ERB-24

USER'S GUIDE

ERB-24 User's Guide

Revision B - July 1994
Part Number: 63930

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Preface

This manual describes how to cable, wire, program, and use ERB-24 relay output boards with digital I/O boards, such as the PIO-12.

This guide serves data acquisition system designers, engineers, technicians, programmers, scientists, and other users responsible for setting up, cabling, wiring, and writing programs that access the functionality of the ERB-24 board. This guide assumes that you are familiar with data acquisition and programming principles and with your particular application.

The *ERB-24 User's Guide* is organized as follows:

- Chapter 1 briefly describes the features, applications, and accessories supported by the ERB-24.
- Chapter 2 describes the features of the ERB-24 in more detail and provides a block diagram of the board.
- Chapter 3 describes how to unpack and set up the ERB-24 board.
- Chapter 4 describes how to attach the ERB-24 to digital I/O boards.
- Chapter 5 provides an example of accessing the functionality of an ERB-24 board using a PIO-12 board and the BASIC programming language.
- Chapter 6 provides troubleshooting information and information on how to obtain technical support and repairs for the ERB-24.
- Appendix A lists the specifications for the ERB-24.
- Appendix B lists the connector pin assignments for the ERB-24.

An index completes this guide.

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1

Overview

The ERB-24 is a 24-channel relay output board. This chapter describes the features and typical applications of the ERB-24 and the accessories provided for the board.

Features

The ERB-24 is compatible with the PIO-12, PIO-24, PIO-96, µCPIO-12, and µCPIO-24 digital I/O boards. The ERB-24 is also compatible with the digital I/O section of the DAS-1600 Series and DAS-1200 Series boards.

The ERB-24 provides the following features:

- 24 double-pole, double-throw relays (dual form C)
- 3 A contact rating (120 Vrms)
- Built-in power supply
- Screw terminals that accept 12-22 AWG wire
- LEDs that indicate activated relays
- 37-pin connector
- 50-pin connector

Applications

The following are typical applications for the ERB-24:

- Energy management
- Laboratory automation
- Product testing
- Process control
- Alarm activation
- Annunciator lighting

Accessories

The optional accessories for the ERB-24 board include the following:

- **C-1800** - Cable for connecting an ERB-24 to a PIO-12, PIO-24, µCPIO-12, µCPIO-24, DAS-1600 Series, or DAS-1200 Series board. The standard cable is 1.5 feet long. The C-1800 cable is available in different lengths, if required. Refer to the Keithley MetraByte catalog for more information on ordering the C-1800 in different lengths.
- **CACC-2000** - Cable for connecting an ERB-24 to a PIO-96 digital I/O board.
- **RMT-02** - Rack-mountable enclosure. The RMT-02 installs into any standard 19-inch rack, such as a Keithley MetraByte RMF-06 or RTT-02.
- **SFC-37** - 37-pin mating connector for making custom digital inputs.

2

Functional Description

Each of the 24 relays on the ERB-24 board is supported by its own control line. The relay is an electromechanical, dual form C (double-pole, double-throw) module capable of switching loads under program control. The electromechanical relays offer zero-leakage output currents.

Each relay contains two normally open contacts and two normally closed contacts. Each contact can switch up to 3 A (resistive) at 120 Vrms.

The ERB-24 provides both a 37-pin and a 50-pin connector. The 37-pin connector is provided for connecting to a PIO-12, PIO-24, µCPIO-12, or µCPIO-24 digital I/O board or to the 37-pin auxiliary connector on a DAS-1600 Series or DAS-1200 Series board. The 50-pin connector is provided for connecting to a PIO-96 digital I/O board.

A 5 V signal applied to the corresponding relay control pin on the connector energizes the relay. Onboard transistor drivers allow control of the ERB-24 by any LSTTL- or NMOS/ CMOS-compatible digital output board.

The ERB-24 contains an annunciator LED for each relay for purposes of monitoring and troubleshooting. Each annunciator LED lights when its associated relay is energized.

The board also contains its own power supply. The power supply operates on 115/230 VAC and accepts 15% voltage fluctuations. Operating temperatures range from 0° to 60°C.

A block diagram of the ERB-24 board is shown in Figure 2-1. Figure 2-2 shows the circuitry for a single relay channel.

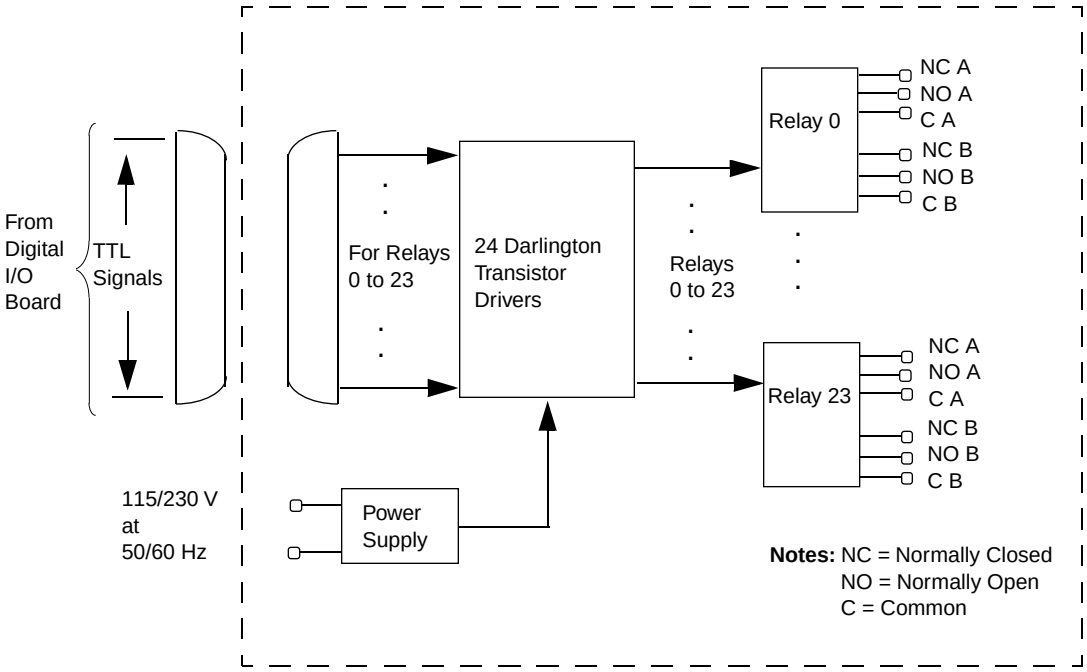

Figure 2-1. ERB-24 Block Diagram

Figure 2-2. Typical Relay Channel

3

Setup

This chapter describes how to set up your ERB-24 board. If you encounter any problems with the board after setting it up, refer to Chapter 6 for troubleshooting information.

Unpacking the Board

Caution: A discharge of static electricity from your hands can seriously damage certain electrical components on any circuit board. It is recommended that you use wrist strap grounds when handling a board. If a wrist strap ground is not available, make sure that you discharge static electricity from yourself by touching a grounded conductor such as your computer chassis (your computer must be turned off).

Whenever you handle a board, hold it by the edges and avoid touching any board components.

Use the following procedure to unpack an ERB-24 board:

1. Remove the board from its anti-static wrapping material. You may wish to store the wrapping material for possible future use.

2. Inspect the board for signs of damage. If damage is apparent, arrange to return the board (see page 6-2).

3. Check the remaining contents of your package against the packing list to be sure your order is complete. Report any missing items, immediately.

4. Once you have determined that the board is acceptable, select the appropriate AC line voltage, as described in the next section.

Setting the AC Line Voltage

Caution: Be sure to set the AC line voltage for the voltage you are using before connecting the ERB-24 to line power. The default setting is 115 V.

The 115/230 AC Line Voltage Selector is a 2-position slide switch located as shown in Figure 3-1. To change the line voltage setting, slide the switch to the appropriate setting (115 V or 230 V) marked on the switch.

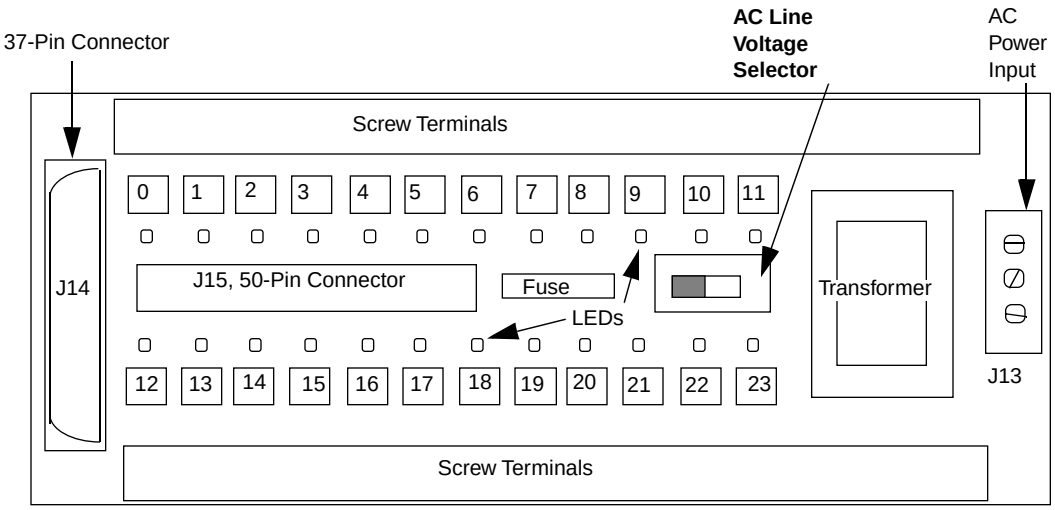

Figure 3-1. ERB-24 Board Layout

Once you have set the AC line voltage, you can attach accessories and wire applications to the ERB-24 board, as discussed in Chapter 4.

4

Cabling and Wiring

Once you have set up the ERB-24, you can attach accessories and wire applications to the board. This chapter describes the pin assignments of the connectors on the ERB-24 and how to attach the ERB-24 to digital I/O boards.

Connector Pin Assignments

The ERB-24 board contains two connectors: a 37-pin, D-type, male connector (J14) and a 50-pin connector (J15), shown in Figure 3-1. The pin assignments of the 37-pin connector are shown in Figure 4-1; the pin assignments of the 50-pin connector are shown in Figure 4-2.

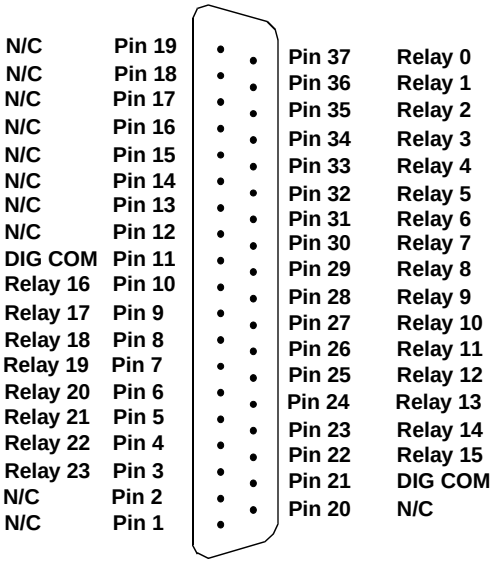

Figure 4-1. Pin Assignments of the 37-Pin Connector (J14)

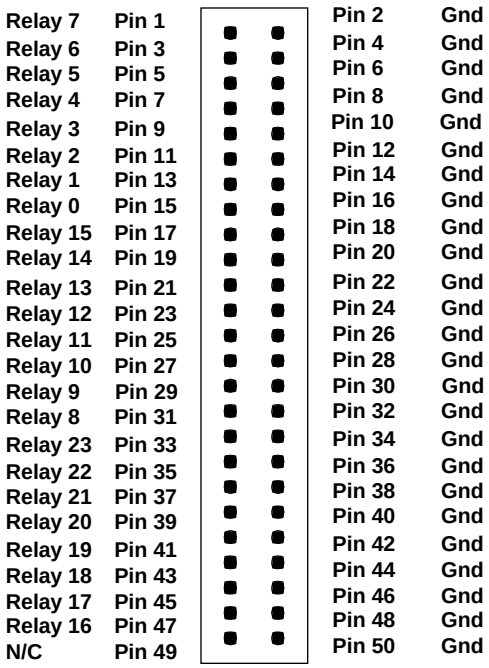

Figure 4-2. Pin Assignments of the 50-Pin Connector (J15)

Attaching to a PIO-12, PIO-24, μCPIO-12, or μCPIO-24

To attach the ERB-24 to a PIO-12, PIO-24, μCPIO-12, or μCPIO-24 digital I/O board, connect a C-1800 cable to the 37-pin connector on the ERB-24 (J14), as shown in Figure 4-3.

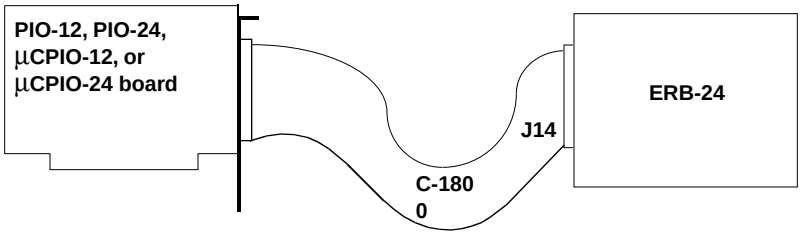

Figure 4-3. Attaching to a PIO-12, PIO-24, μCPIO-12, or μCPIO-24 Board

Attaching to the DAS-1600 or DAS-1200 Series

To attach the ERB-24 to a DAS-1600 or DAS-1200 Series board, first attach the DAS board end of the PIO cable that comes with the DAS-1600 and DAS-1200 Series boards to the PIO cable connector (J2) on the DAS board. Next, install the 37-pin D-type connector of the PIO cable in the connector panel next to the main I/O connector (J1) of the DAS-1600 or DAS-1200 Series board. Finally, attach connector J14 on the ERB-24 to the 37-pin D-type connector of the PIO cable with the C-1800 cable. Figure 4-4 illustrates these connections.

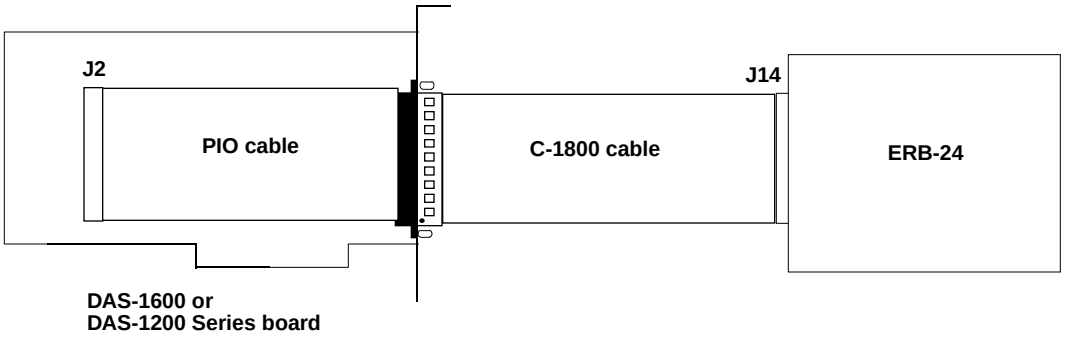

Figure 4-4. Attaching to a DAS-1600 or DAS-1200 Series Board

Attaching to a PIO-96

You can attach up to four ERB-24 boards to a PIO-96 digital I/O board. To attach an ERB-24 to a PIO-96, connect the CACC-2000 cable to the 50-pin connector (J15) on the ERB-24 board and to the 50-pin connector on the PIO-96, as shown in Figure 4-5.

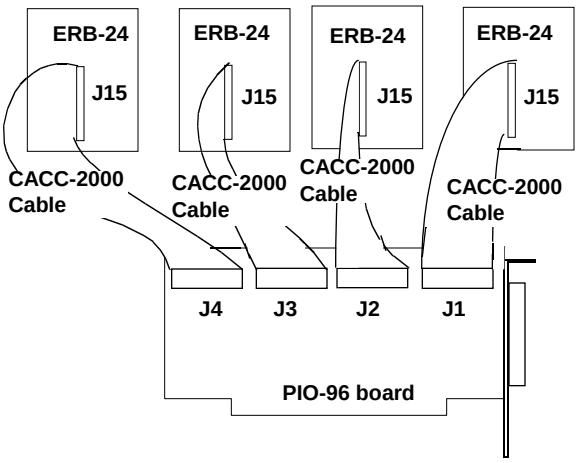

Figure 4-5. Attaching to a PIO-96 Board

5

Programming

This chapter provides an example of how to activate relays on the ERB-24 using a PIO-12 digital I/O board and BASIC as the programming language.

PIO-12 Relay Signal Names

Table 5-1 lists the PIO-12 signal names and the corresponding ERB-24 relays.

Table 5-1. PIO-12 Relay Signals

Relay	Signal	Relay	Signal
0	PA0	12	PC4
1	PA1	13	PC5
2	PA2	14	PC6
3	PA3	15	PC7
4	PA4	16	PB0
5	PA5	17	PB1
6	PA6	18	PB2
7	PA7	19	PB3
8	PC0	20	PB4
9	PC1	21	PB5
10	PC2	22	PB6
11	PC3	23	PB7

BASIC Example

The following simple BASIC program activates relays on the ERB-24 used with a PIO-12 board:

```
10 OUT &H313, &H80 'Sets all PIO-12 ports to outputs
20 OUT &H310, 1    'Activates relay 0 (Port A, Bit 0)
30 OUT &H311, 16   'Activates relay 20 (Port B, Bit 4)
40 OUT &H312, 3    'Activates relays 8 and 9
                   '(Port C, Bits 0 and 1)
```

6

Troubleshooting

If your ERB-24 board is not operating properly, use the information in this chapter to help you isolate the problem. If the problem appears serious enough to require technical support, refer to page 6-2 for information on how to contact an applications engineer.

Problem Isolation

If you encounter a problem with an ERB-24 board, use the troubleshooting information in Table 6-1 to try to isolate the problem. Table 6-1 lists general symptoms and possible solutions for problems with ERB-24 boards.

Table 6-1. Troubleshooting Information

Symptom	Possible Cause	Possible Solution
Board does not respond	The board is damaged.	Contact the Keithley Applications Engineering Department; see page 6-2.
	Bad cable or cable not connected.	Check cable connections. Replace cable if defective.
	No A/C or power cord not plugged in.	Check power connections to board.
Intermittent operation	Vibrations or loose connections exist.	Cushion source of vibration and tighten connections. Check cable.
	The board is overheating.	Check environmental and ambient temperature. See the documentation for your computer for specifications.
	Electrical noise exists.	Provide better shielding or reroute wiring.
Data appears to be invalid	An open connection exists.	Check wiring to screw terminal.
	Outputs not indicating proper level.	Check that the circuit is complete (are both relay connections used?). You may need to apply pull-up resistors for the external source.

If your board is not operating properly after using the information in Table 6-1, refer to the next section for information on how to contact an applications engineer.

Technical Support

Before returning any equipment for repair, call the Keithley MetraByte Hardware Applications Engineering Department at:

(508) 880-3000

Monday - Friday, 8:00 A.M. - 6:00 P.M., Eastern Time

An applications engineer will help you diagnose and resolve your problem over the telephone. Please make sure that you have the following information available before you call:

ERB-24 Board	Serial #	_____
	Revision code	_____
	VAC line voltage	_____
Digital I/O Board	Type	_____
	Serial #	_____
	Base address	_____
	Interrupt selection	_____
Computer	Manufacturer	_____
	CPU type	8088, 286, 386, 486, Pentium, _____
	Clock speed (MHz)	8 12 20 25 33 ____
	Math coprocessor	Yes No
	Amount of RAM	_____
	Video system	CGA Hercules EGA VGA
	BIOS type	_____
Operating system	DOS version	_____
	Windows version	3.0 3.1 _____
	Windows mode	Standard Enhanced
Software package (if applicable)	Name	_____
	Version	_____
	Invoice/order #	_____
Compiler (if applicable)	Language	_____
	Manufacturer	_____
	Version	_____

If a telephone resolution is not possible, the applications engineer will issue you a Return Material Authorization (RMA) number and ask you to return the equipment. Include the RMA number with any documentation regarding the equipment.

When returning equipment for repair, include the following information:

- Your name, address, and telephone number.
- The invoice or order number and date of equipment purchase.
- A description of the problem or its symptoms.
- The RMA number on the **outside** of the package.

Repackage the equipment, using the original anti-static wrapping, if possible, and handling it with ground protection. Ship the equipment to:

ATTN: RMA #_____
Repair Department
Keithley MetraByte
440 Myles Standish Boulevard
Taunton, Massachusetts 02780

Telephone (508) 880-3000
Telex 503989
FAX 508/880-0179

Notes: If you are submitting your equipment for repair under warranty, you must include the invoice number and date of purchase.

To enable Keithley Metrabyte to respond as quickly as possible, you must include the RMA number on the outside of the package.

A

Specifications

Table A-1 lists the specifications for the ERB-24.

Table A-1. ERB-24 Specifications

Feature	Attribute	Specification
Relays	Quantity and type	24 DPDT, dual form C
	Contact material	Gold overlay silver
	Contact rating	3 A at 28 VDC, resistive 3 A at 120 VAC, resistive 1.6 A at 220 VAC
	Operate time	20 ms maximum at rated voltage
	Release time	10 ms maximum
	Life expectancy Mechanical Electrical	 10^7 operations/minute 10^5 operations/minute at rated load
Environmental	Operating temperature range Storage temperature range Humidity	0° to 60°C –40° to +100°C 0 to 90% noncondensing
Power Consumption	Input power	115 VAC ±15% (2 A fuse) 230 VAC ±15% (1 A fuse) 50/60 Hz, 14.5 VA maximum

Table A-1. ERB-24 Specifications (cont.)

Feature	Attribute	Specification
Physical	Dimensions	16-inches long by 4.75-inches wide by 2-inches high (40.6 cm long by 12.1 cm wide by 5.1 cm high)
	Weight	2.2 lb (1 kg)
	Screw terminal wire spacing	0.197 inches (5 mm)
	Screw terminal wire sizes	12-22 AWG
	Mounting screws for boards	4-40

B

Connector Pin Assignments

This appendix contains the pin assignments for the ERB-24 board connectors.

37-Pin Connector

Pin assignments for the 37-pin connector, J14, on the ERB-24 are shown in Figure B-1.

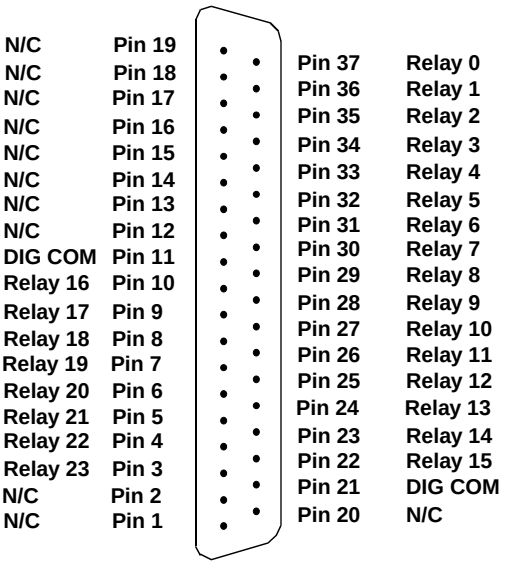

Figure B-1. Pin Assignments for the 37-Pin Connector (J14)

50-Pin Connector

Pin assignments for the 50-pin connector, J15, on the ERB-24 are shown in Figure B-2.

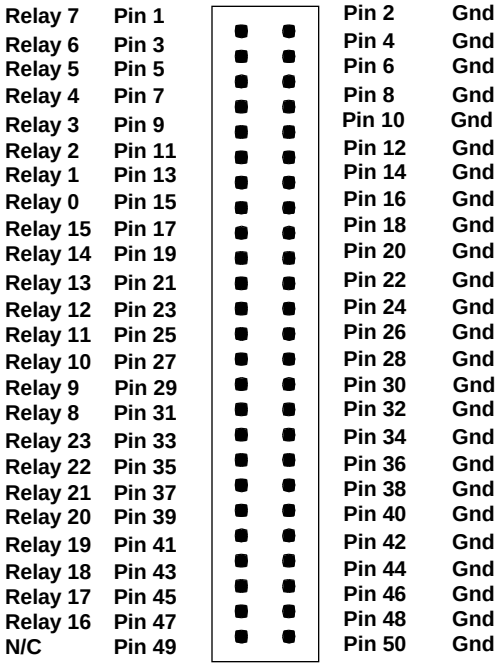

Figure B-2. Pin Assignments for the 50-Pin Connector (J15)

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