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Allegro® Sensor Evaluation Kit Technical Guide

Version 2.0

ASEK2-UG

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Quick Start

Before using the ASEK, Allegro recommends that you read and understand this entire document. However, in most cases, basic configuration can be done very quickly so that you can start to familiarize yourself with the ASEK. The basic steps are described in this section. The configurations described are for operating the ASEK in a direct connection to a personal computer that has an Internet Web browser installed.

To set up the ASEK, perform the following steps:

1 Connect the ASEK Main Board module to the computer using either a standard Ethernet crossover cable, or a separately-powered Ethernet hub and two standard Ethernet LAN cables (the computer may be powered-on at any time).

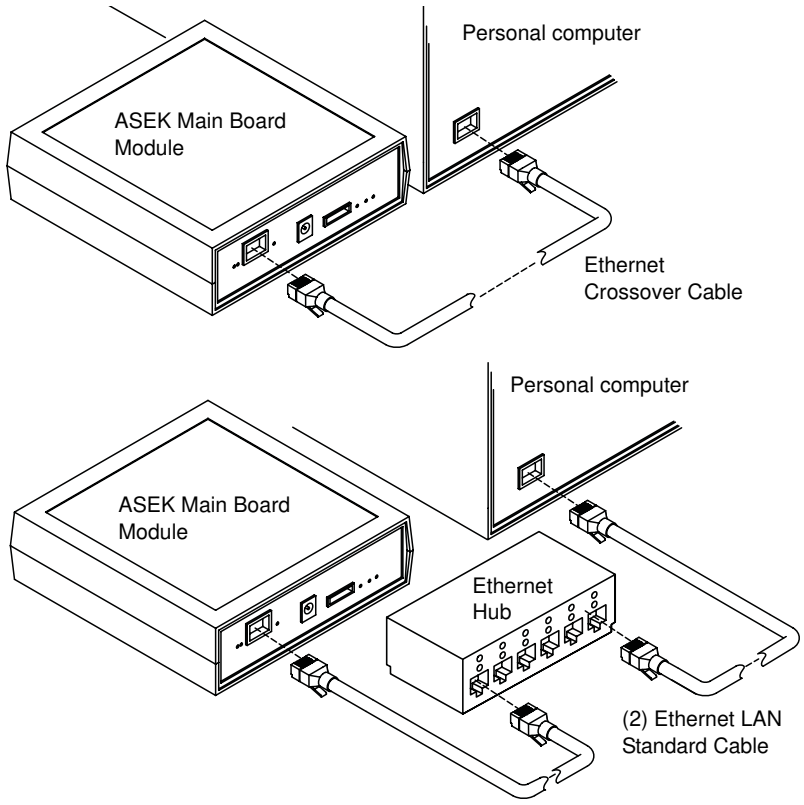

Figure QS-1 Connecting the computer
Direct connection options: Ethernet crossover cable (above), or Ethernet hub and two standard cables (below).

2 Solder the device-under-test (DUT) socket to the appropriate ASEK interface board, and connect the ribbon cable between the interface board and the ASEK Main Board module (Figure QS-2). (DUT connection without interface board is described later in this document.)

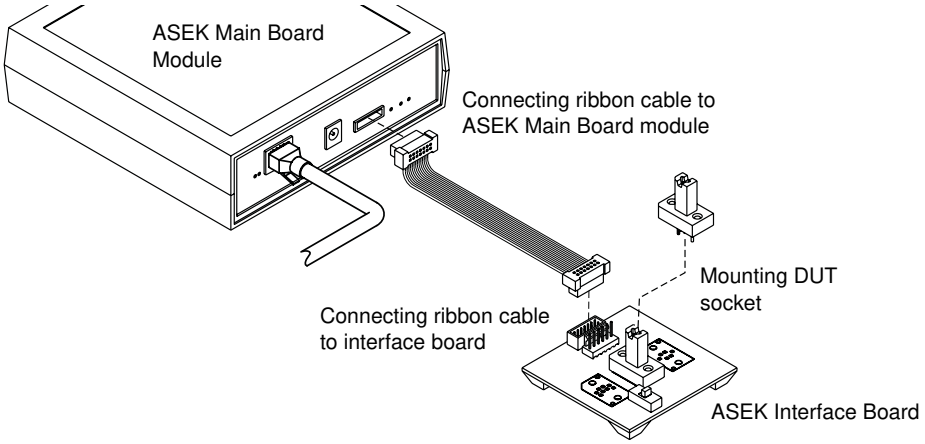

Figure QS-2 Connecting ribbon cable
For data transfer between ASEK Main Board module and an interface board with DUT socket.

3 CAUTION: ONLY USE the power supply included in the ASEK. Select a regional power plug appropriate for the test facility, and swap it into the transformer body.Then connect the mini plug to the ASEK module and connect the wall plug to the facility power mains.(Figure QS-3) The ASEK powers-on immediately. Allow 30 seconds for the firmware to load.

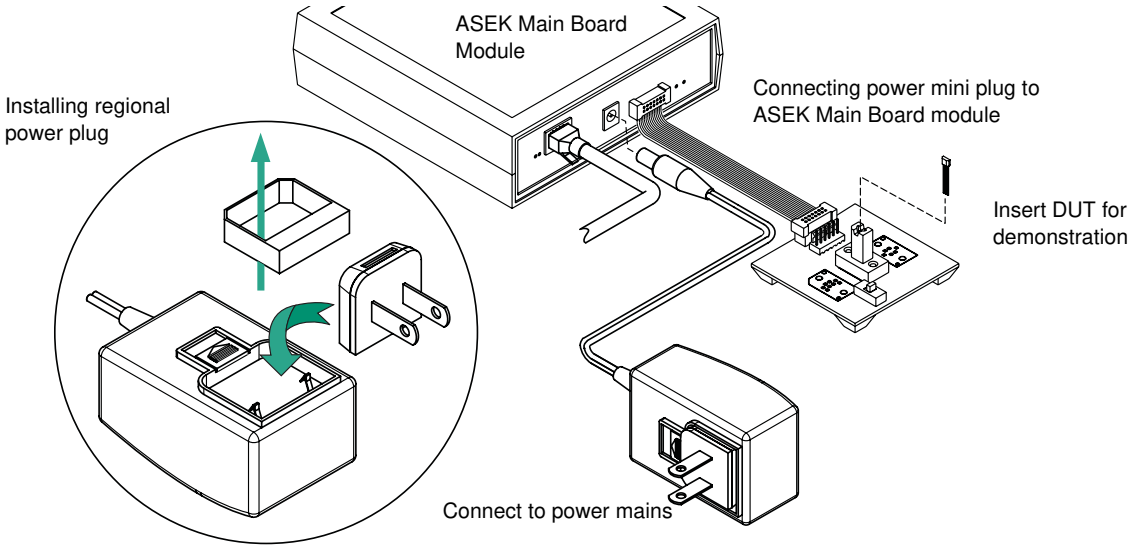

Figure QS-3 Connecting power supply
Powers ASEK Main Board module, peripheral PCBs and a DUT for demonstration.

4 Open the Internet Web browser on the computer, and navigate to http://192.1.2.3. The ASEK software opens as a Web page.

5 Insert the DUT into the socket and use the ASEK software to perform demonstrations.

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Using This Manual

This chapter introduces the purpose and use of this document. It also includes information on contacting Allegro® MicroSystems (Allegro) support groups. Information in this document is subject to change without notice. For additional information, contact your local Allegro field service representative or sales representative, as described in this chapter.

Compatibilities

This guide describes the use of the Allegro Sensor Evaluation Kit (ASEK) Version 2, and applies to the following release levels:

- Allegro Sensor Evaluation Kit firmware and hardware compatible with the ASEK-02 Main Board revision 1

In addition to these releases, certain additional configuration files contain information on specific devices and configurations that may be updated from time to time for compatibility with new products. For information on updated configuration files, contact your local Allegro field service representative.

The ASEK is designed to operate only with the power supply transformer supplied in the kit. Do not use with any other transformer.

The network interface operates on IEEE 802.3, 10/100Base-T Ethernet

The ASEK kit and contents are lead (Pb) free and RoHS compliant.

Outline

The following sections are presented:

- Chapter 1, *Introduction*, provides a reference for the applications covered, kit parts list, system requirements, user-supplied parts specifications, system electrical characteristics, and safety considerations.
- Chapter 2, *Network Configuration*, describes the procedure for configuring the ASEK to connect to the operator computer via LAN or by direct connection.
- Chapter 3, *ASEK Hardware*, describes the ASEK board, power supply, and connections.
- Chapter 4, *DUT Programming*, describes procedures for using the various programming and evaluation tools provided in the ASEK software.
- Chapter 5, *ASEK Main Board Calibration*, describes the use of the Calibration board.

Audience

This guide is intended for:

- Qualified technicians and engineers who are employees of companies that purchase of the corresponding Allegro products.
- Computer network administrators of companies who purchase the kit.
- Allegro field applications engineers.
- Allegro design, sales, and support staff

Assumptions

Users of this guide should have a working knowledge of the Microsoft Windows operating system for using certain of the software modules, Hall effect sensor technology, electronic test and measurement techniques, electrical power supply operation, and have a knowledge of the application being designed.

Relationship to Other Documents

This document replaces all previous user guides for the Allegro Sensor Evaluation Kit, version 2.

CAUTION: Check for the latest version of this manual, on the Allegro On-line Store website at www.allegromicro.com.

The data in this manual constitutes the available documentation on the ASEK-02 kit. The kit is intended to be used as is, and Allegro does not support modifications to the kit, other than those specified in this document.

Using PDF Hyperlinks

When viewed online as an electronic book in PDF format, the cross-references in the text, such as: *see Figure 1-1*, are active hyperlinks. To go to the cited figure, table, or section, click the link text. To do so, position the arrow-shaped pointer over the hyperlink text, and when it changes to a pointing hand , click to go to the target.

In addition to the links embedded in the text, the page numbers in the Table of Contents and list of figures are hyperlinks. Click the page number to go to the cited page.

The Adobe Acrobat viewer also provides an interactive set of links in the **Bookmarks** tab in the Navigation pane. The Navigation pane is displayed by default, but if it has been closed in the instance that you are using, in the Acrobat main menu, click **View > Navigation Tabs > Bookmarks**, or press the **F4** key.

Document Conventions

The following document conventions are used throughout the documentation set.

Convention	Description
Bold text	Literal text appearing in the interface of the software product
`Monospace text`	Text that is entered or returned by the software
Italic text	When describing data input, a variable data placeholder (the text is replaced with appropriate text for entry); in other contexts, text to be considered literally
[*text* / *text*]	Optional fields, with the pipe (|) character indicating to select one of the alternatives given within the brackets
{text, text}	Mandatory fields, with the comma (,) character indicating to select one or more choices within the braces
	Information about potential loss of data
	Additional information of interest
	Information about potential hazard to operator or equipment

Getting Help

A PDF version of this manual is available on the Allegro On-line Store website.

For additional information on the ASEK system or to report problems, contact your local Allegro field applications engineering office.

Chapter 1

Introduction

Welcome to the Allegro Sensor Evaluation Kit (ASEK). The ASEK boards, together with the Web-based firmware application, provide a powerful and flexible system for evaluation and programming of Allegro Hall-effect sensors. The kit includes a calibration board that provides a rapid and repeatable method for calibrating the ASEK Main Board.

Applications

The ASEK system is intended for use with field-programmable Hall effect devices offered by sale by Allegro. This includes the following types of devices:

- 2-, or 3- or 4-wire switches or latches that are programmed using the supply pin
- 3-wire linear sensors that are programmed using the output pin

The firmware for the kit includes configuration data for specific Allegro devices that are supported at the time of release of the kit. From time to time, as additional devices become available, the firmware may be updated to adapt to those devices, and made available in updated versions of this kit. Contact your local Allegro field applications engineering office for details on supported devices.

The kit is intended for use as:

- a benchtop engineering tool for evaluating individual Allegro sensor devices; it can be used to characterize and understand the performance of the various types of sensor devices
- calibrating field-programmable Allegro devices in small volumes; the device is ideal for characterizing the effects of the various register value increments and for understanding and developing procedures for programming code streams for use on production systems

CAUTION: The ASEK system is intended for low-volume engineering applications. It is not intended to be used in volume production environments, other than for system development purposes.

Additional device development kits for other Allegro devices may be available on the Allegro website, www.allegromicro.com, by following the *On-line Store* link.

ASEK Software

The programs required to access and operate the ASEK are pre-installed as firmware on the Main Board of the ASEK. The firmware falls into the following categories:

- Main Application. One graphical interface provides access to all functions, and it opens automatically upon accessing the IP address of the ASEK Main Board. These functions are summarized in the following items.

- Board Configuration Utility. This module allows a network system administrator to change the LAN address of the ASEK Main Board.
- Board Calibration Utility. This module allows the operator to calibrate the ASEK Main Board.
- Device Demonstrator modules. These are simplified interface applications used to evaluate and program the device under test (DUT). There are three demonstrator modules: for switches (2- or 3-wire), for standard linear devices, and for linear devices with additional programming modes (the 137x family).
- Desktop Utility. This module allows the operator to perform hands-on benchtop and in situ system evaluations of the behavior of various Allegro field-programmable devices. It includes:
  - Desktop Utility. This module provides an interface to sending and receiving data from the ASEK.
  - 136X Utility. This module provides a specific interface for working with linear devices in the A136x family.
  - Configuration File. This contains information about particular devices, used with the Desktop and 136X utilities.

ASEK Hardware

The kit hardware consists of a module housing the main controller and system interface printed circuit board (PCB) assembly, with peripheral PCB assemblies that serve as interfaces for mounting or connecting to DUT sockets. Interconnect cables and a multiregional power supply are also provided. The general layout of the ASEK system is shown in Figure 1-1 on page 1-3.

Allegro Kit Contents

Before opening the ASEK package, ensure that the necessary support items are available, as described in *System Requirements*, on page 1-6. At the minimum, an ESD-resistant pad should be available for placing the contents as they are unpacked.

The ASEK Board kit comprises several circuit board assemblies, with supporting elements, identified in Table 1-1.

When the package is received, immediately compare its contents to Table 1-1. If there are any missing or damaged items, contact your local Allegro field applications engineering office immediately.

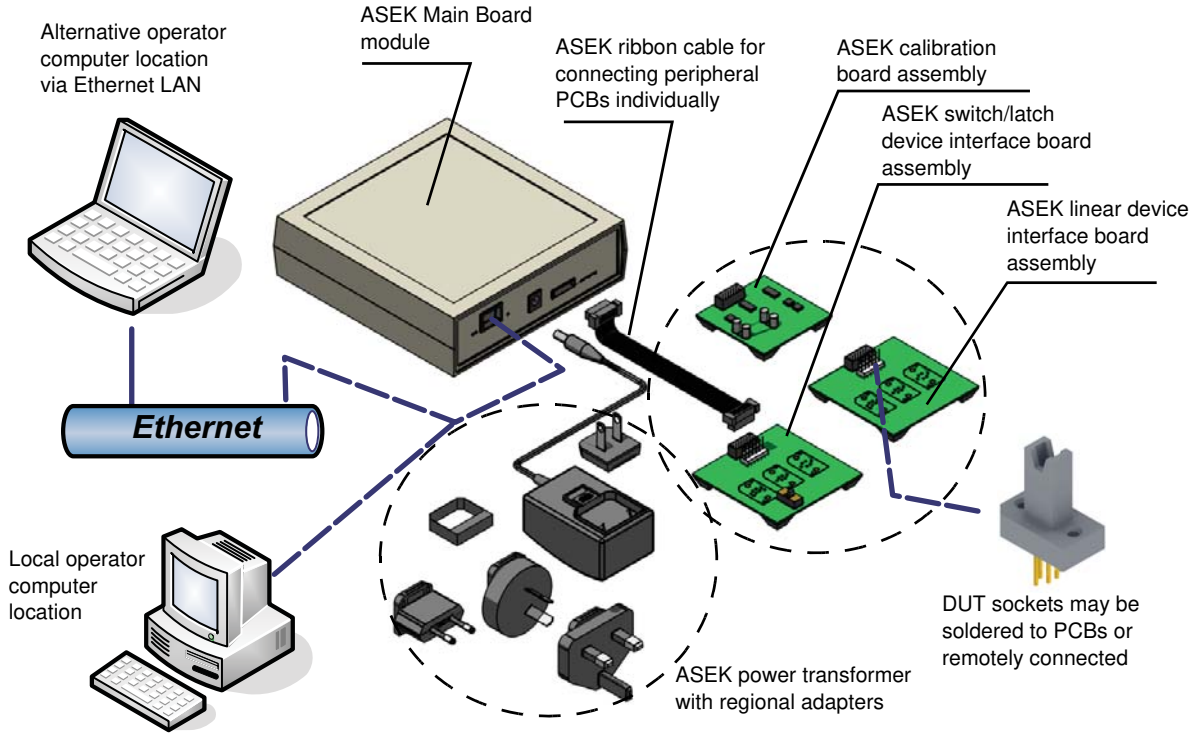


Figure 1-1 ASEK System Configuration

The system can operate over an Ethernet LAN or a direct-wired connection to the Main Board module by addressing the ASEK IP address. The connection is compatible with common process control systems. A ribbon cable connection from the Main Board module can be connected to either of the product interface boards or to the ASEK system calibration board.

Table 1-1 ASEK-02 Parts List

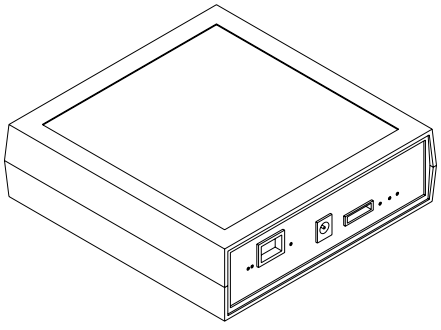
Item	Part Number	Quantity	Description
Allegro Sensor Evaluation Kit	ASEK-02	–	Consisting of the components listed in this table
Application software	N/A	1	Installed as firmware on the Main Board of the ASEK
Main Board module	N/A	1	Primary demonstrator module consisting of the following components
Protective Housing	N/A	1	13 cm x 13 cm, 4 cm overall height approximately; apertures for power supply socket, Ethernet socket, peripheral interface cable socket; windows for power and signal LEDs 

Table 1-1 ASEK-02 Parts List (Continued)

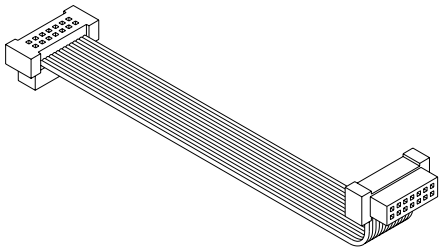
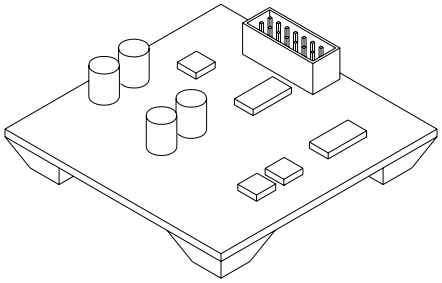
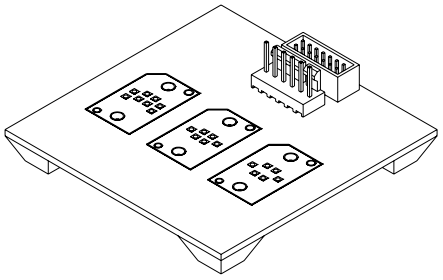
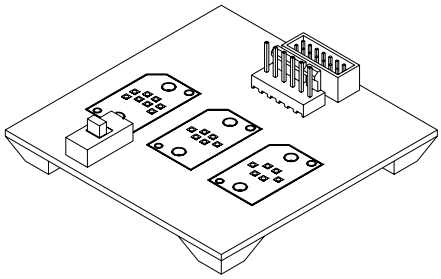
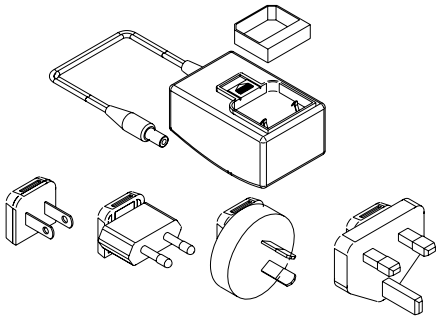
Item	Part Number	Quantity	Description
Main Board	85-0329-001 Rev. 1 (Installed in housing)	1	Main Board should only be operated inside of the protective housing due to the heat generated by the Ethernet interface board. Firmware version is available using the ASEK Desktop Utility.
Peripheral Connection Ribbon cable	85-0329-300 (Installed on housing)	1	10 cm length, with IDC male 14-pin ribbon cable connector each end 
Calibration Peripheral PCB	85-0329-100 Rev. 1 Calibration Board	1	5 cm x 5 cm, IDT female 14-pin ribbon cable header (Molex 87831-1429), used for calibrating the ASEK Main Board 
Linear Device (Output Pin Programmed) Demonstrator Peripheral PCB	85-0329-101 Rev. 1 Socket Board	1	6.3 cm x 6.3 cm, IDT female 14-pin ribbon cable header (Molex 87831-1429), 6-pin solid header 2.54 mm centers (Molex 22-11-2062), 3 device socket areas; used for Allegro linear Hall devices 

Table 1-1 ASEK-02 Parts List (Continued)

Item	Part Number	Quantity	Description
Switch Device (Supply Pin Programmed) Demonstrator Peripheral PCB	85-0329-102 Rev. 2 VCC Programming Socket Board	1	6.3 cm x 6.3 cm, IDT female 14-pin ribbon cable header (Molex 87831-1429), 6-pin solid header 2.54 mm centers (Molex 22-11-2062), 3 DUT socket areas; switch for programming pin selection; used for Allegro switch or latch Hall devices 
External DC Power Supply Module (Wall-mount)	85-0329-400	1	6 cm x 4 cm, 4 cm overall height approximately; 5 VDC 1.2 A 5%, 90-264 VAC, 5.5 mm diameter center positive, mini plug cable, 4 regional power plug adapters, contact protective shroud 

System Requirements

This kit includes hardware and software, and requires additional user-supplied equipment to operate properly.

Network Connections

The ASEK must be operated by a computer, but it is designed to allow the computer to be located either at the test bench using a direct wired connection, or to be located remotely, connected by Ethernet LAN. The ASEK includes an Ethernet port.

Although operation of the ASEK for device demonstrations can be performed either locally or via LAN, changing of the IP address of the ASEK must be performed via direct connection (see *Changing the IP Address*, on page 2-2).

For direct connection to the operator computer, the following alternatives can be used:

- A CAT5e 0.9 m Ethernet crossover cable between the ASEK and the operator computer.
- Ethernet standard LAN cable connected to a local separately-powered Ethernet hub, with a second Ethernet cable connecting from the hub to the operator computer.
- For computers that do not have an Ethernet interface, either type of cable can be connected to the computer by means of a wired USB Ethernet adapter.
- Wireless, serial port, and parallel port protocols are not supported.

Work Area

The work area should allow the printed circuit board assemblies, as well as the DUT (device under test) to be protected from ESD (electrostatic discharge) at all times. Standard temperature and humidity levels should be maintained to suppress ESD.

The boards should be placed on a level work surface, free of objects and obstructions. The surface should be located at an ergonomic height.

The work area should allow the printed circuit board assemblies to be located as near as practicable to each other. For data and power connections between the ASEK Main Board and the peripheral PCBs, the ASEK includes a ribbon cable that is approximately 10 cm in length. It is recommended that the supplied cable always be used as the interface to the peripheral PCBs, and for best results, it should not be extended in length.

User-Provided Equipment

Certain equipment and materials must be provided by the user. These are described in the following tables.

Table 1-2 User-provided Equipment: Computer and Network Peripherals

Item	Description
Computer	CPU and memory: processing is performed primarily on the ASEK Main Board Hard disk space: if the Desktop Utility is used, that requires under 100 kB Interfaces: Ethernet port with RJ45 female connector, or USB 2.0 or higher female port that can accommodate an Ethernet adapter Computer monitor, color; 1024 x 768 pixels minimum recommended for optimum viewing of user interface application Mouse and keyboard
Operating system	Supports a graphical user interface Web browser application installed For use of the Desktop Utility module, Microsoft Windows and .NET Framework 2.0 installed
LAN	Direct connection (required for changing IP address of ASEK): Ethernet crossover cable, RJ45 male/male CAT5e, or Separately-powered Ethernet hub connected between ASEK and operator computer by 2 standard Ethernet connection cables LAN connection: IEEE 802.3, 10/100Base-T Ethernet LAN with standard Ethernet connection cable

Table 1-3 User-provided Equipment: Programming Tasks

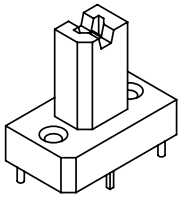
Item	Description
DUT sockets	DUT sockets for standard device package types are available directly from Azimuth Electronics (www.azimuth-electronics.com). Otherwise, as required by the package type of the Allegro DUT. 

Table 1-3 User-provided Equipment: Programming Tasks (Continued)

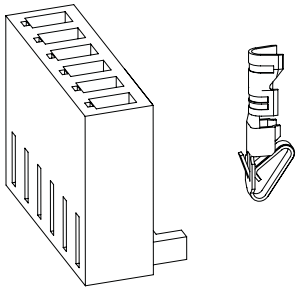
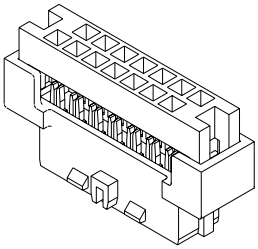
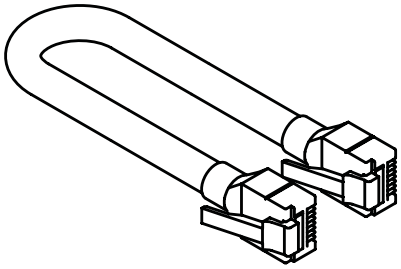
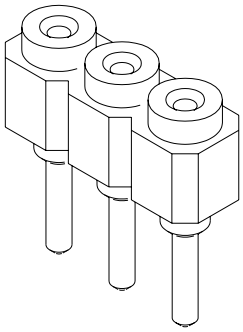
Off-Board Connection	For connection from an ASEK interface PCB to a user-provided DUT socket that is mounted off-board, connection to on-board Molex 6373 series 6-pin solid header (such as Molex 6471 series Crimp Terminal Housing 22-01-2025, accepts Molex 4809 series Crimp Terminals 22-30 AWG, such as 85-50111), shielded cable with 4 to 8 conductors and length as short as possible.  For direct connection from ASEK Main Board to a user-provided DUT socket (without ASEK interface board), connection to on-board Molex 87833-1420 14-pin ribbon cable PCB header, 2 mm centers (such as Molex 87568-1494 IDT cable-to-board receptacle). 
Ethernet Crossover Cable	Used for IP address setting. 0.9 m or shorter, male RJ45 connectors both ends; CAT5e crossover cable; compatible with Ethernet 10/100Base-T. 
Soldering Equipment	DUT sockets acquired from Azimuth Electronics are manually soldered onto the peripheral PCBs. Additional filter components may be required to be soldered to the PCBs for certain applications.
DUT bypass capacitor	As required by application, see DUT datasheet for rating. Recommended maximum rating of 0.1 µF to avoid creating instability in ASEK system, and minimum 50 V.

Table 1-3 User-provided Equipment: Programming Tasks (Continued)

DUT blowing capacitor	As required by application, see DUT datasheet for rating. Capacitor must be capable of withstanding higher voltages required for blowing solid state fuses internal to the DUTs while programming them. This capacitor may be required to be inserted and removed at different stages of programming, and a socket should be used. On the ASEK linear DUT interface PCB, an optional socket is installed with 2.54 mm and 5.08 mm pitch holes, accepts capacitor leads 0.38 mm to 0.64 mm in diameter and 2.54 mm to 3.71 mm in length (Aries series 0513 collet socket). 

Safety

In order to prevent damage to the operator or to the kit or DUT, only qualified electronics technicians or individuals with equivalent training should operate the product.

Follow the safety precautions required by local laws and regulations, and by the procedures of your company.

The following specific warnings are not meant to be exclusive, or to limit the application of normal safety precautions in any way:

CAUTION: Only use the power supply provided with the ASEK. Do not substitute any other power supply, or damage to the ASEK electronics may occur.

CAUTION: Always take precautions to avoid ESD before handling boards. This includes: using ESD resistant clothing and gloves, and personal conductive straps, properly connected to an earth ground. The work surface should be on an ESD-resistant pad, and the operator should be standing or sitting on an ESD-resistant mat.

CAUTION: To avoid overheating, the ASEK must be located in an open area with adequate circulation of air around all surfaces of the assembly.

The ASEK Main module and the peripheral PCBs must be oriented with the component side upwards to allow conductance of heat away from the board. Failure to do so may cause damage to the assembly.

The ASEK Main module and the peripheral PCBs must be separated from the work surface to allow adequate airflow for cooling the underside of the board. The boards should rest on the standoffs provided with the kit (a minimum of 0.25 inch in height).

WARNING: THERMAL HAZARD

When operated under the normal conditions for the ASEK, the Ethernet interface card operates at a duty cycle that does not normally generate hazardous amounts of heat. However, the Ethernet card is mounted on the Main Board of the ASEK and both are enclosed in a plastic housing. Do not operate the ASEK with the Main Board removed from the housing or with the housing covers removed.

CAUTION: Do not touch any portion of the board or exposed connections when power is connected to the boards.

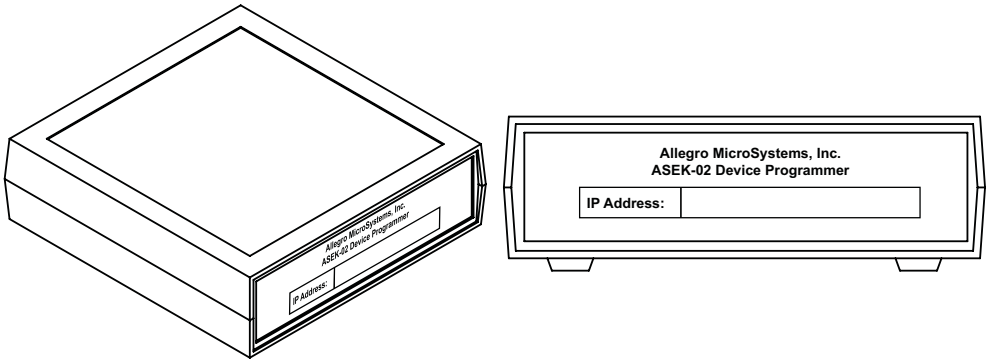
Chapter 2

Network Configuration

The ASEK is operated through a Web-based interface, and is accessed through a network connection. The “network” can be a facility LAN, a compatible process control system computer, a simple direct connection by cable from an operator computer, or a connection through a local Ethernet hub. With a valid LAN IP address, the ASEK can be accessed by any of these means. The net submask can also be configured. This chapter describes IP considerations and how to reconfigure the IP address and subnet mask when necessary.

WARNING: Keep an accurate record of the IP address of the Main Board. The ASEK can only be accessed through the IP address. If the IP address is lost, the Main Board module must be returned to Allegro for resetting.

Anytime the IP address is changed, it can be noted in the area provided on the front of the Main Board module housing, shown here.



Using the Default IP Address

A default IP address, http://192.1.2.3, and a local subnet mask, 255.255.255.0, are loaded in an EPROM on the ASEK Main Board. If the default IP address is valid on the network (including direct connections to the operator computer), no further address configuration is required. Access the ASEK as described in *Accessing the ASEK Software Interface*, on page 6-1.

Note: It is recommended that the IP address being used for the ASEK always be reserved by the LAN network administrator.

Changing the IP Address

If it is necessary to change the IP address of the ASEK Main Board, complete the procedure described in this section. This procedure applies in any circumstance in which the IP address must be changed. Changing the address may be necessary at initial configuration, if the default IP address in the ASEK firmware conflicts with an existing address on the network. However, changing the IP address can be done at any time, and there is no limit on the quantity of reconfigurations.

IP address reconfiguration requires knowledge of the local area network (LAN) at the facility where the testing will occur. In addition, reconfiguration requires Administrator privileges on the computer used to configure the ASEK. For these reasons, a network system administrator is normally required to perform the IP address reconfiguration.

Note: This procedure requires that the ASEK be directly connected to the operator computer. After the IP address and subnet mask have been set, the ASEK can be reconnected and accessed using that address over any type of “network,” either an Ethernet LAN, or a direct connection via Ethernet crossover cable or local hub.

To change the IP address of the ASEK, the network administrator should perform the following steps:

1 Have the following available:

- ASEK Main Board module
- ASEK-included power supply
- Ethernet crossover cable or local hub and two LAN cables
- Computer
- If an Ethernet port is not available on the computer, acquire a USB 2.0-to-Ethernet wired network adapter with female RJ45 terminal

CAUTION: When reconfiguring for use with a laptop computer that may not always be hard-wired to the LAN, to avoid possible interference with other LAN port assignments, such as a docking station, do not use the LAN port jack on the laptop to perform IP address configuration. It is highly recommended to instead use an auxiliary USB port on the laptop to perform the IP address reconfiguration, and also to serve as the connection point when operating the ASEK during DUT demonstration tasks.

For the same reason, do not use a wireless LAN connection to the operator computer when performing IP address reconfiguration.

2 Prepare the computer:

a Power-on the computer at any time.

b Disconnect the operator computer from the LAN.

c Determine which direct connection method to use (crossover cable or standard cable from a local hub; see *Data Link Configuration*, on page 3-2), and connect the corresponding Ethernet cable to the computer Ethernet port or network adapter.

3 Prepare the ASEK Main Board module:

a On the ASEK Main Board module, insert the loose end of the appropriate Ethernet cable

into the corresponding jack, labeled *10/100baseT Ethernet*. (For jack location, see Figure 3-1 on page 3-2.)

b Prepare and connect the power supply for the ASEK main board, as described in *Power Supply Configuration*, on page 3-3
.

CAUTION: Use only the power supply provided with the ASEK. Use of other power supplies may result in damage to the ASEK.

After powering-on always wait at least 30 seconds to ensure that the firmware is loaded and the IP stack is started.

4 Open the ASEK software interface:

a On the operator computer, open the Web browser application.

b Enter **http://192.1.2.3** as the IP address, and search for that destination. The ASEK software interface Main page appears in the browser. It is shown in Figure 2-1.

Figure 2-1 ASEK software interface, Main page
The Home Page button returns to this page from any other page in the application, and the Refresh Off button prevents real-time update of the values shown in the panel, for V_{CC} and V_{OUT}, to conserve system resources.

Note: If the Main page does not appear, confirm that the ASEK IP address has not already been changed. If the IP address is not known, the ASEK may have to be returned to Allegro for resetting. Contact your local Allegro field applications engineer for assistance.

5 Enter the IP address and subnet mask:

a In the ASEK interface, click the **Board Configuration** button. The Programmable Linear Demonstrator Board Configuration Utility page opens. It is shown in Figure 2-2.

b To accept the default IP address, ignore the **IP Address** text box.

Otherwise, to change the IP address, in the **IP Address** text box, type the new IP address.

c In the **Net Mask** text box, enter the mask, if necessary:

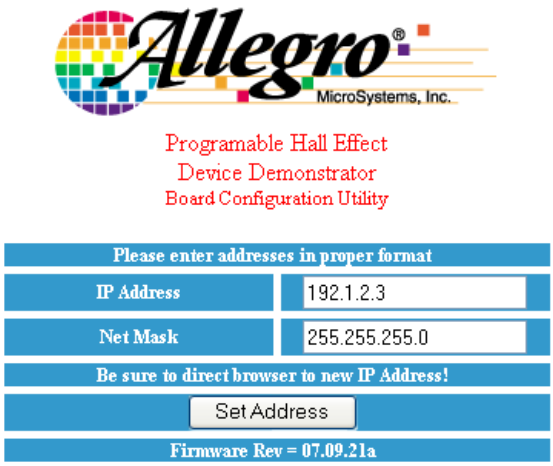


Figure 2-2 ASEK software interface, IP address setting page

If the ASEK will be used in a direct connection to the operator computer, designate the local subnet mask by typing:

```
255.255.255.0
```

To configure a LAN connection, enter the appropriate subnet mask.

d Click the **Set Address** button. The changes are written to the ASEK Main Board EPROM, and the ASEK interface Main page reopens.

e Close the Web browser to end the session.

f Connect the ASEK and computer in their operating configuration and test to ensure that the IP address is working properly.

6 The ASEK can now be used for DUT demonstration tasks from the corresponding node on the network.

CAUTION: It is highly recommended that an initial board calibration be performed before performing any DUT demonstrations. For more information, see Chapter 5, *ASEK Main Board Calibration*.

Configuring Simultaneous LAN Connection

An alternative IP address may be configured where necessary to allow access to the ASEK via direct connection while maintaining a connection to the Internet and other IP addresses via the LAN.

CAUTION: This procedure may require Administrator privileges to perform. It is highly recommended that the LAN system administrator perform LAN-related configuration tasks.

To configure an alternative address for the LAN, perform the following steps: