

Application Note AN-0009

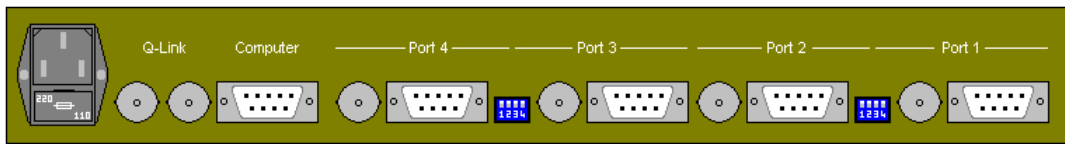
SI-0002 Multi-Mode Serial Interface

Quartz routers use a communication system called QLink that allows routers and panels to be connected together using a single co-ax 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 (RS232/422) ports for connection to third party equipment.

The daisy chained Q-Link system is simple to install but has a limit of 32 devices that can be connected to it. For larger systems requiring more than 32 devices the SI-0002 provides multiple Q-Links allowing up to 64 panels and routers to be connected on five separate Q-Links. When the SI-0002 is used in Q-Link mode it has to be the system master and so only one SI-0002 can be used in a system in this mode.

In any system, if the Q-Link is accidentally cut it will cause loss of control from all control panels 'down stream' of the damage. In certain types of application the SI-0002 can be used simply as a multiple Q-Link device to limit system failure only to the Q-Link segment that is damaged. This is very relevant in outside broadcast (OB) vehicle applications where long cables external to the OB are used. In this example, one Q-Link would be used inside the OB and four Q-Links distributed outside.

The one or two RS232/422 ports on each router can be limiting where the system has only a few routers but requires multiple serial ports. For these applications the SI-0002 can be used in Serial (RS) mode to give five separate feeds of RS232/422 data. Multiple SI-0002 units can be stacked together to give yet more serial ports. An SI-0002 working in RS mode can be either the system master or a system slave device.

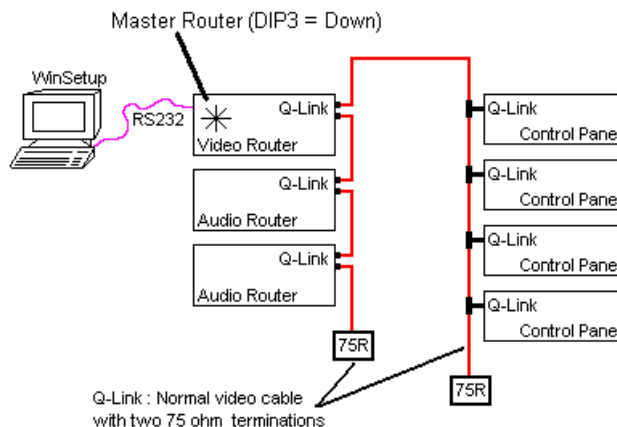


This application note describes the hardware and software requirements of the Quartz equipment and shows typical uses.

From the 1st November 1998 all SI-0002 interfaces were fitted with the FU-0003 processor option, which operates all RS232/422 serial ports at 38400 baud. A section at the end of this application note describes the older product that was fitted with the FU-0001 processor and operated at 9600 baud.

Typical Quartz Router System

A typical Quartz router system is shown below



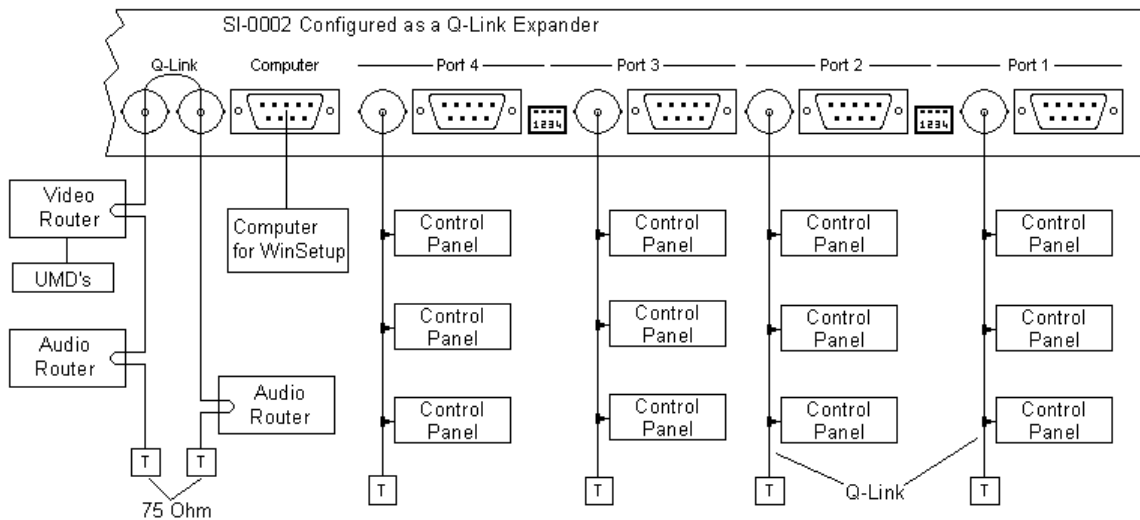
The router system has one of the routers set as a master (*), in this case the video router. The master holds the system setup and controls the Q-Link communication. All other Quartz routers and control panels are slave devices.

The system will support 32 devices on the Q-Link with a maximum of 16 routers. With a typical system using four routers (video + dual audio + time code) this leaves 28 panels that can be added.

The RS232 link is optional but allows either the setup of the router to be changed (only if connected to the master) or the computer to control the router. For the RS232/422 link to work the router must have DIP-2 in the down position and the links correctly set for RS232 or RS422. Older products may also require a computer interface module (CI-0001) to be fitted.

SI-0002 in Q-Link Expander Mode

A router system using a SI-0002 fitted with FU-0003 processor working in Q-Link mode is shown below. When used as a Q-Link expander, the SI-0002 is always the system master.



The main QLink connectors would normally link to any routers in the system, leaving the port QLink connectors for panels.

The computer link is optional but allows a computer to control the router. If WinSetup is to be used to change the configuration of the router, then the PC serial link must be connected to the SI-0002, as this is the master. The internal processor DIP-2 switch must be set to the down position to enable this connector. The port operates at 38400 baud, no parity, 8 data bits, 1 stop bit.

In Q-Link mode the port BNC connectors provide four separate Q-Link feeds and the port D9 connectors are not used. The DIP switches are organised as two DIP switches per port i.e port 1 uses DIP-3 & DIP-4, port 2 uses DIP-1 & DIP-2

- Set the internal processor DIP-3 switch to Down (system master)
- Set the internal processor DIP-4 switch to Up (S/W to Q-Link mode)
- Set the rear panel DIP switch pairs to Up, Up (H/W to Q-Link mode)

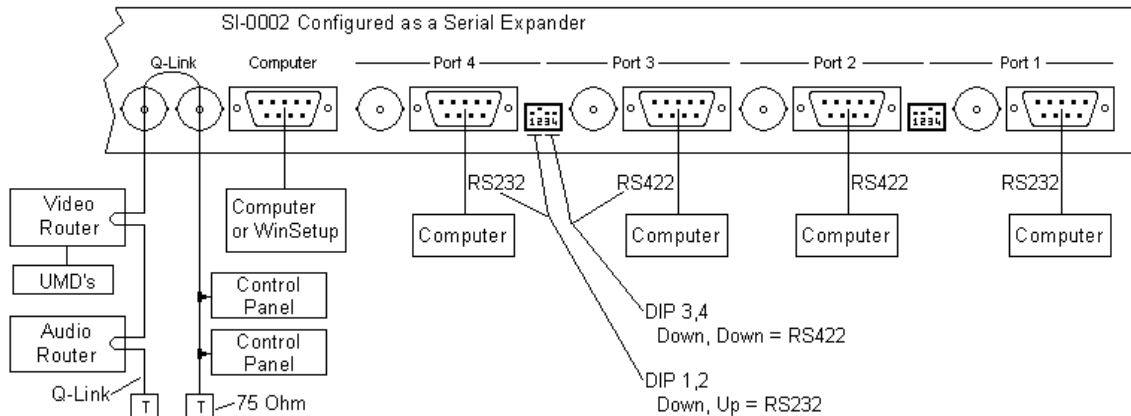
The system will support 64 devices on the Q-Link's with a maximum of 16 routers. With a typical system using four routers (video + dual audio + time code) and the SI-0002 this leaves 59 panels that can be added.

In Q-Link mode all unused Q-Link connectors must be fitted with a 75ohm termination for correct operation.

If the SI-0002 emits a beep...beep...beep sound at power up or reset then the rear panel DIP switches are set in a mode that is incompatible with the internal processor DIP-3 and DIP-4 switches. Check all the DIP switch settings and then press reset.

SI-0002 in Serial Expander Mode (RS232/422)

A router system using a SI-0002 fitted with FU-0003 processor working in serial (RS) mode is shown below. When used as a Serial expander, the SI-0002 can be either a system master or slave.



The main Q-Link connectors would normally link to any routers in the system. If internal processor DIP-3 is up then the SI-0002 will be a system slave and another Q-Link device must be configured as a master. If DIP-3 is down then the SI-0002 is the system master and must hold the System Setup.

The computer link is optional but allows a computer to control the router. If the SI-0002 is the system master then WinSetup PC serial link must be connected to the SI-0002. The internal processor DIP-2 switch must be set to the down position to enable this connector. The port operates at 38400 baud, no parity, 8 data bits, 1 stop bit.

In Serial mode the port D9 connectors provide four separate RS232 or RS422 feeds and the port BNC connectors are not used. The DIP switches are organised as two DIP switches per port i.e port 1 uses DIP-3 & DIP-4, port 2 uses DIP-1 & DIP-2

- Set the internal processor DIP-3 switch to Down (system master) or Up (system slave)
- Set the internal processor DIP-4 switch to Down (S/W to RS mode)
- For RS232 set the rear panel DIP switch pairs to Down, Up (H/W to RS232 mode)
- For RS422 set the rear panel DIP switch pairs to Down, Down (H/W to RS422 mode)

The ports operate at 38400 baud, no parity, 8 data bits, 1 stop bit.

The system will support 32 devices on the Q-Link with a maximum of 16 routers. With a typical system using four routers (video + dual audio + time code) and the SI-0002 this leaves 28 panels that can be added.

If the SI-0002 emits a beep...beep...beep sound at power up or reset then the rear panel DIP switches are set in a mode that is incompatible with the internal processor DIP-3 and DIP-4 switches. Check all the DIP switch settings and then press reset.

Ordering Information

- SI-0002** Standard unit to be used as Q-Link expander or RS expander.
- SI-0002-7** Q-Link expander for interfacing between Third party control systems and Quartz standard Q-Link panels.
- SI-0002-20** RS expander for connection to stand alone -S7 panels operating on RS422 or RS232 links, e.g. CP-3201-S7

Fault Diagnosis

The SI-0002 emits a beep...beep...beep sound at power up or reset : This is a warning caused when the rear panel DIP switches are set in a mode that is incompatible with the internal processor DIP-3 and DIP-4 switches. Check all the DIP switch settings and then press reset.

The SI-0002 in Q-Link mode is slow to respond to panel button presses: This is caused when the Q-Link devices are not spread evenly about the five Q-Link connectors. Try and put an equal number of devices (panels and routers) on each Q-Link. Ensure that any unused Q-Links are terminated with 75 ohms.

Can I get more information when the SI-0002 is operating : Yes. With WinSetup connected to the Computer connector, select the 'System->PC Comms Window' option. On the SI-0002 place internal processor DIP-2 switch in the up position. Press reset and the SI-0002 will output a stream of diagnostics messages. You should see a sequence something like:

```
SI-0002 Application code
S/W: 4.20
Compiled Oct 14 1998 at 12:44:23
Board type (bf): PC170 Q-link expansion (variant 00)
UART 1 H8 internal
UART 2 H8 internal
UART 3 16552a
UART 4 16552b
UART 5 16552a
UART 6 16552b
Mode: Q-Link
Status: Master
Q-Link address: 00
Delay (Note 1)
Check vector table
Vector table OK (Note 2)
Ptab from ROM to RAM
Check NVRAM status
Initialise local panel
Initialise xtab
Initialise ntab
Initialise routes
Dummy poll
Start up quick polls
CP-1600 detected, port 1, addr 0x1c (Note 3)
.. Sending device table
.. Sending route settings 3 2 1
.. CP-1600 on-line, port 1, addr 0x1c
Initialise computer port
Main loop (Note 1)
Take by device 0x1c on L=0x07, D=1, S=2 (Note 4)
```

Note 1: If the SI-0002 is a slave then the next message after 'Delay' will be 'Main loop'

Note 2: If the vector table is corrupted then the SI-0002 will report 'Vector table corrupted, setting to zero'. You will need to download a setup into the SI-0002.

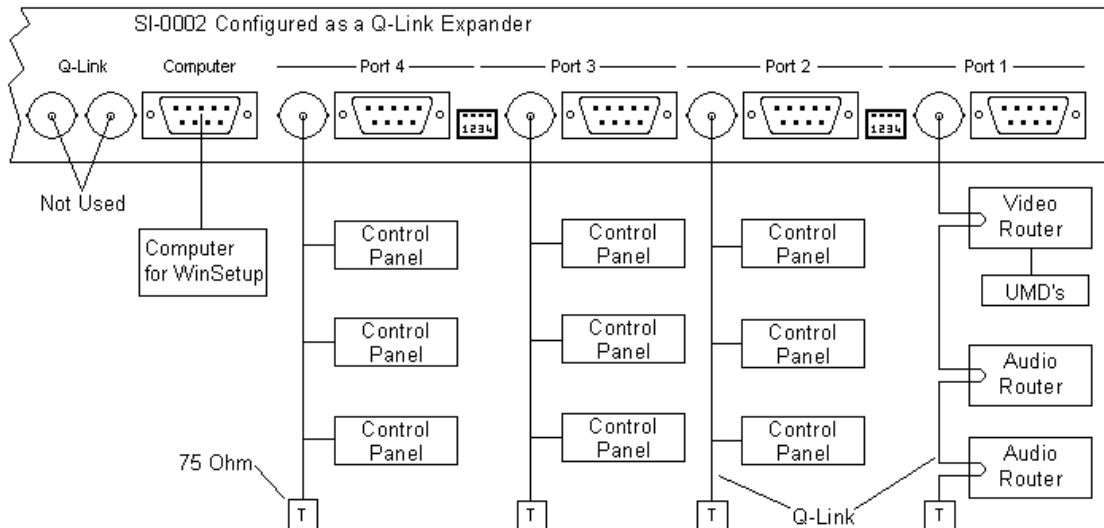
Note 3: This section is dependant on the system configuration and will be repeated for each device found on the Q-Link. The main Q-Link connector is referred to as 'port 0'.

Note 4: This message is output when a panel makes a route change.

Appendix A: Old Versions of SI-0002 Hardware and Software

From the 1st November 1998 all SI-0002 interfaces were supplied with the FU-0003 processor option. Older product was supplied with the FU-0001 processor and this imposed certain limitations on the SI-0002 operation.

SI-0002 in Q-Link Expander Mode: A router system using a SI-0002 with FU-0001 in Q-Link mode is shown below:



In Q-Link mode the port BNC connectors provide four separate Q-Link feeds. In this mode the port D9 connectors are not used. The DIP switches are organised as two DIP switches per port i.e port 1 uses DIP-3 & DIP-4, port 2 uses DIP-1 & DIP-2

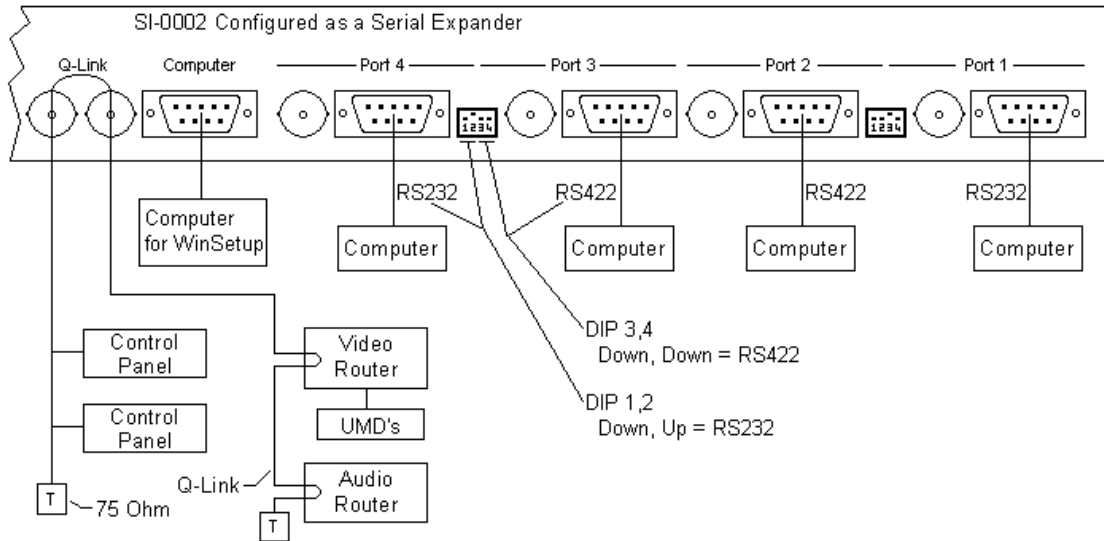
SI-0002-Q software must be fitted.

Set the rear panel DIP switch pairs to Up, Up.

The computer link is optional but allows a computer to control the router. If WinSetup is to be used to change the configuration of the router, then the PC serial link must be connected to the SI-0002 as this is the master. In either case the computer interface module (CI-0001) must be fitted inside the SI-0002 and internal processor DIP-2 must be set to the down position.

The system will support 64 devices on the Q-Link with a maximum of 16 routers. With a typical system using four routers (video + dual audio + time code) and the SI-0002 this leaves 59 panels that can be added.

SI-0002 in Serial Expander Mode (RS232/422): A router system using a SI-0002 with FU-0001 in serial (RS) mode is shown below:



The SI-0002 has four serial ports operating in RS232 or RS422 mode. In addition any other router can be fitted with a CI-0001 to enable more RS232/422 interfaces.

The port BNC connectors are not used in this mode. The DIP switches are organised as two DIP switches per port i.e port 1 uses DIP-3 & DIP-4, port 2 uses DIP-1 & DIP-2

SI-0002-R software must be fitted.

For RS232 set the rear panel DIP switch pairs to Down, Up.

For RS422 set the rear panel DIP switch pairs to Down, Down.

For both modes set the internal processor DIP-2 to Down

If the setup of the router is to be changed then the computer operating the setup software must be connected to the master. This can be the SI-0002 or any router. In either case the computer interface module (CI-0001) must be fitted and processor DIP-2 must be set to the down position.