



SC-40 Routing and Control System



System Setup and Operations Guide



SC-40 Routing and Control Customizing Guide

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FCC Compliance (USA) and Digital Equipment Compliance (Canada)

This equipment has been tested and found to comply with the limits for a Class A, digital device, pursuant to Part 15, Subpart B of the FCC Rules and the Canadian EMC Requirement (ICES-003). These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case, the user will be required to correct the interference at their own expense. Shielded cables must be used to ensure compliance with the FCC Class A limits.

Declaration of Conformity

Utah Scientific, Inc.

4750 Wiley Post Way, Suite 150
Salt Lake City, Utah 84116-2878 U.S.A.

We declare our sole responsibility that the Utah-400 Digital Routing Switcher is in conformance with the following standards:

Emission

- EN55022:1994+A1&A2

Immunity

- EN55024:1998
- EN61000-3-2
- EN61000-3-3

Safety

- IEC 60950-1:2001 /EN 60950-1:2001

Following the provisions of the Directive(s) of the Council of the European Union:

- EMC Directive 89/336/EED
- Low Voltage Electrical Directive 72/23/EEC

Utah Scientific, Inc. hereby declares that the product specified above conforms to the above Directive(s) and Standard(s).



Important Safeguards and Notices

This section provides important safety guidelines for the Operator and Service Personnel. Specific warnings and cautions are found throughout the guide where they apply, but may not appear here. Please read and follow the important safety information, specifically those instructions related to risk of fire, electric shock, or injury to persons.

Safety Symbols



- Hazardous Voltage symbol



- Caution symbol. The product is marked with this symbol when it is necessary to refer to the manual to prevent damage to the product.

Warnings

Please observe the following important warnings:



- Any instructions in this guide that require opening the chassis, changing a power supply, or removing a board, should be performed by qualified personnel only. To reduce the risk of electric shock, do not perform any service unless you are qualified to do so.
- Heed all warnings on the unit and in the operating instructions.
- Do not use this product in or near water. Disconnect AC power before installing any options or servicing the unit unless instructed to do so by this manual.
- This product is grounded through the power cord ground conductor. To avoid electric shock, plug the power cord into a properly wired receptacle before connecting the product inputs or outputs.
- Route power cords and other cables so they won't be damaged.
- The AC receptacle (socket) should be located near the equipment and be easily accessible.
- Disconnect power before cleaning. Do not use any liquid or aerosol cleaner - use only a damp cloth.



- Dangerous voltages exist at several points in this product. To avoid personal injury, do not touch exposed conductors and components while power is on. Do not insert anything into either of the systems two-power supply cavities with power connected.
- Do not wear hand jewelry or watches when troubleshooting high current circuits, such as power supplies. During installation, do not use the door handles or front panels to lift the equipment as they may open abruptly and injure you.
- To avoid fire hazard when replacing fuses, use only the specified correct type, voltage and current rating as referenced in the appropriate parts list for this product. Always refer fuse replacement to qualified service personnel.
- Have qualified personnel perform safety checks after any service.

Cautions

Please observe the following important cautions:



- When installing this equipment do not install power cords to building surfaces. To prevent damage when replacing fuses, locate and correct the problem that caused the fuse to blow, before reconnecting power.
- Use only specified replacement parts

Notices

Please observe the following important notes:



- When the adjacent symbol is indicated on the chassis, please refer to the manual for additional information.
- For the HD-2020 Chassis and Master Control Panel, refer to “Connecting and Disconnecting Power” - Chapter 2 (Hardware Installation).

Company Information

Utah Scientific, Incorporated

**4750 Wiley Post Way, Suite 150
Salt Lake City, Utah 84116-2878 U.S.A.**

- Telephone: +1 (801) 575-8801
- FAX: +1 (801) 537-3098
- Technical Services (voice): +1 (800) 447-7204
- Technical Services (FAX): +1 (801) 537-3069
- E-Mail -General Information: info@utsci.com
- E-Mail -Technical Services: service@utsci.com
- World Wide Web: <http://www.utahscientific.com>
- **After Hours Emergency:** +1 (800) 447-7204. Follow the menu instructions for Emergency Service.

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- Return of the price paid, or
- Repair or replacement of the software or hardware that does not meet the above warranties and is returned to Utah Scientific under the returned materials authorization (RMA) process with freight and forwarding charges paid.

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Warnings and Cautions

Warning



The SC-40 Control System is designed to be continuously powered up. The power socket should be located near the equipment and easily accessible in case of an emergency.

Potentially lethal AC voltages are present when the SC-40 AC System is powered up. This equipment should be operated and maintained by technically qualified personnel.

Caution



Your warranty does not cover damage resulting from improper handling of, repairs to or unauthorized modifications of your equipment. Refer to the warranty page for further information.

This equipment contains components that are susceptible to damage from electro-static discharges. A static safe environment, including workstations, tools and containers, is recommended when handling or shipping circuit cards or equipment.

Claims Against the Carrier

Visually inspect the container your equipment was shipped in. You should receive cartons in good condition with no visible physical damage such as tearing, crushing puncture or water damage.

Make a note of any physical damage to the shipping containers before unpacking them. If possible, note any damage on the shipping invoice from the carrier before you sign for it. In some cases it may be useful to take pictures of the damage to present to the carrier if a claim must be made.

As the SC-40 is unpacked for installation, carefully check for any internal damage. Examine the frame and contents carefully as rough handling may dislodge cards and/or power supplies and cause internal damages not readily noticeable until the equipment is powered up.

File all damage claims with the carrier and contact Utah Scientific for further instructions.

Note: Utah Scientific assumes no responsibility for loss or damage to equipment in shipment. You must direct all claims related to such damage to the insurer and / or carrier. Do not return damaged items to Utah Scientific until your claim is authorized and Utah Scientific provides you with a Returned Materials Authorization (RMA).



Overview

The SC-40 Compact System Controller manages analog, digital, and HDTV signal distribution. The SC-40 allows the operator to centrally and monitor existing routers and master control switches over a single, unified control network, and is configured as a single or redundant controller.

The SC-40 contains the SC-400 controller card, and the control software residing within the SC-40 is the U-CON system configurator and rMan router management program. The controller is fully compatible with UTSCI's SoftPanel products, which include the router control applications for iPad and Android tablets.

System Connections

The SC-40's U-Net control panel port provides high speed connections between the UCP and SCP Series control panels and the SC-40 controller. Industry standard RJ45 connectors allow wiring of the control panels, while the Ethernet port allows network connections using standard Ethernet LAN topologies. The Ethernet interface is used for making system configuration changes via the U-Con system configuration utility or for remote routing switcher control. A 10/100-baseT connection allows the use of standard Ethernet devices for interfacing to the SC-40. This interface, along with a published control protocol, provides the user with control application capability.

Three RS-232/422 serial control ports allow remote computer control and/or automation software control of the SC-40 control system. These serial control ports can also be used to communicate with third party routing switchers and external devices such as Under Monitor Displays and tally control systems.

The MX Bus is a high speed control link that connects the SC-40 to the UTAH Series routing switchers.

The Alarm Connector provides external connection of the SC-40's internal operating alarms including power supply voltage and temperature and CPU failure alarms. The GPI/O connectors allow for the connection of contact closures to provide remote control of certain operations of the SC-40 such as changeover between the main and backup controller boards.

The Sync Reference input for SD and HD signals is used to generate a SMPTE RP168 compliant switch command that switches the crosspoints during the vertical blanking interval.



Operation

The SC- 40 LED Indications

- The 'Ready' LED indicates whether or not the cards are in sync and communicating with one other.
- Active, which indicates the 'controlling' card when the board is part of a redundant pair. The LED is green (ready) when the card is in default status. The current default card will give up control to its alternate when the **changeover** button is pressed.
- Power Ok. All power supplies are functional.
- Power Error indications. Located behind the Power Ok LED, these will illuminate to indicate a problem with a specified power supply.
- Battery Error. Will illuminate when the battery is low.
- Sync LED -- Will illuminate when an NTSC composite signal is in place -- allowing vertical interval switching.
- Ethernet link -- Illuminates when the ethernet port is in use.

SC-40 Jumper Settings

- J2 Switch -- Used to clear the RAM
- JP1 -- Serial Port 1 -- **RS-232**
- JP2 -- Serial Port 2 -- **RS-422**

SC-40 Dipswitch Setting

User Switch 0

When set, the system will initiate a software load, though the Linux application itself will not start. This is typically used for factory troubleshooting.

User Switch 1

User switch 1 determines which of the two memory banks is in use. A change to either memory partition (0 or 1) will not affect the other. The actual switch position determines which memory partition is in use.

User Switch 5

Used to start the Linux operating system, but not the actual application.

User Switches 2 - 4

Undefined at this time.

Bypass Switch

Also used for factory troubleshooting. The default configuration is all switches positioned toward the silkscreened numbers, or to the *right* as the board is viewed from the front.

Hardware Features

The SC-40 Control System is normally shipped with the following components:

- One SC-40 Chassis
- Two Power supplies (Redundancy is supplied as standard)
- Two SC-40 Control Cards (Redundancy is supplied as standard)
- Two Power Cords
- Two (2) MX-Bus Terminator
- 8 UNET Terminators
- One PC to RJ-45 Adapter Plug
- One SC-40 Control System Users' Guide

Front Cover Features

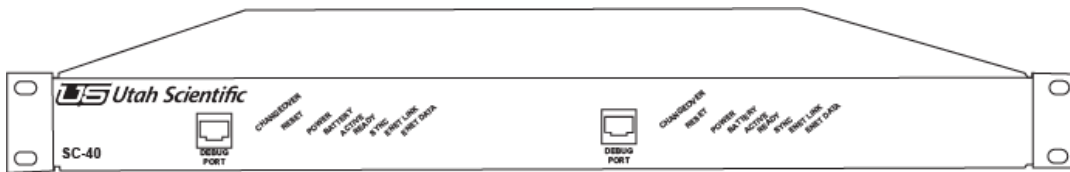


FIGURE 1-1. SC-40 Front Panel Components

Figure 1-1 shows the components of the SC-40 Front Panel. The function of each component is explained in the Table below.

TABLE 1-1. SC-40 Front Panel Functions

Component	Function
Release Latch(s)	Releases the front cover when each latch is moved toward the center of the chassis.
Power Supply Light Pipes	Will show “Green” when both supplies are operating properly, “Red” indicates a fault
Clear Display Lens	Allows the user to view the current display mode without removing the front cover.

SC-40 Chassis Front

With the front cover removed the following components are visible from the front:

- The SC-40 Control Boards (Normally shipped with two control boards).
- Two Power Supplies.
- One Chassis Monitoring (Display) Module.

TABLE 1-2. SC-40 Chassis Internal Component Functions

Component	Function
Power Supplies	115 VAC – 230 VAC, auto sensing
Monitor / Display Board	Selects and displays SC-40 system parameters
Control Boards	Provides Control and Configuration

SC-40 Control System Backplane

The SC-40 Backplane provides all of the connections necessary to control Utah Scientific equipment.

- The SC-40 backplane is arranged into the following groups of connectors:
 - RJ-45 UNET Connector
 - RJ-45 ENET Connector
 - Sync Reference
 - Two MX-Bus Connectors (25 pin D Connector – Female)
 - Six Control Connectors (9 pin D Connector – Female)
 - Alarm Connector (9 pin D Connector – Female)

Figure 1-3 shows the complete backplane identifying all of the groups above.

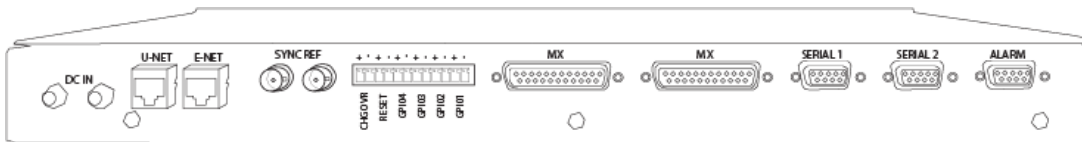


FIGURE 1-2. SC-40 Backplane

TABLE 1-3. Backplane Connections and Functions

Port	Function
DC In	Connection for the DC Line Power Adapter
UNET	For use with UNET based control panels.
Ethernet	Standard Ethernet Port
Alarm	SMPTE and Remote Alarm 0 – 3.
Serial	Hardware selectable as RS-232 / RS – 422.
Sync 1 - 3	NTSC Black Burst, PAL Black Burst, or TRI-Level Black Burst
MX-Bus	Two MX-Bus Connectors (25 pin D Connector – Female)



Specs

Mechanical Dimensions: 19"W x 13" D x 1.75"H (1 ru EIA rack mount)

Connectors: Sync:

Network Ports:

GPI/O Connector:

Alarm Port:

Serial Control Ports:

MX-Bus Ports:

BNC (looping inputs for analog PAL, NTSC, or HD (tri-level) sync signals)

RJ-45 (Ethernet, U-Net)

Terminal Strip (four pairs of contacts)

DB-9F Subminiature 9-pin D connector with female pins.

DB-9F Subminiature 9-pin D connector with female pins (3 ea)

DB-25F Subminiature 25-pin D connector with female pins (2 ea)

Environmental: Temperature:

Relative Humidity:

10-40 °C

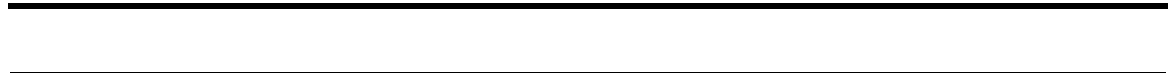
0-90% (non-condensing)

AC Power: 110 / 240VAC

50 / 60 Hz

Consumption is 20 VA max.

Redundant external power supply option





In this Guide

This guide provides information on installing, configuring, and operating the SC-40 Control System. The following chapters and appendices are included.

- Chapter 1: “**Introduction**” summarizes the guide and introduces the SC-40 Control System.
- Chapter 2: “**Hardware Installation**” provides installation instructions for the user. Includes some “do’s” and “don’ts” regarding the installation.
- Chapter 3 “**System Configuration**” provides information the user needs to know when setting up or changing the SC-40 Control Boards.
- Chapter 4 “**Operations**” offers a detailed description of connections, software setup, and SC-40 system operations.

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How to use this Guide

The chapters in this guide follow a logical sequence from the introduction through specifications.

- Read this chapter “**Introduction**” to familiarize yourself with the product and its components.
- Follow the instructions in “**Hardware Installation**” to install the SC-40 Control System and related components including control panels signal levels and inter-system communications.
- The chapter on “**System Configuration**” relates directly to the SC-40 Control Card(s) and what can be configured on them.
- “**Operations**” describes operational commands that can be sent to the SC-40 via Telnet or the system debug port. This section also describes various status messages available at the debug port.

Front Panel Layout

LED Indications

- The 'Ready' LED indicates whether or not the cards are in sync and communicating with one other.
- Active indicates the 'controlling' card when the board is part of a redundant pair. The LED is green (ready) when the card is in default status. The current default card will give up control to its alternate when the **changeover** button is pressed.
- Power Ok. All power supplies are functional.
- Battery Error. Will illuminate when the battery drops below 3.0v. (The normal condition is green.)
- Sync LED -- Will illuminate when an NTSC composite or tri-level signal is in place -- allowing vertical interval switching.
- Ethernet Link -- Illuminates green when the ethernet port is connected to a network.
- Ethernet Data -- Illuminates amber when the ethernet port is in use. The light will flicker as data is transferred over the network.

Physical Switches

- Changeover -- The switch on the active card may be pressed to swap control to the backup card. This switch works in conjunction with the "ready" LEDs. The "ready" LED must be green on both cards, otherwise this switch will not function.
- Reset -- This switch may be used to restart control to the active SC-40. Follow this sequence to properly reset the active control card.
 - (1) Press the reset button on both cards at the same time, (2) release the reset button on the active card, (3) release of the reset switch on the backup card.

Hardware Features

The SC-40 Control System is normally shipped with the following components:

- (1) SC-40 Chassis
- (1) DC Power supply
- (1) SC-400 Control Card (Redundancy is optional)
- (2) MX-Bus Terminators
- (1) UNET Terminator
- (1) 9-pin to RJ-45 Adapter Plug (USI Part Number: 140100-2)
- One SC-40 Control System Users' Guide (USI PN 82101-0100)

Front Cover Features

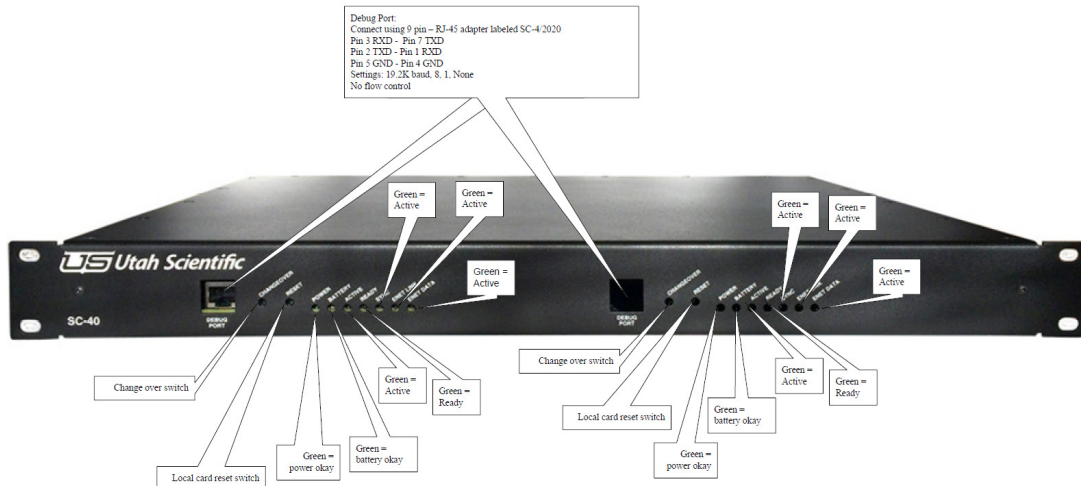


FIGURE 1-1. SC-40 Front Panel Components

Rear Panel Layout

The SC-40 Backplane provides all of the connections necessary to control Utah Scientific equipment.

The SC-40 backplane is arranged into the following groups of connectors:

- (1) RJ-45 UNET Connector - CAT5 cable used to connect up to 32 UNET panels at a maximum of 1000 feet
- (1) RJ-45 Ethernet Connector - used for configuration software and remote control
- (2) looping sync ref inputs - used to connect analog blackburst or tri-level signal for vertical interval switches
- (2) MX-Bus Connectors (25 pin D Connector – Female) - used to connect Utah Routers
- (2) Control Connectors (9 pin D Connector – Female) - used for 3rd Party Control

Figure 1-2 shows the complete backplane identifying all of the groups above.

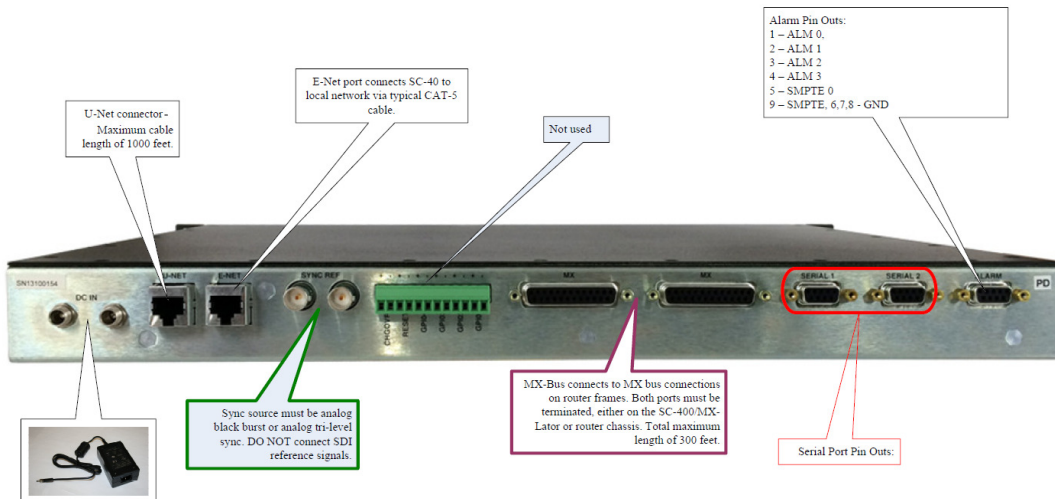


FIGURE 1-2. SC-40 Backplane with Callouts



TABLE 1-1. Backplane Connections and Functions

Port	Function
DC Plugs (redundant)	Connection for the DC Line Power Cord(s).
UNET	For use with UNET based control panels.
Ethernet	Standard Ethernet Ports.
GPIO	General Purpose Relay / Optos. (used for salvo control)
Alarm	SMPTE and Alarm port
Serial Ports	Hardware selectable as RS-232 / RS – 422.
MX-Bus	To MX-Bus connections on router frames
Sync Ref	NTSC Black Burst, PAL Black Burst, or Tri-Level



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Unpacking and Inspection

The SC-40 Control System, when shipped by itself, is packaged in a 25" x 25" x 13" carton and encased in Styrofoam. The SC-40 Chassis is in the bottom of the carton and all accessories are packed on top, packaged and wrapped in bubble wrap. **See Figure 1-1: SC-40 Basic Packaging and Contents.**

When the SC-40 Control System is shipped with control panels or other systems in the same carton it will be in a 25" x 25" x 29" carton and layered with the SC-40 on the bottom, other systems or control panels in the second layer and accessories on top. **See Figure 1-2: SC-40 Expanded Packaging and Contents.**

In either case, the SC-40 is wrapped in anti-static wrap and encased in Styrofoam.

The easiest method of removing the SC-40 Chassis from the package is to:

1. Open the top of the box and remove all the accessories.
2. Cut the sides of the box and break the Styrofoam away from the back of the SC-40 Chassis.
3. Gently pull the SC-40 from the Styrofoam packing.

Inspect the accessories package and inventory it for the following items:

1. One (1) DC Power Cord.
2. Two (2) MX-Bus Terminators.
3. UNET Terminators. (USI Part # 65324-04)
4. One (1) 9-pin to RJ-45 adapter Plug; DB-9S to RJ-45 USI PN 140100-2.
5. One (1) SC-40 Control System Users' Guide; USI PN 82101-0100.

If anything is missing from the above list, contact: **Utah Scientific Technical Services at 1.800.447.7204** or your Utah Scientific Sales Representative.



Cable Considerations

Utah Scientific provides only pre-assembled cables for the SC-40. You must assemble cables associated with the Serial Ports, GPIO Ports, Alarm Ports, UNET, Ethernet, and coaxial cables. This section provides some guidelines regarding those cables.

Cables that may be ordered from Utah Scientific

The SC-40 Control System is not normally shipped with any control cables; these are usually shipped with the Utah Scientific routing systems.

The cables provided by Utah Scientific include:

- The MX-Bus Cable - Part Number 80229-10; this cable may be special ordered in lengths up to 50 foot.

Cables that need to be fabricated

- **Sync1** – use any good grade of 75-Ohm coaxial cable.
- **UNET and Ethernet Ports** – use Ethernet Category 5, UTP with RJ-45 Connectors. Grounded and shielded cables are recommended.
- **Serial Ports** – use any 22 Gauge to 24 Gauge twisted pair with DB-9P (male) connectors for the SC-40 backplane.
- **Alarms Port** – use any 22 or 24 Gauge twisted pair with DB-9P (male) connector.
- **GPIO Ports** – use any 22 or 24 Gauge twisted pair to connect to the TB-1 male Phoenix Connector (furnished with the SC-40 System).

Connecting All Pieces to SC-40 Chassis

Note: Make all connections to rear of SC-40 before applying power

1. MX-Bus cable connections

- a. UTSCI provides one 10' MX-Bus cable for each chassis that uses the MX data bus. These include UT400, UT300, UT200, MXLator and MX-Hub equipment.
- b. There are two possible options for connecting the various MX-Bus equipment. Option 1 is to connect one end of a cable to a single port on the SC-40 chassis and the other end to either of the dual ports on the MX-bus equipment. Then from that chassis 2nd port, another cable will run from there to the next piece of MX-Bus equipment.

Continue this looping topology until the final frame is attached. You must then attach one of the two MX-Bus terminators to the open port on the SC-40 chassis and the other terminator to the open port on the final frame closing the MX-Bus loop. Option 1 View

Using option 2 you can essentially have the SC-40 chassis in the middle of the different MX-Bus equipment. You will attach an MX-Bus cable to each of the two MX-Bus ports on the SC-40 chassis and run them in two different directions to different MX-Bus equipment, looping through each chassis and putting an MX-Bus terminator on each final chassis open port.

c. The total overall length of MX-Bus cannot exceed 300 feet. To maximize the length of the bus, an MX-Bus hub (DA) may be used. This will allow up to 4 additional runs of 300 feet each to be used. The hub has 5 ports, which consist of 5 pairs of 25 pin MX-Bus connectors. The first pair of connectors is attached to the SC-40 port using one cable. Then place one MX-Bus terminator on the open port on the SC-40 and the other one on the open control port on the hub. The remaining 4 pairs of ports on the hub now act as 4 MX-Bus ports as if they were coming directly off the SC-40. Each pair will use two terminators and can each go out to 300 feet. They can then be attached to any MX-Bus equipment using option 1 or 2.

2. UNET Connections

a. The UNET bus is the UTSCI proprietary protocol used to connect to the UCP/SCP models of control panels. There is one UNET port on the back of the SC-40 chassis. This port is capable of looping up to a maximum of 32 control panels and a combined total over all length of 1000 feet. Attach a standard, straight through CAT-5 cable to the UNET port, then run it to the back of the UCP/SCP control panel port labeled UNET. There are two ports on each panel. Connect to either port and use the other port to loop on to the next control panel. A UNET terminator must be placed on the end of the loop in the unused port of the last control panel.

Option 1

There is a second option that requires the use of an optional UNET hub. Attach the UNET port on the SC-40 to the 1st port on the hub and run the remaining ports of the hub to each control panel in that loop. Use the hub for connecting one panel to each port on the hub or loop through to additional panels. A 2nd UNET hub can be attached to the 1st hub for additional panels but no more than 2 hubs, 32 panels and 1000 feet per SC-40 UNET port may be exceeded.

3. Ethernet connections

a. There is one Ethernet port on the rear of the SC-40 chassis. This is a specific network connection and should be treated as individual networks. It is set up using the default IP address of 192.168.5.230 unless specified prior to shipment. The address is stored in each SC-40 card so when either SC-40 card is active they will use the same number. The port is used for attaching Ethernet control panels as well as use of the UCON and RMAN editing and router management software.

b. Connect a standard straight through CAT5 cable to the Ethernet port if running to a local hub or a LAN and use a standard crossover cable if running directly to a PC.

4. SYNC connections

a. There are two sync reference ports on the rear of the SC-40 chassis.



The sync ports should be fed with analog black burst signals, either NTSC, PAL, or Tri-Level. **Do not connect digital SDI or HD-SDI signals to these ports.**

The Sync must be terminated in the daisy chain with a BNC 75Ohm / 1% terminator.

5. Serial Port connections

- a. There are two nine pin serial port connectors on the rear of the SC-40 chassis. These ports are currently enabled to use only the UDI-1B (RCP-1) protocol. These can be used as either RS232 or RS422 ports and are selectable by moving the appropriate jumper blocks on the SC-40 card. Remove both cards and located on the rear left of the SC-40 card the jumpers are labeled port 1- port 6. Move the block to the desired position and re-insert the cards. If these jumper blocks must be moved after power has been applied, follow steps at the end of this chapter for proper removal of SC-40 cards.
- b. Baud rates are currently hard coded for 2 settings. Ports 1,3 and 5 are set to 38.4k for the baud rate with parity set to 8N1. Ports 2,4 and 6 are set to 19.2k for the baud rate with parity set to 7E2. If a different baud rate and parity are required, refer to the end of this chapter for procedure on how to change serial port settings.
- c. Serial ports only use TX, RX and GND for RS232, which are pins 2(TX), 3(RX) and 5(GND). For RS422 the pins are 7(TX+), 8(RX-), 2(TX-) and 3(RX+) If Attaching to a standard 9 pin PC port simply use a straight through 9 pin cable for RS232.

Applying Power to SC-40 Chassis

1. Plug the DC cord in and verify the green power LED displays.
2. The green ready LED will come on, on both cards after the information that is in the active card has been synced up with the backup card. This can take several minutes depending on how much information is stored in the active card.



Changing IP address for SC-40 card

These steps should be followed when the system contains a redundant SC-40 card.

The IP address is stored on the SC-40 card as opposed to the chassis, as a result, the process must be completed on both cards individually.

1. Connect the adapter to the 9 pin serial port on the PC.
2. Using any terminal program such as HyperTerminal or TeraTerm (provided with system disc) set the baud rate to 19200k and the parity to 8N1 with no flow control and then hit the return key on the keyboard. You should then see the prompt `\>`. This visual sequence is available, by request, in Quicktime and Flash format.
3. To check current settings type `chassis (space)-r` and hit the return key. To change the IP address type `chassis (space)-ip1 (space) (new IP address)` and hit the return key. This will put the new IP, gateway and broadcast addresses into the SC-40 chassis. This visual sequence is available, by request, in Quicktime and Flash format.
4. After doing this you must push the reset button on both SC-40 cards at the same time. (refer to next section on proper resetting of SC-40 cards) After the reset process completes on the terminal, type `chassis (space)-r` and then return to verify new settings.

Changing the Chassis ID

These steps should be followed for proper changeover.

1. Currently, chassis ID changes must be done manually using the RJ45 diagnostic port located on the front of the SC-40 card.
2. Connect a standard straight through CAT5 cable to the RJ45 connector on the front of the active SC-40 card to the 9 pin - RJ45 adapter that was provided with the system.
3. Connect the adapter to the 9 pin serial port on the PC.
4. Using any terminal program such as HyperTerminal or TeraTerm (provided with system disc) set the baud rate to 19200k and the parity to 8N1 with no flow control and then hit the return key on the keyboard. You should then see the prompt \>. This visual sequence is available, by request, in Quicktime and Flash format.
5. To check the current chassis ID, type chassis (space)-r and hit the return key. (This chassis ID is the name that is found in U-CON for the SC-40 icon). To change the chassis ID, type chassis (space)-chid(space)new name. (This name can contain underscores and hyphens, as long as there are no spaces.)
6. After doing this you must push the reset button on both SC-40 cards at the same time. (refer to next section on proper resetting of SC-40 cards) After the reset process completes on the terminal, type chassis(space)-r and then return to verify new settings.



Setting the Correct Time and Date

Note: Any date and time set must be completed for both cards in a two card system. Follow this procedure - including 'Proper Reset' and 'Proper Changeover' whenever the time and date are set. Note also that this setting is independent of your house clock.

1. Currently, date and time changes must be done manually using the RJ45 diagnostic port located on the front of the SC-40 card.
2. Connect a standard straight through CAT5 cable to the RJ45 connector on the front of the active SC-40 card to the 9 pin - RJ45 adapter that was provided with the system.
3. Connect the adapter to the 9 pin serial port on the PC.
4. Using any terminal program such as HyperTerminal or TeraTerm (provided with system disc) set the baud rate to 19200k and the parity to 8N1 with no flow control and then hit the return key on the keyboard. You should then see the prompt \>. This visual sequence is available, by request, in Quicktime and Flash format.
5. At the prompt, type **settime**, then press ENTER. This will allow you to designate the current time in the format provided. HH:MM:SS - hours, minutes, and seconds separated by a colon. Press ENTER.
6. Next you will designate the date by typing **setdate** at the prompt, then press ENTER. Month, day, year, and day of the week are entered, separated by forward slashes. In this case, Wednesday, July 9, 2008 would be entered as:

07/09/08/3 [ENTER]

Days of the week correspond to Monday - 1, to Sunday - 7.

Next you will need to perform a system reset to update the time and date (Proper Reset, next).

Proper Reset

1. If a reset is needed with only one card installed, simply push the reset button on that particular card (outside button).
2. A system reset needed within a two-card system can be accomplished with or without both ready lights on. Locate the active card, press and hold the reset buttons on both cards at the same time. Let go of the reset button on the active card first, followed by the reset button on the backup card. This will ensure that

the active card comes up first and remains the active card. Important: An improper reset may cause serious loss of data.

Proper Changeover

To change over from the active card to the back up card, simply push the change over button on the active card (the inside button). The change over button does not function when pushed on the back-up card. The change will only occur if the ready LED is lit on both cards.

Proper Hot Swappable Removal of SC-40 Cards

1. The SC-40 cards are hot swappable so if only one card exists in your system, simply remove the card and re-insert it when ready. Make certain to plug the card in firmly.
2. If there are two cards in your system always make certain there is a ready light on both cards prior to removing the cards. If both cards are to be removed, first remove the backup card (this is the one without the Active LED on) and then remove the active card last.
3. If only the active card is to be removed, make sure the ready light is on both cards and then push the changeover button (inside button) on the active card to switch control to the backup card. Then remove the original active card.

Changing Serial Port Settings

There are two ways to modify serial port settings; using the U-CON software (*see the U-CON Operations Guide*), or manually through the config file within the SC-40/SC-4000.

Step 1 - Launch the NFS Server.

Step 2 - Navigate to C:\usi\“call letters”-SC-4001\encode

Step 3 - Run the batch file called getencode.bat, and follow the instructions from each call-out.

Step 4 - A new file called “call letters”-SC-4001.conf will appear in the encode folder. Open this with the text editor.

Step 5 - Scroll to the bottom of the file and make the desired changes to the serial ports.

Note: When editing this file it is imperative that all spaces and commas remain as they are seen. Failure to do so will cause the SC-40 to not function properly.

Step 6 - Save changes and exit the file.

Step 7 - Run the batch file called burnenc-network-nr.bat.

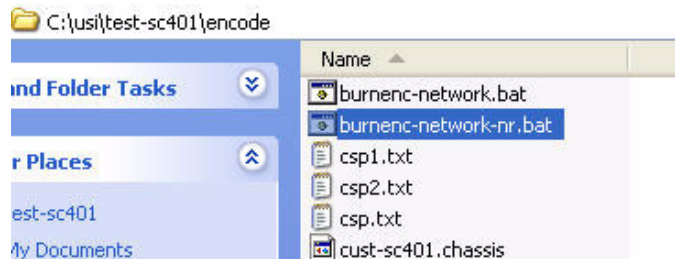


FIGURE 2-1. Burn Encode - screen 1

Hardware Installation

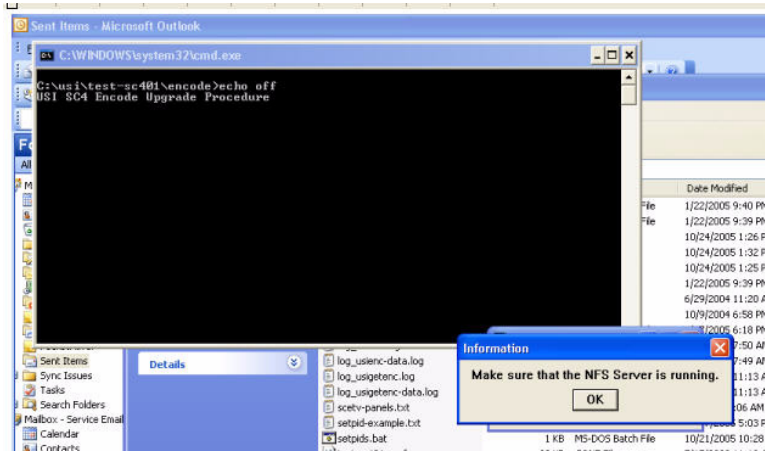


FIGURE 2-2. Burn Encode - screen 2

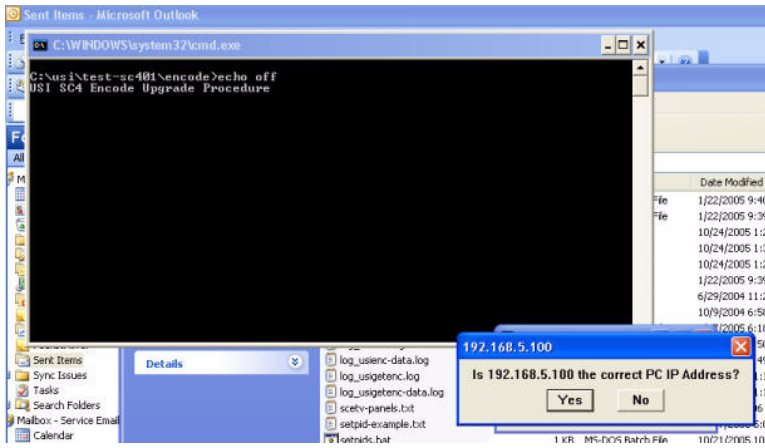


FIGURE 2-3. Burn Encode - screen 3

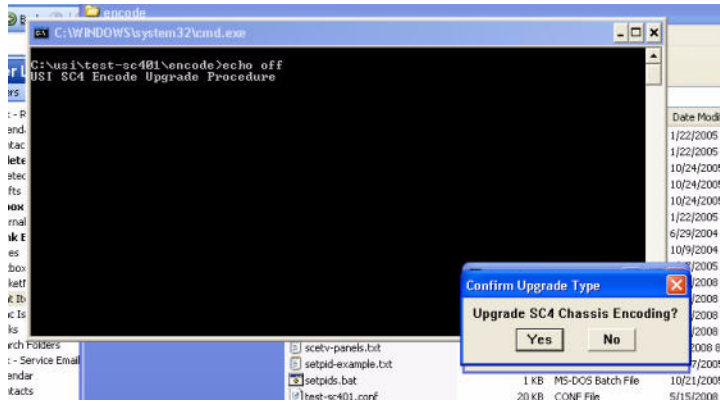


FIGURE 2-4. Burn Encode - screen 4

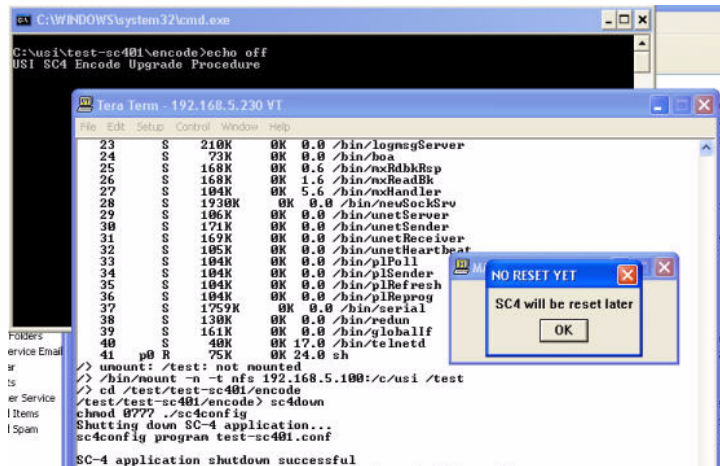


FIGURE 2-5. Burn Encode - screen 5

This will place the changes in the active SC-40 card. However, the changes will not be utilized until the SC-40 cards have been reset.

Step 8 - Press and hold the reset button on both SC-40 cards at the same time and release the reset button on the active card first, followed by the backup card. (The 'active' LED will be illuminated on the card that is in use.)



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SC-400 Control Board

The SC-40 system actually uses the SC-400 control cards, which are enclosed within the chassis. These are not accessible unless the chassis is pulled from the rack and disassembled. This is very unlikely and only necessary if a card were to be replaced or a facility default were needed. This is a single access plate on the top of the frame for changing serial modes from RS-232 to RS-422.

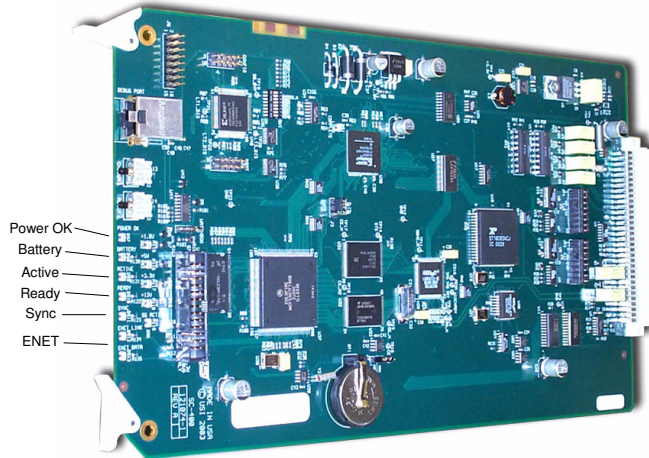


FIGURE 3-1. SC-400 Control Board View

SC-400 Jumper Settings

- J2 Switch -- Used to clear the RAM
- JP1 -- Serial Port 1 -- **RS-232**
- JP2 -- Serial Port 2 -- **RS-422**



SC-400 Dipswitch Setting

These switches are set by the factory and should only be changed with help from a trained service engineer.

User Switch 0

When set, the system will initiate a software load, though the Linux application itself will not start. This is typically used for factory troubleshooting.

User Switch 1

User switch 1 determines which of the two memory banks is in use. A change to either memory partition (0 or 1) will not affect the other. The actual switch position determines which memory partition is in use.

User Switch 5

Used to start the Linux operating system, but not the actual application.

User Switches 2 - 4

Undefined at this time.

Bypass Switch

Also used for factory troubleshooting. The default configuration is all switches positioned toward the silkscreened numbers, or to the *right* as the board is viewed from the front.

SC-40 Control Board System Operation

The SC-40 Control System is designed so it may operate with one control board or in the redundant mode, with two control boards. Utah Scientific always recommends having the system configured as a redundant system in case of board failure during system operation.

Redundant Operation

When the SC-40 System is powered up the top control board typically comes up in the primary mode. This is not always the case and the user should be aware that either board (upper or lower) may function as the primary controller after the power up sequence.

The Debug Port

The RJ-45 Debug Port is provided on each control board and is located on the front Right-hand side of each board. See Figure 1.

The Debug Port has two primary functions:

1. To aid the user in system diagnostics or when diagnosing problems with Technical Services.
2. When performing software upgrades as recommended by Utah Scientific.

The Debug Port can be connected to a PC using the adapter plug (Part # 140100-2, DB-9S to RJ-45) provided by Utah Scientific and a straight through CAT-5 cable (furnished by the user).

The debug port will communicate with any terminal program although Hyper-terminal and Tera-Term Pro are two of the programs that work well.

The set up for your terminal emulator should be:

1. 19200 Baud,
2. 8 Data Bits,
3. No Parity,
4. 1 Stop Bit,
5. No flow control.



SC-40 Front View Components and Functions

The following table describes the components of the front view:

TABLE 3-1. SC-40 Control Board Front View Component Functions

Component	Function
L & R Board Extractors	Rotate outward to extract board from the chassis.
RJ-45 Debug Port	Female connector for RJ-45 Debug Cable.
Chgovr Switch	Push to change to inactive SC-40 board.
Reset Switch	Push to reset control board – <i>Use with caution, setups may be lost.</i>

The SMPTE and Remote Alarms

The SC-4 Control System has two SMPTE Alarm circuits and four Remote Alarm circuits. The features and/or functions of each alarm is shown in Table 6, below; the DB-9S Alarm Backplane Connector is shown in Figure 19.

TABLE 3-2.

Alarm	Specification	Function
SMPTE 0	SMPTE 269M-1999	Standard relay closure fault reporting
SMPTE 1	SMPTE 269M-1999	Standard relay closure fault reporting
Alarm 0	N/A	TTL Logic, 5 Volts @ 5 milliamps
Alarm 1	N/A	TTL Logic, 5 Volts @ 5 milliamps
Alarm 2	N/A	TTL Logic, 5 Volts @ 5 milliamps
Alarm 3	N/A	TTL Logic, 5 Volts @ 5 milliamps

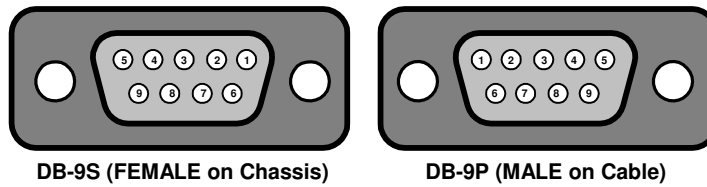


FIGURE 3-2. DB-9 Alarm Port Connectors



Alarm Port Pin-Outs

Table 3-7 shows the Alarm Port Pin-Outs for the DB-9 Connector.

TABLE 3-3.

Connector Pin	Signal
1	ALM0
2	ALM1
3	ALM2
4	ALM3
5	SMPTE0
9	SMPTE1
6, 7, 8	GND

Serial Port Pinouts

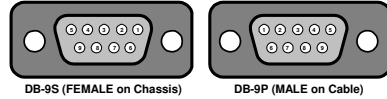


TABLE 3-4.

RS-232 Mode		RS-422 Mode	
1	N/A	1	Not used
2	TXD	2	TX-
3	RXD	3	RX+
4	N/A	4	Not used
5	Ground	5	Ground
6	N/A	6	Not used
7	N/A	7	TX+
8	N/A	8	RX-
9	N/A	9	Not used



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SC-40 Operation

The Debug Port

Introduction

The debug port of the SC-40 is the major source of operational information and control. While configuration info is downloaded to the SC-40 via UCON, some operational information is still best determined by a direct connection to the debug port.

Physical Connection

Supplied with your SC-40 is an adapter intended to plug on to the serial port of any standard PC. This adapter is USI PN 140100-2. It has a male 9 pin D connector on one end and a female RJ-45 connector on the other. The user supplies a straight thru CAT 5 cable between the adapter and the debug port on the SC-40.

Terminal Emulation software setup

Any terminal emulation program such as windows Hyper terminal is useful for debug port operation. Utah Scientific recommends TeraTerm, a freeware terminal emulation software package available on the internet. Serial Port parameters necessary to communicate to the SC-40 are as follows:

TABLE 4-1.

Baud Rate	19.2K
Data Bits	8
Stop Bits	1
Parity	NONE
Hardware Handshaking	NONE

General Status

Once you are connected to the SC-40, pressing the return key should return a prompt of `"/>`". From this prompt various operations can be performed.



The most valuable data is gathered after a system reset. This is the point where the SC-40 'finds' all connected routers and control panels. The best method for determining what the SC-40 discovers is to connect the debug port to the upper SC-40 and then press and release the reset buttons (See figure 3-1) simultaneously.

MX H/W messages indicate that the SC-40 has found and MX-Bus based router at the specified address. The ID number varies with different address types.

Specific Operations

Reading system setup information

The chassis command is used to read and/or set the chassis IP address(s), system name and other parameters. It's usage is detailed below.

chassis

Synopsis: chassis [OPTIONS] [FILE]

This program allows the user to interact with the chassis identification ROM located in the local chassis. Not all new USI products support this feature. If you aren't sure or are getting unexpected results, please check the appendix and verify the operation is supported on the platform you are working with.

Options:

- -r – read and display data contained in the local chassis config ROM.
- -init – write a set of default values into the chassis config ROM
- -ip1 <xxx.xxx.xxx.xxx> – sets the IP address for network interface 1 to the specified value.
- -ip2 <xxx.xxx.xxx.xxx> – sets the IP address for network interface 2 to the specified value.
 - Please note not all devices support a 2nd network interface.
- -cust <customer name> - Sets the customer name to the text specified. Typically this will be the call letters of the station using the device.
- -chid <chassis ID> - This sets the chassis ID to the text specified. Typically this will be a description of the physical device location. Ex: MCP-CR01-KUSI

- -unet <xxx> - set the unet node for this device to that specified.
- mask1 <xxx.xxx.xxx.xxx> - sets subnet mask for network interface 1 to...
- mask2 <xxx.xxx.xxx.xxx> - sets subnet mask for network interface 2 to...

Gathering data from the onboard log

logdump

Synopsis: logdump [OPTIONS]

This command displays log entries from NVRAM. If no option is specified then ALL log entries will be dumped to the screen. Optionally, a number can follow the command, which specifies that only that number of final entries will be displayed. The log can only handle a certain number of entries. Older entries will be lost as the log overflows saving only the most recent events.

Example: logdump 10 - dumps the last ten log messages to the screen

Viewing / Setting Configuration parameters

sc4config is used to display and in some cases modify the custom configuration parameters of the SC-40. Various options are detailed below.

SC-40config

sc4config display – displays all config tables

sc4config sim – Turns on simulation for all router levels. Append a level number to simulate that level

sc4config nosim – Turns off simulation for all router levels. Append a level number to unsimulate that level

sc4config mx – Displays MX Bus configuration

sc4config pl – Displays Party Line Configuration

sc4config routers – Displays router configuration

sc4config levels – Displays level mapping

sc4config srcs – Displays source table



sc4config dsts – Displays destination table

sc4config serial – Displays serial port parameters

sc4config misc – Displays miscellaneous parameters

sc4config dstattrs – Displays router attribute status

tiedump

Displays the tieline status

tiedump clear – clears out the tieline status (crosspoints are not affected.) This will free all tie lines.

lockdump

This displays the output lock status.

lockdump – displays lock status.

lockdump clear – removes all locks.

router

This utility provides certain router status functionality such as setting, viewing, and saving status.

- **router xy** - This connects each source to its corresponding destination; i.e., 0-0, 1-1, etc. This is best used with the SC-40 default configuration.
- **router source <srcnum>** - This routes the source value specified as srcnum to all outputs. This is best used with the SC-40 default configuration.
- **router killstatus** - This clears all router and tieline status (except for attributes) but leaves the SC-40 configuration intact.
- **router save display** - provides a display of all routes that have occurred.

The router utility can also save the router status to a file that can be subsequently loaded. This functionality is best used with the *rtrsave* and *rtrload* scripts, found in the SC-40 installation directory; i.e., C:\usi\

Simply double-click the *rtrsave.bat* file after running the NFS server, then enter the PC IP address and the SC-40 IP address as prompted. You will also be prompted to enter a filename where the current router status will be stored. You may then enter a list of destinations whose status you want to Sav. (Leave this blank to default to all destinations.)

The destination list should look something like this:

1-5,7,11,300-350 (no spaces)

Other destinations will not have their status saved in the file, so a load operation using that file will not affect them. Double-click the *rtrload.bat* file to load one of the saved files. The router connections will be restored to the saved status.

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