

#### Overview

The length of RS-232 cable that runs from a HomeWorks™ panel to a PC is limited to 50 feet. While it is possible to simply connect cables in excess of this amount, the reliability of the communications is greatly reduced. In order to allow greater distances between RS-232 connections, it is necessary to convert the RS-232 protocol to another protocol, transmit the data, convert the data back to the RS-232 protocol and then read the data. An easy way to do this is by using two RS-232 distance extenders (one for input and one for output) to connect a system to a HomeWorks panel. This distance can be increased to up to 4000 feet by using the procedure described below.

#### Requirements and Recommendations

The following list shows the equipment required to extend your RS-232 cable for connecting your system to the HomeWorks panel. For this connection, two Serial Distance Extenders sold by Black Box Corporation are recommended.

**PI325A Serial Distance Extender Set (see Figure 1 below)**

**(Set contains one input extender (PI323A), one output extender (PI324A)—one of each is required—and a power supply for each device.)**

**RJ-45 Cable (Black Box Part Number: EL08MS) or equivalent shielded cable**

**RS-232 Custom Cable**

**RS-232 Adapter Cable**

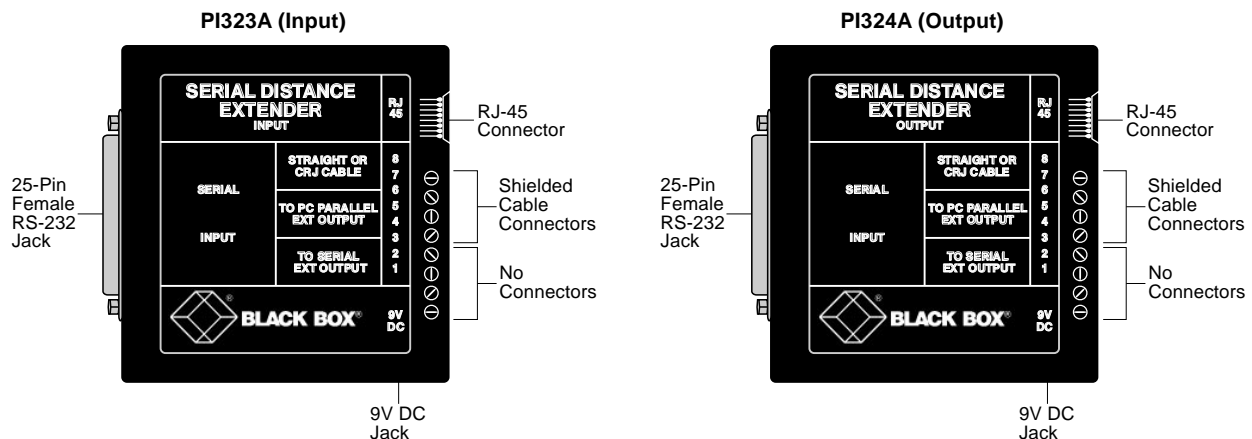


Figure 1: Input and Output Serial Distance Extenders

#### Connection Guidelines

Follow the guidelines and refer to Figure 2 below to connect your system to the HomeWorks panel using the Serial Distance Extenders.

**1. Using an RS-232 Adapter Cable with Your System.** The input to a Serial Distance Extender is a standard DB25F (25-pin female) connection. You may need to use an RS-232 adapter cable to connect your system to a distance extender if:

- Your system's output is not a DB25M (25-pin male).
- There is not enough clearance to attach the Serial Distance Extender to your system.

**Note:** Black Box and Radio Shack sell an assortment of 9-pin to 25-pin adapters and gender changers.

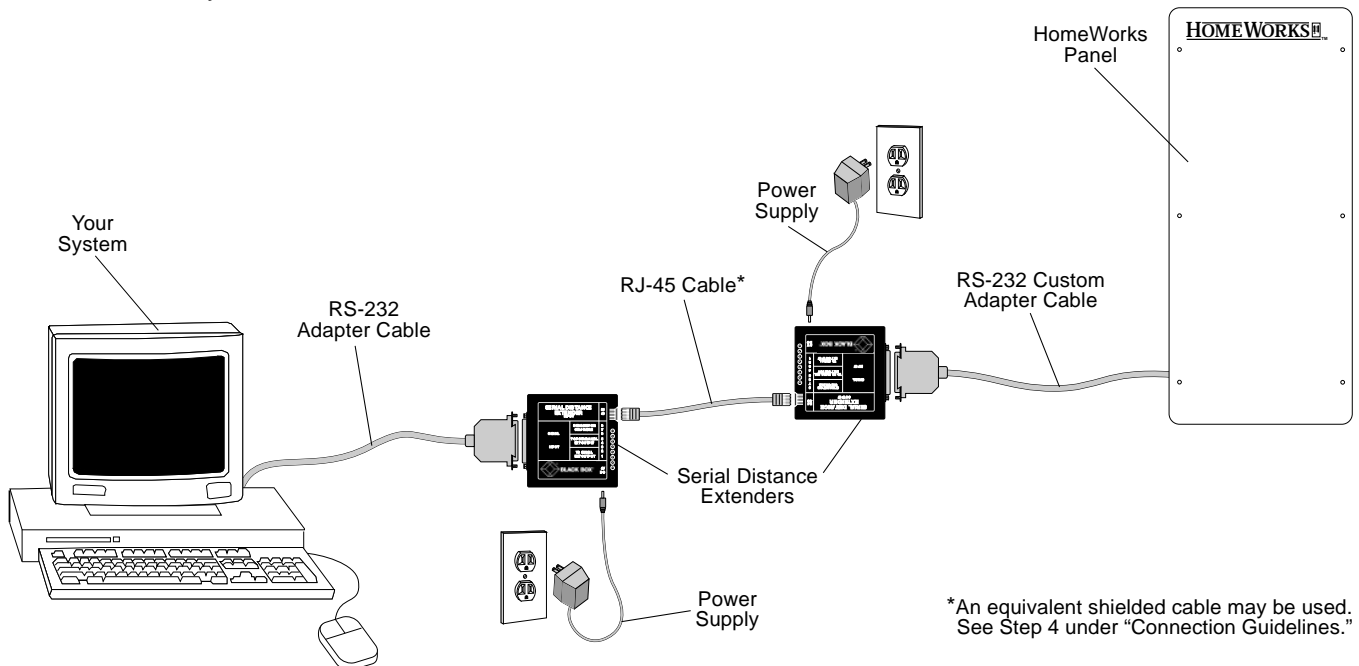
2. **Using Serial Distance Extenders.** The Serial Distance Extenders recommended may be purchased as a set of two Serial Distance Extenders (PI325) from Black Box. The set contains an Input Serial Distance extender (PI323A) and an Output Serial Distance Extender (PI324A) (see Figure 1). If you need to order a replacement for one of the extenders, make sure you order the correct one, since the system will only work with a pair of input and output devices. **Note:** When connecting the extenders to your system, it does not matter which device is the input or which device is the output as long as one of each is used.
3. **Using Serial Distance Extenders Power Supply.** Two 9V power supplies are provided with the PI235A set of extenders. Each power supply plugs into a standard 120V/60Hz wall outlet.
4. **Attaching RJ-45 or Shielded Cable to the Extenders.** Connect the two distance extenders using RJ-45 or shielded cable. Refer to the chart below to determine the type of cable to use for the distance you need:

Cable	Maximum Distance
28-gauge shielded, non-twisted pair	1000 feet
24-gauge shielded, non-twisted pair	2000 feet
24-gauge shielded, twisted pair	4000 feet
RJ-45	4000 feet

If using shielded cable, use category 4 conductor cable. You only need to connect pins 5, 6, 7, and 8 of each distance extender. Twisted pair cable should have pairs 5 and 6 twisted and pairs 7 and 8 twisted. Refer to Figure 1 for connection location on a Serial Distance Extender.

If using an RJ-45 cable, use the 8-pin, telephone type jack RJ-45 connector (standard for RJ-45 connections) on each distance extender. Refer to Figure 1 for connection location on a Serial Distance Extender. **Note:** RJ-45 cable is usually sold with 8-pin telephone type jacks already attached.

5. **Using Custom Adapter Cable to Connect to the HomeWorks panel.** We recommend you use a custom RS-232 cable (sold by Black Box) to connect the Serial Distance Extender to the HomeWorks panel. For your convenience, on the following page is a sample Black Box Custom Cable Form already filled out for the cable you will need. **Note:** Remember to fill in the length of the cable you need and your company information prior to sending this order. If you decide to use a different cable this form will show you the pin connections you need.



\*An equivalent shielded cable may be used. See Step 4 under "Connection Guidelines."

Figure 2: Setup for Connection Using Serial Distance Extenders



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