Quartz

SC-1000

System Controller

System Manual

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Safety

WARNING: Dangerously high voltages are present inside this equipment.

WARNING: To reduce the risk of fire or electrical shock, do not expose this appliance to rain or moisture.

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

Quartz Electronics Ltd

FC

Tested to comply with FCC Standards

For Home or Office Use

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions:

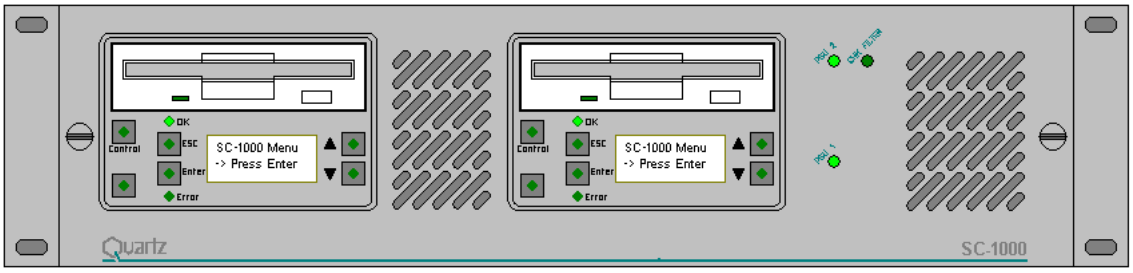
1) This device may cause harmful interference, and
2) This device must accept any interference received, including interference that may cause undesired operation.

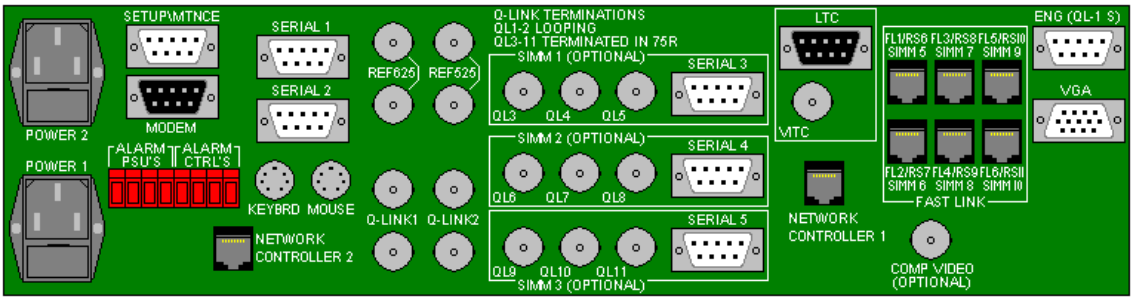
System Controller SC-1000

Contents

General Description

The SC-1000 System Controller is used on larger systems to provide a more powerful solution than the standard FU-0003 processor installed in most Quartz routers.





The key features of where the SC-1000 exceeds the FU-0003 are listed below.

- Can cope with a larger setup or configuration database than the FU-0003. The embedded FU-0003 processor has a limited amount of RAM memory, typically 128K bytes, that limit's the size of databases that can be stored. The SC-1000 has over 5M bytes that can store larger databases as well as multiple databases.
- Supports multiple Q-Links for expansion or redundancy. The FU-0003 can support four Q-Links when fitted with the CI-0004 module. Although these are physically separate links the processor is only able to deal with a single Q-Link message at any one time and this limits the total Q-Link bandwidth. The SC-1000 can support up to eleven Q-Links and has sufficient processing power to deal with all links simultaneously.
- Supports multiple serial devices. The FU-0003 can support two serial links when fitted with the CI-0004 module. The SC-1000 can has one setup port, one modem port, and 5 general purpose serial ports.
- Supports dual redundant controllers. The FU-0003 is only a single processor with no redundancy options. The SC-1000 chassis can be fitted with two processors that support hot swapping and auto changeover in the event of a failure.
- Supports Ethernet (10-base-T on RJ45). An FU-0003 based system can only interface to Ethernet via a PC running WinControl software. The SC-1000 has a dedicated Ethernet port for each processor module.
- Much faster system boot time. A system based on the FU-0003 works by sharing parts of its setup database with each device in the system. This allows the workload to be shared out once the system has booted up. On a large database this downloading can take up to 3 seconds per device, and with many panels on the Q-Link the total boot time becomes unacceptably long. The SC-1000 has sufficient processing power to handle **all** system operations and does not need to share its database. This gives a boot time of approximately 300mS per device.

- No disruption if panels are added when the system is 'live'. This is related to the point above. As panels are added 'live' to a FU-0003 system, all other panels see a small delay before they will respond to button presses. As the SC-1000 does not share its database there is no such delay.
- Reduced down time during reconfiguration. A system based on the FU-0003 has limited RAM memory available and can only store one setup database at any one time. To download a new database the current database has to be overwritten and so the system must be halted to prevent corrupted data being used. The SC-1000 has sufficient RAM to allow multiple databases to be stored. The system then only has to be halted momentarily as an internal database swap is performed.
- Support for SNMP network monitoring.

The SC-1000 consists of a chassis that can hold two processor cards and two power supplies. Each processor card consists of a main carrier circuit board, an industrial processor sub-module, and a front display and floppy disc assembly.

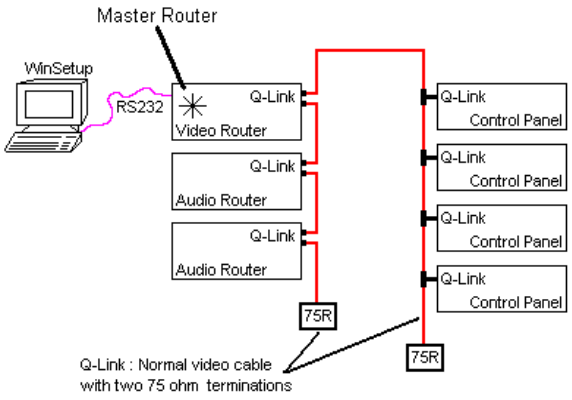
The SC-1000 includes its own mains power supply that generates 5v for internal use. A second power supply can be fitted for redundancy. Each supply has its own mains IEC inlet that is fitted with a fuse holder. The supply is auto-ranging and will work on any supply in the 90-264 volt range.

Note that the Keyboard, Mouse, VGA, Fast Link, and Composite Video connectors are reserved for future use.

Small System using Embedded Controller

All the frames and remote control panels are connected by a single coaxial link called Q-link. This link uses standard 75Ω video cables daisy-chained from frame-to-frame and panel-to-panel. Each end of the links is terminated in 75Ω.

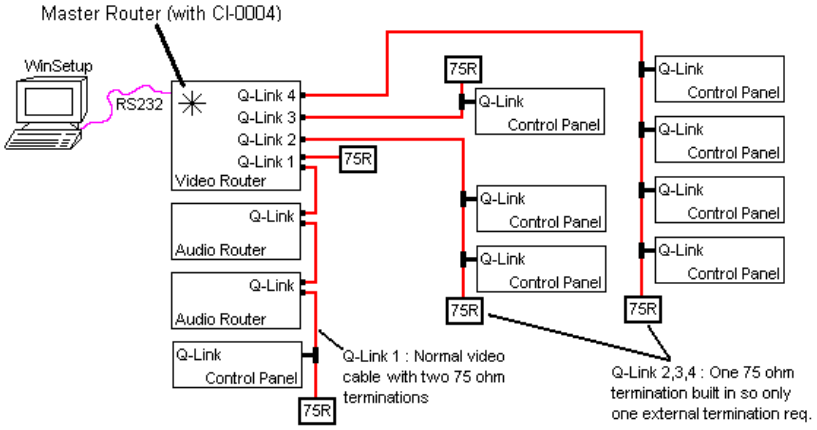
A pair of connectors is fitted to the frames and the link looped through them. On frames with several Q-Link connectors the "Q-Link-1" or "Q-Link 1a/1b" is always available. The extra Q-link connectors are only supported when a CI-0004 module is installed on to the FU-0003 processor. Only one connector is fitted on the panels and a T-piece needed to tap off the **Q-link**. In this way a panel can be removed from service and replaced without disrupting the link, even temporarily.



This daisy chain method ensures the best transmission quality of the control signals down the cable. Short cuts such as running stubs to some panels are not recommended as this may cause data errors. The maximum cable length is shown in the Technical Specification in Section 2 of this manual.
A total of 64 devices can be supported, normally organised as 16 frames and 48 panels. Each unit connected to the Q-link has its own *address* switch that is set up as part of the system setup.

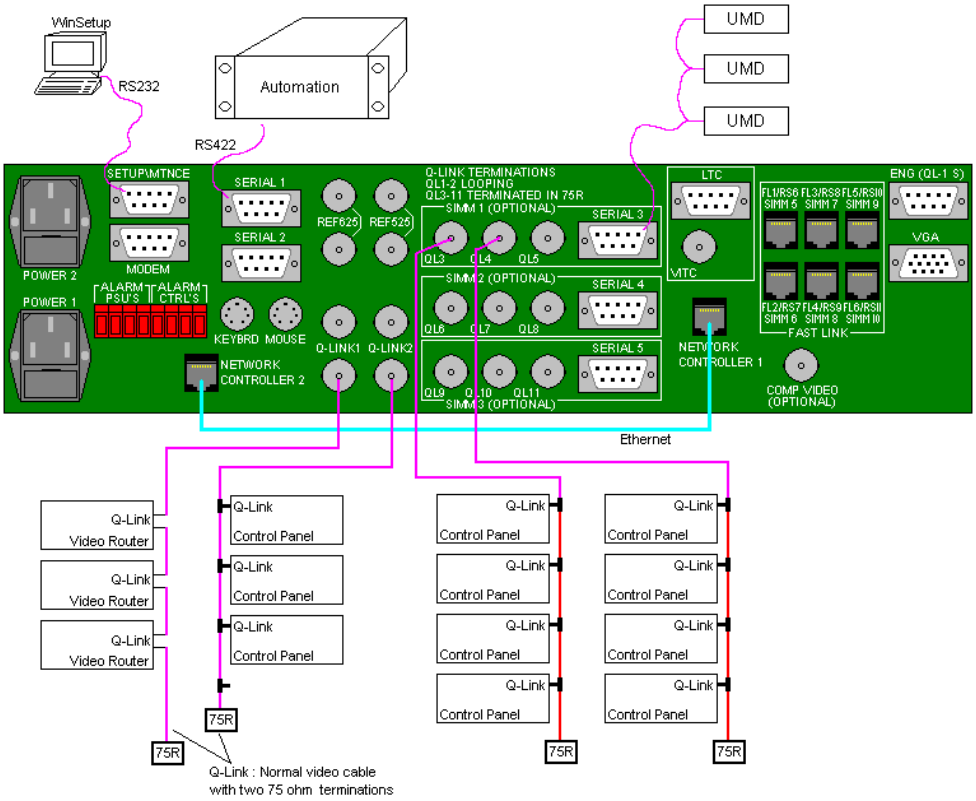
Medium System Using Embedded Controller with Multiple Q-Links

In larger systems it may be more suitable to have several Q-Links on the master frame and to wire off in different directions. This requires a CI-0004 module in the master router. Only routers of 32x32 and above have the extra BNC connectors to support a CI-0004.



Large System using the SC-1000

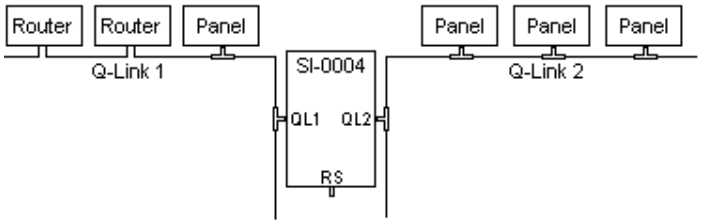
This section describes how to configure the SC-1000 to work with a typical Quartz routing system. A typical system diagram is shown below.



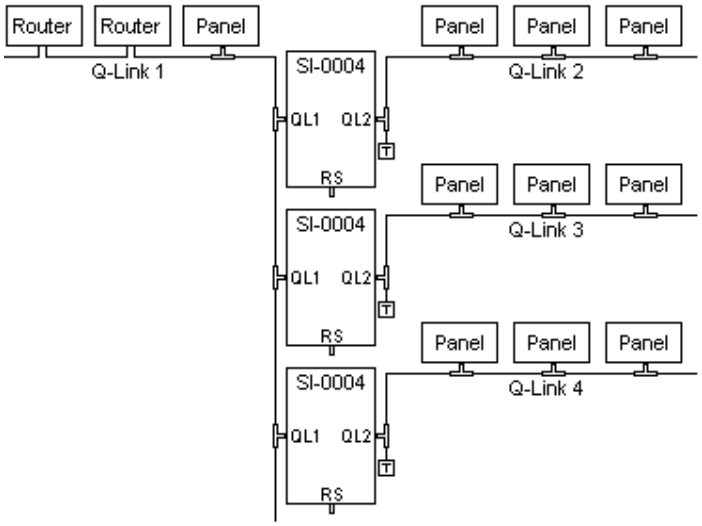
The SC-1000 is always the master of the system in which it operates. For good system performance, all frames should be on one Q-Link, and panels evenly distributed across the remaining Q-Links. Any unused Q-Links must be fitted with a 75Ω termination.

Protecting and Isolating the Q-Link

In large buildings or outside broadcast vehicles (OB trucks) the Q-Link system can be affected by mains earth differences between physically remote areas. This causes currents to flow in the outer of the Q-Link cable that can disrupt the Q-Link communications. To prevent this problem Quartz can supply a SI-0004 Q-Link opto-isolator unit.



In large buildings the SI-0004 would only be installed once a problem had been identified. In OB trucks it is good practice to install an SI-0004 between the internal Q-Link and any external 'tail gate' or bulk head patch panels. Multiple SI-0004 units can be used where several external Q-Links are required.



Refer to Application Note AN-0016 for further information on the SI-0004 interface.

System Compatibility

The SC-1000 is compatible with existing Quartz control systems using but panel and router firmware will usually need to be updated. Panels updated to work with the SC-1000 can still be used with systems operating the FU-0003 embedded processor.

WinSetup

The WinSetup program defines the precise operation of the routing system and allows the user to edit the system configuration that is stored as a file on a PC. This file is then be downloaded to the routing system. When the system powers up the configuration data is used to initialise each router and control panel as it comes on-line.

Systems using WinSetup V1.xx (16 bit application) can be easily upgraded to the new WinSetup V2.xx (32 bit application, Win95 or later) as existing WinSetup QRS files are read in to WinSetup V2 without any changes being required.

The SC-1000 can store multiple downloaded setup files in non-volatile Ram-disc or on floppy disc.

Firmware: SC-1000

The SC-1000 operational firmware is compatible with all current Quartz router and control panel hardware, but V5.4x, V6.40, or later is required in all devices connected to the SC-1000. The SC-1000 operational firmware is stored in non-volatile Ram-Disc and can be updated by download from a PC or installed from floppy disc. The SC-1000 can be supplied with many different serial port protocols pre-installed.

Firmware: Routers

All Quartz routers controlled from the SC-1000 over Q-Link must be fitted with V5.40, or V6.40, or a later issue. These versions are a superset of the existing software and have extra Q-Link commands to support the SC-1000.

Firmware: Control Panels

All Quartz control panels controlled from the SC-1000 over Q-Link must be fitted with V5.40, or V6.40, or a later issue. These versions are a superset of the existing software and have extra Q-Link commands to support the SC-1000.

Installation

Physical Installation

The SC-1000 is designed to fit into standard 19" equipment racks. Installation in a 19" rack is simple. Guide the unit through the aperture in the front of the rack until the rack-mounting flanges are flush against the side member of the rack and bolt in place with fixing screws (not supplied). Behind the unit you should allow for a depth of 485mm plus provision for the connection of external cables.

Setting the Power Line Voltage

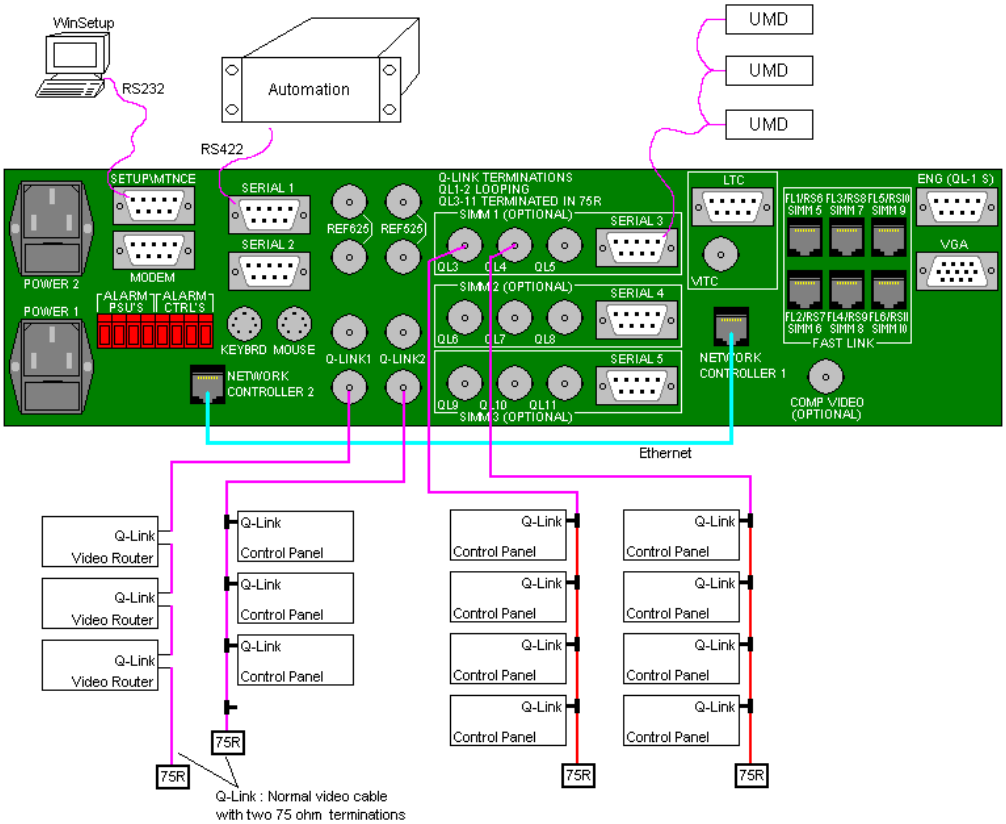
This is NOT required as the SC-1000 uses auto-ranging power supplies. The rear panel IEC inlet contains a fuse holder. Fuses should only be replaced with fuses of the correct type and rating.

Power Up Diagnostics

At power up or reset the SC-1000 performs a self-test sequence. Status LED on the front panel will light in sequence and the POST LED's on the processor module also light in sequence. The front panel display will then show "Booting……." as the operational software is started. The current setup database will then be loaded and all routers and panels brought 'on-line'. The whole process will typically take less that 30 seconds.

Configuring the SC-1000 to work in a new Quartz Router Installation

This section describes how to configure the SC-1000 to work with a typical Quartz routing system. A typical system diagram is shown below.



The SC-1000 is always the master of the system in which it operates. For good system performance, all frames should be on one Q-Link, and panels evenly distributed across the remaining Q-Links. Any unused Q-Links must be fitted with a 75Ω termination. Quartz recommends the following Q-Link use:

Q-Link	Priority	Recommended Use
1	High	Routers in central equipment room located close to the SC-1000 with a short cable run, therefore unlikely to be accidentally disconnected or damaged.
2	High	Essential panels e.g. transmission control. Keep cable run as short as possible , therefore unlikely to be accidentally disconnected or damaged.
3 to 11	Medium/Low	All normal panels, but try and group each functional area on to one Q-Link e.g. Studio 5 uses Q-Link 3, as this can make upgrades and fault location easier.

If any panels are located in different buildings, in electrically noisy areas, or locations that will be disconnected or powered up/down frequently then use one of more dedicated Q-Links for these locations.

Any panel or frame, with any address (so long as it is unique) may be attached to the SC-1000. The single BNC ports have an internal 75Ω termination that can be enabled by a link set inside the SC-1000. These links should be set before installation. The SC-1000 allows up to 16 Q-Link routers and 160 control panels to be controlled.

The number of Q-Links and Serial ports available depends on the CI-0006 SIMM options installed inside the SC-1000. The rear panel is clearly labelled.

SIMM Fitted	**Ports Enabled**
SIMM-1	Q-Link 3, 4, 5, Serial 3
SIMM-2	Q-Link 6, 7, 8, Serial 4
SIMM-3	Q-Link 9, 10, 11, Serial 5

For configuration of the system over a serial link, the SETUP/MTNCE port is available and is used in conjunction with WinSetup V2. Setup's can also be loaded from floppy disc or over the network.

For dual redundant operation a crossover network cable must be connected between the two network RJ45 connectors.

Time code in either LTC or VITC format can be connected to the SC-1000 to support timed crosspoint settings. The time code option requires a time code SIMM to be installed, CI-0008. Using Winsetup32 it is then possible to set up a simple list of routes that are to be made at specific times. The SC-1000 uses the time code input and switches the routes at the specified time.

Configuring the SC-1000 to work with an existing Quartz Routing System

If the SC-1000 is to be used with an existing Quartz routing system then the following installation instructions should be followed.

1) Make a note of your current systems configuration, in particular note the control panel addresses. You can get this information from your existing WinSetup configuration. Use the WinSetup menu System -> Compare Router Configuration to double check that the setup in the existing router is the same as the WinSetup QRS file.

2) Load WinSetup32 (requires Win95 or later). Read in your existing configuration, the QRS file and then immediately save with a later version number e.g 0123-12.QRS should be saved as 0123-13.QRS. If a problem occurs with the upgrade this will allow you to drop back to the earlier version. WinSetup32 will have converted the file to the latest format. Select Download and WinSetup will send the file to the SC-1000.

3) Upgrade all control panels to V5.40 or V6.40 or later firmware. If the panels are fitted with flash memory this is best achieved using Firmware Manager to download the new firmware. If flash is not fitted but the panels use processor module M-PU-0006 (PC-223) then this is best achieved by fitting flash memory.

To upgrade panels using Firmware Manager, first power up your existing system with all panels connected and working normally. It is a good idea at this stage to use WinSetup Q-Link Device Status to check that all panels are connected and on-line. Check your WinSetup PC also has Firmware Manager loaded and V5.40 or V6.40 (or later) firmware files. Start Firmware Manager and use the Quick Search menu and Firmware Manager will search the Q-Link for all connected devices. Use Assign Latest Version and Firmware Manager will attach the latest firmware files to the corresponding Q-Link device. Now select Program Selected Files and each panel in turn will be re-programmed with the latest firmware. The process takes approximately 3 minutes per device.

4) Upgrade all routers to PC215 V5.40 or V6.40. If the routers use M-FU-0003-0001 then this is best achieved by fitting flash memory. If an older M-FU-0003-0000 or M-FU-0001-0000 processor were in use then now would be a good time to upgrade, as the older processors do not support in circuit re-programming of the flash memory.

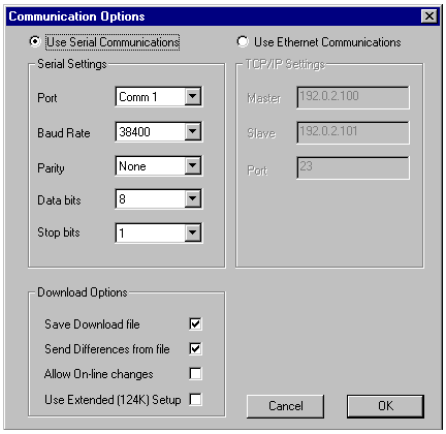
5) Use WinSetup32 to read in your configuration, the QRS file, and then select Download and WinSetup will send the file to the SC-1000.

6) Connect you existing routers to Q-Link 1. Connect your existing control panels to Q-Links 2, 3, 4, but remember that Q-Links 3-11 are optional and depend on the number of CI-0006 modules installed.

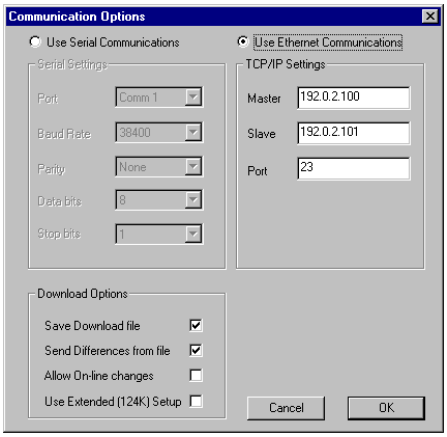
Connecting the WinSetup Computer

Once installed and powered up, the WinSetup (V2.xx) computer should be connected to the SC-1000 using either a serial connection or the Network port.

If a serial connection is being used then either the front panel D9 connector or the rear panel Setup/Maintenance connector can be used. Use the WinSetup menu Comms to select the correct COM port for your computer and check the baud rate is set to 38400, no parity, 8 data bits, and one stop bit.



If a network connection is being used then connect to either the rear panel Net connector or via a network hub. Use the WinSetup menu Comms to select the correct TCP/IP addresses for the Master controller and Slave (if dual redundant). The Port is set to 23 for Quartz standard protocol operation.



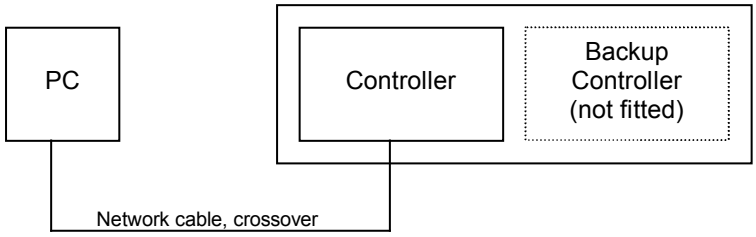
Use the WinSetup menu System -> PC Comms Window to open a communication dialog for the controller. Press the Acknowledge button a few times and the SC-1000 should reply with .A that confirms the cable, baud rate, etc are all OK.

The RJ45 Ethernet connector can also be used to download setup files from WinSetup but this feature is not currently supported.

Connecting a Network

Each SC-1000 processor has its own RJ45 network connection that supports TCP/IP protocol. In single controller installations this can be used to communicate with the controller. In dual redundant controller applications the network is also used to pass setup and route change status. There are three basic connection strategies that can be used.

1) Single Controller, Single PC
This is the simplest method and would be used to download setup files (not supported yet) or send basic engineering level commands to the controller.

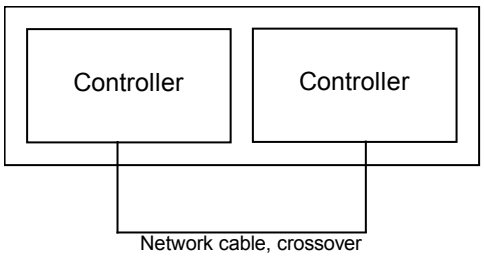


To test the network link the Ping command can be used. Assuming the factory asset TCP/IP address has not been changed then from the DoS command prompt type:

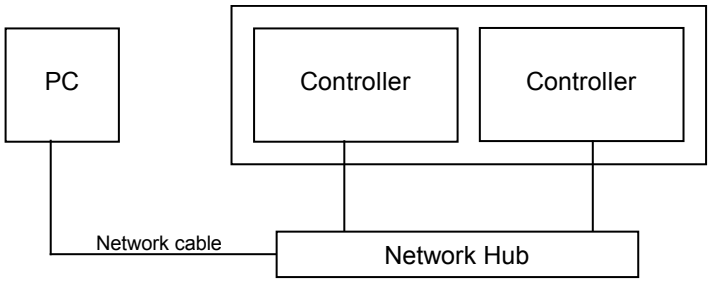
Ping 192.0.2.100

The command will show that it has had a reply if the link is OK. Alternatively the Telnet window can be used. From the Windows task bar select **Run** and type **Telnet 192.0.2.100**. A communication window will be displayed and typing carriage return several times should give a .E response from the SC-1000 controller.

2) Dual Controller, No PC
This method must be used in dual controller installations to allow the controllers to exchange setup and route status information. When the cable is correctly installed the reserve controller will have its OK LED and control button LED flashing in sync with each other.



3) Dual Controller, Multiple PC's or other devices
This method must be used in dual controller installations to allow the controllers to exchange setup and route status information and where other devices need to connect to the SC-1000. When the cables and hub are correctly installed the reserve controller will have its OK LED and control button LED flashing in sync with each other.



The TCP/IP protocol requires each device to have an address, specified as a 4 byte number e.g 192.0.2.100. Connections between devices are established by opening a 'Socket' for each connection. A good analogy is with public telephone networks. To make a telephone call you ring the number required (the TCP/IP address). The telephone system checks that there is a phone at that number and if the call is answered, allocates a dedicated connection through the network (a Socket) for the duration of your call. In a TCP/IP system one device is designed to be a server for a particular application.

With the SC-1000, one controller acts as a server for the other controller. At power up server (main) controller allocates a Socket for initial communications with any reserve controllers. The reserve controller will open a connection with the Sever (main) controller and a second Socket will be allocated, dedicated to the reserve controller. The same process is used for any further connections.

The SC-1000 is designed to support 20 Sockets at any one time. One of these is immediately allocated to the inter-controller Server function, and a second will be allocated to the reserve controller in a dual controller installation. Further sockets are allocated for the Telnet server and SMS-7000 server which normally leaves 16 Sockets for other devices to connect to.

Changing the TCP/IP Address

Each SC-1000 controller is supplied with a factory default TCP/IP address. This can be changed by a special command issued from WinSetup32 using the PC Comms Window.

The factory default addresses are:

Main (left-hand) controller	TCP/IP address = 192.0.2.100
	Sub-net mask = 255.255.255.0
Reserve (right-hand) controller	TCP/IP address = 192.0.2.101
	Sub-net mask = 255.255.255.0

The following examples assume that the addresses will be changed to:

Main (left-hand) controller	TCP/IP address = 192.168.27.200
Reserve (right-hand) controller	TCP/IP address = 192.168.27.201

First check that WinSetup is connected to the Setup serial port on the back of the SC-1000.

Check that the Main (left-hand) controller is in the controlling state with its Control LED on. From the PC Comms Window type carriage return a few times and the SC-1000 will reply with a .E response, this confirms that the serial link is good.

Type the command: .&LOCALTCPIP,192.168.27.200
The SC-1000 will reply: .&LOCALTCPIP,192.168.27.200

Type the command: .&REMOTETCPIP,192.168.27.201
The SC-1000 will reply: .&REMOTETCPIP,192.168.27.201

Note the use of the comma after TCPIP and the dot between address numbers.

To change the Sub-net mask:

Type the command: .&TCPNETMASK,255.255.0.0
The SC-1000 will reply: .&TCPNETMASK,255.255.0.0

To change the default gateway:

Type the command: .&TCPGATE,192.0.2.55
The SC-1000 will reply: .&TCPGATE,192.0.2.55

Now change control to the reserve (right-hand) controller by pressing and holding the Control button. After a few seconds the Control LED will change to the on state. From the PC Comms Window type carriage return a few times and the SC-1000 will reply with a .E response.

Type the command: .&LOCALTCPIP,192.168.27.201
The SC-1000 will reply: .&LOCALTCPIP,192.168.27.201

Type the command: .&REMOTETCPIP,192.168.27.200
The SC-1000 will reply: .&REMOTETCPIP,192.168.27.200

To change the Sub-net mask:

Type the command: .&TCPNETMASK,255.255.0.0
The SC-1000 will reply: .&TCPNETMASK,255.255.0.0

To change the default gateway:

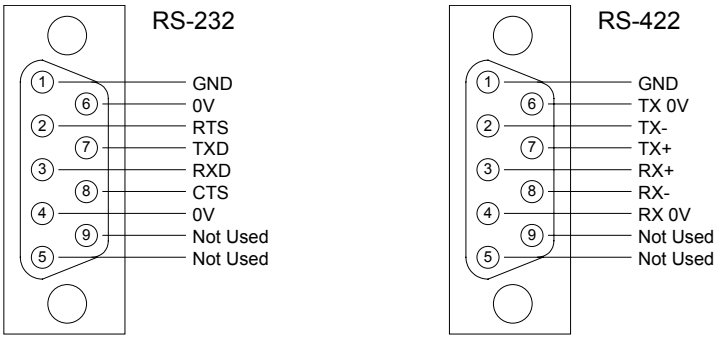
Type the command: .&TCPGATE,192.0.2.55
The SC-1000 will reply: .&TCPGATE,192.0.2.55

Note that **a reboot is required before any of the above commands takes effect**. Also note that any of the above commands can be used without an address when they will return the current setting e.g.

Type the command: .&LOCALTCPIP
The SC-1000 will reply: .&LOCALTCPIP,192.168.27.201

Front Panel Computer Port

The computer port is used to download new setup files from WinSetup, or to investigate error status information. The serial interface connector behind the front panel is a D-Type 9 way sockets using the following pin-out.

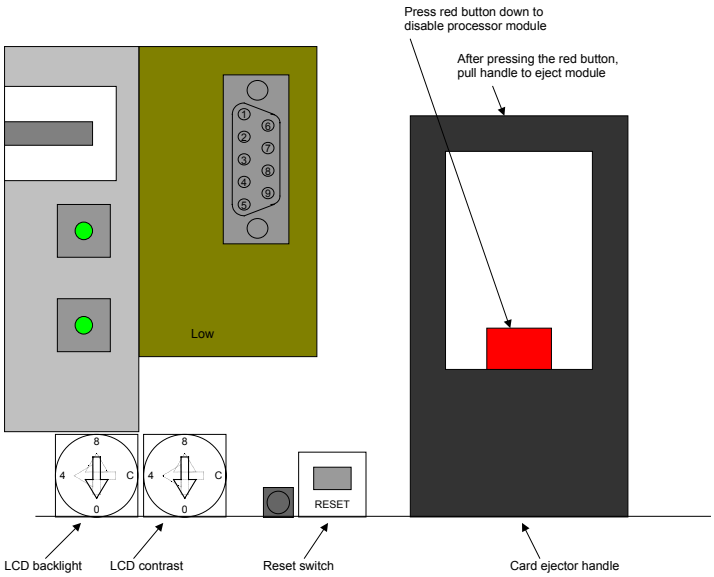


Reset Switch and Card Ejector Switch

Removing the front door reveals the processor module(s), the ejector handle and switch, and the reset switch.

Pressing the small reset switch located behind the front door can reset the processor module. Reset is normally only used after loading new software. Reset will not cause any video routes to change.

The card ejector handle has a built in red switch that must be pressed before the card can be removed. When pressed this switch causes an immediate disconnect of the processor modules external I/O circuitry (except the network port) thus preventing any disturbance to external communications as the module is removed.

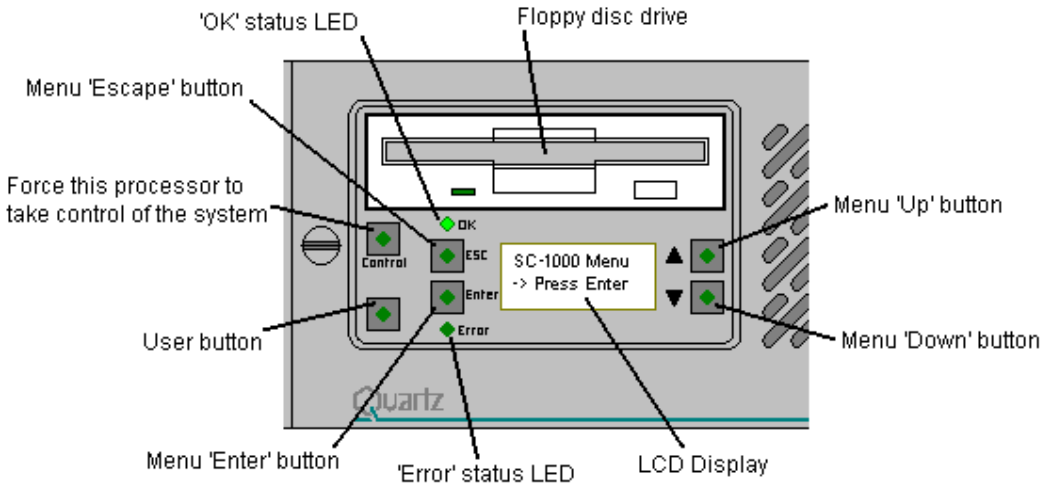


Setting SC-1000 Links and Switches

The processor module has a number of links and these will have all been factory set.

Front Panel Operation

The SC-1000 is fitted with a front panel LCD display that shows a menu structure. Buttons are provided for menu navigation and control.



OK status LED: This flashes at approx 1Hz to indicate that the processor is running. In dual controller installations the reserve controller OK LED will flash in sync with the Control LED when the external Ethernet link is working correctly.

Error status LED: This is normally off. It will come on for various error conditions such as

1. Internal software crash
2. Setup error detected, such as defining more Q-Links than exist. This will trigger a jump to a Setup Recovery menu
3. Other, yet to be defined

Control button: This is On to indicate that this processor is controlling the system. A flashing state indicates that the other (dual redundant) processor is controlling the system. To change over the flashing button must be pressed and held for a few seconds. In dual controller installations the reserve controller Control LED will flash in sync with the OK LED when the external Ethernet link is working correctly.

Enter button: Causes the currently selected menu item to be actioned. Each menu item has an *action* icon to indicate the likely effects.

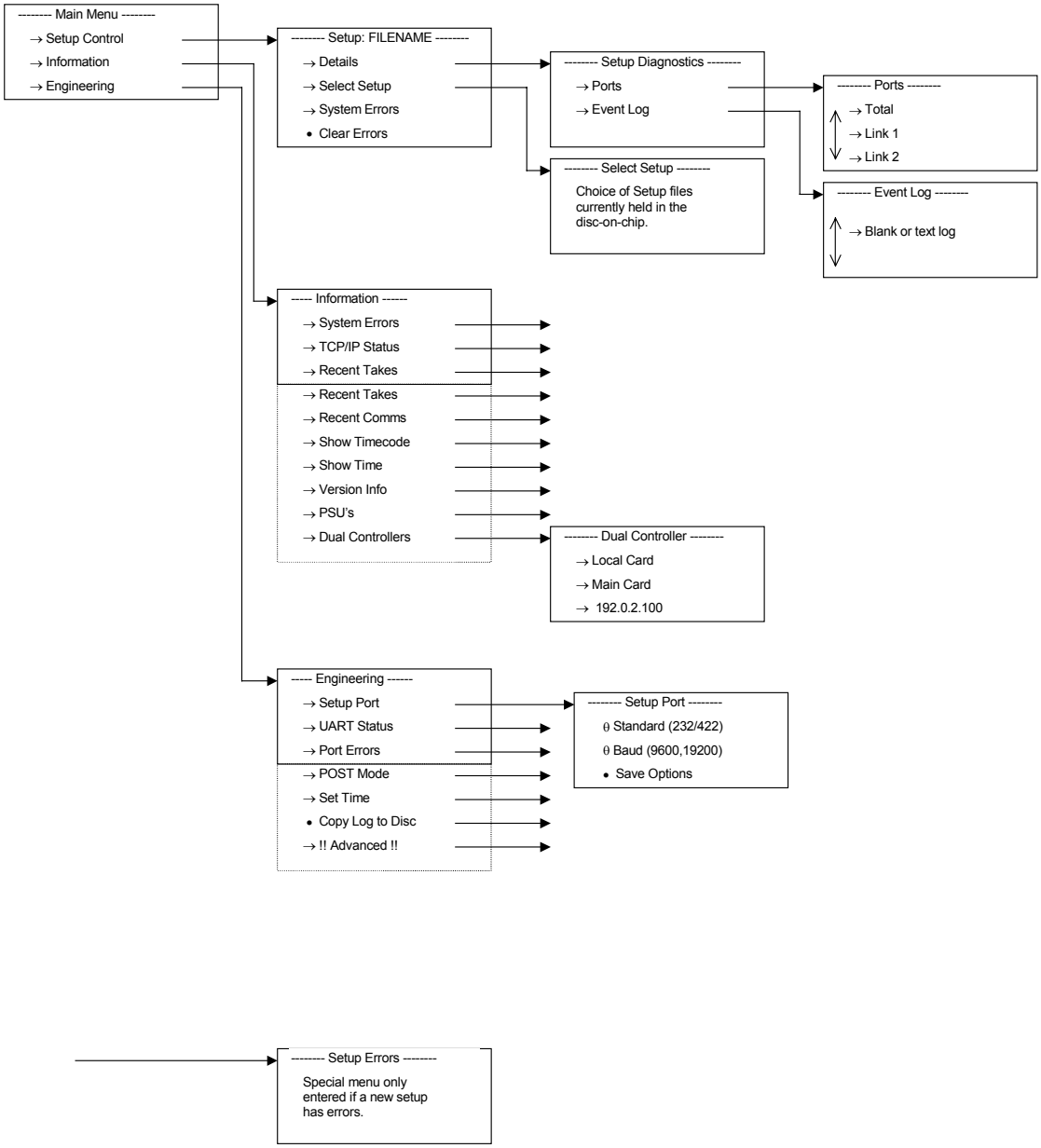
- → This menu item leads to another menu
- • This menu item causes something to change
- **s** This menu item causes a new setup to be loaded
- θ This menu item steps through options

Escape button: This causes a sub-menu to exit to the menu above. Holding the Esc button during boot up starts the SC-1000 but does not load the current setup.

Up/Down arrow button: Causes the menu cursor to scroll up or down. The LED will come on to indicate that menu items exist off the top or bottom of the screen.

User button: Not currently used.

The Menu Structure



Dual Redundant Controllers

The SC-1000 chassis will support two controllers working in a dual redundant configuration. The processors share connections on the motherboard such that one processor will be controlling the rear panel connectors while the other is in standby mode. The controlling processor has its Control LED on and the standby controller shows a flashing LED.

To transfer control the user must press and hold the flashing Control button for a few seconds, after which control will be transferred. After transferring control one-way, it cannot be transferred back until a period of approx 20 seconds has passed.

A crossover network cable connecting the two RJ45 network connectors must link the controllers. The controllers have an internal link that is used for low level communication but they require the network cable to transfer high-level data such a route status and configuration files.

Each SC-1000 controller has a TCP/IP address to allow network communication. This address is built in to the operating system kernel and is initially factory set to either

192.0.2.100	Normal address for left hand controller
192.0.2.101	Normal address for right hand controller

See the installation section for details of how to change the TCP/P address.

If a controller has to be removed from service in a live installation then the following procedure should be followed.

1) Transfer control away from the controller to be removed by pressing and holding the Control button on the other controller. The controller to be removed should then have a flashing Control LED.
2) Press the ejector handle red switch down. This will electrically remove the controller from the backplane by tri-stating all the Q-Link and RS232/422 drivers. The network is not disconnected at this stage.
3) Use the ejector handle to lever the controller out of the SC-1000 chassis.

To re-install the controller, re-insert the module and use the ejector handle the lever the card fully into the SC-1000 chassis. The red ejector switch should automatically engage. Wait for the controller to boot and display the normal operational menu. After a short period the Control and OK buttons should start to flash I sync indicating that the external network connection has been re-established. After a further period the controller should indicate that it is loading the setup file from the currently active controller. The system is then back in full dual redundant operating mode.

Third Party Interfacing

The SC-1000 can be connected to many third party devices to support typical broadcast system requirements. A general guide to the interfaces supported by Quartz can be found in application note AN-0006.

As the SC-1000 has to connect to a diverse range of products, it includes a feature to allow the internal level, destination, and source to be translated before being used by a remote control protocol. This might be used for example to convert an update on Level 1, destination 257 to an update on Level 2, destination 1 to support a device that does not cope with numbers larger than 256

Below is a summary list giving the common interfaces or those that are more specific to the SC-1000.

ABIT Automation

The SC-1000 can be controlled by an ABIT automation system. This uses Quartz native (-1) protocol operating at 38400,N,8,1.

BBC Broadcast Network Control System (BNCS)

The SC-1000 can be controlled by the BBC BNCS networked computer system. This uses Quartz native (-1) protocol operating at 38400,N,8,1.

DAL Automation

The SC-1000 can be controlled by a DAL automation system. This uses Quartz native (-1) protocol operating at 38400,N,8,1.

GVG SMS-7000 Emulation

The SC-1000 supports GVG SMS-7000 router emulation to allow connection of network devices such as the M2100 vision mixer.

This is configured from WinSetup32 using the System -> SC-1000 Configuration -> Port Options menu. Press Add and then select the TCP/IP Port. Change the Port and Protocol settings to SMS-7000 Protocol, TCP/IP Server, and in the adjacent box enter 12345 (the port number).

GVG M2100 Control Panel Aux Bus

The SC-1000 can accept information from an M2100 control panel (tub) to trigger salvoes when the M2100 changes between channels.

This is configured from WinSetup32 using the System -> SC-1000 Configuration -> Port Options menu. Press Add and then select the serial port to be used. Change the Port and Protocol settings to M2100 CP Protocol with baud rate settings at 9600,N,8,1 and RS422. In the extra protocol Information box add the salvo numbers and the channel names i.e.

```
1=”FCM1    “
2=”FCM2    “
3=”MCR1    “
4=””
```

Note that the names are padded out to 8 characters with spaces.

When the M2100 tub selects channel FCM1 it will output the text string FCM1 on its Aux-2 connector. This is received by the SC-1000, which then triggers salvo 1. If the M2100 deselects all channels then a null string is output and this will trigger salvo 4 in the above example.

Harris/Louth Automation

The SC-1000 can be controlled by a Harris/Louth automation system. This uses Quartz native (-1) protocol operating at 9600,N,8,1.

Image Video TSI-1000
The SC-1000 can connect to an Image Video TSI-1000 UMD system to allow route status to be gathered by the UMD system. The UMD system can also request source and destination names. This uses Quartz native (-1) protocol operating at 38400,N,8,1.

Odetics Automation (Airo & Roswell)
The SC-1000 can be controlled by an Odetics automation system. This uses Quartz native (-1) protocol operating at 38400,N,8,1.

Omnibus Control System
The SC-1000 can be controlled by the Omnibus networked computer system. This uses Quartz native (-1) protocol operating at 38400,N,8,1.

TSL SC-1
The SC-1000 can connect to a TSL SC-1 UMD System Controller to allow route status to be gathered by the UMD system. The UMD system can also request source and destination names. This uses Quartz native (-1) protocol operating at 38400,N,8,1.

Utah
The SC-1000 will control a Utah router. This uses Utah RCP-1 protocol.

This is configured from WinSetup32 using the System -> SC-1000 Configuration -> Port Options menu. Press Add and then select the serial port to be used. Change the Port and Protocol settings to Utah SC3 Protocol with baud rate settings that match Utah settings.

Maintenance

If you experience problems then initially refer to Section 5 of this manual for general advice on the maintenance of the system, especially those sections referring to panels.

The front door of the SC-1000 is fitted with fan filters. As these will become blocked with dust during use they should be removed and cleaned periodically. A Fan Filter warning LED on the front door indicates that the SC-1000 internal temperature is excessive, normally caused by blocked fan filters. Note that removing the front door also creates an error that will be cleared once the door is re-fitted.

Loading New Software

New software can be installed directly to the SC-1000 from floppy disc. New software is supplied by Quartz as a DOS 'boot' disc. If you have a dual controller system then it is good practice to install the software to the reserve controller and test its operation before upgrading the second controller. It is also good practice to have the current version available on disc in case of problems.

1) Check the front panel menu and record the current software version
2) Insert the Quartz SC-1000 disc into the floppy of the controller that is being upgraded.
3) Remove the front door and press the reset button.
4) The SC-1000 will display Booting…….
5) A message will be displayed "Copying Vx.xx" as the software is copied to flash disc.
6) A further message will then be displayed "Copy Complete, Press Reset"
7) Remove the floppy disc and press reset to restart the controller.
8) Check the front panel menu to confirm the new software version has loaded.
9) Check any new features are working.

In some cases it will be more convenient to supply the software upgrade by e-mail. In this case it is necessary to create a DOS boot disc before copying to software to the floppy. This requires a DOS, Windows 3.1, or Windows 95/98 machine. Use the following procedure:

1) Insert a floppy into your PC's disc drive.
2) Change to the MSDOS prompt and type **format a: /s**
3) The disc will be formatted and the system files transferred
4) Now copy the Quartz files to the floppy
   - Autoexec.bat
   - SCxxx.zip
   - Options.ini
   - Pkunzip.exe
   - Scmsg.exe

The autoexec file runs a sequence of commands to delete the current SC-1000 operational software and unzip and install the new file.

In rare cases it is necessary to upgrade the operating system kernel. This procedure is identical to that described above.

Corrupted Setup Files

There is a small possibility that the setup file could become corrupted or be otherwise unreadable due to software incompatibility. As the setup file is read and processed at power up, this could cause a situation where the SC-1000 would not boot up. If this ever occurs the front panel Esc key can be held in during boot up and the corrupted setup will be ignored. Select a new setup from the front panel or download a new setup and then re-boot the SC-1000 to commence normal operation.

SNMP Remote Diagnostics

SNMP is a network protocol that allows a 'manager' computer to gather information about remote devices. It also allows a basic level of control to the remote device. An SNMP device can be polled for information or have 'Traps' set that cause a message to be issued when a particular condition occurs. The SNMP standard also supports 'Community Names' and these are synonymous with passwords and provide a level of security against inadvertent changes. The manager software is generic and must be given some information about the device it is connecting to. MIB files provide this information and are text files supplied by the equipment manufacturer (Quartz in this case).

The SC-1000 uses SNMP version 1. Traps, and Community Names are supported and these are configured via the SC-1000's main serial port. Trap messages are sent whenever the SC-1000 would normally display the message on its local display - this means that conditions like a router falling off line can be flagged on a remote PC running an SNMP management program. Since the SC-1000 can log a wide variety of messages they are sent as plain text.

The SC-1000 also keeps a database of the status of all connected devices (panels, routers, etc). Although this is not currently available via SNMP, it can be remotely queried via a TCP/IP connection from WinSetup.

The basic tree of commands contained in the MIB file are as follows;

* control	* command	Setting this key is the same as sending a command via the serial port (to make a take etc)
	* setup	This key can be read to obtain the name of the active setup/configuration
	* controlstate	Key defines the current control state (master/reserve)
* settings	* localtcpip	The TCP/IP address of the controller
	* remotetcpip	The address of a second controller when used in a dual-redundant system
	* traptcpip	The TCP/IP address that trap messages are sent to
* information	* version	The software version/revision number
	* memory	The current used/free memory of the controller
	* simms	The number of SIMMS installed (such as additional serial comms modules)
	* diskusage	The amount of used/free solidstate disk storage
	* upperpsu	The temperature of the upper PSU (if present)
	* lowerpsu	The temperature of the lower PSU (if present)
* routestatus	* startdestination	The first destination to show the status for, via SNMP
	* enddestination	The last destination to show the status for, via SNMP
	* destinationtable	A 'table' type key that gives the route status for a range of destinations/levels.
	* destinationentry	Each entry can show up to 8 levels of route status
* history	* lasterror	The last recorded system error (that was sent as a trap)
	* lastwarning	The last recorded system warning (that was sent as a trap)
	* lastmessage	The last recorded system message (that was sent as a trap)
* traps		* traps are sent for a wide variety of conditions, generally a trap is sent whenever a message would appear on the controller module itself.

Error Logging
The front panel menu allows various logging functions to be enabled. This is intended for Quartz engineers to locate the cause of problems. All history logging should be left disabled.

Status LED's
There are status LED's on the SC-1000 main processor PCB that give engineering status information.

Global En	LD-15	
Done	LD-10	
Test	LD-14	
POST	LD1-8	
The following are only visible with the top cover removed		
B2 En	LD-18	
B1 Add En	LD-17	
B1 En	LD-16	
Done FT	LD-11	
Pwr Rst	LD-13	

Main Module Links
The processor module has a number of links and these will have all been factory set.

Link	Function	Factory Setting
LK-4	CTP2, RS422 or RS232	
LK-5		
LK-6	RS1 Term	
LK-7	RS1, RS232 or RS422	
LK-8	RS2 Term	
LK-9		
LK-10	RS2, RS232 or RS422	
LK-11	Keyboard Enable	Sw Ctrl
LK-14	Eng or PROM	Eng
LK-21		
LK-22		
LK-24		
LK-25	Setup/Term	
LK-26	SA13 or BCLK	SA13
LK-27	CLK8M or BCLK	CLK8M
LK-28	Init	
LK-29		Towards front
LK-30		
LK-31	FT Module SIMM5 fitted or not fitted	
LK-32	FT Module SIMM6 fitted or not fitted	
LK-33	FT Module SIMM7 fitted or not fitted	
LK-34	FT Module SIMM8 fitted or not fitted	
LK-35	SIMM Use, FT or CI-0006	
LK-36	SIMM Use, FT or CI-0006	
LK-37	SIMM Use, FT or CI-0006	
LK-38	SIMM Use, FT or CI-0006	
LK-39	SIMM Use, FT or CI-0006	
LK-40	SIMM Use, FT or CI-0006	