

# **SymNet™** | Network Audio Solutions



## Quick Start Guide

### Control I/O

# Quick Start Guide: Control I/O



## Before You Begin

### What Ships in the Box

- A Control I/O hardware device.
- One PS-5 switching power supply which provides 15 VDC @ 1.33 amperes. NOTE: The PS-5 will accept a 100-240 VAC input. A power cable for domestic use is supplied for the PS-5. Export customers should supply the appropriate substitute cable for their locale.
- This Quick Start Guide.

### What You Need to Provide

- A Windows® PC with 300MHz or higher Pentium® and:
  - + WIN 98SE, ME, 2000 or XP®.
  - + 10-15 MB free storage space.
  - + 1024x768 graphics capability.
  - + 16-bit or higher colors.
  - + CD-ROM drive or Internet connection.
  - + 64MB RAM (WIN 98SE/ME), 128MB RAM (WIN 2000/XP).
- Shielded twisted pair wire to connect the Control I/O RS-485 port to the RS-485 port of a master SymNet hardware device (Ring x, Address 1).
- CAT5 cables to connect the Control I/O to any ARC(s).
- External controls (pots, switches, encoders, etc.) and hook up wire as necessary.

### Getting Help

SymNet Designer, the Windows application that controls all SymNet hardware, includes a help module which acts as a complete User's Guide for both hardware and software.

If you have questions beyond the scope of the help module, contact our Customer Support Group in the following ways:

**Tel:** +1 (425) 778-7728  
8:00 am to 4:30 pm  
Monday through Friday,  
Pacific Time

**Web:** <http://www.SymetrixAudio.com>

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

This Class B Digital apparatus meets all requirements of the Canadian Interference-Causing Equipment Regulations



Cet appareil numérique de la classe B respecte toutes les Exigences du Règlement sur le matériel brouilleur du Canada.

Keep up-to-date with the latest version of SymNet Designer™, the Windows® application that controls all SymNet hardware, go to: <http://www.SymetrixAudio.com>

### Important Safety Instructions.

- 1 Read these instructions.
- 2 Keep these instructions.
- 3 Heed all warnings.
- 4 Follow all instructions.
- 5 Do not use this apparatus near water. This apparatus shall not be exposed to dripping or splashing and no objects filled with liquids, such as vases, shall be placed on the apparatus.
- 6 Clean only with dry cloth.
- 7 Do not block any ventilation openings. Install only in accordance with the manufacturer's instructions.
- 8 Do not install near any heat sources such as radiators, heat registers, stoves, or other apparatus (including amplifiers) that produce heat.
- 9 This apparatus shall be connected to a mains socket outlet with a protective earthing connection. Do not defeat the safety purpose of the polarized or grounding-type plug. A polarized plug has two blades with one wider than the other. A grounding type plug has two blades and a third grounding prong. The wide blade or the third prong are provided for your safety. If the provided plug does not fit into your outlet, consult an electrician for replacement of the obsolete outlet.
- 10 Protect the power cord from being walked on or pinched particularly at plugs, convenience receptacles, and the point where they exit from the apparatus.
- 11 Only use attachments/accessories specified by the manufacturer.
- 12 Use only with the cart, stand, tripod, bracket, or table specified by the manufacturer, or sold with the apparatus. When a cart is used, use caution when moving the cart/apparatus combination to avoid injury from tip-over.
- 13 Unplug this apparatus during lightning storms or when unused for long periods of time.
- 14 Refer all servicing to qualified service personnel. Servicing is required when the apparatus has been damaged in any way, such as power-supply cord or plug cord is damaged, liquid has been spilled or objects have fallen into the apparatus, the apparatus has been exposed to rain or moisture, does not operate normally, or has been dropped.



	<b>CAUTION</b> RISK OF ELECTRIC SHOCK DO NOT OPEN	
<b>WARNING:</b> TO REDUCE THE RISK OF FIRE OR ELECTRIC SHOCK DO NOT EXPOSE THIS EQUIPMENT TO RAIN OR MOISTURE		
<b>AVIS:</b> RISQUE DE CHOC ELECTRIQUE NE PAS OUVRIR		

SEE OWNERS MANUAL. VOIR CAHIER D'INSTRUCTIONS.  
No user serviceable parts inside. Refer servicing to qualified service personnel.  
Il ne se trouve à l'intérieur aucune pièce pour être réparée l'utilisateur.  
S'adresser à un réparateur compétent.

- ! **The lightning flash** with arrowhead symbol within an equilateral triangle is intended to alert the user of the presence of uninsulated "dangerous voltage" within the product's enclosure that may be of sufficient magnitude to constitute a risk of electric shock to persons. The exclamation point within an equilateral triangle is intended to alert the user of the presence of important operating and maintenance (servicing) instructions in the literature accompanying the product (i.e. this Quick Start Guide).
- ! **CAUTION:** To prevent electric shock, do not use the polarized plug supplied with the unit with any extension cord, receptacle, or other outlet unless the prongs can be fully inserted.
- ! **Power Source:** This Symetrix hardware uses a switching power supply that automatically adjusts to the applied voltage. Ensure that your AC mains voltage is somewhere between 100-240 VAC, 50-60 Hz. Use only the power cord and connector specified for the product and your operating locale. A protective ground connection, by way of the grounding conductor in the power cord, is essential for safe operation. The appliance inlet and coupler shall remain readily operable once the apparatus has been installed.
- ! **User Serviceable Parts:** There are no user serviceable parts inside this Symetrix product. In case of failure, customers inside the U.S. should refer all servicing to the Symetrix factory. Customers outside the U.S. should refer all servicing to an authorized Symetrix distributor. Distributor contact information is available online at: <http://www.SymetrixAudio.com>.

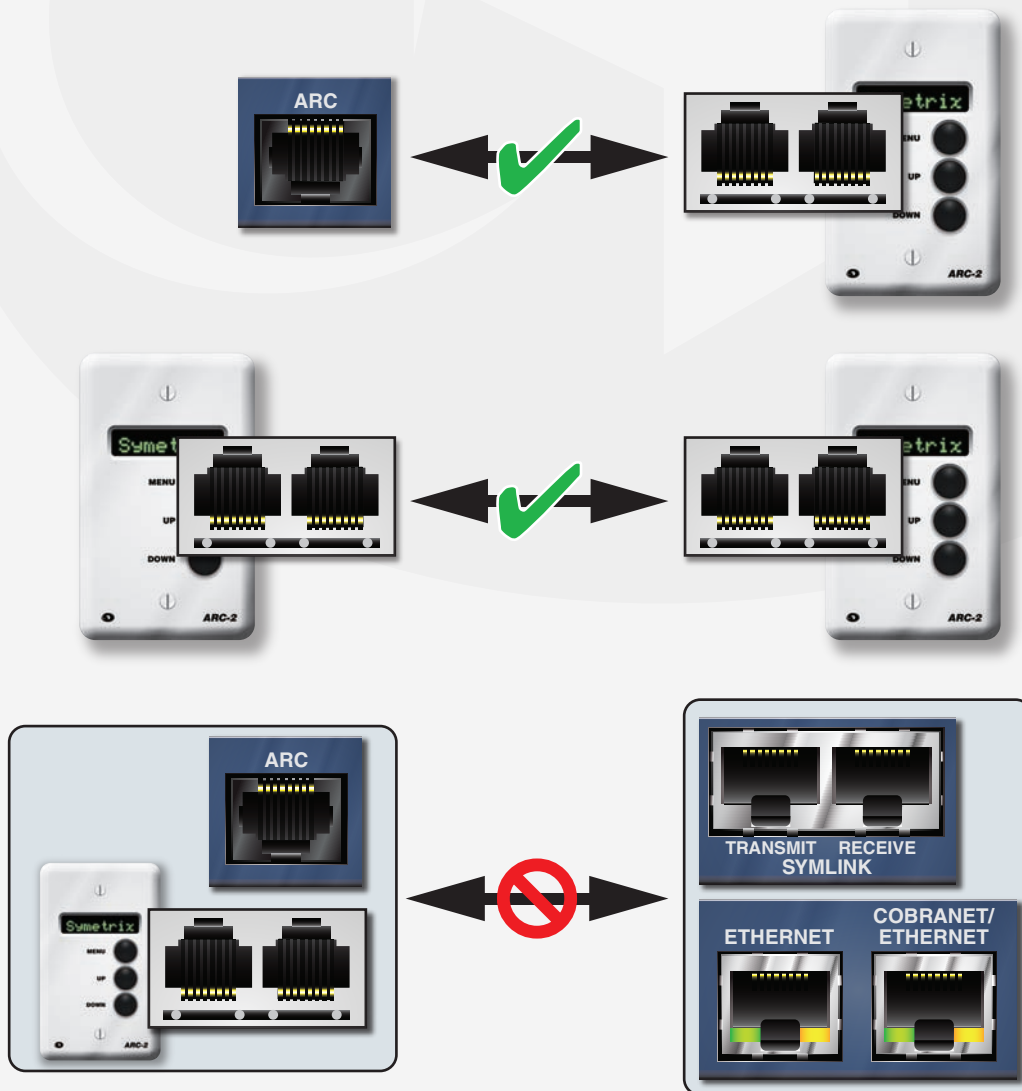
## Warning

# ! WARNING! !

The RJ-45 connectors labeled "ARC" are only for use with the ARC series of remotes.

**DO NOT plug the ARC connectors on Symetrix products into any RJ-45 connector labeled "SYMLINK", "ETHERNET" or "COBRANET".**

The "ARC" RJ-45 connectors on Symetrix products can carry anywhere from 6 to 24 VDC which can damage SymLink, Ethernet and CobraNet circuitry.



## Introduction

SymNet™ is a scalable DSP platform configured by SymNet Designer software and made by Symetrix. Installed in Convention Centers, Sports Arenas, Houses of Worship and many other venues throughout the world, consultants, integrators and end-users rely on the robust stability of the SymNet platform.

SymNet is an open architecture system. This means DSP modules (EQ, compression, etc.) are placed into the design and connected using standard drag-and-drop methods. Various SymNet hardware can be chained together to provide a custom audio solution for the client. SymNet’s main advantage can be summed up in one word: “Options”. Options for DSP processing, options for audio routing and options for control.

## Overview

The Control I/O is an RS-485-based peripheral for Symetrix DSP systems. Control I/O also has a stand-alone ASCII mode, which is compatible with third-party hardware such as those from AMX, Crestron, etc. Control I/O functions as a hardware interface for analog controls such as switches, pots, relays and binary outputs – including generic MIDI devices.

The Control I/O also functions as a hardware interface for analog controls, extending the capabilities and connectivity supported by Symetrix DSP models. The device provides an assortment of external control options that can be assigned to most parameters within a Symetrix DSP. Programming assignments and firmware version upgrades are handled by software included with Symetrix DSP hardware. The Control I/O package includes eight analog control inputs, eight open collector outputs, four single pole, double-throw relays, and four RJ-45 connectors to support four Symetrix ARC Wall Panels, each with a discrete channel of ARC Audio. A DB-15 connector functions as a MIDI interface. This allows communication from generic MIDI devices that can be configured to function as a mixing console-type interface for SymNet.

In ASCII mode the Control I/O may be integrated into other third-party hardware and systems, such as those from AMX, Crestron, and others. Compatible systems must be capable of communicating with Control I/O over RS-485. All of the capabilities listed above apply, with the exception of ARC Wall Panel support. ARC Wall Panels are proprietary and only work with Symetrix DSP systems.

Mechanical Data		
Item	Specifications	Remarks
Space Required	1U (WDH: 48.3 cm x 15.6 cm x 4.37 cm / 19 in x 6.1 in x 1.72 in). Depth does not include connector allowance.	Allow at least 1 inch additional clearance for rear panel connections. Additional depth may be required depending upon your specific wiring and connections.
Electrical	100-240 VAC, 50-60 Hz, 15 VDC output, 20 Watts maximum.	No line voltage switching required.
Ventilation	Maximum recommended ambient operating temperature is 30 C / 86 F.	The ventilation should not be impeded by covering the ventilation openings with items such as newspapers, tablecloths, curtains, etc.
Shipping Weight	2.0 kg (4.4 lbs.)	



Front Panel		
Item	Description	What It Does
POWER	Red LED	Indicates that the unit is powered on.
RS-485 COMM	Yellow LED	Indicates active RS-485 communications.
MIDI COMM	Green LED	Indicates active MIDI communications.

# Quick Start Guide: Control I/O

## Rear Panel and System Connection



Rear Panel		
Item	Description	What It Does
POWER INPUT	4 pin XLR jack	Accepts power from a Symetrix PS-5 switching power supply (15 VDC @ 1.33 A).
DEVICE CONFIG	8 DIP switch block	Configures the Control I/O's device address (0-31). Addressing is done in a binary fashion. (See Device Address Quick Reference).
RS-485	Euroblock	Connects to Ring Master SymNet hardware device (SymNet 8x8, 8in or 8out DSP, or SymNet CobraLink if multi-ring system) or 3rd party RS-485 compatible controller.
ARC AUDIO	Euroblocks	Splits a single analog line level audio signal off of the ARC port. Can be wired to a line level analog input or output jack for remote audio over CAT5.
REMOTE ARCS	4 x RJ-45	Distributes power and RS-485 data to one or more ARCs per port. (See: ARC Network Design)
MIDI I/O	Female DB15	Allows external MIDI control via a standard DB15 "joystick" to (2) DIN 5 MIDI IN and MIDI OUT cables adapter. (Adapter not included).
RELAY OUTPUTS	Euroblocks	4 x SPDT relays rated at 3A, 24VDC, resistive; 0.3A, 60VDC, resistive and can be wired normally open or normally closed.
OPEN COLLECTOR OUTPUTS	Euroblocks	8 x open collector outputs with paired common ground pins. OC outputs go low (0V) when active, and are internally pulled high (5V) when inactive and can drive external LED indicators directly.
ANALOG CONTROL INPUTS	Euroblocks	8 x analog control inputs able to be used as 8 potentiometer inputs, 8 mechanical rotary encoder inputs, or as 16 switch inputs (+5 VDC reference voltage supplied).

**NOTE:** Detachable Euroblock connectors are designed for use with bare wire. Do not tin stranded wires before inserting them into the connectors.

## System Connection

Connect the RS-485 port on the back of any master SymNet hardware device (at Ring x, Address 1) to the RS-485 port on the Control I/O using shielded twisted pair cable wired in parallel.



**WARNING:** When designing a system, one must be careful not to double power any ARCs. If all pins on the CAT5 connections are used, power can travel over the CAT5 cable and reach any ARC on that particular chain. So, power over CAT5 could potentially come from the Control I/O or from an ARC that is powered locally and then daisy chained via CAT5 to other ARCs. In general, it is recommended to use only one type of connector on the ARCs, either the RJ-45s (with CAT5 cable) or the Euroblocks.

### ARC PORT PINOUT (both Grounds and Powers required for specified distance)

Pin #	Function
1	Audio (+)
2	Audio (-)
3	Common Ground
4	RS-485 Data (A)
5	RS-485 Data (B)
6	Common Ground
7	Power (+V)
8	Power (+V)

**Note:** The ARC Audio lines may be grounded at the Symetrix Rack-mount device and the ARC wall panel to provide additional distance.

## RS-485 Termination

The Control I/O features an RS-485 termination jumper, J20 on the PCB. Terminated and open positions are labeled on the PCB silkscreen. For maximum signal integrity, follow the termination guidelines below:

For star configurations, terminate at the Control I/O.

RS-485 TERMINATION GUIDELINES	
Daisy-chain length	Termination
0 - 200 ft.	No termination required
200 - 1000 ft. (if powering over CAT5)	Terminate at the ARC
> 1000 ft. (or if not powering over CAT5)	Terminate at the ARC-PS, Control I/O or DSP device and at the furthest ARC device

## MIDI I/O

With the DB15 MIDI I/O “joystick” port, the Control I/O can function as a MIDI Continuous Controller (CC) to RS-485 Controller translator. The DB15 port uses a standard to (2) DIN 5 MIDI IN and MIDI OUT cable adapter. (Adapter not included). The adapter is the same that most all computer sound cards with a joystick port use and is available at many computer and music supply outlets. (Please see the SymNet Designer online help for information on how to map a MIDI Controller number to an RS-485 Controller number in a SymNet DSP design.)

## Device Addressing

Every RS-485 device (including all ARCs and Control I/Os) connected to the same SymNet Ring must be uniquely identified. You may use the pictorial diagrams below to quickly set up and understand the device address DIP switches on the Control I/O. Any time the DIP switches are changed, the unit must be power cycled for the changes to take effect.

Note: The Control I/O contains field-upgradable firmware. Upgrading is facilitated by DIP switch #2 labeled “UPGRADE / RUN”. Unless instructed by Symetrix Technical Support personnel or a Symetrix Technical Bulletin, this switch should remain in the “RUN” position.

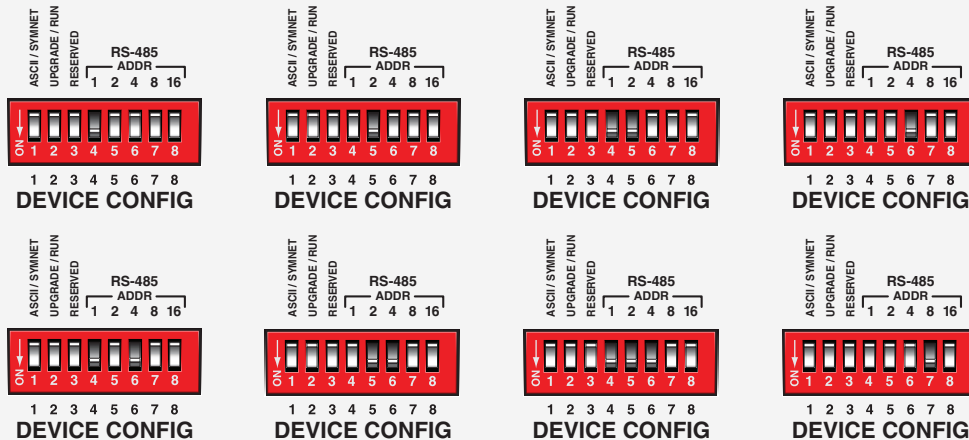
## Relay Outputs

The Control I/O provides three (3) SPDT relay contacts. Common, Normally Closed and Normally Open pins are furnished on a 3-pin Euroblock connector. Contact ratings for the relay are: 3 Amp, 24 VDC, resistive; 0.3 Amp, 60 VDC, resistive. Do not use at 120 VAC. (Please see the SymNet Designer online help for information on how to address the Relay Outputs in a SymNet DSP design.)

Note: These relays can also be used for power failure detection. See SymNet Designer online help for more information.

## Control I/O DIP Switch Settings

NOTE: For the sake of space, only switch settings for the first 8 addresses are pictured. An address of up to 31 is possible (all DIP switches down). For systems containing 32 total Control I/O’s, an address of zero (0) is available (all DIP switches UP).

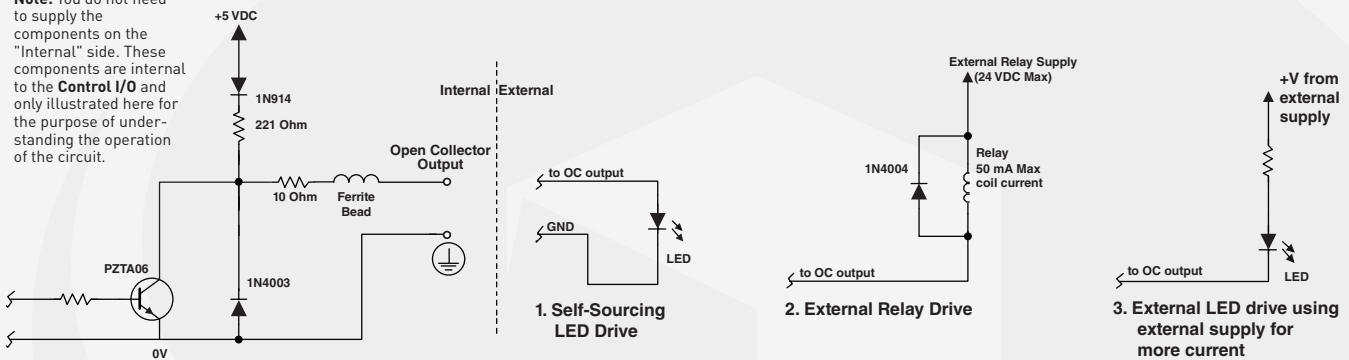


### Binary (Open Collector) Outputs

The following illustrations depict three typical open collector output hook ups. The most common uses for the open collector outputs are to fire external LED indicators (LED lit when O/C inactive) or drive external relays. Six NPN transistor outputs are provided, cleverly wired to allow operation as open collector output for relay coil driving or for sourcing LED drive current. Collector and ground connections

furnished. These outputs can drive an LED directly. A current limiting resistor is not needed. The current must be  $< 50 \text{ mA}$ ,  $24\text{V}$  maximum. If you're driving a relay, be sure to include a reversed biased diode connected across the relay coil. Connect the LED from the output to ground. (Please see the SymNet Designer online help for information on how to address an Open Collector output in a SymNet DSP design.)

**Note:** You do not need to supply the components on the "Internal" side. These components are internal to the **Control I/O** and only illustrated here for the purpose of understanding the operation of the circuit.



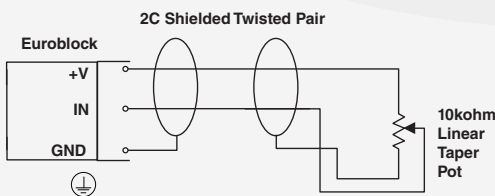
### Analog Control Inputs

The following illustrations show the connection of either a 10k Ohm linear potentiometer, a mechanical rotary encoder or switches to one of the 8 analog control inputs of Control I/O. (Please see the SymNet Designer online help for information on how to assign an analog control input to a SymNet DSP parameter.)

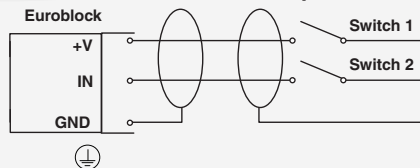
The Symetrix model RC-3 is the perfect potentiometer match for the Control I/O. Suitable potentiometers, switches and encoders might also be sourced from electronic parts suppliers such as Digi-key. Note that encoders must be of the mechanical type.

**Disclaimer:** From time to time we test the compatibility of our own products with those of third parties. While we are happy to share with our customers the results of our own studies as well as other possibly unsubstantiated information regarding these third party products, it is the policy of Symetrix, Inc. to neither endorse, recommend nor support products manufactured and/or supplied by third parties. The responsibility of choosing third party products which are compatible with Symetrix products rests solely with the qualified contractor, consultant or system designer.

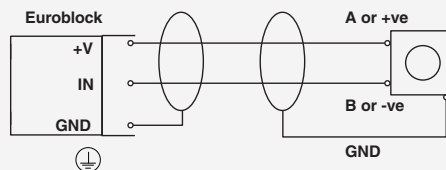
Typical Control Potentiometer Wiring



Typical Control Switch Wiring for Discrete Switch Inputs



Typical Mechanical Rotary Encoder Wiring



## Remote ARCs

The ARC ports distribute power and RS-485 data to one or more ARCs arranged in one or more chains over standard CAT5 cable. The Control I/O can support up to eight (8) ARCs total within the guidelines set forth in the ARC Network Design section. (Please see the SymNet Designer online help for information on how to program the ARC.)



**WARNING:** The RJ-45 connectors labeled “ARC” are only for use with the ARC series of remotes. DO NOT plug the ARC connectors on Symetrix products into any RJ-45 connector labeled “SYMLINK”, “ETHERNET” or “COBRANET. The “ARC” RJ-45 connectors on Symetrix products can carry anywhere from 6 to 24 VDC which can damage SymLink, Ethernet and CobraNet circuitry.

## ARC Network Design

The ARC can be powered two ways: (1) over CAT5 via the RJ-45 “ARC” port on ARC-enabled Symetrix products, or (2) by local 6 to 24 VDC power supplied to the ARC’s terminal block connections.

The ARC’s power requirements vary depending on the voltage supplied to it. At 15 VDC, it uses approximately 115 mA, while at 6 VDC it uses approximately 300 mA maximum. As the voltage goes from 15 to 6 VDC, the current requirement increases accordingly.

ARCs can be daisy-chained and fed power over this daisy-chain from the ARC port. However, as the length of the cable increases, so does the resistive line loss, which lowers the voltage available at each subsequent ARC. The actual power drain on each output from an ARC port can vary substantially depending on the number of ARCs and the distance each of them is separated by. In order to assist with system design, Symetrix has available a Microsoft Excel spreadsheet that can help a system designer determine power requirements based upon cable length, number of ARCs and the power supply to be used. This spreadsheet can be downloaded from the SymNet Technical Support pages at: <http://www.SymetrixAudio.com>.

The following table gives some indication of cabling limitations, based on DC power only (the table is only relevant for the RJ-45 ARC port on this specific product): minimum stated distances assume 28 gauge CAT5 cabling, maximum stated distances assume 24 gauge CAT5 cabling.

If power is not distributed over CAT5, each RS-485 chain will be limited to 1000 ft in a star network configuration and 4000 ft in a daisy-chain network configuration. Longer distances may be possible using third party RS-485 extender products.

### CABLE LENGTH LIMITATIONS FOR ARC DC POWER OVER CAT5 CABLE

Maximum total cable length (to end of chain)	Number of ARCs in 1 daisy-chain
180-470 ft.	4
220-620 ft.	3
320-910 ft.	2
630-1810 ft.	1

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the results of our own studies as well as other possibly unsubstantiated information regarding these third party products, it is the policy of Symetrix, Inc. to neither endorse, recommend nor support products manufactured and/or supplied by third parties. The responsibility of choosing third party products which are compatible with Symetrix products rests solely with the qualified contractor, consultant or system designer.

### ARC PORT PINOUT (both Grounds and Powers required for specified distance)

Pin #	Function
1	Audio (+)
2	Audio (-)
3	Common Ground
4	RS-485 Data (A)
5	RS-485 Data (B)
6	Common Ground
7	Power (+V)
8	Power (+V)

**Note:** The ARC Audio lines may be grounded at the Symetrix Rack-mount device and the ARC wall panel to provide additional distance.



**WARNING:** When designing a system, one must be careful not to double power any ARCs. If all pins on the CAT5 connections are used, power can travel over the CAT5 cable and reach any ARC on that particular chain. So, power over CAT5 could potentially come from the originating ARC port or from an ARC that is powered locally and then daisy chained via CAT5 to other ARCs. In general, it is recommended to use only one type of connector on the ARCs, either the RJ-45s (with CAT5 cable) or the terminal blocks

## ARC Audio

**ARC Audio** provides a means to take a single balanced analog audio line and either inject it into or pick it off an RS-485 network’s CAT5 cable run. An ARC Audio port on a Symetrix device may be wired to a nearby device’s analog input or output. This provides a means of easily running a single audio channel to or from a remote source or destination. The ARC-MIC and ARC-XLR make use of ARC Audio to transport audio signals back to a SymNet rack mount unit.

**Note 1:** The original Menu ARC remote (simply named “ARC”) does not support ARC Audio lines and will ground the audio lines if connected.

**Note 2:** To avoid the possible grounding, mixing, or shorting of the ARC Audio lines, it is recommended to home run any ARC devices making use of the ARC Audio lines so that only one ARC device is on each chain.

### Limits of ARC Audio

ARC Audio is a simple analog audio signal travelling the same cable as the RS-485 data and power. As such, the usual audio signal cautions apply. Avoid running parallel to other power lines or near any other sources of EMI or RFI. Most CAT5 is unshielded and is susceptible to interference and noise. We provide here the following information on ARC Audio’s performance and limitations:

# Quick Start Guide: Control I/O

## Arc Audio Continued • Stand-Alone Operation • ASCII Control Protocol

### Line-level Balanced Audio:

Professional line level balanced signals can also be sent over up to approximately 1500 feet of CAT5 without significant degradation.

All unbalanced signals should be avoided completely.

### Mic-level Audio:

Unbuffered condenser or dynamic microphones should generally be avoided, though it may be possible to achieve decent quality with cable runs of less than 50 feet using a fairly hot microphone level with a noise gate or expander in to clean up the signal. This technique does not provide much flexibility within the system design, and therefore is not recommended.

### Frequency response:

Frequency response can roll-off due to the capacitance of a long cable run. The amount of roll-off is highly dependent on source impedance (the output impedance of what is supplying the signal). Most pro audio devices have low output impedances (200 Ohms or less) and do not suffer significant roll-off (approximately -1 dB at 20 kHz with 1500 feet of CAT5). A device with a 600 Ohm output impedance could cause some audible roll-off (-3 dB at 10 kHz), but should be of sufficient quality for speech signals.

### Data Noise:

With an unbuffered mic and long cables, data noise may be audible as a “motorboat” sound. Experimenting with RS-485 termination and baud rate may improve the sound somewhat.

## Stand-alone Operation

The Control I/O may also be used in a stand-alone fashion or integrated into other RS-485 compatible control systems such as those made by AMX or Crestron. All previous hook up information applies as well as device addressing information (with the exception of DIP switch #1 “ASCII / SYMNET”, which should be down in the “ASCII” position and then the unit power cycled to enable stand-alone mode). The REMOTE ARC ports will not be of use in this application as the ARCs do not use the protocol outlined below.

## ASCII Control Protocol

### Introduction

The Control I/O has the capability of being used as a generic control device, without the SymNet system being present. In this mode, the device accepts generic commands from the RS-485 input and respond accordingly. This section outlines how that is accomplished, and the commands supported by the device.

### Control I/O Setup

Setting the second DIP switch from the left (looking from the rear) to the ‘on’ (down) position puts the Control I/O into the ASCII control mode. After changing modes, the unit will need to be power cycled for the setting to take effect. While in the ASCII control mode, the unit will not respond to normal SymNet commands, but instead to a

simple ASCII based protocol suitable for AMX/Crestron type controllers or even a simple terminal program.

### Command Set

The <address> field must match the value of the address on the specific unit’s DIP switch. If the address field does not match, then the command is ignored and no response is sent which allows multiple units to reside on the same RS-485 bus. If the address is correct but the command isn’t recognized, or any of the parameters are incorrect, a NAK will be returned. The address field can range from 0-31. If everything was satisfactory, an ACK will be returned. Parameter values can be separated by space(s) or a comma, though numeric parameters directly following a character value need no delimitation. All numeric parameters are positive decimal integers except for the Send MIDI String command which accepts a string of two digit hexadecimal numbers.

#### (FU) Flash Front LEDs

Command:

FU <address><cr>

Where <address> is a decimal number 0-31.

Response:

<ACK/NAK><cr>

#### (RV) Return Software Version

Returns the current firmware version of the Control I/O’s microcontroller.

Command:

RV <address><cr>

Response:

<value> <ACK/NAK><cr>

Where <value> is the version number times 100.

#### (IM) Set Input Mode

Command:

IM <address> <input> <mode><cr>

Where <input> is a decimal number 1-8 and <mode> is:

P = potentiometer

E = encoder

S = dual switch

Note: Input modes are persistent with power cycling. A new unit from the factory will set all 8 inputs as dual switches.

Response:

<ACK/NAK><cr>

If <input> is outside the 1-8 range, or <mode> is not “P”, “E”, or “S” then a “NAK” is returned.

### (RI) Read Input State

Reads the state of the analog control inputs.

Command:

```
RI <address> <input><cr>
```

Where <input> is a decimal number 1-8.

Response:

```
<value> <ACK/NAK><cr>
```

If the input is a pot, <value> is always returned as 3 decimal digits with a range of 000-255.

000 = pot arm at ground

255 = pot arm at max

If the input is an encoder, <value> is always returned as 3 decimal digits with a range of 000-255. The step size is assumed as 1. Encoder range can be limited with the EN and EX commands. When used as encoder inputs, the analog control inputs feature a built in acceleration function to speed large changes.

If the input is a dual switch, <value> is:

000 = No switches on

001 = Lower (A) switch on

010 = Upper (B) switch on

011 = Both switches on

Note: If <input> is outside the 1-8 range, a NAK is returned along with a <value> of 0. If the port mode wasn't previously set up, a "NAK" is returned along with a <value> of 0.

### (SO) Set Open Collector Initial Value

Allows the powerup value of the open collectors to be set. This is useful for initializing the open collector outputs to a given state on powerup.

Command:

```
SO <address> <output> <state><cr>
```

Where <output> is a decimal number 1-8 and <state> is 0 for off and 1 or greater for on. When the open collector is off, the voltage at the open collector is pulled high to 5 volts allowing an attached LED to light. When the open collector driver is on, there is a low impedance between the output and ground connections allowing an external load to sink current.

Response:

```
<ACK/NAK><cr>
```

If <value> is greater than 255 or <input> is outside the 1-8 range, a "NAK" is returned. This value is saved and restored on powerup.

### (OC) Open Collector Output Control

Turns open collector outputs on (active low) or off (tristate, normally pulled high). These outputs first initialize to off (high), however this initial state can be changed with the Set Open Collector Initial Value command.

Command:

```
OC <address> <output> <state><cr>
```

Where <output> is a decimal number 1-8 and <state> is 0 for off and 1 or greater for on. When the open collector is off, the voltage at the open collector is pulled high to 5 volts allowing an attached LED to light. When the open collector driver is on, there is a low impedance between the output and ground connections allowing an external load to sink current.

Response:

```
<ACK/NAK><cr>
```

### (SR) Set Relay Initial Value

Allows the powerup value of the relays to be set. This is useful for initializing the relays to a given state on powerup.

Command:

```
SR <address> <relay> <state><cr>
```

Where <relay> is a decimal number 1-4 and <state> is 0 for off and 1 or greater for on. An off state of the relay corresponds to the NC of the relay connector being connected to the common (C) connection. An on state corresponds to the NO of the relay connector being connected to the common (C) connection.

Response:

```
<ACK/NAK><cr>
```

If <value> is greater than 255 or <input> is outside the 1-4 range, a "NAK" is returned. This value is saved and restored on powerup.

### (RC) Relay Control

Turns relays on or off. These outputs first initialize to off, however this initial state can be changed with the Set Relay Initial Value command.

Command:

```
RC <address> <relay> <state><cr>
```

Where <relay> is a decimal number 1-4 and <state> is 0 for off and 1 or greater for on. An off state of the relay corresponds to the NC of the relay connector being connected to the common (C) connection. An on state corresponds to the NO of the relay connector being connected to the common (C) connection.

Response:

```
<ACK/NAK><cr>
```

## ASCII Control Protocol (continued)

### (SE) Set Internal Encoder Initial Value

Allows the powerup value of the internal encoders to be set. This is useful for initializing the encoders to a given state on powerup.

Command:

```
SE <address> <input> <value><cr>
```

Where <input> is a decimal number 1-8 and <value> is 0-255.

Response:

```
<ACK/NAK><cr>
```

If <value> is greater than 255 or <input> is outside the 1-8 range, a "NAK" is returned. This value is saved and restored on powerup.

### (EN) Set Internal Encoder Minimum Value

Allows the minimum value of the internal encoders to be set. This is useful for restricting the range of the encoder input(s).

Command:

```
EN <address> <input> <value><cr>
```

Where <input> is a decimal number 1-8 and <value> is 0-255.

Response:

```
<ACK/NAK><cr>
```

If <value> is greater than 255 or <input> is outside the 1-8 range, a "NAK" is returned. This value is saved and restored on powerup. If the minimum encoder value is set greater than the maximum encoder value, anomalous operation will occur.

### (EX) Set Internal Encoder Maximum Value

Allows the maximum value of the internal encoders to be set. This is useful for restricting the range of the encoder input(s).

Command:

```
EX <address> <input> <value><cr>
```

Where <input> is a decimal number 1-8 and <value> is 0-255.

Response:

```
<ACK/NAK><cr>
```

If <value> is greater than 255 or <input> is outside the 1-8 range, a "NAK" is returned. This value is saved and restored on powerup. If the maximum encoder value is set less than the minimum encoder value, anomalous operation will occur.

### (MC) Return MIDI Control Changed

Used to determine if one or more MIDI controllers have changed value.

Command:

```
MC <address><cr>
```

Response:

```
<value> <ACK/NAK><cr>
```

Where <value> is 0-127. If the value is 0, no MIDI values have changed since the last poll, else the MIDI controller number 1-127 that has changed will be returned. Each poll will return the lowest numbered changed controller until all the changed parameters have been reported. Only MIDI channel 1 is decoded (where lower nibble = 0 in the MIDI control change command byte) A typical poll sequence would be:

```
If (Ctrl = MC<addr>) != 0 then Value = RM<addr> <Ctrl>
```

### (RM) Read MIDI Input Value

Allows an external MIDI input to be read by an RS-485 controller.

Command:

```
RM <address> <controller><cr>
```

Where <controller> is a decimal number 1-127.

Response:

```
<value> <ACK/NAK><cr>
```

Where <value> is a decimal number 0-127.

If <controller> is outside the 1-127 range, a "NAK" is returned along with a value of 0. Only MIDI channel 1 is decoded (where lower nibble = 0 in the MIDI control change command byte).

### (SM) Send MIDI String

Allows MIDI strings to be sent to the Control I/O via RS-485, then output on the MIDI out connector. Note: the maximum string length is 512 MIDI characters including all delimiters. Longer strings must be sent using multiple invocations of the command. The data is in decimal format. The string is stored until the <cr> is received, then sent out in one block.

Command:

```
SM <address> <$data byte 1>...<$data byte n><cr>
```

Response:

```
<ACK/NAK><cr>
```

## SymNet Designer Software

### Installation

The SymNet Designer software provides real-time control over multiple audio functions from a Windows 98/2000/XP PC environment.

Use one of the following procedures to install the SymNet Designer on your computer.

From the SymNet Designer CD-ROM:

1. Insert the CD-ROM into your computer's CD-ROM drive.
2. If the software does not auto run, Click on the Start button, Run D:\SETUP

(If your CD-ROM drive isn't D:, then substitute its drive letter)

From the Symetrix web site (<http://www.SymetrixAudio.com>):

1. Download the SymNet Designer self-extracting installer.
2. Find the file you downloaded and double-click it to start the Setup program.

The software always starts up in offline mode. Regardless, you can explore the software, experiment to your heart's content, and perhaps even get useful work done. You can save any Sites that you create to a file that can be downloaded later into an operating SymNet system.

If there is a SymNet hardware device connected, you can download to, and upload from the SymNet system. Once you have a device connected, you can also work online in real time, which allows you to hear adjustments and settings as you make them.

### Using SymNet Designer

Once the installation process is complete, you should have an icon on your desktop, and a program item in the Start menu. Click on the SymNet Designer icon and you're ready to begin.

SymNet Designer is mostly self-explanatory. The Configuration Screen represents all SymNet hardware devices in a system. Each device can store up to 1000 presets. Using the tool kit (left-hand) window, you select the SymNet

device that you wish to configure and drag it to the configuration page. Double-clicking on the device opens it, and causes the tool kit to display all the different signal processors available. The tool kit window is context sensitive. It always displays the items that can be placed in the current window. You can use the Browser to navigate to all of the relevant windows opened.

Drag and drop signal processors into the configuration page. Connect them together by clicking on a connection point and moving the mouse in the direction you want the wire to run. Make corners by clicking at the corner and moving off in a new direction. Terminate a wire by clicking on the terminating connection point or by hitting the ESC key or right mouse button. Right click on an existing wire and choose "Start Wire" to make a tee connection.

Once you've completed your design, download it to the SymNet system. Double click on processors on the configuration page to see their DSP modules and routing. Double-click on a DSP module to change its settings.

**Note:** Many useful functions are available in the mouse right-click. Explore! That's the ultra-condensed version. You'll find more complete information in SymNet Designer's online help.

### Hardware Memory

SymNet saves its settings in internal flash memory, allowing it to recall settings through a power-down/up cycle. Unlike static RAM, the flash memory does not require batteries, and is designed to retain its memory for the life of the product.

### The Symetrix Limited Warranty

Symetrix, Inc. expressly warrants that the product will be free from defects in material and workmanship for eighteen (18) months from the date the product is shipped from the factory. Symetrix's obligations under this warranty will be limited to repairing or replacing, at Symetrix's option, the part or parts of the product which prove defective in material or workmanship within eighteen (18) months from the date the product is shipped from the factory, provided that the Buyer gives Symetrix prompt notice of any defect or failure and satisfactory proof thereof. Products may be returned by Buyer only after a Return Authorization number (RA) has been obtained from Symetrix. Buyer will prepay all freight charges to return the product to the Symetrix factory. Symetrix reserves the right to inspect any products which may be the subject of any warranty claim before repair or replacement is carried out. Symetrix may, at its option, require proof of the original date of purchase (dated copy of original retail dealer's invoice). Final determination of warranty coverage lies solely with Symetrix. Products repaired under warranty will be returned freight prepaid via United Parcel Service by Symetrix, to any location within the Continental United States. Outside the Continental United States, products will be returned freight collect.

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### Servicing Your Symetrix Product

If you have determined that your Symetrix product requires repair services and you live outside of the United States please contact your local Symetrix dealer or distributor for instructions on how to obtain service. If you reside in the U.S. then proceed as follows.

### Return authorization

At the Symetrix factory, Symetrix will perform in-warranty or out-of-warranty service on any product it has manufactured for a period of three (3) years from date of discontinued manufacture.

Before sending anything to Symetrix, please contact our Customer Service Department for a return authorization (RA) number. The telephone number is +1 (425) 778-7728. Additionally support is available via the web site: <http://www.SymetrixAudio.com>.

### In-warranty repairs

To get your Symetrix product repaired under the terms of the warranty:

1. Call us for an RA number (have the serial number, shipping and contact information and description of the problem ready).
2. Pack the unit in its original packaging materials.
3. Include your name, address, daytime telephone number, and a brief statement of the problem.
4. Write the RA number on the **outside** of the box.
5. Ship the unit to Symetrix, freight prepaid. We do not accept freight collect shipments.

Just do these five things, and repairs made in-warranty will cost you only one way freight charges. We'll pay the return freight.

If you don't have the factory packaging materials, we recommend using an oversize box. Wrap the unit in a plastic bag, surround it with bubble-wrap, and place it in the box surrounded by Styrofoam peanuts. Be sure there is enough clearance in the box to protect the rack ears. We won't return the unit in anything but Symetrix packaging for which we will have to charge you. If the problem is due to operator misuse or error, you will have to pay for both parts and labor. In any event, if there are charges for the repair, you will pay for the return freight. All charges will be COD unless you have made other arrangements (prepaid, Visa or Mastercard).

### Out-of-warranty repairs

If the warranty period has passed, you'll be billed for all necessary parts, labor, packaging materials, and freight charges. Please remember, you must call for an RA number before sending the unit to Symetrix.



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**Engineered by Symetrix™**

**SymNet Control I/O Quick Start Guide**

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