# SIGMA
# ADX SERIES

LARGE MATRIX ROUTING SYSTEM

ANALOG and DIGITAL

OPERATORS MANUAL


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# ADX SERIES

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## OPERATORS MANUAL

## SPECIFICATIONS

### ANALOG VIDEO MODULES (VS-1616, VI-16T, VI-16L, VO-16, VO-16S)

| | |
|---|---|
| Input Impedance | 75 , terminated (VI-16T)<br>High Z, Looping (VI-16L) |
| Coupling | DC, (AC Optional) |
| Input Return Loss | 35dB minimum to 5MHz |
| Input DC Offset | 0.3V max. ( 6.0 max. AC coupled-optional) |
| Tilt, Field and line | 1% maximum |
| Differential Phase | 0.15 @4.43 MHz 10-90% APL |
| Differential Gain | 0.15% @4.43 MHz 10-90% APL |
| Frequency Response | 0.1dB from DC to 25 MHz |
| Bandwidth | 125 MHz |
| Input Gain Variation | 0.15 dB maximum |
| Crosstalk | >55 dB @ 5 MHz |
| Hum and Noise | -65 dB rms below 1Vp-p |
| Connectors | BNC |

### DIGITAL VIDEO MODULES (DS-1616, DVI-16T, DVI-16L, DVI-16LEQ, DVO-16, DVO-16S, DVO-16R2)

| | |
|---|---|
| Input Signal Level | 0.600 or > Vp-p (Unequalized) |
| Input Return Loss | -15dB minimum 5MHz to 270 MHz |
| Input Cable Loss | 50 ft. max. (Belden 8281 or equivalent)<br>1000 ft. with optional E.Q. |
| Outputs Signal Level | 0.800 Vp-p 10% |
| Outputs Return Loss | -15 dB min. 5 MHz to 270 MHz |
| Output Rise & Fall Time | 1.0 nsec 0.25 at 20% to 80% |
| Jitter | 450 psec (non-reclocked), 250 psec (reclocked) |
| Crosstalk | No Output Signal, Worse Case |
| Data Rate | 400 Mb/s |
| Overshoot | 10% maximum |
| Connectors | BNC |

### ANALOG AUDIO MODULES (AS-1616, AI-16, AO-16)

| | |
|---|---|
| Input Impedance | 30 K , balanced |
| Bandwidth | 150 kHz |
| Input Level | +24 dBu, maximum |
| Output Level | +24 dBu, maximum into 600 |
| Frequency Response | 0.1 dB 10 Hz to 30 kHz any level<br>0.25 dB to 100 kHz |
| Hum and Noise | <-85 dBu with 22 kHz low pass |
| Total Harmonic Distortion | <0.015%, max. @ +24 dBu, 0.002% typical |
| Crosstalk | 90dB 10Hz to 20kHz all inputs driven, 110dB typ. |
| Gain | Adjusted to Unity 0.2 dB, 600 termination |
| Connectors | 3 Pin Detachable terminals |

### DIGITAL AUDIO MODULES (DAS-1616, DAI-16T, DAI-16L, DAO-16, DAO-16S)

| | |
|---|---|
| Input Signal Level | 7 Vp-p max. |
| Input Impedance | 110 , terminated |
| Input Coupling | Transformer |
| Common Mode Rejection. | 7V Peak DC to 20 kHz |
| Input Cable Length | 1500 ft. max.(Belden 1800B) |
| Output Impedance | 110 |
| Output Coupling/Level | Transformer, 7 Vp-p max. (4 Vp-p typical) |
| Output Isolation | > 50 dB |
| Rise & Fall Time | < 30 nsec (10% to 90%) |
| Common Mode Noise | 30 dB below signal |
| Jitter | < 20 nsec |
| Electrical Length | 90nsec typical (64x64frame)<br>Model DAI-16L-active loop, 70nsec additional<br>Model DAO-16S-sec. switch, 55nsec additional |

## SYSTEM CONTROL INTERFACE MODULE (SCI-ADX)

| | |
|---|---|
| Data Transmission System | RS-232 & RS-422/485 |
| Serial Port Baud Rate | 9,600; 19,200; 38,400; 57,600 baud |
| Control Levels | Eight |
| Communication Line | Coaxial, up to 2000 feet |
| Control Panels | Up to 64 on Comm. Line |
| Number of Salvos | Four to Ten, depending on Master Control Panel |
| Protocol | Simple ASCII, supports Xon/Xoff |
| External Sync Reference | Composite Sync or Blackburst, auto detect |
| Connectors | BNC for Comm. Line and Ext. Sync.<br>9 Pin “D” for Serial Port<br>25 Pin “D” for Control Bus to slave frames |

## MECHANICAL

| | |
|---|---|
| Switch Frame | 10.5” H x 19” W x 15” D |
| Master Control Panel (ANX) | 1.75” H x 19” W x 2.5” D |
| Master Control Panel (SYX, SYX-3232, ASY-16S) | 3.5” H x 19” W x 2.5” D |
| Single Bus Panels (SBX-32, SBX-64) | 3.5” H x 19” W x 2.5” D |
| Rapid Take Single Bus Panel (RTX) | 1.75” H x 19” W x 2.5” D |

## POWER REQUIREMENT

| | |
|---|---|
| Input Voltage Range | 100 to 240 VAC, 50/60 Hz |
| Power Consumption | 120 W maximum, per frame |

## UNPACKING

Inspect your packages and equipment for any damage that might have occurred during shipping. Report any damages to both Sigma Technology Systems and your shipping company.

Frames and power supplies are shipped in the same overpack carton. However, the power supply is in a separate carton within the overpack carton. Remove the frame and power supply from the cartons. Install the power supply and assure the power supply is properly captured with the spring loaded locking plunger.

Control Panels are shipped in separate cartons. The “Wall Mount” power supply for the control panel is in the same carton as the control panel.

## INSTALLATION

All frames and control panels are intended to be mounted in standard 19” EIA equipment racks. To allow frame installation into a rack, remove the front door. The front door has four screws used to retain it during shipping. Remove these four screws before mounting the frame into a rack. Before lifting the frames into place assure the power supply is properly captured with the spring loaded locking plunger. After mounting, the front door is held into place by the ball stud hardware.

Frames are designed for maximum ventilation of heat build up under normal operation. To assist the ventilation, leave 1RU (1.75”) space between frames.

The Master Frame in any system is the frame containing the System Control Interface Module, SCI-ADX. This frame is typically located at the top of the frames in multi-framed systems. The position of the Master Frame may be anywhere with respect to the other system frames. Ease of wiring the video and audio cables may dictate position of each frame within a rack.

## INTERCONNECT WIRING

After mounting the frames in a rack, the video or audio input and output signals must be wired to the frame. Connections to the SCI-ADX interface panel are required to achieve control communication from a Sigma control panel or other control device. All connections are addressed at the rear of the unit. The following information is a guideline to perform the interconnect wiring.

## VIDEO WIRING

The video input modules are available in either terminating or looping configuration. The terminating VI-16T, is typically used in systems with sixty-four or less outputs. This provides the video source with proper 75 termination. Simply connect the source video cables to corresponding input BNCs on the rear of the frame. If the routing switcher is not to be the terminating device, the video switch module needs to be the looping configuration.

The VI-16L is the looping video input module. Systems having more than sixty-four outputs must use the looping video input modules as well as the VI-16T modules. The outputs will be split between two frames. One frame will use the looping inputs and the other frame will use the terminating inputs. The looping video path on systems with more than sixty-four outputs is configured as follows:

The source video cable connects to the looping video rear panel module that supports the output module for output group “1 to 16”. **NOTE: Active loop-through is used on VI-16L (Rev E. and after PCB’s). This requires that the input signal be connected to the BNC on the right side of panel (as viewed from the rear when installed in ADX frame).**

Using the loop-through BNCs (the one on the left, as viewed from the rear) on the looping rear panel, connect the video from the looping module to the corresponding terminating module used to support the same output group in the second frame.

The number of input and output modules will be determined by the matrix configuration. Each frame can support up to four input and four output modules for a 64x64 configuration. Systems with the use of multiple frames can be as large as 128x128. The video input modules are duplicated for each frame in multi-framed systems.

The VO-16 is configured much like the input modules. Systems providing more than sixty-four inputs require the use of the secondary switch output module, VO-16S.

The front mounted VS-1616 supports a path of sixteen inputs to sixteen outputs. A VS-1616 is required for each group of 16x16 crosspoints. For example, in a 16x16 matrix only one module is required. In a 32x16 two modules are required. A 32x32 requires four modules and a 48x48 requires nine modules. A fully loaded frame of 64x64 would require a complete set of sixteen modules.

## PULSE ROUTING

Systems that require a Horizontal and/or Vertical drive pulse of 2Vp-p to 4Vp-p must use the PI-16T or PI-16L input modules and PO-16 or PO-16S output modules. These modules are similar to the video modules in the manner in which they are configured. The pulse modules use BNC connectors for input and output.

## AUDIO WIRING

Balanced Audio connections are provided by 3 position detachable terminal blocks. There is a single connector assigned for each input and output. The audio input module has only one configuration vs. the looping and terminating configurations of the video-input module. To achieve termination on the audio switch module, a load resistor may be added across the terminal block where the incoming wire is attached. Where audio signals need to be bridged from one audio switch module to another, simply use balanced bridging cables. Bridging would be required in systems with more than one output group.

## COMMUNICATIONS LINE WIRING

Reference to the communication line is typically abbreviated to COMM Line. All of the control panels are connected to the System Control Interface SCI-ADX via a coaxial cable. There are two COMM Line BNC connectors on the rear of the Master frame that houses the SCI-ADX both connectors can be used for the purpose of connecting control panels.

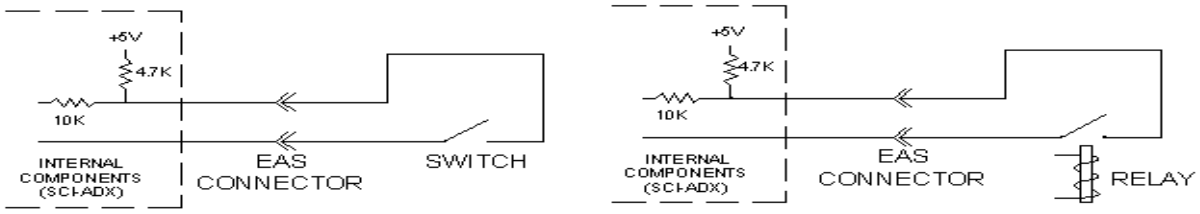
Installing the Master Control panel to a system can be done at either COMM 1 or COMM 2 BNC. Connect a coaxial cable between the COMM Line BNC of the SCI-ADX and the COMM connection on the rear of the control panel. Several control panels may be added to the COMM Line as system requirements dictate. Additional panels are added by installing "BNC T" connectors in the coax path. Total coaxial cable paths are recommended to be within 2000 feet. This coaxial path should NOT be terminated in a 75Ω load.

## CONTROL BUS WIRING

Ribbon cables with 25 Pin D-type connectors are used as Bus connectors. These Bus connectors are used in systems with multiple frames to transmit the control data to all modules. The data bus is provided on the rear of each frame at the SCI interface panel. Multi-frame systems will be provided with a bus cable to meet the requirements of the system plus one future frame. Frame placement within the racks will determine the required length of the bus cable. Special cable requirements can be accommodated by Sigma Electronics Inc.

## EMERGENCY ALERT SYSTEM (EAS) WIRING

To accommodate inclusion into a system with an EAS function, a 2-pin terminal block is provided on the SCI-ADX rear panel. To activate the EAS signal these 2 pins need to be shorted together by either a contact closure or closing of a relay (see diagram below). When this connection is made, the SCI will automatically make the switch to whatever has been pre-programmed into Salvo 10.




EAS EXTERNAL CONNECTION DIAGRAM

When the EAS is activated, all serial (RS-232 & RS-422) input to the SCI-ADX is ignored. Also, any pending commands in the serial buffer are flushed.

While the EAS mode is active, the system status is transmitted to the remote panels via the COMM line. Any changes or status requests made from the remote panels are ignored by the SCI-ADX until the EAS event has terminated.

When the EAS event has terminated, the connection between the two pins of the EAS connector should be removed and the system will revert to the conditions present at the beginning of the event.

## SERIAL PORT CONNECTIONS

RS-232 and RS-422/485 may be used for external control of the system. This provides a method to allow computer control, modem control, or other third party control devices to communicate with the SCI-ADX. The 9 Pin D-type Serial I/O connector is also located on the SCI interface panel. It is located on the rear of the Master frame. Actual pin assignment and wiring information is provided in the section on SCI-ADX.

## SYNC REFERENCE

Sync reference may be applied to the SCI-ADX. The routing switcher will switch during the vertical interval of the reference signal when applied. This signal is applied to the “REF IN” on the rear of the Master frame. This signal can be either Composite Video (1Vp-p) or Composite Sync Pulse (4Vp-p). The SCI will automatically compensate for the reference signal level.

If no signal is present on the Sync input BNC, the SCI-ADX will execute the switch when it interprets the command.

## MOTHERBOARD CONFIGURATION

The ADF-64 frame contains a motherboard. The motherboard has card edge connectors for module insertion from the front and rear of the frame. From the front of the frame there are switches available for configuring the logical addressing of the modules. There are four switches positioned between the card slots of each of the four output groups. Switch S1 assigns the settings for group one, as S2,3 and 4 set groups two, three and four respectively. The DIP switches are typically factory set for the application described at the time of order. No changes to the switch settings should be made unless the system is being reconfigured.

### OUTPUT GROUP SELECT

The four switches, each an eight position DIP switch, use positions one to four to set the output group. In a single frame system of 64x64, the output groups would be 1-16, 17-32, 33-48 and 49-64 from left to right (S1 to S4) as viewing the switches from the front of the frame. Systems which exceed 64 outputs require a second frame. The second frame starts with output group 65-80 on the left most group and proceeds across the frame with groups 81-96, 97-112 and 113-128. Refer to the chart below to determine DIP switch settings.

### INPUT GROUP SELECT

Switch position eight on each of the four switches is used to select the input group. A single frame system of 64x64 requires switch position eight to be ON. Likewise, a two frame system of 64 inputs by 128 outputs requires both frames to have switch position eight ON. However, if the system is configured as 128 inputs by 64 outputs, the input group of frame one is 1-64, position eight ON while the input group of frame two is 65-128, position eight OFF. A 128x128 system configuration requires four frames per channel, two frames set to 1-64 and two frames set to 65-128. Refer to the chart below to determine DIP switch settings.

### CONTROL LEVEL SELECT

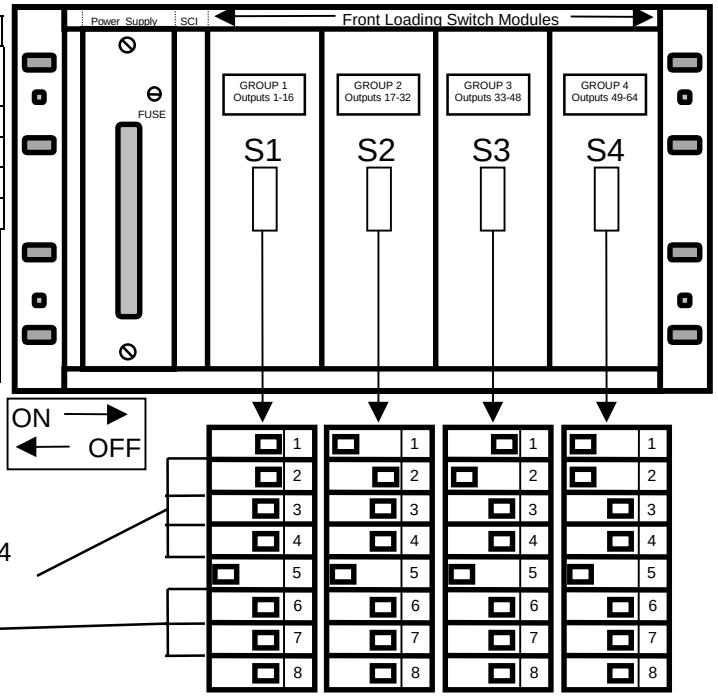
The assignment of a control level allows each channel of a multi-channel system to be sourced from a different device. With separate control levels video from a VTR and audio from a CD player can be sent to a common destination device. To execute a split mode switch the video and audio motherboards must be assigned different control levels. The factory default is Level 1 for video modules and Level 2 for audio modules. The SYX control panel provide four level windows to allow “split” mode or “break-away” mode switching. The SCI protocol has ASCII commands to switch control levels, Level 1 = A, Level 2 = B, Level 3 = C and Level 4 = D. Refer to the SCI section for more details on the protocol. The control panel section has more details on the different switching modes.

The DIP switch positions 5, 6 and 7 are used to set the control level. Factory default settings should be adequate for the majority of applications. An application which requires a stereo or two channel audio switcher to source audio signals from two separate devices requires the control level of each audio channel to be different. One of the audio frames must be changed from level 2 to either level 3 or 4. Another example which requires user settings of the control level is if the application needs to restrict switching to audio-follow-video only. This is done by setting the control level of the audio and video frames to the same level.

| Output Group Select | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Switch Position** | **1 16** | **17 32** | **33 48** | **49 64** | **65 80** | **81 96** | **97 112** | **113 128** |
| **1** | On | Off | On | Off | On | Off | On | Off |
| **2** | On | On | Off | Off | On | On | Off | Off |
| **3** | On | On | On | On | Off | Off | Off | Off |
| **4** | On | On | On | On | On | On | On | On |

| Control Level | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** |
| **5** | On | Off | On | Off | On | Off | On | Off |
| **6** | On | On | Off | Off | On | On | Off | Off |
| **7** | On | On | On | On | Off | Off | Off | Off |

| Input Group Select | | |
|---|---|---|
| | **1 64** | **65 128** |
| **8** | On | Off |




Shown is a sample 64x64 Audio frame configuration.
Output groups are set for 1-16, 17-32, 33-48 and 49-64

Each switch is set for control level 2.

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## INTRODUCTION

The SCI serial interface card is the heart of the Sigma ADX Series large matrix routing system. The SCI functions as the controller between the user and the switcher crosspoints. A switch can be generated one of two ways: by a remote control panel or by the serial port.

### Control Panel Interface

On the rear of the main frame are two BNCs labeled "COMM 1" and "COMM 2". Coaxial control lines connect the COMM ports to the remote control panels. Multiple control panels may be supported by the SCI. The 64 different panel addresses allow each panel to have a unique polling address. This prevents conflicts of transaction information during a poll between the SCI and a specific address. The SCI systematically polls the control panel addresses to request transaction data. When polled, data present at the control panel is transmitted to the SCI via the coax cable. The SCI interprets and executes the instruction. After a panel is polled, the SCI transmits an update of the transaction to all the system control panels. In this way there is a positive feedback for each transaction.

### Serial Control Interface

The second method of control is through the serial port. The SCI can support either RS-232 or RS-422 protocols. Selection of RS-232 is obtained by placing the dual 9 Pin jumper on JP2 (factory default). To select RS-422 the jumper must be moved to JP1. Serial communications is achieved with very simple and straightforward ASCII commands. The interrupt driven communications link will respond immediately whenever a command is issued from an external serial device. When the command is received, it is interpreted and executed. The SCI will issue a response of "OK" to the sending device upon completion of each transaction. If the command was invalid the SCI will transmit a "?". The response can be disabled if required.

### Vertical Interval Switching

The SCI is capable of generating a vertical interval switch. To do this a reference signal must be present at the "REF IN" BNC. This signal can be either a composite video signal (1 Vp-p) or a composite sync pulse (-4vpp). The SCI will use this reference to determine the vertical interval switch. If no “REF IN” signal is present the SCI will execute the switch as soon as it is interpreted.

### SCI Configuration Switches

There are three switches located on the front on the ADX-SCI circuit board. S1 is a momentary push button switch labeled "RESET". This switch functions as a microprocessor hardware reset that forces the processor to restart from a default setup condition. The SCI will reset all crosspoints, every output will be set to input 1. An S1 reset will clear all entries in the internal salvo tables and panel restrictions in the SCI memory. **Reset must be used with care.** Refer to the CTRL-W command before implementing a system reset with S1.

The 12-position DIP switch, S2, provides system configuration. System configuration includes serial port baud rate, switcher input range, output range, RS232/422 protocol logical addressing and 4/8 level selection. Refer to the tables provided in this manual.

The four-position switch, S3, is used to select Numeric/Alpha mode, enable/disable hardware handshaking and control panel scanning.

### Control Levels

The SCI-ADX supports four or eight control levels. DIP switches on the mother board of the ADF-64 frame set the control level for each output group. Level 1, typically assigned to the video modules, is designated with an A in the ASCII protocol. Level 2, typically assigned to the audio modules, is designated with letter B in the protocol.

The separation of signals into levels allows the router’s logic to switch one level without effecting any other level. Using level control allows the operator to switch a video signal to a given destination without changing the audio signal for that destination. This is referred to as a breakaway mode switch.

As well, the operator may source video and audio from two different source devices. With the use of level control the video source is preset on its level and audio is preset on a different level. At the TAKE command the two different source signals switch to a common destination. This is referred to as a split mode switch.

## RS232 PROTOCOL COMMANDS

The following commands may be issued from a computer/terminal keyboard or other similar communication control device. This protocol is supported by various control systems provided by other control system manufacturers. Standard ASCII characters are used to create the command strings. The SCI-ADX is not case sensitive, and therefore does not care if capital or lower case letters are used. Please note that spaces are not used in any command strings.

**COMMAND: Audio-Follow-Video switch**

**IxxxOxxx {RETURN/ENTER}**

The **'I'** represents INPUT and the **'O'** OUTPUT. The **'xxx'** represents the one to three digit number of the respective INPUT and OUTPUT. Leading zeros are optional. Valid INPUT numbers for the SCI are **1 to 128**. Valid OUTPUT numbers are **1 to 128**. To generate a TAKE command, press the RETURN/ENTER key on the keyboard. When the SCI receives the request and executes the change, it will respond with an ASCII message **'OK'** (unless disabled - see "N/Y" command explanation).

**COMMAND: BREAKAWAY**

**AxxxOxxx {RETURN/ENTER}**

In this command only the requested input Level (A) will change causing that level to breakaway from the other levels. The **'A'** could actually be **A**, **B**, **C, D, E, F, G, or H**. These eight letters represent the eight control levels 1-8 respectively. So an **"A"** would correspond to **Level 1** and a **"D"** would represent **Level 4**. The **'Oxxx'** is the OUTPUT or destination number.

**COMMAND: SPLIT:**

**BxxxCxxxOxxx OR DxxxAxxxOxxx**

In these examples, the inputs for two levels are assigned different sources, but both will go to the same OUTPUT or destination. Again, it is not necessary to supply the leading zero in assigning source or destination numbers. **B17C03O04** or **B17C3O4** will both perform the same switch.

Order and number of levels does not matter. Any combination of levels in any order is valid. For example, **D09B21A2C11O9** is a valid sequence.

**COMMAND: STATUS**

Any OUTPUT's status can be obtained by entering the following protocol sequence:

**Sxxx {RETURN/ENTER}**

The **'S'** represents STATUS and the **'xxx'** represents the one to three digit ASCII number of the OUTPUT. Any leading zeros are optional. Press RETURN/ENTER to generate execution. The SCI will respond with the following ASCII message:

**Output xxx, L1 xxx, L2 xxx, L3 xxx, L4 xxx, L5 xxx, L6 xxx, L7 xxx, L8 xxx**

This will all print on one line on the terminal video screen. The **'xxx'** will indicate the one to three digit ASCII number for the OUTPUT and all the sources for LEVEL 1 to 4 or 1 to 8 in an eight level system.

**COMMAND: STATUS ALL**

A global status can also be generated. This will give the STATUS for all the active OUTPUTS. By default, those OUTPUTS not yet addressed will be indicated as having INPUT 01 selected.

**SA {RETURN/ENTER}**

The **'S'** represents STATUS and the **'A'** represents ALL. As always, press the RETURN/ENTER key to execute the command. The SCI will respond with the following in two columns across the screen:

| L1 | L2 | L3 | L4 | L5 | L6 | L7 | L8 | OUT |
|---|---|---|---|---|---|---|---|---|
| xxx | xxx | xxx | xxx | xxx | xxx | xxx | xxx | xxx |
| xxx | xxx | xxx | xxx | xxx | xxx | xxx | xxx | xxx |
| xxx | xxx | xxx | xxx | xxx | xxx | xxx | xxx | xxx |

The current INPUT STATUS for all levels of each OUTPUT will be listed. The number of outputs to which the SCI DIP switches are set (see SCI DIP switch settings) will limit the number of outputs displayed.

Anytime an invalid or incomplete message is sent to the SCI, it will respond with an ASCII **'?'** unless this response is disabled (see "N/Y" command). This will occur for each group of invalid characters it receives. The RETURN/ENTER key is the delimiter between commands. Therefore, invalid characters will not cause a **'?'** response until the RETURN/ENTER key has been sent.

**COMMAND: MATRIX SETUP REQUEST**

The input/output matrix setup information of the system can be displayed. To do this, send the following command:

**? {RETURN/ENTER}**

The SCI will respond with the following message:

**AVAILABLE OUTPUTS ARE: xxx**

**AVAILABLE INPUTS ARE: xxx**

where '**xxx**' is the number of inputs and outputs set at the SCI DIP switches.

**COMMAND: DISABLE RESPONSE**

Responses generated by the SCI can be disabled with the following command. The command is:

**CTRL-N**

This will prevent all SCI responses. No carriage return is required.

**COMMAND: ENABLE RESPONSE**

At any time, the responses can be resumed. The command is:

**CTRL-Y**

Again, no carriage return is needed. Please note this process differs from the **XON/XOFF** routine. In that case, the responses are held in a buffer and then all pending messages are sent upon receiving the **XON** command. In this case, the messages are simply discarded and no record of them is kept. In this way, it is possible to tailor a program to allow only a status response but inhibit all other SCI messages.

**COMMAND: CLEAR ENTRY**

Whenever a wrong key is accidentally pressed or a command needs to be changed, the current command can be cleared by pressing the SPACEBAR. This is always true as long as the RETURN/ENTER key has not yet been pressed. All keystrokes made since the last entry of the RETURN/ENTER key will be erased. The CANCEL command is automatic and does not require the RETURN/ENTER key to be pressed. The format is:

**{SPACEBAR}**

The SCI will respond by sending a carriage return and linefeed to move the cursor on the screen to the beginning of the next line.

The SCI always gives priority to commands over responses. All commands are executed before any responses are sent. This assures the fastest processing of a change request.

**COMMAND: DISABLE CONTROL PANELS**

It is possible to disable the remote control panels and give exclusive attention to the serial port for improved response time to incoming serial commands. To halt the scanning of panels press:

**PD {CARRIAGE RETURN}**

The response is "**Panels Inactive**." This will cause the polling and updating of any remote panels to stop. This command is especially useful to improve SCI efficiency in systems where control panels are not used. Also, this command can be used to temporarily disable the panel scan, execute time critical serial transactions, and then re-enable the panel scan with the next command.

**COMMAND: ENABLE CONTROL PANELS**

To re-enable the control panel scan routines press:

**PE {CARRIAGE RETURN}**

The response is "**Panels Active**." Now the SCI is fully functional again and the panels will be updated and polled as before. Careful tailoring of programming will allow maximum efficiency in executing serial commands in those applications where execution time is especially critical.

**COMMAND: CONTROL PANEL STATUS**

The current control panel status can be determined by pressing:

**PS {CARRIAGE RETURN}**

This will yield the response of **Panels Active** or **Panels Inactive** depending on the current state.

## SPECIAL COMMANDS

There are several special commands available that should be used with care.

**COMMAND: SYSTEM HARD REBOOT**

It is possible to force a system reset from the serial port, duplicating the function of the RESET switch on the front of the SCI. All outputs are reassigned to source 1, all previously stored data is cleared, all salvo information is erased, and the system will then reboot as though a power-on condition occurred. This hard reboot command is:

**CTRL - C**

Note no carriage return is required.

**COMMAND: SYSTEM SOFT REBOOT**

This is a less destructive reset. This method will force the internal watchdog timer to restart the system as though a power-on condition had occurred. No crosspoint or salvo table information is lost. Upon this reset the DIP switch settings of the SCI are read. It is useful to use this reset command when changing the DIP switches without requiring a power down of the SCI. This soft reboot command is:

**CTRL - W**

Again, no carriage return is required.

**COMMAND: CONDENSED STATUS**

It is possible to get the status of the system in a condensed format. There are two possible methods. The first is in binary and the second is in packed BCD. The advantage here is a minimal number of bytes are issued from the port and it is a very efficient method of gaining the status from within an external control program. Since these characters are often non-printing ASCII characters it is not useful to use in a terminal package.

The command for a condensed status in binary is:

**SB {RETURN/ENTER}**

The command for a condensed BCD status is:

**SC {RETURN/ENTER}**

For a detailed explanation of the byte sequence please contact Sigma Electronics software department.

**COMMAND: HALT DATA TRANSMIT**

The SCI supports the **XON/XOFF** protocol. This is a method, through software, of halting and resuming transmission of data. The **XOFF** is activated by holding the Control key and pressing **'S' (CTRL-S)**. This will halt data transmission.. Incoming commands are still executed during an **XOFF**. It is the responses generated by the SCI that are not sent. They are held in a message buffer until an **XON** is received. Like the CANCEL command, **XOFF** is automatic and does not require the RETURN/ENTER key to be pressed.

**COMMAND: RESUME DATA TRANSMIT**

**XON** is activated by holding the Control key and pressing **'Q' (CTRL-Q)**. This will resume transmission of data from the SCI. All pending responses are sent out the serial port in the same sequence in which they were received and stored. Like the CANCEL and XOFF command, **XON** is automatic and does not require the RETURN/ENTER key to be pressed.

## SALVO COMMANDS

The SCI-ADX is capable of internally storing ten different salvos. A salvo provides a method of switching multiple commands at one time. This "grouping" of switches eliminates delay of switching from the first step to the last step in a multi-step switch. There are commands that pertain exclusively to the creation, edit and execution of a salvo.

There are ten distinct Salvo symbols:

| Symbol | Keyboard | Command |
|---|---|---|
| ! | Shift 1 | Salvo 1 |
| @ | Shift 2 | Salvo 2 |
| # | Shift 3 | Salvo 3 |
| $ | Shift 4 | Salvo 4 |
| % | Shift 5 | Salvo 5 |
| ^ | Shift 6 | Salvo 6 |
| & | Shift 7 | Salvo 7 |
| * | Shift 8 | Salvo 8 |
| ( | Shift 9 | Salvo 9 |
| ) | Shift 0 | Salvo 10 (EAS) |

SHIFT 1 through SHIFT 0 correspond to salvo 1 through salvo 10. When activating a salvo the first character in the command **must be** the salvo designator symbol); !, @, #, $, %, ^, &, *, (, or ). The Salvo stored as Salvo 10 will execute upon a closure applied to the EAS screw terminals on the rear of the master frame. This provides an automatic response to an Emergency Alert System alarm.

### COMMAND: STORE SALVO

Creating a transaction to be stored in a salvo is done exactly as a regular transaction except the salvo symbol is the leading character. The following example will store this transaction in salvo 2 (@):

**@A10C3O19 {RETURN/ENTER}**

This is a split mode transaction stored in salvo number 2 (@ = SHIFT 2),change level 1 (A) to source ten (10) and level 3 (C) to source three (3) of output (O) nineteen (19).

Multiple switches may occur upon a single salvo command. This allows multiple input to output switches to be preloaded and then switch simultaneously upon the execution of the salvo. A typical multiple output salvo would be entered like the following string of commands;

**! I 01 O 01 {RETURN/ENTER}**
**! I 02 O 02 {RETURN/ENTER}**
**! I 03 O 03 {RETURN/ENTER}**
**! I 04 O 04 {RETURN/ENTER}**
**! I 05 O 05 {RETURN/ENTER}**
**! I 06 O 06 {RETURN/ENTER}**
**! I 07 O 07 {RETURN/ENTER}**
**! I 08 O 08 {RETURN/ENTER}**
**! I 09 O 09 {RETURN/ENTER}**
**! I 10 O 10 {RETURN/ENTER}**
**! I 11 O 11 {RETURN/ENTER}**
**! I 12 O 12 {RETURN/ENTER}**
**! I 13 O 13 {RETURN/ENTER}**
**! I 14 O 14 {RETURN/ENTER}**
**! I 15 O 15 {RETURN/ENTER}**
**! A 16 B 64 O 16 {RETURN/ENTER}**

(No spaces are used between any commands.)

This salvo command is set for Salvo 1 (!) and switches inputs (I) one to fifteen (1 - 15) to outputs (O) one to fifteen (1 - 15) respectively. The last step of salvo 1 performs a split switch of input level 1 (A) from source sixteen (16) and input level 2 (B) from source sixty-four (64) to output (O) sixteen (16). The salvo command is finished with Return/Enter. The number of possible transactions in a salvo is equal to the number of outputs in the system. You can only change each output once in any particular salvo. Switch commands do not need to be in numerical order. If multiple commands are entered for one output, only the last command for that output will be visualized after the execution of the salvo.

### COMMAND: SALVO STATUS ALL

The status of a salvo can be examined by prefixing the status command with the salvo symbol.

**!SA {RETURN/ENTER}**

The example provided is for salvo 1 (!). This example provides the status (S) for all outputs (A). The difference between a normal status check and a salvo status check is anytime a level is not assigned (such as in a breakaway), the unassigned inputs will display dashes "**---**" to indicate these input levels will not be affected by the salvo. The dashed lines would appear at levels 3 (C) and 4 (D) of output 16 for the sample salvo 1 given in the previous command paragraph.

**COMMAND: SALVO STATUS SINGLE OUT**

Within each salvo a specific output can be checked for the status.

**#S9 {RETURN/ENTER}**

The example command for salvo 3 (#) would yield the current status (S) for output nine (9).

**COMMAND: SALVO ERASE (clear)**

There are **six** commands available to erase a salvo or portions of a salvo. To erase an entire salvo use the following command.

**$Z {RETURN/ENTER}**

In the example above, the command will take salvo 4 ($) erase (Z) the entire contents:

To erase only a specific output , use the command with an output limiter attached.

**@Z14 {RETURN/ENTER}**

This example for salvo 2 (@) erases (Z) all input assignments for output fourteen (14).

A range of outputs within a salvo can be erased as a group.

**!Z11-18 {RETURN/ENTER}**

This example for salvo 1 (!) erases (Z) all input assignments for outputs eleven (11) through (-) eighteen (18).

It is possible to erase only one level of a salvo. The following command erases only the level designated for all transactions listed in the command string.

**@ZB {RETURN/ENTER}**

The example above for salvo 2 (@) will erase (Z) all level 2 (B) entries for each output specified in the salvo.

It is also possible to erase a level for a specific output within a salvo.

**#ZC9 {RETURN/ENTER}**

The example above for salvo 3 (#) erases (Z) the level 3 (C) input assignment for output nine (9).

A command is available to erase a level within a range of outputs for a particular level.

**#ZA12-19 {RETURN/ENTER}**

The example above for salvo 3# will erase (Z) all entries for level 1 (A), beginning with output twelve (12) through (-)and including output nineteen (19).

**COMMAND: EXECUTE SALVO**

A salvo can be executed immediately by choosing the proper salvo symbol and using the execute command.

**!X {RETURN/ENTER}**

The example above is the salvo 1 (!) execute (X) command.

**COMMAND: PRESET SALVO**

The command to PRESET a salvo, but not execute it, allows the system to queue a system for an immediate preloaded switch upon the execute command.

**$P {RETURN/ENTER}**

The example above for salvo 4 ($) presets (P) and holds the salvo. During a salvo preset condition, no other salvo can be accessed. Neither edits nor system transactions are permitted. There are essentially only three options: execute the salvo, cancel the salvo or request a status. This is true whether it is a command from the serial port or a control panel. All other switch commands are ignored during a salvo preset.

A salvo preset has an internal timer of approximately 30 seconds. If a preset salvo is not executed within this time, it will automatically be canceled and a salvo cancel message will be sent out the serial port.

**COMMAND: EXECUTE PRESET SALVO**

To execute a preset salvo, choose the salvo number/symbol of the preset salvo.

**$ {RETURN/ENTER}**

The example above will execute salvo 4 ($), which was in the preset mode.

**COMMAND: CANCEL PRESET SALVO**

A preset salvo can be canceled.

**$Q {RETURN/ENTER}**

The sample above takes a preset condition for salvo 4 ($) and releases (Q, quit) it. This cancellation of the preset salvo allows normal transactions to resume.

## RS422/485 PROTOCOL COMMANDS

Unlike the RS232 commands, the RS422/485 protocol allows for multiple devices to be connected to a computer/terminal at the same time. In order for the computer/terminal to communicate with a device in RS422/485, it must first tell the device to listen. This is the purpose of the logic address. The SCI has four DIP switches reserved for setting the device's logic address. Valid addresses for the SCI are 01-07 (an address of 00 indicates that RS-232 is being used).

The format for RS-422/485 protocol is identical to that of RS232 with one exception. Any RS422/485 command must be have the prefix of a forward slash (/). The forward slash is required on all commands including special commands like **XON/XOFF.**

**/xx**

The slash (/) is the precursor, and the **'xx'** is the logic address of the device. This is **ALWAYS** a TWO DIGIT NUMBER.

For example, to generate a typical audio-follow-video switch use the sequence below.

**/xxIyyyOzzz {RETURN/ENTER}**

The forward slash (/) precedes the SCI's two digit logic address **'xx',** the input number is represented by one, two or three digits **'yyy'** and the output or destination is represented by the one, two or three digit **'zzz'**.

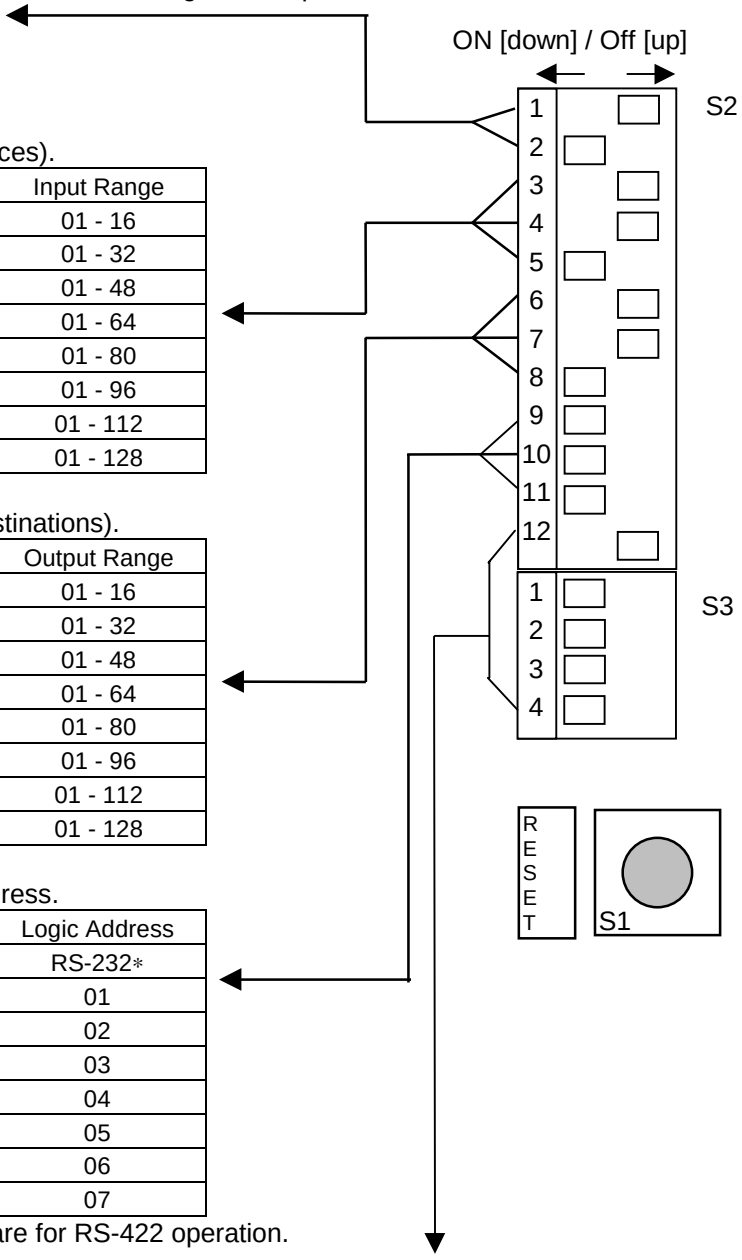
## Serial Control and Mode Switches

The system configuration DIP switches S2 and S3 are located on the front edge of the SCI-ADX printed circuit board. The system master frame holds the SCI-ADX module. Remove the front panel of the frame to access the switches. The momentary push-button reset switch S1 is positioned next to S3. See INTRODUCTION for details.

This chart sets the communications Baud Rate.

| S2,1 | S2,2 | Baud Rate |
|---|---|---|
| ON | ON | 9600 |
| OFF | ON | 19200 |
| ON | OFF | 38400 |
| OFF | OFF | 57600 |

The Dip switch settings below are configured for a 64x64 matrix using RS-232 protocol at 19,200 baud rate.




This chart sets the number of switcher inputs (sources).

| S2,3 | S2,4 | S2,5 | Input Range |
|---|---|---|---|
| ON | ON | ON | 01 - 16 |
| OFF | ON | ON | 01 - 32 |
| ON | OFF | ON | 01 - 48 |
| OFF | OFF | ON | 01 - 64 |
| ON | ON | OFF | 01 - 80 |
| OFF | ON | OFF | 01 - 96 |
| ON | OFF | OFF | 01 - 112 |
| OFF | OFF | OFF | 01 - 128 |

This chart sets the number of switcher outputs (destinations).

| S2,6 | S2,7 | S2,8 | Output Range |
|---|---|---|---|
| ON | ON | ON | 01 - 16 |
| OFF | ON | ON | 01 - 32 |
| ON | OFF | ON | 01 - 48 |
| OFF | OFF | ON | 01 - 64 |
| ON | ON | OFF | 01 - 80 |
| OFF | ON | OFF | 01 - 96 |
| ON | OFF | OFF | 01 - 112 |
| OFF | OFF | OFF | 01 - 128 |

This chart indicates protocol format and logical address.

| S2,9 | S2,10 | S2,11 | Logic Address |
|---|---|---|---|
| ON | ON | ON | RS-232* |
| OFF | ON | ON | 01 |
| ON | OFF | ON | 02 |
| OFF | OFF | ON | 03 |
| ON | ON | OFF | 04 |
| OFF | ON | OFF | 05 |
| ON | OFF | OFF | 06 |
| OFF | OFF | OFF | 07 |

Use address 00 for RS-232. All other settings are for RS-422 operation.

| **Control Level** | | | **Control Panel Type** | | | **Handshaking** | | | **Reserved** | | **Panel Scan** | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| S2, 12 | Levels | | S3,1 | Panel Type | | S3.2 | Handshaking | | S3.3 | | S3.4 | Panel Scan |
| ON | 8 | | ON | Numeric | | ON | Enabled | | Reserved | | ON | Scan ALL |
| OFF | 4 | | OFF | Alpha | | OFF | Disabled | | | | OFF | Scan Active |

NOTE 1 - Fixed serial communications parameters are: 8 Character bits 1 Stop bit No Parity
NOTE 2 - Synchronous mode switching occurs on line 10 in NTSC and line 7 in PAL when reference is supplied.

## JUMPER SELECTION

## SERIAL PORT COMMUNICATION FORMAT

| | |
|---|---|
| RS-232 SELECTION | JP2, 9 position jumper with header attached, factory default. |
| RS-422/485 SELECTION | JP1, 9 position jumper, move header from JP2 to this position for RS-422/485.<br>J4, RS-422/RS-485 selector, factory default is RS-422<br>J5, Delete for RS-422 and RS-232 (factory default), Add for RS-485<br>J6, Delete for RS-422 and RS-232 (factory default), Add for RS-485 |
| Reserved Function | JP3, programming interface for U6 (factory reserved) |

## SCI-ADX 9 PIN 'D' RS-422/485 WIRING

| PIN # | FUNCTION* | DIRECTION |
|---|---|---|
| 1 | Ground | ---- |
| 2 | Transmit A | Output ( TX Data - ) |
| 3 | Receive B | Input ( RCV Data + ) |
| 4 | Receive Common | ---- |
| 5 | N/C | ---- |
| 6 | Transmit Common | ---- |
| 7 | Transmit B | Output ( TX Data + ) |
| 8 | Receive A | Input ( RCV Data - ) |
| 9 | Frame Ground | ---- |

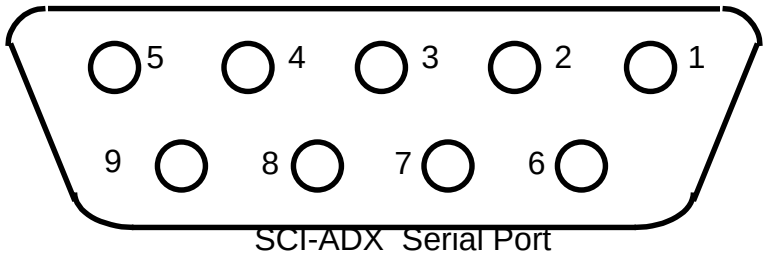
*(Same as standard: ANSI/SMPTE 207M/1984)

## 9 PIN 'D' RS-232 PIN ASSIGNMENT

| PIN # | FUNCTION* | DIRECTION |
|---|---|---|
| 1 | N/C | ---- |
| 2 | RECEIVE DATA | INPUT to SCI-ADX |
| 3 | TRANSMIT DATA | OUTPUT from SCI-ADX |
| 4 | DATA TERMINAL READY | OUTPUT from SCI-ADX |
| 5 | SIGNAL GROUND | N/A |
| 6 | DATA SET READY | INPUT to SCI-ADX |
| 7 | READY TO SEND | OUTPUT from SCI-ADX |
| 8 | CLEAR TO SEND | INPUT to SCI-ADX |
| 9 | N/C | ---- |

The Pin assignments noted are per the RS-232 standard. Although the standard defines the use of twenty five (25) Pins, only nine (9) are required for PC serial communications. Of those nine pins, only seven are required for communication to the SCI when handshaking is required. If handshaking is not required only three pins will be active. There is no need to jumper the handshaking pins when unused. Consult the control device manufacturer's data sheet to determine proper wiring.

PIN OUT




SCI-ADX Serial Port

## RS-232C WIRING

SCI-ADX 9 PIN 'D'

| PIN | SIGNAL DESIGNATION | SERIAL PORT CONNECTIONS (COMM 1-DCE) | | SERIAL PORT CONNECTIONS (COMM 2-DTE) |
|---|---|---|---|---|
| 1- | N/C | N/C | | N/C |
| 2- | RECEIVE DATA (RXD) [INPUT] | RXD | OR | TXD |
| 3- | TRANSMIT DATA (TXD) [OUTPUT] | TXD | OR | RXD |
| 4- | DATA TERMINAL READY (DTR) [OUTPUT] | CTS | | CTS |
| 5- | SIGNAL GROUND | GROUND | | GROUND |
| 6- | DATA SET READY (DSR) [INPUT] | RTS | | RTS |
| 7- | READY TO SEND (RTS) [OUTPUT] | DSR | | DSR |
| 8- | CLEAR TO SEND (CTS) [INPUT] | DTR | | DTR |
| 9- | N/C | N/C | | N/C |

Although the RS-232C standard defines the use of 25 pins, only nine of those are needed for basic PC serial communications. Of those nine, only seven are required for serial communications with the SCI-ADX. The above wiring chart is typical for most IBM and compatible type PC's. However, it is always best to check with the manufacturer's wiring specifications to determine exact pin assignments before beginning. This is especially true if using COMM 1, since some manufacturers use a 9 pin 'D' connector instead of a 25 pin 'D'. Regardless of the connector, the signal connections are the same. RXD and TXD are reversed depending upon whether the serial port is configured as a DTE (data terminal equipment) or a DCE (data communications equipment).

If handshaking is not required by the control equipment, there is no need to jumper the pins on the SCI-ADX. When handshaking is not required only 3 pins will be used: TXD, RXD and Signal Ground. All other pins will have no connection.