) Refers to the digital audio standard (AES3-1992) set by the Audio Engineering Society and European Broadcast Union, and used by most forms of digital audio from CDs to professional digital video.

ASPECT RATIO: The ratio of width to height in a picture. Theatre screens generally have an aspect ratio of 1.85 to 1, widescreen TV (16x9) is 1.77 to 1, and normal TV (4x3) is 1.33 to 1.

CCIR (International Radio Consultative Committee): An international standards committee. (This organization is now known as ITU.)

CCIR-601: See ITU-R601.

CLIFF EFFECT: (Also referred to as the 'digital cliff') This is a phenomenon found in digital video systems that describes the sudden deterioration of picture quality when due to excessive bit errors, often caused by excessive cable lengths. The digital signal will be perfect even though one of its signal parameters is approaching or passing the specified limits. At a given moment however, the parameter will reach a point where the data can no longer be interpreted correctly, and the picture will be totally unrecognizable.

COMPONENT ANALOG: The non-encoded output of a camera, video tape recorder, etc., consisting of the three primary colour signals: red, green, and blue (RGB) that together convey all necessary picture information. In some component video formats these three components have been translated into a luminance signal and two colour difference signals, for example Y, B-Y, R-Y.

COMPONENT DIGITAL: A digital representation of a component analog signal set, most often Y, B-Y, R-Y. The encoding parameters are specified by ITU-R709 for HDTV signals. SMPTE 274M and SMPTE 296M specify the parallel interface.

COMPOSITE ANALOG: An encoded video signal such as NTSC or PAL video that includes horizontal and vertical synchronizing information.

COMPOSITE DIGITAL: A digitally encoded video signal, such as NTSC or PAL video that includes horizontal and vertical synchronizing information.

DROP FRAME: In NTSC systems, where the frame rate is 29.97002618 frames per second, the drop frame mode permits time of day indexing of the frame numbers by dropping certain frame numbers. Specifically frames 0, and 1 at the beginning of each minute except minutes 0,10,20,30,40, & 50, are omitted, to compensate for an approximate timing error of 108 frames (3 seconds 18 frames) per hour. A flag bit is set in the time code to signal when the drop frame mode is in effect.

EBU (European Broadcasting Union): An organization of European broadcasters that among other activities provides technical recommendations for the 625/50 line television systems.

EMBEDDED AUDIO: Digital audio is multiplexed onto a serial digital video data stream.

ITU: The United Nations regulatory body governing all forms of communications. ITU-R (previously CCIR) regulates the radio frequency spectrum, while ITU-T (previously CCITT) deals with the telecommunications standards.

ITU-R601: An international standard for standard definition component digital television from which was derived SMPTE 125M and EBU 3246-E standards. ITU-R601 defines the sampling systems, matrix values and filter characteristics for Y, B-Y, R-Y and RGB component digital television signals.

NTSC: National Television Standards Committee established the television and video standard in use in the United States, Canada, Japan and several other countries. NTSC video consists of 525 horizontal lines at a field rate of approximately 60 fields per second. (Two fields equals one complete Frame). Only 487 of these lines are used for picture. The rest are used for sync or extra information such as VITC and Closed Captioning.

PAL: Phase Alternating Line. The television and video standard in use in most of Europe. Consists of 625 horizontal lines at a field rate of 50 fields per second. (Two fields equals one complete Frame). Only 576 of these lines are used for picture. The rest are used for sync or extra information such as VITC and Teletext.

PIXEL: The smallest distinguishable and resolvable area in a video image. A single point on the screen. In digital video, a single sample of the picture. Derived from the words *picture element*.

SMPTE (Society of Motion Picture and Television Engineers): A professional organization that recommends standards for the film and television industries.

SMPTE 12M: The SMPTE standard for Time and address code. SMPTE 12M defines the parameters required for both linear and vertical interval time codes.

SMPTE 125M: The SMPTE standard for bit parallel digital interface for component video signals. SMPTE 125M defines the parameters required to generate and distribute component video signals on a parallel interface.

SMPTE 259M-C: The SMPTE standard for 525 and 625 line serial digital component and composite interfaces.

SMPTE 272M: The SMPTE standard for embedding audio in serial digital standard definition (SMPTE 259M-C) video signals.

SMPTE 274M: The SMPTE standard for bit parallel digital interface for high definition component video signals with an active picture of 1080 lines x 1920 pixels.

SMPTE 276M: The SMPTE standard for transmission of AES/EBU Digital Audio Signals Over Coaxial Cable.

SMPTE 292M: The SMPTE standard for high definition serial digital component interfaces.

SMPTE 296M: The SMPTE standard for bit parallel digital interface for high definition component video signals with an active picture of 720 lines x 1280 pixels.

SMPTE 299M: The SMPTE standard for embedding audio in serial digital high definition (SMPTE 292M) video signals.

TRS: Timing reference signals used in composite digital systems. (It is four words long).

TRS-ID: Abbreviation for "Timing Reference Signal Identification". A reference signal used to maintain timing in composite digital systems. (It is four words long.)

2. INSTALLATION

2.1. UNPACKING

Remove the equipment carefully from the boxes and check against the Packing List supplied with each unit. This shows what items have been shipped against your order and includes all options.

Any error should be reported to your supplier immediately. After you have unpacked the equipment please save all the packing material as this could be useful in the future if the unit needs to be returned for maintenance.

Check each item supplied for transit damage. Any damage should be reported in detail to your supplier. You must state the serial number of the unit which can be found on the rear of the frame. Check that power cords supplied are suitable for your country and that the equipment is compatible with your mains (line) voltage.

The SC-500E range uses a common external PSU 'brick' that is auto-ranging and converts nominal 115V or 230V AC mains voltages to safe 12V DC. This then connects to the SC-500E where any internally required voltages are generated. The external PSU has an IEC inlet and approximate 1.7m of DC lead terminated in a two-pin bayonet style connector.

IEC connectors have an earth pin and as a matter of safety this earth pin must be connected to a solid ground to ensure a proper earth connection.

In the UK, equipment is supplied with a power cord already fitted with a 3 pin mains plug. Should the lead be re-wired then please make connections using the colour code below:

- **Brown =** Live (Line or Phase)
- **Blue =** Neutral (Return)
- **Green/Yellow =** Earth (Ground)

There is no power switch on the unit so it is essential that the power cord is removed before commencing to service the unit.

All SC-500E PSU's are auto-ranging and no adjustments are required.

2.2. PHYSICAL INSTALLATION

2.2.1. System Controller

All units are designed for mounting in standard 19" equipment racks. The depth of the frames is 260mm (approx.) excluding connectors. In addition, allowance must be made for the cables to be installed at the rear of the frame.

Overall power dissipation is very low and cooling is by natural convection.

Do not place the SC-500E directly above very hot equipment or in sealed equipment racks that are not adequately cooled.
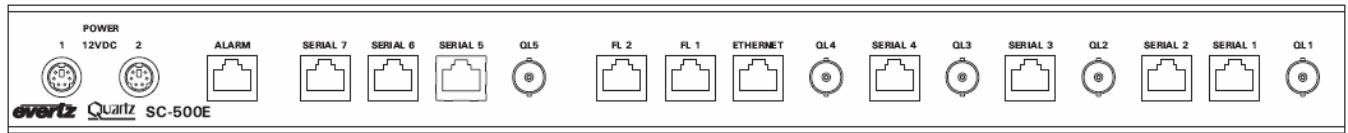
2.3.   ELECTRICAL CONNECTIONS

Figure 2-1: Rear View of SC-500E

2.4.   STANDARD CONFIGURATION

The following are the standard options that are supplied with the unit. Further options can be added depending on the system requirements.

2.4.1. Power 1 PSU 12VDC Input

This is the main 12 Volt DC input. The SC-500E is supplied with the external power supply unit (PSU) QT-PS. Before using, please check that you have been supplied with the correct unit. The PSU does not contain any serviceable parts and for safety reasons should not be opened as there is a significant risk of electric shock. A redundant external power supply can also be fitted, if required (see section 2.5).

2.4.2. Q-LINK 1, Q-LINK 2, Q-LINK 3, Q-LINK 4 Ports

These are Q-Link ports. The sockets are a standard BNC coaxial type. Q-Link is a unique network that interconnects Evertz/Quartz routers and remote control panels. It uses a standard 75ohm video cable that daisy-chains from frame-to-frame and panel-to-panel. A 'T-piece' connector allows any control panel to be removed from the network without disruption.

2.4.3. Serial 1, Serial 2, Serial 3, Serial 4 RS-422/RS-232 Ports

These are RS-422/RS-232 serial ports and are fitted as standard. The sockets are RJ-45 connections.

	Note: Q-LINK 3 and Serial 3 share the same communications lines so only one of the two ports can be used at any one time.

	Note: Q-LINK 4 and Serial 4 share the same communications lines so only one of the two ports can be used at any one time.

2.4.4. Alarm Connection

This connection is used to provide an alarm if there is a complete power failure of the unit. This is an RJ45 connection.

2.4.5. Ethernet Connection

This is a standard RJ-45 Ethernet connection. The socket is an RJ-45 type. The port is compatible with a 10BaseT network running TCP/IP protocol.

2.4.5.1. Connecting to an Ethernet Network

The SC-500E uses 10Base-T (10 Mbps), 100Base-TX (100 Mbps) or Gigabit (1Gbps) twisted pair Ethernet cabling systems. When connecting for 10Base-T systems, category 3, 4, or 5 UTP cable as well as EIA/TIA – 568 100Ω STP cable may be used. When connecting for 100Base-TX systems, category 5 UTP cable is required. The cable must be "straight-through" with a RJ-45 connector at each end. Establish the network connection by plugging one end of the cable into the RJ-45 receptacle of the SC-500E and the other end into a port of the supporting hub.

The straight-through RJ-45 cable can be purchased or can be constructed using the pin-out information in Table 2-1. A colour coded wiring table is provided in Table 2-1 for the current RJ-45 standards (AT&T 258A or EIA/TIA 258B colour coding shown). Also refer to the notes following the table for additional wiring guide information.
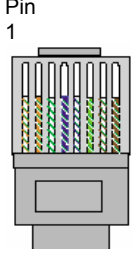
	Pin #	Signal	EIA/TIA 568A	AT&T 258A or EIA/TIA 568B	10BaseT or 100BaseT
Pin 1	1	Transmit +	White/Green	White/Orange	X
	2	Transmit –	Green/White or White	Orange/White or Orange	X
	3	Receive +	White/Orange	White/Green	X
	4	N/A	Blue/White or Blue	Blue/White or Blue	Not used (required)
	5	N/A	White/Blue	White/Blue	Not used (required)
	6	Receive –	Orange/White or Orange	Green/White or Green	X
	7	N/A	White/Brown	White/Brown	Not used (required)
	8	N/A	Brown/White or Brown	Brown/White or Brown	Not used (required)

Table 2-1: Standard RJ-45 Wiring Colour Codes

Note the following cabling information for this wiring guide:
- Only two pairs of wires are used in the 8-pin RJ-45 connector to carry Ethernet signals.
- Even though pins 4, 5, 7 and 8 are not used, it is mandatory that they be present in the cable.
- 10BaseT and 100BaseTX use the same pins (a crossover cable made for one will also work with the other).
- Pairs may be solid colours and not have a stripe.
- Category 5 cable must use Category 5 rated connectors.

The maximum cable run between the router and the supporting hub is 300 ft (90 m). The maximum combined cable run between any two end points (i.e. router and PC/laptop via network hub) is 675 feet (205 m).

Devices on the Ethernet network continually monitor the receive data path for activity as a means of checking that the link is working correctly. When the network is idle, the devices also send a link test signal to one another to verify link integrity.

2.5.   OPTIONAL CUSTOMIZED CONFIGURATIONS

2.5.1. Power 2 PSU 12 VDC Input

This is the redundant power supply input. The power supply can be supplied as an option. Use only the approved power supply unit QT-PS. The part number for this unit is PSU-S-105. The use of non-approved power supply units might have unpredictable results and may cause damage.

2.5.2. Serial 5, 6, 7 RS-422/RS-232

These are standard RS-422/RS-232 ports and the socket is an RJ-45.   These ports are currently unsupported.

2.6.   ABOUT Q-LINK

Quartz routers use a communication system called Q-Link that allows routers and panels to be connected together using a single coaxial video cable.

As standard, routers and panels have one Q-Link port for connection to other Quartz products. They also have one or two optional serial (RS-422/RS-232) ports for connection to third party equipment.

The daisy chained Q-Link system is simple to install and has a connection limit of 64 devices. Each unit being connected to the Q-Link has its own address switch, which is set up as part of the system configuration. The maximum cable length is 500m.

Each end of the link must be terminated in 75Ω.

⚠	**WARNING: The installer must fit a 75Ω terminator at each end of the cable.**

This daisy-chain method ensures the best transmission quality of the control signals down the cable. Shortcuts that might save cable, such as running stubs to some panels, are not recommended as this may under certain circumstances cause data errors.

WinSetup

Q-Link | Q1

**SC-500
System Controller**

Q-Link

device 1

Q-Link

device 2

Q-Link

device 3

Q-Link

device 64

Single Q-Link
supporting
upto 64 devices

Q-Link: Normal video cable
with each end fitted
with a 75Ω termination.
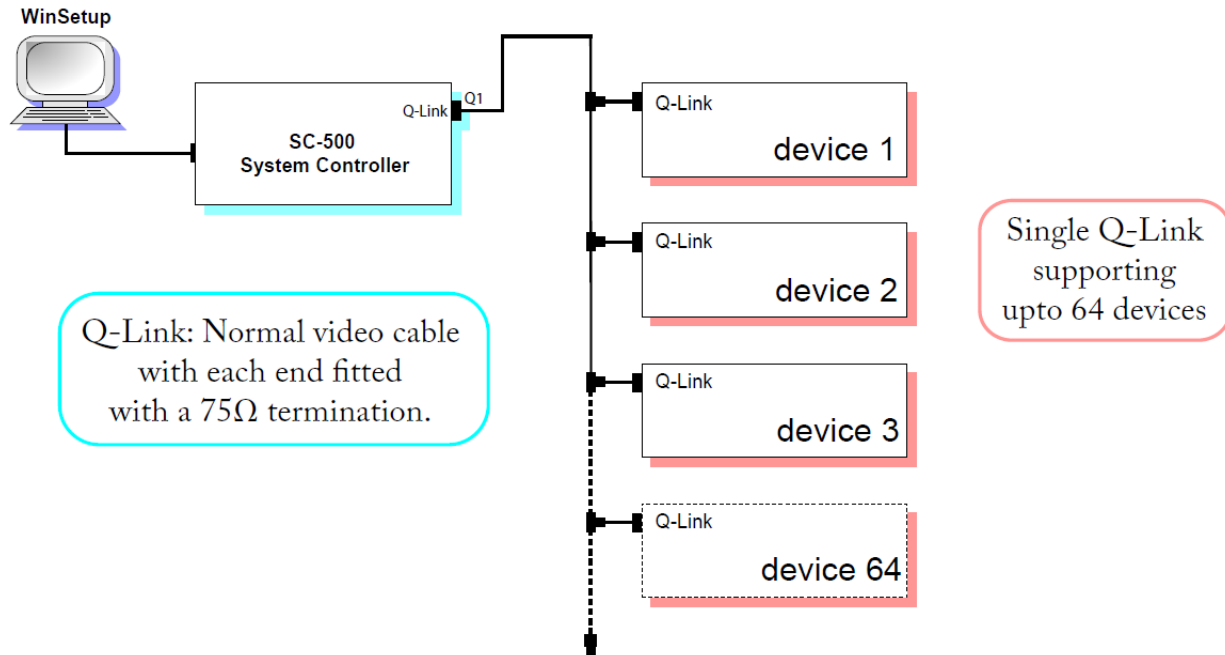
Figure 2-2: Daisy Chain Method

3. TECHNICAL DESCRIPTION

3.1. SPECIFICATIONS

Q-Link: 75Ω video cable (max length 500m)
  Quantity: 2 independent, 2 shared

Serial RS232/422:   RS422/232, RJ45
  Quantity: 2 independent, 2 shared

Ethernet: 10/100baseT, RJ45
  Quantity: 1

3.2. PHYSICAL

Height: 1.75" (44mm) 1RU
Width: 19" Rack Mount (482mm)
Depth: 5" (130mm)
Weight: 2 lbs (1.55kg)
Operating Temperature: 0 - 40°C

3.3. ELECTRICAL

Supply: 90V – 132V, 180V – 264V, 50/60Hz
Power Consumption: 10 Watts

4.   OPERATION

4.1.   SYSTEM OVERVIEW

The SC-500E system controller is an interface device that has been designed to provide flexibility amongst the many connection options available on Evertz/Quartz routers and control panels.   It provides a cost effective method for updating routing systems with advanced features while still utilizing existing legacy equipment.

There are three main applications of the SC-500E; these are listed below:

4.1.1.   Interfacing Ethernet Control Panels with Quartz Routers

In this application, the SC-500E communicates with legacy Quartz routers via serial or Q-Link and with the control panels via Ethernet.   This allows legacy routers to use the latest control panels that only have an Ethernet connection.

4.1.2.   Interfacing Q-Link Control Panels with Evertz Routers

In this application, the SC-500E communicates with new Evertz routers via Ethernet and with the control panels via Q-Link.   This allows new routers to use legacy control panels that only have a Q-Link connection.

4.1.3.   Interfacing Q-Link Control Panels with EQX Server

In this application, the SC-500E communicates with the EQX Server control system via Ethernet and with the control panels via Q-Link.   This provides the flexibility to use control panels connected over Q-Link with the EQX Server in situations where running Ethernet cable is not desirable.

4.2.   SYSTEM COMPONENTS

The SC-500E system controller consists of two main components: an interface card that provides the external Q-Link, serial and Ethernet interfaces for connectivity, and a controller card that provides the configuration and communications for the device.

The front of the controller module can be accessed by removing the front door. The door is removed by unscrewing the two thumb screws on each side and pulling the door panel forward. Before the front door can be completely removed, the power cord connected to the front LED must be disconnected first.

> **WARNING: Before completely removing the front door, ensure that the connector for the power LED is disconnected first.**

4.3. SYSTEM CONFIGURATION

There are a number of control and monitoring interfaces on the front of the SC-500E system controller card. The main components on the controller card are shown in Figure 4-1. Each component serves an important function in the overall system. The following sections describe the functions of each component.
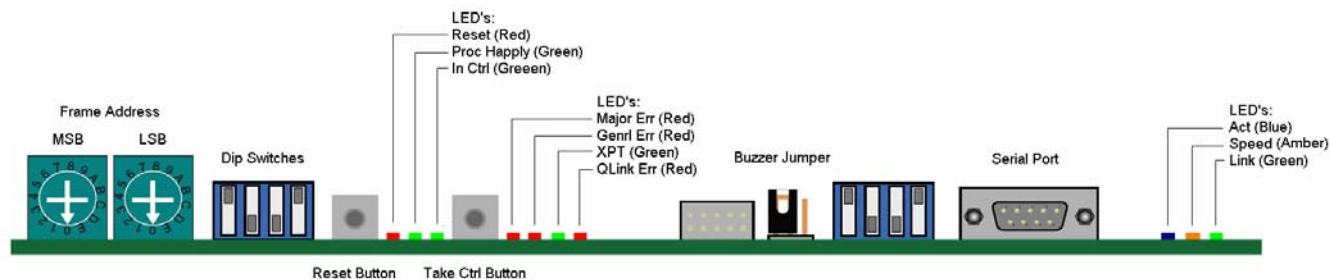

Figure 4-1: Front Edge Controls

4.3.1. Frame Address Switches

The Frame Address switches are used to define the Q-Link address of the SC-500E. For the Q-Link communication link between the routers to work, each device on the Q-Link needs a unique number or address. This is the only function of the frame address switch.

The frame address switches have settings 0, 1, 2 … D, E, and F in hexadecimal format. The MSB switch supplies the upper 4 bits of the unit's 8 bit address and the LSB switch supplies the lower 4 bits of the unit's 8 bit address, giving units a Q-Link address range of 0x00 to 0xFF.

4.3.2. DIP Switch settings

The four way DIP switch fitted to the front processor of the SC-500E must be set correctly before the system will work. The functions of the DIP switches are shown in Table 4-1. After making changes to the DIP switch always press the *Reset* button to accept the change.

Position	DIP-1	DIP-2	DIP-3	DIP-4
UP	Normal Mode	Default Mode	Slave	Normal
DOWN	Diagnostic Mode	Diagnostic Mode	Master	Reserved

Table 4-1: DIP Switch Functions

4.3.3. Serial Port

The front serial port on the controller module is used to access the configuration menu on the SC-500E. This menu is used to modify networking parameters and also to provide basic monitoring information for debugging purposes.

4.3.4. Status LEDs

The SC-500E has various status LEDs to provide the user with a quick indication of how the system is operating and to warn of any errors that may be encountered. The following sections describe the LEDs that are most integral to the use of the SC-500E.

4.3.4.1. RESET LED

The *RESET* LED is normally off. This red LED indicates that the reset circuit has been activated, either by the *Reset* pushbutton, after a power loss, or because the processor watchdog timer has tripped (software malfunction).

4.3.4.2. PROC HAPPY LED

The *PROC HAPPY* LED flashes green on/off/on/off at approximately 1Hz to indicate that the processor is running. This LED should always flash when the SC-500E is running normally.

4.3.4.3. MAJOR ERR LED

If the *MAJOR ERR* LED is off then the unit is operating normally. If on, this red LED indicates that a major error has occurred and the SC-500E is no longer able to operate.

4.3.4.4. GENERAL ERR LED

If the *GENRL ERR* LED is off then the unit is operating normally. If this red LED flashes on occasionally then a Q-Link message has been missed, a Q-Link error detected, an RS232/422 error has occurred, or there was no time to process video transitions.

> **Off** = Normal operation.
> **Random** = Q-Link, RS232/422, or Timing error.
> **2Hz** = Flash is blank (i.e. boot loader only).
> **4Hz** = Flash not valid (i.e. checksum error).
> **On** = Flash is untested, only occurs during power up.

4.3.4.5. XPT LED

The *XPT* LED flashes green whenever a crosspoint change or take command is made on any control panel to any router that is connected to the SC-500E.

4.3.4.6. ACT LED

The *ACT* LED flashes blue when the SC-500E is sending or receiving data via the Ethernet port. The LED will be off if there is no valid connection.

4.3.4.7. SPEED LED

The *SPEED* LED is amber and is on when a 100Base-TX link is last detected on the Ethernet port. The LED is off when a 10Base-T link is last detected. Upon power-up the LED is off as the last detected rate is not known and therefore defaults to the 10Base-T state until rate detection is completed.

4.3.4.8. LINK LED

The *LINK* LED is green and indicates that the SC-500E has established a valid linkage to its hub, and whether the SC-500E is sending or receiving data. This gives a good indication that the segment is wired correctly.

4.3.5. RS-422 and RS-232 RJ-45 Pin Assignment

All Quartz products use the same pin assignment for the RJ-45 RS-422/RS-232 connector. This pin assignment is shown in Table 4-2.

Pin	RS-232	RS-422
1	0V	0V
2	n/c	Sony n/c
3	TXD	Tx+
4	connects to pin6	Rx-
5	RXD	Rx+
6	connects to pin4	Tx-
7	n/c	n/c
8	n/c	n/c

Table 4-2: RS-232 & RS-422 RJ45 Pin Assignment

RS-232 and RS-422 may be selected using WinSetup as described in the configuration section 5.1.5.

4.3.6. RS-485/RS-422 Compatibility

RS-485 is a derivative of the RS-422 standard. All the main operating voltage levels are the same assuring a high degree of compatibility (99%) with Evertz/Quartz port routers and other equipment. The RS-485 standard supports 2-wire and 4-wire modes. The 4-wire mode is the universally preferred and supported option. Check that the device to be connected is using the 4-wire mode. This will be the case if the device connector has a transmit pair (Tx+ & Tx-) and a receive pair (Rx+ & Rx-). Some RS-485 (and RS-422) devices will tri-state (Hi-Z) their driver when not transmitting, effectively disconnecting the device and rendering it transparent. This may cause problems for the port router when used in auto-detect mode. For these devices, the port routers individual port must be configured to turn off the auto-detect mode. This locks the *transmit* and *receive* pairs to their respective connector pins.

4.3.7. Ethernet Port

The SC-500E Ethernet port is a standard RJ-45 connector supporting twisted pair Ethernet (10BaseT or 100BaseT).

The port can be connected via a standard network switch or hub if required. When a network cable is connected to the router the rear panel Green LED will illuminate to indicate a physical connection. The Green LED flashes when data is received on the network. The Amber LED will be OFF for 10BaseT and ON for 100BaseTX.

Table 4-3 shows a comparison between the different pin configurations for the RJ-45 ports.

Pin	RS-232	RS-422	EIA/TIA 568B
1	0V	0V	Pair2 10BaseT
2	0V	0V	Pair2 10BaseT
3	TXD	Tx+	Pair3 10BaseT
4	CTS	Rx-	Pair1
5	RXD	Rx+	Pair1
6	RTS	Tx-	Pair3 10BaseT
7	n/c	n/c	Pair4
8	n/c	n/c	Pair4

Table 4-3: Comparing Various Pin Configurations

5.   CONFIGURING THE SYSTEM USING WINSETUP

The WinSetup program is used to configure most of the routing functions, including control panel operation. It allows such things as the number of signal levels to be defined, which routing frames and panels are connected to the system and the names of the inputs and outputs.

The configuration of the SC-500E uses a special version of WinSetup that is different from the versions used to configure the routers. To ensure that the correct version is used, check the *Options, System Version* menu. The correct version has the SC-500E as the only system inside the Routing System Controller box.

> ✎   **Note: Configuration of the SC-500E requires a specific version of WinSetup.**

WinSetup is supplied with a comprehensive help system that can be accessed by pressing **F1** (function key F1) from any screen (dialog). The help system can also be entered from the *Help, Index* menu. The following notes are a very brief guide to WinSetup intended for getting started.

The following dialog is the WinSetup main screen. Any part of the system can be configured from the menu at the top of the screen. The grey bars above each main section and the line items within the main sections can both be used for quick access to specific items.
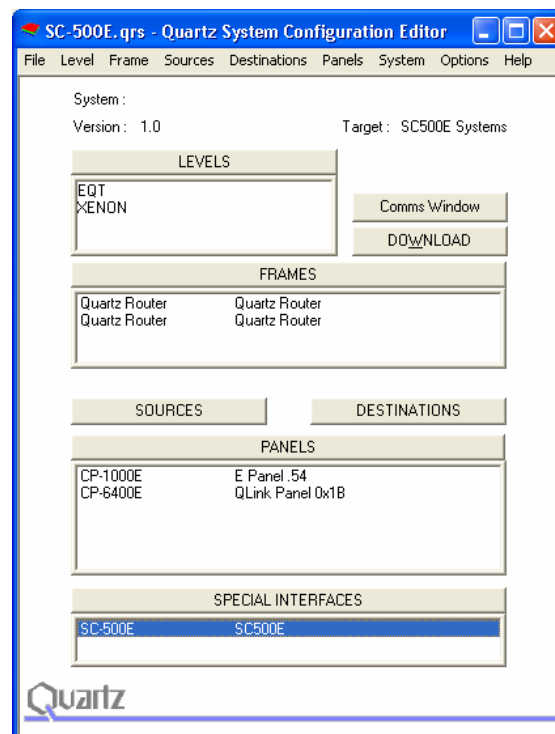
Figure 5-1: WinSetup Configuration Editor

When generating a new system configuration some of the menus and functions are greyed out (not available). This is deliberate to 'lead the user through' the functions that need to be set up. Carry out the following functions to configure the system.

(1) **Levels:** Enter the level names for each of the signal levels you want to control. Do not tick the "Complex" box at this stage.

(2) **Frames:** Enter the frames dialog and use the new button. When using a SC-500E, all frames within the system must use the Quartz protocol so all routers are considered a *Quartz Router*. The only change that needs to be made in the Edit Frame dialog is the *Q-Link* address. This address must be unique among all devices in the system and it must match the one that has been physically set on the router.
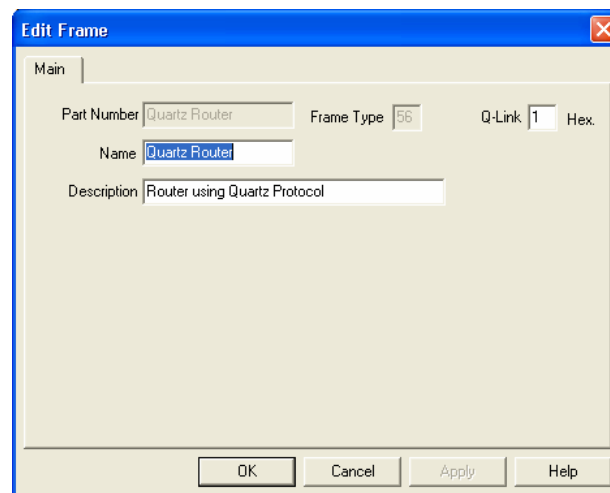
Figure 5-2: WinSetup Frame Editor

(3) **Sources:** Enter the sources dialog and use the add button to fill the name table with SRC-1 to SRC-X. The names can be edited later when a few panels are configured and working.
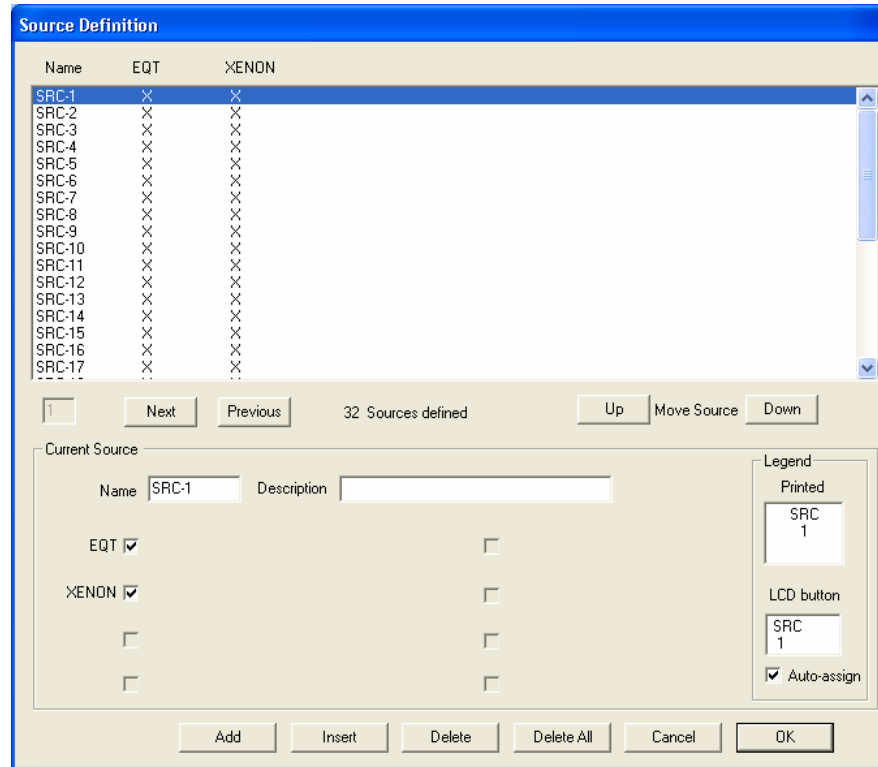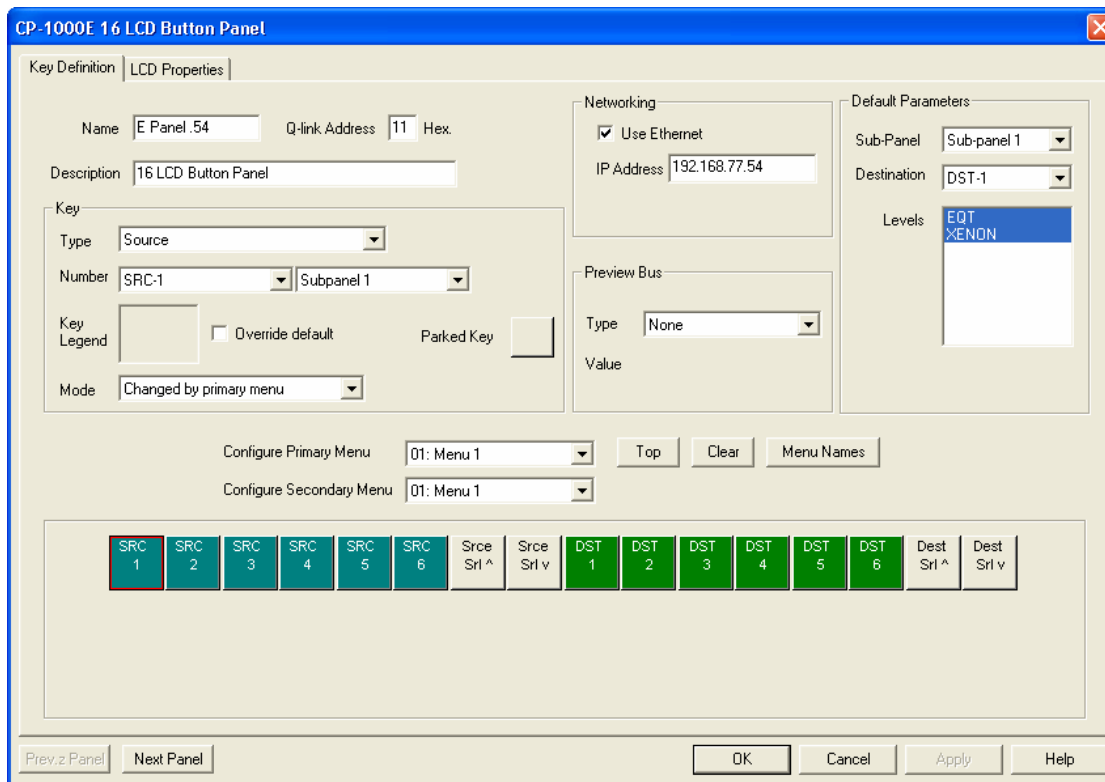
Figure 5-3: WinSetup Source Definition

If you want to edit a name now, select one row from the list of names in the upper part of the screen, the details appear in the lower part of the screen. From here you can edit the name and decide which signal levels that name will control when selected on a control panel.

(4) **Destinations:** Enter the destination dialog and set up the destination names in the same way as used for the source names.

(5) **Panels:** Enter the panel's dialog and use the new button. This will show all Evertz panels listed by part number. Select the part number that matches the part number on the panel's serial number label. Ignore the A/E designation as the connection method for the panel that will be defined in the panel configuration dialog. Once a part number is selected, a new dialog will appear showing a graphic of the panel.

Figure 5-4: WinSetup Panel Configuration

Each button can be programmed by selecting the button and then editing the functions in the Key section of the dialog. Each panel should also be given a name for later identification, E Panel .54 in this example. The Q-Link address will be allocated automatically by the program but can be edited if required. The default parameters control how the panel will function at power up. In this example the panel will always control DST-1 to start with. Now add any further panels that the system will need.

> **Note: An indication for the connection method used (Q-Link or Ethernet) must be made in the panel configuration of each panel.**

To differentiate between a panel that is connected via Q-Link and a panel that is connected via Ethernet, check the *Use Ethernet box* when appropriate. When checked, an IP address is required to be entered. This is the IP address of the control panel.

(5) **Download:** Use the System menu, Download-to-Router to transfer the setup data to the router. Remember to save the setup as it **CANNOT** be retrieved from the router.

> **Note: The configuration for the SC-500E can only be downloaded over Ethernet and not serially.**

5.1. SPECIAL INTERFACES

The SC-500E is a system controller so it has some additional settings from standard router configurations. The special interfaces section is used to define all of the interfaces that will be connected to the SC-500E. Enter the special interfaces dialog and select the SC-500E from the list of interfaces. Select the new button to create the interface. Ensure that the Q-Link address is set to the same value defined by the hex switches as described in section 4.3.2.

Once the interface has been created, each connection to the SC-500E must be defined. Each connection is defined as a port and this is configured by selecting the newly created SC-500E interface and accessing the port section.

5.1.1. Control Panel Ethernet Interface

The control panel Ethernet port is a single interface that is defined to allow all properly equipped control panels to connect to the SC-500E via Ethernet. The interface is defined as a *UDP* interface using the *RouterLink* protocol. The port is always defined as *90.* A properly configured setting is shown in Figure 5-5.
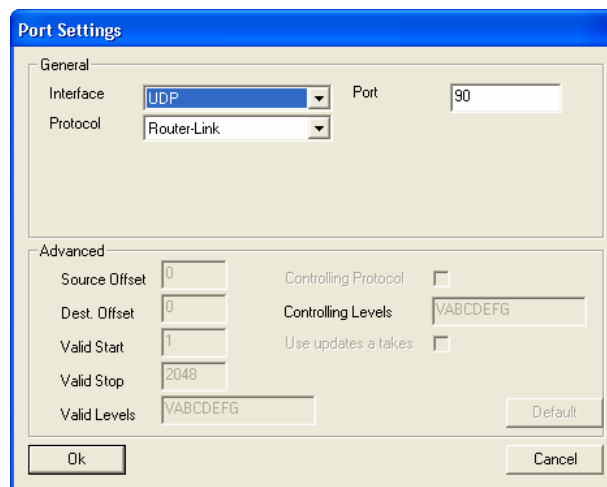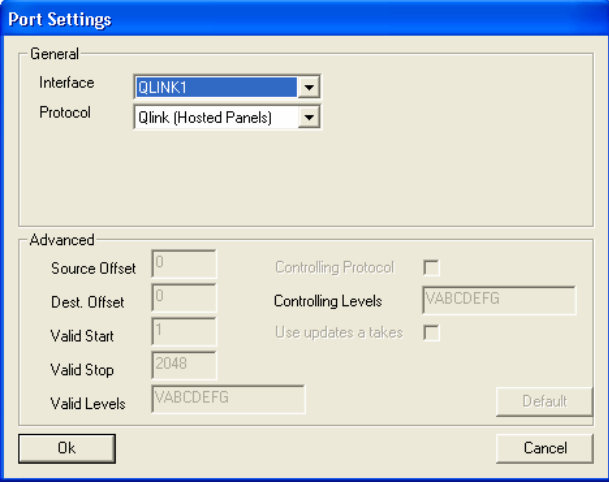

Figure 5-5: Ethernet Panels Port Settings

5.1.2. Control panel Q-Link Interface

The control panel Q-Link port is an interface that is defined to allow all properly equipped control panels to connect to the SC-500E via Q-Link. Each of the Q-Link ports can be defined as a port to host panels using Q-Link. The interface is defined as a *QLINK1* interface using the *Qlink (Hosted Panels)* protocol. Interfaces *QLINK2 – QLINK4* can also be defined in this manner. A properly configured setting is shown in Figure 5-6. In this configuration, control panels can be connected to the physical port that is labeled Q-Link 1 on the rear of the device.
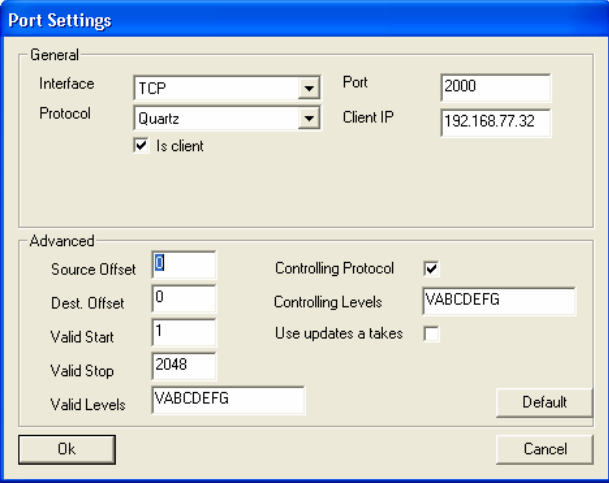
Figure 5-6: Q-Link Hosted Panels Port Settings

5.1.3. Router Ethernet Interface

The router Ethernet port is an interface that is defined to allow a router to be controlled by the SC-500E using an Ethernet connection. Each router must have its own interface defined. The interface is defined as a *TCP* interface using the *Quartz* protocol. Each router is defined as a client so the *Is client* box must be checked and an appropriate *Port and Client IP* address must be entered. The *Controlling Protocol* box must also be checked to allow the router to receive commands from the SC-500E. A properly configured router Ethernet port setting is shown in Figure 5-7.

Figure 5-7: Ethernet Router Port Settings

5.1.4. Router Q-Link Interface

The router Q-Link port is an interface that is defined to allow a router to be controlled by the SC-500E using a Q-Link connection. Each router must have its own interface defined. The interface is defined as a *QLINK1* interface using the *Qlink (Slave)* protocol. Interfaces *QLINK2 – QLINK4* can also be defined in this manner. The *Controlling Protocol* box must also be checked to allow the router to receive commands from the SC-500E. A properly configured router Q-Link port is shown in Figure 5-8.
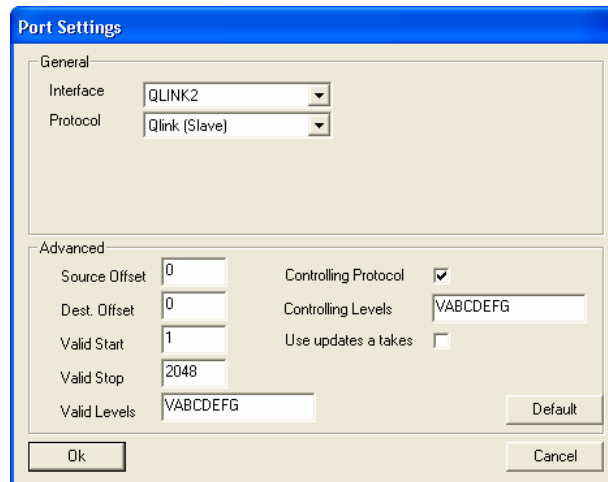

Figure 5-8: Q-Link Router Port Settings

5.1.5. Serial Interface

The serial port is an interface that is defined for multiple purposes. It can be used to control a router or it can be used to provide external automation control to routers connected to the SC-500E. The interface is defined as a *COM1* interface using the *Quartz* protocol. Serial ports *COM1 – COM4* can be defined in a similar way. The format of the serial protocol is also defined in this dialog using the options that are provided for *Baud Rate, Parity, Data bits, Stop bits* and *Standard (RS232 or RS422).*

If the serial port is being used to control a router then the *Controlling Protocol* box must be checked. If the serial port is being used to provide external control of the SC-500E then this box can be left unchecked. A properly configured serial port is shown in Figure 5-9.
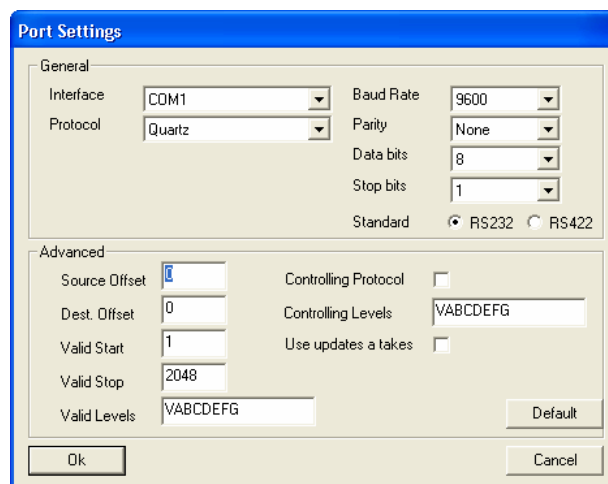

Figure 5-9: Serial Port Settings

5.1.6. Ethernet Interface

The Ethernet interface is defined to provide access to the SC-500E so that it can be controlled via Ethernet using Quartz protocol. Port 25 is defined as the default port for control. In addition, four more ports can be added: 3737, 3738, 3739, and 3740. An example of a properly configured Ethernet port for external control is shown in Figure 5-10.
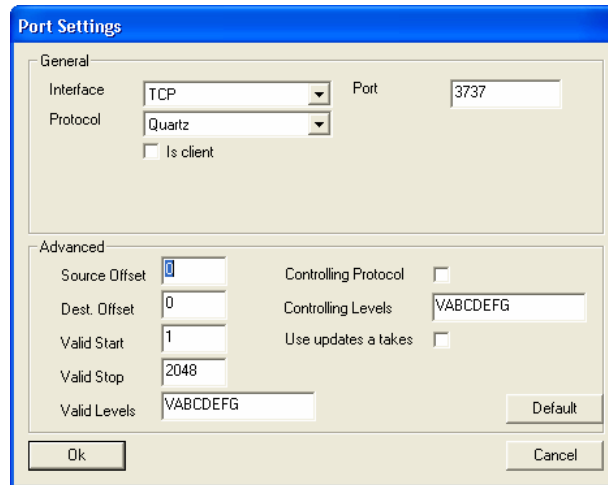

Figure 5-10: Ethernet Port Settings

5.1.7. Configuring Routers to Communicate with the SC-500E

All routers under the control of the SC-500E must have its own configuration. The configuration of the router will depend on the type of router and what it is capable of.

For routers that have redundant frame controllers, the connection must be through a serial connection so that the frame controller redundancy can be handled by the router and not the SC-500E. This is a single connection so that the redundancy of the attached router is transparent to the SC-500E.

> **Note: To maintain frame controller redundancy in routers equipped with this functionality, the connection to the SC-500E must be through serial.**

For routers that are connected via Q-Link a special interface must be defined in the WinSetup configuration. This special configuration is a SC-500E interface with the appropriate Q-Link address defined. This will setup the router to communicate with the SC-500E and not directly to the control panels.

> **Note: All router frames connected to the SC-500E via Q-Link must have a special interface defined in each respective configuration.**