ARC-2 and ARC-2i Menu ARCs
Quick Start Guide
What Ships in the Box

- A Menu ARC hardware device.
- ARC-2 only: One PS-6 (domestic) or PS-6E (export) power supply which provides 9 VDC @ 500 mA.
- This Quick Start Guide.

What You Need to Provide

- A Windows® PC with 1 GHz or higher Pentium® and:
  - Windows XP® Vista®.
  - 250 MB free storage space.
  - 1024x768 graphics capabilities.
  - 16-bit or higher colors.
  - CD-ROM drive or Internet connection.
  - 512 MB or more of RAM as required by your operating system.
  - Shielded twisted pair wire to connect the Modular ARC’s RS-485 terminals to the RS-485 port of a Symetrix hardware device.
  - CAT5 cables to connect any ARC to any device with an RJ-45 ARC port.

Getting Help

All Symetrix software, the Windows applications that control all Symetrix hardware, include a help module which acts as a complete User’s Guide for both hardware (including the Menu ARC) 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
Monday through Friday, Pacific Time
Web: http://www.symetrix.co

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 numerique de la classe B respecte toutes les Exigences du Reglement sur le materiel brouilleur du Canada.

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.
6. Clean only with dry cloth.
7. Do not block any ventilation openings.
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 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 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.

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 the equilateral triangle is intended to alert the user to 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.symetrix.co.
**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.
Overview

The ARC-2 and ARC-2i, known together as the Menu ARCs, are menu-driven remote controls for Symetrix DSPs. Tap into the full power of your system with twenty-four (24) menus with up to sixteen (16) items each that can be used to address multiple basic functions or initiate complex logic-based control events: gain, preset triggering, source selection, room combining and more. The 8-character backlit display supports up to thirty-one (31) scrolling characters, providing instant user feedback for control assignments, default settings, and actions. The three buttons help you navigate menus, raise or lower values, and enable or disable the remote control. All control assignments, including item labeling, parameter limits and firmware version upgrades are handled by software included with Symetrix DSP hardware. Power, control, and a single channel of ARC Audio are connected via RJ-45 inputs or screw-type barrier strips. **Intuitive Navigation:** Pressing the menu button navigates through the menu names. The menu button also acts as a preset trigger when a preset list is scrolled. The up/down arrow buttons adjust parameter settings and scroll through preset lists. Holding the menu button and using the up/down arrow keys moves you forward or backward through the menus. **Programmable Setup:** The wall panel’s behavior is programmable as well. Menu brightness in “active” and “inactive” states can be set independently, so the display will “sleep” in light-sensitive environments like theaters. If the Menu ARC goes idle, it can scroll a message and return to the top of its menu tree. Upper and lower parameter limits help contain the range of adjustment and a button press lockout will prevent tampering by curious but unauthorized fingers. The ARC-2 features an aluminum faceplate and includes a power supply while the ARC-2i features a white plastic faceplate and is powered directly by its host device, power supply not included. Both mount into a single gang electrical box (US).

### Menu ARC Features

<table>
<thead>
<tr>
<th>Feature</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Processor</td>
<td>Atmel ATmega 128</td>
</tr>
<tr>
<td>Field-Upgradeable Firmware</td>
<td>Yes</td>
</tr>
<tr>
<td>Number of Menus</td>
<td>24</td>
</tr>
<tr>
<td>Enumerations per Menu</td>
<td>16</td>
</tr>
<tr>
<td>Menu Range Limits</td>
<td>Yes</td>
</tr>
<tr>
<td>Maximum Characters per Menu Name</td>
<td>31</td>
</tr>
<tr>
<td>Maximum Number of Strings*</td>
<td>255</td>
</tr>
<tr>
<td>ARC Audio Support</td>
<td>Yes</td>
</tr>
<tr>
<td>115k RS-485 Baud Rate Support</td>
<td>Yes</td>
</tr>
<tr>
<td>Maximum Operating Voltage</td>
<td>30 VDC</td>
</tr>
</tbody>
</table>

*A “string” is equal to eight characters.
Menu ARC Anatomy

Nearly all of the configuration and connection options are on the rear of the Menu ARCs except for the baud rate selection jumper (see Baud Rate Select section). The anatomy of a Menu ARC is outlined below:

**J9: ARC Audio Grounding**
Two sets of jumpers at J9 configure the grounding of the ARC Audio pair. Refer to the legend below for positions. Refer to the ARC Network Design section for more information.

**J5 and J6: RJ45 “ARC” ports**
The ARC ports distribute RS485 data, power and an ARC Audio line to one or more ARC devices over standard CAT5 cable. These ports may be used to chain multiple ARCs or to home run back to any Symetrix rack mount device with an ARC port.

**J8: RS485, Power and ARC Audio**
When powering a Menu ARC from the included PS-6 power supply, RS485 data and Power both connect here. Connect the PS-6 positive lead to “V+” and the negative lead to “GND”. The RS-485 shield or ground also connects to “GND” and the RS-485 conductor pair connects the bus in a parallel fashion to “A” and “B”. WARNING! Do not use at the same time as J5 or J6. Additionally, ARC Audio connections, AF+ and AF-, are provided. Again, GND is shared.

**J7: RS485 Termination**
Refer to the RS485 Termination section for more information.

**S4: Device Address DIP Switches**
Configures the device’s RS485 bus address. Refer to the Device Addressing section for more information.
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. Most Symetrix products with an ARC port can power from two (2) to ten (10) ARCs. (Please see the individual products’ documentation for specific details.)

**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 Symetrix Technical Support pages at: http://www.symetrix.co.

The following table gives some indication of cabling limitations, based on DC power only (the following table is only relevant for the RJ-45 ARC port when powering a Menu ARC from the ARC-PS); minimum stated distances assume 28 gauge CAT5 cabling, maximum stated distances assume 24 gauge CAT5 cabling.

### Cable Length Limitations for ARC DC Power Over CAT5 Cable

<table>
<thead>
<tr>
<th>Maximum total cable length (to end of chain)</th>
<th>Number of ARCs in 1 daisy-chain</th>
</tr>
</thead>
<tbody>
<tr>
<td>224-640 ft.</td>
<td>4</td>
</tr>
<tr>
<td>276-792 ft.</td>
<td>3</td>
</tr>
<tr>
<td>350-1028 ft.</td>
<td>2</td>
</tr>
<tr>
<td>486-1396 ft.</td>
<td>1</td>
</tr>
</tbody>
</table>

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.

**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.

**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 Symetrix rack mount device.

**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:

**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.

**RS-485 Termination**

The Menu ARC's feature an RS-485 termination jumper. Jumper J7 next to the RS-485 terminal block (J8) enables and disables termination. Terminated and Open positions are labeled by the PCB silkscreen. For maximum signal integrity, follow the termination guidelines below:

<table>
<thead>
<tr>
<th>Daisy-chain length</th>
<th>Termination</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 - 200 ft.</td>
<td>No termination required</td>
</tr>
<tr>
<td>200 - 1000 ft.</td>
<td>Terminate at the ARC</td>
</tr>
<tr>
<td>(if powering over CAT5)</td>
<td></td>
</tr>
<tr>
<td>&gt; 1000 ft.</td>
<td>Terminate at the ARC-PS, Control I/O or DSP device and at the furthest ARC device</td>
</tr>
</tbody>
</table>

For star configurations, terminate at the ARC-PS, Control I/O or DSP device.

**Note:** Never terminate a single RS-485 bus at more than two devices.
**Device Addressing**

Every RS-485 device (including all Menu ARCs, Modular ARCs, and Control I/Os) connected to the same RS-485 bus must be uniquely identified. The Menu ARCs use a bank of five DIP switches (S4) to designate one of thirty-one device addresses. Addressing is done in a binary fashion. Some examples are depicted below:

<table>
<thead>
<tr>
<th>ADDRESS 1</th>
<th>ADDRESS 2</th>
<th>ADDRESS 3</th>
<th>ADDRESS 4</th>
<th>ADDRESS 5</th>
<th>ADDRESS 7</th>
<th>ADDRESS 9</th>
<th>ADDRESS 11</th>
<th>ADDRESS 12</th>
<th>ADDRESS 25</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image1.png" alt="DIP Switch Configuration" /></td>
<td><img src="image2.png" alt="DIP Switch Configuration" /></td>
<td><img src="image3.png" alt="DIP Switch Configuration" /></td>
<td><img src="image4.png" alt="DIP Switch Configuration" /></td>
<td><img src="image5.png" alt="DIP Switch Configuration" /></td>
<td><img src="image7.png" alt="DIP Switch Configuration" /></td>
<td><img src="image9.png" alt="DIP Switch Configuration" /></td>
<td><img src="image11.png" alt="DIP Switch Configuration" /></td>
<td><img src="image12.png" alt="DIP Switch Configuration" /></td>
<td><img src="image25.png" alt="DIP Switch Configuration" /></td>
</tr>
</tbody>
</table>

**Baud Rate Select**

J10 on the Menu ARC sets the RS-485 baud rate for the device. Jumpered = 38.4 kbps, Open = 115.2 kbps. All devices on the same RS-485 bus must be set to the same rate. Additionally, the device hosting the RS-485 bus must be switched to the appropriate rate. As of this writing, only SymNet Express devices are capable of hosting a 115k baud rate. All other Symetrix devices host a 38.4k baud rate. Refer to SymNet Designer’s Help for information on setting the RS-485 baud rate.

**Note:** the Menu ARC’s faceplate will need to be removed in order to access this jumper. J10 is just below the menu display.
Sample System Diagram: Symetrix Integrator Series Restaurant Application

ARC-PS

RC-4: Volume and Source Selection
Speakers
MS-1: Ambient Noise Sensing
Paging Mic

SymNet DSP Device(s)

RS-485 from Master DSP device to ARC-PS

Legend:
CAT 5 Connection
Shielded Twisted Pair Connection

Sample System Diagram: SymNet Hotel Application

Restaurant & Bar
Banquet & Meeting Rooms
Lobby

Wall Panel controls local volume, source selection, and time of day presets.

ARC-2i
Satellite Tuner
Jukebox
Television
CD Player

ARC-PS

ARC Audio to DSP audio input

This illustration of a typical SymNet Network Audio Solution shows the place of the ARC-PS in a large, multi-purpose network audio solution.
The Symetrix Limited Warranty

Symetrix, Inc. expressly warrants that the product will be free from defects in material and workmanship for two (2) years 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 two (2) years 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.

The foregoing warranties are in lieu of all other warranties, whether oral, written, express, implied or statutory. Symetrix, Inc. expressly disclaims any IMPLIED WARRANTIES, including fitness for a particular purpose or merchantability. Symetrix’s warranty obligation and buyer’s remedies hereunder are SOLELY and exclusively as stated herein.

This Symetrix product is designed and manufactured for use in professional and studio audio systems and is not intended for other usage. With respect to products purchased by consumers for personal, family, or household use, Symetrix expressly disclaims all implied warranties, including but not limited to warranties of merchantability and fitness for a particular purpose.

This limited warranty, with all terms, conditions and disclaimers set forth herein, shall extend to the original purchaser and anyone who purchases the product within the specified warranty period. Symetrix does not authorize any third party, including any dealer or sales representative, to assume any liability or make any additional warranties or representation regarding this product information on behalf of Symetrix.

This limited warranty gives the buyer certain rights. You may have additional rights provided by applicable law. Note: Some Symetrix products contain embedded software and may also be accompanied by control software intended to be run on a personal computer. Said software is specifically excluded from this warranty.

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The total liability of Symetrix on any claim, whether in contract, tort (including negligence) or otherwise arising out of, connected with, or resulting from the manufacture, sale, delivery, resale, repair, replacement or use of any product will not exceed the price allocatable to the product or any part thereof which gives rise to the claim. In no event will Symetrix be liable for any incidental or consequential damages including but not limited to damage for loss of revenue, cost of capital, claims of customers for service interruptions or failure to supply, and costs and expenses incurred in connection with labor, overhead, transportation, installation or removal of products, substitute facilities or supply houses.

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://support.symetrix.co.

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.