

BURK TECHNOLOGY

ARC-16

BOARD INSTALLATION INSTRUCTIONS

INTRODUCTION

The ARC-16 offers a number of options to serve a wide variety of operational needs. By installing the desired options, users are able to customize their system to achieve efficient, reliable and cost-effective site management. If you purchased options with your ARC-16 order, Burk Technology installed and activated them for you (see your Factory Configuration Sheet). If you purchased options to use with an existing ARC-16, this document provides the necessary installation instructions.

IMPORTANT! Before you start, verify which revision of the ARC-16 CPU board is installed in your unit. This document applies to both the original ARC-16 CPU design and the new version B CPU (CPU-A and CPU-B), and some steps depend on which CPU is installed. You can determine the CPU revision based on the firmware version installed in your ARC-16. **Firmware versions 5.4 and below are installed on CPU-A. CPU-B was introduced with firmware version 5.5.** There are no operational differences; however, the AUX board and Two Port Adapter used with CPU-A are now integrated on the CPU-B board.

Computer Interface (CI) – page 4

Allows you to establish a direct connection between a computer and an ARC-16 when using optional AutoPilot® software.

Enhanced Speech Interface (ESI) – page 4

Provides computer and telephone access to your ARC-16 sites using optional AutoPilot software or a touch-tone phone.

Universal Modem (RMS/RMT) – page 6

Used whenever the communications link is not a 2-wire circuit. This includes 4-wire telco, STL subcarriers, SCA channels, TRL, and digital RS-232 links.

Wire Modem (WMS/WMT) – page 7

Used on 2-wire circuits, such as dedicated phone lines.

Studio I/O (SIO) – page 8

Provides eight channels of metering, status and command for controlling and monitoring equipment at the studio site. Two SIOs may be installed in an ARC-16 Studio unit for a total of sixteen channels.

Studio Status Indicator (SSI) – page 9

The SSI provides full-time status monitoring of a remote site by supplying 16 independent open collector outputs to drive user supplied alarms, buzzers or indicators. It can also be connected to the SP-16 status panel.

Installing a Second Wire or Universal Modem – page 10

Instructions for adding a second modem to an ARC-16. Includes TPA board installation instructions for CPU-A. For CPU-B, there is no TPA board, but a hardware kit – item TPA B Kit – is required.

Note: these instructions indicate which options require a change to your ARC-16 configuration before the options may be used. Refer to “Configuring the ARC-16 System,” which ships with new ARC-16 systems and is available on the Burk Technology web site at www.burk.com.

GETTING HELP

Refer to the ARC-16 Instruction Manual for information on installing and operating the ARC-16. For answers to frequently asked questions, links to support documents, and downloads, visit www.burk.com. If you still need help, contact customer support at 978-486-3711 or email support@burk.com.

COMPUTER INTERFACE (CI)

When used with AutoPilot® or AutoLoad software, the Computer Interface allows you to establish a direct connection between a computer and an ARC-16.

Installing the CI

The CI must be installed as the top board in the right rear of the ARC-16 (opposite the corner used by the power supply). If the ARC-16 has no I/O boards installed, the CI will sit on the floor of the unit. If one or more I/O boards are installed, the CI must sit above these.

If I/O boards are installed, remove the front center, rear center, and rear right-hand mounting screws from the uppermost I/O board and replace them with the standoffs provided.

1. Install the CI on the standoffs so that the DB-25 connector extends through the slot in the rear of the ARC-16. Secure with the screws provided.
2. Connect one end of the 24-pin ribbon cable to the header on the CI so that it extends away from the board.
3. If CPU-A is installed, connect the 24-pin cable to the AUX board, which is at the right end of the CPU board. The cable must be connected to the header closest to the display board. Exercise caution to avoid misregistered connectors.

If CPU-B is installed, the headers are mounted directly on the CPU board.

4. Skip this step if you are using firmware version 5.3 or below. If you are using firmware 5.4 with CPU-A, there is a wire ending with a female two-pin header coming out from the bottom of the CI. This two-pin header connects the CI to the male two-pin header P3 on the AUX board. A document titled “Modifying Your ARC-16 For Firmware Version 5.4” ships with the hardware modification kit and explains the AUX board modification.

If you are using CPU-B, there is a cable that links the 6850 socket to header J5 on the CPU. Remove the 6850 chip and use the new cable to connect the 6850 socket to the J5 on the CPU.

There are no ARC-16 configuration changes necessary to activate the CI.

Connecting a PC to the ARC-16

Use a null-modem cable to directly connect your computer to the CI in the ARC-16. The pin-outs for a null-modem cable are as follows:

	DB-25F (Computer)	DB-25F (CI)		DB-9M (Computer)	DB-25F (CI)	
PGND	Pin 1.....	Pin 1	PGND	RxD	Pin 2.....	Pin 2 TxD
RxD	Pin 3.....	Pin 2	TxD	TxD	Pin 3.....	Pin 3 RxD
TxD	Pin 2.....	Pin 3	RxD	GND	Pin 5.....	Pin 7 GND
CTS	Pin 5.....	Pin 4	RTS	RTS	Pin 7.....	Pin 5 CTS
RTS	Pin 4.....	Pin 5	CTS	CTS	Pin 8.....	Pin 4 RTS
GND	Pin 7.....	Pin 7	GND			
CD	Pin 8.....	Pin 20	DTR			

Jumper computer Pin 20 to computer Pin 6

ENHANCED SPEECH INTERFACE (ESI)

The Enhanced Speech Interface lets you monitor and control all connected sites with one phone call. Included on the ESI is a computer interface for direct connection to a computer, and a built-in data modem for dial-up connection using the AutoPilot® or AutoLoad software.

Installing the ESI

The ESI must be installed as the top board in the right rear of the ARC-16 (opposite the corner used by the power supply). If a CI is already installed, the ESI will replace the CI. If the ARC-16 has no I/O boards installed, the ESI will sit on the floor of the unit. Otherwise, the ESI must sit above these.

If I/O boards are installed, remove all mounting screws except the screw closest to the 24-pin ribbon cable and replace them with the standoffs provided.

1. Install the ESI on the standoffs so that the RJ-11 jacks and DB-9 connector extend through the slots in the rear of the ARC-16. Secure with the screws provided.
2. Connect one end of the 24-pin ribbon cable to the header on the ESI so that it extends away from the board.
3. If CPU-A is installed, connect the 24-pin cable to the AUX board, which is at the right end of the CPU board. The cable must be connected to the header closest to the display board. Exercise caution to avoid misregistered connectors.

If CPU-B is installed, the headers are mounted directly on the CPU board.

4. Effective with firmware version 5.4, a new interrupt address line is used by the ARC-16 program. Skip this step if you are using version 5.3 or below.

With CPU-A, there is a wire ending with a female two-pin header coming out from the bottom of the ESI. Use this two-pin header to connect the ESI to the male two-pin header P3 on the AUX board. A document titled "Modifying Your ARC-16 For Firmware Version 5.4" ships with the hardware modification kit and explains the AUX board modification.

With CPU-B, there is a cable that links the 6850 socket to header J5 on the CPU. Remove the 6850 chip and use the new cable to connect the 6850 socket to the J5 on the CPU.

The ESI must be activated in the configuration menu. Please review the "Configuring the ARC-16 System" document for the necessary configuration changes. The ESI operates at 1200 bps.

Connecting a PC to the ARC-16

Use a null-modem cable to directly connect your computer to the ESI's DB-9 connector. The pin-outs for a null-modem cable are as follows:

	DB-9M (Computer)	DB-9M (ESI)		DB-25F (Computer)	DB-9M (ESI)		
RxD	Pin 2.....	Pin 3	TxD	TxD	Pin 2.....	Pin 2	RxD
TxD	Pin 3.....	Pin 2	RxD	RxD	Pin 3.....	Pin 3	TxD
GND	Pin 5.....	Pin 5	GND	CTS	Pin 5.....	Pin 7	RTS
CTS	Pin 8.....	Pin 7	RTS	GND	Pin 7.....	Pin 5	GND

Telephone Connection

Connect a standard modular telephone line cord to the "LINE" jack to complete the telephone line connection to the ESI. You may optionally connect a local telephone set to the second jack marked "SET."

Although the ESI has transient protection on the board, it is strongly recommended that you install a surge suppressor on the phone line. A surge suppressor, model TS-1, is available from Burk Technology.

Audio Connection

If desired, connect a source of unbalanced audio to the phono jack on the rear of the ESI. The signal should be one volt rms or less.

UNIVERSAL MODEM (RMS/RMT)

The Universal Modem facilitates a variety of communication options for linking ARC-16 transmitter remote control units. Standard on the Universal Modem is FSK AUDIO communication, but it may be easily converted for use with STL and TSL systems, FM broadcast subcarriers, and RS-232 data links with simple plug-in modules. The universal modem is 2200 Ohms unbalanced, 1.5Vp-p out, 0.25Vp-p min. in.

Installing the Universal Modem

The Universal modem installs on the floor of the ARC-16 in front of U13 on CPU-A or J2 on CPU-B as follows:

1. Secure the modem using the supplied screws.
2. Connect the 5-pin header attached to the BNCs to the Universal Modem header JP8.
3. Connect the 5-pin header attached to the barrier strip to Universal Modem header JP4.
4. Using the 2" 10-pin ribbon cable, connect Universal Modem header JP3 to header J4 on CPU-A or header J2 on CPU-B.

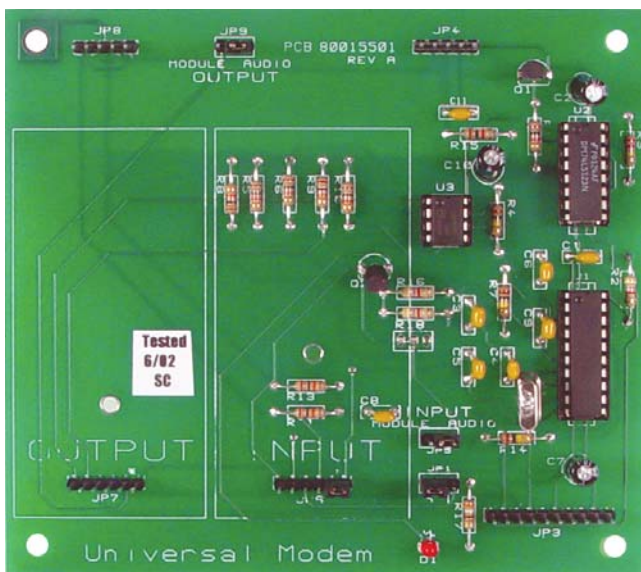
Configuring the Universal Modem

To configure the Universal modem, there are INPUT and OUTPUT headers (JP6 and JP7, respectively), and three jumpers that need to be selected.

If FSK audio is desired, then no module is necessary. For the INPUT header only, jumper the last two pins of JP6 if no module is installed. The last two pins are highlighted by an asterisk on the board.

If a module is required, plug the module into the appropriate header. INPUT and OUTPUT are labeled on the module. Jumpers JP5 and JP9 select whether a module is installed. JP5 selects the input path, and JP9 selects the output path. Move the jumper to the left two pins if a module is used, or to the right two pins for audio.

Jumper JP1 selects whether the modem answers or originates. The designations S and T refer to Studio and Transmitter, and S is typically assigned to the originating modem. Users only need to ensure that modems on opposite ends of a bi-directional link have opposite designations (one modem is assigned S and the other T).



WIRE MODEM (WMS/WMT)

The wire modem is for use with a 2-wire audio circuit only. The wire modems are 600 Ohms unbalanced, with -9dBm nominal output and -20dBm average input. Minimum input is -29dBm.

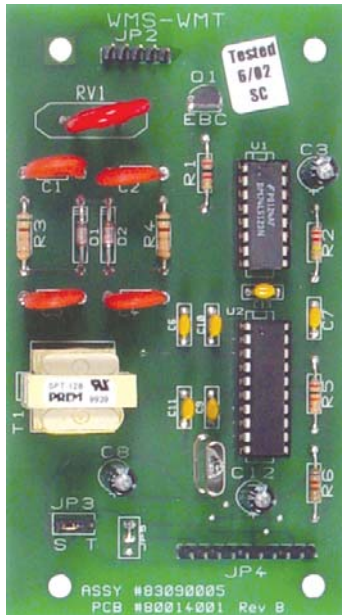
Installing the Wire Modem

The WMS/WMT Two-Wire Modem installs on the floor of the ARC-16 in front of U13 on CPU-A and JP2 on CPU-B. The WMS is configured for use in a studio unit and the WMT for use in a transmitter unit.

1. Secure the modem using the supplied screws.
2. Connect the 5-pin header from the barrier strip to header JP2 on the Wire Modem.
3. Use the 10-pin ribbon cable to connect header JP4 on the Wire Modem to header J4 on CPU-A, or to header J2 on CPU-B.

Configuring the Wire Modem

Jumper JP3 selects whether the modem answers or originates. The designations S and T refer to Studio and Transmitter, and S is typically assigned to the originating modem. Users only need to ensure that modems on opposite ends of a bi-directional link have opposite designations (one modem is assigned S and the other T).



STUDIO INPUT/OUTPUT (SIO)

The SIO kit includes an I/O board for your studio unit along with appropriate hardware to install. For a technical description of the I/O board, as well as instructions on making the external connections, please refer to the ARC-16 Instruction Manual.

Installing the SIO

The I/O board is installed in the right rear of the ARC-16 (opposite the corner used by the power supply). If more than one I/O board is to be installed, secure the bottom I/O board with standoffs, providing a platform for the second I/O board to sit on.

1. Secure the I/O board using the supplied hardware. If you are installing two SIOs, secure the first board with standoffs, and the second with screws.
2. Connect one end of the 24-pin ribbon cable to the header on the I/O so that it extends away from the board.
3. If you are using CPU-A, connect the 24-pin ribbon cable on the bottom I/O board to the AUX board header closest to the I/O board. This defines the board as channels 1-8. When installing a second I/O board, connect the 24-pin cable to the center header on the AUX board. This defines the board as channels 9-16. The AUX board is a daughter card that sits on the right end of the CPU board. Exercise caution to avoid misregistered connectors.

If you are using CPU-B, connections are made to the same headers, only the headers are located on the CPU board.

Configuring the I/O board

To activate the I/O board, enter the ARC-16's configuration mode and set the highest channel for this local site to 8 and set the CHANNEL 1-8 option to ON. If installing a second I/O, set the highest channel to 16, and set the CHANNEL 9-16 option to ON.

Please review the "Configuring the ARC-16 System" document for details on updating your unit's configuration.

STUDIO STATUS INDICATOR (SSI)

The model SSI Studio Status Indicator provides an external output tally for all ARC-16 status signals. The status signals received from a remote site are brought to the studio rear panel as high-current open collector outputs. This allows the SSI to display a remote site's channel status whether or not that site is currently selected on the studio front panel.

Installing the SSI

The SSI board is installed in the ARC-16 Studio unit.

1. Install the SSI above any installed SIO board. When you install two SSI's, secure the first board with standoffs and the second with the supplied screws.
2. If you are running CPU-A, connect the SSI using the supplied 4" 24-pin jumper to the second header on the AUX board. The AUX board is a daughter card that sits on the right end of the CPU board. If no SIO board is installed, then a second SSI board may be installed on the rear-most header of the AUX board.

If you are running CPU-B, the connections are the same, only the headers are mounted directly on the CPU board.

Configuring the SSI

Enable the SSI by entering the ARC-16's configuration mode and selecting YES for the option P-1 SSI (refer to the "Configuring the ARC-16 System" document). P-1 SSI will allow monitoring of the next logical site (see Table 1 below).

Enable this second SSI by selecting YES for the option P-2 SSI in the ARC-16's configuration mode. P-2 SSI will allow monitoring of the second logical site. (See Table 1 below).

Table 1: Next Logical Site Assignments

Studio Site ID	Next Logical Site for P1-SSI	Next Logical Site for P2-SSI
D	A	B
C	D	A
B	C	D
A	B	C

Note: you may need to change the site designator of your transmitter or studio unit for the SSI to monitor the desired site.

External Connections

The SSI outputs operate the same as control outputs (refer to the ARC-16 manual for details and example connection methods). Connect the external indicators as shown in Table 2 below. A mating DB-37 Male connector is provided. Relays will be necessary if AC loads or high current DC loads must be switched.

Table 2: External Indicator Connections

Status #	Pin #	Status #	Pin #	Status #	Pin #	Status #	Pin #
1	1	5	3	9	5	13	7
2	9	6	11	10	13	14	15
3	2	7	4	11	6	15	8
4	10	8	12	12	14	16	16

INSTALLING A SECOND WIRE OR UNIVERSAL MODEM

For an ARC-16 to communicate with more than one unit, two modems and two communication ports must be used. For CPU-A, this requires the installation of a Two Port Adapter (TPA). For CPU-B, the Two Port Adapter is not needed, but you will need a hardware kit (item TPA B Kit) to secure the new modem and connect it to the CPU.

The TPA Kit (for CPU-A) contains the following items:

- 1 - TPA Board assembly with one MC6850 IC installed
- 1 - custom 2-port ribbon connector (two 10-pin ribbon connectors tied together with a black wire)
- 2 - 3/4" standoffs
- 3 - 1-1/4" standoff
- 3 - 1/4" machine screws
- 1 - 3-wire BNC connector assembly
- 2 - BNC female panel mount connectors
- 2 - grounding lugs

The TPA B Kit (for CPU-B) contains the following items:

- 1 - 4" 10-pin ribbon cable
- 3 - 1-1/4" standoff
- 3 - 1/4" machine screws
- 1 - 3-wire BNC connector assembly
- 2 - BNC female panel mount connectors
- 2 - grounding lugs

Installing the TPA (CPU-A only)

For CPU-B, go on to the next page.

- 1 Remove the 10-pin ribbon connector that connects the existing modem to the CPU board at J4. This ribbon assembly will not be used.
2. Remove the 6850 ACIA/UART device from location U13 on the CPU board, and install it in the empty socket of the TPA board.

Carefully note the location of Pin 1 on the board, and on the IC. The two ICs should be oriented in the same direction.

3. Replace the two 1/4" Phillips-type screws located at both ends of U11 on the CPU board with the supplied 3/4" standoffs. Set the screws aside to use in the next step.
4. Using one half of the supplied TPA 10-pin cable assembly, connect the CPU board J4 to the installed modem JP4.

The black conductor lead should meet the CPU board J4 at Pin 3 (counting right to left), and there should be no connection to Pin 3 of the connector on the modem board.

5. Carefully plug the TPA board into the socket at location U13 on the CPU board. Secure the board to the standoffs using the original set of screws from step 4.

Installing the New Modem

1. If you are installing a Wire Modem, skip this step. Universal Modems require the installation and connection of BNC connectors, which are included with the TPA (or TPA B Kit). Install the two BNC connectors and grounding lugs on the rear panel in the available mounting holes. Use the existing set of BNC connectors as a guide. Then solder the 3-wire BNC connector assembly to the BNCs. The yellow lead should meet the BNC near the barrier strip assembly, and the red lead should meet the BNC near the power module. Solder the black wire to the pair of ground lugs. It is not necessary to link this new set of ground lugs to the existing set; they are interconnected through the chassis wall.

Note: the type of modems you are using determines which modem will be mounted on the floor of the chassis. If the new modem is the same as the original modem, it can be added above the existing modem (Port 2). If one modem is a 2-Wire, and the other modem is a Universal Modem, the size of the board requires that the 2-wire modem sits on the floor of the ARC-16 (Port 1), and the Universal Modem will sit above the 2-wire (Port 2).

2. Connect the barrier strip 5-pin connector to the modem mounted on the floor of the chassis. The connector goes to JP4 on Universal Modems, JP2 on Wire Modems. Universal Modems also connect to the lower 3-wire BNC connector at JP8.
3. Prepare the new modem for installation:

Installing Two Modems of the Same Type (Two Wire Modems or Two Universal Modems)

If both ports will contain the same type of modem, install one of the 1/4" machine screws in the front corner of the board (near JP4 on the WMS/WMT, or near JP3 on Universal Modems). Use 1-1/4" standoffs to support the three remaining corners.

Installing One Wire Modem and One Universal Modem

For systems using a single WMS/WMT modem along with a Universal Modem, install the WMS/WMT on the floor of the unit. This modem is designated as Port 1. Secure the WMS/WMT by using three of the 6-32 x 1/4" machine screws. Use two screws near JP4 and one near JP2. The remaining corner of the board will be secured using one of the 6-32 x 1-1/4" standoffs. Two more 1-1/4" standoffs support the Universal Modem under its JP8 and JP7 connectors.

4. Mount the upper modem to the three standoffs using the 1/4" screws.
5. For Universal Modems, connect the 3-wire BNC connector to JP8 and connect the barrier strip 3-pin connector left-justified to JP4. For Wire Modems, connect the barrier strip 3-pin connector JP2 on the Wire Modem.
6. If you have CPU-A and the custom 10-pin cable assembly, connect the remaining half of the TPA 10-pin ribbon/jumper assembly to the TPA board and the upper level modem. The black conductor should meet the modem, not the TPA.

If you have CPU-B, connect the second modem to the CPU header J3 using the supplied 10-pin cable.

After the new modem is installed, you must complete ARC-16 unit configuration before the modems will send or receive. Please refer to "Configuring the ARC-16 System."