

## Introduction

**Thank you for choosing Harman Kardon®!** The ABH 4 Expansion Hub that you have purchased will enable you to extend the capabilities of an A-BUS®-based multiroom system to four or more rooms, with a Harman Kardon A-BUS/*READY* receiver as the control point. In applications in which you wish to add A-BUS connectivity to a receiver, preamplifier or surround processor that is not A-BUS/*READY*, a few simple connections to a multiroom or tape output will enable you to add the power and simplicity of A-BUS to your home.

We strongly recommend that you carefully read this instruction sheet before installing your new ABH 4. It contains important information that will guide you step by step through the correct and safe installation of the unit. If you do not have experience installing in-wall electrical and telecommunications components, you are advised to consult with a qualified low-voltage contractor or custom installer.

If you have any questions about this product, its installation or its operation, please contact your retailer or custom installer. He or she is your best source of product information.

Designed for simple installation by a custom installer or advanced do-it-yourself hobbyist, the ABH 4 will add to your listening pleasure by distributing sound throughout your home with the level of performance and product design elegance for which Harman Kardon has been famous for more than fifty years.

## Features

- Simple connection to any A-BUS/*READY* Harman Kardon receiver
- Easy interface with existing audio/video receivers, preamplifiers or processors to add A-BUS capability for multiroom systems with only a single Category 5 cable run to each remote module
- Designed for easy mounting on wire back-boards, or for shelf placement

## IMPORTANT SAFETY AND INSTALLATION INFORMATION!

### Wire Separations

Remote control wiring systems must be installed to minimize the possibility of accidental contact with hazardous power and lighting wiring. Never place remote control wiring near bare power wires or lightning rods, antennas, transformers, steam or hot water pipes, or heating ducts. Never place remote control wire in any conduit, box, channel, duct or other enclosure containing power or lighting circuits of any type. Always provide adequate separation of remote control wiring and other electrical wiring according to code. When in doubt about separation distances, the "Rule of Sixes" can be used. This rule requires 6 feet of separation between remote control wiring and open high-voltage wiring, lightning grounding wire or grounding rods. It requires 6 inches of separation from all other high-voltage wiring, unless in conduit.

### Cutting and Drilling

Always observe trade safety rules for concealed wiring. Be extremely careful not to cut through or drill into concealed wiring or pipes. Make a small inspection opening before cutting or drilling.

## Additional Installation Information

Common wire-splicing techniques may cause the wire to break, resulting in poor circuit integrity. This can cause interference and result in poor system performance.

Dust or dirt can cause special problems on wiring contacts. Be sure all contacts are clean and that all parts are installed correctly to protect them from dust and dirt.

Your new Harman Kardon ABH 4 A-BUS Expansion Hub has been custom-designed for use with A-BUS products. Do not connect the RJ-45 jacks to any other device.

Make sure to follow all instructions when preparing wiring for use with the ABH 4 Expansion Hub and associated equipment. Failure to do so may result in a potential safety hazard, including possible danger to persons and/or equipment.

If you will be running RJ-45 cable through a ventilation plenum, remember to use plenum-rated cable to comply with NEC and other safety requirements. Failure to do so may result in a potential fire or safety hazard.

If you have any doubt about your ability to work with electrical and telecommunication wiring, you are advised to hire a professional licensed electrician or custom installer to install this product.

## Installation Planning

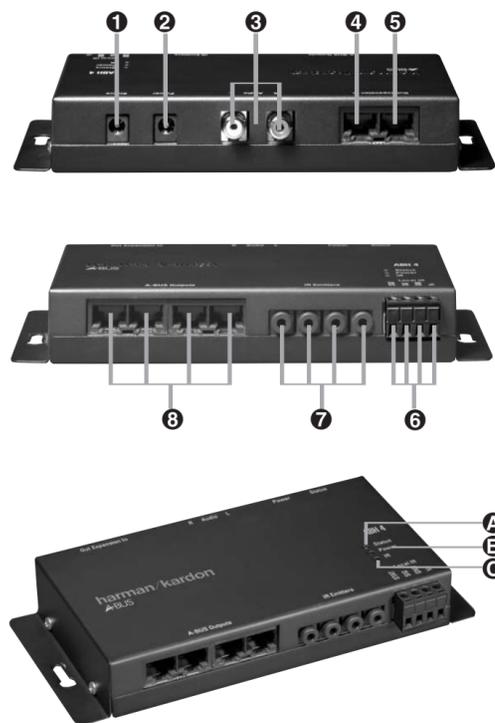
When installed, the ABH 4 may be placed flat on a shelf or mounted to a wire back-board using standard wood screws and the keyhole notches on the outer edge of the ABH 4. The unit's power supply must be placed on a shelf and should not be attached to a back-board. When planning an installation, remember to allow sufficient clearance for all wires and connectors that will be attached to the ABH 4 so that severe angle bends of connecting cables are avoided.

The wiring used to connect the ABH 4 to the A-BUS/*READY* receiver and A-BUS modules in remote rooms may be Category 5 or 5e wiring. Be certain that any specific safety rating requirements for riser or plenum wiring are taken into account, if needed. The speaker wiring should also be in-wall-rated as required, and may not exceed 14 AWG. To simplify wiring, you may wish to use two pairs of (4x14) CL-3-rated in-wall wiring and run a single cable from the ABH 4 to both locations. One pair will be used to connect the first speaker and the other will continue to the second speaker.

## What Is Included

Your ABH 4 should be packed with the following items. If any of the below are missing, please contact Harman Kardon customer service.

- ABH 4 Expansion Hub
- AC Power Cord
- Power Supply
- RJ-45 Connection Jumper Cable



## Typographical Conventions

To help you use this manual, the following typographical conventions are used to identify the various parts of the product.

- ① (number in a circle) Indicates a connection point on the side edges of the ABH 4.
- Ⓐ (letter in a circle) Indicates an LED indicator on the top face of the ABH 4.

## Top-Edge Connections

- ① **Status Input:** When the ABH 4 is used in the stand-alone mode with a non-A-BUS/*READY* source or receiver, an optional 12-volt DC power source may be attached to this jack to keep the A-BUS system active.
- ② **Power Input:** Connect the small mini plug at the end of the ABH 4 power supply to this jack.
- ③ **Audio Inputs:** When the ABH 4 is used in the stand-alone mode to create an A-BUS system using a receiver that is not A-BUS/*READY*, connect the right and left audio outputs from the feed source to these input jacks. The source may be a single product such as a tuner or CD player, or it may be the Tape outputs or Multiroom outputs of a receiver. Note that these inputs are connected to Music Sense circuitry that will automatically turn on all A-BUS modules connected to the ABH 4 when an audio signal is present, and turn them off 30 seconds after the audio signal stops.

④ **Expansion In Jack:** This jack connects to the device that is providing the A-BUS system source that feeds the A-BUS modules used with this ABH 4. In most applications, the connection will be to the A-BUS output on a Harman Kardon A-BUS/*READY* receiver, although the input may also come from the **Expansion Out Jack** ⑤ of another ABH 4 when multiple hubs are in use. In all cases, the connection should be made using a standard TIA 568A RJ-45 jumper cable.

⑤ **Expansion Out Jack:** If you are using more than one ABH 4 in your system to add additional rooms, connect one end of a jumper cable with RJ-45 connectors to this jack. Connect the other end of the jumper cable to the **Expansion In Jack** ④ on the next ABH 4.

## Bottom-Edge Connections

⑥ **Local IR Input Terminals:** When the ABH 4 is used with a source product other than an A-BUS/*READY* receiver, these terminals allow you to connect a compatible, optional IR receiver/sensor to receive infrared remote commands for the control of source components in a room where there is no A-BUS module. IR commands received by the sensor will be retransmitted to the **IR Emitter Jacks** ⑦ for use with optional IR emitters. Follow the instructions packed with the IR receiver/sensor for the proper connections to the terminals here. To connect wires from the sensor, unscrew the retaining screw on the appropriate terminal until wire clamp retracts into the bottom of the terminal block. Insert the wires following the instructions in Step Seven on the other side of this sheet, and tighten the screw until the clamp secures the wire so that it does not fall out.

⑦ **IR Emitter Jacks:** These jacks route the IR signals that are received either by the remote sensor in an A-BUS module such as Harman Kardon's AB 1 or from an optional IR receiver connected to the **Local IR Input Terminals** ⑥ to optional remote IR emitters. These emitters should be placed over the IR receiver in the source components to be controlled in accordance with their manufacturer's instructions. This enables a remote control where an A-BUS module is installed to control source components such as a CD or DVD player.

⑧ **A-BUS Outputs:** These jacks are the communications link between the remote A-BUS modules and the ABH 4, carrying audio signals and power to the A-BUS modules, and IR commands from the A-BUS modules to the ABH 4 and products connected to it. Connect a cable from each remote A-BUS module to these outputs using standard RJ-45 connectors with cabling wired in compliance with the TIA 568A standard.

## LED Indicators

- Ⓐ **Status Indicator:** This LED will light when the ABH 4 is activated. In most cases, it will light when a Harman Kardon A-BUS/*READY* receiver connected to the ABH 4 is turned on. When the ABH 4 is used with non-A-BUS/*READY* products, the Status Indicator will light when an audio signal is present at the **Audio Inputs** ③ or when a DC power source is connected to the **Status Input** ①. The Status Indicator will go out 30 seconds after the power or audio source is removed.
- Ⓑ **Power Indicator:** This LED will light to indicate that the ABH 4 is connected to a power source that enables the remote modules and the infrared relay system to operate. This power source may be either a connection to an A-BUS/*READY* product, the ABH 4's power supply or through a connection to another ABH 4. Note that the ABH 4's external power supply must be connected in order for it to power multiple remote modules.
- Ⓒ **IR Indicator:** This LED will flash to confirm that an IR signal is being passed through the ABH 4. This signal may originate from a remote A-BUS module or from an optional remote sensor attached to the **Local IR Input Terminals** ⑥.

## INSTALLATION AND CONNECTION

### Important Safety Note:

Before beginning the installation process, make certain that all electronics products in the system are turned off and disconnected from their A/V power connection. This avoids the possibility of accidental activation that could possibly damage the equipment or cause personal injury. Do not turn on the equipment until instructed.

The ABH 4 may be used in two modes of operation. The installation process will vary according to which option you select.

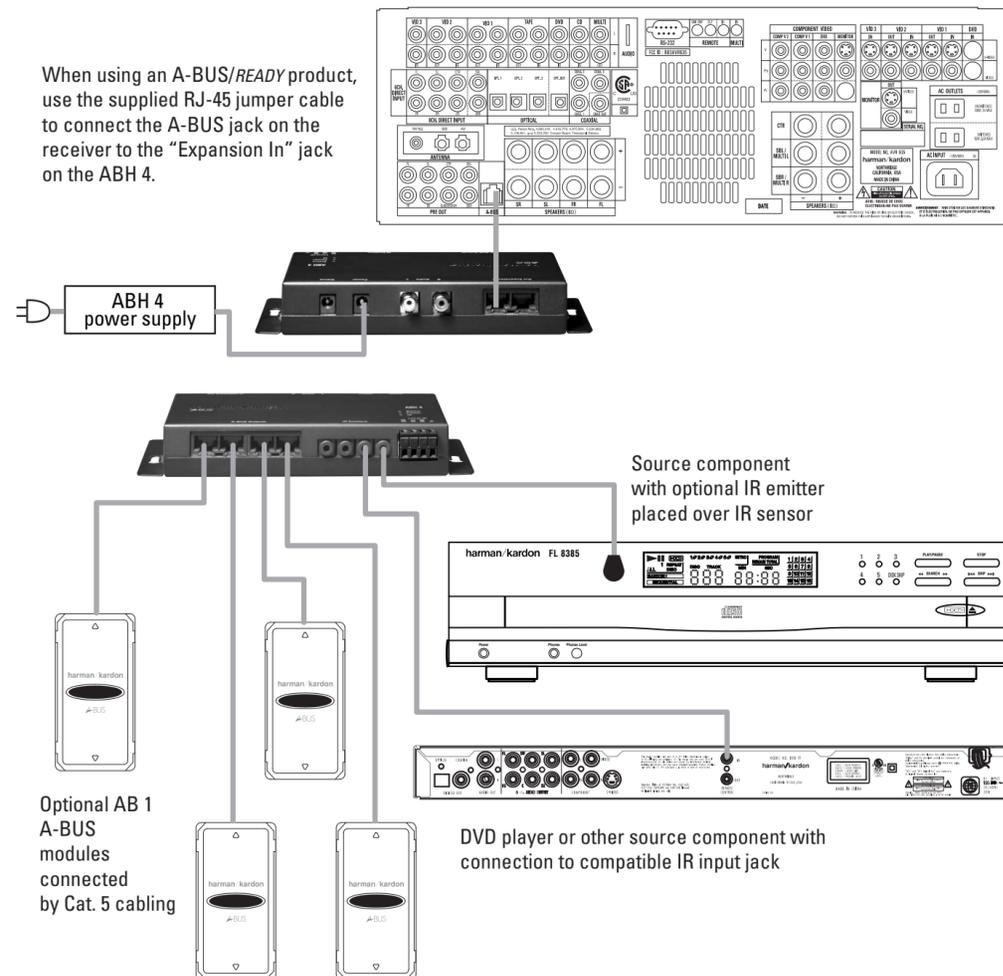
- When used in conjunction with an A-BUS/*READY* Harman Kardon receiver, the ABH 4 provides the power that enables up to four remote rooms to be equipped with A-BUS modules such as the Harman Kardon AB 1, with more room installations possible through the use of additional ABH 4 hubs.
- The ABH 4 may also be used with any receiver, preamplifier or surround processor that has a "tape" or "multiroom" output to send the selected source to A-BUS modules installed in remote rooms. Alternatively, a Tuner or CD player may be connected to the ABH 4 to create a one-source multiroom audio system.

### Mounting the ABH 4 (optional)

Before making any connections to the ABH 4, read the instructions below and carefully plan the placement of any wiring that may be required. The ABH 4 may be mounted on a wall using the screw slots provided on the sides of the unit, or it may simply be placed on any flat surface.

- To mount the ABH 4 to a wall, first place the unit against the surface to which it will be mounted, and make certain that there is sufficient clearance at all sides for any cables that will be attached and that they are able to reach their destination.
- Although the ABH 4 is relatively light, make certain that the wall surface is able to support the ABH 4.
- While holding the ABH 4 to the wall, trace the outline of the slots on the "wings" at the left and right side of the ABH to the wall.

When using an A-BUS/*READY* product, use the supplied RJ-45 jumper cable to connect the A-BUS jack on the receiver to the "Expansion In" jack on the ABH 4.



- Drill a pilot hole and install an anchor or retaining socket sufficient to accommodate a #10 pan-head Phillips-type wood screw that is at least 1 inch long at each side, under the circular part of the tracing. If you have any questions or doubt about the ability of the wall surface to properly support the weight of the ABH 4, consult a properly trained installer before proceeding.
- When the anchor is installed, place a screw through the slot on either side of the ABH 4 and then tighten the screw into the anchor until it is almost completely secured.
- Slip the ABH 4 so that it slides down the keyhole notch of the slot and then tighten it securely to the wall.

### Connections to an A-BUS/*READY* Receiver

#### Step One: Connect the ABH 4 to the Receiver

Using the RJ-45 jumper cable supplied with the ABH 4, connect one end to the **Expansion In Jack** ④ on the ABH 4 and the other end to the A-BUS/*READY* jack on the rear panel of your Harman Kardon receiver.

#### Step Two: Connect the A-BUS Modules

Connect the RJ-45 jacks on the Cat. 5 cabling that runs to the remote room modules to the **A-BUS Outputs** ⑧ on the ABH 4. Make certain that the connector is wired in accordance with the standard TIA 568A color-coding. Connect the A-BUS modules in the remote rooms to the Cat. 5 cable in accordance with the instructions for the module.

#### Step Three: Connect the AC Power Supply

Connect the AC Power Supply furnished with the ABH 4 to the **Power Input** ②. Plug the AC power cord into the socket on the Power Supply. Do not connect the power cord to an AC outlet at this time.

#### Optional Step Four: Multiple ABH 4 Connections

If you are using more than one ABH 4 in a system, connect the **Expansion Out Jack** ⑤ to the **Expansion In Jack** ④ on another ABH 4, using the RJ-45 jumper cable supplied with the second ABH 4. Then, follow steps two and three, as shown above.



# 4-Room A-BUS® Expansion Hub ABH 4

## Connections to a Non-A-BUS/READY Product

The ABH 4 may also be used to bring the benefits of A-BUS technology to audio systems that are not A-BUS/READY. To do this, a few additional steps are required to connect an audio feed and to install any required infrared emitters that are used to control the source equipment. Although this installation is relatively simple, you may wish to have it completed by a trained installer who is familiar with A-BUS and audio/video systems integration.

### Step One: Connect an Audio Source

Connect the audio outputs of the source that will be used to feed the A-BUS modules by using a standard audio interconnect cable (not included) connecting the **Audio Inputs 3** on the ABH 4 to the audio outputs of the source device. The source may be the tape outputs of a stereo preamplifier or receiver, the tape outputs or multiroom outputs of an audio/video receiver or surround processor, or it may be a direct connection to a single source such as a CD player or tuner.

### Step Two: Connect the A-BUS Modules

Connect the RJ-45 jacks on the Cat. 5 cabling that runs to the remote room modules to the **A-BUS Outputs 6** on the ABH 4. Make certain that the connector is wired in accordance with the standard TIA 568A color-coding. Connect the A-BUS modules in the remote rooms to the cable in accordance with the instructions for the module.

### Step Three: Connect the AC Power Supply

Connect the AC Power Supply furnished with the ABH 4 to the **Power Input 2**. Plug the AC power cord into the socket on the Power Supply. Do not connect the power cord to an AC outlet at this time.

### Optional Step Four: Multiple ABH 4 Connections

If you are using more than one ABH 4 in a system, connect the **Expansion Out Jack 5** to the **Expansion In Jack 4** on another ABH 4, using the RJ-45 jumper cable supplied with the second ABH 4. Then, follow steps two and three as shown above.

**NOTE:** The following steps provide additional options that extend the flexibility of your A-BUS system. If you are not familiar with audio/video systems installations, you may wish to have them completed by a properly trained installer.

## Optional Step Five: Status Power Connection

If your system requires that the remote A-BUS models are active and able to receive commands when the host receiver, processor or preamplifier is not turned on, connect an optional power supply to the **Status Input 1**. The power supply is the small type typically used to power portable electronics products and should provide a nominal 12 volts DC at 200 mA, using a standard 2.1 plug with "Center Positive".

## Optional Step Six: Connect IR Emitters

If you are not using direct IR control connections to "IR In" jacks on products by Harman Kardon and wish to control a receiver, processor or preamp, or a source product such as a CD or DVD player, connect optional IR emitters to the **IR Emitter Jacks 7** and then place them over the IR sensor on the front panel of the unit to be controlled in accordance with the emitter manufacturer's instructions.

## Optional Step Seven: Remote IR Sensor Connection

If the source and control equipment is behind cabinet doors or dark glass and you wish to have an optional IR sensor in the main listening room control those products, connect that sensor (not included) to the **Local IR Input Terminals 6**. To make the installation easier, the black connector block may be removed by grasping the top and bottom of the block and pulling it out toward you. Reinstall it after the connections are made by simply pushing it back into the socket.

When using an optional IR receiver (not supplied) the connections are as follows:

ABH 4 "Local IR" Connection Point	Sensor Connection Point
V+	+12V
SIG	IR OUT
GND	GND

**NOTE:** The STAT connection is not used in standard installations.

If you are not familiar with the use of external IR sensors in systems integration applications, we strongly recommend that a trained custom installer perform the installation.

## Operation

When the installation is complete and all connections have been made to the ABH 4 and receiver, processor or preamplifier, and the A-BUS modules have been properly installed in the remote rooms, operation of the ABH 4 is simple. There are no user controls on the ABH 4.

After checking the connections, plug the AC power cord from the ABH 4's Power Supply into a non-switched AC outlet and turn on the host receiver, processor or preamplifier. Operation of the ABH 4 is seamless, as the remote A-BUS modules will communicate directly with the host source.

When the ABH 4 is used with an A-BUS/READY receiver, the A-BUS modules in the remote room operate as if they were connected directly to the host receiver. No further controls are needed. Follow the instructions included with the A-BUS modules for operation information.

When the ABH 4 is used in the stand-alone mode with a source that is not A-BUS/READY, the method of operation varies depending on the specifics of the installation:

- When a 12-volt adaptor is not connected to the ABH 4's **Status Input 1**, the system is able to pass through IR commands from the remote modules to turn on the host receiver, processor or preamplifier, but there is no power to a remote module's internal amplifier until an audio signal is sensed at the ABH 4's **Audio Inputs 3**.
  - When a 12-volt adaptor is connected to the ABH 4's **Status Input 1**, the system is ready for full operation at all times, including pass-through of IR commands from remote A-BUS modules as well as power to the remote modules' internal amplifiers.
- The three LED indicators on the ABH 4 signify the following operational modes:
- The **Status Indicator A** lights when the system is activated either by connection to an A-BUS/READY receiver that is turned on, when a signal is sensed at the **Audio Inputs 3** or when a 12-volt power source is connected to the **Status Inputs 1**. This light indicates that the remote modules are active and ready to accept and transmit commands.
  - The **Power Indicator B** lights when the AC Power Supply is connected to the ABH 4 and/or when a connection is made between the ABH 4 and an A-BUS/READY receiver. This light indicates that the system is powered on and is operational.
  - The **IR Indicator C** flashes whenever an IR command is transmitted through the system.

## Troubleshooting Guide

If the remote A-BUS modules do not operate at all:

- Verify all connections between the remote modules and the ABH 4
  - Check the RJ-45 connection between the ABH 4 and the host receiver (A-BUS/READY systems)
  - Check the AC power connection at both the ABH 4's Power jack and on the Power Supply
- If the remote module's status LED is lit but there is no sound:
- Make certain that an active source has been selected on the host receiver
  - Check the RJ-45 connection between the ABH 4 and the host receiver (A-BUS/READY systems)
  - Check the audio connections between the ABH 4 and the host receiver (non-A-BUS/READY systems)

For additional troubleshooting information and updated operational and installation hints, please visit the Product Support section of the Harman Kardon Web site at [www.harmankardon.com](http://www.harmankardon.com).

## Specifications

ABH 4 Dimensions (D x W x H):  
3-5/16" x 7-3/16" x 1-3/16" (83mm x 184mm x 30mm)

Weight: 0.9 lb (410g)

Power Supply Dimensions (D x W x H):  
2-13/16" x 5-15/16" x 1-7/16" (70mm x 151mm x 36mm)

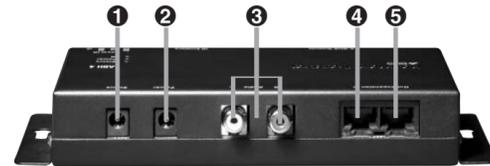
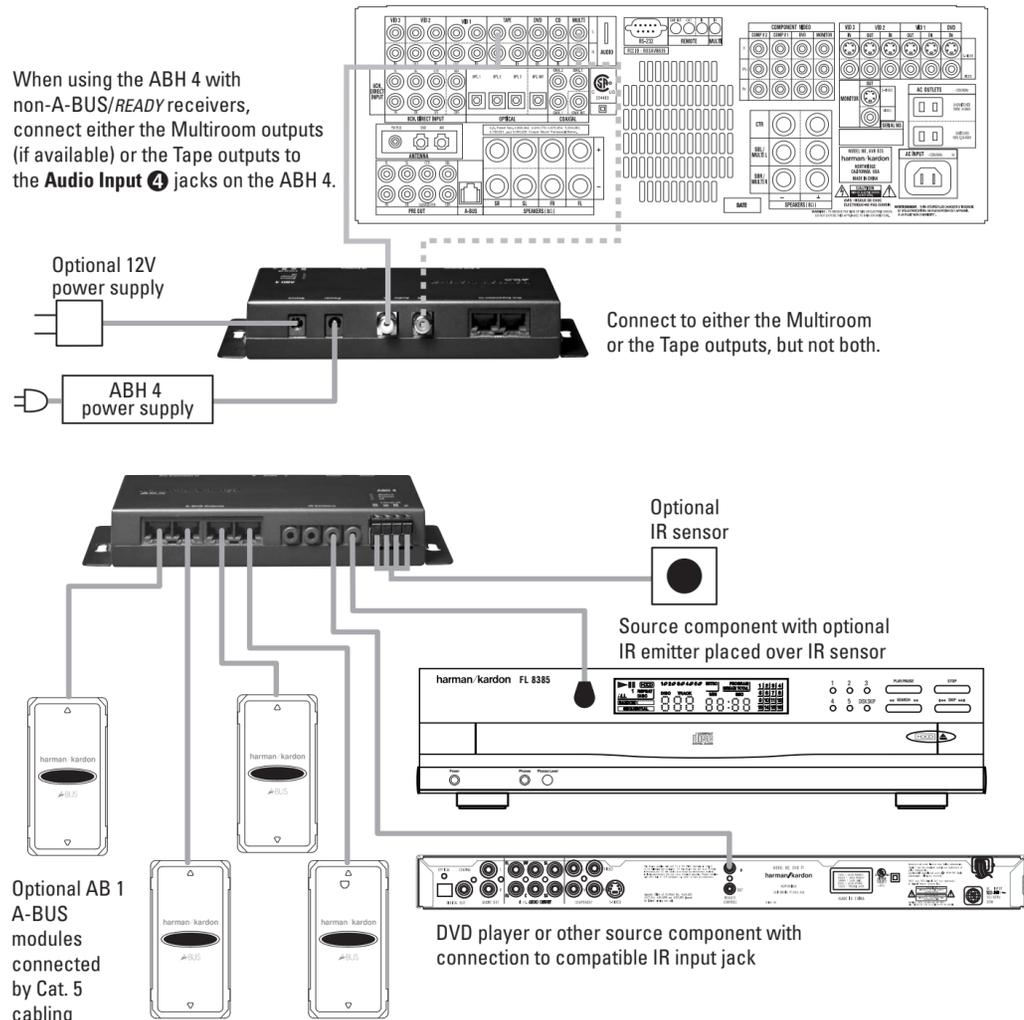
Weight: 1 lb (450g)

Power Supply Input: 108 – 264 VAC, 115 watts

Power Supply Output: 24-volt, 4-amp supply included

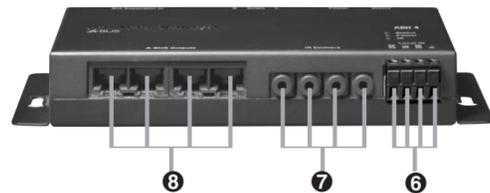
Status Power: 12 volts, 200ma

Wiring protocol for A-BUS connections: TIA wiring specification for TIA 568A



## Top-Edge Connections

- 1 Status Input
- 2 Power Input
- 3 Audio Inputs
- 4 Expansion In Jack
- 5 Expansion Out Jack



## Bottom-Edge Connections

- 6 Local IR Input Terminals
- 7 IR Emitter Jacks
- 8 A-BUS Outputs



## LED Indicators

- A Status Indicator
- B Power Indicator
- C IR Indicator

## harman/kardon®

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